POTATO PROCESSING
INTERNATIONAL

Supporting the potato industry worldwide

Issue 4 • Volume 30 • 2022

Spotlight
Efficient Use of Resources Equals Profitability

Process
Forming Potato Products to Perfection

Ingredients
Breadings & Batters

Markets
Potato Starch: Steady Boat in Turbulent Waters

POTATOBUSINESS

#digitalmedia

#news
www.potatobusiness.com

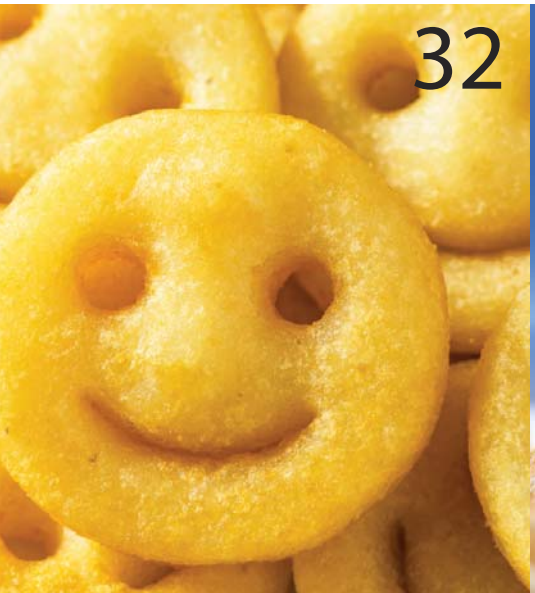
#exclusive content
Potato Business Digital

#insights
Dossier

#industry updates
Newsletter

#customization
e-Blasts

Contents



Why 'Food Processing' Is Confusing to Consumers

Tudor Vintiloiu - Editor in chief
email: tudor.vintiloiu@trade.media, Skype: tudor.vintiloiu

Food, nutrition and health experts don't always agree on terms and concepts surrounding processed foods, according to new research from the University of Surrey. The research, published in Frontiers in Nutrition, suggests that food scientific experts and stakeholders need to quickly reach a consensus when it comes to processed foods to benefit consumers and improve health outcomes.

The research highlighted the ambiguity and confusion surrounding terms such as "processing", ultra-processed", and even "healthy" foods.

Christina Sadler, a postgraduate researcher and PhD candidate at the University of Surrey and Senior Manager at the European Food Information Council, said:

"There is agreement that food processing can be part of the solution to provide enough food for the population's nutritional needs and reduce the environmental impact on the planet, but confusion still exists among experts on what role it should play in the food system. A lack of consensus about the classification of food processing and processed food may lead to conflicting information and hinder progress towards these goals. That is why we are recommending further collaboration between all those with a professional interest in food, particularly if they want to be seen as trustworthy sources when offering advice to the wider public."

We need to quickly identify the root issues, while viewing food processing as part of a complex food system, to understand how processing can be optimized towards the goal of equitable, safe, sustainable, and healthy diets.

"We need to quickly identify the root issues, while viewing food processing as part of a complex food system, to understand how processing can be optimized towards the goal of equitable, safe, sustainable, and healthy diets."

The research also identified a lack of consensus about the scope of processing, the degree of processing and the aspects used to evaluate the healthiness of processed foods. Perceived conflicts of interest and different areas of expertise within this broad topic may be why clear communications about processed foods are hard to come by and why it is difficult to frame the risks and benefits of food processing. ●

Tudor Vintiloiu (editor in chief)
email: tudor.vintiloiu@trade.media
Tel: +40 721 277 042
Skype: tudor.vintiloiu

Ionel Vaduva (on-line editor)
email: ionel.vaduva@trade.media
Tel: +40 21 315 9031
Skype: ionel.vaduva

Cristina Nae (advertising sales director)
email: cristina.nae@cmgromania.ro
Tel: +32 499 731 114/+40 725 409 997

Marian Cilibeanu (production manager)
email: production@trade.media

Simona Dumitrescu (circulation manager)
simona.dumitrescu@trade.media

Raluca Canescu (publisher)
raluca.canescu@trade.media
Tel: +40 21 315 90 31
Skype: raluca.canescu

Nicoleta Marasescu (managing director)
nicoleta.marasescu@trade.media
Tel: +40 723 452 329
Skype: nicoleta.marasescu

Contributing writers
Jonathan Thomas, Cedric Porter, Nora Olsen, Mintel Group LTD, Euromonitor International, Future Market Insights, AHDB, Persistence Market Research

(IT Support)
email: admin@trade.media

Editorial office:
Trade Media Solutions SRL,
G-ral David Praporgescu Street, no.1, District 2, Bucharest, 020965, Romania
Tel: +40 21 315 9031
www.mediatrade.ro

Printed by: Sothis
ISSN: 0968-7661

facebook
Like our page and join our online community: www.facebook.com/**Potatobusiness**

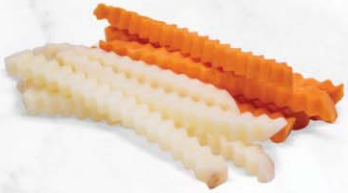
twitter
Follow us on Twitter: http://twitter.com/**potatobusiness**
We will update regularly on our activities, upcoming features and show attendance.

