

ED 401 445

CE 072 938

TITLE Machine Tool Advanced Skills Technology (MAST).
Common Ground: Toward a Standards-Based Training System for the U.S. Machine Tool and Metal Related Industries. Volume 15: Administrative Information, of a 15-Volume Set of Skill Standards and Curriculum Training Materials for the Precision Manufacturing Industry.

INSTITUTION Texas State Technical Coll., Waco.

SPONS AGENCY Office of Vocational and Adult Education (ED), Washington, DC.

PUB DATE Sep 96

CONTRACT V199J40008

NOTE 277p.; For other volumes in this set, see CE 072 924-937.

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ABSTRACT

This volume developed by the Machine Tool Advanced Skill Technology (MAST) program contains key administrative documents and provides additional sources for machine tool and precision manufacturing information and important points of contact in the industry. The document contains the following sections: a foreword; grant award letter; timeline for progress for the period October 1995 to September 1996; record of industrial assessment, including an industry-wide assessment of skills; dissemination/contacts for information and review, including a list of 47 industrial manufacturing associations and their addresses and a chart of Standard Industrial Classification and Dictionary of Occupational Titles codes that serve as an index to an industrial listing of industries, addresses, and telephone numbers; minutes of key meetings that provide insights into the skills standards development and curriculum update business; quarterly and annual reports of the program; and Internet applications and examples from the Internet that deal with MAST. A discussion of the partner occupational specialty assignments breaks out the primary and secondary responsibilities by center and specialty. Some practical evaluation models/tools are outlined and information on how to track industrial assessment efforts is provided. Evaluator reports are included. (YLB)

ED 401 445

Machine Tool Advanced Skills Technology

**COMMON GROUND:
TOWARD A STANDARDS-BASED TRAINING
SYSTEM FOR THE U.S. MACHINE TOOL
AND METAL RELATED INDUSTRIES**

VOLUME 15

**ADMINISTRATIVE
INFORMATION**

of
a 15 volume set of Skills Standards
and
Curriculum Training Materials for the
PRECISION MANUFACTURING INDUSTRY

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
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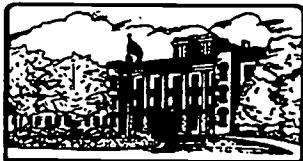
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U.S. Department of Education*

CE 072938



San Diego *City* College



SPRINGFIELD TECHNICAL
COMMUNITY COLLEGE



Machine Tool Advanced Skills Technology Program

MAST

VOLUME 15

ADMINISTRATIVE
INFORMATION

Supported by
The Office of Vocational and Adult Education
U.S. Department of Education

September, 1996

GRANT INFORMATION

Project Title: Machine Tool Advanced Skills Technology Program

Grant Number: V199J40008

Act under which Funds Administered: Carl D. Perkins Vocational Education Act
Cooperative Demo - Manufacturing Technology, CFDA84.199J

Source of Grant: Office of Vocational and Adult Education
U.S. Department of Education
Washington, DC 20202

Grantee: Texas State Technical College
Waco, Texas

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ACKNOWLEDGMENTS

This project was made possible by the cooperation and direct support of the following organizations:

- U.S. Department of Education, Office of Vocational & Adult Education
- MAST Consortia of Employers and Educators

MAST DEVELOPMENT CENTERS

Augusta Technical Institute - Itawamba Community College - Moraine Valley Community College - San Diego City College (CACT) - Springfield Technical Community College - Texas State Technical College

INDUSTRIES

AB Lasers - AIRCAP/MTD - ALCOA - American Saw - AMOCO Performance Products - Automatic Switch Company - Bell Helicopter - Bowen Tool - Brunner - Chrysler Corp. - Chrysler Technologies - Conveyor Plus - Darr Caterpillar - Davis Technologies - Delta International - Devon - D. J. Plastics - Eaton Leonard - EBTEC - Electro-Motive - Emergency One - Eureka - Foster Mold - GeoDiamond/Smith International - Greenfield Industries - Hunter Douglas - Industrial Laser - ITT Engineered Valve - Kaiser Aluminum - Krueger International. - Laser Fare - Laser Services - Lockheed Martin - McDonnell Douglas - Mercury Tool - NASSCO - NutraSweet - Rapistan DEMAG - Reed Tool - ROHR, International - Searle - Solar Turbine - Southwest Fabricators - Smith & Wesson - Standard Refrigeration - Super Sagless - Taylor Guitars - Tecumseh - Teledyne Ryan - Thermal Ceramics - Thomas Lighting - FMC, United Defense - United Technologies Hamilton Standard

COLLEGE AFFILIATES

Aiken Technical College - Bevil Center for Advanced Manufacturing Technology - Central Florida Community College - Chicago Manufacturing Technology Extension Center - Great Lakes Manufacturing Technology Center - Indiana Vocational Technical College - Milwaukee Area Technical College - Okaloosa-Walton Community College - Piedmont Technical College - Pueblo Community College - Salt Lake Community College - Spokane Community College - Texas State Technical Colleges at Harlington, Marshall, Sweetwater

FEDERAL LABS

Jet Propulsion Lab - Lawrence Livermore National Laboratory - L.B.J. Space Center (NASA) - Los Alamos Laboratory - Oak Ridge National Laboratory - Sandia National Laboratory - Several National Institute of Standards and Technology Centers (NIST) - Tank Automotive Research and Development Center (TARDEC) - Wright Laboratories

SECONDARY SCHOOLS

Aiken Career Center - Chicopee Comprehensive High School - Community High School (Moraine, IL) - Connally ISD - Consolidated High School - Evans High - Greenwood Vocational School - Hoover Sr. High - Killeen ISD - LaVega ISD - Lincoln Sr. High - Marlin ISD - Midway ISD - Moraine Area Career Center - Morse Sr. High - Point Lamar Sr. High - Pontotoc Ridge Area Vocational Center - Putnam Vocational High School - San Diego Sr. High - Tupelo-Lee Vocational Center - Waco ISD - Westfield Vocational High School

ASSOCIATIONS

American Vocational Association (AVA) - Center for Occupational Research and Development (CORD) - CIM in Higher Education (CIMHE) - Heart of Texas Tech-Prep - Midwest (Michigan) Manufacturing Technology Center (MMTC) - National Coalition For Advanced Manufacturing (NACFAM) - National Coalition of Advanced Technology Centers (NCATC) - National Skills Standards Pilot Programs - National Tooling and Machining Association (NTMA) - New York Manufacturing Extension Partnership (NYMEP) - Precision Metalforming Association (PMA) - Society of Manufacturing Engineers (SME) - Southeast Manufacturing Technology Center (SMTC)

MAST PROJECT EVALUATORS

Dr. James Hales, East Tennessee State University and William Ruxton, National Tooling and Machine Association (NTMA)

SPECIAL RECOGNITION

Dr. Hugh Rogers recognized the need for this project, developed the baseline concepts and methodology, and pulled together industrial and academic partners from across the nation into a solid consortium. Special thanks and singular congratulations go to Dr. Rogers for his extraordinary efforts in this endeavor.

This report is primarily based upon information provided by the above companies, schools and labs. We sincerely thank key personnel within these organizations for their commitment and dedication to this project. Including the national survey, more than 3,000 other companies and organizations participated in this project. We commend their efforts in our combined attempt to reach some common ground in precision manufacturing skills standards and curriculum development.

This material may be found on the Internet at <http://machinestool.tstc.edu>

CATALOG OF 15 VOLUMES

VOLUME 1	EXECUTIVE SUMMARY STATEMENT OF THE PROBLEM MACHINE TOOL ADVANCED SKILLS TECHNOLOGY PROJECT PROJECT GOALS AND DELIVERABLES PROJECT METHODOLOGY PROJECT CONCLUSIONS AND RECOMMENDATIONS APPENDICES
VOLUME 2	CAREER DEVELOPMENT GENERAL EDUCATION REMEDICATION
VOLUME 3	MACHINING - CORE COURSES (MAC)
VOLUME 4	MANUFACTURING ENGINEERING TECHNOLOGY (MET)
VOLUME 5	MOLD MAKING (MLD)
VOLUME 6	WELDING (WLD)
VOLUME 7	INDUSTRIAL MAINTENANCE (IMM)
VOLUME 8	SHEET METAL (SML) AND COMPOSITES (COM)
VOLUME 9	TOOL AND DIE (TLD)
VOLUME 10	COMPUTER-AIDED DRAFTING AND DESIGN (CAD)
VOLUME 11	COMPUTER-AIDED MANUFACTURING AND ADVANCED CNC (CNC)
VOLUME 12	INSTRUMENTATION (INT)
VOLUME 13	LASER MACHINING (LSR)
VOLUME 14	AUTOMATED EQUIPMENT TECHNOLOGY (CIM)
VOLUME 15	ADMINISTRATIVE INFORMATION

VOLUME 15
ADMINISTRATIVE INFORMATION

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FOREWORD

This volume contains key administrative documents and is included in the deliverables to provide the reader additional sources for machine tool and precision manufacturing information and important points of contact in the industry. For example, this volume contains information on how to use the MAST Home Page (<http://machinetool.tstc.edu>). It also contains Standard Industrial Codes (SIC) listings of over 3,000 companies in the machine tool and metals related business. These listings were used in the national survey.

This volume also contains useful information for current or future grant administrators, specifically those doing industrial skills standards research. It outlines some practical evaluation models/tools and provides information on how to track industrial assessment efforts. In addition, the minutes of key meetings provide insights into the skills standards development and curriculum update business.

This volume does not contain all the administrative documentation for the MAST Program. This complete set of information is voluminous. However, this information is available on CD-ROM by contacting:

Mr. Joe Penick, MAST Program Director
Texas State Technical College
3801 Campus Drive
Waco, Texas 76705

Telephone: (817) 867-4849
FAX: (817) 867-3380
Internet: jpenick@tstc.edu



**U.S. DEPARTMENT OF EDUCATION
WASHINGTON, D.C. 20202
GRANT AWARD NOTIFICATION**

GRANTS AND CONTRACTS
SERVICE

1	RECIPIENT NAME TEXAS STATE TECHNICAL COL/WACO 3801 CAMPUS DRIVE WACO, TX 76705	4	AWARD INFORMATION PR/AWARD NUMBER V199J40008 ACTION NUMBER 01 ACTION TYPE NEW AWARD TYPE DISCRETIONARY															
	2		PROJECT TITLE MACHINE TOOL ADVANCED SKILLS TECHNOLOGY (MAST) PROGRAM	5	AWARD PERIODS BUDGET PERIOD 10/01/94 - 09/30/96 PROJECT PERIOD 10/01/94 - 09/30/96													
3	PROJECT STAFF RECIPIENT PROJECT DIRECTOR HUGH ROGERS 817-867-4834 EDUCATION PROGRAM STAFF JACKIE FREDRICH 202-205-9071 EDUCATION GRANTS STAFF JUANITA BOWE 202-708-8461	6	AUTHORIZED FUNDING THIS ACTION 1,472,721 BUDGET PERIOD 1,472,721 PROJECT PERIOD 1,472,721 RECIPIENT COST SHARE 0%															
			7	ADMINISTRATIVE INFORMATION PAYMENT METHOD ED PMS ENTITY NUMBER 1-741646989-A3 REGULATIONS EDGAR, AS APPLICABLE 34 CFR 426 ATTACHMENTS BACS														
8	LEGISLATIVE & FISCAL DATA AUTHORITY: CARL D. PERKINS VOCATIONAL AND APPLIED TECHNOLOGY PROGRAM TITLE: COOPERATIVE DEMO - MANUFACTURING TECHNOLOGY CFDA 84.199J <table border="0"> <tr> <td>APPROPRIATION</td> <td>FY</td> <td>CAN</td> <td>OBJECT CLASS</td> <td>AMOUNT</td> </tr> <tr> <td>91 3/40400</td> <td>94</td> <td>E001347</td> <td>4115</td> <td>470,537</td> </tr> <tr> <td>91 4/50400</td> <td>94</td> <td>E001647</td> <td>4115</td> <td>1,002,184</td> </tr> </table>			APPROPRIATION	FY	CAN	OBJECT CLASS	AMOUNT	91 3/40400	94	E001347	4115	470,537	91 4/50400	94	E001647	4115	1,002,184
APPROPRIATION	FY	CAN	OBJECT CLASS	AMOUNT														
91 3/40400	94	E001347	4115	470,537														
91 4/50400	94	E001647	4115	1,002,184														
9	TERMS AND CONDITIONS OF AWARD THE FOLLOWING ITEMS ARE INCORPORATED IN THE GRANT AGREEMENT: 1) THE RECIPIENT'S APPLICATION AND COOPERATIVE AGREEMENT (BLOCK 2), 2) THE APPLICABLE EDUCATION DEPARTMENT REGULATIONS (BLOCK 7). OTHER INFORMATION AFFECTING THIS ACTION IS PROVIDED IN THE ATTACHMENTS SHOWN IN BLOCK 7. <div align="right" style="border: 1px solid black; padding: 5px; width: fit-content; margin: 20px auto;"> RECEIVED OCT 3 1994 President's Office TSTC WACO/MARSHALL </div> <div align="right"> <i>Catherine S. DeLuca</i> 9/30/94 CATHERINE S. DELUCA DATE GRANTS OFFICER </div>																	

ED - GC8 007 (11/88)

PLEASE SEE OTHER SIDE FOR MORE INFORMATION

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EXPLANATION OF BLOCKS ON THE GRANT AWARD NOTIFICATION

FOR DISCRETIONARY, FORMULA, AND BLOCK GRANTS (See Block 4 of the Notification)

1. **RECIPIENT NAME** - Legal name of the recipient, name of the primary organizational unit that will undertake the funded activity, and the complete address of the recipient. The recipient is commonly known as the 'grantee.'
- *2. **PROJECT TITLE** - A brief description of the project that includes the Catalog of Federal Domestic Assistance (CFDA) title and/or the project title as shown on the grant application form, the date(s) of the application, and any negotiated amendments.
- *3. **PROJECT STAFF** - This block contains the names and telephone numbers of the U.S. Department of Education and recipient staff who are responsible for project direction and oversight.
 - ***RECIPIENT PROJECT DIRECTOR** - The recipient staff person responsible for administering the project. This person represents the recipient to the U.S. Department of Education.
 - ***EDUCATION PROGRAM STAFF** - The U.S. Department of Education staff person responsible for the programmatic concerns of the Department.
 - ***EDUCATION GRANTS STAFF** - The U.S. Department of Education staff person responsible for the administrative and business-management concerns of the Department.
4. **AWARD INFORMATION** - Unique items of information that identify this notification.
 - PR/AWARD NUMBER** - A unique, identifying number assigned by the Department to each application. On funded applications, this is commonly known as the 'grant number.'
 - ACTION NUMBER** - A numeral that represents the cumulative number of steps taken by the Department to date to establish or modify the award through fiscal or administrative means. Action number '01' will always be 'NEW AWARD.'
 - ACTION TYPE** - The nature of this notification (e.g., NEW AWARD, CONTINUATION, REVISION, ADMINISTRATIVE).
 - AWARD TYPE** - The particular assistance category in which funding for this award is provided, i.e., DISCRETIONARY, FORMULA, or BLOCK.
5. **AWARD PERIODS** - Project activities and funding are approved with respect to two different time periods, described below:
 - BUDGET PERIOD** - A specific portion of time for which Federal funds are being provided from a particular fiscal year to fund a recipient's approved budget. The start and end dates of the budget period are shown.
 - PROJECT PERIOD** - The complete length of time for approved activities, from the start date of the first budget period to the projected end date of the final budget period. A project period may contain one or more budget periods.
6. **AUTHORIZED FUNDING** - The dollar figures in this block refer to the Federal funds provided to a recipient during the award periods.
 - ***THIS ACTION** - The amount of funds obligated (added) or de-obligated (subtracted) by this notification.
 - ***CARRY-OVER** - The amount of funds, remaining from the previous budget period, that are authorized by the Grants Officer for use in the current budget period. This item does not appear on all notifications.
 - ***BUDGET PERIOD** - The total amount of funds of all obligations during the stated budget period, plus any authorized carry-over.
 - ***PROJECT PERIOD** - The amount of funds obligated from the start date of the first budget period to this date. This amount does not include carry-over.
 - RECIPIENT COST-SHARE** - The funds, expressed as a percentage, that the recipient is required to contribute to the project, as defined by the program legislation or regulations and/or the terms and conditions of the award.

* This item differs or does not appear on formula and block grants.

7. **ADMINISTRATIVE INFORMATION** - This information is provided to assist the recipient in completing the approved activities and managing the project in accordance with U.S. Department of Education procedures and regulations.

PAYMENT METHOD - The means by which Federal funds are transferred to a recipient's account. Most grants are paid through the U.S. Department of Education Payment Management System (EDPMS).

ENTITY NUMBER - A unique, identifying number that the Department assigns to each recipient for payment purposes. The number is based on the recipient's Internal Revenue Service tax identification number.

***REGULATIONS** - The parts of the Education Department General Administrative Regulations (EDGAR) and specific program regulations that govern the award and administration of this grant.

***ATTACHMENTS** - Additional sections of the Grant Award Notification that discuss payment and reporting requirements, explain Department procedures, and add special terms and conditions in addition to those established in Block 9 of the award. Any attachments provided with a notification continue in effect through the project period until modified or rescinded by the Grants Officer.

8. **LEGISLATIVE AND FISCAL DATA** - This block gives the name of the authorizing legislation for this grant, the CFDA title of the program through which funding is provided, and U.S. Department of Education fiscal information.

APPROPRIATION, FY, CAN, OBJECT CLASS - The fiscal information recorded by the U.S. Department of Education accounting system to track obligations by award.

AMOUNT - The amount of funds provided from a particular appropriation and common accounting number (CAN). Some notifications authorize more than one amount from separate appropriations and/or CANS. The total of all amounts in this block equals the amount shown on the line, 'THIS ACTION' (see 'AUTHORIZED FUNDING' above (Number 6)).

9. **TERMS AND CONDITIONS OF AWARD** - Requirements of the award that are binding on the recipient.

***GRANTS OFFICER** - The U.S. Department of Education official authorized to award Federal funds to the recipient, establish or change the terms and conditions of the award, and authorize modifications to the award.

FOR FORMULA AND BLOCK GRANTS ONLY: (See also Numbers 1, 4, 5, & 8 above)

2. **PROJECT DESCRIPTION** - A brief statement that identifies the date of the application, the Catalog of Federal Domestic Assistance (CFDA) title, and any amendments.
3. **EDUCATION STAFF** - The U.S. Department of Education staff persons to be contacted for programmatic and payment questions.
6. **AUTHORIZED FUNDING**
 - CURRENT AWARD AMOUNT** - The amount of funds that are obligated (added) or de-obligated (subtracted) by this action.
 - PREVIOUS CUMULATIVE AMOUNT** - The total amount of funds awarded under the grant before this action.
 - CUMULATIVE AMOUNT** - The total amount of funds awarded under the grant, this action included.
7. **STATE APPLICATION IDENTIFIER (SAI) NUMBER** - A twelve-character number assigned by a state clearinghouse to applications that require state review or that are covered by Executive Order 12372.
9. **TERMS AND CONDITIONS OF AWARD**
 - AUTHORIZED OFFICIAL** - The U.S. Department of Education staff person authorized to award Federal funds to the recipient, to establish or change the terms and conditions of the award, and to authorize modifications to the award.

MAST PROJECT GANTT CHART
October 1, 1995 - September 30, 1996

ID	Task Name	Duration	Start	Finish	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Texas Survey	55d	10/1/95	12/15/95	█															
2	National Survey	88d	10/1/95	1/31/96	█	█	█													
3	Competency Profiles Finalized	44d	10/1/95	11/30/95	█	█														
4	Pilot Curriculum Pretest	22d	10/1/95	10/31/95	█															
5	Memorandum of Agreements	22d	10/1/95	10/31/95	█															
6	Load Internet	82d	10/10/95	1/31/96			█	█	█											
7	Draft Deliverables Book: Partners	23d	1/1/96	1/31/96				█												
8	Executive Summary Complete	23d	1/1/96	1/31/96				█												
9	Prepare Composite Bound Deliverables	20d	2/1/96	2/28/96					█											
10	Joint Partner Review of Bound Deliverables	22d	3/1/96	4/1/96						█										
11	National Partner Meeting: Review Deliverables	22d	4/1/96	4/30/96							█									
12	Steering Committee Meeting: Review Deliverables	23d	5/1/96	5/31/96								█								
13	Pilot Curriculum Post Test	65d	5/1/96	7/30/96									█	█						
14	Prepare Final Report	42d	6/1/96	7/30/96										█	█					
15	Steering Committee Review of Final Project	22d	8/1/96	8/30/96												█				
16	Final MAST Partners' Meeting @ TSTC Waco	0d	9/15/96	9/15/96																◆
17	Dissemination of Deliverables	21d	9/1/96	9/30/96																█

Project: _____
Date: 9/27/95

Task: █
Progress: █
Milestone: ◆

Summary: █
Rolled Up Task: █
Rolled Up Milestone: ◇

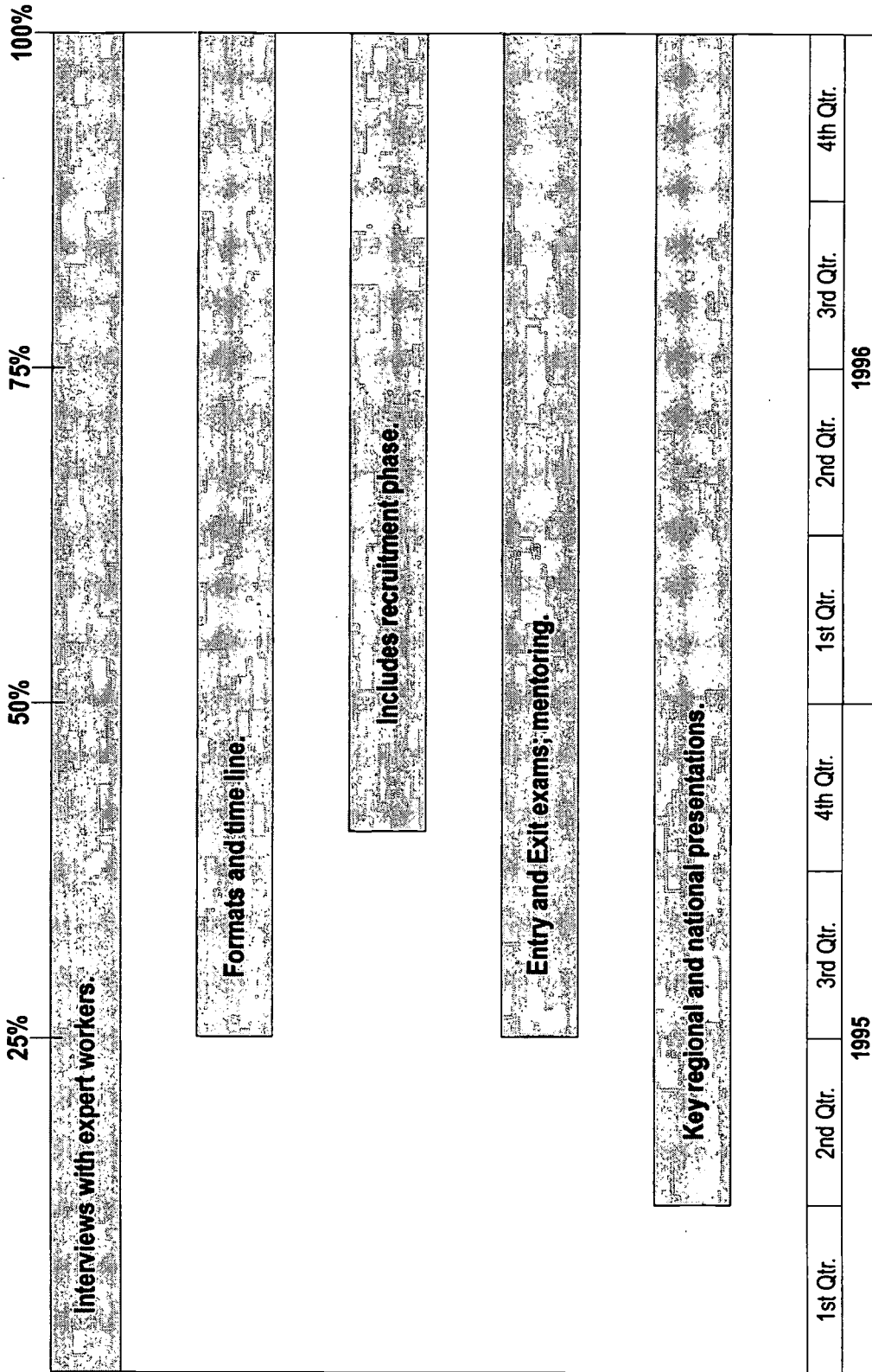
Rolled Up Progress: █

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MAST Overall Performance



1. Industrial Assessment

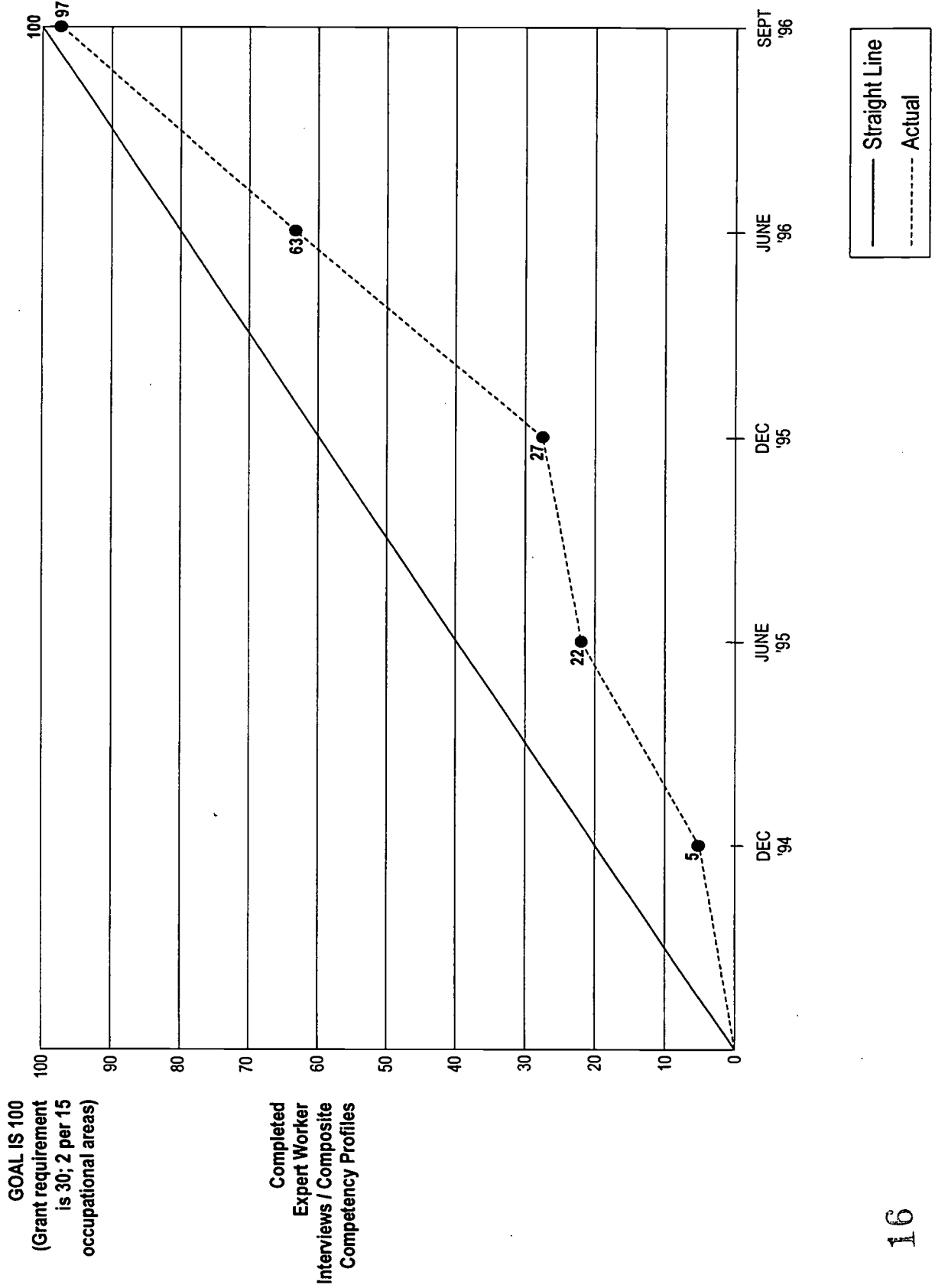
2. Curriculum Development

3. Pilot Program

4. Student Assessment

5. Deliverables

INDUSTRIAL ASSESSMENT



Industry Wide Assessment of Skills

Lead Partner (1)
Supporting Partner (2)

Competency Profile	TSTC (1) Beverly (1)	Mechanical/EMC Supervisors TSTC (1) Beverly (3)	Machine Mfg (MLD) TSTC (1) Beverly (2)	Welding (WLD) TSTC (1) TSTC (2)	Industrial Maintenance Technician (IMT) Augusta (1) Moraine (2)	Sheet Metal (SM) TSTC (1) San Diego (2)	Composites (COM) TSTC (1) Beverly (2)	Tool and Die (TLD) Beverly (1) TSTC (2)	Computer Aided Design and Drafting (CAD) Moraine (1) Beverly (2) Augusta (2)	Computer Numeric Control/CAM (CNC) San Diego (1) Beverly (2) Augusta (2) Springfield (2)	Instrumentation (INT) Augusta (1) San Diego (2)	Springfield (1) TSTC (2)	San Diego (1) Moraine (2)
Outline	02/10/95	02/05/95	04/21/95	06/15/95	03/16/95	07/05/95	07/05/95	05/17/95	06/01/95	04/28/95	02/10/95	06/13/95	06/01/95
Faculty Validation	02/04/95	01/27/95	04/20/95	06/14/95	03/15/95	06/30/95	06/30/95	05/15/95	04/01/95	04/27/95	02/04/95	06/12/95	06/01/95
	X	X	X	X	X	X	X	X	X	X	X	X	X
1. Bell Helicopter	ALCOA	ALCOA	Emich	Bowen Tool	ALCOA	Chrysler T&S	Chrysler T&S	McDonnell	Read Tool	Bowen Tool	Lockheed	EBTEC	Lockheed
2. Bowen Tool	Bell Helicopter	D.J. Pfeifers	D.J. Pfeifers	Dart Equipment	Bowen Tool	McDonnell	McDonnell	Read Tool	FMC Corporation	Chrysler T&S	Northeast	AB Leons	Devils Tech
3. Lockheed	Bowen Tool	Foster Field	Foster Field	Geodiamond	Geodiamond			America Saw	Thomas Lighting	Devils Tech	Serfs	Laser Fire	Edna Leonard
4. McDonnell	Chrysler T&S	Geodiamond	Geodiamond	Emergency One	Lockheed			Scott & Wesson	ITT Engineered	Edna Leonard	AMOCO	Laser Services	NASSCO
5. United Tech	Dart Equipment			Standard Refill	McDonnell			Delta International	Super Splies	Geodiamond	ALCOA	Industrial Laser	ROBER
6. Devas Precision	Geodiamond				Read Tool			AIRCAP/MTD	Delta International	Lockheed	Emergency One		Southwest Fab.
7. America Saw	Lockheed				Thermal Ceramics			Super Splies	Kruger Int'l	McDonnell			Tidmore Ryan
8. Scott & Wesson	Mercury Tool				AMOCO			Thomas Lighting	Electro-Motive	NASSCO			Delta International
9. Emergency One	Read Tool				ASCO			Townshank	Republic Dablog	Rate			Blauer Douglas
10. Chrysler Mead					Brosser				Chemtron Film	Solar Turbin			AIRCAP/MTD
11. TARDEC					Emergency One					Southwest Fab.			
12. Scadin					FMC/Global Def								
13. Emergency One					Greenfield								
14. Kaiser Aluminum					Kaiser Aluminum								
15.													
16.													

Industrial

Site

Validation

INDUSTRIAL MANUFACTURING ASSOCIATIONS

The Association for Manufacturing
Technology (AMT)
Westpark Drive
McLean, VA 22102-4269

National Center for Excellence in Adult
Education
Advanced Technology Center
Sinclair Community College
4600 South Redwood
Dayton, OH 84130

National Coalition of Advanced Technology
Centers
601 Lake Air Drive
P. O. Box 21689
Waco, TX 76702-1689

National Alliance for Business
1201 New York Avenue, N.W.
Suite 700
Washington, DC 20005-3917

National Skill Standards Board
1201 New York Avenue, N.W.
Suite 706
Washington, DC 20005
1-800-787-2981

National Center of Education Economics
39 State Street, FL5
Rochester, NY 14614-1310
716-546-7620

National Council for Occupational Education
1161 Francisco Road
Columbus, OH 43220-2654

American Association of Community
Colleges
One Dupont Circle, N.W., Suite 410
Washington, DC 20036

Alliance for Community College Innovation
26522 La Alameda
Suite 370
Mission Viejo, CA 92691

CIM/HE Alliance
(Computer Integrated Manufacturing in
Higher Education)
{Individual Member Addresses}

Society of Manufacturing Engineers
P. O. Box 930
Deerborn, MI 48121
1-800-268-9591

Nelson E. Wall/Robert Reeve
American Welding Society
550 N.W. LeJeune Road
Miami, FL 33126

Victor Harville/Ronald McCage
Southern Association of Colleges and
Schools
1866 Southern Lane
Decatur, GA 30033-4097

Charles Kelly
National Electrical Contractors
3 Bethesda Metro Center
Suite 1100
Bethesda, MD 20814-5372

National Tooling & Machining Association
(NTMA)
9300 Livingston Road
Ft. Washington, MD 20744

Jack Simich
Graphic Arts Technical Foundation
4615 Forbes Avenue
Pittsburgh, PA 15213-3796

Dan Hull
Center for Occupational Research
and Development (CORD)
601 Lake Air Drive
Waco, TX 76710

Cheryl Fields Tyler/Terry Pirtle
American Electronics Association
Box 54990
5201 Great American Parkway
Santa Clara, CA 95056

John Tippie/James Warren
Laborers-AGC Education & Training Fund
37 Deerfield Road
P. O. Box 37
Pomfret Center, CT 06259

Kenneth M. Chapman
American Chemical Society
1155 Sixteenth Street, N.W.
Washington, DC 20036

Irwin Kaplan/Molly Mannon
Electronics Industries Foundation
919 18th Street, N.W.
Washington, DC 20006

John Morrison/Jane Beardsworth
Foundation for Industrial Modernization
(FIM)
1331 Pennsylvania Avenue, N.W.
Suite 1410, North
Washington, DC 20004-1703

C. J. Shroll
National Coalition for Advanced
Manufacturing (NACFAM)
1331 Pennsylvania Avenue, N.W.
Suite 1081, North
Washington, DC 20004-1703

Patricia Lundquist
National Automotive Technicians Education
Foundation
13505 Dulles Technology Drive
Herndon, VA 22071-3421

Eui Park
Piedmont Triad Center for Advanced
Manufacturing
N.C. A&T State University Department ~
Industrial Engineering
Greensboro, NC 27411

Debbie Sumner
BMP Regional Support Center
P. O. Box 2009
Oak Ridge, TN 37831-8091

Larry Owen
SAU Tech. Station
Camden, AR 71701

Victoria Kohl
Southeastern Michigan Alliance for
Advanced Manufacturing
2480 Opkyke Road
Bloomfield Hills, MI 48304-2266

Bob Smith
NIST/Midwest Manufacturing Technology
Center MMTCC
P. O. Box 1485
Ann Arbor, MI 48106

Tom White
MAMTC NIST/Mid-America Manufacturing
Technology Center
12927 Gavois Road
St. Louis, MO 63127

Caroline Zumbrunnen
MAMTC NIST/Mid-America Manufacturing
Technology Center
10561 Barkley, Suite 602
Overland Park, KS 66212

Jim Mullineaux
12927 Gavois Road
St. Louis, MO 63127

David Harrison
The Advanced Integrated Manufacturing
Center
444 W. 3rd Street
Dayton, OH 45502-1460

Drew Casani
The Automation & Robotics Research
Institute
7300 Jack Newell Blvd., S.
Ft. Worth, TX 76118-7115

Brenda Landrum
Arizona Manufacturing Application &
Education Center
2411 W. 14th Street
Tempe, AZ 85002-3349

Elizabeth Taft
Ben Franklin Technology Center of Western
Pennsylvania
4516 Henry Street, #103
Pittsburgh, PA 15123-3730

Tony Dickens
Robert C. Byrd Institute
1050 4th Avenue
Huntington, VA 25755-8100

Bill Mink
P. O. Box 200
Blackwood, NJ 08012

Fatima Weathers
Cleveland Advanced Manufacturing Program
4600 Prospect Avenue
Cleveland, OH 44103-4314

Michelle Adams
1450 Scalp Avenue
Johnstown, PA 15904-3374

Roger Fountain
Great Lakes Composites Consortium
8400 Lake View Parkway, #800
Kenosha, WI 53142-7410

Nick Scott
Institute for Plastics Innovation
333 Aiken Street
Lowell, MA 01854

Michael Rosen
Riverwest Technology Center
531 E. Burleigh Street
Milwaukee, WI 53212

David Winters
NCTPC (National Center for Tooling and
Precision Components)
2600 Dorr Street
Toledo, OH 43607-3237

Stanley Shelly
National Institute of Flexible Manufacturing
R.D. #2, Box 100
Meadville, PA 16335

Ray Zavada
P. O. Box 9386
Louisville, KY 40209-0386

Betty Crist
Oregon Advanced Technology Consortium
Wilsonville, OR 97070-9465

The following SIC and DOT codes serve as an index to assist in using the attached industrial listing.

Occupational Speciality	SIC Codes	D.O.T. Code
CNC Machinist	3599, 3549, 3545, 3540 and series 3300, 3400, 3500	609.362-010
Computer Aided Drafting Technician	3300, 3400, 3500, and 3600	007.281-010
CIM Technician	3300, 3400, 3500, 3600, and 3700	638.261-026
Computer Networking Technician	3571, 3572, 3575, 3577, 3661, 3663, 3669, and 3679	031.262-014
Systems Electrician	3300, 3400, 3500, 3620 series, 3661, 3663, 3669, 3670 series, 3694, and 3699	729.281-026
Industrial Maintenance Mechanic	series 3300, 3400, and 3500	638.281-014
Instrumentation and Control Technician	3549, all 3600, 3700 series, 3823, 3827, and 3829	003.261-010
Machinist	3540 series, 3550 series, 3599, all 3300, and 3400 series	600.280-022
Manufacturing Engineering Technician	3300, 3400, and 3500 series	012.167-042
Mold Maker	3061, and 3460 series	705.684-038
Non-Metallics Composites Technician	2899 and 3089	754.381-018
Sheetmetal/Aircraft Structural Technician	3431, 3432, 3444, 3443, 3442, 3441, 3448, and 3449	804.281-010
Superabrasives and Grinding Technician	all 3000 and 3400 series	603.280-018
Tool and Die Technician	all 300 and 3400 series, 3545, 3541, 3542, 3543, and 3544	601.260-010
Welder	all 3300, 3400, series and 3548	819.384-010

IN	NAME	USE	STREET	CITY	STATE	ZIP	TELEPHONE	SIC	SIC3	SIC4
3		1728	N Main St	Guymon	OK	73942-2804	405-338-7157	3561	941	1781
3b	J Co	771	Maryland Ave	Claremont	CA	91711-3531	909-821-3031	3541H		
4	7-Vs Precision Machine & Mfg	5332	Mcintosh Pt	Sanford	FL	32773-8145	407-321-1468	3599A		
4	A & A Machine Works	6801	Blenvenue St	Arabi	LA	70032-1062	504-279-9747	3599A		
5	A & A Tubular Inspection In	2211	Parker Ln	Bakersfield	CA	93308-6033	805-325-8529	1389K		
6	A & B Combustion	10816	N Highway	Fresno	CA	93650	209-431-3404	5074D	7699	7699J
7	A & B Die Casting Co Inc	1417	4th St	Berkeley	CA	94710-1322	510-525-8991	3363	3544D	
8	A & G Tool & Die Inc		1st & H	Petaluma	CA	94955	707-762-7863	3544D	3541H	3599E
9	A & I Engineering Inc	3702	W Sample St	South Bend	IN	46619-2941	219-234-7539	3544E		
10	A & M Machine Shop	1208	4th St	Kalamazoo	MI	49001-2586	616-345-8955	3599A		
11	A & M Motor Supply	16165	Los Gatos Blvd	Los Gatos	CA	95032-4515	408-356-5141	2992		
12	A & M Welding	16935	S Broadway	Carson	CA	90745	310-321-5540	3542		
13	A & N Tool & Die	5615	Willow Ln	Lake Oswego	OR	97035-5338	503-635-6996	3544D		
14	A & P Grinding	1824	Railroad St	Corona	CA	91720-2512	909-736-1302	3541H	5013W	7538C
15	A & R Grinding			Lexington	KY	40508	606-254-9928	3541H	7699P	
16	A & S Fabricating Co	265	U S Highway 431 N	Livermore	KY	42352	502-278-2371	3599A	3441	7692D
17	A & S Machine Shop	360	Merrimack St	Lawrence	MA	01843-1740	508-794-4444	3599A		
18	A & S Pump & Machine Inc		E Columbia Ave	Boardman	OR	97818	503-481-7518	3599A		
19	A & S Tool & Manufacturing Co	4415	State St	Belford	IA	52722-6172	319-355-1313	3544D	3599E	3441
20	A & W Screw Machine Products I	3131	Kansas Ave	Riverside	CA	92507-3477	909-781-4901	3599A		
21	A 1 Svc Welding		12-A Climer Rd	Amarillo	TX	79121	806-359-6991	5084E	3443A	0782B
22	A A B C O Laboratory	6491	Southfront Rd	Livermore	CA	94550-9588	510-447-9320	3599A		
23	A A Fire Safety Equipt Corp	475	Long Beach Blvd	Long Beach	NY	11561-2233	718-347-7747	7382A	3569E	
24	A B C Machine Co	33	Londonderry Rd	Londonderry	NH	03053-6601	603-425-7417	3599A		
25	A B C Machine Works	115	Wooster St	Bethel	CT	06801-1837	203-743-0705	3599A	5084	
26	A B C Metals & Supply Co	2931	E Ventura Blvd	Oxnard	CA	93030-8846	805-485-7805	5051A	5051B	3364A
27	A B Steel Mill Inc	204	N North Bend Rd	Cincinnati	OH	45216-1728	513-761-6625	3312		
28	A H T D Inc	5055	Se Lafayette St	Portland	OR	97206-3046	503-771-6743	3544D		
29	A J C Co	8429	White Oak Ave	Rancho Cucamonga	CA	91730-3871	909-989-3675	3599A		
30	A J S Associates	27	Haverhill Rd	Amesbury	MA	01913-2227	508-388-6842	3599A		
31	A Jay Machine Co	367	Deck Valley Rd Bristol	Blountville	TN	37617	615-323-1460	3599A		
32	A P E C	7005	Corporate Cir	Indianapolis	IN	46278-1959	317-293-9200	3829	5084V	3494
33	A P Technologie	897	N Redwood Rd Ogden	Salt Lake City	UT	84116-1912	801-731-5700	3089	3544E	
34	A S A P Machine Co	8575	Ronda Dr	Canton	MI	48187-2003	313-459-2447	3541C	3599A	
35	A S C Haverstick & Co	4232	Ridge Lea Rd	Amherst	NY	14226-1050	716-283-3292	3569		
36	A S C O Red Hat Valves	1334	Myrtle Ave	Akron	OH	44310	216-929-1705	3494		
37	A T & T Nassau Metals Corp	286	Richmond Valley Rd	Staten Island	NY	10309-2620	718-317-4400	3339		
38	A To Z Fabrication	6295	Harrison Dr	Las Vegas	NV	89120-4045	702-736-8886	5013	1791D	
39	A To Z Tool & Repair Inc	245	S State Road	Las Vegas	NV	89120-4045	702-736-8886	5013	1791D	
40	A-1 Cylinder Heads & Motors	2000	S McKinley Ave	Plantation	FL	33317-3734	305-581-7594	3563	5051R	3545
41	A-1 Engines & High Performance Parts	1300	N William St	Oklahoma City	OK	73108-7230	405-631-7741	7538C	7538U	7538
42	A-1 Machinery Inc	328	Production Ct	Goldsboro	NC	27530-2128	919-734-2253	5531	5013	3599A
43	A-1 Metal Spinning	14635	Joanbridge	Louisville	KY	40299-2003	502-491-9487	3599A	3599E	7692D
44	A-1 Welding Service	180	North Ave	Buena Park	CA	90620	818-338-8779	1791D		
45	A-C Control Services	501	Old County Rd	Athens	GA	30601-2278	706-354-0366	5063A	1791D	5039
46	A-Fn Machine Technology Inc		Schreiber Industrial Park	Belmont	CA	94002-2567	415-592-5125	3829		7692D
47	Aa Fire Equipment Co			New Kensington	PA	15068-4531	412-335-9702	3599A		
48	Aaa Ellenburg Well Pump Service	3014	Garden Lakes Blvd	Bloomfield	CT	06002	203-726-9495	3999		
49	Aaa Engineering Diring			Rome	GA	30165-1716	706-235-4042	5084G	3599E	1781
50	Aaa Paymaster Sales And Service	4660	Beechnut St	Weaverville	CA	96093	916-623-6289	3541C	4941	1781
51	Abb Industrial Systems Inc	5000	Peachtree Ind Blvd Nw	Houston	TX	77096-1816	713-667-7541	5044M	7389	5044D
52	Abrasive & Tool Specia	2400	Directors Row	Norcross	GA	30071	770-729-9119	3829		3545
53	Absco	140	W Market	Salt Lake City	UT	84104-4513	801-972-3182	3291	3399	2842
54	Abston Machine Shop	1266	Ardmore Hwy	Somonauk	IL	60552	815-498-3843	3714		
55	Ac & D Industrial	5911	Clinton Hwy	Taft	TN	38488-5040	615-425-6400	3599A		
56	Academy Machinery & Engineerin	4827	Huntington Drive North	Knoxville	TN	37912-2547	615-688-1556	3563	7699A	3569
57	Acc Rebuilders Inc	853	E Eh Crump Blvd	Los Angeles	CA	90031	213-225-9425	3599E		
				Memphis	TN	38126-3698	901-774-5874	3621	5013	7539
									5013	3714



62	Accurate Ceramic Grinding	6255	Harrison Dr	CA	92670-6740	714-779-3485	3541H					
63	Accurate Cutter & Tool Grindn	10280	Crouse Willison Rd	CA	92670-6740	714-779-3485	3541H					
64	Accurate Mach Co Inc	1058	S Ewing St	OH	43031-9109	614-967-5475	3541H					
65	Accurate Machinery & Manufacturing Co	72	Roanoke Ave	IN	46203-1590	317-357-8491	3599A					
66	Accurate Machining	2285	S Jason St	NJ	07111	201-344-6100	3599E					3469
67	Accurate Metal Products	2120	Lamberts Mill Rd	CO	80223-4006	303-935-4524	3541H					
68	Accurate Mfg Co Inc	1940	Lone Eagle St	OH	43119	614-878-6510	3599A					3451
69	Accurate Plastics Corp	108	W Mount Vernon St	MO	65714-9653	417-725-2622	2671					3089
70	Ace Machine Co		Rt 111	NH	03841	603-329-6716	3599A					
71	Ace Machine Fabrication	9230	Princeton Rd	KY	42241	502-886-0165	3599A					
72	Ace Specialty Co Inc	695	Ensminger Rd	NY	14150-6698	716-874-3670	3544D					3599K
73	Acklin Stamping Div	1925	Nebraska Ave	OH	43607-3800	419-536-4661	3399					3441
74	Acme Crankshaft Grinding Co	3534	4th St	LA	70058-2895	504-347-8061	3541H					
75	Acme Gear Co Inc	130	W Forest Ave	NJ	07631-4526	201-568-2245	3566					
76	Acme Industries Inc	55	Bradrock Dr	IL	60018-1937	708-296-3346	3599A					3613
77	Acme Machine		6541-D E	OK	74145	918-664-5449	3599A					
78	Acme Metal Prods Ofc		Bridge & Beade	PA	18651	717-779-9533	3599A					
79	Acro Tool & Die Co		Wayne Park Dr	OH	45215	513-733-5333	3544D					
80	Acro-Built Industries	126	Titus Ave	NY	14212-1832	716-896-6999	3599A					
81	Action Casting Of The Southeast Inc	1218	Columbus Cir	NC	28403-3924	910-251-3929	3363					7692D
82	Action Industries	6453	Fig St	CO	80004-1041	303-431-5794	3599A					3599
83	Action Machine Works Co	41	Runyons Ln	NJ	08817-2219	908-287-8888	3599A					3544D
84	Action Threaded Products	6955	Sharlem Ave	IL	60501	708-496-0100	3452					
85	Adell Machine & Repair	4749	Lancaster Dr Ne	OR	97305-1737	503-393-0953	3599A					3599F
86	Admiral C & B Propeller & Machine Co	4930	W Commerce St	FL	33616-2704	813-837-9476	3599A					3724
87	Admiral Equipment Co	305	W North St	OH	44303-2398	216-253-1353	3569					
88	Adonis Art Foundry		19652-8th Street East	CA	95476	707-938-3757	3365					3544E
89	Advance Development & M		Soundview Rd	CT	06437	203-453-4325	3599A					
90	Advance Equipment Co	5404	Reichold Rd	AL	35404-1200	205-345-9660	3599E					
91	Advance Industrial Machine		W6335 Designdr	WI	54942	414-757-6786	3599A					3599E
92	Advance Plastics Inc	6	Depot St	MA	01560-1306	508-839-0492	3089					
93	Advance Tooling	2905	Memorial Blvd	TN	37172-4242	615-384-6716	3544D					
94	Advanced Aero Space	27956	Beale Ct	CA	91355-1210	805-295-8282	3599A					
95	Advanced Control Incorporated	2414	3rd	IL	61244	309-755-5545	3599D					
96	Advanced Controls & Electric C	63130	Gillette Rd	OR	97701-5707	503-388-2062	3829					1731
97	Advanced Fabricating Technology	2766	3 Mile Rd Nw	MI	49504-1318	616-453-4488	3999L					3053
98	Advanced High Technology Metal			TX	77023	713-923-6412	3364					3462
99	Advanced Industrial Corp	3528	31 Lic	NY	11100	718-472-0127	3452					3399
100	Advanced Prototype Speciali	18	Mammoth Rd	NH	03076-3223	603-635-3158	3599A					
101	Advanced Rotary Cutting Systems	445	W Jackson Ave	IL	60540-5256	708-416-6446	3999L					
102	Aero Tech Machine	1105	Garden Of The Gods Rd	CO	80907-3407	719-599-5133	3599A					
103	Aero-Dynamics	800	W Elgin St	OK	74012-2425	918-258-0290	3599A					
104	Aerodyne Machine Inc	5200	W Military Hwy	VA	23221-1014	804-488-2140	7538C					5084L
105	Aeromech Industries Inc	5468	Fairchild Rd	FL	32536-8155	904-682-6141	3721					
106	Aerospace Technologies Inc	7445	E Lancaster Ave	TX	76112-7388	817-451-0620	3724					
107	Aerospace Tool Corporation	1810	Se 1st Redmond	OR	97756	503-923-7210	3569					3599A
108	Agh Machine & Tool Co		N Hayes Ave	NJ	08090	609-468-6700	3599A					3599E
109	Ain Plastics Inc	300	Park Ave S	NY	10010-5375	212-473-2100	5945					3089
110	Air & Hydraulics Engineerin Inc		P O Box 360108/3431 Lorna Ln	AL	35236	205-823-7400	3511					3594A
111	Air Capital Tool Services Inc	2100	S West	KS	67203	316-945-5854	3541H					7699D
112	Air Movement Prods Co Inc	2	Edna St	NY	10507-1507	914-666-8979	3444					
113	Air Products And Chemicals Inc	2600	E Roosevelt Rd	AR	72206-2582	501-375-1256	3548B					5084I
114	Air Sweeper Svc	348	S 40th St	TX	76543-4646	817-690-6065	7538C					7538
115	Air-Fluid Tech Inc			WI	53223	414-355-9597	3494					3599A

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121	Airtech Corporation	17	5603	87962-4319	NJ	Rahway	07065-4529	908-382-3700	1761	5051D	3599A	3569
122	Ajusta Mfg Co	821	821	N River Rd	WA	Ferndale	98248	360-384-4345	7359E	5084	3599A	3569
123	Alamo Iron Works Sales & Supply	4844	4844	Baldwin Blvd	TX	West Bend	53095-2669	414-334-7611	3599A		3599A	5084J
124	Alamo Pipe & Supply	406	406	Fairgrounds Rd	NM	Alamogordo	88310-6158	505-437-5620	5083J	3498	5211O	5091A
125	Alar Machine Inc	25	25	Interstate Dr	NH	Somersworth	03878-1210	603-692-7200	3599A			
126	Albuquerque Bolt & Fasteners	2926	2926	2nd St Nw	NM	Albuquerque	87107-1416	505-345-5869	3452	5085	3493	
127	Alert Fire Fighting Equip Corp	3406	3406	N East St	MI	Lansing	48906-2095	517-485-2061	3569E			
128	Algi Machine Shops Corp	9516	9516	Rayo Ave	CA	South Gate	90280-5228	213-563-6013	3599A			
129	Algoma Products	8450	8450	Algoma Ave Ne	MI	Rockford	49341-9170	616-866-3444	5531	2899	3291	7542C
130	Allinco	11246	11246	S Post Oak Rd	TX	Houston	77035-5745	713-729-8600	3599D	3082	3829C	
131	All Industries & Dealer Supply	3390	3390	Nw South River Dr	FL	Miami	33142-6952	305-638-9212	3452	7389G	3569	
132	Allbright Machine Co Inc	4701	4701	N Golder	TX	Odessa	79760	915-550-9201	3599A			
133	Allegheny Steel & Brass Corp	5950	5950	W 51st	IL	Summit Argo	60501	708-458-6887	3316			
134	Allen Industrial	960	960	S Hathaway St	CA	Banning	92220-6302	909-849-4966	3599E	3471		
135	Allen Machine Products	960	960	S Hathaway St	CA	Banning	92220-6302	909-922-9467	3599A			
136	Allen Tool & Mfg	21828	21828	Lassen St	CA	Chatsworth	91311-3681	818-718-2258	3599A			
137	Alliance Machine Inc	10650	10650	County Road	MN	Osseo	55369-4075	612-425-1616	3599A	3599F		
138	Alliance Tool & Equip	2120	2120	Sirathmore St	IN	Fort Wayne	46802-6970	219-432-2909	3599A			
139	Allied Auto Parts-Div Of Brist	20	20	Harper Ave	CT	Waterbury	06705-1224	203-754-5178	3714			
140	Allied Caster Company Inc	2007	2007	S Brazos St	TX	San Antonio	78207-7741	210-222-9000	3599A			
141	Allied Distributing	3100	3100	Pawnee St	TX	Houston	77054-3306	713-741-3100	3714			
142	Allied Precision Sales	30	30	E Elm Ave	IA	Pocahontas	50574	712-335-3154	3599A			
143	Allied Pump Corp	128	128	Harrison St	NJ	Hoboken	07030-6044	201-798-3277	5084G	3599E		
144	Allright Pipe And Boiler Insulatio Co			Nc 73 Hwy	NC	Iron Station	28080	704-735-2383	3443			
145	Allright Tool Co	6517	6517	Georgia Rd	AL	Birmingham	35212-2725	205-591-1468	3599A			
146	Alltrista Industrial Plastics Company	600	600	N Weinbach Ave	IN	Evansville	47711-5909	812-479-5960	3082	3021	3089	
147	Alltype Screw Machine Prods	100	100	New York Ave	NY	Westbury	11590-4909	516-334-5100	3451			
148	Allwood Precision Tool Co Inc	115	115	Industrial	NJ	Passaic	07055	201-778-8185	3569			
149	Almac Engineering Inc	20769	20769	Mound Rd	MI	Warren	48091-2901	810-755-2060	3469			
150	Almetco Alloys	1308	1308	W El Segundo Blvd	CA	Gardena	90247-1524	213-321-2700	3364	5051A	1791D	5093A
151	Alp Engineering	13701	13701	McKinley Hwy	IN	Mishawaka	46545-7474	219-257-1000	3825			
152	Alpine Plastic	7119	7119	Centennial Blvd	TN	Nashville	37209-1018	615-350-6300	3089			
153	Alpine Plastics Inc	6775	6775	Mi Rd	MI	Sterling Heights	48310	810-739-7620	3089			
154	Airy Tool & Die Co Inc	386	386	Fillmore Ave	NY	Tonawanda	14150-2494	716-693-2419	3544D	3462		
155	Ais Tool & Die Enterprises In	542	542	Main St	NY	Westbury	11590-4806	516-997-6153	3545			
156	Ais Tool & Die Enterprises Inc	542	542	Main St	NY	Westbury	11590-4806	516-997-6070	2399	3499	3599A	3469
157	Altair Machinery Corp	175	175	Oval Dr	NY	Central Islip	11722-1402	516-582-8307	3599A			
158	Altech Metal Cutting	130	130	Ryerson Ave	NJ	Wayne	07470-8100	201-305-1922	3541	3599A		
159	Alumax Extrusions Inc	2300	2300	Alumax Rd	SD	Yankton	57078-9355	605-665-6063	3354			
160	Aluminum Fabricators Inc	3416	3416	E 23rd St	MO	Kansas City	64127-4300	816-231-8888	3365			
161	Alvin Industries	66	66	Saint Claire Ave	CT	New Britain	06051-1631	203-223-8967	3599A			
162	Amasteel Div Ervin Industries	3893	3893	Research Park Dr	MI	Ann Arbor	48108-2217	313-769-4600	3291			
163	Amazon Hose & Rubber Co Rubber	130	130	N Jefferson St	IL	Chicago	60661-2383	312-372-4073	3494	3069		
164	Amer Hydracast Inc	1738	1738	Harding Rd	IL	Chicago	60640	312-784-2600	3542			
165	Amer Machinery Co	2538	2538	N Martin Lthr King Dr	WI	Milwaukee	53212	414-374-6930	3052	3545	3566	3568
166	American Acrylics & Plastics Inc			Bridgewater Area	NJ	Somerville	08877	908-685-7676	3089			
167	American Aluminum Casting Co	322	322	Coit St	NJ	Irvington	07111-4006	201-372-3200	5051A	3363	3369	
168	American Automation & Manufacturing Incorporal			U S Highway 23 S	NY	East Point	41216	606-789-8511	3599F			
169	American Boiler & Chimney Co	3401	3401	Gand Ave	KY	Pittsburgh	15204	412-771-7828	3443			
170	American Bolt & Nut Co Inc	138	138	Carter St	PA	Pittsburgh	15204	412-771-7828	3443			
171	American Carbon & Metals	3499	3499	Grand Ave	MA	Chelsea	02150-1518	617-884-3331	3452	5085		
172	American Cast Iron Pipe Co	3675	3675	Crestwood Pky Nw	PA	Pittsburgh	15204	412-777-0780	3364			
173	American Chocolate Mould Co In	3194	3194	Lawson Blvd	GA	Duluth	30136-6864	770-717-8554	3498	3494		
					NY	Oceanside	11572-3702	516-766-1414	3544E			



ERIC ID	Company Name	Address	City	State	Zip	Phone	Fax	Website
178	American Driveshaft	1904-E Stolz St	Victoria	TX	77901	512-576-6124	3714B	
179	American Filter & Filter	Welch Rd	Dallas	TX	75244-4521	214-661-2820	5075B	351
180	American Linc Inc	N Lakeshore Dr	Lake Charles	LA	70601	318-436-1443	2499	331
181	American Linear Manufacturers	Main St	Westbury	NY	11590-4923	516-338-5741	3599F	
182	American Machine & Repair		Upland	CA	91784	909-988-5600	3599A	3599E
183	American Machine Fabrication I	E 8th St	New Albany	IN	47150-3347	812-944-4136	3599A	7692D
184	American Machinist Shafing Shop	6th St Sw	Cedar Rapids	IA	52404-4718	319-362-2521	3599A	
185	American Master Tool Inc	Fleetwood St	Sun Valley	CA	91352-2747	818-771-0232	3599A	
186	American Mold Technologies Inc	Executive Dr	Harrison Township	MI	48045-1311	810-469-0550	3544E	
187	American Mold Plate Corp	U S Hwy 69 S	Bullard	TX	75757	903-894-7281	3089	
188	American Precision Centerless	2088c E Centrl Ave	Duarte	CA	91009	818-357-6610	3541H	
189	American Refuse Systems	Paper Mill Rd	Florence	SC	29502	803-662-8847	7359	5084O
190	American Rigging Inc	S Westshore Blvd	Tampa	FL	33611-3309	813-832-3700	3315	2393
191	American Rotary Tools Co Inc of California	Slauson Ave	Whittier	CA	90606-2831	310-693-4366	3545	
192	American Shim & Die Inc	Mogadore Rd	Kent	OH	44240-7531	216-678-1557	3499	
193	American Stainless Equipment	San Joaquin Ave Se	Albuquerque	NM	87108-4298	505-255-7576	3494	5046B
194	American Steel Rule Die Inc	Reedy Dr	Eikhart	IN	46514-9413	219-262-3437	3544D	
195	American Tire Works	395a Jericho Trnkp	Smithtown	NY	11745	516-361-6600	5531	3559M
196	Amerlab Corporation Inc	Garibaldi Ave	Lodi	NJ	07644-2506	201-777-2120	3365	5722
197	Ameritek Heat Treating Service	S	Houston	TX	77018	713-480-5637	3398	1761
198	Amex Die Cutting Service	Chico Ave	South El Monte	CA	91733-1613	818-579-6800	3999L	
199	Amherst Epoxy Dist Inc	Columbia Dr	Amherst	NH	03031	603-883-3329	3089	
200	Amistad Foundry	Industrial Blvd	Del Rio	TX	78840	210-774-2015	3599	
201	Amj Equipment Corporation	Olive St	Lakeland	FL	33801-4047	941-682-4500	3829	
202	Amko Service Co Hope Cryogenic Division	Hwy 4 N	Hope	AR	71801	501-777-8636	3599A	
203	Ampex Casting Inc	W 47th St	New York	NY	10036-2826	212-719-1318	3363	3599
204	Amsterdam Anthony Corp	Boone Ave	Bronx	NY	10460-5660	718-991-1689	3599A	
205	Amtec Corporation	Bradford Blvd Nw	Huntsville	AL	35805-1949	205-722-7200	9661	3599A
206	Anchor Tool Inc	Jason Ct	Corona	CA	91719-6199	909-734-1749	3599E	3544D
207	Anderson Fred & Sons Exploration Drilling	Grass Valley Rd	Winnemucca	NV	89445-8706	702-623-4203	3541C	
208	Anderson J R Consultant	Belding Rd Ne	Cannonsburg	MI	49317	616-691-7130	3599F	
209	Anderson Machinery Co Inc	Rachel Dr	Stratford	CT	06497-6411	203-375-4481	3541	5084D
210	Anderson Tooling Co	75b Pineaire Dr	Brentwood	NY	11717	516-273-8512	3089	3544E
211	Andon Specialties Inc	N Padre Island Dr	Corpus Christi	TX	78408-2260	512-289-6366	3494	
212	Anflo Fastening Systems	Beech Ave	Pittsburgh	PA	15233-2036	412-322-3311	5085	5051R
213	Angelus Pattern Works Inc	Belgrave Ave	Huntington Park	CA	90255-2730	213-587-3674	3544E	3452
214	Anglo Precision	N Black Horse Pike	Williamstown	NJ	08094-9136	609-629-9556	3599A	3543
215	Ankem Chemicals Inc	Cartwright St	Dallas	TX	75212-4304	214-638-4877	5169	3412
216	Ankeng Engineering	W Fayette St	Syracuse	NY	13204-2925	315-475-1968	3494	2899
217	Apollo Broach Co	Schoolcraft Rd	Livonia	MI	48150-1833	313-425-5750	3541B	
218	Apple Machine & Supply Co	Orange Ave	Fort Pierce	FL	34947-1550	407-466-9353	3714B	3599A
219	Applied Control Concepts Inc	N 55th St	Milwaukee	WI	53223-2313	414-362-7880	3829	1791D
220	Approved Fire Equipment		Durham	NC	27701	919-682-8196	3999	7699
221	Aquarian Engineering		Rocklin	CA	95677	916-652-5025	9511A	3599E
222	Aquidneck Fastners	Aquidneck Dr	Tiverton	RI	02878	401-625-1172	3452	4941
223	Archimedes Tool & Die Machine Bg Co	Charlevoix St	Detroit	MI	48215-2507	313-823-9642	3599A	
224	Arco Metals Inc	Old York Rd	Baltimore	MD	21218-2562	410-235-7977	3599A	
225	Arco Tool & Cam Co	3rd St	Newark	NJ	07107-2625	201-484-7889	3541	
226	Arctic Fire & Safety	30th Ave	Fairbanks	AK	99701-7506	907-452-7806	3999	3569E
227	Arday Mfg Co Inc	Atlantic Ave	Freeport	NY	11520-5211	516-379-4770	1791D	8099
228	Arizona Analytical Instruments-Tempe Plastics	S Rockford Dr	Tempe	AZ	85281-3053	602-966-9681	3544E	3089
229	Arizona Valve Fitting Co	S 35th St	Phoenix	AZ	85040-2852	602-268-4848	3494	3498
230	Ark Precision Machining Inc	Charcot Ave	San Jose	CA	95131-2204	408-321-0260	3599A	
231	Aries Service Co Inc	Santa Fe Springs Rd	Santa Fe Springs	CA	90670-2918	310-946-5907	3479	5943E
232	Arm Tag Precision Grinding Co	W Grand Ave	Chicago	IL	60639-3096	312-622-9666	3541H	
233	Armor Equipment Sales Corp	57th Ave	Oakland	CA	94621-4487	510-532-0688	5551	5093A
234	Armstrong Export Inc	Nw 53rd St	Miami	FL	33166-4511	305-592-8361	5082X	3743
235	Arnold H Co Inc	Liberty St	Rockland	MA	02370-1239	617-878-0346	3599F	3552

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236	Artisan Well & Pump Co	1115	W 8 Mile Rd	AR	72901-8824	501-646-0540	10919	345	5085G
237	Artform Plastics Corp	103	Wills Mtn Rd	CA	91706-1810	818-338-0274	3541H		
238	Arundel Machine Tool Co Fax Line	135	Old Limerick Rd	WV	26764	304-789-6490	7538C		
239	Asap Manufacturing	2775	S Main St	PA	19047-2698	215-464-8878	3451		
240	Ascension Development Inc	395	W 20th Ave	WI	53153-9735	414-392-2552	3599E	1781	
241	Ascent Manufacturing Co	7257	Commercial St	MD	21502	301-722-7440	3089		
242	Ashwell Label Dies Inc	9612	Bryan Dairy Rd	ME	04005	207-282-3828	3599A		
243	Asil Aerospace	1525	Lurline Ave	CT	06787-1714	203-283-8898	3599A		
244	Ason Metal Products Inc	17985	S Sunol Dr	ID	83854-9301	208-773-7136	3724		
245	Assembly Engineering Inc	390	E 14 Mile Rd	CA	95112-4404	408-298-7557	3599A	3471A	
246	Associated T A D Inc	3002	E Taggart St	FL	34615	813-579-8138	3544D		
247	Associated Welding Supply Co	2300	S Main St	CA	91311-5114	818-998-4413	3728	3599A	
248	Asteroid Grinding Inc	25	N Lister Ave	CA	90023-4031	213-266-1322	3469		
249	Astra Tool & Mfg Inc	515	Allen St	MI	48026-2293	810-294-2760	3599A		
250	Astrotronics	2318	E Juanita Ave	OH	44413-2411	216-426-4144	3544	3599	
251	Asvero Molded Craft	116	Chico Ave	TX	77581-4712	713-485-2755	5082A	7389G	3548B
252	Ate Fixture Fab	19	Celtic Cir	IL	60614-2995	312-276-7526	3541H		
253	Atech Turbine Components	4273	Ballard St	CT	06604-5104	203-579-2639	3599A		
254	Aten Well Drilling	1920	N Dickerson Rd	AZ	85204-6542	602-926-8969	3599A		
255	Atkins Tool Co	3780	Bannard St	AL	35758-1837	205-772-0700	3825B		
256	Atlantic Machinery	799	Nw 52nd St	MA	01607-1103	508-798-8928	3599A	1781	
257	Atlantic Sheet Metal Corp	50	Marfetta St Nw	MI	49663-9320	616-839-7120	3599E		
258	Atlas Consolidated Machine Cor	804	Peel St	NJ	08077-1901	609-829-9300	3599A		
259	Atlas Heating & Sheet Metal Fabricators	4802	Marine Dr	FL	33010	305-635-6631	3541	5084D	7389G
260	Atlas Machine Inc	410	Starcrest Dr	GA	30318-5750	404-892-9902	3364A	5085	1761D
261	Atlas Mfg Co	1416	E McClurken Ave	NJ	07524-1004	201-684-5803	3599A		
262	Atlas Precision Plastics	39	Fair Oaks Rd	WA	98225-8420	360-671-4999	1791D		
263	Atm Machines Works	2001	S Twin City Hwy	NC	28110-8496	704-283-7678	3599A		
264	Atwood Tool And Machine Inc	679	Kattelville Rd	IL	62286-1871	618-443-4181	3321		
265	Austin Air & Hydraulic	56	E Martin Luther King Jr Blvd	NC	28704	704-684-4282	3544E	3089	
266	Austin Electric Motor Repair	2739	Aiken St	TX	77627-4445	409-722-4484	3599A		
267	Austin Ignition Co	932	N Union St	NY	13901-5802	607-648-6543	3544B	3599A	
268	Austin-Mac Inc	19115	6th Ave S	TX	78702-1339	512-469-0267	3563	7699A	3511
269	Automated Control Systems Inc	25	Washington St	MI	48867-3972	517-725-7017	5063C	3599E	
270	Automatic Controls Co	1626	W 8 Mile Rd	OH	44304-1347	216-253-7791	3536	3494	5013B
271	Automatic Components Inc	3030	Kenwood Cir	WA	98134-2101	206-624-7066	3535	3599A	3568
272	Automation Design & Machine Co	8273	Minnesota Ave	MA	02062-3412	617-255-0140	3829		
273	Automation Electric	8273	Maxroy St	MI	48219-1494	313-533-8890	3829		
274	Automation Products Inc	6312	S 86th Ct	MA	02038-3201	508-520-0001	3829		
275	Automax Corporation	131	Aaron Ln	ME	04015	207-627-7149	3599A	3541	
276	Automotive Engineering Inc	1901	River St	MN	55802-2432	218-722-1905	3829	1731	
277	Automotive Engineering Machine Shop	4301	Barbara Ave	TX	77008-6219	713-869-0361	3829		
278	Automotive Industrial Engine Service Inc	10760	Pete Brown Rd	IL	60458-1767	708-458-9489	3494		
279	Awscos Inc/Stone Rebabbling	1880	Weaver Ave	MD	20735-2201	301-868-3555	7538C		
280	Axix C N C Machining Co Radio	1011	S Of Aztec	NY	12839-1337	518-798-0272	7538C		
281	B & A Ford Performance	123	Nw Of City	NM	87301-6703	505-863-6622	7538C		
282	B & B Industries Inc	1605	55th St	NC	28269-1627	704-596-3695	3339		
283	B & B Machine & Tooling Inc	2117	W 2nd St N	CA	91733-2749	818-350-4012	3599A		
284	B & C Corp Prop Shaft	1703	9th St Nw	OK	74948	518-427-7757	3711	1381	1389
285	B & C Fabricating	1941	N 10th St	CO	80301-2742	303-444-3313	3599A		
286	B & C Machine Shop	1703	W Winchester Ave	KS	67203-6010	316-262-1072	3599A		
287	B & C Machine Shop	1941	S Bluff Blvd	OH	44314	216-848-0850	3599A		
288	B & D Machine Shop	1941	S Bluff Blvd	IN	46060-1510	317-773-0257	3444		
289	B & E Machine Shop	1941	S Bluff Blvd	KY	40965-2562	606-248-5259	3599A		7692D
289	B & E Machine Shop	1941	S Bluff Blvd	MA	02715-1243	508-669-4389	3599A		
289	B & E Machine Shop	1941	S Bluff Blvd	IA	52732-6668	319-242-2192	3599A	3541	

Company Name	Address	City	State	Zip	Phone	TX	Fort Worth	TX	Phone	Zip
B & M Machine Shop	4420 Mclean Rd	Lovers Ln	MI	49002-3600	817-656-8968	MI	Kalamazoo	MI	817-656-8968	3599A
B & M Machine Co	814 Cass St	Po Box	MI	49120-2513	616-327-9308	MI	Niles	MI	616-327-9308	3452
B & M Machine Shop Inc	37752 Po Box	4th St Sw	TN	37707	616-683-2011	TN	Arthur	TN	615-869-4712	3599A
B & M Precision Inc Office	1225 4th St Sw		FL	33570-5348	813-645-1188	FL	Ruskin	FL	813-645-1188	3599A
295 B & M Precision Mfg			CA	95100	408-727-5833	CA	San Jose	CA	408-727-5833	3599A
296 B & R Fabrication & Machine	213 S Jefferson St		PA	18102-4603	610-820-0410	PA	Allentown	PA	610-820-0410	3599A
297 B & R Tool Instrument Corp	12 Comrcl Blvd		NY	11727	516-736-2275	NY	Coram	NY	516-736-2275	3599A
298 B & S Centerless Grinding C	87 Opal St		CT	06460-3029	203-874-3296	CT	Millford	CT	203-874-3296	3599A
299 B & S Engineering Co Inc	25 Hayward St		MA	02171-2415	617-471-2007	MA	Quincy	MA	617-471-2007	3599A
300 B C D Metal Products Inc	18 Williams St		MA	02149-1910	617-389-0342	MA	Everett	MA	617-389-0342	3599A
301 B C R Tool Co	5975 Ford Ct		MI	48116-8511	810-229-2580	MI	Brighton	MI	810-229-2580	3599A
302 B D Gage Company	2013 W 7th St		TX	79763-3713	915-337-6771	TX	Odessa	TX	915-337-6771	3599A
303 B J Machine Company Inc	N4995 Hwy Q		WI	53948	608-847-4288	WI	Mauson	WI	608-847-4288	3599A
304 B K & C Plastic Products	M-27		MI	49721	616-627-9328	MI	Cheboygan	MI	616-627-9328	3089
305 B L & P Service	14826 Garrett Rd		TX	77044-5844	713-456-7867	TX	Houston	TX	713-456-7867	3621
306 B M Machine Service	1617 E 49th St		TX	79762-4402	915-362-2267	TX	Odessa	TX	915-362-2267	3599D
307 B Machine Products	Rt 95 W		WV	26102	304-863-3041	WV	Parkersburg	WV	304-863-3041	3599A
308 B-E Electronics Co Inc	2184 Flintstone Dr		GA	30084-5008	770-939-0409	GA	Tucker	GA	770-939-0409	3829
309 Babb Tool & Machine	15957 Illinois Ave		CA	90723-4901	213-636-1916	CA	Paramount	CA	213-636-1916	3599A
310 Bach Machine Co	438 Lanza Ave		NJ	07026-2004	201-478-3062	NJ	Garfield	NJ	201-478-3062	3599A
311 Badger Topper Machine Co	5081 N 124th St		WI	53005	414-781-8908	WI	Brookfield	WI	414-781-8908	3544D
312 Baechler Willy Machine	49 Hwy		CA	95250	209-754-4646	CA	San Andreas	CA	209-754-4646	7538C
313 Bailey Controls Co	6766 S Revere Pky		CO	80112-3907	303-799-0200	CO	Englewood	CO	303-799-0200	3829
314 Bailey Division Of Crmb	5927 South Loop E		TX	77033-1017	713-643-3107	TX	Houston	TX	713-643-3107	3494
315 Bailey Food Machs	Valley St		OH	45404-2065	513-223-1914	OH	Dayton	OH	513-223-1914	3599
316 Ball & Socket Mfg Co	493 W Main St		CT	06410-2450	203-250-6000	CT	Cheshire	CT	203-250-6000	3469
317 Ballard Sheet Metal Works I	Ballard Ave Nw		WA	98107-4810	206-784-0545	WA	Seattle	WA	206-784-0545	3365
318 Balleau Standard Transformer Co	9130-J Red Branch Rd		MD	21044	410-995-1820	MD	Columbia	MD	410-995-1820	3699
319 Baltimore Fire Protection & Equipment Co Inc	7512 Connelley Dr		MD	21076-1707	301-565-0569	MD	Hanover	MD	301-565-0569	7382A
320 Banjo Distributing Co	7112 Oaklawn Dr		TX	78229-3021	210-525-1015	TX	San Antonio	TX	210-525-1015	3699D
321 Banks Machine & Mfg Co Inc	Highway 7		KY	41666	606-358-9678	KY	Wayland	KY	606-358-9678	3599A
322 Banner Engineering Co	Banks Ave		NC	28801-4017	704-252-3886	NC	Asheville	NC	704-252-3886	3544B
323 Banner Tool & Die Inc	Forest View Rd		IL	61109-1686	815-398-1400	IL	Rockford	IL	815-398-1400	3544
324 Banner Tool & Machine Co	Industrial Blvd		KY	40219-1803	502-964-1912	KY	Louisville	KY	502-964-1912	3535
325 Bapko Metal Fabricators	N Parker St		CA	92667-5520	714-639-2433	CA	Orange	CA	714-639-2433	1791D
326 Barajas Machine Shop	13040 Tom White Way		CA	90650-4547	310-926-6856	CA	Nonwalk	CA	310-926-6856	3599A
327 Barber-Colman Company Industrial Instrument	2200 Norcross Pky		GA	30071-3670	770-840-9811	GA	Norcross	GA	770-840-9811	3829
328 Barnes Manufacturing Services	560 31st St		IA	52302-3724	319-377-3442	IA	Marion	IA	319-377-3442	3599A
329 Barnetts Machine Shop	Baron Steel Ave		NC	28768	704-884-4343	NC	Pisgah Forest	NC	704-884-4343	3599A
330 Baron Drawn Steel Corp Nights Sundays & Hol	331 Bartlett Phil		OH	43607-1747	419-531-4721	OH	Toledo	OH	419-531-4721	3312
331 Basilius Tool Co Plastic Injection Molds Since	7 N Westwood Ave		CA	94536	510-792-7342	CA	Fremont	CA	510-792-7342	3545
332 Basque Plastics Corp	Jytek Dr		MA	01453-5915	508-537-5219	MA	Leominster	MA	508-537-5219	3089
333 Bastian Material Handling Cor	Association Ct		IN	46280-1962	317-575-9992	IN	Indianapolis	IN	317-575-9992	3599A
334 Bath Iron Works Corp	Commercial St		ME	04101-4728	207-761-4800	ME	Portland	ME	207-761-4800	3548A
335 Batley Machinery Co	Calhoun Rd Ne		GA	30149	706-278-8556	GA	Rome	GA	706-278-8556	3569
337 Bauer Precision Machining	Aiello Dr		CA	95111-2134	408-224-2120	CA	San Jose	CA	408-224-2120	3599A
338 Bay Area Laser			CA	94086	408-245-2737	CA	Sunnyvale	CA	408-245-2737	3699C
339 Bay Pneumatic Inc	440 Convention Way		CA	94063-1407	415-365-1444	CA	Redwood City	CA	415-365-1444	3511
340 Bay Shore Systems Inc	E H St		CA	94510-3573	707-745-9233	CA	Benicia	CA	707-745-9233	3541C
341 Bay State Controls Corp	Union St		MA	01608-1100	508-799-0335	MA	Worcester	MA	508-799-0335	3494
342 Bayport Manufacturing Co	Mound Rd		MI	48092-2626	810-751-4040	MI	Warren	MI	810-751-4040	3469
343 Bear Plastics Inc	3912 Broadway Ave		TX	76117-3543	817-831-7252	TX	Fort Worth	TX	817-831-7252	3089
344 Beard J W Welding & Machine	Jct Hwy 9 &		IA	52131	319-382-8305	IA	Decorah	IA	319-382-8305	3599A
345 Bearings & Industrial Sales Inc	Parkway Dr		ID	83221-1652	208-785-6574	ID	Blackfoot	ID	208-785-6574	3562
346 Beaumont Precision Machiner	E 5th St		CA	92223-2140	909-845-4466	CA	Beaumont	CA	909-845-4466	3599A
347 Beaumont Seal Inc	N Beaumont		TX	77613	409-752-2076	TX	China	TX	409-752-2076	3599A



352	Beech Design & Machine Co	271	Highway	42	Bedford	KY	40006	502-295-7505	3599A	3451
353	Beier Dallas L Williamette Drilling Co	7365	Parisippany Rd		Parsippany	NJ	07054-5105	201-887-0084	3599A	3544D
354	Belcher Auto Machine Shop Inc		Oneil Rd Ne		Salem	OR	97303-1702	503-393-1757	3541C	5082H
355	Belgian Screw Machine Products	600	Main		Centreville	AL	35042	205-926-4866	7538C	
356	Bell Welding & Machine Shop Inc	6075	Homer Rd		Concord	MI	49237	517-524-8825	3451	
357	Belmont Industries	97	N 34th St		Terre Haute	IN	47805-1594	812-466-1288	3714B	7692D
358	Ben Tek Inc	710	E Church Ave		Cambridge	MA	02138-1093	617-547-7600	3291	5499A
359	Benco Precision Machining	403	Old County Rd		Reed City	MI	49677-9194	616-832-3114	3599A	
360	Bencor Manufacturing Co Inc		512-2nd Ave		Belmont	CA	94002-2547	415-595-5743	3599A	
361	Benda Industries	8	Skander Ct		Redwood City	CA	94063	415-369-0549	3599A	
362	Bennett Machining	6804	Normandy Cir		Concord	CA	94523-1727	510-685-9189	3541	
363	Benny Machine Co Inc	441	Dual Blvd E		Midvale	UT	84047-1434	801-565-0750	3599A	
364	Benrox Tool Supply	27670	Groesbeck Hwy		Isanti	MN	55040	612-444-5508	3599A	
365	Bernard Plastic Rproducts Inc Injection Plastic	5055	Stickney Ave		Roseville	MI	48066-2759	810-775-8900	5072	5085
366	Bernier Cast Metals Inc	2626	Hess Ave		Toledo	OH	43612-3797	419-729-3914	3089	
367	Berry Bearing Co	901	1st Ave Sw		Saginaw	MI	48601-7498	517-754-7571	3325	
368	Besco Machining	776	W Front St		Cedar Rapids	IA	52405-4857	319-362-9940	3562	5063C
369	Best Grinding Service Inc	1201	Iowa St		Covina	CA	91722-3611	818-966-0171	3599A	3568
370	Best Industrial Equipment				South Houston	TX	77587-4825	713-947-3138	3541H	3599A
371	Best Machine & Tool Co Inc	357	Richards Rd		Stanton	MO	63079	314-927-5337	3569	
372	Best Machine & Welding Co Inc	140	S 8th Ave		Zanesville	OH	43701-6605	614-452-4149	3544D	
373	Best Mfg	2260	American Ave		Maywood	IL	60153-1386	708-343-4455	3555	
374	Beta Instrument South	103	Auburn Ct		Hayward	CA	94545-1815	510-785-1090	3599A	7692D
375	Bete Fog Nozzle Inc	9434	Old Katy Rd		Peachtree City	GA	30269-1676	770-631-1290	3829	
376	Bethlehem Steel Corp Main Office Information				Houston	TX	77055-6366	713-461-9411	3544B	3559G
377	Bipe International				Sparrows Point	MD	21219	410-388-3000	3731	3312
378	Bilco Manufacturing Co Inc	272	Lincoln Blvd		Belleville	MD	20704	301-953-7088	3569E	
379	Bill C Thomas Company	701	Kings Row		Middlesex	NJ	08846-2305	908-356-5964	3599A	
380	Billico Manufacturing Inc Manufacturing Plant N		Madsn Ave		San Jose	CA	95112-2726	408-275-1000	3545	3315
381	Billerica Motor Parts	308	Boston Rd		Zeilienople	PA	16063	412-452-0411	3599A	
382	Bills Precision Machining	671	Aldo Ave		Billerica	MA	01822	508-663-6528	5013	7538C
383	Biloxi Machine & Metal Works	203	Howard Ave		Santa Clara	CA	95054-2209	408-727-4813	3599A	
384	Bird Machine Co Sales	24050	Madison St		Biloxi	MS	39530-4613	601-436-6141	3599A	
385	Bird Machine Tool Sales Inc	300	E 10th Ct		Torrance	CA	90505-6015	310-373-7622	3569D	
386	Black Machine Co	228	Buckeye Blvd		Hialeah	FL	33010	305-888-7545	3545	5084D
387	Blair Tool & Plastic Co		Rd	1	Port Clinton	OH	43452-1422	419-734-5520	3599A	
388	Blanchester Foundry Co	214	E Cherry		East Freedom	PA	16637	814-695-2032	3089	
389	Blasting Specialts	1113	S Lewis Ave		Blanchester	OH	45107	513-783-2091	3369	3321
390	Blenn-Air Inc	229	S Glasgow Ave		Tulsa	OK	74104-3905	918-592-1757	3291	5082N
391	Blh Process Electronic Weighing Systems				Inglewood	CA	90301-2105	310-641-1888	3599A	
392	Blom Industries Inc	25551	Joy		Salt Lake City	UT	84100	801-582-2021	1711E	3829
393	Bludworthy Jay Inc	3103	W Navigation Blvd		Mount Clemens	MI	48046	510-468-5600	3469	8711L
394	Blue Chip Industries		703-8th		Corpus Christi	TX	78402	512-887-7981	4493H	3731
395	Blume Power Tool Repair	3316	South Blvd		Mikado	MI	48745	517-826-5767	3544D	
396	Boa Production Inc	30	Pekola Ter		Charlotte	NC	28209-1953	704-523-7811	3291	0919
397	Bobs Dermaking & Repair Service		Po Box	32	Carteret	NJ	07008-1205	908-541-4140	3544E	7699P
398	Bock Machine Co Inc	16300	Arrow Hwy		Morristown	NJ	07960	201-539-6439	3599A	3544D
399	Boleky L H Co Mfr Rep		Bellevue Suburban Bldg		Inwindale	CA	91706-2056	818-960-4122	3599A	
400	Boitex Inc	4901	Oates Rd		Pittsburgh	PA	15123	412-761-8994	3829	5099C
401	Bona Services	835	Potts Ave		Houston	TX	77013-2815	713-675-9433	3463	4961
402	Bond Industrial Machinery Co	499	Atlantic Ave		Green Bay	WI	54304-4535	414-497-0595	3599F	3494
403	Bone Knife Company The	4009	Avenue A		Brooklyn	NY	11217-1812	718-624-1500	3599E	
404	Bonney Forge Main Ofc		Meadow Cedar		Lubbock	TX	79404-2805	806-755-6812	5084L	3541H
405	Boonton Plastic Molding Co	30	Plane St		Allentown	PA	18102	610-435-9611	3462	3421
					Boonton	NJ	07005-1720	201-334-4400	3089	5031K

406	Bordanaro & Son Inc	800	Moorpark Ave		Oakland	CA	94603-3710	510-632-2026	3599A	3451
7	I C Fabrication	203	Granada Dr		San Luis Obispo	CA	93401-7341	805-541-5504	3354	347
3	Items Inc	5520	Council St Ne		Cedar Rapids	IA	52402-1906	319-378-1502	3541	761
3	Bosco Brothers Inc	24	Prospect Ave		Norco	LA	70079-2624	504-764-6842	3569	
4	Boughtons Precast	1724	Aspen Cir		Pueblo	CO	81006-1406	719-545-3263	3443A	
411	Boulevard Fence & Iron Works	5009	Roosevelt Blvd		Philadelphia	PA	19124-2421	215-744-5060	3548A	
412	Bowe Knives	2527	State St	676	Beltendorf	IA	52722-5038	319-355-4777	3541H	3421
413	Bowen Cyrus L Constr Co	15123	Rte 2 State Rte		Marietta	OH	45750	614-373-6671	3541C	1623B
414	Bowie Bolt Supply	2650	Marlboro Pike		Upper Marlboro	MD	20772-3129	301-952-0300	3452	
415	Boyer Engineering & Manufacturing	20	Davison		River Grove	IL	60171	708-453-0382	3451	
416	Boylan Drilling & Supply Inc	702	Aga Fra		Santa Fe	NM	87501	505-982-1564	5084G	4941
417	Bracalentes Manufacturing Co	6625	West Creamery Rd		Quakertown	PA	18951	215-536-3077	3599A	3451
418	Branch Manufacturing Co	402	Pine St		North Branch	MN	55056-5115	612-674-4441	3469	3544D
419	Brandt Metal Products	2951	E Cobaugh		New Carlisle	OH	45344	513-845-8755	3599A	
420	Breshon Machining	1700	E 26th St		Tacoma	WA	98421-1311	206-627-6271	3599A	
421	Brett Machining	200	Cloverdale Ave		Concord	CA	94518-2418	510-509-7998	3599A	
422	Briggs Equipment Corp	1701	Rt 58 E		Suffolk	VA	23432	804-539-7404	5084L	3523
423	Briggs-Weaver Inc Industrial Trucks Industrial	200	Choctaw Dr		Baton Rouge	LA	70805-7823	504-357-8631	3569	5261B
424	Brink Race Craft	1701	Mavis St		Irving	TX	75061-7638	214-438-3204	3711	
425	Brints Welding & Repair Serv	200	S 20th St		Tampa	FL	33605-6657	813-248-3302	3599A	7692D
426	Broadway Splicing & Supply Inc	611	Raser Dr		Missoula	MT	59802-1628	406-721-4013	3545	2411
427	Brodbeck Toole & Machine Co	4825	S 6200 W		Voca	TX	76887	915-239-5441	3599A	5085B
428	Brody Chemical Inc	7555	S 10th St		West Valley City	UT	84119	801-963-2436	2899	3291
429	Broker Mfg Inc	119	155d New Boston St		Oak Creek	WI	53154-1909	414-764-6363	3089	5087E
430	Brooks Equipment	8101	Espasie Millon		Woburn	MA	01801-6227	617-933-1980	3569E	
431	Broussard Furniture & Appliance	611	Denmark Rd		Youngsville	LA	70592	318-856-8774	6515	5084G
432	Brown & Morrison	1970	W 2nd St		Pineville	NC	28134	704-554-8570	3564	1781
433	Brown Corporation Of Waverly Inc Meil Simpson	3201	Rr	1	Waverly	OH	45690-9701	614-947-7763	3469	3829
434	Brown Leslie E Well Drill	2042	Swarthmore Ave		Georgetown	PA	15043-9801	412-973-9371	3541C	1781
435	Bruces Machine Shop	3020	W St		Lakewood	NJ	08701-4553	908-364-3344	3714B	3599A
436	Brutzer Metal Products Inc	6877	Clover St		Lima	OH	45801	419-225-8084	1761C	3469
437	Bsk Industries Inc	15412	State Hwy No	10	Portage	IN	46368-1609	219-762-4557	3569	
438	Big Machines & Polishing Co Inc	1170	N Hollywood Way		Morris Plains	NJ	07950	201-540-1960	3599A	
439	Buccaneer Enterprises	175	S New England Ave		Burbank	CA	91505-1026	818-845-2320	3599A	
440	Budget Engine Rebuilders	13848	Belford Industrial Dr		Chicago	IL	60638	312-586-3577	7538U	7538C
441	Buelle Tool & Engineering	34845	Mound Rd		Belvidere	IL	61008-8712	815-544-6431	3599A	
442	Build A Mold	233	Utah Ave		Sterling Heights	MI	48310-5723	810-939-2940	3544E	
443	Bull C H Co Tool & Equip Div	105	Industrial Dr	62	South San Francisco	CA	94080-6802	916-446-5050	1711	3536
444	Burd Manufacturing Co Inc	1512	SR		East Longmeadow	MA	01028-3148	413-525-3936	3599A	3569
445	Burger Metal Products	1170	S Patton St		Charlestown	IN	47111	812-256-6661	3364	3451
446	Burke Products Inc	175	Nw 72nd Ave		Xenia	OH	45385-5670	513-426-7353	3679B	3599A
447	Burnham Boilers & Controls	13848	S Federal Blvd		Denver	CO	80219-2012	303-922-4328	3443	
448	Burnham Cool Heat Inc Service Guaranteed	5220	S Torrence Ave		Chicago	IL	60633-2135	708-730-1700	7549F	3714C
449	Bustos Grinding & Repair Serv	1216	Nw 72nd Ave		Oakland	CA	94601	510-568-5898	3599E	5013W
450	Buy Rite Fire & Safety Equipment Company	45	N 4th Ave		Miami	FL	33166-4858	305-591-2911	3569E	3999
451	Buyken Industries Inc	856	Greenville Hwy		Kent	WA	98031	206-852-0634	3544D	5084
452	Byars Machine Co Main Office	8850	Barry St Se		Laurens	SC	29360	803-682-3146	3599A	1761
453	Byron Center Machine	335	S Garfield Ave		Grand Rapids	MI	49548-7713	616-455-6820	3599F	3441
454	C & C Metal Form & Tooling Co	25136	Mason Ave		South Gate	CA	90280	310-861-9554	3544D	
455	C & C Power Tools	1702	Windfern Rd		Daytona Beach	FL	32117-4719	904-253-5815	7699P	5072E
456	C & C Supply Co Inc	856	Hubbard St		Houston	TX	77064-7700	713-466-0506	3498	3599
457	C & D Tool & Die	335	5 Millie Rd		Mount Clemens	MI	48043-5422	810-463-5809	3544D	
458	C & J Fasteners Inc	18975	Se Village Green Dr		Redford	MI	48239-3717	313-535-8835	0919	
459	C & L Tool & Die Inc	802	Rr	1	Port Saint Lucie	FL	34952-3447	407-335-5655	3599A	3452
460	C & M Custom Machining Inc	1509	Nichols Rd		Glenmoore	PA	19343-9801	610-458-0897	3599A	3469
461	C & S Machine Inc		Profit Dr		Lake Elsinore	CA	92532-2235	909-674-2196	3542	
462	C & S Precision Inc		Johnson Ferry Rd		Garland	TX	75040-5749	214-487-6181	3599A	
463	C & S Valve Company				Marietta	GA	30062-8122	770-973-8333	3494	



468	C T Crankshaft Grinding	3501	Lincoln Ave	CA	90620	818-337-2412	3599A
469	Cadillac Plastic & Chemical Co	582	W 123rd St	CA	95100	408-988-1314	3089
470	Cadillac/Faulkner Plastics Inc	1919	NW 19th St	FL	33311-3538	305-527-1111	1761E
471	Cal Chemical & Manufacturing	1003	Baldwin St	MI	48214-2430	313-331-0990	3291
472	Calder Machine Company Inc	2116	Jody Rd	SC	29501-2032	803-665-5730	3599A
473	Calibron Instruments	220	Grove St	MA	02154-6550	617-894-6440	5013
474	Calif Metal Work Co	11381	Luddington St	CA	91352-3107	818-504-0786	1761C
475	California Alloy Co	1475	Potrero Ave	CA	91733-3090	818-579-3230	3823
476	California Industrial Machine	8926	Benson Ave	CA	91763-1670	909-985-1121	3582
477	Callumet Stamping Co	27970	Groesbeck Hwy	MI	48066-2797	810-776-3725	3469
478	Cameron Grinding	24939	Budde Rd	TX	77380-3008	713-367-4777	7699D
479	Cammerzell Tool & Die Works	650	Strawberry St	NJ	08638-3387	609-695-7415	3599A
480	Camtel Fabrication Inc	3616	N Flora Rd	WA	99216-1710	509-922-3299	3365
481	Canton Machine Works	6700	N Canton Center Rd	MI	48187-1649	313-459-7815	7538C
482	Capital Machine Works	675	Madison	NE	68317	402-782-2181	3599A
483	Capitol Manufacturing Co Pipe	6505	Rusk St	TX	77011-4519	713-928-3488	3498
484	Caprice Engineering Co	509	Hindry Ave	CA	90301-2070	310-641-6403	3599A
485	Car-Lin Services Inc	807	S Hamilton St	GA	30719	706-278-8116	3599A
486	Carbet Corp	1015	Golf Dr	MI	48341	810-334-4523	3544D
487	Carbonic Sales & Service		Valley Blvd	CA	95341	209-383-7440	3999
488	Caris Machine Shop	14594	Valley Blvd	CA	92335-6204	909-350-1187	3714B
489	Carlson Industries Inc	7905	Highway	GA	30274-3901	770-478-8851	3536
490	Carlson Machine Company	10927	Garfield Pl	CA	90280-7595	310-923-3248	3599A
491	Carnegie Manufacturing Co Inc	20	Montesano Rd	NJ	07004-3310	201-575-3449	3544E
492	Carnel Labs	21434	Osborne St	CA	91304-1520	818-882-3977	3825B
493	Carolina Brass & Aluminum	1835	Harrelson Rd	SC	29374-3212	803-574-8933	3321
494	Carolina Engineering Machine Shop		Withrow Rd	NC	28043	704-245-1607	7538C
495	Carolina Instrumentation Co	800	S Stratford Rd	NC	27103-3202	910-768-2592	3829
496	Carteret Die-Casting C	74	Veronica Ave	NJ	08873-3417	908-246-0070	3363
497	Cary Machine Co		104-E Woodwinds Industrial	NC	27511	919-467-5592	3599A
498	Cascade Precision Inc	10809	47th Ave W	WA	98275-5001	206-742-0888	3599A
499	Casco Tool & Die	11875	Stephens Rd	MI	48089-3971	810-755-5850	3544D
500	Cash C D Manufacturing Co	4900	W Bloomingdale Ave	IL	60639-4562	312-889-3370	3599A
501	Cass Tool & Manufacturing Inc	525	Morris Ave	IL	60060-1966	708-949-0292	3544D
502	Cast Machined Products	3900	Magnolia St	CO	80207-1442	303-377-1052	3369
503	Cast Metals Inc	2711	Mullins Ct Nw	MI	49504-1219	616-453-9709	3369
504	Casting Alternatives	14600	York Rd	MD	21152-9306	410-472-1233	3599A
505	Casting Unlimited		Lake St	NY	13808	607-263-5192	3369
506	Castle Hone & Lap	671	Aldo Ave	CA	95054-2209	408-727-3922	3599A
507	Catamar Plastics Inc	49	Research Dr	CT	06460-2864	203-878-3411	3544E
508	Cavalier Machine Shop	5005	Pine Gap Rd	SC	29303-1926	803-599-1973	7538C
509	Cei Automation Inc	15250	E 33rd Pl	CO	80011-1237	303-375-0050	5962
510	Celcom Company Inc			NC	27502	919-387-0415	3569E
511	Center Machine Inc	221	State Rd	WI	54824	715-646-2511	3599A
512	Center Precision Products		Westover Dr	VT	05857	802-334-1480	3599A
513	Central Caster & Material Handling Inc	10733	Colewood Ln	TX	75243-5207	214-341-0899	3429
514	Central Equipment Co Inc	855	Angliana Ave	KY	40508-3190	606-253-2611	3523
515	Central States Tooling Serv Inc	241	E Helena St	OH	45404-1003	513-223-1313	3541
516	Ceramic & Metal Coatings Shop		Coiffey Ln	GA	30253	770-957-1561	3599A
517	Ceramic Cooling Tower Co	650	N Sam Houston Pky E	TX	77060-5906	713-448-8440	3443
518	Challenge Fastener Inc	936	Electric	OH	44805	419-289-6295	3452
519	Chambers Machinery Inc	3031	W Chambers St	WI	53210-2043	414-442-6460	3599A
520	Chandler Industries		Airport Indstrial Park	MN	56265	612-269-8893	3599A
521	Chanute Machine	200	N Plummer Ave	KS	66720-1424	316-431-4080	3599A



522	Charlton Tool & Supply Inc	11993	Ravenna Rd	Chardon	OH	44024-9044	216-286-6440	3541		
523	China Tool Inc	26416	W 7 Mile Rd	Redford	MI	48240-1917	313-533-8126	3599A		
524	China Tool Inc	8100	Reading Rd	Cincinnati	OH	45237-1400	513-821-3939	3089		
525	Chattanooga Supply Inc	4295	Cromwell Rd	Chattanooga	TN	37421-2166	615-899-8484	2899	5087C	7359A 3569
526	Chatten E M Equipment Co Inc	2625	N 24th St	Quincy	IL	62301-1215	217-222-5454	3523		
527	Chautauqua Machine Specialties		Parpenter-Pringle Rd	Ashville	NY	14710	716-782-3276	3599A		
528	Chellis International	819	W State St	Fremont	OH	43420-2537	419-332-0229	3291	3544D	
529	Chester Industries Inc	5061	W 161st St	Cleveland	OH	44142-1602	216-676-4900	3569		
530	Chgo Hi-Speed Tool & Supply Co	5480	N Elston Ave	Chicago	IL	60630-1454	312-736-9600	3545	3291	3541
531	Chips Machine Service	2522	W McDowell Rd	Phoenix	AZ	85009-2907	602-233-9656	3599A		
532	Christie Mach Works Co Inc	425	W Mccarty St	Indianapolis	IN	46225-1237	317-638-8840	3599A	7692D	
533	Cincinnati Controls Inc	6580	Corporate Dr	Cincinnati	OH	45242-2101	513-530-0044	3679B	3829	
534	Cincinnati Gilbert Mach Tool Co	3366	Beekman St	Cincinnati	OH	45223-2700	513-541-4815	3541		
535	Cinti Electr Tool Inc	5928	State Rt	Miamitown	OH	45041	513-353-3662	3541H		
536	Cinti Valve Co	1519	Tremont Fairmnt	Cincinnati	OH	45205	513-471-8258	3494		
537	Cinti Ventilating Co	7410	Industrial Rd	Florence	KY	41042-2916	606-371-1320	3365	3399	1761 3441
538	City Tool Die & Mfg Co Inc	984	Memorex Dr	Santa Clara	CA	95050-2810	408-727-4611	3599A	3541	
539	Clampitts Well Systems Inc			Gray	GA	31032	912-986-5312	3541C	1781	3561
540	Classic City Tool & Engng	1929	Wayne St	Auburn	IN	46706-3514	219-925-1420	3599K	3599A	3544D
541	Classic Die Inc	610	Plymouth Ave Ne	Grand Rapids	MI	49505-6040	616-454-3760	3544D	3544E	3541
542	Classic Machine		E Hwy	Giddings	TX	78942	409-542-4167	3599A	1629L	
543	Classic Tool Mach Inc	546	Hoyt St	Painesville	OH	44077-3616	216-352-1693	3544B	3599A	
544	Clayton Industries Stamping	4115	Commerce Ave	Fairfield	AL	35064-1325	205-780-8300	3469		
545	Clegg Manufacturing Co	117	Cedar Ln	Englewood	NJ	07631-4803	201-568-0888	3599A		
546	Cleveland Tubes Inc	4201	W Orange St	Pearland	TX	77581-3326	713-485-3133	3498		
547	Cline Machine Works	1706	W Cherry	Clarksville	AR	72830	501-754-7161	3599		
548	Clovis Hedny Industries Inc	7021	La Highway 1 S	Addis	LA	70710-2032	504-749-3531	3564	1541A	3569D 6515
549	Coast Carbide Engineering	13429	Valley Blvd	LA Puente	CA	91746-2418	818-961-5530	3363	3544D	
550	Coastal Bolt Sales & Serv In	3702	Colgate St	Houston	TX	77087-4604	713-644-2069	3452	5085	
551	Coastal Corrosion Control Inc	11386	S Choctaw Dr	Baton Rouge	LA	70815-2101	504-275-6131	5051	8661	2899 3541C
552	Coastal Instrument Services			Arroyo Grande	CA	93421	805-481-5558	3825		
553	Coastal Rubber & Gasket Co	3356	Sports Arena Blvd	San Diego	CA	92110-4530	619-222-1161	3053	3069	3999L 5551
554	Coastal Welding	1125	48th St	West Palm Beach	FL	33407-2388	407-863-5104	3365	8712C	3441 5084R
555	Coats Warner Corp	14731	Keswick St	Van Nuys	CA	91405-1206	818-994-4504	3569	5083G	5084H 2671
556	Coffman Welding & Metal Work	477	Cates Bypass Rd	Russellville	KY	42276-2339	502-726-8677	1761C		
557	Cohn & Gregory Inc	1805	East Ave	Fort Worth	TX	76103-2107	817-335-2893	5063C		
558	Coleman Steel Treating Inc	8465	Hamilton Rd	Memphis	TN	38101	901-342-1234	3398		
559	Collier Metal Craft	424	Commercial Blvd	Naples	FL	33942-4709	941-643-0095	3444		
560	Collins Machine & Die	1793	Homer Corn Rd Se	Marietta	GA	30007	770-426-7700	3599A		
561	Collins Machine & Tool Co	924	Myatt Industrial Dr	Madison	TN	37115-2429	615-860-2846	3544D		
562	Collins Sheet Metal		Route	Berwick	ME	03901	207-384-4428	3444		
563	Colonial Electric Corp	523	S Ellis Rd	Jacksonville	FL	32203	904-783-0128	3825B		
564	Colonial Mold Inc	44479	Reynolds Dr	Clinton Township	MI	48036-1245	810-469-4944	3544E		
565	Color Casting Inc	155	Canal St	New York	NY	10013-4511	212-925-9595	3363	3364	3599
566	Columbia Machine Works	934	75th Ave	Oakland	CA	94621-2912	510-568-0808	3599A	3599E	
567	Combined Casting Corp	37	W 47th St	New York	NY	10036-2809	212-382-0832	3363	3364	3599
568	Combustion & Control Co Inc	20715	50th Ave W	Lynnwood	WA	98036-7608	206-774-1163	5074D	1711E	3694 3829
569	Commerce Grinding Co Inc	600	W Commerce St	Dallas	TX	75208-1804	214-651-1977	3541H	3599A	
570	Commerce Pipe And Steel Co	11017	Gravois Industrial Ct	Sappington	MO	63128-2040	314-849-1188	3498		
571	Commercial Distributing Co Div Of Burke Engl	870	W 2600 South So Silt Lk	South Salt Lake	UT	84105	801-972-2039	3829		
572	Commercial Plastic & Supl Corp	9831	Jamaica Ave	Jamaica	NY	11421-2213	718-849-8100	3021	3089	
573	Commercial Plastics	9834	Jamaica Ave	Jamaica	NY	11421-2255	718-441-1500	3089		
574	Commercial Screw Products Inc	30520	Lakeland Blvd	Wickliffe	OH	44092-1750	216-944-8200	3599A		
575	Commercial/Slack Heat Treaters Inc Commc	2447	6th Ave S	Seattle	WA	98134-2024	206-623-5042	3398		
576	Companion Industries Inc	891	W Queen St	Southington	CT	06489-1094	203-628-0504	3544D		
577	Comptronics Inc	39	Calvary St	Walham	MA	02154-5974	617-891-4120	3599A		
578	Computer Automated Technologies	118	E Touhy Ct	Des Plaines	IL	60016	708-296-2111	3599A		
579	Concepts Machine Tool Engineering	317	E Gd Riv	Fowlerville	MI	48836	517-223-7235	3541	3599F	



584	Consolidated Metal Products Inc	3445	Garber Dr	TX	79901-1613	915-533-0411	3599A	331*	7692D
585	Conspec Systems Inc	55	Winans Ave	IL	60641-4793	312-685-2100	3569		5271A
586	Contemporary Casting Ltd	260	W 52nd St	NJ	07016-3144	908-272-2771	3354	3399	3599
587	Contico International	24	Zane Grey St	TX	79906-5226	915-772-5000	3089		
588	Continental Machine & Eng	4949	Huish Dr	IN	46312-3768	219-398-7300	3599A		
589	Continental Metal Specialty Inc	100	Continental Dr	KY	40475-9698	606-623-7411	3544D		
590	Contract Design Services Inc	1133	Mount Read Blvd	NY	14606-2815	716-254-0050	2399	3599F	
591	Control Components Inc	2275	Lower Wetumpka Rd	GA	30303	404-688-2316	3829		
592	Control Engineering Inc	190	Daly Cir	MA	01089-1310	413-781-1330	3829	5065	
593	Control Industries	2129	Center Park Dr	NC	28217-2904	704-357-3113	3829		
594	Control Technologies Inc	89	Ethan Allen Dr	VT	05403-5857	802-860-1700	3829		
595	Controlled Precision Machining Inc	37560	Enterprise Ct	MI	48331-3467	810-553-4411	3599A		
596	Converting Technology Inc		Hackettstown Area	NJ	07840	908-850-3767	3569		
597	Conveyor Equipment Company	2350	Sherry Dr	NY	10598-3657	914-962-6284	3444		
598	Cooper Industries	409	S River Rd	IL	60540-5036	708-717-7839	3494		
599	Cooper Metals Inc	5302	Spencer Hwy	TX	77505-1514	713-487-9585	1761	1791D	
600	Corey Canapary & Galanis Rsch	447	Sutter St	CA	94108-4601	415-397-1200	8741G	3829C	
601	Cornett Machine Shop Inc	706	S Highway	KY	42501-3509	606-678-5163	7538C		
602	Cornucopia Tool & Plastics Inc	448	Sherwood Rd	CA	93446-3554	805-238-7660	3089		
603	Corporate Cutting Dies Inc	540	Dana Ave	OH	43223-5201	614-464-2361	3999L	3544D	
604	Corrosion Materials	4650	S Pinemont Dr	TX	77041-9311	713-939-0364	3364	3446	
605	Costa Mach Inc	924	Home Ave	OH	44310-4187	216-376-3636	3599A	3599F	
606	Cottage Casting Co		John	NJ	07960	201-539-4780	3369		
607	Count-On Tools Inc Fax	366	Carl Cedar Hill Rd	GA	30680-3443	404-307-1785	3545		
608	Countrs Precision Grinding Co	66	E 10 Mile Rd	MI	48030-1135	810-541-0016	3541H		
609	County Line Equipment Co In	8507	Pacific Hwy E	WA	98422-3917	206-922-6658	3599E	5082	
610	Covlet Machine & Design Inc	14628	Smokey Point Blvd Ste	WA	98271-8900	360-658-1977	3599A	1791D	
611	Cox Machine Inc	5920	W	KS	67203	316-943-1342	3599A		
612	Cq Machining	21427	N 23rd Ave	AZ	85027-2525	602-516-1556	3599A		
613	Cragin Hardware & Industria	2021	N Laramie Ave	IL	60639-3193	312-237-4170	5722F	5251	5231A
614	Craig & Neier Service Mch Shop	232	E Main St	IN	46168-1115	317-839-6251	7538C		
615	Craig H Metals & Supply Co	280	Rocky Creek Rd	SC	29615-6145	803-234-5724	3498	5051D	3494
616	Crains Grinding & Machine Ser	4473	N Highway	NC	28037-8186	704-483-0551	3599A	7699P	
617	Cramers Grinding & Tooling	3447	Baldy View Ln	OR	97477-9401	503-747-6704	3544D	3599A	
618	Crane Valley Casting Inc		Crane Creek Rd	MO	65633	417-723-5539	3363		
619	Crankshaft Grind & Metal	1124	S 300 W	UT	84101-3053	801-364-6427	7538C	7538Z	3599A
620	Croft & Son Mfg Inc	509	Highland Ave	OH	43963-1110	614-859-2200	3599A	7692D	
621	Crosby Mfg Co		Crosby	MN	56441	218-546-5115	3089		
622	Cross/Laubenstein Manufacturing Co	166	Dundaft St	PA	18407-1565	717-282-4344	3089		
623	Crowl Machine & Heat Treati	1632	Nw 5th St	OK	73106-5046	405-236-4702	3541H	3599A	7699D
624	Crutchfield Stamping Inc	8596	Lake Chetac Dr	OH	45241-3402	513-398-2046	3469		
625	Crystal Industries	1835	Ne 144th St	FL	33181-1419	305-944-5671	3291		
626	Crystal Metal Products Co Inc	2700	Castor Ave	PA	19134-5598	215-426-5322	3599A		
627	Cuno Machine Co		Star Rt	MO	63361	314-564-2788	3599A	7692D	
628	Curtis Steel Corporation	6504	Hurst St	TX	77008-6217	713-861-4621	3542	5051D	2299
629	Custom Automatic Mach	320	Vermont Ave	OH	45404-1524	513-224-1391	3599A	3451	
630	Custom Coating Division	4127	Meadow Ln	LA	71111-2911	318-742-0300	3398		
631	Custom Contracting Services Inc	3358	Burd Rd	WY	82601	307-265-6251	1541	3541C	1794
632	Custom Controls Corporation	4630	16th St E	WA	98424-2663	206-922-5874	3829	1731	
633	Custom Cylinder Hd	1210	S May	OK	73100	405-681-2242	7538C		
634	Custom Engine Machine Service	2714	9th St	WA	98312-3859	360-479-2560	7538C	3599A	
635	Custom Grinding	22952	Rasch Dr	MI	48043	810-792-6970	3541H	3599A	
636	Custom Head Porting	956	N Us Highway	FL	32750-3156	407-834-3078	7538C		
637	Custom Hydraulic & Machine Inc	22911	86th Ave S Kent	WA	98031-2466	206-854-4666	3599A		



Customer Name	Address	City	State	Zip	Phone	Fax	Product
3701 Custom Machine & Tool	S Interstate 85 Service Rd	Charlotte	NC	28208-3543	704-391-9325	3599A	7699D
127 Cl chining	N Chery St	Flushing	MI	48433-1601	810-659-2454	3599A	
150 Custom Mold & Tool	E Hwy	Mountain View	MO	65548	417-934-6075	1791D	
642 Custom Rollforming Corp	East Dr	Melbourne	FL	32904-1025	407-724-0127	3599A	3544E
643 Custom Stainless Steel Inc	1-E	Moundridge	KS	67107	316-345-2821	3542	3089
644 Custom Tool & Design Inc	Buerkle Rd	White Bear Lake	MN	55110-5246	612-777-4948	3325	
645 Custom Tool & Die Co	Pittsburgh Ave	Erie	PA	16509-6207	814-838-9777	3599A	3544E
646 Cyltemp Specialty Steel Div	W Marquette Wds	Stevensville	MI	49127	616-429-8791	3544D	
647 D & B Machine Shop	Marquardt Ave	Cerritos	CA	90701	310-926-6629	3312	
648 D & D Industries Inc	Po Box	Pocatello	ID	83206	208-234-0516	7538C	
649 D & D Machine Shop	Groesbeck Hwy	Fraser	MI	48026-4207	810-294-5580	3599A	
650 D & D Welding	Aspen Cir	Pueblo	CO	81006-1408	719-546-1880	3599A	3441
651 D & F Corporation	Ocean St	Eugene	OR	97402-2916	503-343-2553	3365	3523E
652 D & J Machine Shop	Merrill Rd	Sterling Heights	MI	48314-3239	810-254-5300	3544E	
653 D & N Iron Works	Industrial Ln	Beaver Creek	OH	45430-1004	513-427-0827	3599A	3599K
654 D & S Machine & Welding	N Lexington Blvd	Corpus Christi	TX	78409-1325	512-289-9004	3599A	7692D
655 D & V Sons Inc	Benson Dr E	Puyallup	WA	98372-2840	206-848-4611	3599A	3441
656 D C Industries	Lines Hill St	Naugatuck	CT	06770-3014	203-729-5372	5032C	3541C
657 D C L Tooling Mach Shop	N Austin Ave	Georgetown	TX	78626-4515	512-869-4841	3599A	3451
658 D K Machine Inc	Pioneer Rd	Apple Valley	CA	92307-4359	619-240-1048	3599A	
659 D L J Sealing Dies	Sullivan Pky	Fort Edward	NY	12828-1027	518-747-0626	3599A	
660 D L R Machine Shop Inc	S Railroad	Lyons	WI	53148	414-763-3484	3544D	
661 D M B Tool Co	Church Ave	Lockridge	IA	52635	319-696-3600	3599A	
662 D T Mechanicals	Corner Of U S Hwy 31 & Al Hwy	Clawson	MI	48017-2006	810-585-3366	3569	
663 D Vn Tool & Die Services	97s	Montgomery	AL	36108	334-284-5693	3523	
664 D W Machine	Covell Ave Nw	Grand Rapids	MI	49504-2676	616-453-1112	3599A	7699D
665 Dabney Machine Shop	W Monroe St	Jackson	MI	49202-2252	517-787-9929	3599A	
666 Dakota Tool & Machine	S Estill Ave	Richmond	KY	40475-2013	606-623-5105	7538C	
667 Dal Miller Co Whol Of Metl Cuttg Tools	E Villard St	Dickinson	ND	58601-5379	701-225-5221	3599A	7692D
668 Dales Grinding	Darwin Ave	Hesperia	CA	92345-5185	619-949-7779	3545	
669 Dallas Machine Inc	La Cadena Drive West	Riverside	CA	92501	909-682-2101	3541H	7699D
670 Dama Tool & Gauge Co	Park View Dr	Schnecksville	PA	18078-2550	610-799-2800	3599A	
671 Dan-Ray Machine Co	172nd Ave	Grand Haven	MI	49417-9431	616-842-9631	3566	3544E
672 Daniel Valve	Essex St	Haverhill	MA	01832-5675	508-374-7611	3599A	
673 Danyl Die Set	Chuckwagon Trl	Casper	WY	82604-9122	307-235-7940	3829	5063N
674 Danzco Machine Work & Welding Fax	143d Av Se	Los Angeles	CA	90022	213-685-8151	3999L	3494
675 Darryls Gear Box	Southfield Rd	Tenino	WA	98589	360-264-5105	3599A	
676 Data Preference Inc	Pearl Ct	Lincoln Park	MI	48146-2608	313-382-3760	3711	7537
677 Data Test Corp	Po Box	Allendale	NJ	07401-1629	201-825-9000	3825B	
678 Datec Tooling & Development	Commercial St	Coronado	CA	92118	619-435-2800	3825B	
679 Daum Products Inc	Cabot Rd	Manchester	NH	03101-1142	603-641-6449	3599A	
680 Dave Stern Inc	Mclean Blvd	Laguna Hills	CA	92653-7014	714-367-1633	3089	
681 David Robin Ironworks	Highway	Paterson	NJ	07513-1086	201-684-1433	7538	5531C
682 Davies Drilling	24th St	Oakridge	OR	97463-9569	503-782-4652	3599A	7534
683 Davis Concrete Products Inc	24th St	Seattle	WA	98028	206-439-3234	3541C	
684 Davis Engineering	Corbin Ave	Phenix City	AL	36867-3856	334-298-4620	7699H	3443A
685 Davis Machining Co	Winona Ave	Canoga Park	CA	91306-1946	818-993-0472	3829	
686 Davro Instrument Corp	& Canon Ave	Burbank	CA	91504-2574	818-845-7293	3599A	
687 Dayton Electro Machining	N Moraine Dr	Lansdale	PA	19446	215-368-2520	3599A	3544D
688 Dayton Gundrilling & Mach Inc	Webster St	Dayton	OH	45439-1507	513-294-7581	3599K	
689 Dayton Wireburn Inc Fax	Armstrong Ln	Dayton	OH	45414-2608	513-890-0679	3599A	
690 De Angelo Machinery Sales Inc	N Lenola Rd	Dayton	OH	45414-4225	513-274-0014	3599A	47
691 Deasey Machine Tool & Die Inc	Rr	Moorestown	NJ	08057-1046	609-234-2552	3545	3541
692 Deck Machine & Tool	N 22nd Ave	Everett	PA	15537-9801	814-847-2728	3599A	
693 Deco Grinding & Machine	Hill Rd	Phoenix	AZ	85009-3005	602-253-1080	3599A	
694 Deco Welding & Iron Works	W Lincoln Ave	Houston	TX	77039-5122	713-449-5229	3541H	
695 Deep Well Threaders Inc	W Hwy	Anaheim	CA	92801-6019	714-758-0231	3548A	
	80	Midland	TX	75959	915-697-0736	3541F	

700	De... Equipment & Supply	7037	St Rt	Mc Connelsville	OH	43756	614-962-2185	3523	3599c
701	D... hine Inc	15235	Herriman Blvd	Noblesville	IN	46060-4230	317-776-1970	3599A	
702	Degels ...anufacturing Inc	25700	D'hondt	Chesterfield Townshi	MI	48043	810-949-3550	3544D	346c
703	Deimling Mold & Tool Inc	1190	Ferris Rd	Amelia	OH	45102-1097	513-752-6653	3544E	
704	Dekalb Tool & Die Inc	2220	Stephens Dr	Tucker	GA	30084-4328	770-938-5605	3469	3544D
705	Delafield Corp	1520	Flower Ave	Duarte	CA	91010-2925	818-303-0740	3494	5085H
706	Delaware Machinery & Tool C In	700	S Mulberry St	Muncie	IN	47302-2356	317-284-3335	3544D	3544B
707	Dell Manufacturing Co Inc	4	Right Ln	Farmington	CT	06032-3148	203-677-8545	3599A	
708	Dellacor Co	1711	Potrero Ave	South ElMonte	CA	91733-3097	818-444-5690	3544D	
709	Delltronics Inc	3620	S Huron St	Englewood	CO	80110-3426	303-789-2661	3566	3599A
710	Delta Control Engineering Inc	1021	Ne 27th Ave	Pompano Beach	FL	33062-4221	305-781-2142	3829	
711	Delta Lok Co	1274	Virginia Ave	Bensalem	PA	19020-5330	215-639-1225	3544D	
712	Delta Machine Works Inc	16	Marion St	Hackensack	NJ	07601-6824	201-487-8769	3599A	
713	Delta Measurements & Control	4	Evergreen Ln	Hopedale	MA	01747-1536	508-478-5565	3829	
714	Delta Valve Rebuilders Inc	295	Moore St	Harrisburg	OR	97446	503-995-6138	3594C	3494
715	Deluxe Diecutting	2600	Fernbrook Ln N	Plymouth	MN	55447-4752	612-559-7389	3999L	
716	Dema Engineering	1365	Grand Ave	San Marcos	CA	92069-2455	619-471-8787	3599A	
717	Dennco Supply Inc	4112	83rd Ave N	Minneapolis	MN	55443-2530	612-560-0704	3291	2891
718	Dennis Johns Machine Shop	9009	Poison Oak Rd	Temple	TX	76502-5481	512-939-7790	7538C	
719	Dennis Tool Co	2020	Rankin Rd	Houston	TX	77073-5100	713-821-9495	3541	
720	Denver Die Mold Inc	12410	W Cedar Dr	Denver	CO	80228-2002	303-986-5559	3544E	
721	Dependable Centerless Grinding Co	20516	Lorne St	Taylor	MI	48180-1901	313-383-1334	3541H	
722	Dependable Precision Products Co Inc	267	1st Ave	Roselle	NJ	07203	908-245-0716	3599A	
723	Dependable Sheet Metal Company Inc	2964	Mill St	Mobile	AL	36607-1916	334-473-3515	3365	2842
724	Descote Inc	4151	Southwest Fwy	Houston	TX	77027-7320	713-622-5575	3494	1791D
725	Design Casting	21628	N Central Ave	Phoenix	AZ	85024-5110	602-516-0562	3363	
726	Despatch Machine Co Inc	130	Despatch Dr	East Rochester	NY	14445-1448	716-586-7637	3599A	
727	Detco Manufacturing	404	Race & Myers	Irwin	PA	15642	412-863-8765	3599A	
728	Detroit Ball Bearing Co	400	Keiso St	Flint	MI	48506-4031	810-238-9633	3562	3494
729	Detroit Pump & Manufacturing Co	400	Dartmouth Dr	Midland	MI	48640-4598	517-832-9611	3599E	5084G
730	Detroit Pump & Mfg Co	3212	S Dye Rd	Flint	MI	48507-1006	810-733-7700	5084G	3599E
731	Detroit Tubular Rivet Inc	1213	Grove St	Wyandotte	MI	48192-7086	313-386-2334	5085	3452
732	Deutz-Allis Lennox Equipment Inc	457	Po Box	Lennox	SD	57039-0457	605-647-5285	3523	5261C
733	Devlin Electric	3410	Eva Dr	Concord	NC	28027-5544	704-782-1331	3829	1731
734	Dewey Machine & Tool Inc	49	James St	Homer	NY	13077-1221	607-749-3930	3599A	
735	Dexter Tool Co	1	Crow Point Rd	Central Falls	RI	02863-1607	401-722-8344	3599A	
736	Di Eugenio Tool Center Inc	1120	S Black Canyon Hwy	Phoenix	AZ	85009-5857	602-258-8364	3545	
737	Di-Al Machine Co	10	Mechanic E	North Brookfield	MA	01535	508-867-2366	7999P	3599A
738	Diamond Drill Contracting Co	1015	N Yardley Rd	Spokane	WA	99212-0961	509-534-1588	3541C	
739	Diamond Perforated Metals Inc	17915	S Figueroa St	Gardena	CA	90248-4212	310-327-9172	1791D	
740	Diansupply Inc	4505	Green Park Rd	Saint Louis	MO	63123-7201	314-892-8597	3999L	
741	Diboll Scale Models	237	Davis Ave	Pass Christian	MS	39571-4505	601-452-4480	3999A	
742	Dickerson Manufacturing	2761	W Oxford Ave	Englewood	CO	80110-4365	303-781-1280	3599A	
743	Dicky Robert R Co Inc Industrial Dist	7601	Seneca St	East Aurora	NY	14052-9457	716-652-1445	3494	
744	Die Supply Co	2532	Converse St	Dallas	TX	75207-5904	214-630-4695	3999L	
745	Dies Inc	1519	Allantic Ave	Kansas City	MO	64116-3910	816-474-9488	3999L	
746	Dihco Inc	612	E Crescent Ave	Saddle River	NJ	07458-1827	201-327-0518	3599A	
747	Dimar Systems	204	N Of Las Cruces	Las Cruces	NM	88000	505-522-1747	5063A	3999
748	Dimension Mold & Design	1977	S River Dr	Tempe	AZ	85281-3056	602-966-1088	3544E	
749	Dimensional Mold Engineering Inc	7591	Rochester Industrial Dr	Rochester Hills	MI	48309-3344	810-651-7600	3544E	3089
750	Dimi Tech	1020	Yates St	Westminster	CO	80030-4612	303-427-3596	3999A	
751	Dimold Co Inc	631	E Elizabeth Ave	Linden	NJ	07036-2230	908-925-5114	3544E	
752	Direct Design	1430	Church St	Saint Henry	OH	45883-9683	419-678-8021	3544D	
753	Diversified Electl Prods Inc	200	Hanger Cir	Bohemia	NY	11716-5027	516-567-5710	3699	
754	Diversified Machining Co	410	N Bagdad Rd	Leander	TX	78641-7802	512-259-0008	3599A	
755	Diversified Mfg Inc	151	Hanger Cir	Lockport	NY	14094-4291	716-625-9567	3541	
756	Diversified Tool & Development	151	Hanger Cir	Richmond	KY	40475-3246	606-624-2202	3451	
757	Dixon Systems & Components	151	Allaireairport	Farmingdale	NJ	07727	908-938-5958	3562	3494

4 D#	Company Name	3975	York St	Denver	CO	80205-3537	303-297-9912	3494
51 D	e & Coupling Co	1013	N Ciero Ave	Chicago	IL	60644	312-287-7722	3599A
52 D	Do All Plastic Inc	1265	Terminal St	Detroit	MI	48214-3444	313-824-6565	3544E 3089
53 D	Dobday Manufacturing Co Inc Tools	42750	Merrill Rd	Sterling Heights	MI	48314-3244	810-254-6777	3599A
758	Domino Electronics	5800	Fairfield Ave	Fort Wayne	IN	46807-3400	219-456-5512	3829 7382A
759	Don Johns Inc/Pbm Valves	1800	Macleod Dr	Lawrenceville	GA	30243-5736	770-995-6838	5063N 5084G 3494
760	Donelson R Co Inc Mfr Agt	16822	Se River Rd	Milwaukee	OR	97222	503-654-3137	3829
761	Dons Petroleum Equipment Sales & Service	11897	Debonair St Ne	Moses Lake	WA	98837-9576	509-765-1114	3563 1794 3599E
762	Dooley Arthur & Sons Inc	314	Center St	Deer Park	TX	77336-2738	713-479-9700	3999 3569E 5084J
763	Dora Supply Co Inc	11625	Walsingham Rd	Largo	FL	34648-2498	813-584-2163	3291 7359A 5251 5192B
764	Dorvison Automatic Screw	4293	Haman Pkwy	Willoughby	OH	44094	216-946-7061	3599A
765	Double D Enterprises Mfg	2116	Hwy 59 N	Gentry	AR	72734	501-736-2417	3369 3599A 7692D
766	Double D Mach And Tool Co	220	Napoleon Rd	Fremont	OH	43420-1577	419-332-4871	3599A 3599F 3544D
767	Double E Grinding & Machine	278	S 5th	Capron	IL	61012	815-569-2236	3599A
768	Dow Engineering Co	1310	Bridge Rd	Salisbury	MA	01952-2410	508-462-7507	3599A
769	Dpi Inc	1676	Indstrl Blvd	Southampton	PA	18954	215-953-1192	3599A
770	Dresser Security	1354	N Ventura Ave	Ventura	CA	93001-1576	805-648-7777	3541C
771	Dresser-Rand Company Services Division	5161	S Sheridan Rd	Tulsa	OK	74112-5416	918-835-8437	3599A 3561
772	Drill & Tap Disintegrating	1112	Sisson Dr	Huntington Beach	CA	92649-2439	714-840-0787	3599A
773	Drill Parts & Service Company In	917	Ruffner Rd	Irontale	AL	35210	205-956-0684	3541C
774	Drillco Equipment Co Inc	4838	14620-E Flint Lee Rd	Chantilly	VA	22021-1517	703-631-3222	3541C
775	Drillmaster Inc	1829	N Commercial Blvd	Arlington	TX	76010	817-467-4845	3541C
776	Drive Line Specialists Inc	3401	Nw 1st St	Fort Lauderdale	FL	33311-8998	305-463-7711	3714B 5531B 5531A
777	Drive Shaft Service Co	7064	West Ave	San Antonio	TX	78213-2704	210-342-6622	7538C 3714B 3714 3714B 3568 3599A 3441
778	Drive Train Ind	4005	E Mulberry St	Fort Collins	CO	80524-3525	970-493-3277	5013
779	Driveshaft Specialists	3232	Everett Ave	Everett	WA	98201-3814	206-259-6074	3714B 3599E
780	Dubbee Mfg	70	Gerald Ave	Van Nuys	CA	91406-3709	818-989-1020	3599A
781	Dublin Machinery	11354	Grove St	Pittsford	NY	14534-1334	716-586-6187	3541
782	Dugan Tool & Die Co	6	Lagrange St	Toledo	OH	43612-1428	419-476-1639	3544B 3544D
783	Dun-Rite Industries Inc	1010	South Ave	Toledo	OH	43609-1195	419-385-5559	3544D
784	Dun-Rite Machine Inc	4300	S Franklin St	Nyack	NY	10960-3734	914-358-0869	3599A
785	Duncan Engineering & Equipment	273	Burbank Blvd	North Hollywood	CA	91601-2441	818-760-4100	3531A 9511A 3479 2899
786	Dunham Products Inc	2941	Industry Dr	Cleveland	OH	44146-4414	216-232-0885	3541H
787	Dunlap Machine Products Lake Havasu City	9	Empire Dr	Lake Havasu City	AZ	86404-2465	520-453-1011	3599A
788	Dunns Die Co	17	Fruitridge Rd	Sacramento	CA	95820-5102	916-421-1901	2759J 3999L
789	Duor Die Corp	379	Manufacturers Dr	Westland	MI	48185-4038	313-729-4452	3363
790	Duval Plastics Inc	1628	Edison Ave	Jacksonville	FL	32254-4363	904-389-1277	3599A 3087
791	Dybec Corp	61	Whippany Rd	Whippany	NJ	07981-1540	201-887-4183	3829
792	Dyer Technology Inc	540	Dracut Rd	Hudson	NH	03051-5055	603-889-6470	3829
793	Dyers Tool And Die	8021	S Long Hollow Rd	Maryville	TN	37801-8381	615-983-7593	3544D
794	Dyko Inc	1208	W Sunset Hwy	Spokane	WA	99204-9019	509-747-4139	3369 3599A
795	Dynamic Grinding	405	Industrial Ave	Norco	CA	91760-2947	909-735-8096	3541H
796	Dynatrol Inc	1366	Kansas St	Hackensack	NJ	07601-5351	201-488-0782	3494
797	Dynetic Industries Inc	540	N Main St	Manchester	CT	06040-1963	203-646-1763	3599A
798	Dynomach Inc	405	Commercial Dr	Port Allen	LA	70767-3226	504-383-3119	3599A 3544D
800	E & R Machine Products	1500	145th St	Little Rock	AR	72206-5865	501-897-4300	3599A
801	E & S Service	405	Travis La	Waukesha	WI	53186	414-544-5990	3599A
802	E B Manufacturing Co Inc	1366	N Bay Dr	North Bend	OR	97459-9576	503-756-2567	7538C 7538 7538U 3599A
803	E D C A Inc	35	Old Indian Trl	Middlefield	CT	06455	203-349-1765	3599A
804	E D M Exotics	1984	S Walnut St	La Crescent	MN	55947-1338	507-895-6012	3452
805	E D M Metal Works	2646	National Ave	Hayward	CA	94545-1710	510-783-2284	3599K 3599A
806	E E B Inc	605	Palma Dr	Ventura	CA	93003-7743	805-658-7658	3599A
807	E N V Engineering	7625	Sunset Ln	Saint Clair Shores	MI	48082-1246	810-415-8336	3089 3599A
808	E O Mfg Co	116	Rosecrans Ave	Paramount	CA	90723-2507	310-630-4585	3599A
809	E Ritter Equipment Company	13807	Horton Pl	West Haven	CT	06516	203-932-5981	3599A 7692D
810	E T J Corporation	1333	Hwy 63 West	Marked Tree	AR	72365	501-358-2555	3523 4971 5261C 3599A
811	E T Tool Inc		Avenue K	Austin	TX	78728-7604	512-251-5849	3599A
			23rd St	Racine	WI	53403-3313	414-637-0474	3544D 3544B



Agency	Address	City	State	Zip	Phone	Fax	Year	Value	Value/Year
1212 [Redacted]	1212 [Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
816 Eagle Tool Inc	Eagle Mills Rd	Sonora	CA	95411	33-821-8102	3541	[Redacted]	[Redacted]	[Redacted]
817 Earl Ralph W Company Inc	W Dell Rd	Bath	PA	18014	42776-9729	502-369-8033	3334	[Redacted]	355
818 Earthech Drilling Co	Jackson St	Columbus	IN	47201	810-759-5200	3541	[Redacted]	[Redacted]	[Redacted]
819 East Coast Industries	Buffalo Rd	Rochester	NY	14624	812-372-0612	3544D	[Redacted]	[Redacted]	5084V
820 East Coast Rebuilding Co	Locust St	Sandy	UT	84070	716-235-7602	3511	[Redacted]	[Redacted]	5072D
821 East Coast Rebuilding Co	Main Concord-Acton Industr Field	Concord	MA	01742	801-566-5417	3541C	[Redacted]	[Redacted]	5051D
822 East Coast Rebuilding Co	George King Blvd	Farmingdale	NY	11735	516-249-3020	3599A	[Redacted]	[Redacted]	7692D
823 East End Iron Works	Sound Ave	Cape Canaveral	FL	32920	407-784-5982	3731	[Redacted]	[Redacted]	7389H
824 East Tennessee Die	Central Ave	Mattituck	NY	11952	516-298-0124	3548A	[Redacted]	[Redacted]	[Redacted]
825 Eastern Vent Systems	Hopewell St	East Point	GA	30344	404-762-1737	3321	[Redacted]	[Redacted]	3369
826 Edco Precision	Mammoth Rd	Dandridge	TN	37725	615-397-0601	3999L	[Redacted]	[Redacted]	[Redacted]
827 Edger Industries	Lemuria St	Pelham	NH	03076	603-595-8559	1711	[Redacted]	[Redacted]	3444
828 Edgcomb Metals Co	Varna Ave	North Hollywood	CA	91605	818-982-0040	3599A	[Redacted]	[Redacted]	[Redacted]
829 Edm Source	Merwin Rd	New Kensington	PA	15068	412-339-6694	3599A	[Redacted]	[Redacted]	3441
830 Edwards Inc	Harding St Ne	Minneapolis	MN	55413	612-331-4000	5051A	[Redacted]	[Redacted]	3325
831 Edwards Machine & Tool Company	S Paintir Ave	Santa Fe Springs	CA	90670	310-698-5502	3599K	[Redacted]	[Redacted]	[Redacted]
832 Efficiency Machining Services	Franklin Ave	Raleigh	NC	27615	919-847-4224	1389J	[Redacted]	[Redacted]	1711
833 Efi Inc	Louisville Rd	Waco	TX	76710	817-754-1632	3599A	[Redacted]	[Redacted]	1791D
834 Elcam Tool & Die Inc	Carlstadt Rd	Coxs Creek	KY	40013	502-348-0076	3599A	[Redacted]	[Redacted]	3544D
835 Eldridge Welding & Machine Co	Rt 321	Parsippany	NJ	07054	201-515-9281	3829	[Redacted]	[Redacted]	[Redacted]
836 Electrical Power Products Inc	14th St	Wilcox	PA	15870	814-929-5831	3599A	[Redacted]	[Redacted]	3544D
837 Electronic Circuits Inc	Woody Creek Rd	Des Moines	IA	50309	515-244-0932	3566	[Redacted]	[Redacted]	3599A
838 Electronic Equipment Company I	W Lewis Ave	Greer	SC	29650	803-244-9634	3699	[Redacted]	[Redacted]	7692D
839 Electronics Stamping Corp	N Powerline Rd	Phoenix	AZ	85009	602-272-6052	8711J	[Redacted]	[Redacted]	3369
840 Electron Recovery Works Inc	S Alameda St	Pompano Beach	FL	33069	305-960-1200	3679B	[Redacted]	[Redacted]	3825B
841 Elemco Building Controls Inc	Martin St	Compton	CA	90221	310-639-2120	5065	[Redacted]	[Redacted]	3469
842 Elite Die & Finishing Inc	Motor Pky	Hauptauge	NY	11788	516-582-8266	3829	[Redacted]	[Redacted]	[Redacted]
843 Elite Machine Shop	Rush St	South El Monte	CA	91733	818-579-3771	3548A	[Redacted]	[Redacted]	[Redacted]
844 Elliott Metal Works	Westrn Ave	Blue Island	IL	60406	708-389-4848	3999L	[Redacted]	[Redacted]	[Redacted]
845 Elliott Technical Sales	Hillsborough Av E	Tampa	FL	33604	813-237-6997	7538C	[Redacted]	[Redacted]	[Redacted]
846 Ellis Tool & Machine Inc	Old Piedmont Hwy	Elkhorn	NE	68022	402-289-4770	3599A	[Redacted]	[Redacted]	3544D
847 Eimec Prdls Co	Tattersall Rd	Greenville	SC	29605	803-269-8930	3599A	[Redacted]	[Redacted]	1791D
848 Elmira Heat Treating Inc	N Elston Ave	Kalamazoo	MI	49002	616-327-1311	3369	[Redacted]	[Redacted]	3652
849 Elms Richard Hydraulic Service	S Kinyon St	Tom Bean	TX	75489	903-546-6540	3599A	[Redacted]	[Redacted]	[Redacted]
850 Emerson Industrial Controls	Lanehart Rd	Chicago	IL	60647	2021	312-384-2630	3544D	[Redacted]	3469
851 Emerson Sales & Service	2716-G Interstate St	Little Rock	AR	72204	501-455-2261	3599E	[Redacted]	[Redacted]	[Redacted]
852 Emg Inc Machine Shop	W Kneeland Rd	Charlotte	NC	28200	704-393-3366	3829	[Redacted]	[Redacted]	5063C
853 Emory Machine & Tool Co Inc	Po Box 4394	Mio	MI	48647	517-826-3388	3711	[Redacted]	[Redacted]	5084L
854 Emrick Machine Tool Rebuil	W 12th St	Erie	PA	16501	814-452-6431	3321	[Redacted]	[Redacted]	5261C
855 Enduro Enterprises	Fessenden St	Rochester	NY	14611	716-436-9610	3599A	[Redacted]	[Redacted]	[Redacted]
856 Energy Battery Inc	S Taylor Ave	Fresno	CA	93706	209-233-6115	3541H	[Redacted]	[Redacted]	5084D
857 Energy Reduction Systems	Holly Ave	Lake Havasu City	AZ	86403	520-855-7888	3599A	[Redacted]	[Redacted]	[Redacted]
858 Energy Tech Services Inc	N Port Ave	Corpus Christi	TX	78401	512-882-5531	3691	[Redacted]	[Redacted]	3699D
859 Engbrecht Tool	Mountain Rd	Stowe	VT	05672	802-253-7385	3829	[Redacted]	[Redacted]	[Redacted]
860 Engine Dynamics	E Broadway Ave	Bismarck	ND	58501	701-222-2999	3829	[Redacted]	[Redacted]	8748B
861 Engineered Flow Controls	Umbarger Rd	San Jose	CA	95111	408-224-2138	3599A	[Redacted]	[Redacted]	[Redacted]
862 Engineered Products Inc Louisi	N 19th St	Lincoln	NE	68503	402-435-1259	7538C	[Redacted]	[Redacted]	3494
863 Engineered Sales & Service Inc	Market St	Longview	TX	75604	903-759-0126	3498	[Redacted]	[Redacted]	3544D
864 Engineered Systems & Equipment Inc	Lake St	Omaha	NE	68134	402-399-8282	3599F	[Redacted]	[Redacted]	3544D
865 Engineered Systems Inc	Hazel Jones Rd	Bossier City	LA	71111	318-747-1620	3089	[Redacted]	[Redacted]	[Redacted]
866 Engineered Systems Inc	Air Park Rd	Ashland	VA	23005	804-798-9056	3829	[Redacted]	[Redacted]	[Redacted]
867 Engineered Systems Inc	Exeter Rd	Caney	KS	67333	316-879-5841	3599A	[Redacted]	[Redacted]	[Redacted]
868 Engineered Systems Inc		Hampton	NH	03842	603-776-7393	3829	[Redacted]	[Redacted]	[Redacted]
869 Engineered Systems Inc							[Redacted]	[Redacted]	[Redacted]

Company Name	Address	City	State	Zip	Phone	Fax	Website
01 Erwin Concepts Inc	4307 Progress Blvd	Louisville	KY	40218-3415	502-458-1492	3544E	
11 E... Products Associate	7336 Ohms Ln	Minneapolis	MN	55439-2330	612-835-9022	5065	3.
2 E... & Equipment Technologies Inc	1201 Poinsett Hwy	Greenville	SC	29609-3629	803-233-4411	5084L	3621
3 Environ Service Inc	506 Charles St	Lansing	MI	48912-3802	517-371-4343	7623	5075
874 Environmental Operations Inc		Cedar Rapids	IA	52402	319-393-6155	1799V	3541C
875 Environmental Products Inc	1 Sandlily Ct	Spring	TX	77380-0953	713-363-4868	3494	3561
876 Envirotronics Inc	1200 Woodruff Rd	Greenville	SC	29607-5730	803-627-0048	3569	
877 Epc Identification Systems	505 Martin Ave	Rohnert Park	CA	94928-2065	707-585-8811	3569H	2672A
878 Equipment Design & Fabrication Inc	722 N Smith St	Charlotte	NC	28202-1454	704-372-4513	3535	3599F
879 Equipment Engineers Inc	2020 Old Fort Foot Rd	Harleysville	PA	19438	215-393-1800	3599E	3561
880 Equipment Repair Inc	1803 McGuckian St	Annapolis	MD	21401-4023	410-269-5331	3599M	
881 Equus Mfg	16727 Parkside Ave	Cerritos	CA	90703-1840	310-404-4849	3599A	
882 Erdle Perforating Of Carolina Inc	10721 John Price Rd	Charlotte	NC	28273-4529	704-588-4380	3089	
883 Erickson Pump Co	17531 S Henrich Rd	Oregon City	OR	97045-9338	503-631-2049	5084G	3599E
884 Ernst-Eichman Machinery Corp	15541 W 110th St	Shawnee Mission	KS	66219-1393	913-492-2770	3545	3541
885 Erpel Design Corp	841 Tech Dr	Telford	PA	18969-1183	215-723-5577	3444	1761
886 Escofab Inc	2 Po Box	Altmore	AL	36504	334-368-1261	3469	
887 Eslinger Drilling & Pump Service	897 McWilliams Dr	Corvallis	MT	59828-9465	406-961-4175	3541C	5084G
888 Esr Industrial & Machine	120 Ne 20th St	Miami	FL	33137-4814	305-576-0192	3599A	3599E
889 Essex-Silver Line Corp	1118 Lakeview Ave	Dracut	MA	01826-4739	508-957-2116	3291	7359A
890 Euroma International Inc	3200 Oakcliff Industrial St	Dracut	MA	03040-2904	770-457-0708	3544E	3089
891 Ev-Rite Tool	Rr 132 Elm	Westfield	GA	01086	413-568-1433	3599A	
892 Evans Machining Service	314 State St	Clairton	PA	15025-1914	412-233-3255	3599A	
893 Evans Metal Fabricators	18155 Sw Baseline Rd Ste D	Aloha	OR	97006-7529	503-690-3025	1791D	
894 Everts Machine Co	21 Francis Ave	West Hartford	CT	06106-2102	203-523-9796	3599A	
895 Evelyn Place Inc	1 Market St	Passaic	NJ	07055-7306	201-779-1397	3545	
896 Ever Ready Thermometer Co Inc	Lackawanna Ave	Little Falls	NJ	07424-2977	201-812-7474	3823	
897 Eveready Mc Callum Machinery	Roosevelt Dr	Derby	CT	06418-1647	203-732-5497	3599E	
898 Evergreen Imports Inc	45437 Warm Springs Blvd	Fremont	CA	94539-6104	510-226-6647	3999	
899 Evergreen Testing & Environmental Services	65 Oliver St	Cohoes	NY	12047-4730	518-238-2915	1799V	3541C
900 Exair Corp	1250 Century Cir N	Cincinnati	OH	45246-3300	513-671-3322	3544B	8734
901 Excel Screw Machine Tool Co	Lorne St	Taylor	MI	48180-1969	313-383-4200	3451	
902 Excell Equipment Co	E 51st St	Tulsa	OK	74105-1737	918-749-0377	3494	
903 Exchange Tool & Supply Inc	Ambassador Row	Dallas	TX	75247-4599	214-631-7720	3429A	3569
904 Executive Safelife Inc	S Main St	Hackensack	NJ	07601-5209	201-342-6661	3569E	
905 Experimental Machine Tool & Plating Co	River St	Troy	NY	12180-4448	518-271-2500	3599A	
906 Ezemach	347 Coral St	Santa Cruz	CA	95060-2106	408-426-1296	3599A	
907 F & F Auto Supply Inc	E Highway	Uvalde	TX	78801-5719	210-278-3341	7538	
908 F & F Tool Mach Shop	Ne 27th St	Pompano Beach	FL	33064-5433	305-782-6683	3599A	
909 F & G Manufacturing Inc	W Commercial Ave	Moonachie	NJ	07074-1703	201-460-0360	3599A	
910 F & H Nozzles	N Yosemite St	Stockton	CA	95203-2749	209-464-1651	3544B	
911 F & J Mach & Tool	Gradwohl Rd	Styvnia	OH	43560	419-841-8628	3599A	
912 F & M Machine & Mfg Co	S 5th Ave	Oroville	CA	95940	916-533-8440	3599A	7692D
913 F & M Machine Inc	Ne 12th Ave	Oakland Park	FL	33334-4918	305-493-5215	3599A	1791D
914 F & T Electronics Die Corp	35th St	Long Island City	NY	11101-1601	718-937-9570	3544D	
915 F E Bradley Corporation Texas	Greenbriar St	Stafford	TX	77477-3923	713-240-2002	3823	
916 F I M S Manufac	Central Ave	Rochelle Park	NJ	07662-4003	201-845-7088	3599A	
917 F M Screw Machine Products Inc	S 15th Ave	Maywood	IL	60153-3078	708-681-0051	3451	
918 F/X Production Services Inc	Currency Dr	Orlando	FL	32809-6923	407-856-1080	7389	
919 Fab Tech	Tappan Cir	Carrollton	TX	75006-6911	214-245-2250	3599A	3699C
920 Faber Mechanical Products Inc	Paulson Ave	Passaic	NJ	07055	201-546-7900	5075B	
921 Fabrico Electrical Insulation Suppliers Inc	Rochester Ave	Rancho Cucamonga	CA	91730-4906	909-944-5522	3699	
922 Fad Tool Co	32 Valley St	Bristol	CT	06010-4991	203-582-7890	3541	
923 Fahion Karl Sheet Metal Inc	Constance St	Pittsburgh	PA	15212-5037	412-321-1233	3399	8731B
924 Faia Machine Co	Toledo St	Farmingdale	NY	11735-6620	516-249-5092	3599A	1761
925 Faith Tool And Mfg Inc	Reading Ave	Willoughby	OH	44094-8210	216-951-5934	3599A	3544E
926 Falcon Machine Co	Riverdale St	West Springfield	MA	01089-1053	413-737-5842	3599A	
927 Falline Corp	Longley Ln	Reno	NV	89502-5952	702-827-6400	5944Z	3479D
							3089
							5162H

8 Falls Ch... Machine Technology	667	S 31st St	Louisville	KY	40211-1469	502-772-3621	3398	3599A	3441
9 F... & Die Co Inc		Woodford Av Ext	Plainville	CT	06062	203-225-0800	3544D	3	
0 F... Northwest Inc	7115	W Marginal Way	Seattle	WA	98028	206-767-7700	3498	5211J	5074C
1 Farm Supply Company San Luis Obispo Pump	675	Tank Farm Rd	San Luis Obispo	CA	93401-7002	805-543-4355	5084G	3599E	
932 Farmers Welding & Machine		16883-9th	Coalinga	CA	93210	209-945-2390	3599A	7692D	
933 Fase Controls Inc	59	Georgetown Cir	O Fallon	MO	63366-8549	314-926-9156	3829		
934 Fastenal	1203	Mulberry St	Terre Haute	IN	47807-2779	812-232-6000	5551	3732	3452
935 Fasteners Inc	35	Budney Rd	Newington	CT	06111-5100	203-666-1551	3452	5085	
936 Fastening Specialty Maui In	5996	Hukilike Unit	Wailuku	HI	96793	808-871-6217	5085G	5051R	5072E
937 Fastner Hardware Inc	130	Indstri Dr	Ivyland	PA	18966	215-355-6641	3599E		
938 Father & Sons Sprinklers		Ne 22nd Way	Fort Lauderdale	FL	33308-2623	305-491-0880	3599E	5083J	
939 Federal Iron Works Co The	100	N Prospect Ave	Youngstown	OH	44506-1268	216-746-6391	3365	5099A	3446
940 Felco Transportation Inc	10001	Derby Ln	Maywood	IL	60153	708-681-2090	3721		
941 Femco Of Florida Inc Mach Shop	1700	Nw 33rd St	Pompano Beach	FL	33064-1307	305-978-3838	3599A		
942 Fenn Manufacturing Co	60	Brookdale Rd	Springfield	MA	01104-3206	413-747-9151	3599A		
943 Ferguson Enterprises Inc	1275	Chatham Pkwy	Savannah	GA	31401	912-234-2211	5722B	5719I	5211O
944 Ferguson Enterprises Inc	2220	Se Lakewood Blvd	Topeka	KS	66605-1170	913-354-4305	3498	5211O	3088
945 Ferrell Jerry Inc	3147	Eastpointe Dr	Medina	OH	44256-8233	216-723-3105	5571	3711	
946 Fetter Enterprises Inc	30	Lincoln HI Nw	Quincy	IL	62301-4406	217-228-3212	3542		
947 Fgs Tool Co		Po Box	Seattle	WA	98109-6734	206-285-2654	3544D		
948 Fibre Metal Mold Tool & Die Inc		Baltimorepke & Brinsonlakerd	Concordville	PA	19331	610-358-1192	3544D	3599A	3544E
949 Fick & Associates	7406	27th St W	Tacoma	WA	98466-4632	206-564-9407	3369		
950 Fiden Industrial Corp	3960	Harlem Rd	Amherst	NY	14226-4706	716-839-3500	3541		
951 Fidler Inc Corporate Office	1700	Egbert Ave	Goshen	IN	46526-4214	219-533-0415	3271	3272	3443A
952 File Industrial Pipe Co	1625	Slate Rd 60 Brandon	Brandon	FL	33511	813-681-3765	8711M	3498	5032F
953 Fifth Avenue Plastics	134	E Pomona Ave	Monrovia	CA	91016-4656	818-305-0900	3089		
954 Fikeco Inc		U S Highway 27 S	Cynthiana	KY	41031	606-234-2878	1791D		
955 Filter Concepts Inc	1401	14720-D Flint Lee Rd	Chantilly	VA	22021-1503	703-263-9775	3291		
956 Filter Materials		Ware St	Waupaca	WI	54981-1365	715-258-5525	3569D		
957 Fire Control Technologies			Hudson	MA	01749	508-562-3002	3999	3569E	
958 Fire Equipment Company		Airport Industrial P	Ocean City	MD	21842	410-289-5580	3569E		
959 Fire Systems Inc	1975		Smyrna	GA	30080	770-955-5673	7382A	3569E	
960 Fire Technologies			Cavendish	VT	05142	802-226-7444	3999		
961 Fischer Mold Inc	393	Meyer Cir	Corona	CA	91719-1078	909-279-1140	3089		
962 Flex Manufacturing Inc	7190	Conservation St Ne	Ada	MI	49301-9584	616-676-8846	3599A		
963 Flexitall Services	2007	Preston Ave	Pasadena	TX	77503-2922	713-920-2400	3569		
964 Flinchbaugh Electric Co Div Of Powermet	321	Court St	Port Huron	MI	48060-5409	810-985-7197	5063C	3599E	3577
965 Flippin Fiberglass			Yellville	AR	72687	501-449-6061	3714		
966 Flores Enterprise	1729	E 28th St	Signal Hill	CA	90806-1923	310-595-1313	3599A		
967 Florida Discharge Machining Co	5148	113th Ave N	Cleanwater	FL	34620-4835	813-573-1588	3599K		
968 Florida Fasteners & Equipment	7805	Nw 57th St	Miami	FL	33166-3527	305-594-2266	3545	3291	0919
969 Florida Hydronics Inc	2929	Edison Ave	Jacksonville	FL	32254-4313	904-389-1322	3599E		
970 Florida Machining Cntr	4986	113th Ave N	Cleanwater	FL	34620-4831	813-573-1601	3599A		
971 Florig Equipment Co Inc	906	W Ridge Pike	Conshohocken	PA	19428-1098	610-825-0900	3714B	7539J	3441
972 Flotec	8132	Woodland Dr	Indianapolis	IN	46278-1350	317-875-8136	3494	3845	
973 Flow Control System	1007	E Admiral Blvd	Tulsa	OK	74120-1601	918-587-9401	3494		
974 Flow Engineering Inc	987	Commercial St	Palo Alto	CA	94303-4908	415-493-7444	3494		
975 Flow Inc	44	N Watertown	Hartland	WI	53029	414-367-1055	3829		
976 Fluid Evacuators	1902	E Inca Cir	Mesa	AZ	85203-2875	602-461-8700	3569J		
977 Fluid Power Components Inc	6730	Suermac Pl	Jacksonville	FL	32203	904-781-5337	3511	3494	5072D
978 Fluorocarbon K S Division	2116	Farallon Dr	San Leandro	CA	94577-6694	510-351-8230	3089		
979 Flurer Machine & Tool Co		W Prospect	Nazareth	PA	18064	610-759-6114	3599A		
980 Forage King Industries Inc			Ridgeland	WI	54763	715-949-1020	3523		
981 Foreign & Bamerican Machine Shop	711	E Main St	Meriden	CT	06450-6018	203-237-3502	7338C		
982 Forgings & Stampings Inc	1025	23rd Ave	Rockford	IL	61104-7198	815-962-5597	3312		
983 Fort Worth Bolt & Tool Co	2822	Bledsoe St	Rockford	TX	76107-2902	817-335-3361	3452	5085G	7359E
984 Fortna Equipment Co Inc	2120	S Holly St	Denver	CO	80222-5606	303-756-6066	3291	7538	3471C
985 Fortner & Gifford Machine Shop	428	N Mount Vernon Ave	Prescott	AZ	86301-2695	602-267-7352	3599A		

6	Forman Systems International	4555	Corporate Dr	Troy	MI	48098-6338	810-952-5339	3369	
7	F... Machine Shop	716	Pennsylvania Ave	Joplin	MO	64801-4621	417-624-3105	7538C	
8	F... Corp	518	W Ocean Ave	Boynton Beach	FL	33426-4383	407-734-1100	3498	5051D
9	Fowler Machine & Welding	1146	Chavender Rd	Resaca	GA	30735	706-277-3111	3599A	
990	Fran-Dan Corp	188	Charles St	Cambridge	MA	02141-2118	617-547-1503	3452	5085
991	Franchino Mold & Engineering	3100	Hart Rd	Jackson	MI	49201-8746	517-787-0140	3544D	
992	Frans Hydraulic Repair Service	21	Lincoln Hwy E	Jeanette	PA	15644-3135	412-527-5511	3599E	3569
993	Frasal Tool Co	14	Foster St	Newington	CT	06111-4906	203-666-3524	3541	
994	Fraser's Bronze Foundry Inc	3207	1st Ave S	Seattle	WA	98134-1819	206-624-1064	3369	5551
995	Fraziers Drilling & Pump Serv	614	Hibbs Rd	Grove City	OH	43123	614-871-1084	3599E	1781
996	Fredon Corp	7911	Enterprise Dr	Willoughby	OH	44094	216-951-5200	3599A	
997	Fremont Machine & Tool		Rr 1 Box	138 Fremont	NE	68025-9736	402-721-9261	3599A	3544D
998	Fresno Paper Box Co	2192	S Railroad Ave	Fresno	CA	93721-3485	209-485-9120	2653	3999L
999	Fresla Components Corp	2307	Belmore Ave	Bellmore	NY	11710-5624	516-221-1975	3599A	
1000	Frew WR Co Inc	2144	E 52nd St	Indianapolis	IN	46205-1408	317-253-3271	5099C	3829
1001	Frick Machinery/Daniel		Rr	2 Merrill	WI	54452-9802	715-536-4985	3599	
1002	Friction Coating	42776	Mound Rd	Sterling Heights	MI	48314-3254	810-731-0990	3291	7699
1003	Fritts J E & Assoc Inc		Voorhees Twp Area	Voorhees	NJ	08043	609-795-2090	3541C	3599A
1004	Frontier Adving Prods	120	Northwd	West Seneca	NY	14210	716-674-7720	7319	5943
1005	Fryma Inc	40	Ethel Rd	Edison	NJ	08817-2249	908-248-0700	3531A	3569
1006	Fulgham Machine & Tool Co	2421	E Mich	Jackson	MI	49202	517-783-6522	3599A	
1007	Furon Advanced Components Division	3711	S Hudson St	Seattle	WA	98118-1919	206-723-5600	3089	
1008	Furtados Machine Shop	332	Phelan Ave	San Jose	CA	95112-4103	408-286-2524	7538C	
1009	Fusion Fabricating Inc	1519	N Cicero Ave	Chicago	IL	60651-1619	312-486-7575	3599A	3441
1010	Fyr Fyter Inc		10905-1 Gladiolus Dr	Fort Myers	FL	33901	941-481-5737	5063A	7382A
1011	Fyr Fyter Of Missouri Inc			Columbia	MO	65205	314-449-4303	3999	3569E
1012	Fyre-Tec	432	Mandeville St	Utica	NY	13502-4610	315-733-2321	7382A	3569E
1013	G & A Division	333	Hamilton Blvd	South Plainfield	NJ	07080-3339	908-753-2050	3599A	3398
1014	G & D Motor & Machine	608	N D St	Grangeville	ID	83530-1134	208-983-2400	7538C	3599A
1015	G & F Prototype Plaster Inc	33670	Riviera Dr	Fraser	MI	48026-1621	810-296-2750	3364	
1016	G & G Machine Shop Inc	1580	E Grove Ave	Rantoul	IL	61866-2736	217-892-9896	7538C	
1017	G & G Make All Inc	780	Old Colony Rd	Meriden	CT	06451-7930	203-238-2664	3599A	1791D
1018	G & H Diversified Manufacturing Inc	11660	Brittmoore Park Dr	Houston	TX	77041-6917	713-849-2111	3699C	3469
1019	G & L Tool Corp	257	Garden St	Feeding Hills	MA	01030-2507	413-786-2535	3599A	
1020	G & M Precision Machining	9785	Wildcat Rd	Tipp City	OH	45371-9421	513-667-1443	3544B	3599A
1021	G & M Tool Co Inc	1250	W Dorothy Ln	Dayton	OH	45409-1317	513-293-6687	3541	3544D
1022	G & P Godwin Co			San Diego	CA	92115	619-287-0159	3599A	
1023	G S Grinding	844	W 14 Mile Rd	Clawson	MI	48017-1404	810-288-0517	3599D	
1024	G M C Enterprises	6108	Yaqui Way	EI Paso	TX	79925-1830	915-774-9889	3599A	
1025	G P Machine	266	Wachtel Ave	Saint Louis	MO	63125-1230	314-631-7243	3599A	
1026	G Q Machine Inc	763	Waverley St	Framingham	MA	01701-8567	508-620-6211	3599A	
1027	G S Mold	3991	Weld County Rd	Longmont	CO	80502	303-772-1075	3544E	
1028	Gaeske Inc	6903	Long Point Rd	Houston	TX	77055-2211	713-688-2728	3498	5051Z
1029	Galgon Industries Inc	37399	Centralmont Pl	Fremont	CA	94536-6549	510-792-8211	3544D	1791D
1030	Galifco Oregon	650	Powers St	Eugene	OR	97402-5337	503-485-5133	3536	3599A
1031	Gallatin Machine Works	6343	Jackrabbit Ln	Belgrade	MT	59714-8914	406-388-4160	3599A	7692D
1032	Galo Welding Service	13150	Nw 32nd Av Op-Lka	Opa Locka	FL	33054	305-769-1341	3599A	7692D
1033	Galow Metal Products Inc	2685	Universal St	Oshkosh	WI	54904-8939	414-236-1280	3469	
1034	Gambal Manufacturing		Rr722 Oak	Old Forge	PA	18518	717-457-8903	3599A	
1035	Ganton Technology Inc	1250	W Madison St	Pulaski	TN	38478-2640	615-363-8339	3363	
1036	Garbarino Paul P Machine & Iro	34	S Autumn St	San Jose	CA	95110-2597	408-295-0248	3599A	
1037	Gardner Disc Grinders & Abrasives	1918	Creekside Dr	Grand Island	NY	14072-2610	716-773-6222	3291A	
1038	Gardners Machine Shop	2500	E Tulare Ave	Tulare	CA	93274-3230	209-686-7575	3599A	
1039	Gardners Seamless Guttering		Rr	4 Lebanon	MO	65536-9804	417-588-1619	3089	
1040	Garner Industries	4200	N 48th St	Lincoln	NE	68504-1498	402-434-9100	3599A	3544E
1041	Gary Wolfes Drilling		Main	Wevertown	NY	12886	518-251-2212	3541C	1781
1042	Gates Rubber Co	6575	West Loop S	Bellaire	TX	77401-3521	713-668-3403	3494	
1043	Gazecki John E Precision Machine Works Inc	2024	Puyallup Ave	Tacoma	WA	98421-2619	206-272-5119	3599A	

ERIC	22 Green Ken	7775	Rt 9 Box	198	Claremore	OK	74017-8901	918-341-7214	3599A
33 C	ologies Inc	7775	18-1/2 Mile		Sterling Heights	MI	48310	810-254-5730	3599A
34 C	Co	1402	Mount Vernon St		Oshkosh	WI	54901-3038	414-231-7909	3724
35	Grayco Precision Inc	204	Versaw Ct		Berthoud	CO	80513	970-532-2688	3599A
1106	Great Lakes Engineering Co	1515	Abbott Ave		Ann Arbor	MI	48103-4103	313-769-8890	3599A
1107	Great Lakes Molding Inc	155	Mccollum		Galesburg	MI	49053-9509	616-665-4218	3089
1108	Great Lakes Performance Whs	13815	Gratiot Ave		Detroit	MI	48205-2805	313-527-7010	3714
1109	Great Lakes Power Prods	4740	Devitt Dr		West Chester	OH	45069	513-874-4707	5551
1110	Great Western Pipe & Supply Co	3860	Forest St		Denver	CO	80207-1121	303-320-4440	3498
1111	Greenville Mach & Iron Works Inc	600	W Irish St #	475	Greenville	TN	37743-5204	615-639-4178	3548A
1112	Greensburg Tool & Supply	230	E Main St		Greensburg	IN	47240-2062	812-663-6756	3452
1113	Greenwood Electric Motors	1301	Union Landing Rd		Riverton	NJ	08077-2554	609-829-2911	5063C
1114	Gretina Machine Shp	8422	Bascom St		Houston	TX	77080-3602	713-690-7328	3599A
1115	Griffin Pipe Products Co	29200	Southfield Rd		Southfield	MI	48076-1906	810-424-9500	3498
1116	Griffin Pipe Products Direct D				Lynchburg	VA	24501	804-845-8021	3498
1117	Grimmer Otto Precision Machining		Littlefield Rd		Acton	MA	01720	508-263-0771	3599A
1118	Grindley Manufacturing Inc	1989	Blake Ave		Los Angeles	CA	90039-3897	213-665-5781	3541H
1119	Grinell Co Inc	21655	Trolley Industrial Dr		Taylor	MI	48180-1823	313-292-3800	3498
1120	Groeger Special Tooling Inc	2600	Bay Rd		Redwood City	CA	94063-3501	415-367-8665	3544D
1121	Groeniger & Company	1600	Lone Palm Ave		Modesto	CA	95351-1578	209-577-3333	3569E
1122	Grohe Mold Polishing				Upland	CA	91784	909-982-2227	3544E
1123	Groth Corp	42	Hidden Lake Rd		Marshall	TX	75670-9709	903-938-8188	4932
1124	Groundwater Supply Co	29	Legate Hill Rd		Sterling	MA	01564-2311	508-422-3209	3541C
1125	Group Industrial Service & Sales Inc	36432	Sherwood St		Livonia	MI	48154-1937	313-462-0144	3599E
1126	Grows Autop & Truck Leasing Co	563	Street Rd		Southampton	PA	18966-3748	215-322-9320	7538B
1127	Gta Machine	117	S 1st St		Sierra Vista	AZ	85635-2517	520-458-8807	7538C
1128	Gulf Coast Machine Shop	1150	Southern Minerals Rd		Corpus Christi	TX	78409-1818	512-289-1273	3599A
1129	Gulf South Equipment Sales	8343	Hooper Rd		Baton Rouge	LA	70811-2818	504-357-3757	3599E
1130	Gulf State Tool		1248c Viscaya Pky		Fort Myers	FL	33901	941-458-0301	3599A
1131	Gundlach T J Machine Company	1	Freedom Dr		Belleville	IL	62223-5104	618-233-7208	3531G
1132	Guy Speaker Co Inc Tubing Flngs	14620	Martin Dr		Eden Prairie	MN	55344-2097	612-937-8705	3829
1133	H & K Machine Serv Inc	1550	Progress West Ln		O Fallon	MO	63366-4120	314-272-8412	3451
1134	H & L Engineering Corp	19921	12 Mi		Roseville	MI	48066	810-777-4180	3089
1135	H & P Tool Co Inc	610	S G St		Richmond	IN	47374-6135	317-962-4504	3599A
1136	H & R Tool & Machine Co	19	W Scates St		Caseyville	IL	62232-1549	618-344-7683	3599A
1137	H And S Specialty Inc	3345	Mannheim Rd		Franklin Park	IL	60131-1533	708-671-4694	3599A
1138	H B Tool & Die	813	Aqua Ave		Page	AZ	86040	520-645-3336	3544D
1139	H E Tool & Mfg Co Inc	450	S Fellowship Rd		Maple Shade	NJ	08052-1823	609-779-1148	3599A
1140	H G International Inc	4866	E 22nd St		Tucson	AZ	85711-4904	520-748-7990	5075B
1141	H Grabell & Sons Inc	2051	Garfield Ave		Los Angeles	CA	90040-1803	213-685-6120	3999C
1142	H S Q Technology				Lansdale	PA	19446	215-393-7470	3829
1143	H U I Industrial Supply Co	660	White Plains Rd		Tarrytown	NY	10591-6800	914-332-6129	3494
1144	H V C Mach Inc	5035	Marietta Ave		Nelsonville	OH	45764	614-753-3713	3599A
1145	H R Products Inc	23146	Ireland Rd		South Bend	IN	46614-4414	219-287-2329	3599A
1146	Hacker Precision Co	1001	W Kirkland Ave		Nashville	TN	37216-3091	615-227-3136	3599A
1147	Halenkamp Pump & Control Service	2570	Nw 4th Ct		Fort Lauderdale	FL	33311-8627	305-792-4180	3599E
1148	Halgon Corp	226	Calle Pintoresco		San Clemente	CA	92672-7503	714-498-0555	3599A
1149	Hall Machine	7920	Silverton Ave		San Diego	CA	92126-6310	619-693-3975	3599A
1150	Hall Machine & Welding Co Inc	102	W Mermod St		Carlsbad	NM	88220-6286	505-887-1143	1541
1151	Hall Precision Tool & Die Co	1345	W 12th St		Erie	PA	16501-1520	814-456-0107	3544D
1152	Haller Plastics	175	Central Ave		Farmingdale	NY	11735-6984	718-895-4097	3089
1153	Hallisey Plumbing & Heating In	8	Purchase St		Middleboro	MA	02346-3316	508-947-3913	1711A
1154	Halprin Supply Co	3804	Broadway Pl		Los Angeles	CA	90037-1484	213-232-3131	3569E
1155	Hamilton Foundry Division Hamilton Foundry & M				Harrison	OH	45030	513-367-2238	3369
1156	Hamilton Machine & Mold Inc	4685	Kimber		Hamilton	MI	49419-9799	616-751-5179	3544E
1157	Hamilton Machine Inc	2715	Central Ave		Lake Station	IN	46405-2201	219-962-3267	7538C
1158	Hamilton Well & Pump Co				Indianapolis	IN	46227	317-788-4607	3599E
1159	Hanamoto Manufacturing Co	16128	Covello St		Van Nuys	CA	91406-2910	818-782-5700	3599A



01	Rock & Grandson Aluminum Fabric	17703	Pennsylvania Ave	Beaufort	NC	28516	919-728-2416	3365	55F	3599A	7692D
11	W Machine Company	415	Cranberry Rd	Cleveland	OH	44137-4306	216-475-0220	3451			
21	Tool Co Inc	7159	Thornapple Rv Se	Farmingdale	NJ	07727-3512	908-919-7300	3544D	35b-a	5999F	5499A
31	Hansen Fred L Corp	40	Rush St	Ada	MI	49301	616-676-1508	3291			
1164	Harding Machine Company	441	N 3rd Ave	Lexington	TN	38351-2241	901-968-2513	3451			
1165	Harding Brothers Inc	441	Rf	Des Plaines	IL	60016	708-299-2005	3541			
1166	Hargraves Water Well Drilling & Service	19381	Wakenden	Kaplan	LA	70548-9801	318-643-6538	3599E	5082D	1781	1623
1167	Hariton Machinery Co Inc	100	Clanton Rd	Redford	MI	48240-1448	313-255-9378	3599E			
1168	Harper Machinery Corp	100	Clanton Rd	Charlotte	NC	28217-1302	704-527-1511	3599A			
1169	Harrel Bit Service			Cross Plains	TX	76443	817-725-6610	3541C			
1170	Harrell Mfg And Tool Inc		Mcloon Rd	Hazlehurst	GA	31539	912-375-4509	3599A			
1171	Harrington Peerless Hoists Co	3105	Sweetwater Rd	Lawrenceville	GA	30244-2488	770-923-7088	3545	2393	3315	
1172	Harris Brothers Machinery Co	501	30th Ave Se	Minneapolis	MN	55414-3218	612-331-1829	3599E	3535	5084D	5084E
1173	Harris Machine	5717	Byrd Dr	Loveland	CO	80538-8991	970-669-5549	3599A			
1174	Harris R H Co	37925	6th St E	Palmdale	CA	93550-5252	805-947-0122	3599A			
1175	Harris-Kayot Inc	2801	W State Blvd	Port Wayne	IN	46808-1801	219-432-4555	3599A			
1176	Harrison Macine & Tool Inc	21	Lexington Ave	Ewing	NJ	08618-2301	609-883-0800	3599A			
1177	Harrison Piping Supply Co	38777	Schoolcraft Rd	Livonia	MI	48150-1086	313-464-4400	3498	3494	5084V	
1178	Harrison Supply Co	260	S Milwaukee Ave	Wheeling	IL	60090-5098	708-537-0255	3569	3545	5399B	
1179	Harry Davis Enterprises	874	Millbrook Rd	Middletown	CT	06457-5522	203-346-3409	3544E			
1180	Hartland Tool & Mfg Company	621	W Industrial Dr	Hartland	WI	53029-2321	414-367-8633	3599A			
1181	Hartman Iron Art Inc	107	Bridge St	Sandpoint	ID	83864-1322	208-265-5315	8412	1791D		
1182	Hartville Edm Co	367	Kent Ave Ne	Hartville	OH	44632-9640	216-877-1461	3599K			
1183	Hartzell Manufacturing Turtle Lake Division	300	Industrial Ave	Turtle Lake	WI	54889-9109	715-986-4407	3089			
1184	Harvey John D Company Inc	2310	Edwards St	Houston	TX	77007-4414	713-862-2929	3714			
1185	Harwell & Son		Rr	Tecumseh	OK	74873-9802	405-598-6097	3599A			
1186	Has Propellers Inc		Municipal Airport	Lubbock	TX	79403	806-763-5298	4581F	3724		
1187	Haslam Co The	350	N 700 E	Centerville	UT	84014-2028	801-292-7221	3569D			
1188	Hassay-Savage Broach Co Inc	100	Industrial Blvd	Turners Falls	MA	01376-1699	413-863-4352	3541B			
1189	Hastings Equity Grain Bin Mfg Co	120	E 2nd St	Hastings	NE	68901-5215	402-462-2189	3523			
1190	Hawaii Metal Forming Corp	151	Puuahale Rd	Honolulu	HI	96819-2253	808-847-5774	3542			
1191	Hawk Engine & Mach	12126	York Rd	Cleveland	OH	44133-3602	216-582-0900	7538C	5084L	7538U	
1192	Hawker De Havilland Inc		7047 1/2 Vineland Ave	North Hollywood	CA	91605	818-503-1146	3721			
1193	Hayden & Co	950	N York Rd	Hinsdale	IL	60521-2950	312-242-1022	3829			
1194	Hayden Industries	22615	83d S	Kent	WA	98031	206-395-3244	3599A			
1195	Hayden Laboratories	6015	Manning Rd	Miamisburg	OH	45342-1609	513-866-5908	3541C	8748U	3826	8734
1196	Hayden Machinery Co	171	River St	Thomaston	CT	06787-1745	203-283-6261	5084D	3599E		
1197	Haygood Of Kc	7731	E Front St	Kansas City	MO	64120-2305	816-483-3010	3714B	5013	3568	5531B
1198	Hayward Industrial Products In	3502	Brockwood Ct	Richmond	VA	23294-8735	804-527-1683	3494			
1199	Headlee R M Inc	6493	Ridings Rd	Syracuse	NY	13206-1113	315-437-3379	3446F			
1200	Heavern Machinery Inc	1428	Franklin St	Columbus	IN	47201-5716	812-372-7533	3541			
1201	Heidman Steel	6400	Beckley St	Baltimore	MD	21224-6501	410-633-3033	3542			
1202	Heights Inc	18821	E Valley Hwy	Kent	WA	98032-1219	206-251-8263	7699S	7538B	3699D	
1203	Heli-Die Inc	1339	Greenwood Ave	Deerfield	IL	60015-2709	708-948-1178	3315			
1204	Helix Of Red Hill	4	& Adams	Red Hill	PA	18073	215-679-7924	3599A			
1205	Helro Corp	17801	Helro Dr	Fraser	MI	48026-3818	810-294-9700	3291A	3599F		
1206	Henri Dovsek Co	24376	La Hermosa Ave	Laguna Niguel	CA	92677-2177	714-495-7813	3599A			
1207	Herbs Tool Grind & Sales I	11033	Timberlake Rd	Lynchburg	VA	24502-3939	804-525-1498	3545			
1208	Heritage Northwest Machine	3526	Brooks Ave Ne	Salem	OR	97303-4118	503-364-5743	3599A	7699D		
1209	Heritage Systems	2306	Port Sheldon Rd	Hudsonville	MI	49426	616-669-5590	3399			
1210	Hernandez A Machine Shop & Pro	1919	Noble St	Houston	TX	77026-6740	713-236-8910	3599A			
1211	Herold Partco Mfg Inc	5310	W 161st St	Cleveland	OH	44142-1610	216-267-8600	3569			
1212	Hester Double Disc Grinding	1003	E Vine St	Lodi	CA	95240-3153	209-339-1204	3541H			
1213	Hetager L G Drilling Inc		Rd	Punxsutawney	PA	15767	814-938-7370	3541C			
1214	Heyward Services Inc	717	East Blvd	Charlotte	NC	28203-5148	704-372-5805	5099C	3531A	5082D	
1215	Hi-Desert Drive Line Service	11920	Mariposa Rd	Hesperia	CA	92345-1638	619-949-7614	7539	3714	3714B	7538A
1216	Hi-Tech Fabrication & Repair	300	Bell Ave	Findlay	OH	45840-4278	419-423-0872	3365	3441	7692D	
1217	Hi-Tech Fire Equipment Co			Quilman	TX	75783	903-878-2471	3999	3569E		



18	Hi-Tech Machining	572	S Williams Rd	Palm Springs	CA	92264-1551	619-323-4646	7538C	3500A
19	F *Drilling Inc			Summit Point	WV	25446	304-725-1644	3541C	3
20	Hs. City Machine Shop	2575	Walsh Rd	San Antonio	TX	78224-3042	210-628-1728	3599A	1781
21	High Tech Machine & Tool Inc	219	Andover St	Wilmington	MA	01887-1231	508-657-8266	3599A	
122	Highland Tool Co	980	Emerson St	Rochester	NY	14606-2708	716-254-7420	3599A	
1223	Highpoint Screw Machine Servc Ofc			Greenwood	IN	46142	317-889-0000	3451	
1224	Hilco Inc	812	Dowling St	Houston	TX	77003-3120	713-224-8277	2394	3569
1225	Hiller Systems	3710	Lakeside Ct	Mobile	AL	36693-5111	334-661-1275	3569E	3999
1226	Hilltop Manufacturing Co	56849	Rice	Hudson	MI	49247	810-437-2530	2399	3599A
1227	Hiot Aluminum Recycling	4239	Lane Rd	Zephyrhills	FL	33541-3649	813-788-6569	3334	1099A
1228	Hirschfeld Steel Co	122	W John Carpenter Fwy	Irving	TX	75039-2014	214-541-1166	1791D	3441
1229	Hitiachi Digital Graphics Usa Inc	114	Carnegie Dr	Oak Ridge	TN	37830-7731	615-483-1961	3541	
1230	Hittle Machine And Tool Co	2122	Dr Martin Luther King St	Indianapolis	IN	46202-1158	317-926-4594	3599A	3541
1231	Hms Inc	9909	Wallisville Rd	Houston	TX	77013-4613	713-675-7400	3463	3053
1232	Hobbs Inc	2009	13th Ave	Grand Forks	ND	58201	701-772-5579	8721	5084G
1233	Hockersmith Jeffrey A			Santa Fe	NM	87501	505-982-9566	1799V	9651
1234	Hoco Engineering Inc	7634	Central Industrial Dr	West Palm Beach	FL	33404-3496	407-845-2142	3599A	
1235	Hoeck Metal Fabricators	1184	Harrison St	San Francisco	CA	94103-4524	415-621-4883	3699	1791D
1236	Hoffmann Otto U & Sons	3	& Cayuga	Philadelphia	PA	19092	215-457-3800	3541H	3599A
1237	Holder Machine & Mfg Inc	3945	Chesapeake Dr	Charlotte	NC	28216-3403	704-399-4934	3599A	3441
1238	Holes Inc			Virginia Beach	VA	23450	804-455-6999	5032C	3541C
1239	Hollis Machine Service	4604	Nw 8th Ln	Oakland Park	FL	33309-3975	305-771-6250	3599A	
1240	Holly Sales & Service	5443	W Crenshaw St	Tampa	FL	33634-3095	813-884-1968	3599	3556
1241	Holt L E Grinding Service		Maple St	Rillton	PA	15678	412-446-0977	3541H	
1242	Holt Tool & Die Co Of Calif	2909	Middlefield Rd	Redwood City	CA	94063-3328	415-364-2547	3599A	3469
1243	Holtgriveve & Co Steel	2900	S Brentwood Blvd	Webster Groves	MO	63119	314-961-4959	3321	
1244	Holton Tool & Design	7121	Arlington Ave	Riverside	CA	92503-1523	909-785-5473	3544E	
1245	Honeywell Inc	1300	Executive Center Dr	Tallahassee	FL	32301-5025	904-656-9579	3829	
1246	Houston Precision Machine Work	7103	Hemlock St	Houston	TX	77087-1740	713-923-7441	3599A	
1247	Howard & Sons Inc		N Of Clovis	Clovis	NM	88102	505-762-0192	4971	5084G
1248	Hsm Machine Works Inc	367	Horseblock Rd	Medford	NY	11763	516-924-6600	3599A	
1249	Huels Auto Machine Shop		916-1/2 N 1st Ave	Durant	OK	74701	405-920-0111	7538	3599A
1250	Huff Equipment Manufacturers	121	Pine Hill Rd	Spencerport	NY	14559-1034	716-352-1551	9511	1795
1251	Huffman Equipment And Service	320	S Beach St	Fort Worth	TX	76105-1199	817-654-0014	3599E	3569
1252	Hughes Steel Fabrication	5443	San Fernando Rd	Glendale	CA	91203	818-242-1042	3399	3441
1253	Hughes-Bechtol Unlimited	6060	Milo Rd	Dayton	OH	45414-3418	513-898-7100	1541	3599A
1254	Hugo Kramm & Sons Inc	150	Broadway	Albany	NY	12204-2719	518-463-4325	3444	
1255	Hulse Engineering & Mfg	718	N Loren Ave	Azusa	CA	91702-2243	818-812-0122	3599A	
1256	Hunter Industries	30835	Groesbeck Hwy	Roseville	MI	48066-1510	810-776-5048	3544D	
1257	Hunter Tool Sales	1920	Freedom Dr	Charlotte	NC	28208-5251	704-334-9791	7699P	3545
1258	Hurst Boiler Sales & Service		S Hwy	Coolidge	GA	31738	912-346-3178	3443	5072E
1259	Hutchinson Machine Works	316	N Clarendon Ave	Scottsdale	GA	30079-1323	404-292-3392	3599A	
1260	Huth Aluminum Foundry Inc	2187	Highway	Shakopee	MN	55379-1754	612-445-3272	3369	
1261	Hy-Pac Hydraulics Inc	1541	Owen Ave	Racine	WI	53403-2144	414-637-6086	3599A	
1262	Hydradyne Hydraulics	336	Industrial Pky	Lafayette	LA	70508-3387	318-232-4129	3678	3494
1263	Hydraulic Service Co Inc	3315	Chelton Loop N	Colorado Springs	CO	80909-6419	719-591-1922	3494	3599E
1264	Hydraulics Supply Corp		Constantine Rd	Savannah	GA	31401	912-233-6791	3599E	1781
1265	Hydro Conduit Corporation Ship		135 W & Hwy	Roanoke	TX	76262	817-430-4868	3498	
1266	Hydrotech Corp Envirmtl Servs	1106	Meridian St	Anderson	IN	46016-2776	317-642-1581	8711M	9512
1267	Hyland Machine & Tool Lic		Commerce Cir	Durham	CT	06422	203-349-2202	3599A	3623
1268	I & M Machine & Fabrication Inc	401	S 4th St	Saint Joseph	MO	64501-2113	816-233-6841	3494	3559
1269	I B C Precision Inc	1139	Centre Rd	Auburn Hills	MI	48326-2603	810-373-8202	3599A	3599E
1270	I C E Industrial Combustion	336	Malletts Bay Ave	Colchester	VT	05446-1467	802-860-1024	3569	3599A
1271	I C M Of Oklahoma City	643	Se 4th St	Oklahoma City	OK	73129-4007	405-235-2609	3699C	5039
1272	I X L Machine Shop		Corner Of 7th & Pine	Holland	MI	49422	616-392-9803	7349C	3829C
1273	Icenhower Max Rev	1330	Hwy 59 S	Texasarkana	TX	75501	903-832-4258	5990	5051D
1274	Ict Inc		Industrial Dr	Shelby	MI	49455-9584	616-861-5348	5944B	3599E
1275	Idaho Falls Foundry & Machine	501	Northgate Mile	Idaho Falls	ID	83401-2531	208-522-7412	3523	7699

6	Imp. Thread & Gage Inc	17124	S Western Ave	Gardena	CA	90247-5224	310-324-0585	3599A		1711F	72990
7	Imp Inc		Po Box	Placerville	CA	95643	916-622-5762	5084G	3		
8	Imp. Case Co	10	Delaney St	Spokane	WA	99209-0912	509-467-3303	3499	87413		
9	Impact Precision Screw Product	62	Spruce St	Newark	NJ	07105-1509	201-344-3120	3451			
1280	Imperial Casting Co	339	Clark St Ext	Providence	RI	02903-1557	401-521-6826	3363			
1281	Imperial Spring Co Inc	23852	Reedy Dr	Southington	CT	06489	203-628-9611	3495			
1282	Imperial Stamping Corp Ofc	129	29 St Dr Se	Elkhart	IN	46514-8311	219-262-2841	3469			
1283	In Tolerance	12521	Crenshaw Blvd	Cedar Rapids	IA	52403	319-363-8561	3599A			
1284	Indarg Engineering	12950	Gravois Rd	Hawthorne	CA	90250-3302	310-679-6022	3599A			
1285	Independent Concrete Pipe Co Of Mo	448	Gem	Meridian	MO	63127-1715	314-842-2900	3498			
1286	Independent Pneumatic Control	4801	Liberty Greene	Waynesburg	PA	15370	412-627-3596	3541H			
1287	Independent Tooling Co	5740	Chaincraft Rd	Cleveland	OH	44125-1888	216-587-5666	1791D			
1288	Industrial Art Metal Spinni	1000	Federal St	Detroit	MI	48209-1291	313-554-0313	3545	3315		
1289	Industrial Cable & Sling Co	4430	Nw 1st Ave	Boca Raton	FL	33432-2601	407-395-5510	5063C	3599E		
1290	Industrial Electric Sales & Service South	9468	Tielker Rd	Fort Wayne	IN	46809-1500	219-478-1514	3599K	3544B	3599A	3599F
1291	Industrial Engineering Inc	4301	S 560 W Sandy	Sandy	UT	84070-2510	801-566-7118	3479	3089	5085H	
1292	Industrial Fluoro-Plastic	141	Arco Ln	Charleston	SC	29418-5923	803-554-6261	4932	5999T	3548B	7692
1293	Industrial Gases Corp-Div Stevenson Zimmer	1409	16w107 83rd St	Hinsdale	IL	60521-5824	708-850-9077	3599A			
1294	Industrial Gases & Precision Machining	377	Glendale Ave	Woonsocket	RI	02895-6098	401-766-2238	3541H			
1295	Industrial Grinding Co Inc	1400	Boyd St	Chattanooga	TN	37412-2816	615-622-0360	3829			
1296	Industrial Heating Systems Inc	2501	Shaw Rd	South San Francisco	CA	94080-6607	415-952-0767	3494	5085H		
1297	Industrial Hose Supply Marwedel	2808	Rahway Ave	Avenel	NJ	07001-2214	908-815-9090	3829			
1298	Industrial Instrumentation Ser	6381	16th St Ne	Black Eagle	MT	59414-1045	406-454-1617	7538C	5083	3599A	
1299	Industrial Machine	1257	Sammys Ln	Florence	SC	29506-3841	803-667-4582	3599A	3441	7692D	
1300	Industrial Machine & Repairs	2734	118th Street	Lubbock	TX	79423	806-745-5849	3599A			
1301	Industrial Machinery & Accessories	560	Western Ave	Buena Park	CA	90621-2832	310-521-6289	3599			
1302	Industrial Machinery & Accessories	602	Columbia Ave	Riverside	CA	92507-2124	909-781-8754	3599A			
1303	Industrial Machining Co	419	84th Ave	Zealand	MI	49464-9594	616-772-2138	3599A			
1304	Industrial Machning Mart & Trading Center	3303	Dublin Ave	Columbus	OH	43215-2388	614-464-4376	3541	5084D	3599E	
1305	Industrial Maintenance Equipment	2501	Kress St	Houston	TX	77020-4910	713-675-1258	3599E	5531B	7538A	
1306	Industrial Maintenance Equipment	2501	Salem St	Durham	NC	27703-4255	919-596-9381	3599A	3599F	7692D	
1307	Industrial Metal Flame Sprayers Inc	1909	N San Fernando Blvd	Burbank	CA	91504-2550	213-849-3184	5051B	5051A	3364A	3498
1308	Industrial Metal Supply Co	31	Tremont Rd	Savannah	GA	31405-1540	912-233-3703	3365	1791D	1623B	1761
1309	Industrial Metalworks	503	15 Av W	Virginia	MN	55792	218-749-4444	3498			
1310	Industrial Piping Supply Inc	750	W Hylda Ave	Youngstown	OH	44507-1606	216-782-8197	1761B	3444	1761	
1311	Industrial Roofing Coompany In	4251	Portage Lakes Dr	Akron	OH	44319-2269	216-645-0020	3599E			
1312	Industrial Rubber Machy Inc	1760	E F St	Casper	WY	82601-1467	307-234-3547	3536	1731	3599E	3599A
1313	Industrial Screen & Maintenance Inc	4113	Hunter St	Long Island City	NY	11101-4180	718-784-2750	2842	1761	3443C	1711B
1314	Industrial Sheet Metal Product	1027	Missouri Bottom Rd	Hazelwood	MO	63042-2318	314-895-1447	1791D			
1315	Industrial Steel Fabrication	1748	Mitchelldale St	Houston	TX	77092-7217	713-688-0880	3599A	3469	3544D	
1316	Industrial Tool & Die	32727	2	Denver	CO	80202	303-825-0056	3089			
1317	Industrial Tooling Service	770	U S Hwy	Heyburn	ID	83336	208-678-7788	3829	0134	5075R	
1318	Industrial Ventilation Inc	4113	4th Ave	Brooklyn	NY	11232-3597	718-854-7115	3829			
1319	Industrl Instrumentation Svce	1027	Rivera Beach	Pasadena	MD	21122	410-437-4987	3548A			
1320	Ingalls Iron Works Co The	1748	Folger Ave	Berkeley	CA	94710-2819	510-204-9017	3699			
1321	Ingalls Power Products Installation	32727	E Caldwell Ave	Visalia	CA	93292-9214	209-734-3362	3523	5084G	3599E	
1322	Ingram Equip Co Pumps	770	8 Mile Rd	Livonia	MI	48152-1338	810-478-2430	3541B			
1323	Ingram Slotting & Machine	4400	W Hawthorne Ln	West Chicago	IL	60185-1968	708-293-3800	3452			
1324	Inland Fastener Inc	24	Railroad Ave	East Chicago	IN	46312-2609	219-399-5506	3312			
1325	Inland Steel Company Inland Steel Flat Produc	1113	1st St	Battle Creek	MI	49017-4920	616-963-4930	3829			
1326	Innovative Control Services	14040	Mearns Rd	Warminster	PA	18974-2215	215-672-4693	3829	3599E	3599F	
1327	Innovative Control Source Inc	28815	Hovey Ave	Warren	MI	48089-5915	810-777-8270	3599K			
1328	Innovative E D M Inc	1413	Aurora Rd	Cleveland	OH	44139-1838	216-248-7716	8741G	3599F		
1329	Inovent Engineering	908	W Barbour Cut Blvd	La Porte	TX	77571-3160	713-471-9223	5084V	5063N	3498	3494
1330	Insoco	7114	Lakeside Dr	Mobile	AL	36693-5154	334-666-1785	3829			
1331	Instrument Control Service	1886	Bellfort St	Houston	TX	77087-5908	713-643-5731	3599A			
1332	Instrument Products Inc		Larchwood Dr	Troy	MI	48093-2225	810-689-0176	7629E	5063N	3829	3823
1333	Instrument Specialties Inc										

1234 Inst. In Int'l Infly, i.e. Intercont Interflex Inc 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391	Instrumentation Marketing Corp Ins Controls & Equipment Products Inc Corp Machine Service Inc Precision Tools Inc Stainless Steel Co Iron Works Precision Machining Machinery & Supply Co Inc Rivet Tool Co Inc Machine & Welding Iron Horse Machine Division Foundry Co Sales Ofc Precision Tool & Die Inc Control Company J & B Tool Co & D Machine Inc Commercial Products F Machine H Machine Co J & J Machine L Machine Co L Machine Shop Specialty Products Corporation Office L Tool Co Inc M Foil Stamping J & M Mach Inc R Engineering Inc R Machining J & R Manufacturing Serv & Sales J & T Bit & Supply Inc J & W Fabricating J A D Custom Machining J And H Manufacturing Co B Industries Mach Co Inc J B Mold Polishing J B Tool Co J C B Precision Tool & Mold C Industries C Machine Co Inc C Machine Inc D Franz Research J E Victor Inc J K Machinery J M C Instruments Inc J M C Tool & Mfg Co Inc M Engineering S Peters Mchry Sales Inc J W Hall Enterprises	820 530 2600 1574 2859 85 19 456 7966 283 16950 16 1102 2314 55 3902 11513 10631 254 2815 1500 368 4960 1234 271 6280 4920 8373 17400 82 133 1450 33 1600 2095 12497 1535 1804 525 845 1919 3201 17731	S Mariposa Ave W Chicago Ave N Westgate Ave N County Road Paces Ferry Rd Nw Kinnelon Rd Phillips Rd Industrial Blvd Arjans Dr King George Rd Ponderosa Ln River Rd Farmers Bridge Rd S Of Windham Rd N Grandview Blvd Greystone Rd Marybill Dr Rivers Ave Sigel Rd Craig Rd 4910-R N Peoria Whitehorse Rd & Second Ave Bloomfld 2nd Harway Ave Old Rt Boynon Dr Moss & Hwy W Main St N Cherry Street Ext Sw 52nd St High St Leonard St San Ignacio Ave E Washington Blvd Highway Judson Rd Denver Ave La France Ave E 357th St 1719-21st Sm Eldridge St W Evans Ave W 2200 S McCoy's Ford Rd Northrock Ct Tribute Rd Portage Trail Ext Fairfield Ave Leafdale Ave E Royallon Rd Elizabeth Sfte	Los Angeles Palos Park Woodland Hills Springfield Troy Atlanta Butler Poquoson Mc Donough San Diego Millington Riverside Waterloo Alburnett Hephzibah Watford City South Windham Waukesha Waterbury Troy North Charleston Germantown Saegertown Toisa Phoenixville Los Alamitos Elizabeth Brooklyn Kellsville Rossville Brownsboro Louisville Wallingford Davie Painesville Raynham San Jose Los Angeles Quitman Pinson San Antonio Bridgeport Bloomfield Willoughby Santa Monica Mount Clemens Englewood Salt Lake City Walton Rockford Sacramento Cuyahoga Falls Mc Henry Casper Kenilworth El Monte Cleveland Dickinson	CA IL MO OH GA NJ VA GA CA CA IA GA ND CT WI CT OH SC OH PA OK PA CA NJ NY WV GA TX OH CT FL OH MA CA CA TX AL TX CT NJ OH CA TX AL TX CT MI CO UT KY IL CA OH IL WY NJ CA OH TX	90005-2125 60464 91364 65803-9503 45373-1317 30339-5701 07405-2398 23662-1135 30253-6607 92504-6230 92126-6361 07946 50701-1344 52202 30815 58854 06266-1131 51388-1675 06701 45373-1033 513-335-8070 29405-7043 45327-9759 814-333-1285 74126 19460 90720 07206 11214-6919 24732 30741 75756 4641-2325 06492-2309 33314-5530 44077-5559 02767-1128 95119-1365 90040-1142 75783 35126-2685 78247-4629 06605-1901 07003-5683 44095-4126 903-967-2258 3541C 205-681-3089 210-655-1358 203-367-4551 201-429-4824 216-946-8161 310-453-3761 810-463-5780 303-922-9345 801-974-9120 606-485-1216 815-877-6079 916-546-5595 216-923-5557 815-344-2953 82601 307-234-7979 07033-2013 91733-3600 44147-2803 77539	213-849-6251 708-923-3000 818-346-5873 417-869-9549 513-335-7990 770-431-6000 201-838-1213 804-868-8487 770-957-3312 619-549-0173 908-903-1049 909-789-9635 319-235-7035 319-842-2216 706-592-6123 701-842-6895 203-423-4575 414-542-3885 203-757-9281 513-335-8070 803-554-9450 513-855-3446 814-333-1285 918-425-5704 610-983-0169 310-430-1171 908-289-4070 718-714-5159 304-898-2040 706-866-7468 903-852-7117 216-875-6200 203-265-6237 305-797-0036 216-357-1234 508-823-9566 408-365-7314 213-268-3391 903-967-2258 205-681-3089 210-655-1358 203-367-4551 201-429-4824 216-946-8161 310-453-3761 810-463-5780 303-922-9345 801-974-9120 606-485-1216 815-877-6079 916-546-5595 216-923-5557 815-344-2953 307-234-7979 908-241-8950 818-444-2980 216-546-1077 713-337-6311	3825 3469 3829 3599F 3541H 3369 3369 3599E 3545 3312 3548A 3599A 3563 3599A 3599A 3599A 3599A 3599A 3451 3599A 3544D 1791D 1731 3544 3599A 3089 3599E 3599A 3599A 3599A 3599A 2899 3541C 3365 3599A 3599A 3599F 3599A 3544E 3544E 3089 3599A 3599A 3599A 3599A 3599A 3291 1791D 3441 3089 3599A 3599A 3599A 5087E 5084V 3498 3599A	5043E 5043
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1396	Jabonetas Machining	1495	Santa Cleotide Ave	TX	78040-3044	210-724-9822	3569	505-...	5089
1397	Jacks Machine Works	660	Rollins Rd	CA	94010-2316	415-344-8942	3599A	3544D	
1398	Jacksons Machine & Engine Parts	1205	S Jackson Hwy	TX	77662-9425	409-769-5203	3566	3544D	
1399	Jaco Manufacturing Co	468	Geiger St	AL	35660-5748	205-381-5548	7538C	5531	
1400	Jakolat Machine Co	3910	10th Ave N	OH	44017-1319	216-234-4000	3089		7699D
1401	James McGraw Inc	31	S 42nd Pl	AL	35234-2415	205-591-8665	5111	7699P	3544D
1402	James Spring & Wire Co	478	Musket Dr	AZ	85034-3013	602-273-0335	3599A		
1403	James Walker Company	6	N Bacton Hill Rd	PA	19355-1035	610-644-3450	3399		
1404	Janer Machining Inc	1	Beach Rd	FL	33037-4334	305-451-4569	3569		
1405	Janil Engineering Company	28	Raynor Ave	NY	11779-6600	516-471-3466	3599A		
1406	Jaten Associates Inc	1247	S Buena Vista St	CA	92583-4664	909-654-2796	3599A		
1407	Jaten Associates Inc	1610	Greensburg Pike	CA	15137-1616	412-823-1120	3599A	1761	
1408	Jayco Steel Rule Cutting Die In	131	Boerum St	NY	11206-2636	718-387-8180	3999L		
1409	Jct Sheet Metal Inc	1228	Se Industrial Blvd	FL	34952-3503	407-398-9522	1791D	1761	5065D
1410	Jeb J Manufacturing	225	Research Dr	CT	06460-8507	203-874-4114	3599A		
1411	Jebco Divison	2614	Atlanticav & Somerdaledr	NJ	08021	609-784-5561	3724		
1412	Jet Metallurgical	10725	Martha St	NE	68105-3261	402-345-6767	3369	3599A	
1413	Jencks Incl/H W	31	Sandhill Rd	TX	75238-1227	214-341-7171	3313		
1414	Jenkins Machine Shop	1137	Swift Ave	MI	49616	616-882-7276	3599		
1415	Jenkins Precision	54	Cowee Dr	MO	64116-4129	816-471-3785	3599A	3313	
1416	Jensen Orla Orlas Machine Sho	581	Division St	NV	89403	702-246-5595	3599A		
1417	Jensen Tools Inc Customer Service	7815	S 46th St	CA	95008-6905	408-378-1442	3599A		
1418	Jerguson Gage & Valve Co	3576	Concord Rd	AZ	85044-5313	602-968-6231	3545		
1419	Jericho Products			PA	17402-8626	717-751-0811	3829	3569	3494
1420	Jerry White Inc	1203	Clinton Dr	CA	95118	408-978-3873	3545		
1421	Jersey Industrial			TX	77547-3421	713-455-8391	3569J		
1422	Jesco Manufacturing Co	5662	State Hwy No	NJ	08098	609-769-1107	3494		
1423	Jet Stream Manufacturing		N Northwest Hwy	IL	60646-6136	312-763-2900	3469	3399	
1424	Jetstream Watercutting	20273	Gulph Creek Business Ctr	PA	19428	610-941-0122	3599A		
1425	Jim Jeffers Water Well Drillin		Mack St	CA	94545-1224	510-786-0800	3541	3063G	
1426	Jmt Automation & Control		M-115 &	MI	49668	616-885-1010	3599E	1781	
1427	Jobar Mfg Co	1220	Kennestone Cir	GA	30066-6045	770-429-1963	3829		
1428	Jobsite Fasteners Inc	7225	Division St	OH	44146-5483	216-232-5555	3599A		
1429	Jodex Graphel Inc	9595	Distribution Ave	CA	92121-2305	619-693-1833	3462	3545	
1430	Johns Precision	6115	Centre Park Dr	OH	45069-3869	513-779-6166	3599K		
1431	Johnson & Berry Manufacturing Inc	34	Front St	MA	01151-1148	413-543-3666	3599A		
1432	Johnson Boiler Co	907	Indian Cmtry Rd	MI	49946	906-524-6433	3599A		
1433	Johnson Bros Metal Forming Co	300	Pine	MI	49417	616-842-5050	3443		
1434	Johnson Controls Inc	5500	Mc Dermott Dr	IL	60104	708-449-7050	3542		
1435	Johnson H20 Equipment	19118	S Reyes Ave	CA	90221-5898	310-637-8800	3829		
1436	Johnson Machine & Tool Inc	4350	Hopewell Ave	IA	52722-5967	319-332-6820	5084G	3599E	5082H
1437	Johnson Metal Products	402	Space Park N	TN	37072-1862	615-859-3749	3541H	3599A	3544D
1438	Johnson Welton V Engineering Co Inc	52	Souther Field Rd	GA	31709	912-924-3403	3599A	7692D	
1439	Johnson Yokogawa Inc		Commerce St	NJ	07081-3004	201-467-8500	3451		
1440	Johnston Tool Die & Machine Co Inc	1201	W Crosby Rd	TX	75006-6905	214-242-6521	3829	5063E	
1441	Johnstone Supply	35	Wilcutt Block Rd	MS	39701-9618	601-329-2420	3599A	3541	3544D
1442	Jolex Boring Inc	335	N Weber Ave	SD	57102-0411	605-338-2652	3699		
1443	Jordan Plastic Center	8495	Ronda Dr	MI	48187-2001	313-459-3080	3599A		
1444	Jorich Machine Co Inc	1101	13th St	GA	31901-2247	706-323-6444	5719B	3089	
1445	Joseph Casting Inc	36	River Rd	NJ	07010	201-945-2020	3599A		
1446	Joseph Hill Co Inc The	141	W 47th St	NY	10036-8601	212-704-0968	3363	3599	
1447	Jpk Enterprises	5000	Spencer St	NY	11205-3930	718-855-2326	3399		
1448	Jrv Machining Service Co	11723	W Oakley Blvd	NV	89102-3393	702-870-0216	3999L	3471A	3089
1449	Ju La Precision Machining	1442	Washington Blvd	CA	90606-2613	310-698-7313	1521E	3599A	
			Arrow Hwy	CA	91706-1342	818-357-6907	3599A		

ERIC	Ju	247	Fourth Tipp City	Tipp City	OH	513-667-2039	3544D
	Ju	2011	E 30th St	Erie	PA	814-898-1237	9651
	Ju	4821	W Mich	Jackson	MI	517-750-9244	3541H 3599A
	Ju	9360	National Rd	Brookville	OH	513-836-9989	3544E 3089
	Ju	138	B Hwy	Blairstown	NJ	908-362-8481	3599A
	Ju	1225	E Manhattan Blvd	Toledo	OH	43608-1549	419-726-4563 3498 5023P
	Ju	5747	W Raymond St	Indianapolis	IN	46241-4344	317-243-9430 3544E 3599A
	Ju	3250	E Camino Real	Alascadero	CA	93422-2501	805-466-6101 7538C
	Ju	6880	Ridge Rd	Douglasville	GA	30134-7135	770-949-2609 3599A
	Ju	421	Highway	Fountain Inn	SC	29644-9191	803-862-9762 3599A
	Ju	1016	E Grove St	Bloomington	IL	61701-4204	309-829-4479 3599A 3544D
	Ju	20248	19 Mi	Big Rapids	MI	49307	616-796-3533 5032C 3273
	Ju	606	Highway	Grace	ID	83241-5121	208-425-3119 4971 3599A 5084G 3599E
	Ju	10501	3502-D N 3000 East	Twin Falls	ID	83301	208-733-2693 1541 1794
	Ju	12275	Us Rt	Warren	OH	44482	216-675-7217 3599A
	Ju	2156	Dixie	Redford	MI	48239-2490	313-532-6688 3451
	Ju	50	Otoole Ave	San Jose	CA	95131	408-577-1510 3599A
	Ju	7751	Main Pq	Bristol	CT	06010	203-585-7257 3599A
	Ju	10105	Alabama Ave	Canoga Park	CA	91303	818-888-2223 7389G 3365 3471C
	Ju	530	W Gulf Bank Rd	Canoga Park	CA	91304-4948	818-716-5716 3451 3599A
	Ju	9003	Cherry Hill Area	Houston	TX	77040-3121	713-466-6656 1629L 3494
	Ju	400	W Kalamazoo Ave	Cherry Hill	NJ	08002	609-751-3322 7378A 3541 3599D
	Ju	3555	N115 W19301 Edison Dr	Kalamazoo	MI	49007-3306	616-381-0690 3545 3599K 3541
	Ju	8700	130th Av N	Menomonee Falls	WI	53051	414-251-8821 3544E
	Ju	9128	3rd Ave	Clearwater	FL	34615	813-585-7352 3599A
	Ju	780	N Prospect St	Brooklyn	NY	11215-2705	718-596-1700 3469
	Ju	130	Tyler Blvd	Colorado Springs	CO	80907-5450	719-636-3864 3089
	Ju	471	E Rose	Mentor	OH	44060-4350	216-974-9660 3599A
	Ju	5862	83r Beaver St	Beilflower	CA	90706	310-920-9692 3544E
	Ju	556	E Fair St	Waltham	MA	02154-8442	617-899-6601 3599A
	Ju	1541	Despatch Dr	Kankakee	IL	60901-2175	815-939-7700 3494
	Ju	218	N 3rd Ave	East Rochester	NY	14445-1448	716-385-1760 3412 3085 3499 5113E
	Ju	4710	Mettler Ave	Anderson	TX	77830	409-873-2813 3599
	Ju	4061	Caldwell Ave	Amf Ohare	IL	60666	312-694-3277 3569
	Ju	28151	Springgrdn Ave	Los Angeles	CA	90003-1316	213-233-9668 3999L
	Ju	2975	Main	Mansfield	OH	44905-1499	419-524-4371 3451
	Ju	14	S C R	Pittsburgh	PA	15123	412-321-2715 3599A 7692D
	Ju	102	New Castle Ave	Trenton	NE	69044	308-334-5301 3599A 7692D
	Ju	11399	Hall	Odessa	TX	79760	915-563-9222 3599A 5063N
	Ju	16134	Brother Blvd	Wilmington	DE	19880	302-594-4545 5947U 4932 3291A 3569
	Ju	2135	Spur Hy	Mount Clemens	MI	48043	810-949-9610 3444 4226
	Ju	5516	Emily Rd	Memphis	TN	38133-3909	901-382-4300 3829
	Ju	44020	S River Dr	Kenai	AK	99611	907-283-7521 5211 5075 3398
	Ju	63	E Lakeswood Blvd	Broad Brook	CT	06016-9660	203-623-7373 3599A 5075 5033 3498
	Ju	2135	Cohasset St	Tempe	AZ	85281-3011	602-894-9760 3089
	Ju	5023P	E Main St	Holland	MI	49422	616-392-7080 3599A 5023P 3441 7692D
	Ju	3441	Cumberland Hts	Van Nuys	CA	91406-2909	818-902-1622 3541
	Ju	3334	W River Dr Ne	Snellville	GA	30278-6425	770-736-1007 3545
	Ju	3544D	N Groesbeck Hwy	Burnside	KY	42519	606-561-5035 3334 1099A 3355 75
	Ju	3599D	Bartlett St	Comstock Park	MI	49321-8914	616-784-7171 3544D 3544B 3599F 75
	Ju	3599A	Lancstrpke	Clinton Township	MI	48036-1108	810-469-8255 3599D
	Ju	3494	Navigation Blvd	Plainville	CT	06062-3122	203-747-4135 3599A
	Ju	1915	Old Covington Rd Ne	Paoli	PA	19301	610-644-2886 3541C 3561 7389X 1781
	Ju	141	Hickory Corner Rd	Corpus Christi	TX	78408-2634	512-884-4123 3829 3494
	Ju	3494	Po Box	Conyers	GA	30208-1521	770-760-8961 3599F
	Ju	3494		Milford	NJ	08848-2033	908-479-1800 3599F
	Ju	3494		Dublin	CA	94568-0205	510-833-0996 3494



1512	King Centerless Grinding Co	29800	King Centerless Grinding Co	Stephenson Hwy	351	Madison Heights	MI	48071-2341	810-542-1615	3541H		
1513	King Richards Jewelry Casting	6737	King Richards Jewelry Casting	Ringgold Rd Ridge		Chattanooga	TN	37412	615-894-8382	3363	3599	
1514	King Way Technical Inc	10855	King Way Technical Inc	68th St S		Cottage Grove	MN	55016-1522	612-459-9428	3541	3599D	3599E
1515	Kings Industrial Maintenance	905	Kings Industrial Maintenance	Violet St		Burk Burnett	TX	76354-3614	817-569-3805	3599A	3599E	1791D
1516	Kingsford Machine Products		Kingsford Machine Products	Hillside		Hop Bolton	PA	18924	717-942-6965	3714B		
1517	Kirk Welding & Co	1608	Kirk Welding & Co	Holmes St		Kansas City	MO	64108-1589	816-221-3030	4923	1311	3548B 7692
1518	Kirklands Pipe & Iron Works		Kirklands Pipe & Iron Works	Hwy	78	Williston	SC	29853	803-266-3456	3548A		
1519	Kks Industries Inc	1200	Kks Industries Inc	Cleveland St Sw		Massillon	OH	44647-7956	216-837-3666	3999L		
1520	Klock Company	4215	Klock Company	Burns Rd		West Palm Beach	FL	33410-4654	407-622-2200	3548		3398
1521	Knight Machining Service	899	Knight Machining Service	Moe Dr		Akron	OH	44310-2560	216-630-1348	3599A		
1522	Knight Pump Service		Knight Pump Service			Moultree	GA	31776	912-985-7157	3599E	1781	
1523	Knight Tool & Die	301	Knight Tool & Die	21st St E		Bradenton	FL	34208-1613	941-747-3301	3544B	3544D	
1524	Knott Kustom Fabrications		Knott Kustom Fabrications	Rr	2	Urbana	IL	61801-9802	217-469-2784	3599A		
1525	Kobold Instruments Inc	371	Kobold Instruments Inc	East St		Charlotte	NC	28200	704-362-4800	3829		
1526	Koehl Machine & Tool Works		Koehl Machine & Tool Works			Buffalo	NY	14207-2061	716-875-4672	3599A		
1527	Koffler Manufacturing Inc		Koffler Manufacturing Inc			New England	ND	58647	701-579-4235	7699C	3599A	7692D
1528	Kokusai Koki America Inc	297	Kokusai Koki America Inc	Kinderkarmack Rd		Oradell	NJ	07649-1535	201-262-1565	3545	5084D	
1529	Koldwave Air Conditioners	950	Koldwave Air Conditioners	Bolger Ct		Fenton	MO	63026-2029	314-349-1900	3494		
1530	Kragel Company Inc The	23	Kragel Company Inc The	Lake St		Hamburg	NY	14075-4932	716-648-1344	2394	3569E	5722C
1531	Kram Precision Maching Inc	6737	Kram Precision Maching Inc	U S Rt	40	New Carlisle	OH	45344	513-845-2244	0272	5941F	3599A
1532	Kramer Mechanical	1082	Kramer Mechanical	E 2nd St		Jamestown	NY	14701-2242	716-664-6355	7538C		
1533	Krasberg Corp	1365	Krasberg Corp	Lee St		Des Plaines	IL	60018-1514	708-296-9500	3469		
1534	Kraus Machine Inc	131	Kraus Machine Inc	W Wichita St		Colwich	KS	67030-9782	316-796-1185	3599A		
1535	Krieger Machine Co	3099	Krieger Machine Co	Se Monroe St		Stuart	FL	34997-5981	407-287-8400	3599A		
1536	Krimes Automotive	302	Krimes Automotive	Ridge Ave		Ephrata	PA	17522-2556	717-733-0505	7538C		
1537	Kritzat John P Inc	196	Kritzat John P Inc	Brahma Ave		Bridgewater	NJ	08807-2755	908-725-4232	3541C		
1538	Kronk Forge	6105	Kronk Forge	John Kronk St		Detroit	MI	48210-2936	313-894-2850	3462	3569	3494
1539	Kue-Ken Div Process Technology Corp	8383	Kue-Ken Div Process Technology Corp	Baldwin St		Oakland	CA	94621-1925	510-569-8382	3531G	5082X	
1540	Kunkle Valve Co	5409	Kunkle Valve Co	Powell St		New Orleans	LA	70123-2306	504-733-3366	5075	3569D	
1541	Kyser Eastland	2301	Kyser Eastland	E 2nd St		Odessa	TX	79761-4911	915-580-7100	7349V	3569D	5084V
1542	L & D Industries	201	L & D Industries	S Fulton		Auburn	IN	46706	219-925-4714	3599A		
1543	L & D Threading Co	7625	L & D Threading Co	Rosecrans Ave		Paramount	CA	90723-2507	310-634-5106	3599A		
1544	L & L Tool & Manufacturing Inc	4924	L & L Tool & Manufacturing Inc	Hillard Rd		North Little Rock	AR	72118-2477	501-758-7373	3544D		
1545	L & M Machine And Tool Co	105	L & M Machine And Tool Co	Lehigh Ave		Hawthorne	NJ	07506	201-523-5288	3599A		
1546	L & S Tool Co	819	L & S Tool Co	Farmington Ave		Berlin	CT	06037-1306	203-828-7892	3599A		
1547	L P Precision	3217	L P Precision	Edward Ave		Santa Clara	CA	95054-2306	408-727-5266	3599A		
1548	La Marche Manufacturing	106	La Marche Manufacturing	Bradrock Dr		Des Plaines	IL	60018-1940	708-299-1188	3699D		
1549	Labelles Machine Service	1024	Labelles Machine Service	W Maude Ave		Sunnyvale	CA	94086-2814	408-746-2775	3599A		
1550	Ladd Machine Service	420	Ladd Machine Service	Air Park Rd		Ashland	VA	23005-3204	804-798-6205	3599A		
1551	Lafayette Machine Corp	4900	Lafayette Machine Corp	Henry Ave		Niagara Falls	NY	14304	716-236-0221	3599A	3599E	3545
1552	Lafayette Grinding Corp	115	Lafayette Grinding Corp	Banker St		Brooklyn	NY	11222-3161	718-388-5973	3541H		
1553	Lake Tool & Supply Co	255	Lake Tool & Supply Co	Newell St		Painesville	OH	44077-1249	216-352-7105	3599E	5084Y	
1554	Lakeland Products	52	Lakeland Products	Abbot Ave		Coldwater	MI	49036-1430	517-639-4849	3089		
1555	Lakes Mold & Mach Co	665	Lakes Mold & Mach Co	Anderson Ave		Akron	OH	44306-3101	216-773-5111	3599K	3544E	
1556	Lakes Pipe & Supply Corp-Erie Div	1020	Lakes Pipe & Supply Corp-Erie Div	Holland St		Erie	PA	16501-2005	814-452-4300	3498	3494	
1557	Lakeside Machine Shop	549	Lakeside Machine Shop	Valley		Hot Springs	AR	71901-6129	501-624-4177	3599E	3599A	1791D 5051D
1558	Lalone Mike Inc	11000	Lalone Mike Inc	Davisburg Rd		Davisburg	MI	48350-2614	810-625-0550	1781	3599E	
1559	Lamantia Machine Co	395	Lamantia Machine Co	E Main St		Benton Harbor	MI	49022-4442	616-927-1886	3544D	3469	
1560	Lambach Wait Inc Fire Extngrshr	348	Lambach Wait Inc Fire Extngrshr	River Dr		Bettendorf	IA	52722-4654	319-355-4694	3999	5063E	
1561	Lamco Machine Co	12330	Lamco Machine Co	Knigge Cemetery Rd		Cypress	TX	77429-3223	713-890-1188	3599A	1389B	
1562	Laminated Plastics	90	Laminated Plastics	Washington St		Haverhill	MA	01832-5524	508-374-9000	3089		
1563	Lamjen Inc	3046	Lamjen Inc	W 22nd St		Erie	PA	16506-2304	814-838-9681	3599A	3544D	
1564	Lancast Aluminum Inc	1644	Lancast Aluminum Inc	W 135th St		Gardena	CA	90249-2506	310-532-7068	3365		
1565	Lancaster Machining Inc	3180	Lancaster Machining Inc	W Fair Ave		Lancaster	OH	43130-9568	614-687-0044	3599A		

Lar	520	Slocum St	OH	43130-2951	614-653-3421	3544B	35f
Lar... Metal Products Co	1904	Hwy 82 Bypass	MS	38930	601-453-6525	7699P	35f
Lai... chine Works	1110	Old World Third	WI	53200	414-347-7862	3829	61B
Landis & Gyr Powers Inc	735	S 2nd Ave	SD	57104-5001	605-336-3788	5044D	3829
Landis & Gyr Powers Inc	1	Prospect Rd	NJ	07508-1452	201-956-7001	3541H	
1570 Lapco Industries Inc	11881	John St	OH	44136-2931	216-238-3700	3322	
1571 Lapp D A	4819	Ne 12th Ave	FL	33334-4803	305-491-2411	3599A	
1572 Laree Inc	384	Pine St	CA	95076-4518	408-724-4432	3365	3544E
1573 Larges Metal Fabrication	19101	15 Mi	MO	63621	314-546-7717	3599A	3544D
1574 Largo Machine Shop	509	Tully Rd	MI	48035	810-791-0040	3469	5084R
1575 Larse Industries Inc	6380	Sashabaw Rd	CA	95350-5853	209-529-2020	5084G	
1576 Larsen I J Pumps Inc	105	31st Ave	MI	48346-2260	810-625-3303	1611G	3599E
1577 Larson Company A Clarkston	400	N 17th St	IL	61201-5916	309-794-0677	5084G	1623
1578 Larson-Becker Co Inc	24730	Crestview Ct	NM	88005-8120	505-526-1411	5082A	
1579 Las Cruces Machine Co	2560	Wyandotte St	MI	48335-1506	810-474-9480	3699C	
1580 Laser Mechanisms Inc			CA	94043-2315	415-965-9884	3699C	
1581 Laser Pro Labs			CA	91382	805-253-0204	3699C	
1582 Laser Shop The			CA	91382	805-253-0204	3699C	
1583 Laser-Tec	232	Rr	IL	61753-9802	309-365-8175	3699C	
1584 Lasmet Tool & Die Co		Wescott Dr	NJ	07065-4706	908-381-0030	3544D	
1585 Lathrop Construction	2533	S West	CT	06776	203-354-8914	1611Z	1771C
1586 Latshaw Enterprises Inc	8206	Edinboro Rd	KS	67203	316-942-7266	3829	3451
1587 Laughlin Collision Service	1101	Penn Ave	PA	16509-4247	814-868-3717	3711B	
1588 Laurel Mould Inc	4421	Theiss Rd	PA	15644-2038	412-527-5640	3544E	
1589 Lawco C N C	15087	Northville Rd	TX	77338-1050	713-821-0665	3599A	
1590 Lawrence Products Inc	302	E 6th Ave	MI	48170-2548	313-420-4366	3599A	
1591 Lawruk Machine & Tool Co	2565	S 300 W	PA	16602-2799	801-943-6136	3599A	3541
1592 Lawson-Yeates Inc	210	E Buckingham Rd	UT	84115-2908	801-487-7800	3498	52110
1593 Lay Mechanical Mntnce Co	3330	W-Osborn Rd	TX	75040-4710	214-487-0404	3599D	3494
1594 Layke Inc	4812	Eagle Rd	AZ	85017-4810	602-272-2654	3599A	
1595 Layman B W & Sons	3108	S Covell Ave	MI	48383-1201	810-887-5640	5084G	1781
1596 Layne-Western Company Inc	409	Plymouth Rd	SD	57105-5520	605-335-7726	8711M	3599E
1597 Le Blond Makino Machine Tool	4400	Hwy	MI	48170-1834	313-453-0390	3541	
1598 Le Jeune Machine Shop & Iron Works Inc	739	Broadway	LA	70535	318-457-8113	3548A	
1599 Le Ran Copper & Brass Co	2675	Roosevelt Rd	NY	14043-2915	716-684-6492	3364A	
1600 Learjet Corp	23	Francis J Clarke Cir	IL	60137-5877	708-790-0607	3721	
1601 Lebanon Equipment Co			VA	24266	540-889-2584	5999	3569
1602 Lee Battery Service Inc			NJ	08736	908-528-5337	3691	3699D
1603 Lee Machine Co			CT	06801-2861	203-794-9509	3599A	5084
1604 Lee Quigley Company The			CA	94520	510-680-7546	3471C	3399
1605 Leese & Co Inc			PA	15601-9803	412-834-5810	3599K	3599A
1606 Lenco Company			NE	68462	402-786-2000	3089	3544E
1607 Lenmar Tool & Die Co Inc			NY	10400	718-823-6060	3544D	3599A
1608 Lepsik Manufacturing	1805	Lenco Plaza	CA	95125-1007	408-971-6005	3599A	
1609 Lesco Mfg Co Plastics	2020	Little Orchard St	CA	91103-1323	213-681-4971	3089	
1610 Letco Inc	851	N Belcrest Ave	MO	65802-2591	417-831-1528	1791D	
1611 Levelite Technology Inc	1340	Space Park Way	CA	94043-1308	415-254-5980	3829C	
1612 Leviton Manufacturing Co Inc	2445	Menwlin	PA	19083	610-446-7544	3699	
1613 Lewallyn Advanced Technologies	4887	E Nance Springs Rd	GA	30735	706-277-1142	5084D	
1614 Lewis Co The	9019	Steeleberry Dr	NC	28217-5315	704-588-2681	3469	
1615 Lewis Tool & Die	1008	2nd St Ne	IA	50035-1019	515-967-2775	3544D	
1616 Lewis Well Drilling	2376	S Charlton Park Rd	MI	49058-9124	616-945-4272	3599E	1781
1617 Liberty Air Power Inc			GA	30134	770-949-1897	3699	
1618 Liberty Tool & Die Co	5101	W 161st St	OH	44142-1604	216-267-4744	3599A	
1619 Lidgerwood Mfg Co	1101	John Ave	WI	54880-1640	715-394-4444	3599A	7692D
1620 Light Solutions Corporation			MA	01718	508-264-9003	3699C	
1621 Lilly Machinery Inc		CR 2213 RLilly Rd	TX	75703	903-561-6733	3599A	3541
1622 Lind Auto Parts Mapco	1720	N Beale Rd	CA	95901-6911	916-742-7336	7538C	3599D
1623 Lindberg Heat Treating Company	130	Huntingdon Ave	CT	06708-1419	203-755-9119	3398	5531A



Line#	Company Name	Address	City	State	Zip	Phone	Fax
1628	Linc Machinery Co Inc	2817 Columbia Ave	Indianapolis	IN	46205-4056	317-924-4828	7389A
1629	Linc sley		Clancy	MT	59634	406-933-5511	7389A
1630	Lindsey & Gowans Machine Co Inc	924 N Selvidge	Allianta	GA	30316	706-272-1041	3599A
1631	Lindsay Machine Shop	187 N 4700 E	Rigby	ID	83442-5965	208-538-7717	3599E
1632	Lingfelt Billy Matr Handing Eopt	1010 Seed Farm Rd	Westminster	SC	29693-4314	803-647-4291	5084E
1633	Lions Mechanical Services	Hwy 52	Charleston	SC	29420	803-572-0955	1711N
1634	Lithonia Lighting Reloc Wiring Div	Lithonia Way	Decatur	GA	30035-4141	770-987-4200	3829
1635	Livinston & Haven Connectors	Saint Vardell Ln	Charlotte	NC	28217-1372	704-525-8802	3494
1636	Lmb Construction	W 4th St	Eureka	MO	63025-1806	314-938-3352	5084L
1637	Lnc Services Corp	Riverside Ave	Paso Robles	CA	93446-2654	805-239-4215	3544D
1638	Lock Ridge Tool Co	W Kirkwall Rd	Azusa	CA	91702-5127	818-334-4416	3544D
1639	Loda Enterprises Inc	Birch Dr	Omaha	NE	68128-2417	402-593-7366	3569H
1640	Logan Corp	Claypool Hill	Richlands	VA	24641	540-963-1011	3999
1641	Lohr & Herrmann Technology Inc	Olympia Ave	Woburn	MA	01801-6307	617-933-0678	3541
1642	Lombardo Raymond J	Shaker Rd E	Longmeadow	MA	01106	413-525-6998	3599A
1643	London Homer Alignment Service	Scotland Ave	Gainesville	GA	30501-4304	770-532-7171	3559M
1644	Long Beach Machinery	W 16th St	Long Beach	CA	90813-1306	310-432-2721	3599E
1645	Long G L Co	Greenwood St	Lincoln	NE	68504-2050	402-464-7369	5932U
1646	Longo Industries	Pennsylvania Ave	Linden	NJ	07036-1761	908-925-2900	5063C
1647	Longo Machinery Sales	Klingerman St	South El Monte	CA	91733-1897	818-401-2828	3599E
1648	Long Motor Equipment	E Hensley Blvd	Bartlesville	OK	74003-2615	918-336-6350	7538C
1649	Longyear	W Seidon Ln	Peoria	AZ	85345-7973	602-486-1881	3541C
1650	Longyear Co Sales	W 1700 S	Salt Lake City	UT	84104-4240	801-972-1395	3541C
1651	Lorraine Instrument	N Velasco St	San Jose	CA	95100	408-727-4233	3825B
1652	Loranger International Corp	E Johnson Ave	Angleton	TX	77515-3029	409-849-8020	3494
1653	Lou Jan Tool & Die Co	Valley Rd	Cheshire	CT	06410-1209	203-272-3536	3599A
1654	Lowell Manufacturing Inc	Badger St	York	PA	17407-1236	717-428-2002	3599A
1655	Loyal Machine	Andover St	Yorkville	IL	60560-1702	708-553-1242	3599A
1656	Lp Brazing Inc	N Sycmrd	Wilmingon	MA	01887-1229	508-658-2295	3548
1657	Lpg Industries	Raven Rd	Clifton Heights	PA	19018	610-622-2900	3823
1658	Ltv Steel Tubular Products	E Biddle St	Monticello	GA	31064-9136	706-468-0422	3312
1659	Lu Paul Tool & Die Co	Park Row	Jackson	MI	49203-1877	517-789-7779	3544D
1660	Lube Systems Inc	W Rice Ave	Houston	TX	77084-4927	713-578-3314	5099C
1661	Ludwig Michael S Drilling	Adams St	Littletw	CO	80123-1165	303-933-0059	3541C
1662	Lujan Engineering	Lulu St	Paramount	CA	90723-4008	310-634-4241	3599A
1663	Luke Steel	S1strd	Wichita	KS	67211-4425	316-263-8489	3599A
1664	Luke Tool & Engineering Co	N Leclaire Ave	Hammonton	NJ	08037	609-561-4048	3599A
1665	Luma Metalcraft Inc	Pontiac Ave	Chicago	IL	60639-4423	312-804-9400	3365
1666	Lundwall Mach Co	State Road	Granston	RI	02920-7921	401-785-2226	3599A
1667	Lynco Products Inc	Mill	Wakarusa	IN	46573-9708	219-862-4981	3599A
1668	Lyn-Mar Machine & Tool	N Highway	Parma	MI	49269	517-531-5161	3599A
1669	Lynch Plumbing & Pump Co	Hwy 12 S	Los Altos	CA	94023	415-948-5561	5084G
1670	Lynns Quality Machine Shop	Glenwood Dyer Rd	Enid	OK	73701	405-234-2051	3599A
1671	Lynott Implement Inc	Phipps Bend Industrial Rd	Hawarden	IA	51023	712-552-2311	3523
1672	Lynwood Tier Center Inc	Newburgh Rd	Chicago Heights	IL	60411-8622	708-474-2070	5531C
1673	Lynx Machine & Tool Co	S Allegheny Ave	Surgoinville	TN	37873	615-345-5020	3599A
1674	Lyon Manufacturing Inc	G-8107 N Dort	Livonia	MI	48150-5009	313-591-0606	3451
1675	Lyns Transportation Lines	Rosalie Rd	Reno	PA	16343	814-677-3089	3721
1676	Lyons Well Drilling Inc	N 69th Ave	Mount Morris	MI	48458	810-686-3980	3599E
1677	M & D Pump Service	Bench Mark Dr	Bailey	CO	80421-2061	303-838-5367	5084G
1678	M & G Machining	Pickle Rd	Glendale	AZ	85303-1719	602-939-7741	3599A
1679	M & H Machine & Welding	Aviation Way	Austin	TX	78728-7720	512-251-2768	3599A
1680	M & J Mach Shop	County Road E W	Akron	OH	44312-4227	216-645-0042	3599A
1681	M & J Machining	S Bridge	Watsonville	CA	95076-2000	408-724-5712	3599A
1682	M & M Hydraulic Co	Energy Pkwy	Saint Paul	MIN	55112	612-635-9414	3511
1683	M & M Industrial Supply	Minnesota Dr	Kankakee	IL	60902	815-933-1775	3569
1684	M & M Machine Service Inc		Pasadena	MD	21122	410-360-0047	2399
1685	M & M Services Inc		Troy	MI	48083-4610	810-589-0910	3599A

Company Name	9103	Mich	Dearborn	MI	48120	313-582-9300	7538U	359
M F Supply Co	205	Utah St	Toledo	OH	43605-2243	419-697-1986	3599A	
M Mining Inc								
M & I Machine Shop		Pearson Knobb Lane	Taylorville	NC	28681	704-632-9934	3599A	3541
MA IW Of Tulsa	1110	N Iroquois Ave	Tulsa	OK	74106-5901	918-587-6087	3714	
1686 M And M Thread And Assembly	2832	Elliott Dr	Troy	MI	48083-4635	810-583-9696	3599A	3541F
1687 M F I Corporation	4273	Will Rogers Pkwy	Oklahoma City	OK	73108-2039	405-947-5100	3599A	
1688 M K Machine & Tool Co	1499	Delp Dr	Harleysville	PA	19438-2936	215-256-9881	3544D	3599A
1689 M L S Screw Machine	10	Dexter Rd	East Providence	RI	02914-2004	401-435-3850	3451	
1690 M O S Tool & Engineering	2233	Calle Del Mundo	Santa Clara	CA	95054-1017	408-748-1166	3089	3544E
1691 M S K Precision Products Inc	4571	Nw 8th Ave	Oakland Park	FL	33309-3936	305-776-0770	3451	3599A
1692 M W Industries Inc	215	E Helms Rd	Houston	TX	77037-1601	713-448-3510	3544D	5085
1693 M-1 Tool Works Inc	1419	S Belden St	Mc Henry	IL	60050-8399	815-344-1275	3544	
1694 Mac Donald Molding Inc	36870	Green St	New Baltimore	MI	48047-1605	810-725-2111	3089	
1695 Mac Machine Co	1719	Whitehead Rd	Baltimore	MD	21207-4085	410-944-6171	3599A	
1696 Macdonalds Industrial Produ	850	Pannell Ave Nw	Grand Rapids	MI	49504-2812	616-363-4844	3363	
1697 Mach 1 Production Machine	36	Marie St	Plainfield	CT	06374-2210	203-564-6855	3599A	
1698 Machine & Rebuild	4947	Cash Rd	Flowers Branch	GA	30542-5102	770-967-8852	7538	3599A
1699 Machine Engineers	651	E 8th St	Jacksonville	FL	32206-3999	904-353-8289	3599A	7692D
1700 Machine Industries Inc	1019	Starr Ave	Eau Claire	WI	54703-1820	715-832-8100	3599A	
1701 Machine Services	212	Southland Ave	Bushnell	FL	33513	904-793-7930	3599A	
1702 Machine Shop	555	Linden Ave	Gustine	CA	95322-1431	209-854-6279	3599A	
1703 Machine Shop Services	156	Main St	Dubuque	IA	52001-7629	319-557-9176	3599A	
1704 Machine Shop Solutions			Bensalem	PA	19020	215-639-8522	7538C	
1705 Machine Tech Industries	127	S Terrace Ave	Mount Vernon	NY	10550-2407	914-665-0855	3599A	
1706 Machine Tool Electronics Services	47260	Freedom Valley	Roseville	MI	48066	810-778-7477	3599D	
1707 Machine Works	430	S 1st St	Albemarle	NC	28001-5717	704-983-5968	3599A	
1708 Machinery Center Div Veet Industries	25755	Groesbeck Hwy	Warren	MI	48089-3671	810-776-3000	3599E	
1709 Machinery Center Inc	1559	W 3860 S Vly City	West Valley City	UT	84119-6291	801-972-1794	5932Y	3599E 5082X
1710 Machinery Service Co		W Alna Rd	Wiscasset	ME	04578	207-882-6788	3599A	
1711 Machinery Wholesales Corporation	5924	S 94th East Pl	Tulsa	OK	74145-8325	918-250-3666	3541	5932
1712 Mactech Industrial Corp			Pompano	FL	33062	305-946-3852	3599E	
1713 Mack W K Enterprises	6060	S 300 W Murray	Murray	UT	84107-6995	801-263-7666	5511	3569E
1714 Mackenzie Products Co Inc		State Hwy No 34	Belmar	NJ	07715	908-681-0200	3599A	
1715 Macuch Steel Products Inc	1527	Augusta Ave	Augusta	GA	30901-3465	706-823-2420	3446C	1791D 7542C 3441
1716 Magnesium Die Casting	200	Maple Park Blvd	Saint Clair Shores	MI	48081-2211	810-773-4500	3363	
1717 Magness Manufacturing Co	1604	N 161st East Ave	Tulsa	OK	74116-4823	918-438-2755	3599A	
1718 Magnetic Cores Div Of Nor-Mag	250	Bishop Ave	Bridgeport	CT	06510-3044	203-335-9921	3316	
1719 Magnetrol Controls	7988	Capwell Dr	Oakland	CA	94621-2106	510-568-7000	3429A	3829 508AV 3569J
1720 Magnum Mach Co Inc	9535	Jackson St	Mentor	OH	44060-4515	216-352-7720	3544B	3599A
1721 Main Machine Industries Inc	2815	E Main St	Canon City	CO	81212-4011	719-275-6548	3599A	3469
1722 Mairs & Power Inc Invstmt Serv		1st Natl Bank Bldg	Saint Paul	MIN	55100	612-222-8478	3699	
1723 Manca Inc	165	Carver Ave	Westwood	NJ	07675	201-666-4100	3545	5084D
1724 Manchester Machine & Rpr	328	N 10th St	Haledon	NJ	07508-2120	201-790-4042	3599F	
1725 Manck Machine Co Inc		Tatum Hwy	Henderson	TX	75652	903-657-2869	3599A	7692D
1726 Manhasset Tool & Die Co	4270	Walden Ave	Lancaster	NY	14086-9770	716-684-6066	3599A	
1727 Manhattan Tool Co Inc	1450	Stratford Ave	Stratford	CT	06497-6434	203-377-5600	3569	
1728 Manley Tool & Machine	1551	N Courtney Rd	Independence	MO	64050-6214	816-836-9766	3599A	
1729 Manning Manufacturing	35	Spencer St	Stoneham	MA	02180-2615	617-279-2311	3599A	
1730 Manor Auto Parts Corp	1326	New York Ave	Huntington Station	NY	11746-1703	516-427-3300	3559M	
1731 Manufacturing Development I	37515	W Harry	Cheney	KS	67025	316-542-3166	3724	
1732 Manufacturing Equipment Co Inc	742	Black Snake Rd	Easley	SC	29640-9658	803-855-2647	7359E	3545
1733 Manufacturing Services Inc	709	Edge St	Fort Walton Beach	FL	32547-2903	904-864-2400	3599A	83
1734 Manufacturing Technology Inc	2226	Goodyear Ave	Ventura	CA	93003-7750	805-644-9681	3599A	
1735 Manufax	1324	Barlow St	Traverse City	MI	49686-4312	616-929-3226	3544E	
1736 Mapelli Inc	1287	Washington Hwy	Elberton	GA	30635-2748	706-283-7405	3291	
1737 Maple Machinery Inc	1625	N Garvin St	Evansville	IN	47711-4566	812-425-0099	3599E	
1738 Maple Mold Technologies	1985	Northfield Dr	Rochester Hills	MI	48309-3824	810-853-0308	3544E	
1739 Mar Ron Industries	2628	Wilkinson Blvd	Lowell	NC	28098	704-824-9554	3599A	

1743	Mar... engineering Co	7350 Greenbush Ave	North Hollywood	CA	91605-4003	818-765-4805	3599A	5091
1744	M... is & Machining	W Reno Ave	Las Vegas	NV	89118-1616	702-364-8234	3594A	351
1745	Marfaulon Mach Engineering Corp	Airport Rd	Cincinnati	OH	45226-1614	513-321-9811	3599A	
1746	Marchi Associates	Hazel Ave	Redwood City	CA	94061-3110	415-364-3411	3829	3823
1747	Marco Edm Inc	Hills Tech Dr	Farmington Hills	MI	48331-5727	810-553-3390	3599K	
1748	Marco Sales Co	E 56th Ave	Commerce City	CO	80022-3661	303-297-1220	3829	5075B
1749	Marcus Curt	16th Ave Nw	Willmar	MN	56201-2090	612-235-0452	3599E	5082H
1750	Marden Industries Inc	Slate Rd 640 E	Lakeland	FL	33801	941-682-7882	3523	
1751	Marf General Machine Work Inc	E 4th Ave	Tampa	FL	33605-5412	813-247-3242	3599A	3599F
1752	Markco Machne Wrks	Golden Ave	Odessa	TX	79764-2831	915-362-8921	3599A	
1753	Markey Machinery Company In	8th Ave S	Seattle	WA	98108-3403	206-622-4687	3599A	5084D
1754	Marklyn Controls & Supply Inc	Dekalb Rd	Farmington	NM	87401-1642	505-327-5071	5084V	3498
1755	Marks Well & Pump	Aspen Knls	Hibbing	MN	55746-3841	218-262-3401	5084G	5082H
1756	Martin Machine Co	8th Ave Nw	New Brighton	MN	55112-7769	612-633-6719	3599A	
1757	Maro Precision Inc	Hwy 301 S	Sharpsburg	NC	27878	919-977-6764	3544B	3599A
1758	Marsh Industrial Sheet Metal Works Inc	Hwy 52 North	Cheraw	SC	29520	803-537-7684	1791D	
1759	Marsh Jerry Mch Shops	Perkins	Joplin	MO	64801	417-781-7181	3599A	3544D
1760	Marshalltown Instruments Co	Parmenter Blvd	Royal Oak	MI	48073-1012	810-280-0000	3829	
1761	Martin K H Precision Machining	Slauson Ave	Santa Fe Springs	CA	90670-2219	310-698-5503	3599A	
1762	Marty Equipment Co	S Lake St	Tucumcari	NM	88401-2542	505-461-1236	3523	
1763	Maruka Machinery Corp Mori-Seiki	Chapin Rd	Pine Brook	NJ	07058-9718	201-227-2343	3545	3541
1764	Marwais Steel Co	Larkspur Landing Cir	Larkspur	CA	94939-1715	510-223-8883	3312	
1765	Marwald West Inc		Modesto	CA	95352	209-523-7861	3523	
1766	Marwell Corp	N Wabash Ave	Redlands	CA	92374-3936	909-794-4192	5075B	3699
1767	Maryland Metals Inc Security Yard	W Church St	Hagerstown	MD	21740-4728	301-739-5525	3545	1795
1768	Maser Alfred W Co Inc	Fox Chase Rd	Philadelphia	PA	19111	215-379-0100	3569	3541
1769	Mason Chico Machinery Inc Contrs Eqp	Up River Rd	Corpus Christi	TX	78409-2814	512-289-6361	5082A	7359M
1770	Mason Header Die	Mason	Mason	MI	48854	517-676-0350	3544D	3599E
1771	Mason Machine	Windy Hill Rd	Blairsville	GA	30512-4111	706-745-9324	3599A	7692D
1772	Master Die Cutting	Los Vallecitos Blvd	San Marcos	CA	92069-1476	619-744-0679	3999L	
1773	Master Metal Engineering	S Burnette Dr	South Bend	IN	46614-3820	219-299-0222	3599A	
1774	Master Pumps & Equipment Corp	W Commerce St	Dallas	TX	75208-1957	214-741-9007	3561	3599E
1775	Mastercraft Pattern Works	E Cottage Pl	York	PA	17403-3219	717-854-8911	3365	3999A
1776	Matchmaker Machine Shop	Route 365	Vernon	NY	13476	315-363-8534	7538C	
1777	Mathieu Arms-Development Inc	Clawiter Rd	Hayward	CA	94545-1723	510-782-9273	3599A	
1778	Mattel Inc Metal Works	Garrett Rd	Haringen	TX	78550	210-421-3936	1791D	3441
1779	Matthew Machinery Sales Inc	Bishop Ln	Louisville	KY	40218-4504	502-962-9889	3541	5084D
1780	Matthiessen-Royall Equipment &	Culebra Rd	San Antonio	TX	78201-6417	210-734-4363	5084A	3444
1781	Maurer Industrial Supply In	Lexington Park Dr	Elkhart	IN	46514-1193	219-293-7442	5251	5082A
1782	Mayer Malbin Co Inc	Morristown Area	Morristown	NJ	07960	201-267-9717	3494	3452
1783	Mayfield Foundry Inc	W 5 Ave	Beaver Falls	PA	15010	412-846-0660	3369	
1784	Mazak Machine Tools	E North Belt	Houston	TX	77038	713-931-7770	3541	
1785	Mbc Precision Machining & Hydraulics	Ridgemoat St	Houston	TX	77087-2009	713-643-8571	3599E	3599A
1786	Mc Connell Machinery Co	E 23rd St	Lawrence	KS	66046-5005	913-843-2676	3523	1629L
1787	Mc Coys Machine Shop	Wichita St	Wichita Falls	TX	76304-3229	817-322-2371	3599A	5261B
1788	Mc Cullough Machine Co	Rr 1	New Derry	PA	15671-9801	412-694-8485	3599A	5511B
1789	Mc Donnell Douglas Aircraft	Naval Air Sta	Patuxent River	MD	20670-5000	301-863-2200	3724	
1790	Mc Dowell Machining	Spring St	Redwood City	CA	94063-3522	415-364-2093	3599A	4581F
1791	Mc Kinney Drilling Co	E Walnut St	Colmar	PA	18915-9756	215-822-3328	3541C	3721
1792	Mc Kiskick Drilling Inc	E Apache St	Tulsa	OK	74116-1424	918-437-2846	3541C	
1793	Mc Minnville Tool & Die Inc	Needmore Rd	Mc Minnville	TN	37110-1489	615-473-8464	3544D	1771E
1794	Mc Neill Manufacturing	Chapman St	Oakland	CA	94601-2805	510-533-3747	3599A	3469
1795	Mccreey Corp	Lakeland Blvd	Wickliffe	OH	44092-2321	216-943-3636	3531G	
1796	Mccullough & Benton Inc	Northeast Expwy Access Rd	Atlanta	GA	30329	404-325-1606	3531A	5198
1797	Mcdonnell Machine Shop	Po Box 241	Winnie	TX	77665-0241	409-296-2241	3599A	
1798	Mcdonnell Douglas Aircraft Co Lng Bch Hls Abc	N Lakewood Blvd	Long Beach	CA	90846-0003	310-429-2495	3721	
1799	Mcwewen Boy L	14th	Barron	WI	54812	715-537-3005	3599A	3914
1800	Mcgee Jack W Non-Ferrous Metals Inc	16th Ave Sw	Seattle	WA	98134-1022	206-624-8414	3339	5093A
1801								3548



Mc	Construction Co	1185	Laurel		Florence	OR	97439	503-997-7989	3541C	331
Mc	Component Technology Inc	9831	S 51 St		Tempe	AZ	85284	602-893-8991	38258	
Mdm	Technologies	333	Firs		Elizabeth	NJ	07201	908-353-7800	3699C	7331
Mead Greg			Hwy	2	Bonnors Ferry	ID	83805	208-267-2897	7699	2411
1802	Meadows Machine Shop Inc	1930	S Vandeventer Ave		Saint Louis	MO	63110-3220	314-771-2200	7538C	
1803	Measurement Control Systems In	1331	S Lyon St		Santa Ana	CA	92705-4608	714-835-0995	3829	5063N
1804	Mec Pro Inc	980	George St		Santa Clara	CA	95054-2705	408-727-9757	3599A	
1805	Mech-Tron Engineering Div	61	Arrow Rd		Wetherfield	CT	06109-1302	203-529-2507	3599A	
1806	Mechanical Art Works	96	Monroe St		Newark	NJ	07105-2109	201-589-4850	3451	3399
1807	Mechanical Engineer Controls Automation Cor	1800	Markle Ave		Eikhart	IN	46517-1322	219-294-7580	8711J	3599F
1808	Mechanical Logistics Inc	2421	W Cucharas St		Colorado Springs	CO	80904-3048	719-636-1370	3599A	
1809	Mechanical Systs Of Dayton Inc	4358	Springfield St		Dayton	OH	45431-1039	513-254-3235	1711	1711B
1810	Mechanism Manufacturing	62	Enterprise Dr		Ann Arbor	MI	48103-9503	313-665-2046	3599A	3444
1811	Mechni Arts Inc	8171	Cole Pkwy		Bonner Springs	KS	66012	913-422-7335	3599A	
1812	Medford Equipment Co	8	Brookside Dr		Medford	NJ	08055-9238	609-654-4887	3599E	
1813	Medso Inc	54	Hubbard Ave		San Fernando	CA	91340	818-365-5010	3599A	
1814	Meltons Precision Machine Sho	7338	Varna Ave		North Hollywood	CA	91605-4015	818-765-6342	3599A	
1815	Merco Plastic Mold & Genl Machine Work	2377	Hoffman St		Bronx	NY	10458-8002	718-220-2884	3599A	3089
1816	Merco Corporation The Disirbtr	223	Fort Pitt Blvd		Pittsburgh	PA	15222-1505	412-471-3222	3694	3829
1817	Mercury Engineering Co Inc	2027	Shelby St		Indianapolis	IN	46203-4045	317-783-7879	3541	5084V
1818	Merritt Enterprises Inc	33	Columbus Blvd		New Britain	CT	06051-2243	203-223-1801	3599A	3599F
1819	Metal Container Corp	105	E Blackhawk Dr		Fort Atkinson	WI	53538-1158	414-563-7720	3354	
1820	Metal Cutting Service	16233	Gale Ave		La Puente	CA	91745-1719	818-968-4764	3541	
1821	Metal Polishing	4685	Interstate Dr		West Chester	OH	45069	513-860-9953	3569E	
1822	Metal Processors Inc	200	Falkenburg Rd S		Brandon	FL	33511	813-654-0050	3542	
1823	Metal Specialties	538	S Ireland St		Burlington	NC	27217-3944	910-228-6080	1791D	
1824	Metalcraft Of Mayville Inc	2600	Metalcraft Rd		West Bend	WI	53095-5249	414-338-4035	3399	
1825	Metallake Corporation		Haverhill Rd		Amesbury	MA	01913	508-388-6670	3714	
1826	Metals & More	713	1st		East Moline	IL	61244	309-796-0633	3399	
1827	Metalscorp Inc	6970	108th Ave		Largo	FL	34647-1666	813-544-2521	3334	5051D
1828	Metric Machine	1041	Po Box		Sanford	NC	27331	919-776-9331	3599	
1829	Metric Tool	21989	Us Highway 19 N		Clearwater	FL	34625-2361	813-791-8189	3599A	
1830	Metro Assemblies	3901	Foss Rd		Minneapolis	MN	55421-4510	612-789-8823	2399	3089
1831	Metro Machine & Tool Co	9350	H Ct		Omaha	NE	68127-1246	402-331-1599	3599A	3679A
1832	Metro Machine Tool	9810	Lunceford Ln		Denver	CO	80221-5626	303-252-4427	3541	
1833	Metro Plastics Technologies In	9175	E 146th St		Noblesville	IN	46060-4310	317-776-0860	3089	3544E
1834	Metro Structural Services Inc	4641	S Braden Ave		Tulsa	OK	74135-7020	918-627-0267	1771	1629C
1835	Metro Tool Co	7325	Hamlin Ave		Skokie	IL	60076-3902	708-673-6790	3545	
1836	Meyer Mach Tool Co	3434	E 7th Ave		Columbus	OH	43219-1735	614-235-0039	3599A	3544D
1837	Mico Machining Mfg Co Inc	1220	Enterprise Dr		Winchester	KY	40391-9668	606-744-5618	3599A	
1838	Microror Inc	43	Nagor Park		Action	MA	01720-3426	508-263-1080	3699C	
1839	Micris Chemical Inc	174	Belmont Rd		Hawthorne	NY	10532-2102	914-747-0767	3291	
1840	Micro Edm Specialties	50	Commercial St		Webster	NY	14580-3106	716-872-4600	3599K	3544E
1841	Micro Industrial				Seattle	WA	98116	206-938-2949	7379C	3829
1842	Micro Machine	1725	W Picacho Ave		Las Cruces	NM	88005-2338	505-524-1497	7538C	7538U
1843	Micro Max Corp Chemcils		N884 Rhine Rd		Eikhart Lake	WI	53020-1617	414-876-2577	3291	
1844	Micro Technology Inc	208	E Monroe St		Tulahoma	TN	37388-4517	615-454-1282	3599A	
1845	Micro Technology Of Brevard Inc	3900	Dow Rd		Meibourne	FL	32934-9255	407-242-7221	3599A	
1846	Micro Tronics	2905	S Potter Dr		Tempe	AZ	85282-3159	602-437-8995	3599K	3069
1847	Microcontrol Systems Inc	105	Southwct		Canonsburg	PA	15317	412-941-1390	3829	
1848	Microtech Mfg Corp	300	Cox St		Roselle	NJ	07203-1704	908-245-0505	3541	
1849	Micron Production Grinding	6100	Birch Rd		Flint	MI	48507-4649	810-235-2900	3541H	
1850	Mid America Fittings	10411	Hickman Mills Dr		Kansas City	MO	64137-1602	816-765-1060	3494	3451
1851	Mid Atlantic Instrumentation I				Norfolk	VA	23500	804-627-4470	3498	
1852	Mid State Tool & Machine Co Service Dept	1904	Hatcher Rd		North Little Rock	AR	72120-9585	501-835-3300	3599A	
1853	Midbrook Products Inc	2080	Brooklyn Rd		Jackson	MI	49203-4744	517-787-3481	3699	3699C
1854	Midbrook Products Inc Machining Division	2080	Brooklyn Rd		Jackson	MI	49203-4744	517-787-3481	3699	3699C
1855	Middendorff Well Co	102	Beech		Sioux Rapids	IA	50585	712-283-2270	3541C	5082H

1850	Tool & Machine Inc	262	Mt Vernon	Midford	NH	03055	603-673-1114	3541H	359C
1851	chine Shop	211	99th St E	Tacoma	WA	98445-2013	206-536-3277	3599A	
1852	Midland Pipe & Supply Co	2829	61st Cicero	Cicero	IL	60650	312-242-4200	3498	3494
1853	Midville Tool & Die Co Inc			Midville	GA	30441	912-589-7250	3599A	
1854	Midway Tool Engineering Company Inc	651	Westmnstrd	Wilkes Barre	PA	18602	717-655-6844	3599A	
1855	Midwest Fluid Components	10151	Summit Ave	Cincinnati	OH	45241-1023	513-563-0745	3494	
1856	Midwest Mold & Engineering	303	Hwy 163 W	Pella	IA	50219	515-628-2371	3544E	
1857	Midwest Steel Rule Dies Inc	1742	Causeway Blvd	La Crosse	WI	54603-3118	608-785-0300	3999L	3544D
1858	Midwest Supply Co	15611	E 6th St	Tulsa	OK	74104-3294	918-583-6175	3291	7389C
1859	Milco Wire Edm	6395	Product Ln	Huntington Beach	CA	92649-1345	714-373-0098	3599K	
1860	Mile Hi Machine Inc	1322	W 56th Ave	Arvada	CO	80002-2797	303-425-0760	3599A	
1861	Miles Auto Parts	455	Prueter Rd	Saginaw	MI	48601-6611	517-754-0445	3559M	
1862	Millex Instrument Pr	4400	Commercial Ave	Palisades Park	NJ	07650-1226	201-944-8774	3451	
1863	Miller Electric & Fire Protection	2007	Tempie City Bl	Lomita	CA	90717	818-444-4555	3993E	
1864	Miller Engineering & Testing	21	70th Ave W	Tacoma	WA	98466-5540	206-564-4554	1731	5063E
1865	Miller Machine & Grind Serv	8530	Markariyn St	Auburn	ME	04210-4809	207-786-4249	3541C	8748L
1866	Miller Tool & Die Co Inc	791	M-89	Richland	MI	49083	616-629-9678	7538C	3541H
1867	Miller Well & Pump Co Inc	6600	4th St	Mayville	WI	53050-1804	414-387-4040	3544D	
1868	Millers Engine Machine & Parts	1083	Bunker Hill Rd	Gainesville	FL	32608-5417	904-376-7924	5084G	
1869	Mills Precision Industries	7702	Balboa Blvd	Cookeville	TN	38501-3956	615-526-5272	7538C	
1870	Milltech	19	S Canal St	Lawrence	MA	01843-1412	508-686-1501	3599A	
1871	Minimac Machine Inc	30993	Huntwood Ave	Hayward	CA	94544-7000	510-489-7192	3599A	
1872	Mise & Nercio Mch Shop	6518	Alder Dr	Houston	TX	77081-4402	713-666-0357	3599A	
1873	Mitchell Machinery Sales	301	E Havens St	Mitchell	SD	57301-4403	605-996-6231	3523	
1874	Mitretek Mold	106	Verdi St	Farmingdale	NY	11735-6321	516-249-3399	3089	
1875	Mize & Company	300	Industrial Dr	Kingman	KS	67068	316-532-3191	3714	
1876	Mkw Enterprise		Depot Rd	Colchester	VT	05446	802-879-6882	3569	3494
1877	Mmcc Inc	101	Clematis Ave	Waltham	MA	02154-7030	617-893-4449	3369	
1878	Modern Machine & Grinding Inc	2001	Clark Rd	Dyer	IN	46311-1704	219-322-1201	3541H	
1879	Modern Machine & Stamping Co	28533	Holiday Pl	Eikhart	IN	46517-1193	219-293-8504	3469	
1880	Modern Machine Service Co	3714	W Burnham St	Milwaukee	WI	53215-2025	414-383-2401	3599A	
1881	Modern Mold & Tool Co	2101	N Davidson St	Charlotte	NC	28205-1827	704-377-2300	3599A	3544D
1882	Modern Plate Co Inc	2612	18th St	Racine	WI	53403-2305	414-634-6130	3321	3369
1883	Moheco Products Co	26835	W 7 Mile Rd	Detroit	MI	48240-1906	313-531-5630	3542	3399
1884	Molalla Pump			Oregon City	OR	97045	503-655-1354	5084G	3599E
1885	Mold Craft Plastics	151	Freestone Ave	Portland	CT	06480-1641	203-342-1906	3544E	
1886	Mold Engineering & Design	145	Ward Ln	Gainesboro	TN	38562-5969	615-268-9643	3544D	
1887	Mold Engineering Inc	6535	E 82nd St	Indianapolis	IN	46250-4524	317-842-1316	3544E	
1888	Mold Markers Information Network			West Covina	CA	91790	818-851-1949	3544E	
1889	Mold Masters Systems Of Americ	345	Staffrd Way	Rochester	NY	14626	716-225-2630	3544E	
1890	Mold-Craft Inc	2405	Missouri St	Tusculum	AL	35674-4746	205-381-7803	3544D	
1891	Monarch Industries	401	N Lowell Ave	Syracuse	NY	13204-2042	315-476-8397	4783	3829C
1892	Monarch Machine Corp	11642	Washington Blvd	Whittier	CA	90606-2425	310-698-9611	3599A	
1893	Monarch Tool & Mfg Co	66	Clinton Rd	Fairfield	NJ	07004-2910	201-575-1244	3599A	
1894	Mondragon Machine Shop	509	S Brownlee Blvd	Corpus Christi	TX	78401-3123	512-882-7640	3599A	
1895	Mono Steel Rule Die Co	51	Manhasset St	Cranston	RI	02910-1009	401-941-6760	3544D	
1896	Monroe Pattern & Mold	1	Sheridan Ave	Elizabeth	NJ	07208	908-245-0270	3544E	
1897	Monroy Iron Works	910	Koerner Ln	Austin	TX	78721-3326	512-385-3665	3548A	
1898	Moore Industries Inc	535	Rochstrd	Pittsburgh	PA	15237	412-369-0100	3829	
1899	Moore Precision	11132	Fleetwood St	Sun Valley	CA	91352-2745	818-768-5089	3599A	
1900	Moore Products Co	1110	Montlmar Dr	Mobile	AL	36609-1723	334-343-7600	3829	
1901	Moore Products Co Industrial I		Summeytown Pike	Spring House	PA	19477	215-646-7400	3829	
1902	Moore Machine Inc		Airport Rd	Statesville	NC	28687	704-872-6054	3599A	
1903	Moraine Mold & Tool Inc	11520	Rockfld Ct	Cincinnati	OH	45246	513-772-5333	3544E	3089
1904	Morgan Steel Inc	1104	Ocean Dr	Homer	AK	99603-7911	907-235-8174	3354	5084I
1905	Morgan Tire Co	3608	Natl Pks Hwy	Carlsbad	NM	88220	505-887-0308	7538	5531C
1906	Morgantown Machine & Hydraulics	38	Purple Sage Rd Rks	Green River	WY	82938	307-875-3901	3599E	

1914	940	Millstead Way	Rochester	NY	14624-5181	716-436-8828	2819	3541H	3599A	3541
Mormood Tools Inc Mc Industries Inc Mo... & Son Hardware Morris Machine & Tool Co Morrison Construction Services	1816	Old Laurens Rd S K St	Clinton	SC	29325	803-833-5969	3365			
Morrison Construction Services	80	Marshall Ave	Tulare	CA	93274-6842	209-686-8660	5075			594. 3585
Motion Industries Inc	1990	Saint St	Cumberland	RI	02864-6406	401-333-9650	3541			
Motor Parts & Supply Company A	3440	Needmore Rd	Richland	WA	99352-2102	509-375-1990	1711			1541 3829
Motor Supply Co	6977	N Academy Blvd	Dayton	OH	45414-4314	513-236-7711	3569			
Motor Vehicle License Plate Ag	1320	W Hwy	Colorado Springs	CO	80918-1126	719-599-8411	5531			
Mountain High Machining	101	N Main St	Watertown	SD	57201	605-886-5769	3714			7623 1541 3829
Mountain Industrial Network Inc	6420	Hollywood Rd	Moorestville	NC	28115-2525	704-663-5472	3711			
Mountain Machine Works	152	Old Clyde Rd	Magalia	CA	95954-9355	916-873-4486	3599A			
Mountain Molding Ltd	2589	Hotel Rd	Clyde	NC	28721	704-627-3200	5734			7378B 3599E
Mountain State Drilling	14444	I25 Frontage Rd	Auburn	ME	04210-8822	207-783-6680	3594A			3599A
Mountain States Indl S	1015	W 1700 S	Meard	CO	80542	970-535-4777	3089			
Mountain States Screw Machine Co	6901	W 117th Ave	Midway	WV	25878	304-683-3158	3541C			
Mountaineer Machine & Hydraulics Inc	9	Brushfork Rd	Salt Lake City	UT	84104-2228	801-972-1166	3599E			5082 7699P 3536
Msm Sll Fabrctr	2	8th Ave Sw	Broomfield	CO	80020-2925	303-465-4349	3599A			3451
Mti Inc	5932	Equion Dr	Bluefield	WV	24701	304-325-8030	3599A			
Mueller Machine & Tool Co	6877	Jackson Ave	New Brighton	MS	55112-7704	612-633-8181	1791D			1761
Multi Grinding Inc	2635	Miller Dr	Ashland	MS	38603	601-224-6628	3599A			3544D
Multi Precision Detail	1110	Paldan St	Saint Louis	MO	63134-2398	314-522-8080	3599A			
Multicraft Inc Die Cutting	600	Fairchild Rd	Warren	MI	48092-1674	810-268-7388	3541H			3599A
Multiplex Manufacturing Co	312	Fowler Ave	Auburn Hills	MI	48326-1825	810-373-3330	3544B			
Munn Manufacturing Co	911	County Line Rd	Winston Salem	NC	27105-4590	910-767-6150	3999L			
Murphys Machine Shop & Weldin	2515	Hattiesburg Dr	Benwick	PA	18603-3307	717-752-4524	3494			
Murray Mold & Die Co	1841	Industrial Rd	Freeport	MI	49325-9773	616-765-3067	3599A			3469
Murphy's Machine & Tool Co	516	Charleston Pl	Magee	MS	39111-4207	601-849-2771	3599A			
Musil Machine & Tool	304	4th St	Murray	KY	42071	502-759-4851	3599A			3544E 3544D
Myrick Machine Co	110	Wright Ave	Fort Wayne	IN	46808-1385	219-484-0382	3494			5085H 5063N 3561
N A C-Southern Glass & Plastics Co	8338	Echols Ave	Wilmette	IL	60091-2829	708-251-0551	7538			5541 3559M
N C Tool & Die Co	1209	Pineneedle Dr	Grand Island	NE	68801-7712	308-382-7044	3599E			
N J C Machine Co	199	47th St	Jacksonville	FL	32207-6549	904-391-0037	3599A			
N J Precision Fabricators Inc	75	N 12th	Savannah	GA	31406-2528	912-353-7666	5231			5719F 3089
N K R Precision Mfg Corp	884	Route	Painesville	OH	44077	216-354-4152	3599A			
N R H Engineering	1525	Elder St	Lyons	IL	60534-1761	708-442-6004	3599A			
N Wood Counter Laboratory Inc	1110	S Bunker Hill Rd	Newark	NJ	07100	201-482-9400	3599A			3451
Nagakra Engineering Works Co Inc	630	E 53rd St	Monroe	NY	10950	914-782-8562	3599A			
Nametric Machinery	123	W William Cannon Dr	Milford	CT	06460-6420	203-876-0073	3829			
Nardo Fire Equipment	1209	Sobranite Way	Collax	NC	27235-9738	910-993-4411	3599A			7692D
Nashville Steel Rule Die Inc	130	Nottawasepee	Chicago	IL	60615-4530	312-324-1114	3823			
National Bushing Parts Co	4501	W 26th St	Austin	TX	78745-5460	512-448-4521	1771			1541 3443A 1799B
National Environmental Products Control Syste	1314	1416-A Lebanon Pke	Columbus	IN	47201-7360	812-375-1382	3542			
National Industry Transformer	7805	Nw 103rd Ave	Sunnyvale	CA	94086-4810	408-737-2770	3599A			
National Machinery Exchange	556	Ross St	Napoleon	MI	49261	517-536-8656	3566			3541H 3599A
National Transmissions	2630	Rosevale Ave	Erie	PA	16508-1519	814-454-1059	3999			5812
Nationwide Fire Equip Co	4248	W Larkspur Dr	Nashville	TN	37210	615-256-5746	3999L			
Natl Equipment Corp	141	W 47th St	Staples	MN	56479	218-894-3940	5531			3714 3544D
Natl Magnetic Sensors Inc	2101	Summer St	Sunrise	FL	33351-7936	305-746-8770	3829			
Natl Tractor Parts Inc Crawler Undercarriage S	174	12127-A Galena Rd	Petaluma	CA	94954-6524	707-763-1108	3829			3625B
Nautical Engineering	2101	1790-11th	Pico Rivera	CA	90660-4391	310-949-2446	3599E			
Navairas Gilbert Machine	141	Houston Hwy	Ronkonkoma	NY	11779-3070	516-585-0632	3699A			4822B
Navarro Iron Works	141	S Harris	Phoenix	AZ	85029-2562	602-861-2848	3999			3569E
Ncl Equipment Specialties	141	S Harris	Chicago	IL	60632-4402	312-376-5400	7629			2064 3559G
			Plantville	CT	06479-1156	203-621-6816	3829			
			Plano	IL	60545	708-552-7642	3599E			
			Oakland	CA	94601	510-839-0902	3731			
			Victoria	TX	77901-5734	512-572-8582	3599A			
			Vallejo	CA	94590	707-642-2854	3548A			
			Oswego	IL	60543	708-554-0990	3699C			5082A 3829C

1976	Eric	Iowa Industrial Fasteners Inc	8530	K St	Omaha	NE	68127-1821	402-592-4988	3452	50"
1977		Nelson & Son Builders	7631	Commerce St	Corcoran	MN	55369	612-420-3844	3564	5074D
1978		Nes Smith Corp/Die Marker	1410	Clark St	Jacksonville	FL	32206-4626	904-353-6317	3544D	3569D
1979		Nesor Alloy Corp	1	Chapin Rd	Montville	NJ	07045	201-227-2747	3364A	3364
1980		Net Shapes Inc	1914	S Bon View Ave	Ontario	CA	91761-5546	909-923-1621	3324	
1981		New England Products	84	High St	Danvers	MA	01923-3130	508-774-7779	3599F	
1982		New Era Converting Machinery Inc	235	E 43rd St	Paterison	NJ	07504-1217	201-345-3939	3599F	
1983		New Hampshire Motor Vehicle Di		Rte	Berlin	NH	03570	603-752-7502	3711	
1984		New Jersey Gasket Mfg Co		Erial Rd	Blackwood	NJ	08012	609-227-1900	3053	3469
1985		New Mexico Steel Co	1600	Pacheco St	Santa Fe	NM	87505-3963	505-982-1997	2813	3569
1986		New Stanton Machin & Tool Inc		Rr	Greensburg	PA	15601-9811	412-925-6250	3599A	3541
1987		New Star Brass & Bronze Works	178	Stockholm St	Brooklyn	NY	11237-3704	718-443-0800	5039	3365
1988		New Vegas Materials	3379	Industrial Rd	Las Vegas	NV	89109-1907	702-733-6388	3545	3446D
1989		Newcomb Machine & Welding Shop	309	Molly Rd	Hot Springs	AR	71901	501-623-8350	3599A	7692D
1990		Newform Electronic Co		37b South St	Marcellus	NY	13108-1327	315-673-9165	3699	3679B
1991		Nicholson Tool & Die	1420	Fields Ave	Columbus	OH	43211-2672	614-299-8500	3599A	3544E
1992		Nicks Machining	1753	Grant St	Santa Clara	CA	95050-3974	408-748-8534	3599A	3089
1993		Nicks Well Drilling	6141	Cedar Run Rd	Traverse City	MI	49684-9682	616-947-4857	3599E	1781
1994		Nicksons Machine Shop Inc	914	W Betteravia Rd	Santa Maria	CA	93455-1194	805-925-2525	3599A	3599E
1995		Nightingale Manufacturing	230	Roymar Rd	Oceanside	CA	92054-1323	619-433-2281	3599A	7538C
1996		Nikkei Equipment Co Inc	184	Central Ave	Shafter	CA	93263-2019	805-746-4365	3523	5083
1997		No Hollywood Die Making & Stamping	7350	Atoll Ave	North Hollywood	CA	91605-4109	818-982-8389	3541	5511B
1998		Noit Bros Inc Mach Shop	121	Valley View Dr	Ephrata	PA	17522-9775	717-733-8761	3599A	
1999		Non Ferrous Metal Products Inc		Wyandotte Rd	Willow Grove	PA	19090	215-659-2673	3365	
2000		Non-Ferrous Fastener Inc		N Main St	Orange	CA	92667-5403	714-997-9053	3452	3444
2001		Norcen Industries Inc	924	Butteroff Indl Park	Jersey Shore	PA	17723	717-398-4363	3599A	3089
2002		Nordstrom Valves Inc			Danville	CA	94526	510-743-1736	3494	
2003		Norfolk Machine & Welding Inc Nights Sunday	1019	W 41st St	Norfolk	VA	23500	804-427-9584	3599A	7692D
2004		North American Products	398	Valley Rd	Gillette	NJ	09333-2110	908-647-7373	3599E	
2005		North Coast Equipment Corp	1271	E 289th St	Wickliffe	OH	44092-2358	216-585-5300	3599E	7389A
2006		North East Machine & Tool Co		Hwy	Janesville	IA	50647	319-987-2003	3599A	
2007		North Hollywood Tool & Mfg Co	12632	Raymer St	North Hollywood	CA	91605-4307	818-983-1201	3469	
2008		North Star Steel-Texas Inc	340	Old Hwy	Vidor	TX	77670	409-768-1211	3312	
2009		North Valley Equipment Inc			Grafton	ND	58237	701-352-1833	3523	0134
2010		Northeast Industrial Tooling I	75	Webster St	Worcester	MA	01603-1932	508-757-8000	3599E	
2011		Northeast Metrology Corp	30	Bermar Park	Rochester	NY	14624-1541	716-426-6440	3599D	
2012		Northeast Tool Corp	850	Saint Paul St	Rochester	NY	14605-1065	716-423-0190	3599A	
2013		Northeastern Plastics Inc	420	Carroll St	Brooklyn	NY	11215-1085	718-855-1446	3089	3544D
2014		Northern Ky Mach Shop	1004	Mary Laidley Dr	Covington	KY	41017-9527	606-356-3444	3599A	
2015		Northern States Metals	51	N Main St	West Hartford	CT	06107-1926	203-521-6001	5051A	3354
2016		Northern Surveying Instr			Crivitz	WI	54114	715-854-7224	3829C	
2017		Northland Equipment Co Inc	306	W State St	Janesville	WI	53546-2556	608-754-6608	3711	8322E
2018		Northwest Calibration Systems	5700	6th Ave S	Seattle	WA	98108-2510	206-762-2515	3823	5013Z
2019		Northwest Implement		Hwy 10 West	Orange City	IA	51041	712-737-4874	5511B	3825
2020		Northwest Metal Spinning Co	9351	Chestnut Ave	Franklin Park	IL	60131-2933	708-455-5060	1791D	3523
2021		Northwest Mine Supply	716	Bank St	Wallace	ID	83873-2304	208-752-0022	3541C	5082X
2022		Northwestern Tool & Die Manufacturing Corp	868	Ely Ave	Vineland	NJ	08360-1687	609-696-9470	3544D	
2023		Norton Co Norton Pike Sivsion		Highland Ave	Littleton	NH	03561	603-444-3947	3291	
2024		Norton Precision Machining Inc	1849	Walsh Ave	Santa Clara	CA	95050-2505	408-980-9238	3599A	
2025		Norwood Tool Co	717	N Western Ave	Dayton	OH	45417	513-268-1629	3544D	
2026		Nosala Engineering & Mfrs	7871	Alabama Ave	Canoga Park	CA	91304-6615	818-703-1971	3599A	
2027		Novi Die & Engineering	1485	Temple City Dr	Troy	MI	48084-4607	810-649-1600	3544D	
2028		Nowak Design & Machine Co Inc		Robert Whrtn	Wharton	NJ	07885	201-366-7208	3599A	
2029		Nowling Industrial Fabricators	2314	Boykin Blvd	Mobile	AL	36605-4306	334-478-1021	1791D	2621
										3441
										5084R



ERIC	Num Corporation	34100	Industrial Rd	Livonia	MI	48150-1335	313-525-0770	3599A
	Ni	2424	S Beech Daly	Dearborn	MI	48120	313-563-1560	3364A
	Ni	1601	Omaha Ave	Norfolk	NE	68701-4596	402-644-8600	3399
	Numerical Control Consultants	3865	W Woods Rd	Castle Rock	CO	80104	303-888-6663	3599A
	2034 Nuts Bolts & Nuts	444	W Grand Ave	Chicago	IL	60610-4038	312-527-4220	3452
	2035 O K Fasteners Inc	815	Industrial Dr	Troy	IL	62294-2443	618-452-1030	3452
	2036 O K Machine		40j Corbin Ave	Deer Park	NY	11729	516-243-0771	3599A
	2037 O P S		Highway 29 & Walnut Dr	Oakville	CA	94562	707-944-2471	7359M
	2038 O R Enterprises	1530	Goodyear Dr	El Paso	TX	79936-6023	915-595-1566	3599E
	2039 O S S International	30777	Northwestern Hwy	Farmington Hills	MI	48334-2512	810-855-9625	3545
	2040 Oakland Pattern & Mold Works	2901	E- 7th St	Oakland	CA	94601	510-535-1122	3999A
	2041 Oberg Arizona Inc	208	S Mckemy Ave	Chandler	AZ	85226-3407	602-961-0622	3544D
	2042 Oberlin Filter Co Div Of Produ	404	Pilot Ct	Waukesha	WI	53188-2439	414-547-4900	3569D
	2043 Ocean Industries	427	Kelly Ave	Londonderry	NH	03053-2023	603-622-2481	3829
	2044 Ocello Tool & Die	1550	Ocello Dr	Fenton	MO	63026-2479	314-343-4385	3544D
	2045 Ochlochnee Metal Works		Rr	Ochlocknee	GA	31773-9802	912-574-5412	3599A
	2046 Oconnell Harry Machining Co	3116	Sylvan Ave	Dallas	TX	75212-4027	214-747-1492	7692D
	2047 Offenhauser Co	2201	Telephone Rd	Houston	TX	77023-4621	713-928-2981	3365
	2048 Offshore Marine Consultant Inc	9764	W Bay Harbor Dr	Miami	FL	33154-1721	305-866-2467	3731
	2049 Ohio Cutter Grinding Co	12900	Berea Rd	Cleveland	OH	44111-1626	216-671-3377	3541H
	2050 Ohio Hi-Speed Mach Inc	9940	York Alpha Dr	North Royalton	OH	44133-3510	216-230-0144	3599D
	2051 Ohio Valley Indust	620	Moon Clinton Rd	Coraopolis	PA	15108-3856	412-269-0020	3569
	2052 Ohio Valley Supply And Maintenance		Ne	North Olmsted	OH	44070	216-835-3666	3291
	2053 Oklahoma Tax Commission Motor Vehicle Deal	409		Oklahoma City	OK	73105-4215	405-521-2467	3711
	2054 Olhausen Farm Power Inc		S Hwy	Luverne	MN	56156	507-283-4439	3523
	2055 Oisen Engineering Inc	1100	E Le Claire Rd	Eldridge	IA	52748-1740	319-285-8134	3599A
	2056 Oisen Jay	1022	Road	Powell	WY	82435-9225	307-754-5844	3599A
	2057 Olympic Transmissions Inc	311	W Main St	Bay Shore	NY	11706-8311	516-666-5880	3699A
	2058 Omaha Valve & Fitting Co	5020	Leavenworth St	Omaha	NE	68106-1429	402-553-8800	3494
	2059 Omc Inc	10035	Tanner Rd	Houston	TX	77041-7551	713-690-3600	3541C
	2060 Omega Casting Corp	129	W 29th St	New York	NY	10001-5105	212-947-6698	3363
	2061 Omega Precision	13040	Telegraph Rd	Santa Fe Springs	CA	90670-4078	310-946-2491	3599A
	2062 Optical Engineering Co Inc	710	Davis Cir	Marietta	GA	30060-3009	770-427-3116	3829C
	2063 Optical Technologies	7323	S 76th Ave	Bridgeview	IL	60455-1107	708-594-0708	3544E
	2064 Optico	5013	Pacific Hwy E	Fife	WA	98424-2658	206-926-1519	3699C
	2065 Opw Fueling Components-A Dover Co	9393	Princeton Glendale Rd	Hamilton	OH	45011-9707	513-870-3100	3494
	2066 Orange County Broaching	1592	S Anaheim Blvd	Anaheim	CA	92805-6227	714-776-9761	3541B
	2067 Orange Engine & Parts No 3	33483	Del Obispo	Mission Viejo	CA	92690	714-493-6261	5531A
	2068 Oregon Pattern & Manufacturing	29250	Meadowww Rd	Eugene	OR	97404	503-689-7528	3369
	2069 Origen Co	9916	1/4 Rush St	South El Monte	CA	91733-2637	818-579-3580	3599A
	2070 Orion Industries Manufacturing	33926	9th Ave S	Federal Way	WA	98003-6708	206-927-1040	2399
	2071 Osso Frank & Co		Rr	Aptos	CA	95003	408-685-3559	3082
	2072 Ostermeyer Hay Equipment			Shelton	NE	68876-9802	308-467-2341	3523
	2073 Othello Iron Works Inc	335	S Broadway Ave	Othello	WA	99344-1349	509-488-3855	3523
	2074 Ottawa Parts House	225	S Walnut St	Ottawa	KS	66067-2206	913-242-4040	7538
	2075 Otto Tool & Stamping Corp	29	Avenue C	Newark	NJ	07114-2601	201-824-9039	1791D
	2076 Ouachita Machine & Tool Co	71	Acorn Ar	Mena	AR	71953	501-394-1472	3599A
	2077 Ouachita Machine Works	120	Hilton N	Monroe	LA	71207	318-396-1468	3599A
	2078 Oxford Machine Company		Coldwater Industrial Park	Oxford	AL	36203	205-831-3406	3599A
	2079 P & B Precision Products		721- 77th Ave	Oakland	CA	94601	510-569-7500	3599A
	2080 P & L Specialties	6775	Mckinley Ave	Sebastopol	CA	95472-6509	707-829-4811	3535
	2081 P E T Engineering Lab	16329	Piuma Ave	Cerritos	CA	90703-1587	310-860-8013	3599A
	2082 P G S Inc	2566	Industrial Row Dr	Troy	MI	48084-7035	810-280-1142	3599A
	2083 P K Machine & Tool Inc	5815	Harlem Rd	Sunbury	OH	43074	614-965-2053	3599A
	2084 P M Plus	5870	Obispo Ave	Long Beach	CA	90805-3716	310-633-5017	3599A
	2085 P M T Inc		Hwy 645 S	Harmony	TX	75684	903-729-5587	3599A
	2086 P S A-West	923	N Foster Rd	Casper	WY	82601-1640	307-265-3244	5084A
	2087 Pac International Inc	5400	Ward Rd	Arvada	CO	80002-1819	303-422-0777	3542

288	Whinery Sales Inc	Nw 86th Ter	FL	33071-7446	305-752-7632	3599E	
8831	t Products Inc	Cedar St	CA	90706-6307	310-633-6673	3365	
12744	Pacific Coast Bolt Corp	Florence Ave	CA	90670-3906	310-944-9549	3452	
2001	Pacific Coast Sales Co	Tyler Ave	CA	91733-3510	818-350-6261	3569	
1677	Pacific Precision Machine	Old County Rd	CA	94002-3936	415-591-6334	3599A	3089
2092	Pacific Space Products Inc	Po Box	CA	93933-0878	408-384-7481	3569H	
2093	Pacific West Coast Dies Inc	Woodland Ave	CA	95351-1542	209-526-5830	3544D	
1064	Pageco Tools	Salsman St	LA	70506-2112	318-233-4727	5211D	7359L 1629L
130	Pagendam Inc	Canterbury Dr	NJ	07446-2508	201-327-1540	3599F	
149	Paige Inc	Executive Dr	ID	83713-8934	208-375-5411	3569E	9221
10670	Pall Corp Scientific & Lab Svc	Avalon St	MI	48080-3721	810-777-8298	3569	
20217	Palmer Express Paper & Graphics Stores	Taylor St	TX	77007-2805	713-861-9153	3569	5112
2201	Palmer Mach Co	West River Rd	ME	04330	207-622-5041	3599A	7692D
25	Palmer Mfg & Supply Inc	N Bechtle Ave	OH	45504-2840	513-323-6339	3365	
110	Palmer Rex Welding & Machine Shop	N Main	TX	79084	806-396-2034	3599A	
440	Palmetto Bp	8th Ave W	FL	34221-5120	941-722-1055	5541	3559M
517	Palmetto Machine Parts	Camson Rd	SC	29625-1407	803-226-6000	3566	3599A
10640	Pamco	Elkwood St	CA	91352-4631	818-768-8968	3599A	
5438	Pannier Corp The	Ashton Ct	FL	34233-3496	941-924-1256	3599A	
9217	Papco Inc	Midwest Ave	OH	44125-2415	216-475-0800	3498	
305	Par Industries Inc	Lake Rd	OH	44256-2458	216-273-1118	3469	
3825	Paradis Ray Machine Inc	Ridge Road & Highway 88 West	CA	95654	209-223-1576	7538C	3714B 7538U 3599A
2110	Paraflex Machine & Tool	N 39th Ave	AZ	85019-3605	602-272-5673	3599A	
1805	Paraflex Manufacturing	80th St E	WA	98404-5412	206-537-7562	3544E	
3113	Paragon Aircraft Corp	Olanes East	CA	92106	619-222-0484	3721	
2113	Paramount-Crawford Technologies Inc Mach S	Old Greensboro Rd	NC	27284-8429	910-996-2731	3599A	
123	Park Avenue Products Inc Casting Div	9th St Nw	OH	44314	216-848-5010	3354	
1050	Parker Blasting & Contracting	Merry Fox Farms Rd	AL	35007-8512	205-663-3443	3312	1541
4511	Parker Hill Associates	W Belmont Ave	IL	60641-4542	312-777-2811	3829	1794
912	Parker Lynn D & Dalene	Wood St	CO	80521-1958	970-484-3743	1541	1794
32	Parker Precision Products Co Inc	Bell St	NJ	07050-1509	201-678-8450	3544D	1794 3599E 3594A
202	Parkersburg Motor Supply	4th St	IA	50665-1024	319-346-2103	5531	3599E
711	Parkeyway Machine & Metal Works	Industrial Pky	AL	36571-3713	334-675-6360	3599A	7692D
1432	Parkway Steel Rule Cutting Dies	Link Rd	VA	24523-3110	540-586-4948	3544D	
4204	Parkwood Machine Tool Co	Parkwood Ave	MD	21206-5613	410-485-0544	3599A	
3702	Parrish Machine Co Inc	Progress Dr	IN	46628-1612	219-234-1051	8711	3599A 3544D
617	Parsons Steel Rule Dies Inc	S Smallwood St	MD	21223-3378	410-945-4800	3999L	
2243	Pat Murphy Enterprises	Stevens Dr	WA	99352-1848	509-375-0476	7538C	7538 7538U 3599A
14827	Patco Grinding	Proctor Ave	CA	91746-3205	818-369-5462	3541H	
539	Patterson Inspection Services	S Sheldon Rd	TX	77530-4253	713-452-5443	1389E	1389K
558	Patton Machine	Johnson Rd & Lillian Rd	NJ	08094	609-629-4405	3599A	
2129	Patton Sales Corp	E Calif St	CA	91761	909-988-6461	3599A	5084D 3498 5051D
80	Patulak Machine Corp	Grove St	MA	01930-2760	508-283-8300	3599A	
4574	Paul & Als Machine Shop	Dyer Blvd	FL	33407-1035	407-848-0803	7538C	3599A
736	Pauls General Sales	West Gate Rd	TN	38544	615-858-4865	3545	
1450	Pecks Coating Supply Co	N 27th Ave	AZ	85009-3603	602-269-6279	3291	2952 5082N
6170	Pedersen Brothers Equipment	Highway 90 E	CA	70615-4707	318-436-2497	3523	5999O 5013B
1563	Pedko Engineering	W	CA	90248	310-532-8392	3089	
4353	Peerless Laser Processors	Directors Blvd	OH	43125-9504	614-836-2073	3699C	
1610	Peerless Machine Products Co	New Brighton Blvd	MN	55413-1643	612-781-0508	1791D	
3511	Pelco Mfg Co Inc	Avalon Blvd	CA	90011-2494	213-234-9276	3544D	3469
12	Pell Engineering & Manufaturi	Green St	MA	01801-4321	617-933-7184	3599A	3541H
315	Penn Machine Of Texas	N Wayside Dr	TX	77020-7514	713-679-7900	3498	
381	Penn Plastics Inc	Bishop Ave	CT	06610-3025	203-334-2673	3544E	3089
206	Penn Tex Industrie	E Dallas St	TX	76063-3150	817-477-4226	3451	
2143	Penna Alloy Machining Co Inc	Freeport & Guyasuta	PA	15123	412-781-5890	3599A	
2144	Penna Hardware Manufacturing Co	W Penna Ave	PA	19355	610-644-1650	3469	
2145	Pent Plastics	E 4th	IN	46710	219-897-3775	3089	

2145	Peoria Manufacturing Inc	17620	Duvan Dr	Tinley Park	IL	60477-3667	708-429-4200	3599A	
2146	Peoria Welding Machin Inc		Zachariah Rd	Beattyville	KY	41311	606-464-3697	3599A	
2147	Peoria Tool Co	1025	Lavern Cir	Hendersonville	TN	37075	615-824-4341	3544D	
2148	Perforated Metals Plus Inc	243	W 8th St	West Wyoming	PA	18644-1609	717-693-2544	30893	
2149	Performance Sprots Inc	64	N Hwy	Ashton	ID	83420	208-652-7738	3711	5551 7699Y
2150	Perkasie Industries Corp		Spruc & ConstitiIn Avs	Perkasie	PA	18944	215-257-6581	3082	
2151	Perri Machine	25	New York Ave	Rochester	PA	15074-1938	412-774-4141	3599A	
2152	Perry Industrial Equipment And Supplies	101	Dyer St	Columbia	TN	38401-4558	615-388-9773	3599E	5051Z 5085H
2153	Perryville Steel Products Co		Hwy 61 S	Perryville	MO	63775	314-547-2541	3599A	5051D 5084I
2154	Perryville Steel Products Co	360	Harrison Ave	Peru	IN	46970-1158	317-473-4221	3599A	3469
2155	Peru Tool & Engineering Inc	300	Stariha Dr	Shell Lake	WI	54871	715-468-2306	3089	
2156	Peterson Fibreglas Laminate	2603	E Boyd Ave	Gallup	NM	87375	505-863-2033	3599A	7538A 7692D
2157	Peterson Welding	907	23rd St	Rockford	IL	61108-3596	815-397-9755	3541	3559 5065
2158	Peterson-Kruse Inc		35633-1304	Florence	AL	35633-1304	205-760-9661	7538C	
2159	Petersville Machine Shop	3634	Cloverdale Rd	Roma	TX	78584	210-849-2075	3559M	
2160	Petes Auto Parts		N Hwy	Union City	NJ	07087	201-662-9718	7538C	
2161	Petes Automotive Machine Shop	1107	72nd N Bgn	Corona	CA	91719-3305	909-737-4024	5084E	7534 3559M
2162	Petes Road Service Inc	18620	Compton Ave	Benicia	CA	94510-1185	707-746-6001	3829	
2163	Petro-Syn Instrument Service	3195	Park Rd	Houston	TX	77082-2676	713-589-9337	3494	
2164	Petroleum Accessories Inc	11261	Richmond Ave	Arlington	TX	76016-1730	817-429-2001	5531E	3711 5531
2165	Peyton Chassis & Components In	3109	Little Rd	Houston	TX	77014	713-583-5426	3599E	
2166	Phillips Hydraulic Services	13315	Vet Mem Blvd	North Hollywood	CA	91605-4105	818-764-3133	3451	
2167	Phillips B E Co Mach Shop	7247	Atoll Ave	Rossville	GA	30741-4528	706-861-4360	3599A	7692D
2168	Phillips Bros Machine Co Inc	2234	Mcfarland Ave	Philadelphia	PA	19144-2292	215-848-5631	3363	3599
2169	Phillips Casting Inc	90	E Church Ln	Floralia	AL	36442-9802	334-858-6113	7538C	
2170	Phillips Machine Shop		Rr	Shohola	PA	18458-9801	717-296-8411	1711A	3561 3599E 4941
2171	Phils Pump Service	1	Rr	Redlands	CA	92373-4637	909-793-2168	7538C	5531 5084I 7389G
2172	Phoenix Motor Parts	535	W Redlands Blvd	Miami	FL	33010	305-591-7107	3699C	
2173	Photoreceptor Systems	1480	Nw 94th Ave	Wadon Dale	IL	60191-2686	708-595-7900	3523	
2174	Picker International	870	Lively Blvd	Seneca	MO	64865-9802	417-776-2708	3599A	
2175	Pierson Ben Centerless Grinding		Rr 2 Box	Tempe	AZ	85281-5214	602-967-8788	3452	
2176	Pilgrim Screw Corp	1430	W 12th Pl	North Tonawanda	NY	14120-3243	716-694-7448	3599A	
2177	Pinto Machine	986	Oliver St	Franklin Park	IL	60131-1817	708-678-6565	3541H	7699P
2178	Pioneer Grinding & Mfg Co	10009	Franklin Ave	Union	SC	29379	803-429-8159	3599A	
2179	Pioneer Machine Shop	574	Sugar Creek Rd	Corapolis	PA	15108-1014	412-262-9050	3569	
2180	Pioneer Pipe Inc	105	N Jamestown Rd	Longmeadow	MA	01106-2039	413-567-5388	5072	5085 3452
2181	Pioneer Valley Fastener & S	31	Woodside Dr	Macon	GA	31201-4514	912-742-4737	3498	
2182	Pipe Fab	2007	Jeffersonville Rd	Baltimore	MD	21224-2606	410-732-9300	3569	3494
2183	Pipe Products Inc	401	S Haven St	Tucker	GA	30084-6658	770-414-6503	3494	
2184	Piping Supplies Inc	4758	Hammernill Rd	Columbia City	IN	46725-1741	219-244-6270	3569	
2185	Pisgah Industries Inc	302	N Main St	Carnegie	PA	15106	412-276-1392	3599E	
2186	Pittsburgh Industrial Corp		Hammond & Gregg	Dayton	OH	45402-1329	513-224-4159	3544D	
2187	Pj Tool Co	36	Front St	Oakland Park	FL	33309-5901	305-563-9977	3599A	
2188	Plan B Industries-Shop Location	3545	Nw 10th Ave	Dallas	TX	75220-2530	214-357-4369	5082A	4932 3699C
2189	Plank Company The	2655	Lombardy Ln	Cleveland	MS	38733	601-843-2741	3523	5511B
2190	Planters Equipment Co		Hwy 61 N	Caroga Park	CA	91304-5653	818-992-3341	3089	3085
2191	Plascap Corp Plastic Closiers	7721	Deering Ave	Charlotte	NC	28203-5091	704-375-8589	2599A	3087 3089
2192	Plastex Fabricators Of Char	318	Remount Rd	Burlington	MA	01803-5198	617-862-4800	3087	
2193	Plastic Design Inc	125	Muller Rd	Saint Louis	MO	63139-3025	314-644-5120	3089	
2194	Plastic Goods Co	6340	Knox Industrial Dr	Grand Rapids	MI	49512-3934	616-698-9810	3599K	
2195	Plastic Mold Technology Inc	4201	Broadmoor Ave Se	Kansas City	MO	64109-1710	816-561-7050	3081	3089
2196	Plastic Sales	3124	Gilham Plz	Bakersfield	CA	93307-5007	805-323-2921	3443A	5084R
2197	Plastic Structures Co	2462	S Union Ave	Ontario	CA	91758	909-395-8400	3599A	3089
2198	Plastics Plus Technology	4247	E Alrprt Dr	Haverhill	MA	01830-5605	508-372-7703	3089	
2199	Plastronic Engineering Co	35	Walnut St	Chanute	KS	66720-3224	316-431-0520	7382A	5084I
2200	Plattner Welding Supplies Inc	1723	S Santa Fe St	Torrance	CA	90503-6501	310-540-2966	3312	
2201	Pohang Iron & Steel	21515	Hawthorne Blvd	Chesterfield	MO	63005-1206	314-537-1909	3451	
2202	Pohlman Inc	140	Long Rd	Franklin Park	IL	60131-1647	708-678-8932	3494	
2203	Pokorney Mfg Co	10148	Pacific Ave						

2208	ERIC Pontiac Seed House & Flower	2463	Eslava Creek Pky	Waterdown	SD	605-886-5742	3523	
2209	Pope Engineering & Testing Laboratories	1463	Old Highway 60 E	Stamford	CT	06902-7630	3089	
2210	Poplar Bluff Steel & Fabrication	1111	S Brook St	Wilmington	DE	19803-5003	7538	5541
2211	Popp Machine & Tool Inc	432	Se Pine St	Pontiac	IL	61764-1601	399D	
2212	Positive Plastic Cards	1015	E Francis Ave	Mobile	AL	36606-2034	3541C	8748L 8641C
2213	Post Supply Co Inc Plumbing Su	3020	Hollywood Ave	Poplar Bluff	MO	63901	3599A	1791D 3441
2214	Post-Tension Foundation Service	19020	Longs Way	Louisville	KY	40208-2055	3599A	
2215	Potestio Brothers	40	Newtown Plz	Portland	OR	97214-1382	7353	3699C 3829C
2216	Power Drive Components Inc	640	N Winton Rd	Ambler	PA	19002-3406	16141	3089
2217	Power Drives-Rochester Corp	412	Arrawanna St	Ridgefield	NJ	07657-2308	3494	
2218	Prair Automotive	2820	San Bernardo Ave	Shreveport	LA	71108-3843	1771	5051H 3541C
2219	Praw Industrial Marketing	2502	Nelga Rd	Parker	CO	80134-9064	7699P	3523 1799A 5261C
2220	Prazak Willie Water Well	1232	Shepherd St	Plainview	NY	11803-4506	3541	
2221	Preceptor Aircraft	1302	Bixby Rd	Rochester	NY	14609	3494	5085H
2222	Precies Products Corp	683	Lincoln Lk Rd Se	Colorado Springs	CO	80909-6205	7538C	7538 3599A
2223	Precise Engineering	1706	Main St	Laredo	TX	78040-3500	3569	
2224	Precise Machine Co	21	Lower Rd	Wharton	TX	77488-5810	1781	3599E
2225	Precise Products Co	4343	E 56th St	Hendersonville	NC	28792-6437	3721	
2226	Precision & Commercial Tooling	625	Ermatt St	Kalamazoo	MI	49001-1616	3599A	
2227	Precision Cut Off Service	505	N59 W 14418 Bobolink Ave	Lowell	MI	49331	3544D	3599K
2228	Precision Die & Mold Corp Inst	1764	E Alosta Ave	Agawam	MA	01001-2513	3599A	
2229	Precision Drilling & Tapping Co	1259	949-A Alton Pkwy	Lincoln	RI	02865-1898	3599K	3469
2230	Precision Electronic Services	3411	W Ridge Rd	Maywood	CA	90270-2805	3599D	
2231	Precision Engine	6717	K St	Bristol	CA	06010-7792	3599A	3541
2232	Precision Foundations	2225	Saint Clair Ave	Menomonee Falls	WI	53051	3544E	
2233	Precision Frame	11246	E Frankln Ave	Glendora	CA	91740-3506	3541C	3599A
2234	Precision Grinding Corp	7978	S Post Oak Rd	Birmingham	AL	35206	5063A	3569E 3669
2235	Precision Grinding Inc	40	S Chotaw Dr	Saint Petersburg	FL	33713-7116	7538C	
2236	Precision Grndng & Mach Cor	23801	Greenwood Ln	Bakersfield	CA	93301-1614	7538	3494 3599M
2237	Precision Industries Inc	116	Al Hwy	Cleveland	OH	44103-1743	3291A	
2238	Precision Industries Inc Mach Shop	6635	N Highway	Minneapolis	MN	55404-2291	3541H	3599A
2239	Precision Machine	408	Sterling St	Houston	TX	77035-5745	3541H	
2240	Precision Machine & Repair	21	1st St	Baton Rouge	LA	70800	3441	
2241	Precision Machine Component In	7050	W Irving Park Rd	Springboro	OH	45066-3033	3599A	
2242	Precision Machine Products Corp	3694	Se Dixie Hwy	Piedmont	AL	36272-6643	1791D	
2243	Precision Machining & Welding	2820	Columbus Pky	Rexburg	ID	83440-3518	3714B	3599E 7539J
2244	Precision Measurement Supply	2620	Tom White Way	Chicago	IL	60634-2410	3451	
2245	Precision Metalcraft Mach Shop	13050	Po Box	Jackson	TN	38301-5828	3599A	3599F
2246	Precision Mold & Machine	2820	N2194 Weyers Rd	Montgomery	AL	36108-1101	3599A	
2247	Precision Mold & Tool Inc	308	Colfax Ave	San Antonio	TX	78238-1248	3599A	
2248	Precision Pattern Inc	21467	Main St	Stuart	FL	34997-5247	3599A	1791D 3469 3999A
2249	Precision Plastic Mold Eng	8869	Baiboa Ave	Lynwood	CA	90262	3544E	
2250	Precision Prototypes	2766	Bay Rd	Kissimmee	FL	34741-1222	3544E	
2251	Precision Pump Company	2820	Elm St	Tacoma	WA	98421-1998	3544E	3543
2252	Precision Scraping & Alignment Inc	2396	Norcross Dr	Norwalk	CA	90650-4547	3544E	
2253	Precision Services Inc	33	Highw Rd	Opelika	AL	36801-8352	3599A	8731B 3544D
2254	Precision Swage Inc	8171	Alpine Ave	Santa Rosa	CA	95402-7213	5084G	3599E
2255	Precision Tool & Die	4045	Remembrance Rd Nw	Kaukauna	WI	54130-9404	3599D	3599E
2256	Precision Tool & Die Mfg Inc			Clifton	NJ	07013-1794	2431	
2257	Precision Tool & Engineerin			Maplewood	OH	45340	3599A	
2258	Precision Tools Service Inc			San Diego	CA	92123-1535	3599A	
2259	Precision Weight Scale Co			Redwood City	CA	94063-3502	3544D	3599A
2260	Precision West Tool & Mfg			Dubuque	IA	52001-1956	3544D	
2261	Precision Wire Edm Service			Columbus	IN	47201-8844	3569	
				Sellersville	PA	18960	3596	3569H
				Sacramento	CA	95826-4725	3469	
				Grand Rapids	MI	49504-1109	3544D 3599K	3599A 3544E

2372	K G K Distributors	Sheldon St.	11665	Verobeach	FL	32960-5572	1407-778-7784	J5944U	
2173	R Hahn Machine Sales	Wibur Ave	1902	Galesburg	IL	61401-5652	309-343-7575	7538	3714B
4 R	Hahn Tool & Die Co	Emery St	1050	Vidor	TX	77662-2701	409-769-5508	3561	3443A
5 R	J F Machine Sales	Evangeline Dr	370	Philadelphia	PA	215-533-2847		3823	3825
6 R	L Richardson & Associates					19124			
2317	R M C Calibration Services								

2271	Prime Fastener Corp	N Berrien St	405	Middletown	CT	06457-1856	203-343-5111	3316	
2272	Prioli Gene Electric Arc Speci	Knickerbocker Ave	285	Albion	MI	49224-1866	517-629-4433	3599A	
2273	Private Label Chemicals Inc	Rochelle St	24311	Bohemia	NY	11716-3103	516-563-1700	3452	
2274	Pro Fab	2nd St Se	601	Laguna Niguel	CA	92656-4033	714-831-8025	3312	
2275	Pro-Gram Engineering Corp	Aster Ave	1134	Minneapolis	MN	55414-2106	612-378-1755	2899	3291
2276	Pro-Mac Machine Corp	County Road J	1952	Sunnyvale	CA	94086-6878	408-248-6701	3599A	
2277	Pro-Pellers	5th St Ne	475	Baldwin	WI	54002-5107	715-684-2266	3599A	
2278	Process Equipment & Supplies	Wash Ave	34111	Akron	OH	44314	216-745-1004	3599A	
2281	Process Equipment Inc	Commercial Dr	300	Burlington	PA	16116-9801	412-658-9895	3599A	
2282	Process Specialties Inc	Stark Rd	12343	Columbus	WI	53105	414-534-4440	5551	3724
2283	Production Components Clark Co Inc	Wallace Neel Rd	4900	Livonia	MI	48150-1544	313-261-8080	3599F	
2284	Production Fasteners Inc	Millard Farmer Industria Blvd	339	Charlotte	NC	28208-8620	704-398-2222	3569D	
2285	Production Mach Tool Co	W 34th St	1900	Newnan	GA	30284	770-253-8454	3569	3531A
2286	Production Metal Forming In	Seaboard Ave	2558	Chicago	IL	60608-6894	312-847-4505	3566	3599A
2287	Production Sales And Engineering Co	Anaheim Ave Ne	4400	San Jose	CA	95131-1026	408-894-9064	3825B	
2288	Productivity Inc	Puritan St	14300	Albuquerque	NM	87113-1663	505-821-3300	3599A	
2289	Proff Mfg Company	N 13th St	4850	Detroit	MI	48227-2997	313-838-8900	3452	5085G
2291	Progressive Engineering	Fair Ln	5508	Terre Haute	IN	47805-1600	812-466-2885	3599A	
2292	Progressive Machine Inc	Greensprings Dr	2625	Cincinnati	OH	45227-3475	513-271-0880	3599A	
2293	Progressive Machine Works	Franklin St	1428	Klamath Falls	OR	97601-5640	503-882-9088	3542	
2294	Progressive Steel Rule Die Co	6th St Sw	5511	Columbus	IN	47201-5716	812-372-1198	3541	
2295	Progressive Tool & Mfg	Jefferson St Ne	532	Cedar Rapids	IA	52404-4813	319-366-5777	3541	3599D
2296	Promac	S 5th Ave	900	Albuquerque	NM	87108-1237	505-268-4537	3541C	8711G
2297	Promex Precision	Utica Rd	29070	Mansfield	TX	76063-2727	817-477-1724	3599A	8711M
2301	Promotech Inc	S Oregon Ave	727	Roseville	MI	48066-4623	810-771-7740	3544D	
2302	Promotech Inc	& Walnut	2	Pasco	WA	99301-4322	509-547-5408	3599A	3441
2303	Proper Mold & Engineering Inc	North St	250	Hamburg	PA	19526	610-562-2281	3599A	
2304	Protech Tool	Bodenhamer St	315	Danvers	MA	01923-1205	508-774-6776	3999L	
2305	Protection Professionals	Arrowhead Dr	3000	Kernersville	NC	27284	910-996-1626	3599A	
2306	Protocast	Footh Bl	12067	Carson City	NV	89706-0482	702-885-2030	3599A	3544E
2307	Protocast	Enterprise Dr	161	Pacoima	CA	91331	818-897-0300	3599A	
2308	Provac Automation Controls	10th Ct	4300	Ann Arbor	MI	48103-9282	313-761-8060	3089	
2309	Pruett Manufacturing Co Metall Stmpg	11 Mi Rd	13870	Opa Locka	FL	33054	305-681-4883	3599A	3021
2310	Puckett Tools & Fasteners Hawkeye Sales Div	Court Street Rd	6070	Warren	MI	48089	810-779-8787	3544E	
2311	Puch Manufacturing Corp	Golden Triangle Blvd	3650	Syracuse	NY	13206-1711	315-433-0153	3599A	
2312	Puckett Tools & Fasteners	Cozycroft Ave	9732	Portland	ME	04101	207-775-5755	5063E	3999
2313	Pump & Motor Shop Inc	Activity Rd	8920	Keller	TX	76248-4802	817-431-1511	3599A	
2314	Pump Control Repair Service	Rr	2	Chatsworth	CA	91311-4401	818-882-7848	3324	3365
2315	Purcell Mach Co Inc	W Beardsley Ave	1710	San Diego	CA	92126-4458	619-536-7772	3511	3494
2316	Puryear Machine Shop	Columbia St	1239	Terre Haute	IN	47802-9801	812-232-1038	3469	
2317	Pv Tool Co	1st Ave Nw	410	Elkhart	IN	46514-1823	219-522-3897	7538	3714
2318	Pvf Suppliers Inc Welding Fittings	Montrose Rd	298	Orlando	FL	32805-3894	407-425-3965	3599A	
2319	Px Filtration Inc	Rr	1004	Cedar Rapids	IA	52405-3928	319-363-2211	5082	5085
		S 18th St	501	Westbury	NY	11590-1734	516-333-4282	3561	3599E
		New York Ave	47	Jupiter	FL	33458	407-744-1931	1711M	3599E
		Lee Hwy	6634	Palmyra	PA	17078-9802	717-838-5611	3599A	
		Business Pky	1004	Ablene	TX	79602-4909	915-672-2321	1541A	3599A
				Westbury	NY	11590-4908	516-333-8055	3599A	
				Chattanooga	TN	37421-2454	615-892-8837	3053	3498
				Richardson	TX	75081-5023	214-470-9894	3569D	5051Z

351503

5072E

3599E

1781

3599E

3599A

8731B

3365

3494

3714

7537

5085

3599E

1781

3599E

3599A

8731B

3365

3494

3714

7537

5085

3599E

Pyro & Engineering In	3315	Miles Rd Nw	Grand Rapids	MI	49509	616-791-9788	3544D
Pyro Industries Inc	1422	Irwin Dr	Erie	PA	16505-4816	814-455-7587	3498
PyroMia Printing	1119	N 1st St	Grand Junction	CO	81501-2175	970-245-7784	3999L
Pyro Service Co	25812	John R Rd	Madison Heights	MI	48071-4099	810-547-2552	3829
	924	N 143rd St	Seattle	WA	98133-6988	206-365-3535	3823
	1140	N Kraemer Blvd	Anaheim	CA	92806-1919	714-630-5720	7538C
			Indianapolis	IN	46219	317-356-9146	3089
	1663	Star Batt Dr	Rochester Hills	MI	48309-3706	810-299-0200	3541H
	2431	Impala Dr	Carlsbad	CA	92008-7228	619-931-6550	3599A
	10020	Miller Way	South Gate	CA	90280-5428	310-928-4418	3599A
	7245	Clark Rd	Paradise	CA	95969-2214	916-872-1072	3544E
	6404	Black Horse Pike	Pleasantville	NJ	08232-5542	609-383-9494	5015
	6240	Bissell Pl	Huntington Park	CA	90255-4598	213-587-7211	3541H
	14001	Norby Rd	Grandview	MO	64030-5708	816-765-0445	5083O
	112	Amedee Rd	Lafayette	LA	70502	318-234-9443	3599A
	2609	Hwy 72 W	Abbeville	SC	29620	803-459-9084	3599A
	3003	E Adams St	Phoenix	AZ	85034-1408	602-225-9786	3599A
	2804	Hwy 36 N	Sealy	TX	77474	409-885-6932	3599A
		Se 59th St	Oklahoma City	OK	73129-9308	405-670-2012	3599A
	577	Masters Industrial Park	Salem	MO	65560	314-729-3178	3599A
	1551	Mel Simon Dr	Toledo	OH	43612-4726	419-476-8228	3469
	4511	Queen City Ave	Cincinnati	OH	45214-1491	513-921-4500	3599A
	7686	N Ravenswood Ave	Chicago	IL	60640-5201	312-784-7661	3544E
		N Bellview Rd	Freeport	IL	61032-9115	815-563-4234	3089
	15724	Taft Pond Rd	Woodstock	CT	06281	203-974-6000	3699C
		W 6th Ave	Golden	CO	80401-5049	303-279-3622	3599A
		Lincoln Ave	Orwigsburg	PA	17961	717-366-0252	3089
		E Hwy	Claxton	GA	30417	912-739-2060	3724
	1226	N 14th St	Quincy	IL	62301-2037	217-223-5464	3599A
			Fresno	CA	93650	209-896-4040	5082A
		Route	West Brookfield	MA	01585	508-867-3155	3357
	109	Main St	Johnston City	NY	13790-2417	607-770-9814	3599A
	2028	Woodard Rd	Cambell	CA	95009	408-371-8900	5551
			Hayward	WI	54843	715-462-9469	3599A
	8016	Santa Fe Springs Rd	Whittier	CA	90606-2716	310-945-7535	3999L
	933	Meadow St	Chicopee	MA	01013-4826	413-594-9205	5063C
		S Hwy 27 & Rushville County Rd	Gordon	NE	69343	308-282-2356	1541A
	3924	Starfile Dr	Ceres	CA	95307-9766	209-538-8102	3599A
	116	Santa Anna Ave	Coleman	TX	76834-7410	915-625-2666	7359L
	198	W Kingston Springs Rd	Kingston Springs	TN	37082-9102	615-797-4593	3721
	1504	17th St	Brodhead	WI	53520-1664	608-897-2353	3523
	15831	Chemical Ln	Huntington Beach	CA	92649-1510	714-894-0527	3599A
	517	S Main At Dixie	Grant Park	IL	60940	815-465-6741	3599A
	205	Delia Dr	Longview	TX	75601-5902	903-753-6785	3599A
	13	E Colorado	Holly	CO	81047	719-537-6532	3559M
	705	Shawnee Trl	Wichita Falls	TX	76303-9601	817-322-9022	3599A
	4691	Pine St	Paris	TN	38242-4918	901-644-9855	3541H
		Westchesterpkpe	Newtown Square	PA	19073	610-325-7443	3599D
		1020a Runion Ave	Fort Wayne	IN	46808-2567	219-423-6168	3599D
	2933	Ne 20th Way	Gastonia	NC	28053	704-864-6763	3089
	27670	Groesbeck Hwy	Gainesville	FL	32609-3312	904-378-3715	3599A
	8321	3rd St	Roseville	MI	48066-2759	810-775-5454	3569E
	11665	Sheldon St	Downey	CA	90241-3823	310-869-0527	3599A
	1902	Wilbur St	Sun Valley	CA	91352-1558	818-767-3015	3599E
	1050	Emery St	Vero Beach	FL	32960-5572	407-778-7784	3544D
	370	Evangeline Dr	Galesburg	IL	61401-5652	309-343-7575	7538
			Vidor	TX	77662-2701	409-769-5508	3561
			Philadelphia	PA	19124	215-533-2847	3823
							3825
							3586

ID	Company Name	Address	City	State	Zip	Phone	Well Name	Well Type	Depth	Permit No.	Completion Date	Operator
2440	Rice Assocs	2440 Rice Assocs										
2441	Richard Tool Die Corp	Richard Tool Die Corp										
2442	Rick Sanford Machine Co	Rick Sanford Machine Co										
2443	Ricks Manufacturing Co	Ricks Manufacturing Co										
2444	Ricks Transmission	Ricks Transmission										
2445	Ridenour Fred Longhorn Trailer & Body Co	Ridenour Fred Longhorn Trailer & Body Co										
2446	Rider Plastics Inc	Rider Plastics Inc										
2447	Riehle Henry Inc Machry	Riehle Henry Inc Machry										
2448	Riehle Mfg Co Inc	Riehle Mfg Co Inc										
2449	Riesen Greg	Riesen Greg										
2450	Rigamonti Welding Inc	Rigamonti Welding Inc										
2451	Riggins Engineering Inc	Riggins Engineering Inc										
2452	Rindleys Servistar Hardware	Rindleys Servistar Hardware										
2453	Rinker Eugene	Rinker Eugene										
2454	Ripon Manufacturing Co Inc	Ripon Manufacturing Co Inc										
2455	Ritter & Sons	Ritter & Sons										
2456	Riverside Steel Inc	Riverside Steel Inc										
2457	Riverwood International Corpor	Riverwood International Corpor										
2458	RK Machining & Sheet Metal	RK Machining & Sheet Metal										
2459	Rmc Ripon Manufacturing Co Inc	Rmc Ripon Manufacturing Co Inc										
2460	Rmi-D	Rmi-D										
2461	Ro Mo Machine	Ro Mo Machine										
2462	Ro-Mez Machine Works Inc	Ro-Mez Machine Works Inc										
2463	Roberts Machine Works	Roberts Machine Works										
2464	Robertson Performance Corp	Robertson Performance Corp										
2465	Robertson Tool & Engineering Inc	Robertson Tool & Engineering Inc										
2466	Robinson Custom Machining Inc	Robinson Custom Machining Inc										
2467	Robinson Ralph C Co	Robinson Ralph C Co										
2468	Robstown Machine Works Inc	Robstown Machine Works Inc										
2469	Rockbridge Casting	Rockbridge Casting										
2470	Rockford Manufacturing	Rockford Manufacturing										
2471	Rocksprings Well Service	Rocksprings Well Service										
2472	Rockwell Equipmet Co	Rockwell Equipmet Co										
2473	Rocky Mountain Power Equipment Co	Rocky Mountain Power Equipment Co										
2474	Rockys Wire E D M	Rockys Wire E D M										
2475	Roco Machine & Supply Second Line	Roco Machine & Supply Second Line										
2476	Rodans Craft & Floral	Rodans Craft & Floral										
2477	Roedel Co The	Roedel Co The										
2478	Rogers Corp Mach Shop	Rogers Corp Mach Shop										
2479	Rogers Gulf	Rogers Gulf										
2480	Rogers Tool & Manufacturing	Rogers Tool & Manufacturing										
2481	Rogers Wheel Alignment & Brake Service	Rogers Wheel Alignment & Brake Service										
2482	Rohde Machine Products	Rohde Machine Products										
2483	Roll Grinding Corp Of America	Roll Grinding Corp Of America										
2484	Rolled Alloys	Rolled Alloys										
2485	Rolled Alloys Inc	Rolled Alloys Inc										
2486	Rolltrusion Inc	Rolltrusion Inc										
2487	Romac Inc	Romac Inc										
2488	Roman Industrial Supl Inc	Roman Industrial Supl Inc										
2489	Ron Bohmfolk Plumbing	Ron Bohmfolk Plumbing										
2490	Ron Johnson Steel Engraving In	Ron Johnson Steel Engraving In										
2491	Ronco Precision	Ronco Precision										
2492	Rooks Machine Shop Inc	Rooks Machine Shop Inc										
2493	Roorda Machine Shop Inc	Roorda Machine Shop Inc										

ERIC	R	S Of City	OK	74830	405-398-4396	3599A
Machine Shop Inc	1201	Montlimar Dr	AL	36609-1718	334-343-9403	3829
Inc	3405	1 1th St	WA	98312-2635	360-377-5501	3498
Rosen Supply Co Inc	4910	Lacey Bv Se	WA	98409	206-473-9358	3498
Rosen Supply Co Inc	1245	S Cleveland Massillon Rd	OH	44321-1657	216-666-6654	3494
Ross Controls Inc		5 Cleveland Massillon Rd	NY	10989	914-268-5133	8731B
Ross Tool & Dies Inc		W227 N722 Westmound Dr	WI	53186	414-544-9939	3599E
Rotating Equipment Repair Inc	18	E Barbour St	NJ	07508-1524	201-942-2559	3469
Rotella J P Co Inc	7943	Haskell Ave	CA	91406-1910	818-994-7768	8711L
Rotomatic Engineering	218	Souderton Rd	PA	18944-2457	215-257-9392	3544E
Royal Mold Company	3133	Highland Blvd	MI	49426-8808	616-669-3393	3089
Royal Plastics Inc	45000	Van Dyke Ave	MI	48317-5576	810-254-1220	3714
Royal Transmission	2953	W Lawrence Ave	IL	60625-3692	312-478-4400	7538
Royal Alignment Serv			CA	94911	415-456-2320	1389K
Roy Sewer Service			PA	19040	215-675-2800	3544D
Roynson Engineering Co			OH	44094-7762	216-951-3863	3544D
Rozic Tool & Die	38335	Apollo Pky	FL	33016-1832	305-556-0040	3599E
Rudys Machine Repairs	8054	W 21st Ct	MI	49201-8997	517-750-3344	3599A
Ruede Products Manufacturin	6666	W Michigan Ave	OH	43130-9202	614-681-9911	3599A
Ruff Mould & Mach Shop Inc	1502	Cincinnati Zanesville Rd Sw	CA	93222-9163	209-276-2282	3548A
Rullian Wrought Iron Works	4169	N Barcus Ave	CT	06107-1504	203-282-7989	3599A
Russell Machine Co	89	Glendale Rd	NJ	07830	908-832-2750	7699H
Russell Reid Waste Hauling & Disposal Service	350	Ali Baba Ave	FL	33054-3815	305-685-6630	791D
Ryder Welding Service Inc	1	Forbes Rd	MA	02150	617-884-8874	3714
S & A Distributing Corp	9324	W 54th St	KS	66203-2164	913-362-4749	1791D
S & A Industrial Corp	7211	N Pacific Ave	CA	95334-9548	209-394-8048	3599A
S & A Mfg & Welding	22	Community Dr	RI	02905-1006	401-467-3245	3599A
S & A Turna Inc	310	Pine Ave	MI	48801-1813	517-463-3383	3545
S & Bs Mini Mall		Hwy 5 S	IA	50225	515-848-3885	3599A
S & S Machine Co	322	Maple Ave	OH	45005-1332	513-746-7403	3599A
S & S Machine Co	2403	Industrial Dr	TN	37172-5014	615-384-6286	3599A
S & S Precision Inc	1310	N Taylor	MI	49501	616-458-3219	3599A
S & S Tool	4571	Patterson Ave Se	MI	49512-5304	616-942-1340	0919
S A E Industries Inc	36	Baldwin St	MA	01028-2232	413-525-2659	3599A
S A Machine Co	43665	Utica Rd	MI	48314-2359	810-731-0330	3599F
S M I	2374	Stone Mtn Lithonia Rd	GA	30058-5248	770-482-7115	3544D
S R Die Company	210	Sandbar Ferry Rd	GA	30901-1850	706-722-3587	3446C
S R P Polite Welders	1777	W Arrow Hwy	CA	91786	909-946-0898	3599A
S S Machinist Co		Hwy 1097 E	TX	77378	713-363-1019	3823
S T I Manufacturing Inc	7609	Benbrook Pky	TX	76126-2102	817-249-0095	3599A
S-W Machine Inc	1200	E Kibby St	OH	45804-3125	419-227-5770	3469
Sabourin Superior Corp	1280	Bassett Rd	OH	44145-1115	216-892-1600	3541
Sacma Machinery Corp		S Berwick Hwy	ME	03904	207-439-9504	3251
Saco Brick Co	25047	Highway	TN	38201	901-352-5351	3399
Saco Inc	281	E Main St	CT	06450-5613	203-237-4311	3559M
Saf-T Auto Centers	1731	Toyon Rd	CA	94549-2111	510-932-9995	3545
Safety Line Inc	322	Standing Springs Ct	SC	29680-6236	803-288-9503	3599A
Sagittarius Mold Inc	4204	Auburn Way N	WA	98002-1379	206-854-7490	3599A
Sai Manufacturing	1741	E Hwy	TX	78570	210-565-5856	7538C
Salas E & Sons Machine Shop		Northwood Bus Center	MD	21802	410-749-2628	3599A
Salisbury Special Tool	133	S State St	WI	54742-9701	715-877-3470	3494
Salverson Distributing Co	2475	Autumnvale Dr	CA	95131-1802	408-262-6500	3363
San Jose Die Casting Corp	32	Cambridge St	MA	01603-2343	508-752-4932	3599A
San-Tec Company Inc	1300	East St	OH	44077-5573	216-354-6500	3089
Sanar Plastics	87	Clinton Ave	OH	44883-1619	419-447-4377	3469
Sarka Sheet Mteal & Fabrica	916	S 10th St	WI	54220-4508	414-684-5567	5251
Saunders Industrial Supl	1456	E Cliff Rd	MN	55337	612-890-2560	3544B
Savage Tool & Mfg Co Inc	100	Beta Dr	TN	37064-3912	615-790-2019	3599
Scan Air Filter Co						



2614	Small Steel Fabricating	1044	Ne 43rd St	FL	33334-3806	305-561-1912	3365	Oakland Park	344
2615	Engineering	13061	Rosecrans Ave	CA	90670-4930	310-921-3330	3599A	Santa Fe Springs	
2616	Slayton International		Rt 2 Box	MN	56172-9000	507-836-8571	3523	Slayton	526
2617	Small Tools Inc	19749	Saint Clair Ave	OH	44117-1097	216-481-9000	3545	Cleveland	
2618	Smco Corporation	513	Shane St	TX	77037-1423	713-591-8400	1791D	Houston	
2619	Smedberg Machine Corp	7934	S South Chgo Ave	IL	60617	312-734-3000	3599A	Chicago	1796B
2620	Smith & Harris Machine Co	5170	W 130th St	OH	44142-1899	216-267-3366	3599A	Cleveland	
2621	Smith Automotive Machine Shop	1065	Mills Ln	KY	40601-8953	502-227-8624	7538C	Frankfort	
2622	Smith Calvin		Rt 1	PA	16731-9801	814-225-4441	3999	Eldred	3599E
2623	Smith Geo B & Sons	404	Dor Ave S	MA	02127	617-268-5660	3341	Boston	3599E
2624	Smith Machine	205	Otero NE	NM	87801	505-835-9455	3599A	Socorro	7692D
2625	Smith Machine	42	N 150 W	UT	84043-1769	801-768-3000	7538C	Lehi	7692D
2626	Smith Tom Industries	817	J R Miller Blvd	KY	42303-3556	502-683-2757	3566	Owensboro	
2627	Smith Tool Company Inc	44175	N Groesbeck Hwy	MI	48036-1179	810-469-9942	3089	Clinton Township	
2628	Smith-Mabry Co	206	Ermain	NJ	08736	908-223-5333	3545	Manasquan	
2629	Smiths Shop	3333	Gibson St	CA	93308-5255	805-325-9443	5084G	Bakersfield	3599E
2630	Smolic Mach Co	37127	Ben Hur Ave	KS	66856	316-256-6244	3599	Lebo	7692
2631	Smt Industries Inc	869	Middle St	OH	44094-6333	216-946-1747	3599A	Willoughby	
2632	Smtc Inc	7027	Belgold St	CT	06010-7445	203-583-0296	3599A	Bristol	
2633	Snows Mach & Weld Inc	598	Bay Bridge Rd	TX	77066-1020	713-537-7056	3599A	Houston	
2634	Sodico		Tolina Rd	AL	36610-3494	334-457-9692	3599A	Prichard	7692D
2635	Soini Precision Tool & Die	123	E Main St	PA	17327	717-235-4804	3363	Glen Rock	5099C
2636	Soini Machine & Supply	3256	Hwy	MA	01833-2106	508-352-2334	3599A	Georgetown	
2637	Sorenson Design & Development Co	440	W 1000 N	AZ	85637	520-455-5242	7538C	Sonoita	
2638	Soro Pete Machine Works Inc	5542	Universal Dr	UT	84321-2244	801-753-1862	3599A	Logan	7692D
2639	Soto Frank H Soto & Sons Die Makers & Die C	1716	S 2nd St	TN	38118-7915	901-360-8957	3544B	Memphis	3599A
2640	Soule Steam Feed Works	402	19th Ave	CA	93702-4145	209-268-0495	3999L	Fresno	7692D
2641	Source Inc Labels	1433	Lafayette Ave	MS	39301-5203	601-693-1982	3562	Meridian	3599A
2642	Source Too Machine Works Shop	6120	N Pedrelli Ave	IN	47804-2632	812-466-7414	2759D	Terre Haute	3089
2643	South Av Mach Co	14	Enterprise St	NV	89446	702-623-9502	3599A	Winnemucca	7692D
2644	South Bay Plastics	20820	Normandie Ave	ME	04240-3504	207-783-9108	3494	Lewiston	3594A
2645	South Bend Form Tool Co Inc	408	W Indiana Ave	CA	90502-1601	310-320-8180	8999W	Torrance	3569
2646	South Eastern Machining Inc	13820	Slover Ave	IN	46613-2093	219-289-2441	8731B	South Bend	3087
2647	South Park Industrial Service Inc	740	S Monroe St	CA	92337-7037	909-350-3444	5084L	Fontana	3599A
2648	South-Side Machine Machine Shop Inc	2112	Wayne Sullivan Dr	WA	98108-4351	206-762-4371	7359A	Seattle	3451
2649	Southeast Aluminum Inc	4436	Independence Ct	KY	42003-1469	502-442-6107	7389D	Paducah	3679C
2650	Southeast Valve Inc	12201	Nations Ford R D	FL	34234-4727	941-355-0197	3354	Sarasota	3599D
2651	Southeastern Enterprises	3208	Benard Ave	NC	28134	704-588-0973	3829	Pineville	5091A
2652	Southeastern Municipal Supply	16125	Tamiami Trl	NC	28206-2741	704-373-1750	3599A	Charlotte	3494
2653	Southern Controls	3511	Wetumpka Hwy	FL	33955-7102	941-637-0515	3498	Punta Gorda	
2654	Southern Die Casting & Engineering	1800	Albertson Rd	AL	36110-2735	334-277-5030	3829	Montgomery	
2655	Southern Fasteners Automotive Support Group	304	Deer Creek Rd	NC	27260-8206	910-882-0186	3363	High Point	
2656	Southern Machine Specialist	10445	Old Atlanta Hwy	MS	38703	601-378-3453	3452	Greenville	
2657	Southern Metal Fabrications	230	Rutledge Rd	GA	30209-9503	770-784-5266	3599A	Covington	
2658	Southern Plains Power	3250	North Fwy	NC	28704	704-687-2804	1791D	Arden	7692D
2659	Southern Pump And Tank Co	1680	Lowery St	TX	76106-6528	817-624-2107	3621	Fort Worth	5084L
2660	Southern Sheet Metal Works	1225	E 2nd St	NC	27101-5603	910-723-1683	3829	Winston Salem	3494
2661	Southern Specialties Corp	1232	E 2nd St	OK	74120-2009	918-584-3371	2842	Tulsa	3599E
2662	Southern Steel Rule Dies	1911	S Great Southwest Pky	OK	74120-2018	918-584-3553	3599A	Tulsa	1761
2663	Southern Steel Rule Dies	5429	Allen St	TX	75051-3506	214-660-3985	3544D	Grand Prairie	3469
2664	Southern Tier Hydraulic Jack	144	Swan Hill Rd	TX	77007-4311	713-802-2565	3544D	Houston	
2665	Southern Tool & Die Inc	2802	Commerce Dr	NY	13862-2716	607-692-4773	3599E	Whitney Point	1799F
2666	Southern Tool & Equipment Co	1260	Rocky Hill Rd	AR	72401-9180	501-932-2350	3599A	Jonesboro	3544D
2667	Southington Tool & Manufacturi	300	Alwater	TN	37919-8091	615-531-8511	3569	Knoxville	3541
2668	Southlake Machine Corp	1231	Birch Dr	CT	06489	203-276-0021	3495	Southington	3599E
2669	Souths Machine Shop		W Main	IN	46375-1335	219-322-5560	3599A	Scherverville	
2670				IL	62869	618-378-3333	7538C	Norris City	

ERIC	2028	Sc	Side	Equipment Sales	Bellefont-Alamance Rd	Burlington	NC	27216	910-228-7344	3523		37	5531A
	9	S.		Bearing Co	E Mc Gaffey St	Roswell	NM	88201	505-623-2300	3562		37	5531A
	10	Southern		Bronze Inc	Po Box	Yucca Valley	CA	92286-1491	619-364-4409	3365			
	11	Southwest Die & Automation			James Watt Dr	El Paso	TX	79936-6436	915-590-2444	3544D			
	2672	Southwest Industrial Service I			Whitmore St	Fort Worth	TX	76107-1443	817-332-6481	3541H		76990	3599A
	2673	Southwest Precision Machine			W Alameda Dr	Tempe	AZ	85282-3330	602-968-2801	2399		3599A	
	2674	Southwest Saw Co Ans Serv Loc			Lowell Blvd	Westminster	CO	80030-5324	303-429-6487	3399			
	2675	Southwest Stainless			Varkel Way	Lithonia	GA	30058-4623	770-482-5611	3498		5085H	3494
	2676	Southwest Tire Molds Inc			N Oats St	Texarkana	AR	75502-5819	501-772-6983	5944Z		3599A	5082N
	2677	Southwestern Industrial Fasteners Inc			Tony Lama St	El Paso	TX	79915-1305	915-592-5859	3291		3452	3991
	2678	Southwestern Industries Inc			Post Rd	Westerly	RI	02891-2633	401-322-1602	3599A			
	2679	Spartan Machine Products			S Rundle Ave	Lansing	MI	48910-2796	517-485-0260	3544D			
	2680	Spartan Die Co			Lowery St	Winston Salem	NC	27101-5603	910-723-1683	3829		5084G	3599E
	2681	Spatco Inc			Dusty La	Newtown	CT	06470	203-270-1310	1541		3443A	
	2682	Spath Construction Company Inc			E 3rd	Lafayette	OR	97127	503-864-3775	3599A			
	2683	Special T Shop Mfg			W Roosevelt Rd	West Chicago	IL	60185-3739	708-293-5440	3829			
	2684	Specialty Extrusion Equipment Inc			Apollo Rd	Lafayette	LA	70501	318-232-2207	3599A			
	2685	Specialty Machine & Supply Inc			Whidden Blvd	Port Charlotte	FL	33980-8411	941-625-3455	5531		3562	3714B
	2686	Specialty Parts Inc Hydric Eqp			N County Rd	Bothell	WA	98011	206-487-0123	3599E			3594A
	2687	Specialty Pump & Well Services			Midway Rd	Longwood	FL	32750	407-339-0988	3599A			
	2688	Specialty Screw Corp			E Main St	Durham	CA	95938-9785	916-899-8080	3699C			5082A
	2689	Spectra-Physics Laserplane Nor-Cal			Charley Watts Rd	Ontario	CA	91761-1859	909-988-4450	3599E		3541	
	2690	Spectrum Cad-Cam			Industrial Park Dr	Livingston	LA	70754-2514	504-686-1003	8711M		3569	
	2691	Spectrum Environmental			N Alpine Rd	South Bend	IN	46637	219-272-7605	3599D		7349	3599E
	2692	Spectrum Services			W Commerce St	Rockford	IL	61100	815-633-5146	3599A			
	2693	Special Mfg			W 4th Pl	Bellville	TX	77418	409-865-8804	3541C			7359L
	2694	Spindle Sales & Service Inc			Temple St	Dallas	TX	75208-1741	214-748-1258	3599A			
	2695	Spoons Machine Works			Nestle Way	Los Angeles	CA	90013-2203	213-626-1233	3544			
	2696	Spring Sidney Co Inc			River Rd W	Holyoke	MA	01040-3423	413-536-2976	3566		3541H	3599A
	2697	Springdale Machine & Gear Co Inc			Research Dr	Pleasant Hill	OR	97455-9719	503-747-9735	3544D		3469	
	2698	Springfield Tool & Die			Kesslerville Rd	Battle Creek	MI	49015-1195	616-962-6278	3364		3369	
	2699	Springfield Foundry Co			196th St Sw	Troy	MI	48083-2163	810-680-4444	3699			
	2700	Square D Co			Hufsmith-Kohville Rd	Easton	PA	18043	610-258-0923	3599A			
	2701	Squibb Machine & Tool Inc			Thompson Bridge Rd	Lynnwood	WA	98036-7005	206-775-8856	3599A			
	2702	Squires Machine			12th St	Tomball	TX	77375	713-379-4402	3312			
	2703	Stabilized Materials Co-Blasting Division			700a Military Pky	Murrayville	GA	30564-1209	770-287-7209	3556		3599A	
	2704	Stainless Equipment Inc			Mid Town Ct	Wayland	MI	49348-9545	616-459-0941	7538U		3599A	7539F
	2705	Stamm Diesel & Machine			S Patterson Blvd	Wayland	MI	49348-9592	616-459-0941	7538U		3599A	7539F
	2706	Stamm Equipment Co			10th & F	Mesquite	TX	75149-4119	214-289-0701	7359E		3569	3498
	2707	Standard Industrial Supply Sal			Valley East Industrial Dr	Hendersonville	TN	37075-2320	615-822-5156	3599A			3541F
	2708	Standard Machine & Tool Inc			Crull St	Dayton	OH	45402-2683	513-228-2111	5531		3599A	
	2709	Standard Parts			Airport Rd	Horsham	PA	19044-1280	215-672-6500	3829			
	2710	Stanec Corp			Carver Ave	New Berlin	WI	53151-2712	414-786-0120	3599A			
	2711	Stanek Tool Corp			Winston St	Modesto	CA	95352	209-523-0781	5551		3452	5082A
	2712	Stanislaus Implement & Hard Co			S	Center Point	AL	35215	205-856-4144	3599F			3523
	2713	Star Design Corporation			Star Mach	Newtown	OH	45244-3416	513-561-2278	3599A			
	2714	Star Mach			Star Machine Co	Nashua	NH	03063-1713	603-882-1423	3599A			
	2715	Star Machine Co			Star Machine Systems	Southampton	PA	18954	215-355-3799	3599A			
	2716	Star Machine Systems			Star Machine Works	Houston	TX	77009-3676	713-864-4793	3599A			
	2717	Star Machine Works			Star Pipe Service	Moore	OK	73160	405-799-1977	1389K			
	2718	Star Pipe Service			Starlite Mfg Co Sales Ofc	Pittsburgh	PA	15123	412-367-3339	3089			
	2719	Starlite Mfg Co Sales Ofc			Std Precision Gear & Instrument Inc	Canton	MA	02021	617-828-4400	3599A			
	2720	Std Precision Gear & Instrument Inc			Turnpike Stoughton	Baton Rouge	LA	70808-4953	504-766-7221	3462			
	2721	Steel Forgings Incorporated			Lee Dr	Santa Fe Springs	CA	90670-1932	310-944-7340	3541H			
	2722	Steel Processing			Po Box	Dermotte	IN	46310-9222	219-987-2978	3312			
	2723	Steelcraft Fabricator			21st St Sw	Pacoima	CA	91333	818-897-5248	3441		3469	
	2724	Steelwave			Branford St	Spicer	MN	56288-9417	612-235-8484	1781		3599E	5082H
	2725	Steffi Drilling & Pump Inc			Highway 23 Ne								

2729	St. ... Inc Mail Shipping	E Halsey Rd N6323 Berlin Rd	NJ	07054-3704	201-887-6400	3544B
2730	Stenma... Wire & Metal Products	West St	WI	54941-9754	414-294-6544	3699C
2731	Stenor Tool Co	Sheridan St	MA	01501	508-832-4680	3399
2732	Stephens And Associates	W Kentucky Ave	MA	01022-1036	413-593-1467	3599A
2733	Stephens Bob	Applegate Ave	CA	95695-5837	916-661-4118	18711
2734	Sterling Machine Co Inc	Port Arthur Ave	OH	45211-5402	513-661-0633	3363
2735	Sterling Machine Shop	Main St	AR	71953-3344	501-394-4248	3541H
2736	Sterling Metalcraft	N Honor St	AR	71953-3344	501-394-4248	3541H
2737	Stern Industries Inc	Groesbeck Hwy	IL	60622-1331	312-276-3050	3399
2738	Stewarts Tool	Mtbr Vndrbh Rd	IL	60622-1331	312-276-3050	3399
2739	Sig Machine	Gianni St	MI	48035-3357	810-791-2344	3469
2740	Slipper Tool & Supply Inc	8th St	MI	48035-3357	810-791-2344	3469
2741	Stokes Machine Shop	9th Ave	CA	95054-2414	408-988-8582	3599A
2742	Stollen Machine & Tool Co Inc	8th St	IN	47712-5396	812-425-3518	3291
2743	Stoller Machine & Tool Co Inc	Lexington Ave	CA	95932-2308	916-458-4121	3599A
2744	Stoner Machining Co	W Lark Industrial Dr	CA	95932-2308	916-458-4121	3599A
2745	Stones Transmission Servc	Dixie Hwy	MO	63026-4396	314-677-3133	3364
2746	Story Plastics Inc	W Pacific Ave	MI	48601	517-777-3610	3699A
2747	Straiford Machine & Welding	Province Rd	CA	91505-1553	818-842-7167	3089
2748	Stratford Molded Plastics Inc	Eton Ave	NH	03884	603-664-9758	3599A
2749	Strats	Mannheim Rd	CA	91303-1506	818-999-6607	3089
2750	Straub Design Co	Florida Ave S	CA	91303-1506	818-999-6607	3089
2751	Suburban Industrial Supply	Grays Bridge Rd	IL	60131-2224	708-455-3040	3544E
2752	Suffield Pattern Works	W Foster Ave	IL	60131-2224	708-455-3040	3544E
2753	Suizer Bingham Pumps Inc	Saint James Ave	MN	55426-2804	612-546-6686	8711L
2754	Suizer Bingham Pumps Inc	Induriplex Blvd	MN	55426-2804	612-546-6686	8711L
2755	Sumar Tool & Engineering Inc	Jordan Cir	CT	06804-2632	203-775-0459	3541H
2756	Summit Co	Groesbeck	IL	60656-1029	708-678-5250	3569
2757	Summit Machine Tool Mfg Co	Bloomfield St Ste	CA	90720-2528	310-431-8799	3999A
2758	Summit Supply Co	Hawthorne Rd	CA	90720-2528	310-431-8799	3999A
2759	Suncoat Heat Treat Inc	Courtesy Rd	TX	77032-2806	713-987-9750	3498
2760	Suncraft Machine Sales & Service	8th Ave S	FL	33711-2203	813-327-6850	3398
2761	Sunset Machine Inc	Los Tomases Dr Nw	NM	87102-1232	505-842-9646	3599A
2762	Sunshine Aluminum Specialties Inc	Scio Church Rd	MI	48103-9287	313-663-5001	3599E
2763	Supa Machinery Sales Inc	6th Ave S	FL	33483	407-272-4414	3354
2764	Superior Aluminum Products Inc	3 Mile Rd	FL	33712-1749	813-327-3396	3599A
2765	Superior Bolt & Supply Co	Francis	WI	53126-9601	414-835-3400	3541
2766	Superior Metal Products Inc	Robert E Lee Dr	OH	45363	513-526-4065	5039
2767	Superior Mold & Die Co	Po Box 490/2463 Hwy	MS	38801-5536	601-840-5700	3452
2768	Superior Pipe Inspection Inc	N Main St	TN	37641	615-257-2154	3599A
2769	Superior Pipe Products	Laurent Armentor Rd	OH	44262-1007	216-688-8251	3544E
2770	Superior Tooling Inc	S 81 S	LA	70562	318-364-9712	1389K
2771	Superior Valve Co	Mount Bethel Rd	OK	74066	918-224-6575	3498
2772	Supreme Machine & Tool Co Inc	O Gresham Lake Rd	SC	29671-9630	803-868-9450	3544B
2773	Surry Machine Works	Dice Rd	NC	27615	919-878-5758	3599A
2774	Sutterlin Mach & Tool Co Inc	Washington Ave	CA	90670-2519	310-946-6698	3494
2775	Suttons Steel & Supply Inc	Dublin Trl	ME	04048	207-793-2835	3599A
2776	Svedala Industries	E Oak St	TX	75149-6751	214-289-0846	3369
2777	Swing Brothers Corp	Pineneedle Dr	NC	27030-3824	910-789-3681	3599A
2778	Swanson Welding & Machine Shop	Hwy 182 E	OH	44060-1827	216-357-0817	3544B
2779	Sweetwater Industries	Beth Ellen Dr	LA	70562	318-365-2441	3498
2780	Swiss Tech Precision	Nw North River Dr	PA	17837-8814	717-523-9700	3541H
2781	Swissco Inc	34th St Se	FL	33142-4924	305-635-1067	3364A
2782	Swpie Etc	Bryan Rd	ND	58079-9514	701-633-5205	7538C
2783		Glenoaks Blvd	TX	77469-8939	713-342-0720	3599A
		Clara St	CA	91352-2059	818-768-9153	3451
		W Lovers Ln	CA	90201-5608	310-927-7866	3599A
			TX	75209-4219	214-357-5931	3599D
						5722D



2784 Sv	ron Laser Service Job Sho	12900	10 Mile Rd	South Lyon	MI	48178-9186	810-486-0402	3699C
15	S. ic	129	Rawls Rd	Des Plaines	IL	60016	708-827-3150	30893
16	System. . Company Mfrs Agt	3237	Lorna Rd	Hoover	AL	35216-5403	205-979-2070	3829
17	Systems & Machinery Services		Po Box	Salt Lake City	UT	84116-0542	801-596-7450	7699A
18	Systems For Energy Control	55	Vine Ave	Highland Park	IL	60035-2018	708-433-4804	3823
2789	Systems Technology Inc	2830	Holmestown Rd	Conway	SC	29527	803-650-2225	3732A
2790	T & A Industrial Distributors	12550	Robin La	Brookfield	WI	53005	414-783-4900	3569
2791	T & C Grinding Service	923	1100-C Duncan	Wilmington	DE	19801	302-656-9406	3599A
2792	T & C Pipe & Supply Salvage		Sartain Dr	Andrews	TX	79714-3817	915-523-3648	3498
2793	T & M Mach Products Inc		Slate Rte 691 Nw	Nelsonville	OH	45764	614-753-2960	3544B
2794	T & M Tool	2567	N Narragansett Ave	Chicago	IL	60639	312-745-8626	3544D
2795	T & S Machine Shop	11882	Nc	Eden	NC	27288	910-627-8491	3599A
2796	T & T Machining	8147	Pleasant Ave	Minneapolis	MN	55420-1140	612-881-3548	7538C
2797	T F S Systems	211	W Maple Ave	Monrovia	CA	91016-3329	818-358-5507	3523
2798	T H Welding & Machine Shop	6329	Mcray Dr	Pineville	LA	71360-2933	318-640-0797	3599A
2799	T J Coleman & Company	4513	Canton Hwy	Marietta	GA	30066-1063	770-591-4843	3699C
2800	T P C Co		Shady Glen Rd	Oak Hill	NY	12460	518-239-6369	3599E
2801	T Q M Machine Co	408	Hawk St	Rockledge	FL	32955-3249	407-636-8438	3599A
2802	T Tooler Co	1920	Lafayette St	Santa Clara	CA	95050-3956	408-980-1186	3541H
2803	T W L Industries Inc	5004	Tampa West Blvd	Tampa	FL	33634-2412	813-884-0695	3599A
2804	T-J-Z Precision Machining	11235	Franklin St	Northglenn	CO	80233-3236	303-451-7335	3599A
2805	T-M Mfg Co	695	E Arques Ave	Sunnyvale	CA	94086-3832	408-736-5202	3541H
2806	T/A Machine & Tool	615	E 9th St	Joplin	MO	64801-4919	417-782-7242	3599A
2807	Taber Machine & Welding	212	Dinn Dr	Racine	WI	53404-1160	414-639-2420	3599A
2808	Taber Mining Mfg Equipment Co	4900	Memco Ln	San Antonio	TX	78218-3713	210-653-9599	3599A
2809	Tahlequah Machine Shop		W Of City	Tahlequah	OK	74465	918-456-6021	3599A
2810	Talbot Tool		Chestnut Grove Rd	Manchester	GA	31816	706-846-2081	3599A
2811	Talbot Welding & Machinery In		Hwy	Labadieville	LA	70372	504-526-4252	3523
2812	Talbot Casting & Machine Co		N Court St	Talladega	AL	35160	205-362-5550	3363
2813	Tallmadge Spinning & Metal Co	935	Southeast Ave	Tallmadge	OH	44278-3154	216-633-4812	3699C
2814	Tana Corporation	3843	Seiss Ave	Toledo	OH	43612-1373	419-476-5995	3545
2815	Tangent Industries		Smyrna Airt	Smyrna	TN	37167	615-459-6921	3599A
2816	Tap Plastics Inc Store	7176	Regional St	Dublin	CA	94568-2324	510-828-7744	5033
2817	Tap Controlled Machining Co	19430	Business Center Dr	Northridge	CA	91324-3505	818-993-7171	3599A
2818	Target Molds	16202	Arrow Hwy	Irwindale	CA	91706	818-960-9432	3544E
2819	Taro-Loid Inc	2943	Supply Ave	Los Angeles	CA	90040-2707	213-685-9444	3291
2820	Tates Machine Shop		Mills Gap Rd	Fletcher	NC	28732	704-684-7909	3599A
2821	Taylor Implement Co		W Hwy	Hoxie	KS	67740	913-675-3272	5531A
2822	Taylor Spring Manufacturing Co	9221	S Kilpatk Ave	Oak Lawn	IL	60453	708-422-3704	3316
2823	Taylor's Machine & Welding Co	1910	Cumberland Ave	South Pittsburg	TN	37380-1726	615-837-7217	3566
2824	Tcf Associates Inc	825	B & C Industrial	Richwood Village	TX	77531	713-265-8188	3494
2825	Tcm	4747	S 83rd East Ave	Tulsa	OK	74145-6921	918-664-1151	5084A
2826	Td Machine Company	7413	Wright Rd	Houston	TX	77041-2421	713-896-4970	3599A
2827	Tds Machining Inc	8400	Wilmette Ave	Darien	IL	60561-5427	708-964-0004	3599A
2828	Team Coils Aerospace Inc	1420	Fields Ave	Columbus	OH	43211-2635	614-299-8500	3599A
2829	Team Manufacturing	2884	N Park Rd	Hollywood	FL	33021	305-986-9426	3599A
2830	Tech Mold Corp	116	Antique Ln	De Forest	WI	53532-1137	608-846-5010	3599A
2831	Tech Sales Inc			Casper	WY	82601	307-234-9636	3829
2832	Tech Tools		8-E Dudley Dr	Roebuck	SC	29376	803-574-6764	3599A
2833	Technical Compression Services Inc	8701	Andrews Hwy	Odessa	TX	79765-2836	915-367-7264	3599A
2834	Technical Machine Components I	51	Lake St	Nashua	NH	03060-4513	603-880-0444	3599A
2835	Technical Precision	1	Vanderbilt Ave	Pleasantville	NY	10570-2805	914-769-1696	3599A
2836	Technical Services Corp	121	Floyd Thompson Dr	Hampton	VA	23666-1307	804-865-0920	3599A
2837	Techniform Industries Inc	2107	Hayes Ave	Fremont	OH	43420-2695	419-332-8484	3599F
2838	Technipipe	9888	Hayes Ave	Houston	TX	77036-8202	713-995-5200	3498
2839	Techniplast Inc	3200	Bissonnet St	Erie	PA	16506-2308	814-838-6817	3089
2840	Technology Plastics Inc	2100	Northwestern Ave	West Bend	WI	53095-1678	414-335-0601	3089
2841	Technox Machine & Mfg Inc	2619	N Normandy Ave	Chicago	IL	60635-2225	312-745-6800	3599A

2	Enterprises	3361	Chinagaridind	CA	95619	916-621-0571	3443B	
3	Tric	800	Emerald Bay Rd	CA	96150-6419	916-541-3225	7699A	76
4	Teas. Air & Machine	1560	5th Ave S	WA	98108-4114	206-246-2550	3599A	
5	Teemark Inc	7206	W 7 St	MN	55169	612-222-2501	3699C	5999E
2846	Tejas Boiler Services Inc	430	Elbert St	TX	77028-3114	713-631-8200	3443	
2847	Teledyne Pines H & H Tool Div	28	S Navajo St	CO	80223-2015	303-744-6304	3544D	3011
2848	Temco Inc	135	By Pass	SC	29622	803-226-8509	3599A	3544D
2849	Tempe Precision Ltd	15311	Dale St	NY	11704-1103	516-249-6210	3599A	
2850	Temr	1605	Old Us Highway	FL	32778-5053	904-343-5595	5063C	3599E
2851	Temrick Inc	4716	Sycamore Ave	NY	11716-1725	516-567-8860	3541H	
2852	Tennessee Tool & Machine Works Company	800	Dayton Blvd	TN	37415-2104	615-870-4485	3599A	3544D
2853	Terminix International	3400	S Council St	NY	11791	516-364-7502	3823	
2854	Terry Industries Inc	16182	Nw 46th Ave	IN	47302-2309	317-282-2724	3469	3544D
2855	Tesco Hi-Lift Inc	204	Pearson Rd Ne	FL	33312	305-791-9470	3594A	1791D
2856	Tesla Company	4288	Baird	WA	98370-8027	360-697-7197	3569H	3441
2857	Testa Machine Company Inc	2250	Penland St	PA	15078	412-947-9397	3599A	
2858	Texas Aluminum Foundry Inc Fax	2730	Spring Valley Rd	TX	76111-4623	817-834-7531	3364	3369
2859	Texas American Pipe & Supply Co Inc	10700	Turner Rd	TX	75244-3616	214-458-7358	3498	
2860	Texas Metal Structures Unlimited	2727	Se Loop	TX	77613	409-752-5666	1541A	3444
2861	Texas Prototype Machine & R		Richmond Ave	TX	76140-1016	817-293-1324	3599A	
2862	Texas Trade International Inc		Kirby Dr	TX	77042-4905	713-952-6533	3498	
2863	Texas Wholesale Products		W Of City	TX	77098-1201	713-528-6492	3569	
2864	Texas-Agri Machine & Industrial Manufacturing	511	Glenn Ave	TX	79072	806-296-5765	3599A	3559F
2865	Textile Measuring Machines	2113	Salem Ave Sw	MO	63129	314-487-9666	3829	7699
2866	Igs Machinery Inc	5650	Snake Rd	IL	60090-6015	708-465-1112	3569	3599E
2867	The Hub Pattern Corp	5140	Alrport	VA	24016-2515	540-342-3505	3321	3549
2868	The Machinery House	36	Dicke Rd	CA	94611-2910	510-531-0481	7389A	3545
2869	Thermoset Plastics Inc		Roanoke Ave	SD	57301	605-996-9752	3599A	
2870	Thieman Stamping Co			OH	45869-9771	419-629-2612	3469	
2871	Thomas Industrial Machinery Co Inc			MA	01089-3710	413-788-4007	3599E	
2872	Thomas Machine Repair			CT	06108	203-282-4717	3599D	
2873	Thornton Drilling Fax Line		207-1/2 Ne Washington Blvd	OK	74006	918-335-2281	3541C	
2874	Thorobred Pattern & Mold Inc	1400	W Madison St	KY	40203-1740	502-585-4901	3321	3599A
2875	Thorpe-Smith Inc	211	Expressway Ct	VA	23462-6526	804-497-2289	5049B	3543
2876	Thre 60 Corp	10823	Plaza Dr	CA	94611-2910	510-531-0481	7389A	8711
2877	Three Way Die Co	1119	Venice Blvd	MI	48189-9737	313-449-0099	3089	3544D
2878	Tietz & Baur Plastics Inc	5009	Lake Meiros Pk	CA	90015-3213	213-388-2822	3999L	
2879	Time Electronics	1041	Lowden Ave	IL	60644	312-378-3181	3089	
2880	Tinker Machining Co Inc	867	Elkridge Landing Rd	NJ	07083-7706	908-353-0933	3599A	7699X
2881	Tir-R Tooling		Lenox Ave	MD	21061	410-859-8390	3599A	
2882	Todd Tool & Machine		Us Hwy 130 Cathy Ln	OH	44906-2040	419-747-6173	3599A	7699D
2883	Todds Hydraulic Repair & Steel Fab	127	Ft Harrison Industrial Pk	NJ	08554	609-499-0407	3599A	
2884	Tokins Enterprises Inc	7909	Tokins Dr	IN	47805	812-466-3457	3052	3494
2885	Tolby Equipment	4	W Glendale Ave	MS	39208-9140	601-939-1093	3541	3599E
2886	Toledo Molding & Die Corp		E Laskey Rd	AZ	85303-2309	602-937-1636	5082	5511B
2887	Toms Iron Works Inc Thomson Tom G	4848	Palmer Dr	OH	43612-3517	419-476-0581	3544E	
2888	Toms Precision Machine	2764	Cloverdale Ave	UT	84120-4960	801-969-8888	3548A	
2889	Toms Welding	3708	1st Ave S	CA	94518-2415	510-682-6099	7538C	
2890	Toms Custom Machining & Repair	2414	S 8th St	MT	59401-3520	406-761-0936	3599A	7692D
2891	Tool & Abrasive Engr Co	1203	Dell Ave	KS	66103-1804	913-362-8267	3599A	
2892	Tool & Die Supply Inc	2681	Halladay St	CA	95008-6612	408-374-5620	3291	3569
2893	Tool Matic Corp	219	N Justine St	CA	92705-5617	714-549-9201	3544D	3999L
2894	Tool Repair Company Inc	18900	Meginnity St	IL	60607-1467	312-421-3044	3541	5051D
2895	Tool-Rite Machine & Development Inc	19	Courtland Dr	MI	48122-1932	313-928-1000	3599A	7699D
2896	Toolcraft Products Inc	1265	Mccoak Ave	SC	29609-2523	803-246-6346	3599A	5084Y
2897	Tooling Enterprises Inc	680	New Babcock St	OH	45404-2800	513-223-8271	3541	3599A
2898	Toolroom Craftsmen Inc	312	Mariboro St	NY	14206-2201	716-842-0445	3544D	3544B
2899	Tools For Bending Inc	194	W Dakota Ave	NH	03431-4165	603-357-2510	3599A	3469
				CO	80223-2195	303-777-7170	7538Z	3559
								3398
								3599A

ERIC	Company	Address	City	State	Zip	Phone	Fax	Website	Other
1	Eric Tool & Manufacturing	Old Mauldin Rd	Greenville	SC	29607-4271	803-277-9029	7699P	354r	5084Y
2	Eric Tool & Manufacturing	Laurelwood Rd	Santa Clara	CA	95054-2417	408-988-2547	3599A	35	731B
3	Tor Tool Works	E Front St	Covina	CA	91723-1299	818-331-0561	3089		
2904	Totem Plastics	Liberty Ship Way	Sausalito	CA	94965-1700	415-332-8835	3541		
2905	Tottser Tool & Die Shop Inc	E Acacia St	Ontario	CA	91761-7704	909-947-3900	3085	3544E	3089
2906	Towaco Screw Machine Products Co	Republic Rd	Huntingdon Valley	PA	19006-1808	215-357-7600	3544D	3363	
2907	Townsend Implement Co	Sunset Rd	Bothell	WA	98012-6171	206-481-7100	3451	3599A	
2908	Trackreations	W Bus Hwy	Mc Allen	TX	78501	210-682-1331	5082A	3523	7699
2909	Tracy B P Co (Division W)	Fremont Ct	Santa Clarita	CA	91355-1141	805-294-0042	3599A		
2910	Tracy Equipment	Green Ave	Washington	CA	15301	412-228-2160	3599		
2911	Trade & Tool Supply Co	Hwy	Tracy	MN	56175	507-629-4740	3523	7699	5261C
2912	Trade Die Cutting	Bound Brook Rd	Middlesex	NJ	08846-2103	908-968-0830	5072E	5072D	5051R
2913	Trade Tech	Maria St	Burbank	CA	91504-3420	818-843-8040	3999L		
2914	Trainer Metal Forming Inc	N 7th St	Milwaukee	WI	53205-2501	414-271-6890	3599D		
2915	Trane Company	Riggs Ave	Portland	TN	37148-1500	615-325-7088	3542		
2916	Trans-Electric	Nw 2nd St	Oklahoma City	OK	73127-6515	405-787-2237	1711C	5075R	7623E
2917	Transnav Inc Usa	Dixon Ave	Missoula	MT	59801-8226	406-549-4263	3714	7537	3829
2918	Transportation Seating Inc	Carlo Dr	Clinton Township	MI	48038-1512	810-954-3600	3544E	3021	
2919	Tranter Inc	S Van Buren St	Marshallville	GA	31057	912-967-2227	3721		
2920	Trayer Engineering Corp	Pennsylvania Ave	Little Rock	AR	72204-1841	501-663-9421	5074D	1711E	3443
2921	Trebor Instrument Co	Sarah Dr	San Francisco	CA	94107-3441	415-285-7770	3699		7699J
2922	Trek Div Of Letts Ind	Santa Ana Ave	Farmingdale	NY	11735-1218	516-293-8127	3599A		
2923	Tremblays Machine Shop	Ne 3rd St	Fontana	CA	92337-6950	909-822-1455	5082A	5511B	3599E
2924	Tri State Machine	West	Crystal River	FL	34429-4214	904-795-0309	7538C		
2925	Tri-City Molds Inc	W Main St	Gastonia	NC	28052	704-868-2682	3599A		
2926	Tri-Plas Inc	Wesley Chapel Stouts Rd	Forest City	NC	28043-2515	704-245-6448	3599A		
2927	Tri-State Engineering Inc	Milford St & S Salisbury Blvd	Monroe	NC	28110-7945	704-372-0752	3089	3021	
2928	Tri-State Machinery Co	Mcneilly Rd	Salisbury	MD	21802	410-742-3156	3599A	7623	
2929	Tri-State Machining Co	Ohio Dr	Pittsburgh	PA	15226-2503	412-344-6500	3541		
2930	Tri-State Mfg & Distributing Co	Theil Rd	Henderson	KY	42420-4337	502-827-8231	3599A		
2931	Tri-States Foundry Inc	Highway 287 S	Paragould	AR	72450-9060	501-239-9691	3714		
2932	Tri-Tube Inc	Rt	Mansfield	TX	76063-3425	817-478-9481	3364	3369	
2933	Triangle Manufacturing Co Inc	Pleasant Ave	Abingdon	VA	24210-9810	540-628-5932	3499		
2934	Triangle-Goss Tool Co Inc	Harding St	Ramsey	NJ	07446	201-825-1212	3599A		
2935	Triangler Co	Yellow Springs Rd	Kensington	CT	06037-1309	203-828-4121	3541	5084	
2936	Tricon Metals & Service Inc	Irontale Indl Park	Chester Springs	PA	19425-1616	610-827-7992	3469		
2937	Trident Supply Co	Sw 25th St	Birmingham	AL	35243	205-956-2367	3599A	3089	5051D
2938	Triflex Abrasives Inc	Nw 72nd Ave	Ocala	FL	34474-9476	904-873-6300	3494		
2939	Trinity Machine Shop	Cane Creek Rd	Miami	FL	33166-4858	305-593-1246	3291	5085	
2940	Trinity Machine Tool	Fairfax Ave	Jackson	TN	38301-9104	901-422-4345	3599A		
2941	Trio Production Co Inc	Cumpston St	Blackwood	NJ	08012-2846	609-228-5923	3599F		
2942	Triple A Mfg Co Inc	Paul St	North Hollywood	CA	91601-2713	818-766-2957	3599A		
2943	Triple D Machine	Honey Creek	Belhel	CT	06801-1796	203-743-9043	3599A	3541	
2944	Triple S Machine Inc	E Turkeyfoot Lake Rd	Jamestown	TN	38556	615-879-4889	3599A		
2945	Tripp Plastics	Greg St	Uniontown	OH	44685	216-896-4084	2399	3599A	
2946	Trojan Mfg Co	W Water St	Sparks	NV	89431-6201	702-355-7552	3089		
2947	Troll E A Tool Inc	Commerce Rd	Piqua	OH	45356-2157	513-778-8473	3541H		
2948	Tropic Machine Products	Sw 33rd St	Newtown	CT	06470-1607	203-426-5525	3599A		
2949	Tropic Tool & Mold Inc	Wagner Dr	Fort Lauderdale	FL	33315-3328	305-779-7038	3599A	3544D	123
2950	Tru-Tec Division	S 8th St	Boaz	AL	35957-1063	205-593-3441	3544E		
2951	Tru-Tex International Corp	Southeast Rd	La Porte	TX	77571-4947	713-471-8970	3823		
2952	True Cut Die Cutting	Elbern Dr	Cincinnati	OH	45240-3713	513-825-8844	3599K		
2953	Trumbull Industries	Market St	Poughkeepsie	NY	12603-4501	914-462-6027	3999L		
2954	Trumpf America Inc	Hyde Rd	Lockport	NY	14094-2926	716-433-3853	3569		
2955	Trumpf Inc		Farmington	CT	06032	203-677-9741	3444		
2956	Tucker Dan	Villa Rd	Santa Fe Springs	CA	90670	310-946-7664	3541		
2957	Tucker Equipment	Sankley Rd	Newberg	OR	97132-9564	503-538-4328	3545		
			Pleasant Grove	CA	95668	916-655-3542	3599E		

2958	Mc	phait Paving Co Inc	Quogue Neck Ln	AZ	85719-7049	520-792-1075	3544E
2959	Eric	e & Fitting Co	W Detroit St	NY	11941	516-325-0959	3531C
2960	Eric	1 Turpeo Tool & Die Co	S Veterans Blvd	OK	74012-3613	918-258-8661	3494
2961	Eric	2 Turfster International	N Old U S	MS	38801-5812	601-844-2138	3544B
2962	Eric	3 Turner Engineering	S 43rd Ave	MI	48116	810-632-9500	3599E
2963	Eric	4 Turner Graphic Services	High Point Rd	AZ	85009-6038	602-272-6014	3599A
2964	Eric	5 Turner Machine Inc	Ash Ave	GA	30134-3419	770-949-3351	1796B
2965	Eric	6 Turning Point Machining	8th St E	TN	37131	615-896-9888	3544D
2966	Eric	7 Twin Tool Inc	Lakeland Blvd	WA	98270-4539	206-252-7300	3599A
2967	Eric	8 Two-M-Precision Co Inc	Garden City Hwy	MN	55101-2403	612-224-5303	3544D
2968	Eric	9 Tws Pump & Supply	Spring St	OH	44092-2203	216-585-0906	3599A
2969	Eric	10 Tylers Machine Shop Inc	Auburn Ave	TX	79701	915-685-0155	1629L
2970	Eric	11 Tywin Inc	Industrial Park Rd	GA	30673-1718	706-678-2014	3599A
2971	Eric	12 U & H Star Fleet Inc	Church	WA	98001	206-852-0333	3599A
2972	Eric	13 U K M Co Inc-Mking Andalysis	Deandra Dr	TX	77379-4101	713-376-1597	371 I
2973	Eric	14 U P Machine Engineering Co Precision Produc	Yeargo Dr	PA	18944-3901	215-257-0122	3599A
2974	Eric	15 U S Machine Shop Nights Sundays Holidays	N 3rd	MI	49874	906-497-5278	3599A
2975	Eric	16 U S Machine Shop Nights Sundays Holidays	E Cleveland Ave	TX	76360-3025	917-495-3922	3599A
2976	Eric	17 Uff Machine Co	Industrial Park Rd	TX	38242-6099	901-642-6440	5084V
2977	Eric	18 Ulander Machine Company	Church	TN	38242-6099	901-642-6440	5084V
2978	Eric	19 Ultimate Hydroforming Inc	Deandra Dr	PA	19013	610-876-7157	3599A
2979	Eric	20 Ultra Metric Tool Co	Yeargo Dr	IN	46077-9221	317-873-6792	3599A
2980	Eric	21 Uneeda Enterprises Inc	N Leavitt St	MI	48314-3262	810-294-2300	3599A
2981	Eric	22 Unified Machine & Design Inc	Chestnut Ridge Rd	IL	60618-8115	312-281-4200	3545
2982	Eric	23 Unified Tool Die & Manufacturi	Mountain Ave	NY	10977-5653	914-426-2800	3291
2983	Eric	24 Union Machine Company Inc	Seymour Ave	NJ	08846-2516	908-469-1570	3599A
2984	Eric	25 Unique Edm & Engineering	Lakeland Park Dr W	IL	60606	312-625-7194	3544D
2985	Eric	26 United Auto Transmission	Arundell Cir	MA	01960	508-535-7337	3599A
2986	Eric	27 United Electric Company	Washington St	CA	93003-4978	805-650-8792	3599A
2987	Eric	28 United Technologies Corporation Sikorsky Air	23rd Ave N	NH	03743-2755	603-542-0001	7538
2988	Eric	29 United Weilding	Main St	MN	55447-4704	612-473-1810	3829
2989	Eric	30 Universal Automotive Engine Parts	Carmwood Trl S	CT	06497-1378	203-386-4000	3728
2990	Eric	31 Universal Diecutters Corp	Meadow Ln	MN	56401-8066	218-828-7032	3365
2991	Eric	32 Universal Electric Foundry	W Utah Ave	IA	50315-6641	515-285-4575	7629K
2992	Eric	33 Universal Iron Works & Machine Shop Co	S R	NV	89102-2715	702-384-5858	7538C
2993	Eric	34 Universal Machining & Manufacturing Inc	W Hubbard St	IN	47638	812-985-5942	3999L
2994	Eric	35 Universal Machining & Manufacturing Systems	Eden Ln	IL	60622-6387	312-421-7233	3369
2995	Eric	36 Universal Manufacturing & Mach	Nelo St	TX	78407-1402	512-289-2714	7538C
2996	Eric	37 Universal Metalcraft Inc	Meadowbrook Rd	CA	95054-2144	408-988-3720	3599A
2997	Eric	38 Uynytex Inc	E 69 Highway	MI	49022-9605	616-926-8320	3599A
2998	Eric	39 Upc	Phoenix Dr	MO	64100	816-453-5422	3599A
2999	Eric	40 Uppcountry Machine Shop	S Stoughton Rd	IN	46733-9808	219-547-4457	3499
3000	Eric	41 Urite Steel	Omaopio Rd	MI	48314-1466	810-739-3333	3544E
3001	Eric	42 Us Die Casting Equipment Inc	Sunset Ave	WI	53716-1853	608-222-5658	3993A
3002	Eric	43 Us Components Inc	Sheldon Rd	HI	96790	808-878-1076	4213C
3003	Eric	44 Usa Structural Glazing	Blue Star Memorial Hwy	MI	48917-1811	517-482-0795	3469
3004	Eric	45 Uss Structural Glazing	E Cleveland Ave	TX	77049-1815	713-456-0835	1791D
3005	Eric	46 V & L Machine & Tool Co Inc	Nw 50th St	MI	49090-9447	616-637-3267	3542
3006	Eric	47 V K Boring Co	Losee Rd	TX	76360-3025	817-495-4211	3599A
3007	Eric	48 V N S Industrial Machining Inc	Getty Ave	FL	33351-8009	305-572-3551	3599A
3008	Eric	49 Vacuums Etc	Groesbeck Hwy	NV	89030-4152	702-399-2741	3365
3009	Eric	50 Vaisala Inc	Walker Dr	NJ	07011-1840	201-772-6020	3599A
3010	Eric	51 Valbrook Machine Corp	Broad St	MI	48066-2389	810-779-4620	3541C
3011	Eric	52 Valcor Engineering Corp	Commerce Way	WI	54311-8313	414-468-6838	3541H
3012	Eric	53 Value Engineered Products	21b Railroad Ave	SC	29150-2504	803-775-4713	7359A
3013	Eric	54 Value Engineered Products	Lawrence Rd	MA	01801-1008	617-933-4500	3829A
3014	Eric	55 Value Engineered Products	W	NY	11580-6030	516-825-1234	3599A
3015	Eric	56 Value Engineered Products	W	NJ	07081-3165	201-467-8400	3494
3016	Eric	57 Value Engineered Products	W	CA	90000	310-337-7355	3599A



3016	Var	Phone Conveyor Co Inc	56b E Foothill Bl	Azusa	CA	91702	818-969-4331	3531
17	V.	Equipment Inc	Hwy 141 E	Perry	IA	50220	515-465-5681	5084L
18	Van.	and Companies Van Zealand Oil Co I	Moasis Dr	Appleton	WI	54911	414-738-3520	5013
19	Vanguard	Industries		Lincoln	NE	68508	402-473-2992	3569D
20	Vanguard	Metals Inc	Brightside Ave	Central Islip	NY	11722-2797	516-234-6500	3599A
3021	Varel	Products Varel Mfg Co	Denton Dr	Dallas	TX	75235-1808	214-351-6486	3541C
3022	Variety	Widget Product Inc	Elizabeth Ln	Corona	CA	91720-2504	909-278-3100	3089
3023	Varisystems		Brook St	Groton	CT	06340-5514	203-536-8419	3829
3024	Varnadore	Curt Pump Service	Bridgers Av E	Winter Haven	FL	33882	941-967-7624	3561
3025	Vektek	Inc	E 6th Ave	Emporia	KS	66801-3389	316-342-7637	3599A
3026	Venezia	Machine Co	Linda Vista Ave	Mountain View	CA	94043-1902	415-961-6872	7699V
3027	Ventura	Hose-Man	Camino Ave	Oxnard	CA	93030-8983	805-988-1072	5099A
3028	Ventura	Metal Fab Inc	Eastman Ave	Ventura	CA	93003-7714	805-654-8118	1791D
3029	Venture	Machine Co	E 20th St	Joplin	MO	64801-5854	417-781-4361	3599A
3030	Venture	Mold & Engineering	Bennett Dr	Fraser	MI	48026-1691	810-296-8084	3089
3031	Ver	Manufacturing	Keller St	Santa Clara	CA	95054-2613	408-727-4747	3599A
3032	Vera	Nova Machine Shop	Ronson Rd	San Diego	CA	92111-1412	619-571-5646	3599A
3033	Veradyne	Corp	W Magnolia Bl	Bradbury	CA	91010	213-849-6003	3599A
3034	Verhey	Coach & Limousine Sales & Leasing	Front Ave Nw	Grand Rapids	MI	49504-4209	616-459-2788	3711
3035	Verifo	Corporation	Canal Blvd	Richmond	CA	94804-2002	510-412-1100	3494
3036	Versa	Automatics	W Gardena Blvd	Gardena	CA	90248-2719	310-538-3204	3599A
3037	Versatec	Supply	Hermosa Cir	Buena Park	CA	90620-1151	310-921-1463	3494
3038	Versatile	Drilling Contract	5th Ave S	Seattle	WA	98108-4114	206-763-9776	3541C
3039	Vgis	Engine Rebuilders	Se	Portland	OR	97206	503-775-0396	7538C
3040	Vian	Enterprises Inc	Teamtrack Rd	Auburn	CA	95603-4347	916-885-1997	3599A
3041	Vibratex		Hollywood Ave	Ho Ho Kus	NJ	07423-1433	201-652-1300	3569
3042	Vic	Industrial Corp	E Emory Rd	Powell	TN	37849	615-947-2882	3291
3043	Victoria	Precision	410-C Clearview Ave	Southampton	PA	18954	215-355-7576	3599A
3044	Videojet	Systems International	Miles Ave	Fairport	NY	14450-2416	716-223-0270	3569
3045	Viking	Industries Inc	Industrial Rd	El Dorado	AR	71730-6615	501-862-5576	3089
3046	Viking	International Services	Po Box	Walnut Creek	CA	94596-0567	510-825-6900	3829
3047	Viking	Supply	Industrial Pk Rd Negane	Marquette	MI	49855	906-226-6778	3569
3048	Village	Automatics Inc	Section St	Edwardsburg	MI	49112-9655	616-663-8521	3599A
3049	Village	Castings	Legion Dr	Caseville	MI	48725	517-856-4500	3369
3050	Village	Machine & Fabricating	Sw 11th St	Deerfield Beach	FL	33442-8158	305-429-3703	3599A
3051	Vin-Built	Welding	Summer W	Springfield	MA	01144	413-736-2555	3599E
3052	Vinaco	Eng Co	Itasca St	Chatsworth	CA	91311-4915	818-700-0541	3599A
3053	Vincent	Machine Shop	S Congress Pkwy	Athens	TN	37303	615-745-6918	5531E
3054	Visimetrix	Inc	Earhart Dr	Amherst	NY	14221-7804	716-634-5488	3541
3055	Visual	Check International		Fresno	CA	93650	209-432-6043	3825
3056	Voell	Machinery Co	Po Box	Waukesha	WI	53187-2103	414-786-6640	3541
3057	Vogelsang	Corp	Swarthmore Ave	Lakewood	NJ	08701-4528	908-364-0444	3469
3058	Vulcan	Industries Inc	Northboro Rd	Marlborough	MA	01752-1823	508-481-2406	3444
3059	Vws	Mfg Inc	Front Ave	Atwood	CO	80722	970-522-2859	3052
3060	W & H	Machine Shop	Trout Run Rd	Saint Marys	PA	15857	814-834-6258	3599A
3061	W & W	Tool & Die	E Grove St	Midland	MI	48640-5299	517-835-5522	3544D
3062	W A	Vorpahl Inc	Lambeau St	Green Bay	WI	54303-4788	414-497-7200	3999
3063	W D	Tool Engineering Co	W Grand Ave	Chicago	IL	60622-4387	312-638-2688	3599A
3064	W E	S Co	Joliet	Aurora	CO	80015	303-373-0990	3829C
3065	W S	W Industry Inc	Mogadore Rd	Kent	OH	44240-7261	216-678-1201	3599
3066	Wachtel	Mechanical Svces Corp	5th Ave	New York	NY	10010-5902	212-229-9300	3999
3067	Wade	Machine	Canoga Ave	Chatsworth	CA	91311	818-882-1120	3599A
3068	Wagner	Machinery Co	S Monterey Park	Los Angeles	CA	90065	213-261-1191	3599E
3069	Walker	& Son Inc/P G	W College St	Springfield	MO	65806-1610	417-862-1745	1311
3070	Walker	Machine Products Inc	Washington St	Collinsville	TN	38017-2749	901-853-2611	3451
3071	Walker	Screw Machine Repair & Salvage	Dink Ashley Rd	Timberlake	NC	27583	910-364-2153	3599D
3072	Wallace	Co Inc	Hwy	Nederland	TX	77627	409-722-3403	3569
3073	Wallus	Screw Machine Products	Saint Marks Pl	Linden	NJ	07036-1996	908-486-0201	3451

7359J
1389
3559M

5046B
5085H
3594A

127

5084I
7692
5084B

3074	Ma	Trks	Box	TX	77377	713-351-7007	3599A
75 V	ools Equip Inc		E Edwardsvl Rd	IL	62095	618-259-5133	3545
76 W	services Inc		W Howard St	MI	48342-1280	810-338-3381	3291
77	Wangs International Inc/Showro	230	Spring St Nw	GA	30303-1051	404-524-2633	3999D
78	Warner A R Enterprises	701	Depot St	PA	15650-1620	412-539-9229	3544D
3079	Waters Custom Machining	3330	E Highway	TX	75149-1101	214-285-7130	3599A
3080	Waukesha Specialty Co			WI	53114	414-724-3700	3599A
3081	Wayland Taylor Inc	815	9th	TX	79351	806-428-3245	3523
3082	Wb Tooling	9612	Humboldt Ave S	MI	55431-2629	612-881-2027	3469
3083	Wean United Inc	347	Park Ave	OH	44481	216-841-7200	3547
3084	Wear-Ever Design & Mfg	514	Lemon St	CA	94590-7243	707-554-6191	3599A
3085	Weaver Diversified Machining	115	Eastman Ave	AL	35901-8218	205-442-3262	3544D
3086	Weaver Industries Inc	201	Industrial Ct	TX	77301-4029	409-539-2156	3624
3087	Weaver Machine Co	1430	Oregon Ave	CA	90813-1427	310-437-4912	3599A
3088	Weber Bros & White Metal	4715	136th Ave	MI	49419-9722	616-751-5193	3599A
3089	Weber Drilling	1240	S Gregory Ln	WY	83001	307-733-3343	3541C
3090	Webers Mach Shop Special General Machinin	2	Campbell Ave	NY	12180-6004	518-272-8033	8731B
3091	Webster Tool & Die Mfg Co	164	Orchard St	NY	14580-3283	716-872-5650	2399
3092	Weermco Mch Shop	111	Nw 14th St	TX	75050-5234	214-264-7211	3599A
3093	Weimer Tool Co	1046	E Hyde Park Blvd	CA	90302-1802	310-672-5205	3599A
3094	Weisbecker Wm J Inc	227	Little Falls Rd	NJ	07009-1223	201-239-7075	3599A
3095	Weissman The	4927	N Damen Ave	IL	60625-1414	312-506-2215	3531G
3096	Wells Casting Co	5700	Walnut	IL	60071	815-678-2811	3363
3097	Wells William H		Spur Hy	AK	99811	907-283-7521	5211
3098	Wellsbuilt	2369	Dickerson Rd	NV	89503-4905	702-324-3755	3599A
3099	Weltek Manufacturing Inc	2751	W Oxford Ave	CO	80110-4364	303-781-6613	3599A
3100	Wendell Trepanning Inc	15120	Garfield Ave	CA	90723-4020	310-634-9035	3599A
3101	Wendells Mach & Mfg	1262	Lancaster-Kirkersville Rd Nw	OH	43130	614-653-1900	3599A
3102	Wendig Automotive Inc	671	N Main St	PA	18901-3924	215-343-4710	3714
3103	Wensel Metals	1	Lloyd Ave	PA	15650-1701	412-532-1677	3469
3104	Wentworth Mold & Die Usa Co Lt	365	John Downey Dr	CT	06051-2907	203-225-3511	3544E
3105	Wesley Weehunt Drilling & Pump Service		Bookout Rd Nw	NM	88352	505-585-2096	3541C
3106	Wesner Assocs	21	Main St	PA	19023-3043	610-532-8047	3599A
3107	West Co	347	Oliver St	PA	17740-1999	717-398-1133	3089
3108	West Coast Fabricators	17360	Sw 63d Ave	OR	97035	503-635-7333	3399
3109	West Gate Sheet Metal Inc	834	W 13th Ct	FL	33404-6727	407-845-2440	1761
3110	West Machine Shop Inc		Hwy 8 E	MS	38732	601-843-5109	3599A
3111	West Michigan Tool And Die	1007	Nickerson	MI	49023	616-925-0900	3544D
3112	Westchester Tool Supply Corp	1051	Saw Mill River Rd	NY	10710-3213	914-965-4411	3569
3113	Western Die Cut Contractor Inc	3650	E 41st Ave	CO	80216-6502	303-355-5153	3999L
3114	Western Foundry & Machine Works	1801	Madison	KS	66600	913-235-6030	3365
3115	Western Grinding Service Inc	601	Harbor Blvd	CA	94002-3924	415-591-2635	3541H
3116	Western Industrial Machining	211	24th St	MD	21157-5501	410-857-9161	3599A
3117	Western Industrial Supply Co	1220	W 15th Ave	TX	79102-2613	806-376-5467	7359E
3118	Western Lithotech-Texas	2034	N Jackson St	TX	75766-5136	903-586-9866	3354
3119	Western Mold Engineering Inc	11726	E 166th	CA	90701	310-865-2459	3544E
3120	Western Motor Parts	1588	San Pablo Ave	CA	94564-2452	510-724-1412	7538C
3121	Western Pumping Systems Inc	17046	S Weber Dr	AZ	85226-4113	602-961-0150	3599E
3122	Western States Drilling	9229	Redwood Rd	UT	84088-6570	801-567-0993	3312
3123	Western States Equipment Co	323	N Canyon Blvd	OR	97845-1152	503-575-1301	5082
3124	Westlake Drilling	184	N 7th St	ID	83254-1475	208-847-1518	5082H
3125	Westmoreland Industrial Supply Co	30	Rt 30 E	PA	15605	412-834-0800	3291
3126	Westwater Supply-Springfield I	1	Walnut St	OH	45505-1145	513-325-2434	1711
3127	Westwood Manufacturing Icn	1500	30th St Nw Ste	WA	98001-1711	206-833-8241	3599A
3128	Westwood Tool	1020	Leander Dr	TX	78641-2042	512-259-4099	3544D
3129	Wheatons Sheet Metal Shop Inc		Craft Rd	NY	14850-1016	607-257-5555	3823
3130	Wheco Corporation		Big Pasco Industrial Park	WA	99302	509-544-0933	3536
3131	Wheeler Boyce Co	4545	Boyce Parkway	OH	44310	216-686-1292	3999A
							3544E

3132	Wheeler Electric Inc	820	W 1st Ave	Eugene	OR	97402-4902	503-687-2121	7694	76F
333	W m Porter T	2060	W Kelly Park Rd	Apopka	FL	32712-5129	407-886-8111	5084D	3C
34	W Tool & Die Corp	3184	College Hwy	Southwick	MA	01077	413-569-5528	3544D	
35	White Star Machinery & Supply Co		Hall Ave	Grand Junction	CO	81504-6036	970-434-0847	5032C	7699P
36	Whitico Machine Inc		School Rd	Jacksboro	TN	37757	615-562-1111	3599A	
3137	Whites F W Machry Co	1820	Cedarhurst Dr	Wickliffe	OH	44092-1100	216-585-2500	3545	
3138	Whites Machine Shop Inc	343	N Clifton Ave	Springfield	MO	65802-4611	417-866-3737	3599A	7692D
3139	Whites Water Well Drilling & Repair			Fort Pierce	FL	34950	407-464-4787	4971	3599E
3140	Wickford Corp Of Nj	128	Buckingham Ave	Trenton	NJ	08618-3314	609-393-3000	3291	
3141	Wiegand Edwin L-Chromalox	6463	Proprietors Rd	Worthington	OH	43085-3263	614-885-3933	3829	5075B
3142	Wi-Mar Hydraulics & Mine Supl		Highway 41 N	Hanson	KY	42413	502-322-8654	3594A	3567
3143	Wilco Die-Tool-Machine Co	2430	Northline Ind Blvd	Ladue	MO	63124	314-872-9252	3599A	
3144	Wilcoxon Enterprises Inc	520	Washington St	West Monroe	LA	71292-6549	318-388-1896	3479D	5211O
3145	Wilder Motor & Equip Co Inc	301	15h Ave N	Nashville	TN	37203-2988	615-329-2365	5084L	3714
3146	Wiley Water Systems Inc	6455	E Jackson St	Muncie	IN	47303-4526	317-284-9484	5084G	3621
3147	Wilkins Pipe & Supply Co	8515	N University St	Peoria	IL	61615-1672	309-692-9550	3498	3599E
3148	Wilkinsons Custom Drive Shaft	2252	Slate Rd 52 W	West Lafayette	IN	47906	317-497-3463	3714B	5211D
3149	Will-Mor Engineering Co Inc	53	Batchelder Rd	Seabrook	NH	03874-4402	603-474-8971	3599A	
3150	Willamette Fluid Power	8895	Pueblo Ave Ne	Salem	OR	97305-9712	503-463-0758	3599E	3594A
3151	William Hough Jr Mch	2387	W Cohoclah Rd	Howell	MI	48843-9342	517-546-0844	3599A	
3152	Williams Bros Div Of Brookline Machine	296	Warren Ave	Portland	ME	04103-1107	207-878-2994	3714B	3594A
3153	Williams Engineering & Mfg Inc	21610	Lassen	Chatsworth	CA	91311	818-882-4800	3599A	5551
3154	Williams Machine Shop	7602	George Washington Mem Hwy	Grafton	VA	23692-4851	804-898-9167	7538U	5531
3155	Williams Machine Works Inc	5725	Main St	Moss Point	MS	39563-2255	601-476-7651	3599A	3731
3156	Williams Manufacturing Co	30707	Commerce	New Haven	MI	48048	810-749-6800	3469	
3157	Williams Motor Parts	603	W 2nd St	Freeport	TX	77541-5790	713-233-5313	5531A	3691
3158	Williams R E Co Inc	3625	Eggert Rd	Orchard Park	NY	14127-1946	716-667-7044	3531G	
3159	Williams Truck Parts Inc	403	Airport Dr	Shreveport	LA	71107-7007	318-221-0601	3714	3714B
3160	Willington Auto Body Inc		Route	West Willington	CT	06279	203-429-8595	7532	3559M
3161	Willow Creek Tool Sales		Main	Willow Creek	MT	59760	406-285-3734	3545	
3162	Wilpak Plastics Inc	244	Dukes St	Kearny	NJ	07032-3929	201-997-8863	3021	3089
3163	Wilson Tool Service	2134	Presidential Row	Mesquite	TX	75149-1125	214-288-8644	1389B	
3164	Wilson Machine Shop	5230	N County Rd 300 E	Mount Summit	IN	47361	317-836-4565	3599A	3085
3165	Wilson Tool & Cutter Service	1013	Se	Oklahoma City	OK	73129-6855	405-672-5497	3541H	7699D
3166	Windmill Construction Machiner	9791	Brighton Rd	Henderson	CO	80640-8631	303-286-9282	3599E	
3167	Windsor Airmotive Barnes Group	7	Connecticut South Dr	East Granby	CT	06026	203-653-5531	3599A	
3168	Windfold Door Control	263	S Whitford Rd	Exton	PA	19341-2637	610-363-1010	3823	7342
3169	Winfields Machine Repair Inc	29761	Groesbeck Hwy	Roseville	MI	48066-1923	810-771-0010	1796B	3599E
3170	Winkco Machine Works	11318	Hirsch Rd	Houston	TX	77016-1738	713-442-3383	3599A	
3171	Winnelson Co	1000	Elk St	Rock Springs	WY	82901-4524	307-382-5730	5075	
3172	Winter Turbos	1640	Dockery Ave	Seima	CA	93662-9785	209-896-9621	3659D	
3173	Wisconsin Air-Cooled Engine Agcy	323	E Louisiana St	Evansville	IN	47711-5021	812-422-9418	5084L	
3174	Wisconsin Metal Products Co	1807	De Koven Ave	Racine	WI	53403-2543	414-633-6301	3469	3724
3175	Wise Tools & Die		Main	Stamping Ground	KY	40379	502-535-6140	3544	
3176	Wilco Inc	6401	Bricker Rd	Avoca	MI	48006-2521	810-387-4231	3599A	
3177	Witherspoon Grinding Servis	2	W Spring St	Covington	OH	45318-1324	513-473-5358	3541H	
3178	Woehr Tool & Die	130	Lewis Rd	San Jose	CA	95111-2135	408-227-2515	3469	
3179	Wolcott R & Sons	23	Cindyla	Deal	NJ	07723	908-493-8610	3599A	
3180	Wolf Machine Inc	129	N Marquette Rd	Prairie Du Chien	WI	53821-1512	608-326-2925	3599A	7692D
3181	Wolfe Brothers Construction		Rr	Marion	VA	24354-9803	540-783-2715	1541	1794
3182	Wolfe Manufacturing Co	2974	Airport Hwy	Toledo	OH	43609-1404	419-382-9571	3451	1611J
3183	Wolter A	7751	S 76th St	Franklin	WI	53132-9758	414-529-0640	3291	3443A
3184	Wolverine Production & Engineering Co	40851	Production Dr	Mount Clemens	MI	48043	810-468-2880	3541B	5499A
3185	Womack Machine Supply Co	9440	Viscount Blvd	EI Paso	TX	79925-7049	915-598-0288	3829	5072D
3186	Woman Power Inc	809	1st Ave	Asbury Park	NJ	07712-5942	908-775-8010	3699	
3187	Woodbury-Beach Co Inc	803	S Van Buren St	Little Rock	AR	72204-1841	501-663-9421	5074D	1711E
3188	Woodland Machinery Co	1103	Nelson Ln	Port Bolivar	TX	77650	409-684-5926	3599E	3443
3189	Woods Machine Services Inc	1321	S Church St	Rocky Mount	NC	27803-3606	919-446-2142	3536	7692D

Company Name	Address	City	State	Zip	Phone	Phone	Phone	Phone	Phone
90 W Custom Engine Rebuilding	1633 E Miner Ave	Stockton	CA	95205-4538	209-943-5885	7538C	7F		
91 W King Unlimited Inc	321 North Loop E	Houston	TX	77022-5931	713-694-6139	3599D			7538U 3599A
92 Worthington Screw Machine Products Office	Highway 72	Paint Rock	AL	35764	205-776-3355	3599A	3451		
93 Worthington Associates	Douglas Ave Ste	Urbondale	IA	50322-3067	515-278-0635	3544B			
3194 Wright Steel Co	Chemical Way	Redwood City	CA	94063-2715	415-368-4112	3541			7692D
3195 Wright Tool Co	Maplelawn Dr	Troy	MI	48084-4604	810-643-6666	3569			
3196 Wrights Electrical Contracting	Ben Hill Rd	Thomaston	GA	30286-9653	706-647-2210	3599K			
3197 Wrights Welding & Propeller Shop	Aetna Rd	Ashtabula	OH	44004-6260	216-998-7244	3732			
3198 Wyley-Elliott Company The	S Washington	Washington	AR	71862	501-234-3365	3542			7692D
3199 Xormox Corp	Galway Dr	Ballwin	MO	63021-7117	314-394-9499	3494			
3200 Y & S Tool	Production Ct	Vandalia	OH	45377	513-890-4322	3363			
3201 Yale Tool & Engraving Inc	Gold Smith Ave	Vandalia	OH	45377	513-890-4322	3363			
3202 Yamazen Usa Inc	Bash St	Plymouth	MI	48170-1082	313-459-7171	3316			
3203 Yardley Manufacturing Co Inc M	S Main St	Indianapolis	IN	46256-1285	317-579-7220	3545			3599A
3204 Yoachim Machinery Co Inc	Independence Sq	Yardley	PA	19067-1620	215-493-2975	3494			
3205 Yoder Die Casting		Indianapolis	IN	46203-5942	317-788-1501	3541			1761
3206 Yornell Tool & Mold Inc	Morgan St	Dayton	OH	45432	513-427-5885	3363			5084D
3207 Youells D D Machining Inc	Bethlhn Pke	Crystal Lake	IL	60014-4468	815-459-9110	3544			
3208 Youngstown Plastic Fabrication	Poland Ave	Telford	PA	18969	215-257-4109	3599A			
3209 Your Pal Inc	I St	Youngstown	OH	44502-2138	216-743-6404	3087			
3210 Yuasa International	Springdale Ave	Omaha	NE	68127-1616	402-339-4477	3599A			3089
3211 Z & Z Precision	Blythe St	Santa Fe Springs	CA	90670-3833	310-941-8822	3541			
3212 Zalk Steel & Supply Co	Saint Anthony Blvd	Van Nuys	CA	91402-6013	818-786-8631	3599A			
3213 Zeiger Industries	Wiseland Ave Se	Minneapolis	MN	55418-1141	612-781-6801	3452			
3214 Zep Manufacturing Co	E Pumice	Canton	OH	44707-1054	216-484-4413	3599A			3479E
3215 Ziliners Tool & Die Co Inc	Spruce St	Santa Fe Springs	CA	90670	310-921-0338	5169			3589
3216 Zinola Mfg	W Evelyn Ave	Sheboygan Falls	WI	53085-2542	414-467-2476	3544D			3599A
		Sunnyvale	CA	94086-5742	408-739-7974	3599A			

MAST Partners' Meeting
Report of October 10 - 11, 1995 Meeting

The MAST Partners' Meeting was held on October 10-11, 1995 and hosted by Moraine Valley Community College. Mr. Joe Penick, Project Director, chaired the meeting.

Attendees:

Texas State Technical College:

Joe Penick, Project Director
Dr. Don Pierson, MASTER Principal Investigator
Wallace Pelton
Terry Sawma

Itawamba Community College:

Barry Emison

Augusta Technical Institute:

Ronnie Lambert

San Diego City College CACT:

Dr. Joan Stepsis
Jack Bollinger

Springfield Technical Community College:

Gary J. Masciadrelli
Nick M. Massa

Moraine Valley Community College:

Richard Kukac
Dr. Richard Hinlcley

Joe Penick called the meeting to order at 8:30 A.M. on October 11, 1995 at Moraine Valley Community College and distributed copies of the MAST Deliverables Schedule and Volume # 4 (draft) to all in attendance. The agenda for this meeting was included in the MAST Deliverables Schedule.

1. Partner College Occupational Specialty Matrix:

The Partner College Occupational Specialty Matrix was amended to reflect the Lead Institution and the secondary college for each of the occupational specialties. A copy of the amended matrix is attached. The lead institution is responsible for the development of competency profiles, outlines, SCANS matrix, Technical Workplace Competencies/Course matrix, and course syllabi, etc. as outlined in the draft Volume # 4 - Machining book. The secondary college will review all documents produced by the lead institution.

2. MAST Project Gantt Chart: October 1, 1995 - September 30, 1996

Joe Penick presented the MAST Project Gantt Chart for review and comment. It was suggested and agreed that items # 15 and 16 (Steering Committee Review of Final Project and Final MAST Partners' Meeting at TSTC) be combined and occur on September 15, 1996.

3. MAST Project Deliverables (Formats and Assignments): Volume 4 - Machining

Wallace Pelton presented the proposed MAST Project Deliverables Format from page 44 of the MAST grant and the dissemination plan (see MAST grant). The MAST Bound Deliverables format and assignments were also presented. Wallace outlined each volume of the fifteen volume set of deliverables and identified the responsible College Partner and date due at TSTC as January 31, 1996. Each volume shall follow the order shown in draft volume #; will be prepared by the lead # 1 college partner indicated on the revised occupational speciality matrix; follow the sample "Volume 4 - MACHINING"; be submitted in both clean, original hard copy and on disk (Word Perfect or Word for Windows format for all text and/or PageMaker files for Competency Profiles and Crosswalks). A copy of the amended MAST Bound Deliverables (Formats and Assignments) is included in this report. Wallace requested all partners contribute appropriate documents for Volume # 2 be sent to Terry Sawma for compilation before December 31, 1995.

4. Memorandum of Agreement: MAST

Joe Penick requested that each college partner prepare a MAST Memorandum of Agreement (MOA) or use the current two (2) year MOA. He requested each partner send copies of the signed MAST MOA to TSTC. The MAST Deliverables Schedule contains a sample MOA that may be followed in preparing the MAST MOA.

5. Claims and Blanket Contract with Partners:

Joe Penick outlined the protocol for college partner reimbursement requests. He identified key points in Texas Public Law that may affect MAST reimbursement protocol.

6. Memorandum Ref: State of Texas Per Diem Allowance for Chicago Trip:

Joe Penick identified the State of Texas per diem allowance for this Chicago trip at a maximum of \$104.00 per day for lodging, \$38.00 per day for meals, and a mileage reimbursement rate at \$0.28 per mile. Requirements for reimbursement were defined and a State of Texas Travel Voucher was included in the MAST Deliverables Schedule distributed to all participants.

7. Quarterly and Annual Reports:

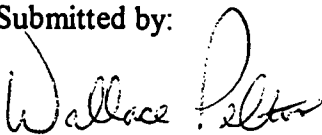
Terry Sawma presented the MAST Quarterly Report Summary of Activities and Events for July 1, 1995 - September 30, 1995. All MAST College Partners are requested to send copies of their Quarterly Reports Summary of Activities and Events to Terry Sawma within 30 days of the end of a quarter. Terry Sawma outlined the Annual Report Format, required by the Department of Education. Each partner college shall submit an annual report to the MAST Project Director by November 15, 1995 for inclusion in the Final Annual Report that will be submitted to the Department of Education. Please send your annual reports to Joe Penick.

8. Survey Data:

Terry Sawma announced that the Texas Industrial Survey has been mailed to over 340 industries in the state. He presented the survey cards and introductory letters to industry. Dr. Joan Stepsis suggested that industries participating in the National Survey be selected randomly and that TSTC coordinate the process. Partners agreed that TSTC shall randomly select the industry participants from a national data base, write the introduction letter, prepare all mailings, and prepare the statistical analysis of the data.

The meeting concluded with a tour of the Technology Building at Moraine Valley Community College. The meeting was adjourned at 3:30 pm on October 11, 1995.

Submitted by:



Wallace Pelton
MAST Site Coordinator
Texas State Technical College

Enclosures:

MAST Partner College Occupational Speciality Matrix

MAST Partner College Occupational Speciality Matrix

Speciality	TSTC	Itawamba	Augusta	Moraine Valley	CACT	Springfield
Manufacturing Engineering Technology Machinbing EDM Superabrasives Mold Making	1	2				
Welding	2			1		
Industrial Maintenance			1	2		
Sheet Metal/Composites	1				2	
Tool and Die	2	1				
Computer Aided Drafting (CAD)		2	2	1		
Computer Numeric Control (CNC)/CAM		2	2		1	2
Instrumentation			1		2	
LASER Machining	2					1
Shop Floor Control /CIM/Flexible Machining				2	1	
General Education	1					

1 = College with Primary Responsibility

2 = College(s) with Supporting Responsibility

Each partner college has the responsibility to review all documentation for each of the occupational specialties.

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3380
<http://machinetool.tstc.edu/>



MAST Partners' Meeting San Diego, California November 16, 1995

The meeting was hosted by San Diego City College in San Diego, California. The meeting actually began at 6:30 p.m. due to some confusion regarding meeting rooms.

Attendees:

Dr. Hugh K. Rogers, Central Florida Technical College; Dr. Jim Hales, Consultant; Jim Weaver, Augusta Technical Institute; Nick Massa, Springfield Technical Community College; Dr. Joan Stepsis, San Diego City College; Jack Bollinger, San Diego City College; Mary Benard, San Diego City College; Doug Welch, San Diego City College; Wallace Pelton, TSTC Waco; Joe Penick, TSTC Waco.

Introduction

The meeting was chaired by Joe Penick using the second peach colored book, "Executive Session". During the meeting, Mr. Penick reviewed what had taken place at Chicago (the meeting of the worker bees discussing the peach colored book, volume 1, "Deliverables Schedule for MAST"). There were some changes to the first peach colored book, and Joe had rearranged that material and put that into the second peach colored book, the Executive Session.

The Meeting

The agenda was reviewed discussing the occupational specialties, the Gantt charts and the deliverables; and since this was the first meeting with the Drs, Joe showed them the different formats and some assignments that were made and specifically the volume 4 machine book.

Joe also talked a little about the MOA's for MAST, the goals for MAST and MASTER and claims and contracts and the per diem allowance, etc.

He ended this section talking a little about the survey and telling them the new plan for the survey with TSTC's MAST office actually doing all the work in Waco and touched on the TRP subgrants. After the discussion on MAST, the second part of the meeting began talking about MASTER.

For MASTER, Joe used a green book, "Operational Plan", the same book we had used in Ft. Worth for the meeting with the NSF, Dr. Agrawal, and with the Steering Committee. Basically, Joe talked a little about what had happened in that meeting and some of the discussions that they had and some of the deliverables and went through some of those things. This was the first time most of these people had addressed the MASTER Grant specifically as far as deliverables, etc.

Closing

At the close of the meeting, the floor was opened for general discussion and Joe mentioned to the partners that he wanted to give each partner college the equivalent of three \$2,000 scholarships and they could use this to help fund students in their pilot program or this money could be used to purchase books or whatever the individual colleges want, but he wanted each of the colleges to have the equivalent of \$6,000 extra up and above their MOA money that had already been promised and they could use this to work with their scholarship there.

Submitted by:



Joe Penick
MAST Project Director

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3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3380
<http://machinetool.tstc.edu/>



MAST Partners' Meeting Moraine Valley Community College Chicago, IL January 19, 1996

Attendees: Dr. Don Pierson, Joe Penick, and Wallace Pelton, TSTC Waco; Barry Emison, Itawamba; Dr. Joan Stepsis, Jack Bollinger, and Mary Benard, The CACT at San Diego; Carson Berglund, technical writer; Dr. Hugh Rogers, Central Florida Community College; Rich Kukac, and Dr. Dick Hinckley from Moraine Valley Community College; Bill Ruxton, Evaluator; Nick Massa and Gary Masciadrelli, Springfield Technical Community College.

DISCUSSION ITEMS

MAST deliverable items were discussed. Mr. Penick used the booklet, "Deliverables Formats and Schedules" (ivory) to cover each section:

1. Discussion on Project Deliverables
2. Deliverables Schedule Gantt Chart
3. Career Orientation Module (8-hour career enhancement tour and 172 hours of basic training in machine tool. This could be used for secondary school students. Mr. Penick offered the partners funds to prepare a recruitment video for each of their schools.

Jack Bollinger, San Diego, has developed a 200-hour basic course for secondary school students which would fill the bill for this part of the grant deliverables on career orientation. This is being used at San Diego for the Continuing Education program. Some copyright matters need to be dealt with, but he would look at the possibility of sending this to the TSTC MAST office.

4. Remote Site Training Materials. Mr. Penick showed an example of the MAST Remote Site Training module. Each partner was asked to develop one module for their occupational specialty area(s). Due date for these modules is mid-February. These modules will be included in a Remote Site Training Model package. The package is being

developed by Mr. Dewey Cooper in Waco. The entire remote site package will serve as a model to be used by colleges for marketing the MAST training modules to industry.

5. Career Action Plans. Mr. Sefcik is in Waco working on these. The rough drafts were shown to the group and comments were solicited.
6. Internship Agreement. Mr. Penick presented the contract agreement that Terry Sawma had worked up for us. With a little revision by Mr. Penick, it is well under way.
7. Executive Summary. Mr. Penick introduced Carson Berglund, a technical writer associated with San Diego. Mr. Berglund distributed copies of the rough draft to the group and several points were discussed. Some information from Dr. Rogers regarding how the MAST program was started and how the partnership was formed was requested. Each partner was requested to get information to Mr. Berglund so that he could include that in the foreword sections of each volume. Mr. Berglund will come up with a list of questions and fax it to each partner. The responsible partner will answer the questions and then return them to Mr. Berglund. The forewords will be created from this information.
8. Career Awareness Video. This is not mandatory, but \$5,000 is available for each of the schools if they wish to do a regional career awareness video.
9. Packaging Instructions. Format instructions for the books were discussed.
10. Industry-Wide Assessment of Skills. Mr. Penick presented this to the group again and emphasized the need for more industry visits to validate our competency profiles. Many of the visits need to be done by TSTC Waco; there is not enough information on sheet metal or composites. Mr. Penick and Mr. Pelton will arrange trips for each of those areas.
11. Pilot Program. Of the five key MAST goals, two of them deal with the pilot program. Mr. Penick talked about the different types of students that were in our pilot programs and at the conclusion of the discussion, he described two worksheets to use to help summarize the program for each partner. One was a MAST pilot program student assessment results analysis. Consisting of the types of students: disadvantaged, non-traditional, traditional students; how many started; how many finished; information on the pilot tests, the entry tests and scores, etc.

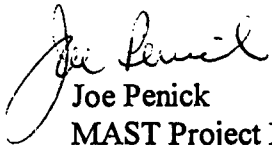
The second document reviewed was a brief description giving the name of the college, overview of the program, how the students were selected, how they applied, funding, apprenticeship, etc.

12. Some partners need to submit their MOA's and State of Texas Contracts.
13. Information for per diem and travel was presented.

CONCLUSION

The meeting was positive, a lot of information was covered, and we look forward to receiving deliverables documentation at TSTC. At the meeting, Springfield Technical College submitted their book on Laser Machining. Two books on CNC and Automated Equipment Technician were received from San Diego.

Submitted by:



Joe Penick
MAST Project Director

Machine Tool Advanced Skills Technology Program (MAST)

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<http://machinetool.tstc.edu/>



MAST Partners' Meeting Orlando, Florida April 24-26, 1996

The final MAST Partner Development Centers Meeting was held in Orlando, Florida and hosted by Central Florida Community College and Dr. Hugh K. Rogers. Meetings were held in the morning hours and tours relative to MAST were scheduled for the afternoons.

Attendees:

Dr. Hugh K. Rogers, Central Florida Community College; Nick Massa and Gary Masciadrelli, Springfield Technical Community College; Dr. Joan Stepsis, Mary Benard, Doug Welch and Jack Bollinger, San Diego City College; Ronnie Lambert and Steve Griggs, Augusta Technical Institute; Don Benjamin, and Barry Emison, Itawamba Community College; Chuck Bales, Moraine Valley Community College; Dr. Hales, Formative Evaluator; Bill Ruxton, Summative Evaluator; Joe Penick, Dr. Don Pierson, and Wallace Pelton, TSTC Waco.

April 25, 1996 Discussions

The agenda/meeting book, "Final MAST Partners Meeting" (coral color cover) was used.

The MAST first draft deliverables, a 15-volume set, was taken to the meeting for partner review. Partners will review and send revisions to the MAST office by May 15, 1996.

The deliverables time line was reviewed (Tab B) and Mr. Penick reported that we are right on schedule and that he needed to do a little more work the dissemination. The Dissemination Model is in first draft form now. A trip is planned to Washington, DC to meet with the project representatives to discuss the plan for deliverables. The model will be complete prior to that trip.

Mr. Penick also emphasized the need for the partners to reconcile their expense vouchers and that he will be calling each partner to discuss the spending line for the remainder of this fiscal year. There was some discussion about the pilot program, the need to wrap it up, and to get the post test done for the students. The results should be received in the MAST office before the final dissemination process.

Minutes

Minutes for previous meeting (Tab C) were discussed.

Quarterly Report

The Quarterly Report was discussed.

Match for equipment, personnel, etc.

There was some discussion.

Tab E

Forms were presented as examples of how matching could be written up and submitted.

Tab F - Discussion of Suspenses

Review of 15-volume sets and submit changes.

Do complete reconciliation for cost and invoices.

Submit all invoices for MAST.

Regional recruiting videos (Springfield and Augusta) submitted to MAST office.

Matching - get documentation done.

For Non-Matching federal costs - must have time and hours for all employees.

Pilot Program & Student Assessment.

Final Industry Visits, if any, turn in competency profiles.

April 26, 1996 Discussions

Dr. Hales emphasized evaluation of the pilot programs. Need photos of the pilot program for record. Send to the MAST Program office.

Need to complete Sheet Metal and Composites curricula. Also need to do more industrial assessment in the form of modified DACUMS/Competency Profiles. Need input from all Partner Development Centers.

Submitted by:



Joe Penick
MAST Project Director

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3380
<http://machinetool.tstc.edu/>



PROJECT REPORT FIRST QUARTER JANUARY 2, 1995

1. The MAST program was funded October 1, 1994. It provides for TSTC Waco as lead institution, with five other developmental institutions. These are: San Diego City College, Augusta Technical Institute, Moraine Valley Community College, Itawamba Community College and Springfield Technical Community College.
2. The grant award from the Department of Education was first announced by U.S. Representative Chet Edwards from Texas. An "Open House" and announcement to the local community was made at TSTC on October 17. (Each out-of-state Center has also made announcements to the media.)
3. The first meeting of the Steering Committee was also held on October 17, when goals, objectives, and methodologies to be used for the project were discussed, followed by a tour of TSTC facilities Industrial Technology building. (Steering Committee meetings were also held in a similar fashion at the out-of-state locations.)
4. The Project Manager met with Mr. Bill Ruxton, one of the evaluators at his office at NTMA, Ft. Washington, Maryland. Project goals and concepts were discussed, along with evaluative information. Mr. Ruxton was most helpful in providing comparative and background information.
5. Three presentations were made to TSTC faculty involved in the career programs. Centers followed a similar program of information to their faculty.
6. Industry partners and public school partners were contacted and visits began. Initial visits were made to Time Manufacturing, Mercury Tool and Die, Bell-Textron, and Alcoa.
7. Letters of Agreement for the scope of work were received from all Centers and Centers assigned the equivalent of two full-time personnel to work on the project. Local project work was done by the Project Manager and existing TSTC staff until full-time personnel could be recruited. New project personnel at the Waco Center were recruited in November, interviewed in December, and would begin work in January.

8. The first national meeting of the Centers was held at CORD in Waco on November 18. Project goals, objectives, and methodology were discussed, as well as a review of literature on skills standards. A presentation was made on comparative projects involving other disciplines; formats for gathering skills standards information; affirming it with industries; and designing the final product. It was decided that a standard format would be best and that we needed a software product to meet that need. Centers were also encouraged in their efforts to work with the public schools in the early phase to promote the career action planning process for students.
9. The Project Manager traveled to the Oak Ridge National Laboratories on November 10-15, and met with the personnel in the Skills Center and Development Center, obtaining very useful information on equipment trends and skills training as applied there with employees.
10. The Project Manager also traveled to Washington, D.C. on December 5-6 to meet with the Department of Education Grants Officer, Dr. Jackie Friederich, and Grants Specialist, Ms. Juanita Bowe. Planning information, concepts, partnerships, and budget were discussed. Future meetings were also planned to include a February national meeting at Oak Ridge National Laboratories and a possible future meeting at Detroit, Michigan.
11. Locally, meetings with Bell-Textron began in October and December, with February 1-2, 1995 established for detailed work on skill standards for machinists.
12. In December, software packages were reviewed for the project and products titled "First Task" and "Course Developer" were obtained. These were sent to each development site for evaluation and training.
13. The second Steering Committee meeting was scheduled for January 20, 1995, and the second national meeting was scheduled for February 18, with two persons from each Development Center scheduled to travel there to review.
14. A second evaluator, Dr. James Hales, was brought into the project due to its scope and areas to be covered. (He and Mr. Ruxton will be present in Waco on January 20th and at Oak Ridge on February 18th.)

SUMMARY

The first quarter of the project has involved: 1) early coordination; 2) letters of agreement; 3) recruitment of new personnel; 4) first visits to schools and industry partners; 5) committee work on methodology; and (6) obtaining the proper project software for task analysis and course development. As a start-up effort, overall progress has been excellent. The second and third quarters will now show a greater rate of progress with skills standards work and deliverables for the first year's work. During this period, the Project Manager will be making on-site visits with the Centers and additional contacts with the federal laboratories.

Hugh K. Rogers
Project Manager, MAST

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-3526 FAX: 817/867-3221



QUARTERLY REPORT: MAST PROGRAM SUMMARY OF ACTIVITIES AND EVENTS: JANUARY 1, 1995 - MARCH 31, 1995

TEXAS STATE TECHNICAL COLLEGE:

MAST STEERING COMMITTEE MEETING

January 20, 1995

Dr. Rogers, Dr. Botsford, and Dr. Groves hosted a MAST Steering Committee meeting in the IDEAS Center at TSTC and presented an overview of the MAST program with representatives from industry, secondary education, post secondary education, and external evaluators (Dr. James Hales and Mr. Bill Ruxton). The overview included identification of the skills standards movement; partnerships with industry and secondary schools; project activities timeline; and a tour of the Industrial Technology building, CAD/CAM, Machining, and Manufacturing Programs.

BELL HELICOPTER TEXTRON

February 1, 1995

Dr. Rogers, Dr. Botsford, and Wallace Pelton were hosted by Bell Textron's Mr. Lucien Rouze and described the objectives of the MAST program. Partnerships between Bell and TSTC were discussed. A tour of the facilities was provided.

BELL HELICOPTER TEXTRON

February 10, 1995

Dr. Rogers, Dr. Botsford, Wallace Pelton, and Darrell Dungan were hosted by Bell Textron. Darrell Dungan, TSTC EDIT Center, facilitated a DACUM for Machinist. Panel members are identified on the DACUM.

**NATIONAL MAST MEETING,
Oak Ridge National Laboratories**

February 16-19, 1995

This was the first organizational meeting of the MAST partners and was attended by Dr. Rogers, Dr. Botsford, and Wallace Pelton, TSTC. The MAST objectives were reviewed and Development Sites shared the information that had been collected to date. A tour of the facilities was provided .

CONNALLY HIGH SCHOOL VISIT

February 17, 1995

Mr. Don Hancock, Superintendent of Connally ISD, invited faculty from TSTC to present an overview of the MAST program at the Connally High School Faculty In-service. Terry Sawma and George Gray met with the faculty and counselors of Connally High School to outline the objectives of the MAST program and describe TSTC's technology programs. Faculty were asked to identify students who may be interested in the "pilot" testing of the Machinist Certificate program for the Fall 1995 semester.

CONNALLY HIGH SCHOOL VISIT

February 20, 1995

Wallace Pelton and George Gray met with the faculty and counselors of Connally High School to outline the objectives of the MAST program and describe TSTC's technology programs. Faculty were asked to identify students who may be interested in the "pilot" testing of the Machinist Certificate program for the Fall 1995 semester. George Gray and Wallace Pelton met with two classes of vocational students and describe aspects of the Machining program and the MAST program. A letter of appreciation was sent to Mr. Jones, Vocational Education Teacher, and included a MAST Program Interest Form to identify potential students for the pilot program in Machining scheduled for the Fall 1995 semester.

MARLIN HIGH SCHOOL VISIT:

February 23, 1995

Wallace Pelton met with Faculty and Counselors of Marlin High School to describe the MAST program objectives. Wallace met with all high school students, freshman through seniors, and presented information about the Manufacturing Technology degree program at TSTC. A letter of appreciation was sent to Ms. Renee Ellers, Vocational Counselor, Marlin High School.

MERCURY TOOL AND DIE

March 2, 1995

Wallace Pelton and Dr. Jon Botsford were hosted by Mr. Jack Peck, Sr. and Mr. Jack Peck, Jr.. Dr. Botsford facilitated a Competency Profile session for Machinist.

WACO HIGH SCHOOL VISIT:

March 6, 1995

Terry Sawma and Wallace Pelton met with the counselors of Waco High School to describe the MAST program and outline the "pilot" program in Machining at TSTC. Additionally, we met

with the vocational instructor in auto mechanics. A letter of appreciation was sent to Ms. Penny Richardson, Counselor, Waco High School.

MAST PARTNERS LETTER

March 7, 1995

Letters were mailed to MAST partners requesting information about available software, E-Mail Addresses, and mailing addresses, telephone numbers, and name of the Site Coordinator.

REED TOOL, INC., Houston, TX.

March 8, 1995

Terry Sawma met with Wayne Mausbach, Manager, Manufacturing Engineering, Reed Tool Company and toured the facilities.

STEWART AND STEVENSON, INC., Houston, TX.

March 9, 1995

Terry Sawma met with Mr. Mike Andrews, Vice President of Stewart and Stevenson, Inc. and toured the facilities.

DANIEL FLOW PRODUCTS, INC., Houston, TX.

March 9, 1995

Terry Sawma met with Ms. Diane Young, Employment Manager of Daniel Flow Products, Inc. and toured the facilities.

ALCOA, INC., Rockdale, TX.

March 14, 1995

Dr. Jon Botsford, Wallace Pelton, and Terry Sawma met with Mr. Mike Vidrine and experts in the specialties of General Mechanic (Welding), Electrician/Instrumentation, and Machinist to identify "Duties and Responsibilities" and prepare a "Competency Profile" for each of these professions. Letter of appreciation sent to Mr. Michael Vidrine on March 15, 1995.

RECRUITMENT VIDEO:

March 15, 1995

Terry Sawma consulted with Mr. Mike Jones and his staff requesting their assistance in developing a recruitment video and preparing the "trailer" portion of the Bell Helicopter -Textron video. Draft to be prepared by early next week.

RECRUITMENT VIDEO: CONTENT OUTLINE

March 16, 1995

Michael Jones presented the content outline for both audio and video for comment/approval. Copy was sent to Dr. Rogers for his review/approval.

MAST SUMMER WORKSHOP PROPOSAL

March 16, 1995

Terry Sawma prepared a proposal for the MAST Summer Workshops and sent copy to Dr. Rogers and Dr. Botsford. The proposal includes a draft Summer Workshop Application form.

STUDENT LETTERS

March 16, 1995

Letters were mailed to thirteen students who have expressed an interest in the pilot program in Machining. The letters include individual applications for the program. Individual names are on file in the MAST office.

HEART OF TEXAS TECH-PREP MEETING, TSTC

March 22, 1995

Dr. Rogers, Terry Sawma, and Wallace Pelton presented an overview of the MAST program to High School Counselors, High School Teachers and other participants of the Tech-Prep meeting. Members were presented with TSTC folders containing a description of the MAST program, Student Applications for the Fall 1995 Machinist "pilot" test program, and Student Interest Survey Forms.

REED TOOL COMPANY

March 30, 1995

Dr. Rogers, Mr. Pelton, and Mr. Sawma met with Mr. Erv Strahan, Director of Human Resources, and Mr. Wayne Mausbach, Plant Manager, of Reed Tool Company, Inc., Houston, Texas to discuss the developing a Competency Profile for each of the occupational specialty areas of machining, manufacturing Engineering, Tool and Die Making, and Mold Making for Reed Tool Company. Arrangements were made for MAST representatives to visit with appropriate practitioners in each of the occupational specialties at Reed Tool Company during April 1995. Discussion continued on the potential to secure industry sponsored scholarships for the Machinist Certificate option at TSTC. Discussion will continue at the April meeting.

MERCURY TOOL & MACHINE, INC.

March 31, 1995

Dr. Rogers, Mr. Sawma, and Mr. Pelton met with Mr. Jack Peck, Vice President of Mercury Tool and Machine, Inc., Waco, Texas and presented a Competency Profile (draft) for Machinist. Mr. Peck will distribute the profile to appropriate personnel at the company for review, comment, and return to the MAST office at TSTC.

Dr. Rogers, Terry Sawma, and Wallace Pelton met to review a draft of the Competency Profile for "Machinist".

COMPETENCY PROFILES

The following list represents the Competency Profiles prepared through the MAST Program and are either complete or in various phases of validation by our Industrial Partners. Competency Profiles that are complete are identified by the date of completion, those without a date are "in-process".

Title of Program	Contact Source	Date Completed
Machinist:	Mercury Tool and Die	3 March 1995
	Bell Textron	10 February 1995
	ALCOA	15 March 1995
	TSTC/Pelton	27 March 1995
Instrumentation:	TSTC/ Gillum and Poux	15 March 1995
	ALCOA (combined Electrician/INT)	15 March 1995
M.E.T:	TSTC/ Pelton	27 March 1995
	Bell Textron	10 February 1995
Mold Making:	El Paso Community College	in process
	American Mold Builders Association	in process
Electrician:	ALCOA (Electrician/INT)	15 March 1995
	TSTC/ Stuckly	in process
Laser Cutting:	TSTC/Pierson/Harris Springfield Technical C.C.	to be received April 1, 1995 in process
Computer Networking:	TSTC/ Zimmerman, Poux, Pelton	in process
Sheetmetal/Aerospace:	TSTC/Reynolds	in process
CIM:	TSTC/ Poux	1 March 1995
IMM:	TSTC/Mills	16 March 1995
	ALCOA	16 March 1995
Title of Program	Contact Source	Date Completed

CAD:	TSTC/Harper	in process
Welding:	TSTC/White ALCOA* (* included in the General Mechanic Profile)	in process
Superabrasives:	TSTC	in process
General Mechanic:	ALCOA	16 March 1995
CNC	TSTC/Pelton Martin Marietta	in process

OTHER SUPPORTING DOCUMENTS (Completed and on file in the MAST Office)

MAST Project Overview	16 February 1995
This overview was prepared for use in presenting the MAST programs goals, objectives, partnerships, problems confronting industry, and issues to be addressed.	
Performance Element A Manufacturing Engineering Technology	13 February 1995
Technical Workplace Competencies: Machinist	13 February 1995
Technical Workplace Competencies: M.E.T.	13 February 1995
SCANS/Course Crosswalk	10 February 1995
SCANS Foundation Skills Exit Level of Proficiency Matrix	09 February 1995
SCANS Workplace Competencies Exit Level of Proficiency Matrix	09 February 1995
Technical Workplace Competencies/Course Crosswalk	14 February 1995

OTHER SUPPORTING DOCUMENTS (On file in the MAST Office, continued)

Technical Workplace Competencies: Machinist Exit Level of Proficiency Matrix	14 February 1995
Technical Workplace Competencies: M.E.T. Exit Level of Proficiency Matrix	14 February 1995
M.E.T 100 Course Syllabus	21 March 1995
M.E.T 200 Course Syllabus	21 March 1995

AMTEC/AUGUSTA TECHNICAL INSTITUTE:

- I. Consultation with staff on MAST scope of work.
 - A. Continue to conduct overviews of MAST project with staff.
- II. Preliminary task assignments.
 - A. List of AMTEC/Augusta Technical Institute personnel involved with MAST project at this date.

Site Administrator	Dr. Jim Weaver
MAST Project Manager	Ronnie Lambert
Administrative Assistant	Gwen Ford
Administrative Assistant	Marsha Harrison
Programs Specialist	Bob Johnson
- III. Contacts and consultations.
 - A. Work sessions conducted with Jim Weaver and Ronnie Lambert.
 - B. Set up office space, computer, and office equipment.
 - C. Contacted Quick Start personnel for input from an industrial viewpoint.
 - D. Made contact with faculty personnel.
 - E. Made contact with public relations personnel.

- F. Made contacts with industry personnel.
- G. Made contacts with assessment personnel at Piedmont Technical College.
- H. Continue to gather DACUM materials from various sources.
- I. Continue to collect industrial assessment materials from industry and post-secondary education.
- J. Gathering curriculum materials and skill standards relating to CADD and CNC areas.
- K. Contacted Special Schools personnel for input from an industrial viewpoint.
- L. Secured Voc Tech catalog of performance objectives, performance conditions, and performance guides for machine tool operations.
- M. Secured SC Voc Tech catalog of performance objectives, performance conditions, and performance guides for machine tool operations. A member of our AMTEC/Augusta Tech MAST steering committee was one of the authors of this document.
- N. Secured a National Occupational Skill Standards in CADD from FIM.
- O. Attended National MAST Conference in Oak Ridge, Tennessee.
- P. Asked for Sloan Foundation grant as a vehicle for distributing developed MAST project materials.
- Q. Hosted AMTEC/Augusta Technical Institute MAST Program Steering Committee meeting.
- R. Issued press release on MAST project in local newspaper.
- S. Secured State of Georgia Program Guide and Program Standard for the Advance Machine Tool Technology.
- T. Contact or meet with industrial representatives daily.
- U. Using Texas State Technical College guide for skill assessment.
- V. Joined Columbia County Vocational Advisory Committee.
- W. Attended Tech Prep Workshop.
- X. Secured School-To-Work materials.

- Y. Secured competencies list for machine tool operations in Columbia County.
 - Z. Investigating School-To-Work and Tech Prep as vehicles for MAST proliferation.
 - AA. Integrating standard questions for interview into the industrial assessment process.
 - AB. Secured cooperation of Aiken Tec.
 - AC. Secured cooperation of Piedmont Tec.
 - AD. Preliminary assessments conducted for three industrial plants.
 - AE. Contact with Vice President for Business and Industry concerning MAST Project.
 - AF. Secured CIM Consortium materials for integration into MAST project.
- IV. Planning activities - next 90 days.
- A. Continue industrial visits.
 - B. Continue public and post-secondary school visits.
 - C. Continue activities with steering committee.
 - D. Conduct DACUMs.
 - E. Start development of student assessment for pilot program.
 - F. Start development of course materials.
 - G. Continue liaison with Technical and Community Colleges in other states.
 - H. Continue and enhance relationships with training related agencies.
 - I. Enhance industrial contacts concerning the MAST project.
 - K. Plan pilot program.
 - L. Continue developing skill standards and distribute to industry for final critique.
 - M. Use questionnaire and DACUM as assessment instruments.
 - N. Continue industrial assessments.

- O. Compare skill standards with skills and competencies being taught.
 - P. Confirm standards and compile information in each occupational area.
 - Q. Conduct review of technical skills and competencies presently taught.
 - R. Determine trends and applications that are significant for training.
- V. Activities Conducted Last Month.
- A. Visited or contacted sixteen industrial plants.
 - B. Contacted or visited seven high schools.
 - C. Continued to work with tech prep personnel at PTC.
 - D. Gathered curriculum materials and skills standards relating to CADD and CNC areas.
 - E. Joined Columbia County Vocational Advisory Committee.
 - F. Attended Tech Prep Workshop.
 - G. Continued to build reference materials.
 - H. Shared Information Tools for Industry publication from STC with industrial partners.
 - I. Continued liaison with Quick Start.
 - J. Continued working with Special Schools.
 - K. Continued to work with assessment personnel at PTC.
 - L. Continued to work with school-to-work personnel at PTC.
 - M. Secured State of Georgia Program Guide and Program Standard for the Advanced Machine Tool Technology.
 - N. Secured competencies list for machine tool operations in Columbia County.
 - O. Secured a National Occupational Skill Standards in CADD from FIM.
 - P. Continued review of technical skills and competencies presently taught.
 - Q. Conducted preliminary assessments for three industrial plants.

MORAIN VALLEY COMMUNITY COLLEGE

I. Major Meetings:

January 5 Used agenda at Industrial Faculty In-service to discuss curriculum projects and determine target areas.

February 8-11 Used planned Workforce 2000 conference trip as opportunity to visit MAST partner college San Diego and review project status and approach in plant floor curricula.

February Held series of meetings with MAST faculty on approach strategies and coordination.

February 17-18 Attended MAST planning session in Knoxville, Tennessee and Oak Ridge, Tennessee.

February 24 Project Directors attended DACUM Workshop.

March Working DACUM documents created by Publications Department for Job Duties and Task listing. Format set for later addition of textual material on front and back covers.

Meetings have been held and future ones are planned with each industrial area. Discussions have been held with Panduit Corporation, Andrew Corporation and Donson Machining concerning their involvement with on-the-job verification of tasks.

The regional area high school/college planning consortium, the Moraine Area Career System, has been approached for a revisit of articulation documents in target curricular areas.

II. Current Project Targets:

Initial work centered on:

Curriculum

Specialist

Welding

James Greer

Machinist

Robert Malis

Design Drafting/CAD

Charles Bales

Second level targets:

Computer-Integrated-Manufacturing

Industrial Maintenance Mechanic

Current Time-Lines:

	DACUM Completion	Initial Verification	Initial Publication	On-Site Verification Completion	Final Publication
Welding	5/1/95	6/15/95	6/15/95	8/30/95	9/30/95
Machinist	5/1/95	6/15/95	6/15/95	8/30/95	9/30/95
CAD	5/1/95	6/15/95	6/15/95	8/30/95	9/30/95
CIM	Dates to be set.				
IMM	Dates to be set.				

SAN DIEGO CITY COLLEGE

The Center for Applied Competitive Technologies (CACT)-SD is progressing rapidly on MAST grant activities and is meeting the following milestones:

I. MAST Pilot Programs - Fall '95

In order to pilot the MAST programs at San Diego City College (SDCC) in the Fall of '95, the program design and course outline revisions must be approved by the SDCC Curriculum Committee prior to implementation. The committee meetings are scheduled for May and October 1995. MAST project team has been preparing to submit the revised program and course outlines to the committee at the May meeting.

The Project Coordinator and MAST Core Team of Subject Matter Experts have completed the revisions to the curricula for both the **Advanced CNC and CAD/CAM Technology** and the **Automated Industrial Equipment/CIM Technology** MAST programs. Both of these programs will be presented to the San Diego City College Curriculum Committee on May 1, 1995 for review and approval.

A series of meetings has been scheduled with the Chair of the Engineering and Industrial Technology Department during the first week of April to review the curriculum, as revised, and finalize completion of all the documentation necessary to ensure compliance with any and all College, District and State requirements. The CACT-SD expects the revised curricula to be approved on May 1st, and is prepared to advertise and implement the field test/pilot programs in the Fall of '95.

II. Skills standards Verification

The Subject Matter Experts will complete the identification of skills and tasks for the **Advanced CNC and CAD/CAM Technology** and the **Automated Industrial Equipment/CIM Technology** programs by mid-April. These skills and tasks will be presented to focus groups comprised of industry representatives from small, mid-sized and large companies for each program area, and used to conduct the skills standards validation.

On March 24, 1995, the CACT hired an Independent Contractor to work with the MAST Project Coordinator to design and implement the skills standards validation process. The validation process includes conducting focus group meetings and compiling results to generate skill standards by company and program area. Focus group meetings will be conducted during April and May with the following desired outcomes:

- a. Verification of skills identified by Subject Matter Experts;
- b. Identification of additional duties and sub-tasks;
- c. Establish competency standards;
- d. Provide information on industry conditions, limitations and resources.

The CACT-SD will compile the information generated and validated by these focus groups to produce skill standards for each program by company and industry.

III. Contacts with Public School Partners

On March 20, 1995, the CACT-SD hosted the first of a series of meetings designed to introduce the **MAST Advanced CNC and CAD/CAM Technology** program to the Tech Prep program participants. The Tech Prep program is designed to develop smooth articulation from secondary to post-secondary schools. Representatives from all local programs in machining and machine technology at the secondary level attended the meeting and toured the CACT-SD Laboratories.

The topics discussed at the meeting included: sharing of information on Work-force needs within the local machine tool industry, career path options, overview of MAST program content and prerequisite skill levels. The school reps shared information on enrollments, popular specialty areas and areas of interest, and follow up on program graduates.

Articulation agreements were discussed, and it was agreed that they will need to be updated as a result of revisions to the MAST grant curricula. The agreements will be updated with each school individually, once the MAST program course outlines are

approved by the curriculum committee in May. The CACT-SD will provide detailed MAST Program course outlines with prerequisite specifications together with skill standards for review and validation by the high school, Regional Occupational Programs and Adult Education Center representatives at the next Tech Prep meeting.

The MAST Project Coordinator is planning another Tech Prep meeting with representatives from all local secondary programs in the manufacturing technology area to introduce the **MAST Automated Industrial Equipment/CIM Technology** program and discuss career path options and program prerequisite requirements. Articulation agreements will be developed with relevant secondary schools currently operating industrial technology programs. This meeting will be scheduled for the end of April.

The CACT-SD also met with representatives from San Diego State University (SDSU) and California State University at Los Angeles (Cal State LA) to discuss and begin developing articulation agreements to allow transfer of selected Machine and Manufacturing Technology courses taken at San Diego City College to these California State University campuses.

IV. NSF Grant Award Received in Support of MAST Program Pilot

The CACT-SD has been awarded an Instrumentation and Laboratory Improvement (ILI) grant by the National Science Foundation's Division of Undergraduate Education (DUE) to acquire selected machine tool components needed to upgrade the CAD/CAM lab for the CACT-SD's MAST Pilot program. Funds received from the grant will be used to purchase a 4th and 5th axes for the vertical Machining Center enabling students to both design and machine advanced CNC surface model programs requiring 4th and 5th axes movement for their production. These higher level CAD/CAM designs are required by industry for sophisticated biomed, biotech and electronics applications.

V. Planned Activities

The following activities are planned for both the **Advanced CNC and CAD/Cam Technology** and **Automated Industrial Equipment/CIM Technology** programs from April 1, 1995 through June 30, 1995:

1. Conduct skill standards validation/verification by the industry focus groups.
2. Compile results and generate skill standards reports for each participating company and for each program area.
3. Begin development of materials and detailed syllabi to support the validated skills standards and approved course outlines.

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

Summary: The project is progressing according to schedule. We are anticipating total disbursement of first years funds by 9-30-95.

I. Industrial Assessment:

- A survey was developed and distributed nation wide to 53 companies in the laser machining/processing industry. The survey included questions related to general company background, customer base, required skills standards, and willingness to participate in the pilot program. Also, each company was asked to provide feedback on the proposed ten (10) course curriculum and suggest equipment necessary to implement such a program. Of the 53 surveys solicited, we received 13 responses (25% returned). The results have been tabulated and are attached.
- Twelve New England based laser machining companies have been visited to date. Others may be visited as time progresses. In the course of our visits, we discovered that another application of lasers in manufacturing is currently being aggressively pursued, namely rapid prototyping. The two processes being used predominately are stereo lithography and powdered metal sintering. These methods are being used for just-in-time manufacturing as companies continue to shorten their time-to-market process. Also, these processes benefit companies involved in casting procurement by reducing or eliminating the cost of hard tooling. We are currently considering adding these applications to our industrial laser applications course.
- Company literature and information is being compiled and is continuing to be a source of understanding the exact nature of the laser machining industry and their training needs.
- After performing the industrial assessment, we have determined that one of the initial corporate partners, American Saw Mfg. Co., would be inappropriate due to the minimal use of laser technology when compared with the four other partners. Therefore, they have been eliminated as an industry partner.

II. Curriculum development:

- Sources of funding for laboratory equipment are continuing to be pursued through industry partnership and/or equipment consignment programs.
- Other existing short courses and seminars in laser machining and materials processing nation wide are continuing to be examined for content and comparison. To date we have only discovered one training seminar in laser machining, which is offered periodically by the University of Wisconsin at

Madison. This program, however, is a three day seminar taught by industry professionals and not a college credit or certificate program.

- DACUM materials are currently being reviewed to maintain standardization in the curriculum development process.
- Technical consultants have been contracted to develop syllabi and course materials for the program. A kick-off meeting was held with the consultants to discuss the overall grant objectives and their individual roles in the program.
- The pilot program teaching schedule was finalized and has been attached.

The following activities are being planned for the third quarter:

- Continuation of visits to New England based laser machining companies for assessment.
- Develop 2+2 articulation programs with area high school partners. The possibility of high school student participation in the pilot program will be pursued. Also, the possibility of expanding the school-to-work program to include the matriculation to the four year level has been discussed in detail with the University of Connecticut and other four year institutions with the ultimate goal of a 2+2+2 program in Engineering.
- Course Design & Development: Create course syllabi including suggested text and appropriate materials using the DACUM process.
- Develop incoming student assessment procedure for potential candidates of the pilot program.

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3380
<http://machinetool.tstc.edu/>

QUARTERLY REPORT: BY MORAIN VALLEY COMMUNITY COLLEGE MAST PROGRAM SUMMARY OF ACTIVITIES AND EVENTS: JANUARY 1, 1995 - MARCH 31, 1995

Major Meetings:

January 5

Used agenda at Industrial Faculty In service to discuss curriculum projects and determine target areas.

February 8-11

Used planned Workforce 2000 conference trip as opportunity to visit MAST partner college San Diego and review project status and approach in plant floor curricula.

February

Held series of meetings with MAST faculty on approach strategies and coordination.

February 17-18

Attended MAST planning session in Knoxville, TN and Oakridge, TN.

February 24

Project Directors attended DACUM Workshop

March

Working DACUM documents created by Publications Department for Job Duties and Task listing. Format set for later addition of textual material on front and back covers.

Meetings have been held and future ones are planned with each industrial area. Discussions have been held with Panduit Corporation, Andrew Corporation and Donson Machining concerning their involvement with on-the-job verification of tasks.

The regional area high school/college planning consortium, the Moraine Area Career System, has been approached for a revisit of articulation documents in target curricular areas.

Current Project Targets:

<u>Initial work centered on:</u>	<u>Curriculum</u>	<u>Specialist</u>
	Welding	James Greer
	Machinist	Robert Malis
	Design Drafting/CAD	Charles Bales

Second level targets:

Computer-Integrated-Manufacturing
Industrial Maintenance Mechanic

Current Time Lines:

Occupational Specialties	DACUM Completion	Initial Verification	Initial Publication	On-Site Verification Completion	Final Publication
Welding	5/1/95	6/15/95	6/15/95	8/30/95	9/30/95
Machinist	5/1/95	6/15/95	6/15/95	8/30/95	9/30/95
CAD	5/1/95	6/15/95	6/15/95	8/30/95	9/30/95
CIM	Dates.....	To.....	Be.....	Set.....
IMM	Dates.....	To.....	Be.....	Set.....

**Machine Tool Advanced Skills
Technology Program (MAST)**

3801 Campus Dr. Waco, Texas 76705
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**MAST QUARTERLY REPORT
PROGRAM SUMMARY OF ACTIVITIES AND EVENTS
APRIL, MAY, AND PROJECTED ACTIVITIES FOR
JUNE 1995**

To: Dr. Hugh K. Rogers
Dean of Instruction
Director: MAST Program

From: Wallace Pelton
Site Coordinator: MAST

Subject: MAST Quarterly Report: April, May, and Projected Activities for June 1995

Date: May 30, 1995

This MAST Quarterly Report includes the activities and events conducted by the MAST Office for April and May 1995 and the Projected Activities for June 1995. All activities are listed in chronological order.

ACTIVITIES/EVENTS: APRIL 1995

BELL HELICOPTER TEXTRON VISIT:

APRIL 5, 1995

Ms. Gretta Hecker, Video Production Assistant and crew, IDEAS Center, TSTC, visited Bell Helicopter Textron to film the video portion of VHS tape being prepared by the IDEAS Center.

M.E.T. VIDEO**APRIL 6, 1995**

Ms. Greta Hecker, Video Production Assistant and crew, IDEAS Center, TSTC shot video at Bell Helicopter Textron to be included in the M.E.T. video being produced through the IDEAS Center. Mr. Gray, MET Department Chair, was interviewed on film and video of the machine shop floor was also taken. Final production of the video is expected by the end of the month.

MIDWAY HIGH SCHOOL VISIT:**APRIL 6, 1995**

Dr. Hugh Rogers, Terry Sawma and Wallace Pelton were invited by Letha Hopkins, Assistant Principal of Midway High School to present an overview of the MAST Program to interested students. Opportunities for scholarship funding under the MAST Grant were outlined and Scholarship Applications were distributed to potential students. Approximately 40 students participated. Attendees names, addresses, and phone numbers were recorded for future follow-up. Appreciation letters were sent to Ms. Hopkins, Assistant Principal, and Mr. Don Taylor, Principal, Midway High School.

LETTERS: TECH-PREP**APRIL 7, 1995**

The Tech-Prep Professional Development Consortium and the Heart of Texas Tech-Prep Consortium Meeting was held on March 22, 1995 at TSTC, Waco. Dr. Rogers, Terry Sawma, and Wallace Pelton presented a brief overview of the MAST program objectives to the Secondary School attendees. Mast Program information letters, Student Interest Forms, and Student Scholarship Applications were mailed to twenty-four secondary high school participants on April 7, 1995. Copies of these letters are maintained in the MAST Office.

WACO HIGH SCHOOL VISIT:**APRIL 7, 1995**

Terry Sawma and Wallace Pelton were invited by Mr. Rick Caywood, Counselor, Waco High School, to make a presentation to interested students about the MAST Grant scholarship provisions and the Machinist Certificate Option under the Manufacturing Engineering Technology Curriculum. Approximately 24 students attended. Attendees names, addresses, and phone numbers were recorded for future follow-up. Opportunities for scholarship funding under the MAST Grant were outlined and Scholarship Applications were distributed to potential students. An appreciation letter was sent to Mr. Rick Caywood on April 26, 1995.

MAST/M.E.T. MEETING:**APRIL 7, 1995**

Wallace Pelton made a presentation to the Manufacturing Engineering Technology Faculty meeting. Wallace identified recent activities of the MAST Office Project, described the scholarship program, and answered questions from concerned faculty.

LETTERS: PROSPECTIVE STUDENTS:

APRIL 10, 1995

MAST Program Information letters and Scholarship Applications were mailed, by request, to seven students interested in applying for MAST scholarships in the Machinist program. Copy is on file in the MAST Office.

CACT: SAN DIEGO CITY COLLEGE

APRIL 10, 1995

Received copy of the Skill Standards for Automated Industrial Equipment/CIM Technician Program prepared by the Center for Applied Competitive Technologies (CACT). CACT expects to have the entire set of standards completed and ready for industry validation by April 17, 1995.

SCHOLARSHIP APPLICANT

APRIL 10, 1995

Wallace Pelton visited the Brown family in Lacy Lakeview to describe the MAST Scholarship program to Ralph Kruppa.

DEAN CARLISS HYDE: GENERAL STUDIES DIVISION

APRIL 10, 1995

Terry Sawma met with Dean Hyde to request SCANS Activities be identified for the academic courses required in the Machinist Certificate Option (MTH 115, PSY 112, ORI 102, and ENG 107). Dean Hyde supplied copies of each of the current course syllabi and a list of SCANS skills addressed in each of the academic courses. Dean Hyde will ask each of the faculty responsible for instruction in these courses to identify the specific SCANS activities and forward this information to Mr. Sawma for inclusion in the Course Syllabi under the MAST Grant, subject to approval by Dean Hyde.

SCHOLARSHIP APPLICATIONS RECEIVED:

APRIL 10, 1995

The MAST Office has received its first completed Scholarship Application for the Machining program. Scholarship files have been designated. A MAST Scholarship Application Review Committee will be established to identify policy guidelines for awarding scholarships to applicants. This committee shall review applications, interview candidates, rank candidates, and select all scholarship recipients by no later than June 1, 1995. Approved established policy along with criteria for scholarship awards shall be written and a copy faxed to all of the Design and Development Centers to standardize the process.

ITAWAMBA COMMUNITY COLLEGE**APRIL 10, 1995**

Don Benjamin, Associate Dean of Career Education/Project Administration Officer of Itawamba Community College, Tupelo, Mississippi called to request copy of the full MAST Grant Proposal and ask for assistance in preparing request for reimbursement through the MAST Grant. Since Dr. Rogers was out of town, I suggested he return the call at a later date

COURSE SYLLABI:**APRIL 11, 1995**

Complete course syllabi for MET 100, 200, 300, 400, 1103, 1603, 301, 2303, 2406 and WLT 105 are being written by Wallace Pelton. Industry driven competencies will be used when developing all course syllabi. All syllabi for any given quarter semester will be fully developed three months before the start of any given quarter. This time-frame will permit faculty members to design lecture and laboratory outlines in preparation for the pilot-testing of national curriculum standards. Terry Sawma has completed the course syllabi for ENG 107, PSY 112, MTH 105, AND ORI 102, with the exception of SCANS Activities. SCANS Activities will be provided by faculty members in the respective disciplines. After the integration of SCANS Activities into these courses and crosswalk preparation, all syllabi will be submitted to Dean Hyde for approval and ultimate inclusion in the MAST Program document.

HCC/UNIVERSITY OF HOUSTON FACULTY TOUR**APRIL 12, 1995**

Dr. John Hansen, U of H College of Technology, Mr. J. C. Neill, U of H College of Technology, Mr. Dick Triche, Houston Community College, and Dr. Jimmy Vu, Houston Community College visited TSTC and toured the facilities of MET, CNS, DDT, LET, and ELT.

EL PASO TRIP**APRIL 17-18, 1995**

Terry Sawma and Wallace Pelton flew out of Austin Airport to El Paso, Texas to meet with Dr. Terry Squier, Director of Advanced Technology Center, El Paso Community College. Dr. Squier provided a tour of the college's technology center facilities. Terry and Wallace visited with mold makers at Eureka, Foster Mold, Inc., D.J. Plastics, and El Paso Plastics to identify specific competencies for mold making. See "El Paso Community College and Industry Site Visit" (full) report dated April 19, 1995 memorandum to Dr. Hugh K. Rogers.

LETTERS OF APPRECIATION**APRIL 19, 1995**

Letters of appreciation were written and mailed to all industry practitioners interviewed and appropriate El Paso Community College faculty and staff.

COMPETENCY PROFILE: MOLD MAKING**APRIL 20-21, 1995**

Wallace Pelton prepared the draft copy of the Competency Profile and list of subtasks for Mold Making.

ALCOA COMPETENCY PROFILES: REVISED**APRIL 21, 1995**

Wallace Pelton revised the draft Competency Profiles reviewed by ALCOA and returned by Mike Vidrine for Machinist, Maintenance Mechanic, and Electrician. Final copy of the revised Competency Profiles will be sent to Mr. Vidrine with cover letter.

VISIT: MR. JOEY LLOYD, OAK RIDGE LABS**APRIL 24-26, 1995**

Mr Joey Lloyd, Machining Training Supervisor, Oak Ridge Labs, Knoxville, Tennessee arrived in Waco and was picked up at the airport by Wallace Pelton. He was provided a tour of the TSTC facilities in MET and IMM. The MAST program initiatives were discussed at length and he was given copy of MAST Presentation Folder. Mr. Lloyd was taken to his Hotel and was expected to go to Bell Helicopter Textron in Arlington, Texas with Dr. Rogers. Mr. Lloyd reviewed the Competency Profiles and Workplace Technical Competencies for CNC and Mold Making. He will be sending information on Sheetmetal and Tool and Die for our review. During his visit he was provided with a tour of Mercury Tool, Inc. Wallace drove him to the airport on April 26, 1995 for his return flight to Oakridge, TN.

TEXAS HIGHER EDUCATION COORDINATING BOARD**APRIL 24, 1995**

Terry Sawma made a visit to the Texas Higher Education Coordinating Board to obtain a copy of the Biotechnology Program Proposal (New and Revised) and "Texas Trends in Biotechnology prepared by CORD (Center for Occupational Research and Development)" at the request of Dr. Rogers.

MAST PRESENTATION FOLDERS**APRIL 24, 1995**

MAST personnel prepared " MAST Presentation Folders" that contain copy of all completed Competency Profiles and General Information about the MAST program for visitors.

MET VIDEO**APRIL 25, 1995**

The MET MAST Video has been completed by the IDEAS Center and will be available for review by the end of the week. Bell Helicopter Textron provided some footage and testimonials on Beta Cam.

TSTC MET/MACHINIST COMPETENCY PROFILES REVISED **APRIL 26, 1995**

Rose Mary Timmons completed the TSTC Competency Profiles for Machinist and Manufacturing Engineering Technology programs.

COMPETENCY PROFILE: MOLD MAKING **APRIL 26, 1995**

The Mold Making Competency Profile and subtask listing is completed and in its first draft form. Copies for review and comment have been sent to all the industry contact persons visited during the El Paso trip and to Dr. Squier and Mr. Larry Hartman of El Paso Community College.

IN PROCESS: COMPETENCY PROFILES **APRIL 26, 1995**

The MAST office is awaiting information form LASER Machining, Welding, Computer Networking and Instrumentation to complete the competency profiles and outlines for these speciality areas. The respective Department Chairs have indicated the requested information will be available by the end of April. Tom Reynolds has prepared some information on technical competencies for Sheetmetal and we are awaiting additional information from Oakridge, Tennessee via Joey Lloyd.

INVITATION: KILLEEN ISD **APRIL 26, 1995**

The mast office received an invitation from Mr. Edward Lindsey, vocational counselor, Killeen ISD to visit the Killeen Campus and present information about the MAST program to interested students. Wallace will make arrangements through Mr. Lindsey to visit their campus along with Terry Sawma before May 12, 1995.

CNC COMPETENCY PROFILE COMPLETED **APRIL 26, 1995**

The first draft of Competency Profiles and Technical Workplace Competencies for CNC are complete and ready for industry validation.

MOLD MAKING COMPETENCY PROFILES **APRIL 28, 1995**

The first draft of the mold making Competency Profile and Technical Workplace Competencies were mailed, as promised, to Dr. Squier, El Paso Community College and to the industry practitioners interviewed during the recent El Paso trip for comment and validation.

SCHOLARSHIP APPLICATIONS RECEIVED:**APRIL 30, 1995**

A total of four completed MAST Scholarship Applications have been received in the MAST office for the Machining Option for Fall 1995. A Scholarship Review Committee will be convened during May 1995 and will be composed of Dr. Botsford, Terry Sawma, Wallace Pelton and George Gray. This committee will review all applications and determine scholarship recipients.

ACTIVITIES/EVENTS: MAY 1995**ACADEMIC COURSE SYLLABI:****May 1, 1995**

Terry Sawma met with Ms. Margaret Kimball (Math), Mr. Michael Pierce (English), Ms. Sylvia Edwards-Borens (Psychology and Orientation), and Ms. Cecile Hollyfield (Integrated Digital Imaging), to identify specific SCANS activities for their respective courses required in the Machinist Certificate option. Once the specific SCANS activities are identified, the SCANS/Course Crosswalks will be updated and the syllabi for MTH 115, PSY 112, ENG 107, and ORI 102 will be updated to include SCANS activities. The Crosswalks and course syllabi will be reviewed by each of the academic faculty and by Dr. Carliss Hyde.

CENTER FOR APPLIED COMPETITIVE TECHNOLOGIES**May 1, 1995**

Wallace Pelton talked with Ms. Mary Bernard, San Diego City College MAST Site Coordinator, and outlined the industry interview process being conducted at TSTC. San Diego City College is preparing for industry validation of developed competency profiles of CNC Controls and Shop Floor Control Systems Applications, Computer Networking, and Advanced CNC Technology.

M.E.T. ADVISORY COMMITTEE MEETING**May 3, 1995**

Wallace Pelton presented an overview of the MAST objectives to members of the MET Advisory Committee. A motion was made to endorse the activities of the MAST program. MAST program officials were invited to Bowen Tool and Smith International, Houston, Texas.

CENTER FOR APPLIED COMPETITIVE TECHNOLOGIES**May 3, 1995**

Wallace Pelton spoke with Mr. Louis Spain, Consultant with San Diego City College, who is responsible for meeting with industrial partners to validate competency profiles. Mr. Spain asked questions about the industry interview protocol conducted at TSTC.

IVY TECH STATE COLLEGE**May 3, 1995**

Mr. Rod Alsman, Ivy Tech, called to speak with Wallace Pelton about the competencies for Superabrasives (Grinding) and the applications of the Machinist Handbook for this curriculum. The MAST office received syllabi from Indiana Vocational Technical College for Machinery Handbook (MTT 104), Abrasive Processes I (MTT 204), Abrasives Processes II (MTT 205), Aviation Technology 103, Aviation Technology 210, and Aircraft Maintenance Technology Course Descriptions .

INTEGRATED DIGITAL IMAGING**May 4, 1995**

Ms. Cecile Hollyfield and Terry Sawma met to discuss integrating SCANS Skills into the IDI curriculum. Ms. Hollyfield provided copies of available IDI course syllabi.

MAST VIDEO**May 5, 1995**

Ms. Jill Bachman, IDEAS Center, Dr. Hugh Rogers, and Terry Sawma reviewed the MAST video prepared by the IDEAS Center and identified sections of the video for editing. Dr. Rogers requested the revisions to the video be completed before the Tulsa MAST National Meeting. Ms. Bachman indicated that the editing could be completed before the May 21, 1995 date.

MAST PARTNERS LETTER**May 5, 1995**

Copies of MAST Monthly Reports were mailed to all MAST Design and Development Centers along with a cover letter requesting listing of Industrial Partners in preparation for the national survey.

MAST SURVEY**May 5, 1995**

Terry Sawma and Wallace Pelton met with Dr. Darlene Morris, Director of Institutional Research and Planning, to request assistance in developing the National Industry Survey, appropriate software for preparing the survey, and performing an analysis of the survey. Dr. Morris suggested the MAST project use the software available at the office of Institutional Research and Planning since purchase of the software and scanner would be cost-prohibitive. Dr. Morris and Mr. Fred Nelson suggested survey formats that would be appropriate and indicated that a draft survey could be ready for the National Meeting in Tulsa, Oklahoma.

MAST SURVEY**May 6, 1995**

Terry and Wallace prepared the draft survey questions and delivered copy to Mr. Fred Nelson. Mr. Nelson will enter the questions into the software package and prepare a draft survey for May 15, 1995 for our review. The survey should be ready for review by MAST partners at the Tulsa, Oklahoma meeting.

CENTER FOR APPLIED COMPETITIVE TECHNOLOGIES**May 8, 1995**

Terry Sawma spoke with Dr. Joan Stepsis, Dean/Director of San Diego City College CACT, about the draft survey to be presented at the Tulsa meeting. Copies of the survey questions were faxed to Dr. Stepsis and Mary Benard for their review and comments.

MAST SCHOLARSHIP APPLICATIONS**May 8, 1995**

Mr. Jeff Walker stopped by the office and received an application for the MAST Scholarship in Machining.

LA VEGA HIGH SCHOOL VISIT**May 9, 1995**

Wallace Pelton and Terry Sawma visited La Vega High School at the invitation of Ms. Rose, Mr. Walker, and Mr. Elliott to present information about the MAST program and scholarships to interested students. Student applications were given to interested participants at the close of the presentation. Dr. Rogers addressed the group as well.

KILLEEN HIGH SCHOOL**May 10, 1995**

Wallace Pelton visited Killeen High School and presented information about the MAST program, including available scholarships for the Machinist certificate option. He met with interested high school students in three separate sessions. Scholarship applications were distributed.

REED TOOL COMPANY, HOUSTON**May 11, 1995**

Dr. Rogers, Wallace Pelton and Terry Sawma conducted validation of Competency Profiles at Reed Tool Company, Inc. for Machinist, Tool and Die Maker, Industrial Maintenance Mechanic, Electrical Systems Technician, and CAD/CAM.

ACADEMIC COURSE SYLLABI

May 15, 1995

The MTH 115 course syllabus has been reviewed by Ms. Margaret Kimball. Minor changes have been entered and copy sent to Ms. Kimball and Dr. Hyde for final review.

APPRECIATION LETTERS

May 15, 1995

Appreciation letters were sent to Edward Lindsey, Vocational Counselor, Killeen High School, and Jack A. Wells, Director of Career and Technology Education, Killeen High School. Appreciation letter was sent to E.E. Strahan, Manager-Labor Relations, Reed Tool Company, Houston, Texas. An appreciation letter was also sent to Ms. Carolyn Rose, Counselor, La Vega High School for hosting members of the MAST Program on May 9, 1995.

SCHOLARSHIP APPLICATION UPDATE

May 15, 1995

Five MAST Scholarship Applications have been received to date. Wallace met with Shawn Walker, La Vega High School, and Hal Lynch to describe the available MAST scholarships.

ELECTRICAL SYSTEMS TECHNOLOGY

May 17, 1995

Terry Sawma met with Mr. Elton Stuckly, E.S.T., to review the Competency Profile and the Technical Workplace Competencies. Terry requested that "subtasks" be identified by Mr. Stuckly and the MAST office will prepare an updated "Profile" and Technical Workplace Competencies (Outline) for Electrical Systems Technology. Mr. Stuckly agreed to place one of his faculty members on this task during the Summer I semester.

MAST INTERVIEWS

May 17, 1995

At the request of Dr. Rogers, Wallace Pelton and Terry Sawma participated in employment interviews for the MAST positions for Project Coordinator and MAST Secretary. Several candidates were interviewed for the secretarial position while a single candidate was interviewed for the Project Coordinator position.

SCHOLARSHIP APPLICANT

May 19, 1995

Terry Sawma met with Mr. Ben Strot to describe the MAST Scholarship Program. Mr. Strot completed an application while in the office and was provided a tour of the Machine Shop.

CIM/HE CONFERENCE

May 21-24, 1995

Dr. Rogers, Wallace Pelton, and Terry Sawma left for Tulsa, Oklahoma for the CIM/HE 1995 Conference on Sunday, May 21, 1995. A meeting of the MAST Partners was called for Sunday, May 21, 1995 at 2:00 p.m. at the Doubletree Hotel. Dr. Rogers presented an overview of MAST activities to attendees. Terry Sawma and Wallace Pelton distributed copies of the "National Meeting MAST Partners Representative Project Documentation" and summarized the methodology, data collection protocol, Competency Profiles, Technical Workplace Competencies (Outlines), and presented the draft survey. Suggestions were made to improve the survey and will be incorporated into the second draft for further review. The second draft survey will be formatted this week through the office of Institutional Research and Planning.

COMPETENCY PROFILE COMMENTS/VALIDATION

May 24, 1995

Competency Profiles were returned from three practitioners of Eureka Vacuum Cleaners, El Paso, Texas for Mold Maker. Final copy will be sent to Eureka during the first week in June, 1995.

COMPETENCY PROFILES COMPLETED

May 25, 1995

Reed Tool Competency Profile drafts have been completed for the occupational specialities of CAD/CAM, Industrial Maintenance Mechanic, Tool and Dye Maker, Machinist, and Electrical Systems Technician. Copies were mailed to Reed Tool for validation on May 26, 1995.

MARTIN MARIETTA COMPETENCY PROFILES

May 30, 1995

The Martin Marietta Competency Profiles for Electrical Systems Technician, Electrician/Instrumentation, Instrumentation and Control Technician, Computer Integrated Manufacturing Technician, and Industrial Maintenance Mechanic are being prepared by the MAST office. Completed Competency profiles will be mailed during the week of June 10, 1995.

SAN DIEGO CACT COMPETENCY PROFILES

May 30, 1995

Competency Profiles and Outlines for Advanced CNC and Automated Industrial Equipment/CIM Technician are being prepared by the MAST office and will be mailed to Ms. Mary Benard, Site Coordinator at San Diego City College, as soon as completed.

NON-METALLICS COMPOSITES PROCESSING:

May 30, 1995

Non-Metallics Composites Processing Duties and Tasks statements were received from Mid-Florida Technical Institute, Orlando, Florida. A Competency Profile is being prepared by the MAST office for Non-Metallics Composites Processing.

LASER MACHINIST:

May 30, 1995

The Technical Workplace Competencies for Laser Machinist were received from Springfield Technical Community College. The MAST office will be formatting this information into a Competency Profile and Outline that identifies the Duties, Tasks, and Subtasks consistent with the MAST model.

SCHOLARSHIPS: MACHINIST

May 30, 1995

A total of twelve scholarship applications for the Manufacturing Engineering Technology Machinist Certificate option have been received by the MAST office. At the request of Dr. Rogers, the MAST office will notify each scholarship recipient. Letters of the award and conditions of the scholarship will be prepared by this office and mailed to all recipients during the month of June.

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3801 Campus Dr. Waco, Texas 76705
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ACTIVITIES AND PROJECTED ACTIVITIES: JUNE 1995

MAST SCHOLARSHIP RECIPIENTS NOTIFIED

June 1, 1995

All machinist certificate Scholarship recipients have been notified by phone and follow-up notification by mail. The terms of the scholarships, activities, and registration materials were included in the mailings. At this time we plan to have a reception for both the student scholarship recipients and their parents. Details are to be worked out during consultation with Dr. Rogers.

COMPETENCIES PROFILES/ CIM and CNC MACHINIST

June 2, 1995

At the request of the CACT Center at San Diego City College, Wallace Pelton prepared Competency Profiles for CNC Machinist and Automated Industrial Equipment/CIM Technician and E-mailed copy to the CACT, faxed copy, and mailed copy by overnight delivery. CACT partners will review, edit as necessary, and use these documents during industry visits.

TECHNICAL WORKPLACE COMPETENCIES: COMPOSITES

June 5, 1995

The Technical Workplace Competency (Outline) for Non-Metallics Composites Processing Technician was prepared by Terry Sawma. Subtasks have not been identified.

LETTERS

June 5, 1995

At the request of Dr. Rogers, Terry Sawma composed a letter to Carol Harper, Department Chair of Drafting and Design, requesting validation and assistance in identifying Tasks and Sub-tasks for CAD.

At the request of Dr. Rogers, Wallace Pelton sent a letter to Ms. Margaret Ann Hohly, Coordinator of Instructional Computing at Cerritos College, Norwalk, California, requesting Duties, Tasks, and Sub-tasks for Composite Technician

TECHNICAL WORKPLACE COMPETENCY OUTLINES

June 5-8, 1995

Technical Workplace Competency Outlines first drafts were completed for the occupational specialties for Sheet-Metal Mechanic, Laser Technicians, and Computer Networking. They are to be reviewed by faculty and administrators in their respective divisions for modification.

CIM/HE CONFERENCE FOLLOW-UP

June 5, 1995

At the CIM/HE Conference, Dr. Henry W. Kraebber, Jr., Associate Professor, Computer Integrated Manufacturing Technology, Purdue University, indicated an interest in the MAST Project. I have composed a letter to Dr. Kraebber asking him to review the materials, including the Competency Profile and Outline for CIM Technology and the second draft of the survey. This letter will be sent out of Dr. Roger's office. Dr. Kraebber received a copy of the "Representative Project Documentation" at the CIM/HE Conference. A copy of the second book, "Representative Project Documentation" version #2, will be sent to Dr. Kraebber when it is available.

LETTERS

June 5, 1995

Dr. William Brown, Director of Computer Integrated Manufacturing at Trident Technical College, Charleston, S.C., is also interested in the MAST Project and indicated his willingness to review the materials for CIM Technician. Dr. Brown received a copy of the "Representative Project Documentation" at the Tulsa meeting. A copy of the second "book" will be sent to Dr. Brown when it is available. I have composed a letter to Dr. Brown asking him to review the materials, including the Competency Profile and Outline for CIM Technology and the second draft of the survey, at the request of Dr. Rogers and it will be mailed out of Dr. Roger's office

At the request of Dr. Rogers, I composed a letter to Dr. James Weaver, Director, Advanced Manufacturing Technology Center (AMTEC), Augusta Technical Institute asking him to review the materials, including the Competency Profile and Outline for CIM Technology and the second draft of the survey. Dr. Brown will also receive a copy of the "Representative Project Documentation" v 1.0" which was distributed at the Tulsa Conference. A cover letter will describe the MAST methodology and data collection techniques. Request will be made for a list of AMTEC's Industrial Partners to be included in the national survey. These materials will be mailed to Dr. Brown out of Dr. Rogers' office.

At the request of Dr. Rogers, a letter will be drafted for his review and sent to Mr. Dick Graham, Director, NIST/Mid-America Manufacturing Technology Center, requesting a list of manufacturers in his area that may be appropriate to receive the national MAST survey.

A letter will be drafted by Dr. Rogers expressing appreciation of the TSTC MAST office for their review of the draft survey and other representative documentation and mailed to all the MAST partners. Request will be made for all industrial partners listings and explain the plan for all survey mailings to be made from the MAST TSTC, Waco office. The Survey is expected to be mailed during mid-July.

MAST STAFF MEETING

June 7, 1995

Dr. Rogers, Dr. Botsford, Mr. Sawma, Mr. Pelton, and Mr. Penick met to discuss the strategies for subtask identification in specific occupational specialties.

NATIONAL SURVEY, DRAFT #2 COMPLETED

June 7, 1995

The second draft of the national survey is completed and will be included in Project Documentation, version #2 for distribution to all MAST partners and other appropriate persons for review and comment.

COMPETENCY PROFILE/OUTLINE INVENTORY

June 8, 1995

The MAST office composed a current Competency Profile/Outline Inventory which identifies completed products of the office by occupational speciality.

PROJECT DOCUMENTATION BOOK 2

June 8, 1995

A second "Representative Project Documentation" v 2.0 is being prepared by the MAST office and will be completed by June 16, 1995. Tentatively, this second draft will include additional materials, including technical and academic course syllabi, revised survey, updated Technical Workplace Competencies and SCANS crosswalks, Machinist Curriculum Outline and course descriptions, and updated Competency Profiles from all MAST Partners .

LOCKHEED MARTIN COMPETENCY PROFILES

June 8, 1995

Competency Profiles have been completed for Lockheed Martin in the occupational specialties of Machinist, CNC, CIM, MET, ELT, EST/INT, INT, and IMM. The Competency Profile for Welding is being prepared by Mr. Joe Penick and will be complete by early June for review and validation.

PROJECT METHODOLOGY NARRATIVE REVISED

June 9, 1995

Terry Sawma, at the request of Dr. Rogers, revised the Project Methodology Narrative for inclusion into the Project Documentation Book #2.

COMPETENCY PROFILE: WELDING**June 12, 1995**

Mr. Joe Penick has completed the first draft of the Welding Competency Profile and Technical Workplace Competencies for review by the Welding Department. Rose Mary Timmons prepared the Competency Profile using PageMaker software.

COMPETENCY PROFILE: SUPERABRASIVES**June 12, 1995**

Mr. Joe Penick met with Mr. Rufus Lamere to begin identifying the Duties, Tasks, and Sub-tasks for Superabrasives Technician.

COURSE SYLLABI COMPLETED**June 12, 1995**

Course Syllabi, including SCANS, have been completed for all courses in the Manufacturing Engineering Technology Machine Certificate Option for the first quarter and are to be submitted to the Department Chair, Assistant Dean and Dean of Instruction for approval. Course syllabi include MET 100, MET 1103, MET 1603, PSYC 1100, and MTH 115.

Course Syllabi, including SCANS, have been completed for the academic courses of PSY 112 and ENG 107. The MAST office is preparing course syllabi for all courses in the second quarter for the Machining Certificate option including MET 200, ENG 107, WLT 105, and PSY 112.

MAST OFFICE ORIENTATION: LADEAN PHILLIPS**June 12, 1995**

Ms. Rose Mary Timmons briefed the MAST Senior Secretary, Ms. Ladean Phillips, on MAST activities, documentation, hard drive storage, software, etc.

PROJECT DOCUMENTATION BOOK 2 COMPLETED**June 13, 1995**

The MAST office completed the second version of the MAST Project Documentation Book for distribution as determined by Dr. Rogers.

PROJECTED ACTIVITIES FOR JUNE 1995

NCATC MEETING, BETHLEHEM, PENNSYLVANIA

Dr. Rogers will be attending the NCATC meeting in Bethlehem, Pennsylvania June 22-24, 1995. He will make formal presentation to NCATC participants on both June 21 and June 22, 1995 identifying the activities of the MAST partners, goals, purpose, and status of deliverables.

NETWORK TO BE ESTABLISHED

A networking system will be set up between all MAST partners and affiliates to facilitate rapid communication and correspondence between the MAST members. The establishment of this network should be complete during June, 1995.

ADDITIONAL INDUSTRY SITE VISITS PLANNED

Industry visits are being planned through the Office of the Project Director to Stewart & Stevenson Services, Inc., Houston, Texas; Chrysler Technologies, Waco, Texas; Aviall, Arlington, Texas; and IBM. Additional industry visits are in the planning stages for computer manufacturers in the Austin area and are being arranged by Dr. Rogers.

SCANS ACTIVITIES: ACADEMIC COURSE SYLLABI

SCANS activities have been identified for the general academic courses required in the Machinist Certificate option and infused into the course syllabi of MTH 115, PSY 112, and PSYC 1100 and are awaiting department and division review and approval. Once the department and division approve all SCANS activities the SCANS/Course Crosswalk will be updated and a sample course syllabus will be included in the "Representative Project Documentation" version #2.

Work is continuing in the following areas to complete Competency Profiles and Technical Workplace Competencies:

- Computer Networking
- Welding
- Instrumentation
- Sheetmetal
- Composites
- Laser Machining

An additional MAST Secretary will obtain a list of all 1995 High School Graduates and prepare a recruiting mail-out describing the MAST scholarship program at TSTC.

The MAST Project Coordinator, Mr. Joseph Penick, was employed beginning June 2, 1995. The addition of a MAST Secretary will compliment the activities of this office. Interviews for the MAST Secretary position continue.

A data base of industries to be surveyed will be prepared for the survey mailings expected in July 1995. We await Industry names, contact person(s) title (s), addresses, and occupational specialities from each of the MAST partners.

Additional activities conducted through the MAST office that are not foreseen at this time will be identified in the June report at the end of June 1995.

Prepared by:



Wallace Pelton
Site Coordinator: MAST Program

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3380
<http://machinetool.tstc.edu/>

QUARTERLY REPORT: BY MORAIN VALLEY COMMUNITY COLLEGE MAST PROGRAM SUMMARY OF ACTIVITIES AND EVENTS: APRIL 1, 1995 - JUNE 30, 1995

Major Meetings:

April 1 - June 30

Series of meetings held with faculty consultants on each draft phase of task and duty lists.

April 20

Meeting was held with Bimba Manufacturing concerning apprenticeships and the MAST project.

May 25, 1995

Meeting was held concerning the CIM workcell and its improvement to support the changes in the curriculum to support the MAST projects of Machinist, Maintenance Mechanic, and Shop Floor/PLC Controls.

May 22, 1995

Participated in MAST dissemination project at the annual Computer-Integrated-Manufacturing in Higher Education conference in Tulsa, OK.

June 22, 1995

Participated in major MAST dissemination project at the National Coalition of Advanced Technology Centers national meeting in Bethlehem, PA.

June 27, 1995

Meeting was held with McCain Manufacturing to discuss machinist apprenticeship in relation to the MAST project.

Current Project Targets:

Current work centered on:

Curriculum
Welding
Machinist

Specialist
James Greer
Robert Malis

Second level targets:

Computer-Integrated-Manufacturing
 Industrial Maintenance Mechanic
 Shop Floor Control/PLC

Robert Malis
 Robert Malis
 Alex Johansson

The time frame on the second level targets will be enhanced to assure that they are completed in the first project year.

Current Time Lines:

Occupational Specialties	DACUM Completion	Initial Verification	Final Verification	On-Site Verification Completion	Final Publication
Welding	5/1/95	Done	8/1/95	8/30/95	*9/30/95
Machinist	5/1/95	Done	8/1/95	8/30/95	*9/30/95
DFT/CAD	5/1/95	Done	8/1/95	8/30/95	*9/30/95
CIM	8/1/95	9/1/95	9/15/95	9/30/95	10/15/95
IMM	8/1/95	9/1/95	9/15/95	9/30/95	10/15/95
PLC	8/1/95	9/1/95	9/15/95	9/30/95	10/15/95

*Interim publication of the DACUM grids set for 7/20/95. They go to our Publications Office on Tuesday, 7/11. They will be mailed to TSTC-Waco as soon shortly after 7/20.

**Machine Tool Advanced Skills
Technology Program (MAST)**

3801 Campus Dr. Waco, Texas 76705
817/867-3526 FAX: 817/867-3221



**QUARTERLY REPORT:
MAST Program Summary of Activities and Events
July 1, 1995 - September 30, 1995**

Submitted to:
Dr. Jackie Friederich, Education Research Analyst
Ms. Marie Clear Buker, Education Programs Specialist
United States Department of Education
330 C. Street
S.W. Mary Switzer Building
Room 4522
Washington, D.C. 20202
D.O.E. # V199J40008

The status of the MAST project with respect to the stated goals are as follows:

▶ **Industrial Assessment:**

MAST project personnel are completing the final phase of an industry-wide assessment of the machine tool and related technologies to define the technical workplace competencies for each of the occupational specialities. Competency Profiles will be completed by all partner colleges by November 30, 1995 for each of the occupational specialities. Texas State Technical College has prepared draft industry survey forms and a national mailing list that will be presented to the partners at the October meeting for review. Industry survey forms will be mailed to participating industries in Texas for validation/comment during October 1995.

▶ **Curriculum Development:**

The curriculum model in Machining Technology is in draft form and will be delivered to MAST partner colleges at a national meeting in Chicago on October 10-11, 1995. This is the draft Book #4 of a 15 volume set (Volume #4 is enclosed). Each partner has been assigned as the lead institution for specific occupational specialities and will prepare their draft curricula by January 31, 1996. The MAST Steering Committee meeting will review these draft curricula during April 1996. The curriculum model includes all course syllabi, technical workplace competencies/course crosswalk, SCANS/course crosswalks, complete outlines with Duties, Tasks and subtasks, and competency profiles.

▶ **Pilot Program:**

Twenty five students have been enrolled in the Manufacturing Engineering Technology Machinist's Certificate program at Texas State Technical College during August 7-11, 1995. Each partner college has enrolled students in their pilot programs during the Fall 1995 semester. Evaluation of the curricula content and effectiveness will be conducted at each lead partner college for their assigned speciality.

▶ **Student Assessment:**

All Machinist Certificate students will be assessed for entry level skills and competencies (pre-test) during October 1995. The assessment tool is being developed by MAST project personnel. At the completion of the certificate, each student will be given a post-test to evaluate skill competencies.

▶ **Project Deliverables:**

The Project Deliverables Gantt Chart (time line) is enclosed.

A draft video, describing the goals of the MAST program has been prepared. Partner colleges will be reviewing the video. The final video will include footage from each partner college and their industry partners. It will also include a description and discussion of each of the deliverable products and how to obtain copies.

The MAST Internet Home page is being built and includes information about the MAST project, partner colleges and Design and Development Centers, detailed course syllabi for all occupational specialties, SCANS/Course Crosswalks, expected Exit Level proficiencies, Technical Workplace Competencies/Course crosswalks, and industry surveys.

During the next quarter, MAST personnel will participate in a number of national meetings and symposiums as follows:

- ▶ Texas Association of Schools of Engineering Technology (TASET) on September 28-29, 1995 in Houston, Texas.
- ▶ NCATC meeting in San Diego, CA. Five separate MAST briefs on November 15-18, 1995.
- ▶ AVA meeting in Denver CO. on December 1-5, 1995. MAST presentation and symposium.
- ▶ Provided booklet for the National Alliance for Business meeting in Washington, D.C. on October 12-13, 1995.


Joe Penick
MAST Project Director

Enclosures:

1. Activity of Events: July, August, and September, 1995
2. Deliverables Time line (Gantt Chart)
3. Draft Deliverables Format
4. Volume # 4 of Draft Deliverables
5. Booklet for National Alliance for Business, October 12-13, 1995
6. Agenda Book for October 10-11, 1995 Partners' Meeting, Chicago, IL.
7. TASET Agenda
8. Texas Survey
 - Survey Card
 - Cover Letter
 - Texas Mailing List
9. Manufacturing Engineering Technology Advisory Committee, Reed Tool Company, October 3, 1995

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705

817/867-4849 FAX: 817/867-3380

<http://machinetool.tstc.edu/>

QUARTERLY REPORT BY AUGUSTA TECHNICAL INSTITUTE MAST PROGRAM SUMMARY OF ACTIVITIES AND EVENTS: JULY 1, 1995 - SEPTEMBER 30, 1995

Contacts and Consultations

- Attended NCATC Conference in Bethlehem, PA.
- Plan to test CNC course with local industries as part of remote site training module development.
- Visited Piedmont Technical College.
- Site selected to test CNC course with a specific industry in local area.
- Received information gained from GA State Youth Apprenticeship Conference in Atlanta recently.
- Working with local industrial plant using Flexible Machining Centers.
- Continue to collect skill validations from industry.
- Visited Aiken Technical College.
- Preparing for fall semester with local high schools and technical colleges.
- Working with local industrial plant in setting up a youth apprenticeship program.
- Visited the following industrial facilities: FMC, Thermal Ceramics, Jarvis Cutting Tools, R.E. Phelon, Thermal King, Brunner, Defiance Products, Greenfield, Automatic Switch Company, Alerich Machining, Club Car, Velux, EZ Go Textron, Richmond Machining, Milliken, Fulghum Industries, Davis Machinery, Greenwood Mills and Kaiser Aluminum.

- Continue to work with Quick Start personnel.
- Produce brochure describing a condensed profile of MAST from a local point of view.
- Continue to work with Special Schools personnel.
- Began distribution of brochure to industry and high schools.
- Compiling occupational competency profiles from industries.
- Continue to work with assessment personnel and Piedmont Technical College.
- Continue to serve on Columbia County Vocational Advisory Committee.
- Continue to collect industrial assessment materials from industry and post-secondary education.
- Continue to collect school to work materials.
- Planning pilot program.
- Planning course outlines.
- Continue to work with school to work personnel at PTC.
- Continue review of technical skills and competencies presently taught.
- Continue to work with Tech Prep personnel at PTC.
- Shared Program Guide and Program Standard with PTC.
- Continue to work with Tech Prep personnel at ATC.
- Shared Program Guide and Program Standard with ATC.
- Use advisory committee for Machinist Program at ATI as SME's for MAST.
- Continue to build reference materials.
- Use advisory committee for Machinist Technology Program at PTC as SME's for MAST.
- Secured comprehensive list of courses for ATC.
- Use advisory committee for Machinist Technology Program at ATC as SME's for MAST.
- Continue to build reference materials.

- Sharing Information Tools for Industry publication from STC with industrial partners.
- Secured comprehensive lists of course offerings for PTC.
- Work with FAMS project in high school and correlate to MAST.
- Using Texas State Technical College guide for skill assessment.
- Produced brochure for PTC and MAST.

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3880



QUARTERLY REPORT: MAST Program Summary of Activities and Events October 1, 1995 - December 31, 1995

Submitted to:
Dr. Jackie Friederich, Education Research Analyst
Ms. Marie Clear Buker, Education Programs Specialist
United States Department of Education
330 C. Street
S.W. Mary Switzer Building
Room 4522
Washington, D.C. 20202
D.O.E. # V199J40008

The status of the MAST project with respect to the stated goals are as follows:

▶ **Industrial Assessment:**

MAST project personnel are completing the final phase of the industry-wide assessment of skills for each of the fifteen occupational specialty areas which are under investigation. Most Competency Profiles have been completed and are ready for final (National survey) validation. The TSTC project staff has completed the Texas survey and is now preparing to mail out survey forms for the National survey. Survey forms will be mailed to participating industries for validation/comment during January-February 1996.

▶ **Curriculum Development:**

Work is nearing completion on all documentation for the advanced specialty areas specified in the grant. Many deliverables are now in the final edit process. Emphasis is shifting to other project deliverables (remote site training modules, career orientation modules, etc.) Examples have been prepared for MAST partner colleges to be reviewed at a national meeting in Chicago on January 18-19, 1996. Partners will be instructed as to required formats and due dates for all deliverables. Deliverables must be received at TSTC for final edit/formatting/dissemination during the first quarter of 1996. The MAST Steering Committee meeting will review these draft curricula during April 1996. Final printing and dissemination will commence shortly thereafter.

▶ **Pilot Program:**

Of the twenty five students who enrolled in the Manufacturing Engineering Technology Machinist's Certificate program at TSTC, only one failed to return for the Winter quarter. Partner colleges have been awarded three equivalent scholarships (total value \$6000.00/each college) for use in their pilot programs to assist with student tuition and books. Evaluation of the curricula content and effectiveness is ongoing at each partner college. Pilot program narratives will be included in deliverables books. This narrative will describe the pilot program recruitment efforts, student population make-up, results of entry and exit level testing, attrition rate, and job placement information.

▶ **Student Assessment:**

All MAST students have been assessed for entry level skills and competencies. The assessment tool was provided, in some cases, by Career Orientation and Placement staff personnel on campus. Some partner colleges used tests which were prepared by faculty. At the completion of the course of study, each student will be given a post-test to evaluate skill competencies.

► **Project Deliverables:**

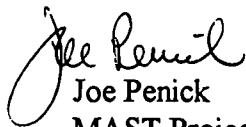
A revised Project Deliverables Gantt Chart (time line) is enclosed. There are no time extensions or deletions to the revised edition. The revision represents added detail.

A copy of the Deliverables book which was given to the partners as a reference is included with this report.

The MAST Internet Home page is up and running (<http://machinetool.tstc.edu>) and includes information about the MAST project, partner colleges and Design and Development Centers, detailed course syllabi for all occupational specialities, SCANS/Course Crosswalks, expected Exit Level proficiencies, Technical Workplace Competencies/Course crosswalks, and industry surveys. As information comes in from each of the partners it is entered onto the system. This process will take some time to complete.

MAST personnel made presentations at a number of national meetings and symposiums during this quarter. MAST materials were prepared for distribution at each meeting, as needed. The meetings were as follows:

- Advisory Committee - La Vega High School, Bellmead, Texas on Oct. 17, 1995.
- Manufacturing Engineering Technology (TSTC) faculty meeting - Waco, Texas on Oct. 23, 1995.
- National Coalition of Advanced Technology Centers (NCATC) at San Diego City College, San Diego, California on Nov. 16-17, 1995. MAST had six presentations at this conference.
- American Vocational Association (AVA) meeting in Denver, Colorado on Dec. 3, 1995.
- National Skill Standards Program Directors Meeting in Washington D.C. on Nov. 20-21, 1995.
- National Tooling and Machine Association (NTMA) and National Institute of Metalworking Skills (NIMS) meetings on skills standards in Fort Washington, Maryland on Dec. 11, 1995.



Joe Penick
MAST Project Director

Enclosures:

1. Deliverables Time line (Gantt Chart)
2. Agenda Book for Partners' Meeting January 19, 1996

MAST Deliverables Scheduled

	Dec 95	Jan 96	Feb 96	Mar 96	Apr 96	May 96	Jun 96	Jul 96	Aug 96
TSTC 1. Collate Texas Survey									
TSTC 2. Mail National Survey									
TSTC 3. Collate National Survey									
ALL 4. Partner Speciality Books, Volumes 3-14									
CATC 5. Executive Summary, Volume 1									
TSTC 6. Remediation & General Education, Volumes 2 & 15									
ALL 7. Remote Site Training Package (1 per site)									
ALL 8. Career Enhancement Outline (tours)									
ALL 9. Regional MAST Video (1 per site)									
TSTC 10. National MAST Video									
ALL 11. Joint Review of Deliverables									
ALL 12. National Partner Meeting-Review Deliverables									
TSTC 13. Steering Committee Meeting									
14. Prepare Administrative Book									
15. Publish Deliverables									196
16. Disseminate Deliverables									

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3880



QUARTERLY REPORT: MAST Program Summary of Activities and Events January 1, 1996 - March 31, 1996

Submitted to:
Dr. Jackie Friederich, Education Research Analyst
Ms. Marie Clear Buker, Education Programs Specialist
United States Department of Education
330 C. Street
S.W. Mary Switzer Building
Room 4522
Washington, D.C. 20202
D.O.E. # V199J40008

The status of the MAST project with respect to the stated goals follows:

▶ **Industrial Assessment:**

MAST project personnel are completing the final phase of the industry-wide assessment of skills for each of the fifteen occupational specialty areas which are under investigation. The national survey has been completed. Over 3,000 companies were contacted with over 800 agreeing to participate. Statistical analysis confirms that the duties and tasks which had been identified during the industry visits and included in the pilot curricula were right on target.

▶ **Curriculum Development:**

Most curriculum research and development has been completed as shown on the MAST deliverables schedule. However, some course revisions are still being made when the national survey and the pilot programs dictate changes. Most curricula is now in its final format and being readied for final deliverables dissemination. MAST personnel expect to continue to revise and update MAST materials until the last volume is sent to the printers for final printing. As of this date, 8 of the 15 volumes have been completed in full draft form and sent to print.

Plans are being considered by Texas State Technical College to maintain and update the MAST information which has been placed on the internet. This will take some effort and expense but the college feels that it would be well worth the effort to continue the work of the MAST project and keep the internet site current with information regarding skills standards and curriculum development. The college will cover the expenses in this area.

▶ **Pilot Program:**

Twenty-five students were initially enrolled in the Manufacturing Engineering Technology Machinist's Certificate program at TSTC. At this time, the number of students is 21. All are doing well and expected to finish the program. Students will be post-tested during the month of June 1996 in order to include the results/evaluation of the pre- and post-tests in the project deliverables along with the final conclusions and analysis of the pilot program. Evaluation of the curricula content and effectiveness is still in progress; however, most curriculum materials have been finalized. Pilot program narratives have been written by each of the development centers and will be included in deliverables books. This narrative describes the pilot program recruitment efforts, student population make-up, results of entry and exit level testing, attrition rate, and job placement information (when available).

▶ **Student Assessment:**

All MAST students have been assessed for entry level skills and competencies. Students were pre-tested with a general mechanical knowledge test which covered areas such as hand and machine tool operation. As expected, the scores were fairly low (average score was 22.8%). We are expecting scores to be much higher at the end of the program. Copies of the test(s) and test results/analysis will be included in the project deliverables.

▶ **Project Deliverables:**

Work is progressing according to schedule on all project deliverables. A revised Project Deliverables Gantt Chart (time line) is enclosed in the attached notebook at Tab B. There are no time extensions or deletions to the revised edition. The revision represents added detail.

Work has begun on first edit of all MAST deliverables. Partners have submitted their materials to TSTC for final edit/formatting. Final decisions as to format, appearance, etc. have been determined and all material is being formatted to conform to the MAST standard and 15-volume set of project deliverables. The MAST development centers will review the "first cut" of the entire 15-volume set of materials on April 24, 1996 in Orlando, Florida. This last partners session is being hosted by Dr. Rogers and Central Florida Community College. Development centers will have 30 days to review all materials and submit changes/revisions to TSTC. All 15 volumes will be final edited during the months of May and June 1996. A set of materials will be presented to DOE during the month of June 1996 for their review. The MAST Steering Committee will review these materials in a July 1996 meeting. Final printing and dissemination will commence shortly thereafter.

Work is nearing completion on the MAST Internet Home page. Information which has been placed on the internet includes information about the MAST project, partner colleges and Design and Development Centers, detailed course syllabi for all occupational specialities, SCANS/Course Crosswalks, expected Exit Level proficiencies, Technical Workplace Competencies/Course crosswalks, and industry surveys. The internet address is <http://machinetool.tstc.edu>.

Respectfully submitted by,



Joe Penick
MAST Project Director

Enclosures: Winter Parter Development Center Meeting Notebook

Machine Tool Advanced Skills Technology Program (MAST)

3801 Campus Dr. Waco, Texas 76705
817/867-4849 FAX: 817/867-3380
<http://machinetool.tstc.edu/>

Progress Report for MAST Program Laser Machining Component BY SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

Progress report for second quarter ending March 31, 1996. The following progress has been accomplished:

1. Industrial Assessment:

- All tasks completed.

2. Curriculum development:

- Sources of funding for laboratory equipment are continuing to be pursued through two NSF-ILI grant proposals, industry partnership and/or equipment consignment programs. The NSF-ILI proposals were submitted November 14, 1995. We have not heard the outcome of these grants as of March 31, 1996.
- The competency profile for Modern Optics was revised. This revision expanded the three main tasks into eleven. This will allow for a smoother flow into the MASTER Technical Module format. The Sub-tasks were modified to reflect these changes.
- All syllabi for the laser machining component were reviewed and modified to include SCANS proficiency profiles and data.
- A resource library for Laser Machining is currently being assembled. The major source for materials is The Laser Institute of America (LIA). Materials include the latest texts, journals, and videos on laser machining, laser safety, materials processing, rapid prototyping, and related subjects. The resource library will be housed in the Engineering Technology Division of STCC.

3. Pilot Program

- The pilot program is progressing on schedule. To date, eight (8) courses have been completed with favorable reviews.
- Two field trips were taken to local laser materials processing companies. On Feb. 7th, the

class visited Trumpf Laser in Farmington, CT. Paul Salvo, Director of Marketing, performed a presentation which detailed laser design and materials processing considerations. He also explained and demonstrated Trumpf's product line. A plant tour followed, in which the class was able to see a variety of laser machining applications.

- On April 4th, the class visited Laser Services, Inc. in Westford, MA. Bruce Beauchesne, President, conducted a tour of his laser job shop including the laser machining of ceramics, paper, and various metals using several different types of lasers.

4. Student Assessment

- Pre and Post tests were given for each of the eight courses and will continue for the remaining two courses. Results have been favorable.

5. Program Deliverables

- Laser Machining will constitute Volume 13 of the final MAST-bound deliverables. This volume is currently being finalized.
- The questions posed by Carson Berglund have been completed and forwarded. These responses will be included in the Forward section of the final MAST Project deliverable.
- A remote site training module was completed. This module was for the Refraction at Plane Interfaces segment of Apply Concepts of Modern Optics.
- A MAST promotional video for laser machining is currently being completed. This video will include program information, interviews with STCC alumni and employers, STCC current students, and Department Chairmen. Video clips of laser machining activities will be edited into the production for enhanced effect.
- A career day in Manufacturing Technology is currently being planned for May 14, 1996. This day is part of Manufacturers week as designated by the Governor of Massachusetts (May 13 - 17). This career day will involve approximately 300 high school students, sixteen high-tech manufacturing firms, and eight colleges and universities.

The following activities are being planned for the third quarter:

- Continuation of the pilot program including pre and post testing and course evaluations.
- Development of the resource library will continue. Other sources for materials will be pursued including The Society of Manufacturing Engineers (SME), Institute of Electrical and Electronic Engineers (IEEE), the Optical Society of America (OSA), and International Society of Optical Engineering (SPIE).
- Completion of the MAST video.
- Planning and completion of the May 14th career day.
- Finalization of the first draft of Volume 13 will continue.

MAST ON THE INTERNET

ON LINE RESOURCES AND TOOLS AVAILABLE THROUGH INDUSTRY AND ORGANIZATIONS

Texas State Technical College has an established, excellent working relationship with the members of the National Coalition of Advanced Technology Centers. These relationships enabled the College to determine the on-line resources and tools available in industry and through organizations with common areas of interest.

TSTC has a complete campus wide area network running on a Fiber Distributed Data Interface (FDDI) backbone. This Wide Area Network integrates many types of computing platforms. The Campus Area Network is composed of FDDI (100Mbps) for the Campus Wide Backbone and over 50 Separate Ethernets (10 Mbps) supporting instructional labs and administrative offices. TSTC also is connected to the Internet via a T1 (1.544 Mbps) digital data line to the Texas Higher Education Network (THEnet) operated by the University of Texas System Telecommunications Office. The campus area network is multi protocol using TCP/IP, Novell IPK, and AppleTalk. The experience of the faculty and staff gained through use of the Internet enabled the staff to supply the deliverables for this project.

Research was conducted via mail and telephone to determine beneficial on-line resources and tools available in industry and through organizations with common areas of interest. In addition to the on-line resources and points of contact, the MAST curriculum is located via the Home Page. Example MAST Internet is attached.

The MAST Home Page address is <http://machinetool.tstc.edu>.

October 26, 1995

Contact Person
Business or Industry Address

Dear-----.

The National Coalition of Advanced Technology Centers (NCATC) has as its mission to promote the infusion of proven advanced technology in American industries through community and technical colleges. The Coalition specifically functions as a network of mutual support to help Advanced Technology Centers (ATC's) achieve their fullest potential as mechanisms for technology application, education, and training. In addition, it provides access to planning and development resources required to launch new ATC's as well as opportunities for other organizations to participate in its workshops, conferences, and activities. The Coalition sponsors an official liaison to the National Institute of Standards and Technology (NIST) to serve as a guest researcher and advisor to the federal government on workforce issues.

Texas State Technical College, along with five other community and technical colleges across the United States, has been awarded a Technology Reinvestment Project (TRP) grant by the National Coalition of Advanced Technology Centers (NCATC) in conjunction with the Center for Occupational Research and Development (CORD) to create an Internet resource for the machine-tool, precision manufacturing, and metals related industries. This Internet resource, available to business and industry, will be a "linkage" of on-line information with databases detailing available training resources; surplus, new, and used industrial equipment and machinery available; advanced technology machine tools in development; a manufacturers database with sources of products, services, suppliers, fabricators, repair facilities, and other types of services to industry both domestic and international.

Texas State Technical College has conducted an Internet search to identify these resources and is creating an Internet Home Page for business and industry to access this information. This Internet information will be an invaluable resource to American industry and technology educators.

The purpose of this letter is to ask for your assistance in identifying additional resources which may be available and be considered for inclusion into the Internet Machine-Tool Linkage project. Please take a moment of your valuable time to complete the enclosed postage pre-paid survey card. In return, once the Internet Linkage project is complete, I will send you the Internet address so you can easily access this important information. Thank you.

Appreciatively,

Terry Sawma
Texas State Technical College

Machine Tool & Precision Manufacturing Technology Curriculum Research

Texas State Technical College - Waco, Texas

MAST Program...

MAST is a Department Of Education grant to develop and demonstrate a national training model for new technologies and manufacturing processes for precision manufacturing and the machine tool industries.

MASTER Program...

MASTER is a National Science Foundation grant to develop the educational resources necessary for implementing the national training model for new technologies and manufacturing processes for precision manufacturing and the machine tool industries.

Related Machine Tool Links...

Specific "non-commercial sites" pertaining to machine tool technologies.

This site made possible through two (2) TRP (Technology Reinvestment Project) grants awarded by:

*the National Coalition of Advanced Technology Centers (NCATC)
and Center for Occupational Research and Development (CORD).*

WEB SOURCE says that you are visitor number **2405**

Send comments to:

Wallace Pelton

Last Updated 7-1-96

Machine Tool Advanced Skills Curriculum Project

<u>Grant Methodologies</u>	<u>Key Partners</u>
<u>The Survey</u>	<u>Competency Profiles</u>
<u>Project Deliverables</u>	

-
- What is this all about?
 - Who should participate as partners?
 - Why is there a need for this project?
 - Problems confronting industry
 - Issues to be addressed
 - Key Goals of this project
-

What is this all about?

Skills standards research and development comes from a conviction that technology and market changes have caused significant modifications in the types of skills and behaviors needed by workers on the job. This conviction has motivated a broad education reform movement that involves changes in curriculum and pedagogy and seeks to tie education more closely to the emerging needs of the workplace. Industry-based skill standards are a crucial component. Skill standards will strengthen the educational system and will become a critical part of reform efforts in the workplace. Working together, educators and employers will get a chance to re-examine not only their relationships with each other, but activities within their own organizations.

Skill shortages in advanced technologies severely limit the productivity of the American machine tool industry. *This national need necessitates the training of multi-skilled machine technicians capable of installing, integrating, maintaining, diagnosing, repairing, and modifying technologically advanced equipment systems.*

The Machine Tool Advanced Skills Curriculum Project is a geographic partnership of seven of the nation's best two-year technical and community colleges located in seven states that have about one-third of the density of metals-related industries in the United States. This project will develop and disseminate a national training model for manufacturing processes and new technologies and within the American machine tool industry.

Who should Participate as Partners?

Individuals in education and industry who desire to learn more about the rapidly changing needs of technology driven machine tool and metals related manufacturing industries, and the ways to obtain and educate skilled people for these jobs.

Why is there a Need for this Project?

Skill shortages continue to severely limit the productivity within the American machine tool industry. This national need necessitates the training of multi-skilled machine technicians capable of installing, integrating, maintaining, diagnosing, repairing, and modifying technologically advanced equipment systems. The survival of existing industries and the successful introducing of new manufacturing enterprises with advanced technologies require the development of innovative training, new curricula and methodologies.

Problems Confronting Industry

- Lack of clearly defined standards for the machine tool industry;
 - Low academic skills levels;
 - Lack of employability skills by many applicants;
 - Lack of qualified applicants for training and apprenticeship;
 - Availability and scheduling of work-based training;
 - Productivity issues (equipment operations limited by worker capabilities);
 - Need for flexible training approaches for special populations and adult learners.
-

Issues to be Addressed

- Increase awareness of secondary school students of career opportunities in machine tool and metals related industries;
- Develop a School-to-Work programs for secondary students with planned training and apprenticeships;
- Offer out-of-school unemployed, and existing industry employees the opportunity to learn new skills;
- Provide the environment for specific workplace training experiences.

- Establish curricula standards with industry validated competencies and apprenticeship/internships with industrial partners (workplace training experiences as capstones of curricula).
-

Goals of this Project

- Industrial assessment (industry validated skills standards and expectations)
 - Curriculum development for training and apprenticeship
 - Pilot program to be designed and implemented
 - Student assessment and evaluation
 - Project deliverables (skill standards and curriculum/training materials)
-

For More Information - Contact

Wallace Pelton

Joe Penick

For more information, call (817) 867-3526

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Wallace Pelton

Machine Tool Grant Methodologies

[SCANS Competencies](#)
[Technical Competencies](#)
[Syllabi lists](#)

Machine Tool Grant Methodology

COMPETENCY PROFILE

1. The occupational survey methodology was designed to build on the strength of the participating colleges' relationship with industry in order to ensure the relevance and credibility of the skills standards and model curricula. Given the compressed time frame for conducting the industry survey, it was agreed that the consortium partners would employ a modified version of the widely-used DACUM (Developing A Curriculum) process to identify the major types of skills required for employment in the occupational areas. We called this modified DACUM a "Competency Profile".
2. The Competency Profile Duties and Tasks have been identified by practitioners in the trade and are therefore "industry driven." A modified DACUM was performed at industry sites and facilitated by representatives of each development center. Panel members were identified on the Competency profile. Panel members were requested to identify job entry level skills and competencies, rank each Duty and Task, and identify the expected "sub-tasks" required to perform each Task within a given Duty. A complete list of industry generated Duties and Tasks has been prepared for each occupational specialty and entitled "Technical Workplace Competencies".
3. Additional skills for Mathematics, Science, and General Education courses were also identified by the panel members. The panel generated a list of "Skills and Knowledge", "Traits and Attitudes", and "Future Trends and Concerns" and are listed on the Competency Profiles.
4. Once final "industry validated" copy was secured, project personnel prepared extended course syllabi reflecting the industry's expectations of technical competencies, SCANS skills, and expected exit level proficiencies for each specific occupational specialty.

COMPETENCY COURSE CROSSWALK

5. Once the Technical Competencies were identified a "Technical Workplace Competency/Crosswalk" was prepared identifying each required course in the curriculum and the specific tasks which were taught in each respective course. An "Exit Proficiency Level Matrix" was developed for the Technical Workplace Competencies and each task was assigned an expected proficiency level at minimum performance level expectations of industry. The preparation of the "Technical Workplace Competency/Crosswalk allowed faculty to review, modify, and adjust course syllabi to meet the expected exit level proficiencies.
6. Skill standards development projects generally follow either one of two basic approaches to documenting skill standards. One is referred to as the *skill components model* and the other as the *professional model*. These two models differ along two dimensions -- the conceptualization of the skill and the role of workers in the development and governance of the standards system.
Professional Model: The performance and responsibilities of professional workers are not characterized by dividing their jobs into a list of discrete tasks or skills and then adding up tasks that the professional has mastered. The nuances of their roles and responsibilities make narrowly defined listings of their skills difficult to define. Generally, most require government and/or state certification boards and formal testing and experience duration requirements.
Skill Component Model: This model is based on the limited roles that front line workers are expected to carry out in

traditional hierarchical organizations. Although this approach tends to focus on duties and tasks, and not on the work characteristics expected of an employee in a high performance organization, it is most often used by national pilot programs to document skills standards by occupation. This project used the Skill Components Model in its methodology. To help overcome the shortfalls of this model, soft skills were infused in the form of SCANS to ensure all the required skills were addressed.

SCANS/COURSE CROSSWALK

7. These soft skills are often referred to as advanced generic skills or SCANS skills (named after the U.S. Secretary of Labor's 1991 Commission on Achieving Necessary Skills). They are based on the recognition of the inadequacy of previous perspectives on skills. Although they differ from the skill components model, they do represent potential to expand the conceptualization of skills.
8. SCANS Competencies and specific classroom activities to address each SCANS Competency have been identified for each of the technical courses, the general education courses and the remediation courses and are included in the methodology.

INDUSTRY WIDE ASSESSMENT

1. Industry on-site visits involved a tour of facilities, review of pertinent job descriptions, and a modified DACUM process resulting in a Competency Profile for each occupational speciality. Employers and employees described expectations of worker skills, identified current required skills, and projected future trends. Employers in respective occupational specialties voiced their expectations for training of future employees.
2. A description of duties and specific tasks for each occupational speciality was prepared, prioritized, and validated by the Company Team. The project staff acted primarily as facilitators in the process responsible for documenting the comments and preparing the occupational skills profiles.
3. Employers stated their expectations of any training programs and apprenticeships that could lead to employment within their company. Expectations for prerequisites and knowledge of math, sciences, and general education were also expressed for each occupational speciality. A list of structured questions was presented to each group, and sessions were tape-recorded for later transcription and review.
4. Companies would review and edit these documents, return them to the institution who would then input the data on "PageMaker" software. A Competency Profile was prepared for the participating company with their company logo and names of panel members.
5. Once specific company skills standards had been completed with all named partners in each region, a national survey was mailed to other companies, targeted to respondents who are identified, prepared, and willing to participate in this national survey.
6. From this process an industry validated composite skills standard document was developed. A final review was held with invited and interested participants hosted by a nation-wide advisory committee. This was scheduled as a final and open forum on the specific occupational skills profiles. Skills standards were also reviewed by organized labor groups, state agencies, professional societies, and other interested national groups.
7. Skills standards for each occupational speciality were field tested for feasibility of training and delivery to educational institutions and trade groups, and finally printed in graphical format for dissemination to companies, educational institutions and other training providers.
8. Public schools participated in the process from the beginning, served on steering committees, provided development experiences for the faculty and counselors, and expanded the vision of young people to provide knowledge of career opportunities in these occupational specialities.

PHASE II

1. The second phase (1995-96) of the project included curricula revisions by institutions and training providers and field testing of the revised curricula with students recruited as experimental groups.
2. Students were both pre-tested and post-tested to assess the knowledge gained and mastery of competencies from these enhanced educational experiences and eventual success ratings in employment industries.
3. Apprenticeship experiences were also be defined and enhanced as part of the process. It is know that internships and apprenticeships currently lack definition and documentation of value-added experiences.

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Machine Tool Advanced Skills Technology SCANS

<u>Machinist</u>	<u>Computer-Aided Drafting Technician</u>	<u>CIM Technician</u>	<u>Computer Networking & Systems Technician</u>
<u>Electrical Systems Technician</u>	<u>Industrial Maintenance Mechanic</u>	<u>Instrumentation & Control Technician</u>	<u>Laser Machinist</u>
<u>CNC Machinist</u>	<u>Manufacturing Engineering Technician</u>	<u>Mold Maker</u>	<u>Non Metallics/Composites Processing Technician</u>
<u>Sheetmetal/Aircraft Structural Technician</u>	<u>Superabrasives, Conventional & EDM Grinding Technician</u>	<u>Tool & Die Maker</u>	<u>Welder</u>

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SCANS/Course CROSSWALK MACHINIST: CERTIFICATE CIP: 48.0501															
1. College Success Skills	6. Machine Tool Practices II					11. Manufacturing Processes									
2. Machine Tool Practices I	7. Oral/Written Communications					12. Introduction to CNC									
3. Precision Tools & Measure	8. Survey of Weld. Proc./Applic.					13. Machine Tool Practices IV									
4. Industrial Specs. & Safety	9. Human Relations					14. Advanced CNC									
5. Occupational Math	10. Machine Tool Practices III					15. <u>Exit Proficiency Level</u>									
Numbers 1-14 below match the courses above. Number 15 refers to the Exit Proficiency Level.															
COMPETENCY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(RS) RESOURCES:															
A. Allocates time	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3
B. Allocates money		x	x	x		x		x		x	x	x			2
C. Allocates material and facility resources	x	x	x	x		x		x		x	x	x	x	x	4
D. Allocates human resources	x	x		x		x	x		x	x	x	x	x	x	1
(IN) INTERPERSONAL SKILLS:															
A. Participates as a member of a team	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
B. Teaches others	x	x	x	x		x	x	x	x	x	x	x	x	x	1
C. Serves clients/customers	x	x		x		x		x	x	x	x	x	x	x	2
D. Exercises leadership	x	x	x	x		x		x	x	x	x	x	x	x	1
E. Negotiates	x			x				x	x		x				1
F. Works with cultural diversity	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4

(IF) INFORMATION SKILLS:															
A. Acquires and evaluates information	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
B. Organizes and maintains information	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
C. Interprets and communicates information	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
D. Uses computers to process information			x		x		x						x		2
(SY) SYSTEMS:															
A. Understands systems	x	x	x		x	x	x	x	x	x	x	x	x	x	4
B. Monitors and corrects performance			x	x			x	x	x		x	x	x	x	2
C. Improves and designs systems			x	x			x			x	x	x	x	x	1
(TE) TECHNOLOGY:															
A. Selects technology			x	x	x	x	x	x			x	x	x	x	4
B. Applies technology to task			x	x	x	x	x	x			x	x	x	x	4
C. Maintains and troubleshoots technology			x	x	x		x				x	x	x	x	3
Numbers 1-14 below match the courses above. Number 15 refers to the Exit Proficiency Level.															
FOUNDATION SKILLS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(BS) BASIC SKILLS:															
A. Reading	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3
B. Writing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3
C. Arithmetic and mathematics	x	x	x	x	x	x				x	x	x	x	x	4
D. Listening	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4

E. Speaking	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
(TS) THINKING SKILLS:															
A. Creative thinking	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3
B. Decision making	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2
C. Problem solving	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2
D. Seeing things in the mind's eye	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
E. Knowing how to learn	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
F. Reasoning	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4

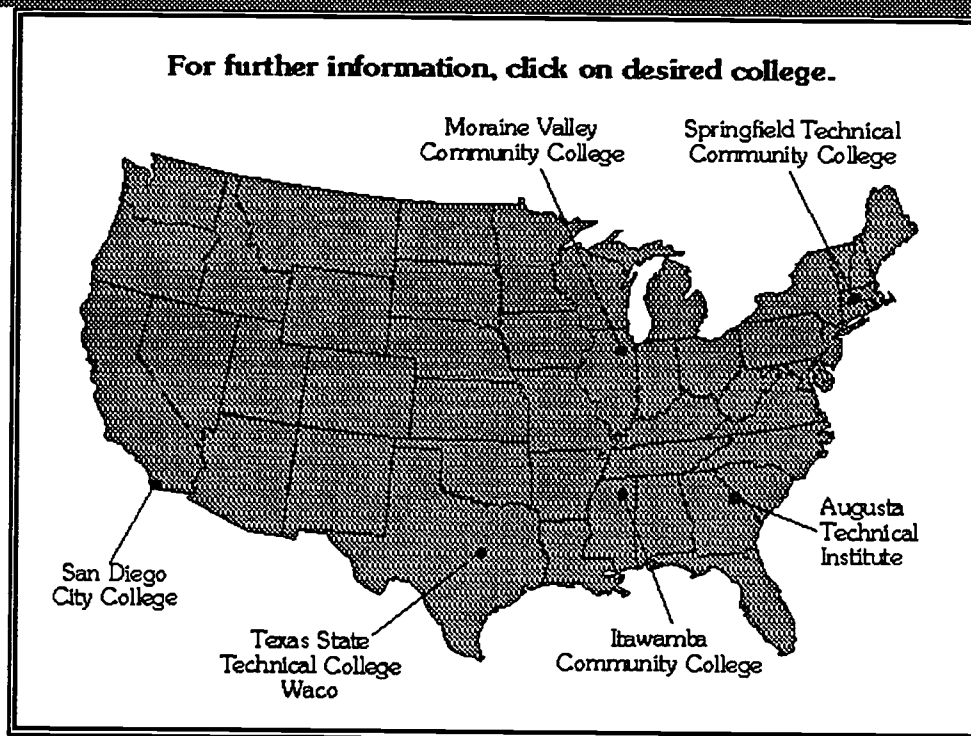
(PQ) PERSONAL QUALITIES:															
A. Responsibility	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
B. Self-esteem	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
C. Social	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
D. Self-management	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4
E. Integrity/honesty	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4

EXIT LEVEL OF PROFICIENCY					
	1	2	3	4	5
Technical Workplace Competency	rarely	routinely with supervision	routinely with limited supervision	routinely without supervision	initiates / improves / modifies and supervises others

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Machine Tool Advanced Skills Curriculum Project Partners

For further information, click on desired college.



Six States in Partnership Program

- [Augusta Technical Institute, GA](#)
- [Itawamba Community College, MS](#)
- [Moraine Valley Community College, IL](#)
- [San Diego City College, CA](#)
- [Springfield Technical Community College, MA](#)
- [Texas State Technical College Waco, TX](#)

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SURVEY RESULTS

MAST personnel visited numerous companies throughout the United States. Visits were also made to many of the Federal Labs and to other technical colleges. These visits provided opportunities to interview "expert workers" in each of the occupational specialty areas for which MAST was responsible. For each of these visits MAST personnel prepared an individualized Competency Profile. This Competency Profile was actually a "picture" of the occupation at that company. These individual Competency Profiles were analyzed and eventually brought together to form a composite Competency Profile, which represented a "picture" of the occupation on a national level.

Even though numerous company interviews were conducted, MAST personnel understood that the interview technique would still fall short of providing a "true" picture of each of these occupations. Restrictions of time and money for travel would seriously limit the achievement of a representative sample via on-site interviews. The mailed survey allowed MAST to contact a much larger number of companies in a much shorter time while staying within the monetary restrictions of the MAST grant. What follows is a narrative of the methodology, findings and conclusions of this survey..

SURVEY METHODOLOGY

Survey instruments were prepared for each occupational area under investigation by MAST (copies of each survey are found in this tab). MAST personnel worked with the staff of Institutional Research and Planning at Texas State Technical College, to plan, design and produce the survey forms. Institutional Research and Planning has the primary role of conducting surveys and performing survey analysis on the TSTC campus. Personnel in this office are qualified in operations research/statistical analysis of data for industry and technical college curriculum and training material development. The survey was designed to solicit two kinds of information. Page one of each survey requested demographic information about the company. The remaining pages included the duties and tasks for each occupational specialty. These duties and tasks had been previously identified through company interviews, previous surveys, faculty input, and other research methods.

The survey process was divided into two phases. Phase 1 was used as a pilot survey for Phase 2. Phase 1 was a survey for just the State of Texas. Part 2 was a survey for the entire U.S. What follows is the survey methodology, analysis and conclusions from each of the surveys.

phase 1 - THE TEXAS SURVEY

METHODOLOGY

342 Texas companies were identified using the latest edition of the Directory of Texas Manufacturers, which is published by the Bureau of Business Research at the University of Texas in Austin. This sampling of industries was selected based on SIC codes, number of employees and other factors. From this selection process a mailing list was prepared.

These companies were mailed a cover letter, which briefly explained the MAST grant, the purpose of the survey, and requested their participation in the Texas survey. Along with this cover letter, a card was sent which listed the occupational areas being surveyed. Companies were asked to check which surveys they

would be willing to complete and return the cards to the MAST office at TSTC in Waco, Texas. When these cards were received in the MAST office, the appropriate surveys were mailed to the participating companies.

MAST personnel made follow-up calls to industry representatives as a means of insuring that the highest number of surveys would be completed and returned. The cut-off date for receiving completed surveys was December 1, 1995. All returned surveys were sent to Institutional Research and Planning for scanning and analysis.

ANALYSIS

- Number of companies targeted for the Texas survey - Letters and cards were sent to 342
- Texas companies
- Number of cards received back indicating willingness to participate in the survey - 68
- Completed surveys received by MAST - 68
- Percentage of companies participating - 19.8%**

CONCLUSIONS

As a result of conducting the Texas Survey, MAST identified several important points.

- Most of the information which was gathered from industry visits/interviews was accurate.

The curriculum was modified where necessary based upon the survey.

- The curriculum/syllabi which MAST had developed as part of the deliverables appears to be tailored for precision manufacturing within the state, now and in the immediate future.
- We see that industry within the State of Texas is appears to be holding on to many of the older technologies, methods and industries (oil tool, heavy manufacturing etc.)
- Lessons learned from the Texas Survey which will be used to improve the National Survey are as follows:

A. Telephone contact with the industry to establish a personal commitment to do the survey and to identify by name the industry point of contact is absolutely imperative to getting a reasonable number of returns.

B. The two step system with an enclosed card used in the Texas survey added to the duration of the overall process and may have actually decreased industry input. The process was streamlined for the National Survey.

phase 2 - THE NATIONAL SURVEY

METHODOLOGY

MAST project staff identified 274,368 companies nationwide using a software package called *Select Phone-CD*. This software includes over 95 million U.S business and residential listings on 6 CD-ROM disks. The disks separate the listings by regions (central, south, Great Lakes, northeast, mid-atlantic, and pacific). The telephone listings can be sorted in many ways including by state, address, zip code, and SIC

codes. Each of the regional listings was sorted by SIC codes, as had been done for the Texas survey. MAST obtained six separate databases (one for each region) from this sorting operation. These data base files were combined and a 1.5% random sampling was done using both database and statistical software packages (*Paradox* and *SPSS*). This sampling netted 3,216 companies which were targeted for the survey.

A telephone bank was set up on the TSTC campus and each of the 3,216 companies were called and asked to participate in the MAST national survey. Each company which agreed to participate was mailed a packet containing the survey(s) for each occupational specialty area requested.

As the surveys were returned, they were sorted (by occupational specialty) and scanned into the computer for statistical analysis using a statistical software package (*SPSS*).

ANALYSIS

- Number of companies identified (by SIC code) using *Select Phone-CD* - 274,368
- Number of companies targeted for the National survey (1.5% random sample) - telephone calls were made to the 3,216 national companies identified by the sampling process
- Number of companies which agreed to participate in the MAST national survey - 1,127
- Number of completed surveys received by MAST - 886
- Percentage of companies participating - 27.5 %**

CONCLUSIONS

The purpose of the national survey was to validate which duties and tasks needed to be addressed in each occupational composite competency profile and in the supporting course syllabi. Generally any task with a weighted average of 1.50 or below was dropped from the course syllabi. Any task rated from 1.5 to 2.00 was critically evaluated for inclusion based upon total hours available for instruction and lab work. Very few tasks were tailored or cut down in scope that had a weighted average of 2.00 to 2.50 overall. All tasks with a 2.50 or above are fully addressed in the MAST syllabi.

We attempted to follow accepted practices associated with statistical analysis of this data. When the frequency of the responses were too low, or when the responses were not spread in a normal pattern, a clear determination could not be made as to the validity of the input. At that point we made a subjective call, based upon our experience in that particular area, as to whether the task should be addressed and how much time should be devoted to it's study.

As a result of conducting the national survey, MAST project staff determined the following:

- Most technicians in all fields are performing a narrow range of tasks (operators as opposed to technicians).
- Production methodologies tend to be dated.
- Very little cross training of technicians (machinist with marginal measurement requirements, i.e. operators not technicians) is occurring.

- Response from companies that manufacture/assemble parts or products in batch runs of a dozen to a few hundred dominate the survey, but all types of companies were well represented.
- In all areas there was an average of only 8% of the employees in the 20-29 year age bracket.
- Approximately 50% of employees are in the age bracket 30-49.
- Approximately 42% of employees are over 50 years old (indicates an aging population).
- The education level of 64% of all employees is high school level or less.
- Only 8% of the companies surveyed are unionized.
- OJT is provided by 70% of the companies surveyed.
- Internship agreements were present in only 12% of the firms surveyed.

The Texas and National Surveys not only gave us an opportunity to validate each task in each of the 15 occupational composite competency profiles (1,140 tasks overall), it also provided useful demographic data. Further, we spoke via telephone to 3,216 companies in the precision manufacturing business, some small (35% with less than 10 employees) and some large (27% with 100 or greater).

The story that the demographics paints is reinforced by the telephone conversations with plant managers and first line supervisors. **The message we received from the machine tool industry is powerful.**

1. There are no viable, broad national apprenticeship programs.
 2. Most practice OJT because they have no good, reliable source for trained technicians. The community and technical colleges do not produce enough to fill the need.
 3. Most feel that their operators are severely undertrained and do not utilize the equipment to its fullest capability.
 4. Our industrial technicians are aged with an inadequate number of replacements being trained (42% are over 50 years of age, 50% are 30-39, with only 8% below age 30).
-

Machine Tool Advanced Skills Technology Competency Profiles

<u>Machinist</u>	<u>Manufacturing Engineering Technician</u>	<u>Mold Maker</u>	<u>Welder</u>
<u>Industrial Maintenance Mechanic</u>	<u>Sheet Metal Non-Metallics Composite Technician</u>	<u>Tool and Die Technician</u>	<u>CADD Technician</u>
<u>CNC/CAM Technician</u>	<u>Instrumentation Technician</u>	<u>LASER Machinist</u>	<u>Automated Equipment Technician</u>

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Machinist

Competencies Profile

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plan, layout, setup, and operate hand and machine tools to perform machining operations necessary to produce a workpiece to referenced engineering standards.

Duties	Tasks			
A-PRACTICE SAFETY	<u>A-1 Follow Safety Manuals and All Safety Regulations/ Requirements</u>	<u>A-2 Use Protective Equipment</u>	<u>A-3 Follow Safe Operating Procedures for Hand and Machine Tools</u>	<u>A-4 Maintain a Clean and Safe Work Environment</u>
B-APPLY MATHEMATICAL CONCEPTS	<u>B-1 Perform Basic Arithmetic Functions</u>	<u>B-2 Interconvert Fractions/Decimals</u>	<u>B-3 Interconvert Metric/English measurements</u>	<u>B-4 Perform Basic Trigonometric Functions</u>
	<u>B-5 Calculate Speeds and Feeds for Machining</u>	<u>B-6 Locate Machining Points from a Datum Point</u>	<u>B-7 Perform Calculations for Sine Bar and Sine Plate</u>	<u>B-8 Calculate for Direct, Simple, and Angular Indexing</u>
	<u>B-9 Perform Calculations Necessary for Turning Tapers</u>	<u>B-10 Solve for Little "H"</u>		
C- INTERPRET ENGINEERING DRAWINGS AND CONTROL DOCUMENTS	<u>C-1 Review Blueprint Notes and Dimensions</u>	<u>C-2 Identify Basic Layout of Drawings</u>	<u>C-3 Identify Basic Types of Drawings</u>	<u>C-4 List the Purpose of Each Type of Drawing</u>
	<u>C-5 Verify Drawing Elements</u>	<u>C-6 Practice Geometric Dimensioning and Tolerancing (GD&T) Methodology</u>	<u>C-7 Describe the Relationship of Engineering Drawings to Planning</u>	<u>C-8 Use Standards to Verify Requirements</u>
	<u>C-9 Analyze Bill of Materials (BOM)</u>	<u>C-10 Understand and Use Quality Systems</u>		

D-RECOGNIZE DIFFERENT MANUFACTURING MATERIALS AND PROCESSES	<u>D-1 Identify Materials With Desired Properties</u>	<u>D-2 Describe the Heat Treating Process</u>	<u>D-3 Perform Heat Treating Operations</u>	<u>D-4 Test Metal Samples for Hardness</u>
	<u>D-5 Identify Types of Plastic Materials and Processes</u>			
E-PERFORM MEASUREMENT/ INSPECTION	<u>E-1 Identify Types of Measurement</u>	<u>E-2 Select Proper Measurement Tools</u>	<u>E-3 Apply Proper Measuring Techniques</u>	<u>E-4 Use Metric and English Standards of Measurement</u>
	<u>E-5 Perform Measurements With Hand Held Instruments</u>	<u>E-6 Perform Measurements on Surface Plate</u>	<u>E-7 Perform Inspections Using Stationary Equipment</u>	
F-PERFORM CONVENTIONAL MACHINING OPERATIONS	<u>F-1 Prepare and Plan For Machining Operations</u>	<u>F-2 Use Proper Hand Tools</u>	<u>F-3 Operate Power Saws</u>	<u>F-4 Operate Drill Presses</u>
	<u>F-5 Operate Vertical Milling Machines</u>	<u>F-6 Operate Horizontal Milling Machines</u>	<u>F-7 Operate Metal Cutting Lathes</u>	<u>F-8 Operate Grinding/Abrasive Machines</u>
	<u>F-9 Operate Jig Boring Machines</u>	<u>F-10 Operate Deburring Equipment</u>		
G-PERFORM ADVANCED MACHINING PROCESSES	<u>G-1 Prepare and Plan For CNC Machining Operations</u>	<u>G-2 Select and Use CNC Tooling Systems</u>	<u>G-3 Program CNC Machines</u>	<u>G-4 Operate CNC Machining Centers (Mills)</u>
	<u>G-5 Operate CNC Turning Centers (Lathes)</u>	<u>G-6 Operate Electrical Discharge Machines</u>		
H-PERFORM GEAR CUTTING OPERATIONS	<u>H-1 Describe the Different Types of Gears</u>	<u>H-2 Understand Gear Terms</u>	<u>H-3 Use Rotary Tables and Dividing Heads</u>	<u>H-4 Discuss Gear Inspection and Measurement</u>
	<u>H-5 Machine a Spur Gear</u>			

I-PERFORM WELDING OPERATIONS	<u>I-1 Weld With Shielded Metal Arc Welding (SMAW) Process</u>	<u>I-2 Weld/Cut With Oxyacetylene</u>	<u>I-3 Weld With Gas Tungsten Arc Welding (GTAW) (Heliarc)</u>	<u>I-4 Weld With Gas Metal Arc Welding (GMAW)/(MIG) and Flux Core Arc Welding (FCAW)</u>
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Manufacturing Engineering

Competency Profile

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use special knowledge and skills to recommend and/or implement solutions for specific manufacturing applications

A. PRACTICE SAFETY	<u>A-1. Follow Safety Manuals and All Safety Regulations/Requirements</u>	<u>A-2. Use Protective Equipment</u>	<u>A-3. Follow Safe Operating Procedures for Hand and Machine Tools</u>
	<u>A-5. Control Fire Hazards</u>	<u>A-6. Apply American Red Cross First Aid and CPR Procedures</u>	<u>A-7. Recommend Hazardous Waste Management Techniques</u>
	<u>A-9. Demonstrate Knowledge of State and Federal EPA Regulations</u>		
B. APPLY MATHEMATICAL CONCEPTS	<u>B-1. Perform Basic Arithmetic Functions</u>	<u>B-2. Interconvert Fractions/Decimals</u>	<u>B-3. Interconvert Metric/English Measurements</u>
	<u>B-5. Perform Basic Trigonometric Functions</u>	<u>B-6. Calculate Speeds and Feeds for Machining</u>	<u>B-7. Locate Machining Points from a Datum Point</u>
	<u>B-9. Calculate for Direct, Simple, and Angular Indexing</u>	<u>B-10. Perform Calculations Necessary for Turning Tapers</u>	<u>B-11. Solve for Little "H"</u>
	<u>B-13. Solve Engineering Equations</u>	<u>B-14. Solve Static Systems for Resultant Force</u>	<u>B-15. Determine Strength of Materials for Various Applications</u>

C. INTERPRET ENGINEERING DRAWINGS AND CONTROL DOCUMENTS	<u>C-1. Review Blueprint Notes and Dimensions</u>	<u>C-2. Identify Basic Layout of Drawings</u>	<u>C-3. Identify Basic Types of Drawings</u>
	<u>C-5. Verify Drawing Elements</u>	<u>C-6. Practice Geometric Dimensioning and Tolerancing (GD&T) Methodology</u>	<u>C-7. Describe the Relationship of Engineering Drawings to Planning</u>
	<u>C-9. Analyze Bill of Materials (BOM)</u>	<u>C-10. Understand and Use Quality Systems</u>	
D. RECOGNIZE DIFFERENT MANUFACTURING MATERIALS AND PROCESSES	<u>D-1. Identify Materials With Desired Properties</u>	<u>D-2. Identify Materials and Processes to Produce a Product</u>	<u>D-3. Describe Heat Treating Processes</u>
	<u>D-5. Test Metal Samples for Hardness</u>	<u>D-6. Describe Casting Processes</u>	<u>D-7. Describe Hot Working Processes</u>
	<u>D-9. Evaluate Alternative Manufacturing Processes</u>		
E. DEMONSTRATE MEASUREMENT/INSPECTION TECHNIQUES	<u>E-1. Identify Types of Measurement Used in Manufacturing</u>	<u>E-2. Select Proper Measurement Tools</u>	<u>E-3. Apply Proper Measuring Techniques</u>
	<u>E-5. Perform Measurements With Hand Held Instruments</u>	<u>E-6. Perform Measurements on Surface Plate</u>	<u>E-7. Perform Inspections Using Stationary Equipment</u>
F. PERFORM CONVENTIONAL MACHINING OPERATIONS	<u>F-1. Prepare and Plan For Machining Operations</u>	<u>F-2. Use Proper Hand Tools</u>	<u>F-3. Operate Power Saws</u>
	<u>F-5. Operate Vertical Milling Machines</u>	<u>F-6. Operate Horizontal Milling Machines</u>	<u>F-7. Operate Metal Cutting Lathes</u>
G. PERFORM ADVANCED MACHINING PROCESSES	<u>G-1. Prepare and Plan For CNC Machining Operations</u>	<u>G-2. Select and Use CNC Tooling Systems</u>	<u>G-3. Program CNC Machines</u>
	<u>G-5. Operate CNC Turning Centers (Lathes)</u>	<u>G-6. Operate Electrical Discharge Machines</u>	<u>G-7. Download Programs Via Network</u>
H. PERFORM GEAR GENERATING OPERATIONS	<u>H-1. Describe the Different Types of Gears</u>	<u>H-2. Understand Gear Terms</u>	<u>H-3. Use Rotary Tables and Dividing Heads</u>

I. PERFORM WELDING OPERATIONS	<u>I-1. Weld With Shielded Metal Arc Welding (SMAW) Process</u>	<u>I-2. Weld/Cut With Oxyacetylene</u>	<u>I-3. Weld With Gas Tungsten Arc Welding (GTAW) (Heliarc)</u>	I (a
	<u>I-5. Perform Plasma Arc Cutting (PAC)</u>			
J. PERFORM DRAFTING TASKS.	<u>J-1. Demonstrate Traditional Mechanical Drafting Skills</u>	<u>J-2. Use Computer-Aided Drafting (CAD) System</u>	<u>J-3. Create 3-D Solid Models</u>	J
K. USE COMPUTERS	<u>K-1. Use Computer Operating Systems</u>	<u>K-2. Use Computer Inquiry Systems</u>	<u>K-3. Use Various Computer Applications</u>	a
	<u>K-5. Use Computer-Aided Engineering System</u>			
L. PARTICIPATE IN TOTAL QUALITY AND SPC ACTIVITIES	<u>L-1. Define Quality in Manufacturing and Explain Importance</u>	<u>L-2. Implement Concepts of Quality in the Workplace</u>	<u>L-3. Apply Principles and Tools of Continuous Quality Improvement</u>	a
	<u>L-5. Evaluate Data to Monitor Production</u>	<u>L-6. Analyze Customer Problems and Recommend Solutions</u>	<u>L-7. Establish Methods, Plans and Procedures to Maintain Quality</u>	
M. MAINTAIN ELECTRICAL DEVICES	<u>M-1. Use Electrical Test Equipment</u>	<u>M-2. Apply Specific Terms to Electrical Circuits</u>	<u>M-3. Analyze Series, Parallel and Complex DC/AC Circuits</u>	a
	<u>M-5. Inspect Transformers and Generators</u>	<u>M-6. Discuss Sensors and Feedback Technology</u>	<u>M-7. Set Up/Program PLC</u>	
N. MAINTAIN HYDRAULIC/PNEUMATIC DEVICES	<u>N-1. Use Test Equipment</u>	<u>N-2. Describe Basic Principles of Hydraulic Systems</u>	<u>N-3. Identify Hydraulic Fluids</u>	
	<u>N-5. Recognize Pumps, Actuators, and Hydraulic Control Devices</u>	<u>N-6. Troubleshoot Hydraulic/Pneumatic Systems</u>		

Mold Maker

Competency Profile

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plan, layout, setup, and operate hand and machine tools to perform operations necessary for machining a new mold or repairing/modifying an existing mold to referenced design standards

A. PRACTICE SAFETY	<u>A-1. Follow Safety Manuals and All Safety Regulations/Requirements</u>	<u>A-2. Use Protective Equipment</u>	<u>A-3. Debur Mold Bases to Help Avoid Cuts</u>
B. APPLY MATHEMATICAL CONCEPTS	<u>B-1. Perform Basic Arithmetic Functions</u>	<u>B-2. Locate Machining Points from a Datum Point</u>	<u>B-3. Interconvert Fractions/Decimals</u>
	<u>B-5. Perform Basic Trigonometric Functions</u>	<u>B-6. Use Sine Bar or Sine Plate for Machine Operations</u>	<u>B-7. Calculate Draft Angles</u>
	<u>B-9. Apply "Shrink Rate" Formulas</u>	<u>B-10. Calculate for Direct, Simple, and Angular Indexing</u>	<u>B-11. Calculate Speeds and Feeds for Machining</u>
C. INTERPRET ENGINEERING DRAWINGS AND CONTROL DOCUMENTS	<u>C-1. Review Blueprint Notes and Dimensions</u>	<u>C-2. Identify Basic Layout of Drawings</u>	<u>C-3. Identify Basic Types of Drawings</u>
	<u>C-5. Verify Drawing Elements</u>	<u>C-6. Identify Lines and Symbols (GD&T)</u>	<u>C-7. Describe the Relationship of Engineering Drawings to Planning</u>
	<u>C-9. Analyze Bill of Materials (BOM)</u>	<u>C-10. Create Technical Sketches</u>	
D. SELECT MANUFACTURING MATERIALS AND PROCESSES	<u>D-1. Identify Materials With Desired Properties</u>	<u>D-2. Identify Heat Treating Processes</u>	<u>D-3. Perform Heat Treating Operations</u>
	<u>D-5. Evaluate Alternative Manufacturing Processes</u>	<u>D-6. Identify Types of Plastic Materials</u>	<u>D-7. Identify Plastic Molding Processes</u>
	<u>D-9. Use Pantograph for Mold Engraving</u>		

E. PERFORM MEASUREMENT/INSPECTION	<u>E-1. Identify Types of Measurement</u>	<u>E-2. Select Proper Measurement Tools</u>	<u>E-3. Apply Pro Measuring Techniques</u>
	<u>E-5. Measure/Layout/Inspect Using Surface Plate</u>	<u>E-6. Inspect Using Stationary Equipment (e.g., CMM and optical comparator)</u>	
F. PERFORM CONVENTIONAL MACHINING OPERATIONS	<u>F-1. Prepare and Plan For Machining Operations</u>	<u>F-2. Use Proper Hand Tools</u>	<u>F-3. Operate Power Saws</u>
	<u>F-5. Operate Vertical Milling Machines</u>	<u>F-6. Operate Horizontal Milling Machines</u>	<u>F-7. Operate Cutting Lathes</u>
	<u>F-9. Operate Jig Boring Machines</u>	<u>F-10. Operate Deburring Equipment</u>	<u>F-11. Polish M Cavities</u>
G. PERFORM ADVANCED MACHINING PROCESSES	<u>G-1. Program Computer Numerical Control (CNC) Machines</u>	<u>G-2. Operate CNC Machining Centers and Turning Centers</u>	<u>G-3. Operate Electrical Discharge Machines</u>
H. PERFORM WELDING OPERATIONS	<u>H-1. Weld With Shielded Metal Arc Welding (SMAW) Process</u>	<u>H-2. Weld/Cut With Oxyacetylene</u>	<u>H-3. Weld Wit Gas Tungsten Welding (GTA (Heliarc))</u>
I. BUILD/REPAIR/MODIFY MOLDS	<u>I-1. Identify Types of Molds (e.g., three plate, multi-cavity, cam action, hot runner)</u>	<u>I-2. Identify Typical Mold Components (e.g., cavity and core insert, ejector mechanisms, etc.)</u>	<u>I-3. Estimate B Mold Cost Considerations (e.g., engineeri material, labor)</u>
	<u>I-5. Install Mold Temperature Control Devices</u>	<u>I-6. Disassemble/Assemble Molds</u>	<u>I-7. Identify "O the Shelf" Mol Components</u>
	<u>I-9. Build/Assemble/Adjust Ejector Plates and Pins</u>	<u>I-10. Vent Molds</u>	<u>I-11. Diagnose Repair all Mold Related Proble</u>
J. USE COMPUTERS	<u>J-1. Use Computer Operating Systems</u>	<u>J-2. Use Computer Inquiry Systems</u>	<u>J-3. Use Comp Aided Drafting (CAD) Softwar</u>
	<u>J-5. Use Mold Flow Software</u>		

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Welder

Competencies Profile

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study arc/gas, SMAW, GMAW, GTAW, brazing, wldallurgy, and print interpretation to perform welding operations necessary to produce a workpiece to required standards

A. FOLLOW SAFE PRACTICES	<u>A-1. Wear Personal Protective Equipment</u>	<u>A-2. Identify Safety Rules</u>	<u>A-3. Familiarize Oneself With Safety at Facility</u>	
B. DEMONSTRATE TECHNICAL COMMUNICATION	<u>B-1. Use Standard American Welding Society Standard Welding Terms and Definitions</u>			
C. INTERPRET WELDING DRAWINGS	<u>C-1. Review Print Notes, Dimensions and Symbols</u>	<u>C-2. Identify Basic Layouts of Drawings</u>	<u>C-3. Interpret Drawing Lines and Views</u>	<u>C-4. Interpret Welding Symbols</u>
	<u>C-5. Convert wldric to English</u>	<u>C-6. Understand Print Specifications</u>	<u>C-7. List Assembly Procedure Per Print</u>	<u>C-8. Understand Various Types of Welding Prints</u>
	<u>C-9. Visualize Final Weldment From Print</u>	<u>C-10. List Flaws and Errors on Drawings</u>	<u>C-11. Interpret AWS Standard Welding Symbols</u>	
D. BASIC WELDING METALLURGY	<u>D-1. Become Conversant With Common wldallurgical Terms</u>	<u>D-2. Describe the Properties of Various Types of Steel</u>	<u>D-3. List Various Alloys and Their Effect When Combined With Steel</u>	<u>D-4. Describe the Effect Welding Has on Properties of various Types of Carbon Steels</u>
	<u>D-5. Identify Basic Concepts Relating to the Heat Affected Zone</u>			

E. BASIC SHIELDED METAL ARC WELDING (SMAW) AND OXY-FUEL GAS CUTTING	<u>E-1. Define Selected Welding Terms Per AWS A3.0</u>	<u>E-2. Describe AWS Code for Mild Steel Electrodes</u>	<u>E-3. Set Up Welding Machine to Required Polarity</u>	<u>E-4. Use Correct Start and Stop Techniques for SMAW Electrodes</u>	
	<u>E-5. Set Up Equipment for Shielded wldal Arc Welding</u>	<u>E-6. Strike an Arc. Run Continuous Stringer Bead</u>	<u>E-7. Weld Using Weave Technique</u>	<u>E-8. Weld Multi-Layer Buildup</u>	
	<u>E-9. Set Up and Shut Down Oxy-Fuel Equipment<</u>	<u>E-10. Cut Steel Plate Using Oxy-Fuel Equipment</u>	<u>E-11. Produce Welds with Properly Fused Starts and Filled Craters</u>	<u>E-12. Low Hydrogen Starts and Stops</u>	
	<u>E-13. Design Welded Joints</u>	<u>E-14. Weld V Groove With Backing in Flat Position</u>	<u>E-15. Set Up Air Carbon Arc Equipment for Gouging</u>	<u>E-16. Use Air Carbon Arc to Excavate a Partial Pen Groove Weld</u>	
	<u>E-17. Gouge to Excavate Defect</u>	<u>E-18. Make X-Ray Quality Weld Repair on a 2F Position T Joint ½" Plate</u>	<u>E-19. Produce Fillet Weld on Sheet Steel T Joints</u>	<u>E-20. Produce Fillet Welds on T Joints Made Up of Both Thick and Thin Joint Members Using SMAW</u>	
	<u>E-21. Use Correct Starts for Low Hydrogen Electrodes</u>	<u>E-22. Use Correct Stops for Low Hydrogen Electrodes</u>	<u>E-23. Weld Using Large Diawlder SMA Electrodes<</u>		
	F. ADVANCED SHIELDED METAL ARC WELDING (SMAW) AND CUTTING	<u>F-1. Weld Single V Groove Welds With Open Roots From One Side</u>	<u>F-2. Weld Various Diawlders of Pipe to Plate</u>	<u>F-3. Produce SMAW Pipe - 5G Position</u>	<u>F-4. Produce SMAW - 2G Position Groove Welds</u>
		<u>F-5. Roll Weld Pipe - SMAW</u>	<u>F-6. Produce SMAW Pipe - 5G Position</u>	<u>F-7. Produce SMAW Pipe - 6G Position</u>	<u>F-8. Create SMAW Pipe to ASME Section 9</u>
		<u>F-9. Interpret Welding Procedures</u>			

G. PIPE WELDING - SMAW	<u>G-1. Produce End Preparations</u>	<u>G-2. Fit and Tack Weld Pipe</u>	<u>G-3. Roll Weld Open Root Pass on Pipe - 1G Position</u>	<u>G-4. Weld Open Root Pipe Joint - 2G Position</u>
	<u>G-5. Weld Open Root Pipe - 5G Position</u>	<u>G-6. Pass Guided Bond Tests Per ASME Section 9</u>	<u>G-7. Weld Open Root Pipe - 2G Position</u>	<u>G-8. Weld Pipe Open Root Passes All Positions Using GMAW</u>
	<u>G-9. Weld Pipe With Backing Using FCAW-G</u>			
H. GAS METAL ARC WELDING (GMAW)	<u>H-1. Assemble GMAW Gun and Name All Parts</u>	<u>H-2. Understand Gas wldal Arc Power Source</u>	<u>H-3. Shielding Gas Application</u>	<u>H-4. Weld With GMAW Using Spray Transfer</u>
	<u>H-5. Weld With GMAW Using Short Circuit Transfer</u>	<u>H-6. Weld With GMAW Using Globular Transfer</u>	<u>H-7. Weld With GMAW Using Pulsed Spray Transfer</u>	<u>H-8. Weld T Joints on Carbon Steel Using GMAW Equipment</u>
	<u>H-9. Weld Multi-Pass Fillet Welds - All Positions</u>	<u>H-10. Weld Multi-Pass Fillet Welds - 3F Vertical Position</u>	<u>H-11. Weld Multi-Pass Fillet Welds - 4F Overhead Position</u>	<u>H-12. Weld Single V Groove With GMAW</u>
	<u>H-13. Weld Pipe - 1G Position</u>			
I. GAS TUNGSTEN ARC WELDING (GTAW)	<u>I-1. Understand Technical Aspects of GTAW</u>	<u>I-2. Weld Fillet - 2F Horizontal Position</u>	<u>I-3. Weld Fillet - 3F Vertical Position</u>	<u>I-4. Weld Fillet - 4F Overhead Position</u>
	<u>I-5. Weld on 1/8" Material and 100% Penetration</u>	<u>I-6. Weld 2G Position Using GTAW</u>	<u>I-7. Weld 3G Position Using GTAW</u>	<u>I-8. Weld 4G Position Using GTAW</u>
	<u>I-9. Weld Pipe Open Root Passes All Positions Using GTAW</u>			
J. MATHEMATICAL SKILLS	<u>J-1. Determine Measurements and Angles</u>			
K. MAINTAIN HOUSEKEEPING	<u>K-1. Clean Work Area and Insure That No Safety Hazards Exist</u>			
L. QUALITY INSPECTIONS	<u>L-1. Perform Visual Checks</u>			

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Industrial Maintenance

Competency Profile

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uses mechanical, pneumatic, hydraulic, and electrical skills to maintain, repair and/or install equipment/machinery used in industry.

A. PRACTICE SAFETY	<u>A-1. Follow Safety Manuals and All Safety Regulations/Requirements</u>	<u>A-2. Use Protective Equipment</u>	<u>A-3. Follow Safe Operating Procedures for Hand and Machine Tools</u>
B. APPLY MATHEMATICAL CONCEPTS	<u>B-1. Perform Basic Arithmetic Functions</u>	<u>B-2. Convert Fractions/Decimals</u>	<u>B-3. Convert Metric/English Measurements</u>
	<u>B-5. Perform Basic Trigonometric Functions</u>	<u>B-6. Calculate Speeds and Feeds for Machining</u>	
C. INTERPRET ENGINEERING DRAWINGS AND CONTROL DOCUMENTS	<u>C-1. Review Blueprint Notes and Dimensions</u>	<u>C-2. Identify Basic Layout of Drawings</u>	<u>C-3. Identify Basic Types of Drawings</u>
	<u>C-5. Verify Drawing Elements</u>	<u>C-6. Practice Geometric Dimensioning and Tolerancing (GD&T) Methodology</u>	<u>C-7. Describe the Relationship of Engineering Drawings to Planning</u>
	<u>C-9. Analyze Bill of Materials (BOM)</u>	<u>C-10. Read/Interpret Prints from Different Occupations</u>	
D. USE PRECISION MEASURING TOOLS	<u>D-1. Identify Types of Measurement</u>	<u>D-2. Select Proper Measurement Tools</u>	<u>D-3. Apply Proper Measuring Techniques</u>
	<u>D-5. Perform Measurements With Hand Held Instruments</u>	<u>D-6. Perform Measurements on Surface Plate</u>	<u>D-7. Perform Inspections Using Stationary Equipment</u>
E. USE HAND TOOLS	<u>E-1. Use Proper Hand Tools</u>	<u>E-2. Install helicoils</u>	<u>E-3. Use drill motors</u>
	<u>E-5. Use torque wrenches</u>	<u>E-6. Use gasket cutters</u>	<u>E-7. Install safety wire</u>

F. OPERATE MACHINE TOOLS	<u>F-1. Prepare and Plan For Machining Operations</u>	<u>F-2. Operate Power Saws</u>	<u>F-3. Operate Drill Presses</u>
	<u>F-5. Operate Horizontal Milling Machines</u>	<u>F-6. Operate Metal Cutting Lathes</u>	<u>F-7. Operate Grinding/Abrasive Machines</u>
	<u>F-9. Operate metal shears</u>	<u>F-10. Operate brakes</u>	<u>F-11. Operate hydraulic/mechanical presses</u>
G. PERFORM WELDING OPERATIONS	<u>G-1. Weld With Shielded Metal Arc Welding (SMAW) Process</u>	<u>G-2. Weld/Cut With Oxyacetylene</u>	<u>G-3. Weld With Gas Tungsten Arc Welding (GTAW) (Heliarc)</u>
H. TROUBLESHOOT EQUIPMENT AND SYSTEMS	<u>H-1. Maintain air conditioning systems</u>	<u>H-2. Maintain electrical control circuits</u>	<u>H-4. Maintain pneumatic control systems</u>
	<u>H-5. Troubleshoot motors</u>	<u>H-6. Troubleshoot centrifugal pumps</u>	<u>H-7. Troubleshoot positive displacement pumps</u>
	<u>H-9. Troubleshoot blowers</u>	<u>H-10. Understand turbines (gas, steam)</u>	<u>H-11. Install piping</u>
I. REPAIR INDUSTRIAL POWER PLANT SYSTEMS	<u>I-1. Troubleshoot small gasoline engines</u>	<u>I-2. Troubleshoot medium size gasoline engines</u>	<u>I-3. Troubleshoot medium size natural gas powered engines</u>
	<u>I-5. Troubleshoot diesel and industrial power plants</u>	<u>I-6. Troubleshoot steam turbines</u>	<u>I-7. Troubleshoot gas turbines</u>
J. REPAIR POWER TRANSMISSION SYSTEMS	<u>J-1. Troubleshoot gear power transmission drives</u>	<u>J-2. Troubleshoot chain power transmission drives</u>	<u>J-3. Troubleshoot belt drive systems</u>
K. FABRICATE/INSTALL SHEETMETAL PARTS	<u>K-1. Layout sheetmetal parts</u>	<u>K-2. Form and/or bend sheetmetal parts</u>	<u>K-3. Fasten sheetmetal parts together</u>
L. SELECT EQUIPMENT FOR MANUFACTURING APPLICATIONS	<u>L-1. Evaluate/recommend condensing units</u>	<u>L-2. Evaluate/recommend furnaces</u>	<u>L-3. Evaluate/recommend chillers</u>
	<u>L-5. Evaluate/recommend pumps</u>	<u>L-6. Evaluate/recommend compressors</u>	<u>L-7. Evaluate/recommend hydraulic units</u>

M. JOIN PIPES	<u>M-1. Solder metal pipes</u>	<u>M-2. Braze or silver solder metal pipes</u>	<u>M-3. Weld metal pipe joints</u>
	<u>M-5. Swage metal pipe/tubing</u>	<u>M-6. Join metal pipe with threads</u>	<u>M-7. Join metal pipe with cement</u>
	<u>M-9. Join plastic pipes with glue</u>	<u>M-10. Join plastic pipes with hot air welding process</u>	
N. CONSTRUCT AIR DISTRIBUTION SYSTEMS	<u>N-1. Fabricate loop systems</u>	<u>N-2. Fabricate dead end systems</u>	<u>N-3. Fabricate branch systems</u>
O. START-UP NEW AIR CONDITIONING SYSTEMS	<u>O-1. Check for leaks</u>	<u>O-2. Check for safe operation</u>	<u>O-3. Evacuate and charge system</u>
	<u>O-5. Troubleshoot systems</u>	<u>O-6. Fill hydraulic systems and set flow through coils</u>	<u>O-7. Install thermostats and low voltage wiring</u>
P. MAINTAIN BOILER AND STEAM SYSTEMS	<u>P-1. Troubleshoot systems</u>	<u>P-2. Adjust systems for optimum performance</u>	
Q. MAINTAIN HYDRAULIC/PNEUMATIC DEVICES	<u>Q-1. Demonstrate working knowledge of hydraulic systems</u>	<u>Q-2. Repair/replace pumps</u>	<u>Q-3. Repair/replace valves</u>
	<u>Q-5. Clean/replace filters</u>	<u>Q-6. Replace seals</u>	<u>Q-7. Clean/fill reservoirs</u>
	<u>Q-9. Repair/replace motors</u>	<u>Q-10. Perform PM and service as needed</u>	
R. PERFORM NON DESTRUCTIVE TESTING	<u>R-1. Make industrial x-ray inspection</u>	<u>R-2. Test using ultrasonic process</u>	<u>R-3. Test using vibration analysis</u>
S. USE COMPUTERS	<u>S-1. Use Lotus 123 or Quattro Pro</u>	<u>S-2. Use WordPerfect</u>	<u>S-3. Work in a Windows environment</u>
	<u>S-5. Use maintenance programs</u>	<u>S-6. Program ladder logic for PLCs</u>	
T. ALIGN SHAFTS	<u>T-1. Use feeler gauges</u>	<u>T-2. Use single indicator</u>	<u>T-3. Use double indicator</u>
	<u>T-5. Use Laser</u>		
U. INSTALL/ALIGN MACHINES	<u>U-1. Install electrical connections</u>	<u>U-2. Perform required pipe fitting tasks</u>	<u>U-3. Grout as necessary</u>
	<u>U-5. Level and align machine components</u>	<u>U-6. Discuss finishing materials (ie. paints, sealers)</u>	<u>U-7. Use stud gun</u>

V. DEMONSTRATE KNOWLEDGE OF BUILDING CONSTRUCTION	<u>V-1. Discuss wood framing techniques</u>	<u>V-2. Discuss metal framing techniques</u>	<u>V-3. Discuss sheeting processes</u>
	<u>V-5. Discuss grouting materials</u>	<u>V-6. Discuss surveying applications and methods</u>	
W. MAINTAIN ELECTRICAL DEVICES	<u>W-1. Use Electrical Test Equipment</u>	<u>W-2. Apply Specific Terms to Electrical Circuits</u>	<u>W-3. Analyze Series, Parallel and Complex DC/AC Circuits</u>
	<u>W-5. Inspect Transformers and Generators</u>	<u>W-6. Discuss Sensors and Feedback Technology</u>	<u>W-7. Set up/Program PLC</u>

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Brad Whittington

Sheet Metal/Composites

Competency Profile

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A. PRACTICE SAFETY	<u>A-1. Follow Safety Manuals and All Safety Regulations & Requirements</u>	<u>A-2. Use Protective Equipment</u>	<u>A-3. Follow Safe Operating Procedures for Hand and Machine Tools</u>	<u>A-4. Maintain a Clean and Safe Work Environment</u>
B. APPLY MATHEMATICAL CONCEPTS	<u>B-1. Perform Basic Arithmetic Functions</u>	<u>B-2. Interconvert Fractions/Decimals</u>	<u>B-3. Interconvert Metric/English Measurements</u>	<u>B-4. Perform Basic Algebraic Operations</u>
	<u>B-5. Perform Basic Trigonometric Functions</u>	<u>B-6. Extract Roots and Raise Numbers to a Given Power</u>	<u>B-7. Determine Areas and Volumes of Various Geometric Shapes</u>	<u>B-8. Solve Ratio, Proportion, and Percentage Problems</u>
C. INTERPRET BLUEPRINTS AND SHEET METAL DRAWINGS	<u>C-1. Review Blueprint Notes and Dimensions</u>	<u>C-2. Identify Basic Layout of Drawings</u>	<u>C-3. Identify Basic Types of Drawings</u>	<u>C-4. List the Purpose of Each Type of Drawing</u>
	<u>C-5. Verify Drawing Elements</u>	<u>C-6. Practice Geometric Dimensioning and Tolerancing (GD&T) Methodology</u>	<u>C-7. Describe the Relationship of Engineering Drawings to Planning</u>	<u>C-8. Use Standards to Verify Requirements</u>
	<u>C-9. Analyze Bill of Materials (BOM)</u>	<u>C-10. Understand and Use Quality Systems</u>	<u>C-11. Draw Sketches of Repairs and Alterations</u>	<u>C-12. Use Blueprint Information</u>
D. IDENTIFY MATERIALS AND PROCESSES	<u>D-1. Identify and Select Appropriate Non-Destructive Testing Methods</u>	<u>D-2. Perform Chemical Etching</u>	<u>D-3. Understand Basic Heat-Treating Processes</u>	<u>D-4. Inspect and Check Welds</u>
	<u>D-5. Perform Precision Measurements</u>			
E. PERFORM CLEANING AND CORROSION CONTROL	<u>E-1. Identify and Select Cleaning Materials</u>	<u>E-2. Perform Cleaning and Corrosion Control</u>		

F. WORK WITH SHEET METAL STRUCTURES	<u>F-1. Install Special Rivets and Fasteners</u>	<u>F-2. Inspect Bonded Structures</u>	<u>F-3. Inspect and Repair Plastics, Honeycomb, and Laminated Structures</u>	<u>F-4. Inspect and Repair Sheet Metal Structures</u>
	<u>F-5. Remove and Install Conventional Rivets</u>	<u>F-6. Hand Form, Layout and Bend Sheet Metal</u>		
G. WORK WITH COMPOSITE STRUCTURES	<u>G-1. Identify Method of Repair</u>	<u>G-2. Identify Bill of Materials (BOM)</u>	<u>G-3. Repair Per Technical Order/Engineering Specifications or Disposition</u>	<u>G-4. Perform Resin Transfer Molding</u>
	<u>G-5. Lay Up a Fiberglass Mold</u>	<u>G-6. Build Honeycomb Structure to Specifications</u>		

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Tool and Die

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skilled workers who produce tools, dies, and special guiding and holding devices that are used in machines and produce a variety of products

A. PRACTICE SAFETY	<u>A-1. Follow Safety Manuals and All Safety Regulations & Requirements</u>	<u>A-2. Maintain Safe Equipment and Machinery</u>	<u>A-3. Maintain a Clean and Safe Work Environment</u>	<u>A-4. Use Safe Operating Procedures For Hand and Machine Tools</u>
	<u>A-5. Use Safe Machining Practices</u>	<u>A-6. Use Safe Lifting Practices</u>	<u>A-7. Consult and Apply MSDS for Hazards of Various Materials</u>	
B. APPLY MATHEMATICAL CONCEPTS	<u>B-1. Perform Basic Arithmetic Functions</u>	<u>B-2. Perform Basic Algebraic Operations</u>	<u>B-3. Perform Basic Trigonometric Functions</u>	<u>B-4. Use Basic Geometric Principles</u>
	<u>B-5. Use and Apply Cartesian Coordinate System</u>			
C. DEMONSTRATE QUALITY CONTROL AND MANAGEMENT	<u>C-1. Utilize Appropriate Inspection Techniques</u>	<u>C-2. Perform Appropriate Use and Calibration of Inspection Equipment</u>	<u>C-3. Know Qualitative Parameters of Machinery and Equipment</u>	<u>C-4. Maintain Equipment to Produce Quality Parts</u>
	<u>C-5. Know and Use Quality Systems</u>	<u>C-6. Write Inspection Procedures</u>	<u>C-7. Document Inspection Results</u>	
D. DEMONSTRATE KNOWLEDGE OF MANUFACTURING MATERIALS	<u>D-1. Identify Materials With Desired Properties</u>	<u>D-2. Demonstrate Knowledge of Physical Properties of Materials</u>	<u>D-3. Identify Manufacturing Properties of Materials</u>	<u>D-4. Discuss Classification System for Metals</u>

E. DEMONSTRATE KNOWLEDGE OF MANUFACTURING PROCESSES	<u>E-1. Know Operation of Vertical and Horizontal Mills and Tooling</u>	<u>E-2. Know Operation of Engine and Turret Lathes and Tooling</u>	<u>E-3. Know Operation of Drill Presses and Tooling</u>	<u>E-4. Know Operation of Surface and Cylindrical Grinders</u>
	<u>E-5. Know Operation of Heat Treating Equipment and Processes</u>	<u>E-6. Know Operation of Welding Equipment and Processes</u>	<u>E-7. Know Sheet Metal Operations</u>	<u>E-8. Know Operation of Jig-Boring Machines and Tooling</u>
	<u>E-9. Know Operation of Tool and Cutter Grinders</u>	<u>E-10. Know Operation of Metal Saws</u>	<u>E-11. Know Operation of Wire EDM</u>	<u>E-12. Estimate Time Required/Cost to Produce a Part</u>
	<u>E-13. Know Proper Flow of Parts Through Shop</u>	<u>E-14. Utilize Concepts and Principles of Fixturing</u>	<u>E-15. Make Calculations For and Use Sine Bar/Sine Plate</u>	<u>E-16. Make Calculations For and Use Rotary Table and Dividing Head</u>
F. PERFORM CNC PROGRAMMING & CAM TASKS	<u>F-1. Prepare and plan for CNC machining operations</u>	<u>F-2. Select and Use Tooling Systems for CNC Machines</u>	<u>F-3. Manually Program CNC Machines</u>	<u>F-4. Use Computer-Aided Manufacturing (CAM) System</u>
G. DEMONSTRATE COMMUNICATION SKILLS	<u>G-1. Use Written Correspondence</u>	<u>G-2. Use Written Technical Information</u>	<u>G-3. Communicate Technical Information Verbally</u>	<u>G-4. Use Graphics for Visual Aid</u>
H. PERFORM DRAFTING/CAD TASKS	<u>H-1. Demonstrate Traditional Mechanical Drafting Skills</u>	<u>H-2. Use Computer-Aided Drafting (CAD) System</u>	<u>H-3. Use and Apply Geometric Dimensioning and Tolerancing (GD&T) Methodology</u>	
I. USE COMPUTERS	<u>I-1. Use Computer Operating Systems</u>	<u>I-2. Use File Management Systems</u>	<u>I-3. Perform Backup on a Personal Computer</u>	<u>I-4. Install/Use Software Packages</u>
	<u>I-5. Understand and Apply Computer Terminology</u>			

<p>J. INTERPRET & USE BLUEPRINTS AND RELATED DOCUMENTS</p>	<p><u>J-1. Interpret, Review, and Apply Blueprint Notes, Dimensions, and Tolerances</u></p>	<p><u>J-2. Interpret and Understand Basic Layout/Types of Drawings</u></p>	<p><u>J-3. Understand and Analyze Bill-of-Materials</u></p>	<p><u>J-4. Ascertain Job Requirements From Drawings</u></p>
<p>K. PERFORM DIE OPERATIONS</p>	<p><u>K-1. Utilize Basic Die Theory and Principles of Die Design</u></p>	<p><u>K-2. Perform Die Repair</u></p>	<p><u>K-3. Demonstrate Die Making Skills</u></p>	<p><u>K-4. Demonstrate Understanding of Different Types of Industrial Dies</u></p>

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Computer-Aided Drafting & Design

Competency Profile

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A. APPLY MATHEMATICAL CONCEPTS	<u>A-1. Perform Basic Arithmetic Operations</u>	<u>A-2. Compute Unit Conversions</u>	<u>A-3. Perform Basic Trigonometric Operations</u>	<u>A-4. Use Cartesian Coordinate System</u>
	<u>A-5. Use Polar Coordinate System</u>			
B. DEMONSTRATE FUNDAMENTAL DRAFTING SKILLS	<u>B-1. Use Drawing Media and Related Drafting Materials</u>	<u>B-2. Use Measuring Scales</u>	<u>B-3. Identify Drafting Line Styles and Weights (e.g., center, hidden, object, dimension)</u>	<u>B-4. Prepare Title Blocks and Other Drafting Forms</u>
	<u>B-5. Create Technical Sketches</u>			
C. PLAN AND ORGANIZE ACTIVITIES	<u>C-1. Determine Scope of Drafting Assignment</u>	<u>C-2. Select Appropriate Drafting Techniques for Drawings</u>	<u>C-3. Maintain Supporting Documents</u>	
D. PREPARE MECHANICAL PRODUCTION DRAWINGS	<u>D-1. Understand and Apply Mechanical Drawing Methods</u>	<u>D-2. Create Detail Drawings</u>	<u>D-3. Create Assembly Drawings</u>	<u>D-4. Perform Technical Lettering</u>
	<u>D-5. Create Bill of Material/Parts List</u>	<u>D-6. Apply Dimensions and Notes</u>	<u>D-7. Apply Dimensional Limits and Tolerances</u>	<u>D-8. Apply Current Drafting Standards to Drawings</u>
	<u>D-9. Perform Drawing Revisions</u>	<u>D-10. Use Commercial and Vendor Data</u>		

E. ASSIST ENGINEERING PERSONNEL	<u>E-1. Understand Basic Design Procedures</u>	<u>E-2. Utilize Fasteners (e.g. screws, bolts, nuts, seals, springs, ...) for Mechanical Applications</u>	<u>E-3. Utilize Power Transmission Elements (e.g. gears, cams, belts, chains, couplings, linkages, for Mechanical Applications</u>	<u>E-4. Utilize Bearings for Mechanical Applications</u>
	<u>E-5. Understand Basic Manufacturing Methods</u>	<u>E-6. Utilize Brakes and Clutches for Mechanical Applications</u>	<u>E-7. Design Shafts for Use in Mechanical Applications</u>	
F. USE COMPUTER-AIDED DRAFTING SYSTEM	<u>F-1. Start and exit a software program</u>	<u>F-2. Demonstrate Proper File Management Techniques</u>	<u>F-3. Use Directory Structure</u>	<u>F-4. Edit Drawing File</u>
	<u>F-5. Utilize Drawing Set-Up Procedures</u>	<u>F-6. Use Geometric Objects (e.g. lines, splines, circles, ...)</u>	<u>F-7. Use Text for Drawing Annotation</u>	<u>F-8. Control Object Properties (color, line-type, ...)</u>
	<u>F-9. Use Viewing/Display Commands</u>	<u>F-10. Use Standard Parts and/or Symbol Libraries</u>	<u>F-11. Understand Procedure to Print/Plot a Drawing</u>	<u>F-12. Use Standard Layering Techniques</u>
	<u>F-13. Create Mechanical CAD Drawings</u>	<u>F-14. Create 3D Mechanical Models</u>	<u>F-15. Utilize CAD Drawing Data</u>	<u>F-16. Use Drawing Feature Attributes</u>
	<u>F-17. Obtain 3D Model Property Data</u>	<u>F-18. Use CAD Dimensioning Features</u>	<u>F-19. Use Third-Party Software for CAD Enhancement</u>	<u>F-20. Perform CAD Customization Procedures</u>

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CAD/CAM and CNC Technician

Competencies Profile

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A. PRACTICE SAFETY	<u>A-1 Use proper safety equipment</u>	<u>A-2 Identify proper clothing</u>	<u>A-3 State proper attitudes for safety</u>	<u>A-4 Handle chemicals properly</u>
	<u>A-5 Identify fire hazards in machining</u>	<u>A-6 Demonstrate proper personal hygiene</u>	<u>A-7 Demonstrate proper laboratory cleaning</u>	
B. PERFORM MEASUREMENTS	<u>B-1 Identify applications and limitations of measuring instruments</u>	<u>B-2 Demonstrate use of measuring instruments</u>		
C. APPLY MATHEMATICAL CONCEPTS	<u>C-1 Perform mathematical computations with calculator</u>	<u>C-2 Calculate fractions and decimals with calculator</u>	<u>C-3 Convert Metric and US standard units of measure</u>	<u>C-4 Perform RPM calculations</u>
	<u>C-5 Perform feed calculations</u>	<u>C-6 Perform depth of cut calculations</u>	<u>C-7 Perform thread cutting calculations</u>	<u>C-8 Perform tap drill calculations</u>
	<u>C-9 Interpret reference tables related to machining</u>	<u>C-10 Apply Cartesian coordinate system in machining</u>	<u>C-11 Perform trigonometric calculations</u>	<u>C-12 Perform Pythagorean Theorem calculations</u>
	<u>C-13 Perform polar trigonometry calculations</u>			
D. READ BLUEPRINTS	<u>D-1 Describe types of blueprint drawings</u>	<u>D-2 Describe blueprint dimensions</u>	<u>D-3 Interpret title, notes, revision and material information</u>	<u>D-4 Interpret blueprint drawings</u>

E. PROGRAM CNC MACHINES & EDM	<u>E-1 Demonstrate cutting tool identification and application</u>	<u>E-2 Identify and describe machine operation nomenclature</u>	<u>E-3 Identify and describe essentials of CNC systems</u>	<u>E-4 Identify and describe types of CNC hardware and software</u>
	<u>E-5 Identify and describe machine axes and coordinate systems</u>	<u>E-6 Describe and interpret CNC coding systems</u>	<u>E-7 Write NC programs</u>	<u>E-8 Plan process for NC operations</u>
	<u>E-9 Demonstrate use of electronic discharge machine (EDM)</u>			
F. OPERATE CNC MACHINES & EDM	<u>F-1 Describe vertical machining process and safety</u>	<u>F-2 Describe vertical machining functions</u>	<u>F-3 Set-up and program operation of vertical machine</u>	<u>F-4 Deomonstrate machining of objects on vertical machining center</u>
	<u>F-5 Deomonstrate machining of objects on vertical machining center</u>	<u>F-6 Describe CNC turning process, equipment and safety</u>	<u>F-7 Describe turning center</u>	<u>F-8 Set-up and program operation of turning center</u>
	<u>F-9 Demonstrate machining of objects on turning center</u>			
G. USE COMPUTERS	<u>G-1 Demonstrate use of computer hardware</u>	<u>G-2 Select/use computer operating systems</u>	<u>G-3 Demonstrate use of basic DOS commands</u>	<u>G-4 Demonstrate use of Windows and Windows NT commands</u>
	<u>G-5 Demonstrate use of MACROS in Windows and Windows NT programs</u>	<u>G-6 Demonstrate use of computer communication systems</u>		
H. USE CNC VERIFICATION PROGRAMS	<u>H-1 Identify CNC verification software programs</u>	<u>H-2 Program and create CNC verification using program icons</u>	<u>H-3 Program CNC verification using pull-down menus</u>	

I. USE CAD/CAM PROGRAMS	<u>I-1 Demonstrate understanding of CAD/CAM programs</u>	<u>I-2 Access CAD program options</u>	<u>I-3 Create designs with CAD section of CAD/CAM program</u>	<u>I-4 Demonstrate ability to use program functions</u>
	<u>I-5 Process tool path data</u>			

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Instrumentation

Competency Profile

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will be able to troubleshoot, repair, calibrate, specify and commission as required all instrumentation and control components relating to overall plant operations. This is to include dynamic evaluation, testing, controller tuning, and total system performance evaluations.

A. PRACTICE SAFETY	<u>A-1. Follow Safety Manuals and All Safety Regulations & Requirements</u>	<u>A-2. Use Protective Equipment</u>	<u>A-3. Follow Safe Operating Procedures for Hand and Power Tools</u>	<u>A-4. Maintain a Clean and Safe Work Environment</u>
B. MAINTAIN CONTROL SYSTEMS	<u>B-1. Proper storage of Circuit Boards</u>	<u>B-2. Collect and Record Data according to company requirements</u>	<u>B-3. Test and Calibrate Transducers according to Specs</u>	<u>B-4. Perform Preventive Maintenance Procedures for Control Devices</u>
	<u>B-5. Test and/or Replace Printed Circuit Boards</u>	<u>B-6. Function Check Individual Elements Within Loop</u>	<u>B-7. Troubleshoot Different Types of System Modules</u>	<u>B-8. Test Different Types of System Modules</u>
	<u>B-9. Configure Software</u>	<u>B-10. Repair Different Types of System Modules</u>	<u>B-11. Install Control System Hardware</u>	<u>B-12. Simulate Control System Check</u>
	<u>B-13. Loop-Check Control System</u>	<u>B-14. Perform On-Line Testing</u>	<u>B-15. Troubleshoot and Maintain PLC's and Motor Control Systems</u>	

C. MAINTAIN FIELD INST. DEVICES	<u>C-1. Test and Calibrate Pressure, Level, Flow, Temperature Switches</u>	<u>C-2. Troubleshoot and Repair Pressure, Level, Flow, Temperature Switches</u>	<u>C-3. Adjust Dampers and Positioners</u>	<u>C-4. Troubleshoot and Adjust Control Drive (Damper)</u>
	<u>C-5. Test and Calibrate Indicators and Gauges</u>	<u>C-6. Troubleshoot and Repair Indicators</u>	<u>C-7. Test and Calibrate Transmitters</u>	<u>C-8. Test and Calibrate Recorders</u>
	<u>C-9. Troubleshoot and Repair Recorders</u>	<u>C-10. Troubleshoot Linear Variable Differential Transformers</u>	<u>C-11. Troubleshoot, Repair, and Calibrate Transmitters</u>	<u>C-12. Test Different Field Sensing Elements</u>
	<u>C-13. Install/Replace Field Sensing Elements</u>	<u>C-14. Troubleshoot and Repair Transmitters</u>	<u>C-15. Tune Controllers: Pneumatic and Electronic</u>	<u>C-16. Troubleshoot and Repair Plant Computing Systems Relating to Process Controls</u>
	<u>C-17. Troubleshoot and Repair Solenoid Valves</u>	<u>C-18. Perform Preventive Maintenance Procedures for Field Devices</u>	<u>C-19. Test and Repair Thermocouples</u>	<u>C-20. Check and Test Vibration Sensing Elements</u>
	<u>C-21. Inspect and Troubleshoot Power Supplies and Converters</u>	<u>C-22. Test and Calibrate Control Valve Actuators</u>	<u>C-23. Troubleshoot and Repair Control Valves/Positioners</u>	<u>C-24. Test and Calibrate Controllers</u>
	<u>C-25. Troubleshoot and Repair Local Controllers</u>	<u>C-26. Troubleshoot and Repair Electronic Computing Relays</u>	<u>C-27. Troubleshoot and Repair Analyzers</u>	<u>C-28. Test and Calibrate Air Analyzers</u>
	<u>C-29. Test and Calibrate Water Analyzers</u>	<u>C-30. Troubleshoot Servo Valves</u>	<u>C-31. Calibrate Servo Valves</u>	<u>C-32. Test and Clean Video Display Unit</u>
	<u>C-33. Check and Adjust Video Display Unit</u>	<u>C-34. Specify and Configure Smart Field Devices, i.e., Transmitters and Valves</u>	<u>C-35. Operate Control Systems Including Single Element, Cascade, Ratio, and Feedforward</u>	<u>C-36. Test and Calibrate Gas Analyzers</u>

D. ORGANIZE WORK ROUTINES	<u>D-1. Organize Documents and Drawings Required on the Job</u>	<u>D-2. Determine Proper Tools, Equipment & Materials to Perform the Job</u>	<u>D-3. Coordinate Work Activities with Other Crafts/Units</u>	<u>D-4. Coordinate Preventive Maintenance Schedule with Planning Group</u>
	<u>D-5. Verify Equipment Isolation Prior to Performance of Work for Safety Reasons</u>	<u>D-6. Report Abnormal Equipment Problems to Supervisor</u>	<u>D-7. Write New Calibration Procedures if Needed</u>	<u>D-8. Follow Specifications</u>
	<u>D-9. Perform Basic Algebraic Operations</u>	<u>D-10. Perform Basic Trigonometric Functions</u>	<u>D-11. Perform Basic Calculus Operations</u>	
E. COLLECT AND FILE DATA	<u>E-1. Record Test/Calibration Data</u>	<u>E-2. Record Preventive Maintenance Data</u>	<u>E-3. Record Equipment Disconnect Data</u>	<u>E-4. Evaluate Collected Data</u>
	<u>E-5. Review & Revise Procedures if Needed</u>	<u>E-6. Write Reports Required by Company</u>	<u>E-7. Specify Equipment for Control Systems</u>	<u>E-8. Prepare and Update Specification Forms</u>
	<u>E-9. Write Work Orders</u>	<u>E-10. Prepare and Update Ladder And/Or Logic Diagrams</u>	<u>E-11. Program PLC's</u>	
F. PARTICIPATE IN CONTINUING EDUCATION ACTIVITIES	<u>F-1. Read/Interpret Diagrams and Drawings</u>	<u>F-2. Sketch Diagrams</u>	<u>F-3. Study Technical Equipment Information</u>	<u>F-4. Application of ISA/JIC Standards</u>
	<u>F-5. Understand Proper Use of Test Equipment and Tools</u>	<u>F-6. Learn to Write Technical Reports</u>	<u>F-7. Acquire Safe Practices for Handling Hydraulic and Special Tools</u>	<u>F-8. Utilize Technical Manuals</u>
	<u>F-9. Understand Personal Computers</u>	<u>F-10. Attend on-going Safety Training Courses</u>	<u>F-11. Participate in Plant Related Training</u>	<u>F-12. Attend PLC Training</u>
	<u>F-13. Attend DCS Training</u>			
G. MAINTAIN AND CONTROL INVENTORY ACCORDING TO COMPANY POLICIES AND PROCEDURES	<u>G-1. Learn to Review and Forecast Spare Parts Inventory</u>	<u>G-2. Prepare Parts Request</u>	<u>G-3. Verify Parts Received</u>	<u>G-4. Research/Verify Substitute Specifications</u>

H. TRBLSHOOT, INSTALL, MAINTAIN AND OPERATE MOTOR CONTROL SYSTEMS	<u>H-1. Troubleshoot, Install, Maintain, and Operate Motor Starters</u>	<u>H-2. Troubleshoot, Install, Maintain, and Operate Relays</u>	<u>H-3. Troubleshoot, Install, Maintain, and Operate Pushbuttons</u>	<u>H-4. Troubleshoot, Install, Maintain, and Operate Switches</u>
	<u>H-5. Troubleshoot, Install, Maintain, and Operate PLC Systems, i.e., PLC and DCS Networks</u>			

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Laser Machinist

Competencies Profile

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will have a working knowledge of the principles of electronics, lasers, optics, materials, engineering documentation, CAD/CAM, systems integration all for the goal of producing products to acceptable engineering standards

A. APPLY MATHEMATICAL CONCEPTS	<u>A-1. Perform Basic Math Functions</u>	<u>A-2. Perform Algebraic Functions</u>	<u>A-3. Study Exponents and Right Triangle Geometry</u>	<u>A-4. Study Elements of Plane and Solid Geometry</u>
	<u>A-5. Perform Data Evaluation and Statistical Analysis</u>	<u>A-6. Perform Proportioning and Interpolation</u>	<u>A-7. Perform Basic Trigonometric Functions</u>	<u>A-8. Investigate Vectors and Vector Systems</u>
	<u>A-9. Investigate the Cartesian Coordinate System</u>			
B. INVESTIGATE FUNDAMENTALS OF INDUSTRIAL ELECTRONICS & CONTROL	<u>B-1. Perform Voltage, Current, Resistance and Power Measurements</u>	<u>B-2. Investigate Fundamentals of Analog Active Devices</u>	<u>B-3. Investigate Fundamentals of Digital Logic Circuitry</u>	<u>B-4. Investigate Operational Amplifiers for Industrial Applications</u>
	<u>B-5. Investigate Linear IC's for Industrial Applications</u>	<u>B-6. Investigate Electric Motors</u>	<u>B-7. Study Industrial Control Systems</u>	
C. APPLY CONCEPTS OF MODERN OPTICS	<u>C-1. Study Geometric Optics</u>	<u>C-2. Study Physical Optics</u>	<u>C-3. Study Refraction at Spherical Surfaces</u>	<u>C-4. Perform Imaging with a Single Lens</u>
	<u>C-5. Perform Imaging with Multiple Thin Lenses</u>	<u>C-6. Study F-Stops and Apertures</u>	<u>C-7. Study Optical Systems</u>	<u>C-8. Study Interference</u>
	<u>C-9. Study Diffraction</u>	<u>C-10. Study Polarization</u>	<u>C-11. Investigate Radiometry and Photometry</u>	

D. PERFORM CNC PROGRAMMING	<u>D-1. Apply Machine Specific (Milling and Lasers) Nomenclature and Terminology</u>	<u>D-2. Investigate the Cartesian Coordinate System as Applied to Milling and Laser Machines</u>	<u>D-3. Apply CNC Programming Language</u>	<u>D-4. Perform Start Up, Tool Changing, and Ending of Programs</u>
	<u>D-5. Perform Positioning and Basic Drilling</u>	<u>D-6. Create a Sub-Program</u>	<u>D-7. Perform Contouring</u>	<u>D-8. Apply Tool Radius Compensation (Cutter Comp)</u>
	<u>D-9. Perform Programming Preparation</u>	<u>D-10. Apply Special Laser Coding Parameters</u>		
E. INVESTIGATE INDUSTRIAL LASER SYSTEMS	<u>E-1. Study Characteristics of Light</u>	<u>E-2. Understand Basic Laser Principles</u>	<u>E-3. Study Laser Output Characteristics</u>	<u>E-4. Investigate Output Modification</u>
	<u>E-5. Apply Safety and Laboratory Procedures</u>	<u>E-6. Perform a Laser Exposition</u>	<u>E-7. Perform Laser Alignment, Gauging, and Inspection</u>	<u>E-8. Investigate Holography and Applications: Non-Destructive Testing</u>
	<u>E-9. Investigate the Interaction of High Power Laser Beam with Materials</u>	<u>E-10. Perform Laser Welding and Surface Treatment</u>	<u>E-11. Perform Laser Material Removal</u>	
F. PERFORM COMPUTER AIDED DRAFTING (CAD)	<u>F-1. Understand PC Basics</u>	<u>F-2. Discuss CAD Basics and File Management</u>	<u>F-3. Use Drawing Settings</u>	<u>F-4. Perform Basic Editing Commands</u>
	<u>F-5. Create Drawings with Accuracy</u>	<u>F-6. Organize Drawing Information</u>	<u>F-7. Control the Display of Drawings</u>	<u>F-8. Use Intermediate Drawing Commands</u>
	<u>F-9. Perform Intermediate Editing Commands</u>	<u>F-10. Create Multiview Drawings</u>	<u>F-11. Create Sectioned Drawings</u>	<u>F-12. Investigate Basic Dimensioning</u>
	<u>F-13. Perform Advanced Dimensioning</u>	<u>F-14. Use and Manipulate Blocks</u>	<u>F-15. Use Blocks to Automate the Drawing Process</u>	

G. PERFORM LASER MATERIALS PROCESSING	<u>G-1. Discuss Traditional Mechanical Machining</u>	<u>G-2. Discuss Non-Traditional Methods of Machining</u>	<u>G-3. Understand Basics of Laser Heating</u>	<u>G-4. Investigate the Effects of Laser Irradiation on Materials including:</u>
	<u>G-5. Demonstrate Machine Operations including:</u>	<u>G-6. Study Hazards and Safety including:</u>		
H. PERFORM COMPUTER AIDED MANUFACTURING (CAM)	<u>H-1. Understand the Basics of a PC Based CAM System</u>	<u>H-2. Discuss Basic CAM Operations</u>	<u>H-3. Set Up Cutting Tools</u>	<u>H-4. Create Part Profiles</u>
	<u>H-5. Edit Part Profiles</u>	<u>H-6. Perform Advanced Editing of Part Profiles</u>	<u>H-7. Edit Tool Paths</u>	<u>H-8. Perform Drilling and Counterboring</u>
	<u>H-9. Use Construction Layers in SmartCAM®</u>	<u>H-10. Perform User Commands and Machine Events</u>	<u>H-11. Create Families of Parts</u>	<u>H-12. Perform CAD/CAM Integration</u>
	<u>H-13. Perform Code Generation</u>			
I. PRACTICE LASER SAFETY	<u>I-1. Discuss Laser Safety Basics</u>	<u>I-2. Discuss Laser Hazards including:</u>	<u>I-3. Study Laser Safety Standards and Hazard Classifications (i.e., ANSI Z136.1 Standards)</u>	<u>I-4. Investigate Controls for Surveying, Alignment and Leveling Lasers</u>
	<u>I-5. Discuss Eye Protection including:</u>			
J. PERFORM MEASUREMENT AND INSPECTION	<u>J-1. Study Basics of Metrology</u>	<u>J-2. Select Instruments Used for Measurement</u>	<u>J-3. Interpret Limits and Tolerances</u>	<u>J-4. Select Gaging Tools</u>
	<u>J-5. Use CMM for Location of Features</u>	<u>J-6. Perform Surface Metrology</u>	<u>J-7. Perform Measurement by Comparison</u>	<u>J-8. Perform Circularity, Cylindricity, Profile of a Line, and Runout Measurements</u>
	<u>J-9. Investigate Advanced Metrology Topics</u>			

Last modified by

Brad Whittington

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Automated Equipment Repair (CIM)

Competencies Profile

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operates, programs, maintains, and repairs automated machine tools and automated manufacturing processes

A. APPLY SCIENCE TO SOLVE INDUSTRIAL PROBLEMS	<u>A-1. Apply Scientific Notation and Engineering Notation to Solve Technical Problems</u>	<u>A-2. Apply Algebraic Formulas to Solve Technical Problems</u>	<u>A-3. Use Variables in Algebra to Predict Behavior of In</u>
	<u>A-5. Use Physics, Algebra, and Trigonometry to Analyze Simple Vectored Forces</u>	<u>A-6. Use Mechanical Physics to Analyze Mechanical Industrial Systems</u>	<u>A-7. Measure, Calculate, Quantities in English and mks) Systems</u>
	<u>A-9. Use Math and Thermodynamics to Analyze Problems Found in Industrial Heat Treating Systems</u>	<u>A-10. Use Math, the Physics of Electromagnetism and Optics to Analyze Industrial Systems</u>	<u>A-11. Use Math, Physics, Measurements to Determi Quantities</u>
	<u>A-13. Use Proper Lab Procedures to Test Chemicals Used in Industrial Processes</u>	<u>A-14. Use Chemical Formulas to Predict and Analyze Reactions in Industrial Processes</u>	<u>A-15. Use Proper Labora Test the Properties of Ele Compounds</u>
	<u>A-17. Apply Properties of Water to Analyze Industrial Water Treatment Processes</u>		
	B. USE DRAWINGS TO ANALYZE AND REPAIR SYSTEMS	<u>B-1. Use Symbols, Organization, and Engineering Values on Mechanical Drawings</u>	<u>B-2. Use Symbols, Organization, and Engineering Values on Electrical Drawings</u>
<u>B-5. Use Symbols, Organization and Engineering Values on Digital Drawings</u>			

C. USE CALIBRATED MEASURING INSTRUMENTS TO TEST/CALIBRATE COMPONENTS	<u>C-1. Apply Machine Tool Metrology and Measurement Instruments to Align Machine Tools</u>	<u>C-2. Apply Electrical Measurement Knowledge and Instruments to Test/Calibrate Electrical Circuits</u>	<u>C-3. Apply Electronic Measurement Knowledge and Instruments to Test/Calibrate Electronic Circuits</u>
	<u>C-5. Apply Digital Electronic Measurement Knowledge and Instruments to Test/Calibrate Digital Electronic Circuits</u>		
D. EXPLAIN TEST RESULTS TO TEAM LEADERS, ENGINEERS, CUSTOMERS, AND OTHER TECHNICIANS	<u>D-1. Use Written English Language; Write Complete Proper Sentences</u>	<u>D-2. Use Written English Language to Effectively Communicate Results of Technical Tests and Instructions</u>	<u>D-3. Use a Word Process Information from Various Write Effective Reports</u>
E. RESOLVE SYSTEM FAILURES WITH CRITICAL THINKING, TROUBLESHOOTING, THEORY AND METROLOGY	<u>E-1. Identify Nature/Purpose of a System, Subsystem, Module, or Component in a Complex Manufacturing Machine/Process</u>	<u>E-2. Apply Theory to Predict Behavior of a Complex Manufacturing Machine or Process</u>	<u>E-3. Measure Complex Manufacturing Machine/Process to Determine Meeting Theoretical Expectations</u>
	<u>E-5. Apply Critical Thinking to Determine If System Is Malfunctioning or If Process must Be Reapplied</u>	<u>E-6. Validate the Process and Apply Corrective Action</u>	<u>E-7. If Corrective Action Result in Repair of System Process</u>

F. USE TECHNIQUES TO ISOLATE MALFUNCTION OF ELECTRONIC SYSTEMS	<u>F-1. Calculate, Predict, and Measure the Response of Quantities in DC Circuits</u>	<u>F-2. Calculate, Predict, and Measure the Response of Quantities in AC Circuits</u>	<u>F-3. Calculate, Predict, and Measure Impedance and Phase Angle in AC Circuits</u>
	<u>F-5. Properly Set-up, Calibrate, and Use Meters and Oscilloscopes</u>	<u>F-6. Use Components Such as Resistors, Inductors, and Capacitors; Construct Circuits and Test Components</u>	<u>F-7. Use Meters/Oscilloscopes to Measure Phase Shift or AC Circuits</u>
	<u>F-9. Use Meters and Oscilloscopes to Test Magnetically Coupled Devices</u>	<u>F-10. Apply Principles of DC Electrical Motors to Identify Types of DC Motors</u>	<u>F-11. Apply Principles of Motors to Identify AC Motors</u>
	<u>F-13. Use Meters or Oscilloscopes to Test Bipolar Transistors and Power MOSFETs</u>	<u>F-14. Use Meters/Oscilloscopes to Test Power Control Semiconductors and Their Triggering Devices</u>	<u>F-15. Use Meters/Oscilloscopes to Test Power Supply Circuits, in Rectifiers/Filtering Circuits and Phase DC Power Supplies</u>
	<u>F-17. Use Schematics and Meters or Oscilloscopes to Differentiate Between Various Types of DC Motor Control Circuits and Replace and/or Troubleshoot and Repair These Motor Controls</u>	<u>F-18. Use Schematic Diagrams and Meters or Oscilloscopes to Identify Advanced Motor Controls That Contain Newer Types of Semiconductor Devices, to Troubleshoot and Repair These Motor Controls</u>	<u>F-19. Apply Semiconductor Amplifier Concepts to Troubleshoot, Replace or Repair the Motor Controls</u>
	<u>F-21. Use Schematic Diagrams and Meters or Oscilloscopes to Test Sensors</u>		

G. MEASURE/ISOLATE MALFUNCTIONS OF MECHANICAL /FLUID POWER SYSTEMS	<u>G-1. Know the Purpose and Use of Major Systems That Comprise a Hydraulic/Pneumatic System to Troubleshoot Components or Systems</u>	<u>G-2. Apply Purpose and Use of Valves in a Hydraulic or Pneumatic System to Troubleshoot Components or Systems</u>	<u>G-3. Use Formulas and M Calculate Quantities in H Pneumatic Systems</u>
	<u>G-5. Test the Condition and Behavior of Fluids in a Fluid Power System</u>	<u>G-6. Use the Knowledge of Flow; Measure Flow in a Fluid Power System</u>	<u>G-7. Calculate, Measure, Troubleshoot Hydraulic a Accumulators</u>
	<u>G-9. Identify, Assemble, Measure, and Apply Knowledge of Operating Characteristics of Selected, Specialized Fluid Power Circuits</u>	<u>G-10. Identify, Assemble, Measure, and Apply Knowledge of Operating Characteristics of Electrically Operated, Specialized Fluid Power Circuits</u>	<u>G-11. Understand and Us Instruments and Troubles Methods for Fluid Power</u>
	<u>G-13. Use Laws of Simple Machines and Physics to Troubleshoot Gearing Systems</u>		
H. APPLY COMPUTER SCIENCE TO COMPUTER CONTROLLED INDUSTRIAL EQUIPMENT	<u>H-1. Convert Mathematical Quantities in Digital Numbering Systems</u>	<u>H-2. Perform Mathematical Operations in Digital Numbering Systems</u>	<u>H-3. Read Digital Symbol it to Control of Digitally Equipment</u>
	<u>H-5. Solve Digital Logic Circuits and Ladder Diagrams in Electrical and Programmable Logic Control Circuits</u>	<u>H-6. Express a Complex Logic Problem in Boolean and Convert it into Ladder Logic</u>	<u>H-7. Use Various Progra and Boolean Algebra to P Computer Controlled Ind Equipment</u>

<p>I. CORRECT MALFUNCTIONS IN PLC CONTROLLED INDUSTRIAL EQUIPMENT</p>	<p><u>I-1. Use a Data Entry Device to Set up and Configure a PLC/PIC to Control Digital and Analog Input/Output Points</u></p>	<p><u>I-2. Set Up/Configure PIC/PLC as Part of the Control System of CNC Machine/Robot to Control Digital and Analog I/O Points</u></p>	<p><u>I-3. Use Equipment Manufacturer's Specifications and Test Digital and Analog on a PLC or PIC</u></p>
<p>J. RESOLVE MALFUNCTIONS FOUND IN COMPUTER SYSTEMS CONTROLLING MANUFACTURING PROCESSES</p>	<p><u>J-1. Operate Different Classes of Personal Computers</u></p>	<p><u>J-2. Maintain Hardware/Software of a Personal Computer</u></p>	<p><u>J-3. Configure and Troubleshoot Communications Interfaces</u></p>
<p>K. ASSEMBLE/DISASSEMBLE MECHANICAL, ELECTRICAL, ELECTRONIC, AND COMPUTER SYSTEMS</p>	<p><u>K-1. Safely Assemble or Disassemble Mechanical Systems Such as Gearing Systems, Shafts, Couplings, Pulleys, Belts</u></p>	<p><u>K-2. Adjust Mechanical Systems Such as Gearing Systems, Shafts, Couplings, Pulleys, and Belts</u></p>	<p><u>K-3. Safely Assemble or Disassemble Subsystems or Components of Power Systems</u></p>
	<p><u>K-5. Safely Assemble or Disassemble Electrical Systems or Components</u></p>	<p><u>K-6. Adjust Electrical Systems or Components</u></p>	<p><u>K-7. Safely Assemble or Disassemble Electronic Systems or Components</u></p>
	<p><u>K-9. Safely Assemble or Disassemble Digital Systems or Components Such as PLCs, CNCs or Computers</u></p>		
<p>L. USE TEAMWORK TO ACCOMPLISH JOB TASKS AND CONTRIBUTE TO SUCCESS OF THE COMPANY</p>	<p><u>L-1. Participate in Team Projects and Contribute to Success of the Team and the Project</u></p>	<p><u>L-2. Participate as a Member of Manufacturing Enterprise and Contribute to Success of the Company</u></p>	<p><u>L-3. Apply Cooperation and Management Techniques as a Member of the Team and Contribute to Success of the Company</u></p>

Last modified by

Brad Whittington

Machine Tool Advanced Skills Curriculum Project Deliverables

BOOK 1: Executive Summary

BOOK 2: Remediation and General Education Courses

BOOK 3: Machining (Core) Courses

BOOK 4: Manufacturing Engineering Technology

BOOK 5: Mold Making

BOOK 6: Welding

BOOK 7: Industrial Maintenance

BOOK 8: Sheet Metal

BOOK 9: Tool and Die

BOOK 10: Computer-Aided Drafting and Design (CADD)

BOOK 11: Computer-Aided Manufacturing (CAM) and Advanced CNC

BOOK 12: Instrumentation

BOOK 13: Laser Machining

BOOK 14: Automated Equipment Repair Technician (CIM)

BOOK 15: Administration Book

*Last modified by
Wallace Pelton*

Partner Occupational Speciality Assignments

Although each of the six partner college development centers possessed detailed expertise in each of the MAST 15 occupational specialities, a division of work was still very necessary to ensure completion of the project due to the enormity associated with industrial assessment and complete curriculum revision for each of the areas of investigation.

Each Collegiate Partner was responsible for development of a specialization component of the overall model. Information for the future direction of this specialization area was obtained from NIST Manufacturing Centers and/or national consortia, professional societies, and industrial support groups addressing national manufacturing needs. Each Collegiate Partner tested its specialization model utilizing local campus resources and local industry. Information gained from the local experience was utilized to make model corrections. After testing and modification, components were consolidated into a national model. These events occurred during the first year of the Program. During the second year of the Program, the national model was piloted at each of the Collegiate Partner institutions. Experience gained from the individual pilot programs was consolidated into the final national model.

The following Partner Occupational Speciality Assignments matrix breaks out the primary and secondary responsibilities by center and speciality. All partners had final review responsibility to ensure all unique regional aspects were taken into consideration in the complete model.

MAST Partner College Occupational Speciality Matrix

Speciality	TSTC	Itawamba	Augusta	Moraine Valley	CACT	Springfield
Manufacturing Engineering Technology (MET)	1	2				
Machining (MAC)	1	2				
Electrical Discharge Machining (EDM)	1	2				
Superabrasives (SAG)	1	2				
Mold Making (MLD)	1	2				
Welding (WLD)	2			1		
Industrial Maintenance Mechanics (IMM)			1	2		
Sheet Metal (SML)	1				2	
Composites (COM)	1	2				
Tool and Die (TLD)	2	1				
Computer Aided Drafting (CAD)		2	2	1		
Computer Numeric Control /CAM (CNC)		2	2		1	2
Instrumentation (INT)			1		2	
LASER Machining (LSR)	2					1
Automated Equipment Technician/CIM (CIM)				2	1	
General Education	1					

1 = College with Primary Responsibility
2 = College(s) with Supporting Responsibility

Each partner college has the responsibility to review all documentation for each of the occupational specialties.

CRITIQUE

TO: JOE PENICK, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST STEERING COMMITTEE MEETING
APRIL 24-25, 1996**

Formative Evaluation Summary:

- The following criteria were established for the evaluation of the MAST Program:
 - Qualitative measures of Industrial Assessment Phase for development of skill competencies
 - Quantitative and Qualitative measures evaluating course material during Curriculum Development Phase
 - Appropriate evaluation of student achievement during the Pilot Program
- A program such as MAST is a collaborative effort between the program administrators and the partners -- education and industry. It is a continuing and iterative process throughout the life of the program. The process has been central to the development and success of this program.
- The nature of the MAST program is non-quantitative and therefore lends itself to qualitative analysis. The notion of quality includes the following criteria:
 - Advances the state of understanding about a topic (making a contribution)
 - Develops a framework for further research on the topic
 - Exceeds the standard of a field of study
 - Influences a variety of publics who are the target group
 - Influences the profession
- This evaluator for the formative aspects of the MAST Program has been able to observe, participate, provide feedback, and analyze the multiple variables of this program over an extended period of time. The involvement provided the

opportunity to respond to organizational processes and clarify action items particular to the partners -- education and industry.

- The following matrix is provided to illustrate the success of the MAST project. In particular, the matrix is designed to cross match the major program criteria with the quality criteria.

QUALITY CRITERIA

PROGRAM CRITERIA	Advances Understanding	Develops Research	Exceeds Standards	Influences Publics	Influences Profession
Meets expectations: Educators	X	X	X	X	X
Industry	X	N/A	X	X	N/A
New Curriculum Ideas Developed	X	X	N/A	N/A	X
Potential Utilization: Public Schools	X	X	X	X	X
Higher Education	X	X	X	X	X
Industry	X	N/A	X	X	N/A
Successful Pilot Testing	X	X	X	X	X
Broad Dissemination	X	X	X	X	X
Has Follow-up Potential	N/A	X	N/A	X	X
Initial Objectives Match Actual Outcomes	X	X	X	X	X

- In summary, the MAST Program has met and exceeded its original goals.
- The Industrial Assessment Phase has involved industry partners from a broad geographic region of the country and has several thousand industries involved in the review process. A significant value-added of this program is the input and validation by so many industries covering all areas of the country. It is this evaluator's judgment that the outcomes of this program can be truly called the result of a national study.
- The course material has been through several iterations of design and development by the program partners. The course content and skill standards have been

reviewed and validated by the program industry partners. Of particular significance is the cross referencing of Skill Standards with SCANS Competencies and Foundation Skills.

- The Pilot Program and Career Action Plan was one of the last objectives addressed in the program as it was dependent on knowledge gained from the skills standards development process. It was really unrealistic to expect to determine student achievement as a result of a program of such short duration. It is appropriate, however, to state that program assessment by students, teachers and counselors was very positive. This outcome clearly leads to strong consideration for future study in positive relationship to the qualitative criteria.
- The Program administrative staff are to be commended for their exemplary and creative effort in accomplishing the goals of the program on time and within budget.
- The Program educational partners have fulfilled all of their agreed upon commitments. They have contributed significantly to the process which has created a new standard for technical skills curricula.
- The industry partners have contributed time, human resources, knowledge, and experience which forms the basic content of the proposed curriculum and without which a national consensus would not exist.

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

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To	Joe Penick	From	Marie Baker
Dept./Agency	TSTC	Phone #	202-205-9379
Fax #	817-867-3380	Fax #	
NSN 7540-01-317-7388		5099-101	GENERAL SERVICES ADMINISTRATION

MEMORANDUM FOR: JACKIE W

FROM: MARIE BL

SUBJECT: TEXAS STATE TECHNICAL COLLEGE
(TSTC) GRANT- PROJECT DELIVERABLES

DATE: MAY 17, 1996

Jackie, here is some information on a truly excellent grant in the Manufacturing Technologies program. The MAST project will end September 30, 1996. The deliverables consist of fifteen volumes, fourteen of which contain a forward, duty/task/ subtask outline, course listing/course descriptions, technical competency/course crosswalk, "SCANS"/ course crosswalk. individual course syllabi, industry competency profiles and pilot program narrative. The first volume is an executive summary - a portion of which I have included for your review.

The project has received an additional grant from National Science Foundation (NSF) to continue their work on text review and revision, update laboratory experiences, and development of capstone experiences. In addition, during the term of our grant, they received a grant to establish Internet connectivity and homepage development. The Internet capability has been established for several months now and last week, Joe Penick, the project director, informed me that they receive approximately 250 'hits' per day on their homepage. They have also received requests for information from 350 community colleges. With the enormous interest this project has generated and the requests received for copies of the deliverables, they are entertaining the idea of publishing the executive summary (volume 1) in hard copy and including in this a CD ROM disk containing the fourteen volumes of specialty area information. (\$26.00 per set vs. \$95-102.00 for printing and shipping the full set)

The project director is also writing two proposals. One, a JTPA Summer Youth program grant which would coordinate academics (remediation if necessary) and machinist courses coupled with campus work assignments. The second is a Dept. of Labor One-Stop-Shop grant utilizing TSTC's industry competency profiles as a correlation between employer needs and job seekers - potential candidates can compare their skills with the skills required for a particular position and can also couple their skill deficiencies with particular courses developed at TSTC.

Mr. Penick and Wallace Pelton, site coordinator, will be here Tuesday, June 18, 1996, to review the deliverables. I would also like them to make a brief presentation to interested OVAE staff at this time. Mr. Penick is a dynamic and energetic director and under his direction, I feel that this project has become an exemplary model of what Department awardees can achieve. I am excited about their accomplishments and felt that as Community College Liaison you would have an interest in the Dept. of Education project as well as the related initiatives.

CRITIQUE

TO: JOE PENICK, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST STEERING COMMITTEE MEETING
NOVEMBER 16, 1995**

Major Themes:

- Partner institutions are progressing on development of curriculum materials. January 31, 1996 is still a reasonable complete date.
- Some confusion still exists on the role of partners in the development of the Summer Career Program. TSTC should develop a proposed program to be presented at the next partners meeting in January. Consideration should be given to distributing the package to public school counselors and teachers with in-service training on how to use the materials presented by partners. This would be in place of actually teaching and courses during the summer. The grant needs to be reviewed to determine if this approach is appropriate.
- TSTC will develop a draft proposal for the Remote Site Training package and present it to the partners at the January meeting. San Diego will assist by providing a CD-ROM example.
- The partners support the format and development of the Internet materials.
- The Texas industry survey needs to be completed in a timely manner.

Futures File:

- Need SCANS definitions included in the curriculum guides.
- Develop a plan for partners to assist in industry survey follow-up.
- Develop a generic video for general distribution at completion of project.
- Partners should develop a final marketing/dissemination plan at the next meeting.

Overall Program Evaluation:

- The program is progressing well as a result of the organization brought to the project by Mr. Penick. Baring unforeseen circumstances, the project should be completed on schedule with all deliverables.

CRITIQUE

TO: JOE PENICK, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST STEERING COMMITTEE MEETING
AUGUST 28-29, 1995**

Major Themes:

- The Steering Committee visited with key personnel at Sandia and Livermore National Labs. A comprehensive tour of labs and project awareness illustrated new technology applications coming on line.
 - Much effort was demonstrated in the area of lasers.
 - Additional skill assessments are available from Sandia and Livermore personnel.
 - Personnel were very clear on the need for articulated programs with secondary schools.
- The MAST partners reviewed the current status of the Occupational Skill Standards and Competency Profiles.
 - There is clear evidence that the profiles are coming together.
 - There is a need to standardize the industry selection and validation process. A general consensus for the process was established. TSTC needs to finalize and disseminate to the partners.
 - The format for course outlines needs to be determined. There should be absolute consistency among the partners with regard to course syllabi.
 - A process for documenting secondary school involvement should be developed. All partners should report their interactions in a consistent format.

Futures File:

- The Steering Committee for MASTER should include one or more representatives from the National Laboratories.

- What kind of secondary school curriculum and at what level is a long-term critical success factor relevant for future study?

Overall Program Evaluation:

- The Annual Report is comprehensive and clearly details all of the work during Year 1. Care must be exercised during Year 2 to continue to relate activities to the program proposal for deliverables and measures.
- This is the time in the program when “detail” becomes important for the development of the final project documents.

CRITIQUE

TO: DR. HUGH K. ROGERS, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST STEERING COMMITTEE MEETING
JULY 14, 1995**

Major Themes:

- Status report of Occupational Skill Standards and Competency Profiles:
 - Potential for dissemination/implementation block grant from State of Texas. Steering Committee represents a critical mass -- industry, school, college representation, to leverage a grant award. Consider submitting proposal in next 12 months.
 - Critical success factors have been identified.
 - Development Centers are providing assigned standards and competencies.
 - Format for material presentation is thorough, detailed and easily interpreted.
 - There have been two national dissemination opportunities in the last few months -- CIMHE in Tulsa and NCATC in Pennsylvania.
 - Recruitment video has been significantly improved and was praised by Steering Committee.
- Public School Involvement:
 - The need to recruit students received considerable positive discussion with both industry representatives and school personnel sharing ideas, i.e.,
 - ▶ *Perception of machinist as quality career*
 - ▶ *School counselors' lack of knowledge about manufacturing*
 - ▶ *Cultural issue with parents who only think college*
 - ▶ *Teachers use college as motivator*
 - ▶ *Schools seek job shadowing and internship experiences for students*
 - ▶ *Need more parent involvement*

Futures File:

- Develop competency profiles for high school graduates articulating into manufacturing technology programs.
- Develop seamless articulation model -- high school, to certificate, to associate degree, to bachelor degree.
- Strengthen the student recruitment process for manufacturing technologies.
- Industry analysis of business paradigms which inhibit student internship opportunities -- separate myths from realities.

Evaluation:

- The Steering Committee was very participatory in the session. Feedback was positive and optimistic about the future of the program and outcomes implementation. The development centers continue to make progress on their assignments and the work-in-process by the host team is outstanding.

Overall Program Evaluation:

- The MAST Project is on schedule with regard to the "evaluation plan."
- The MAST Steering Committee has identified the critical success factors which will enable program completers to be successful entry-level employees. Skills competency development is on track in preparation for global validation.
- The curriculum phase is well under way with an excellent format developed which references competencies and SCANS skills with course syllabi.
- The Steering Committee has developed excellent rapport with public school program participants. School leadership has committed to active involvement in the program. Discussion has resulted in the identification of significant follow-up programs as a result of MAST.

CRITIQUE

TO: DR. HUGH K. ROGERS, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST COMMITTEE MEETING
MAY 21-22, 1995**

Major Themes:

- Review of first draft of MAST curriculum document
 - High praise on part of program participants for format and layout of curricula.
 - All program participants in attendance agreed to use curricula format.
- Development Center updates
 - Texas State Tech and San Diego are most advanced in curriculum development.
 - Springfield and Moraine are prepared to submit first drafts of technical skills assessments and curriculum skills
 - Augusta and Itawamba are making progress toward industry analysis and subsequent curriculum skills.

Futures File:

- Remind participants of project time line and request copies of data collection, analysis and curriculum skills.
- Initiate monthly conference calls to involve all six participants and to assure progress.

CRITIQUE

TO: DR. HUGH ROGERS, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST MEETING AT OAK RIDGE CENTER FOR MANUFACTURING TECHNOLOGY
FEBRUARY 17, 1995**

Major Themes:

- Overview of Center for Manufacturing Technology
 - Tour: Skills Training Program
 - ▶ Concurrent Engineering Center
 - ▶ Machine Tool Center
 - ▶ Metrology Center
 - Evaluation: Evidence of excellent prior planning to maximize time
 - ▶ Oak Ridge personnel well prepared
 - ▶ Excellent opportunity for questions
 - ▶ Everyone could hear group presenters
 - ▶ Good networking between Center and MAST participants
- MAST Program Review and Planning
 - Mast Development Center Updates
 - ▶ All six centers are making progress toward project objectives.
 - ▶ Clarification of data collection process and format for recording data was essential to this meeting.
 - ▶ San Diego, Springfield, and Moraine have developed curriculum in advance of industry data. CAUTION must be exercised to see that industry visits are to collect baseline data rather than validate new courses.
 - ▶ The schedule for completion of the project Phase I by late summer may be overly ambitious given the current level of work by the development centers.

Futures File:

- Review preliminary data gathering outcomes from each development center to assure consistency.

- Provide generic list of questions to guide discussion during industry visits
- Initiate monthly conference calls for progress check.
- Establish time and location for next meeting now to assure full attendance and participation.

CRITIQUE

TO: DR. HUGH ROGERS, MAST PROJECT DIRECTOR

FROM: DR. JAMES HALES, FORMATIVE EVALUATOR

**SUBJECT: MAST STEERING COMMITTEE MEETING
JANUARY 20, 1995**

Major Themes:

- Human issues - quality, ethics, safety, teamwork, loyalty
- Project management skills
- Broad understanding of manufacturing plus technical skills
- Communication skills
- Schools - cooperative learning, distance learning
- Parent involvement
- Ability to change for changing careers
- Technical programs/careers not well known to teachers and students

Positive Aspects:

- Good representation of college/industry/educational partners
- Good participation by industry/education representatives
- Meeting kept on schedule
- Good luncheon
- Tour of facilities highlighted MAST program areas at college

Areas for Improvement:

- Presenters did not seem to understand their assignment
- Educators did not get status of presenting from up front

- Participants did not leave meeting with assignment or good knowledge of next step

Futures File:

- Technological literacy program for public schools
- Integrate human issues into technical curriculum

For more information:

**MAST Program Director
Texas State Technical College
3801 Campus Drive
Waco, TX 76705**

**(817) 867-4849
FAX (817) 867-3380
1-800-792-8784
<http://machinetool.tstc.edu>**

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