LinkedIn
Join our group on LinkedIn search for: **PPI News**

Trade Media SOLUTIONS

Annual subscription:
1 year €120 and 2 years €210
Subscribe online: www.potatobusiness.com/subscribe
Email: subs@mediatrade.ro
or Telephone: +40 21 315 90 31.
Visit our website: **www.potatobusiness.com**






Explore

Intelligent Cutting Solutions




Urschel manufactures intelligent, sanitary food cutting machinery responsive to your processing needs and environment. Rugged design withstands harsh production conditions while maintaining precision cuts. Limited maintenance with the ability to run continuously for uninterrupted production presents significant cost-savings.

As The Global Leader in Food Cutting Technology, Urschel provides cutting solutions for all types of potato applications.

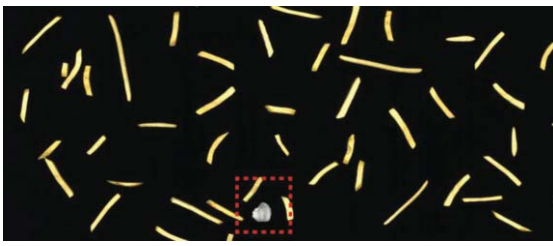
Contact Urschel to achieve your processing goals.

#1 Best selling provider of industrial cutting machinery throughout the world.

URSCHEL®
The Global Leader in Food Cutting Technology

Set up a free test-cut of your product.
www.urschel.com

AI-driven FM Alert Software for Key Technology's DSS



Key Technology, introduces AI-driven FM Alert software for their digital sorting systems at Pack Expo booth S-3547. This powerful tool captures and saves digital images of critical FM contaminants detected by the sorter and rejected from the product stream.

The software's data outputs can be used to immediately alert operators and/or signal a downstream device. FM Alert with AI assists processors in better controlling FM and improving documentation to protect food safety.

"Thanks to the application of advanced artificial intelligence, our new FM Alert software achieves uniquely accurate results – identifying, recording, and acting on true FM findings on the line. The food processing industry continues to focus more and more on elevating food safety. By making the product safer, this effective FM-fighting tool helps customers protect their brand's reputation and avoid costly recalls. Every food processor wants to prevent contamination, making FM Alert universally beneficial across all applications," Marco Azzaretti, director of Marketing at Key said.

The new AI-driven FM Alert is an option available on every new Key digital sorter including VERYX and is available as a field upgrade for all installed Key sorters.

Romain Cools Retired from WPC

Following 16 years of dedicated service to the World Potato Congress Inc.'s Board of Directors, and the past four years as President, Romain Cools has decided to retire from WPC and stepped down as President and CEO of the World Potato Congress (WPC) Inc. on July 1, 2022.

According to his announcement, John Griffin became the new President and CEO of the World Potato Congress (WPC) Inc.

"John Griffin has been involved with the WPC Board of Directors since 2007 and for the past four years, he has served as Vice-President of the World Potato Congress Inc. Mr. Griffin resides in Elmsdale, Prince Edward Island, Canada. Mr. Griffin brings with him a vast knowledge of the potato industry as President of WP Griffin Inc., a family-owned grower, packer, and shipper of potatoes. WP Griffin Inc. packages many different types of potatoes in various sizes and most recently launched microwaveable mini potatoes with various spices," Romain Cools declared.

McCain Foods Secures Resson's Predictive Crop Intelligence Technologies

McCain Foods has secured Resson's predictive crop intelligence portfolio, an analytics technology firm that improves farming efficiency. Resson's vision-intelligence-based technologies use field data imagery to help farmers make better decisions, resulting in increased productivity from every acre of land.

McCain has been working with Resson for the past nine years as an early investor in digital agriculture technologies to develop algorithms that forecast farm yields based on the assessment of potato fields and crop development using remote sensing technologies. This acquisition will give these technologies scale as McCain expands the service by investing in its growth and collaborating with Resson's current customers to help growers and food processors manage crop production more efficiently.

No Foreign French fries for the Russian Vkusno & tochka

According to the head of the company that now runs the former McDonald's Corp chain of restaurants in Russia, producers of French fries are refusing to supply the country, and attempts to increase domestic processing are highly problematic.

McDonald's exited Russia in May following a Western backlash against Moscow's military campaign in Ukraine, which included a slew of economic sanctions. It sold all of its restaurants to a local licensee.

On June 12, restaurants began opening under the name Vkusno & tochka, or "Tasty and that's it." The new owners were quick to emphasize that high-quality standards would be maintained, if not improved, and that customers would notice little difference. It has since been forced to admit that it will face a French fry shortage until autumn, blaming a poor harvest in Russia and supply chain issues.



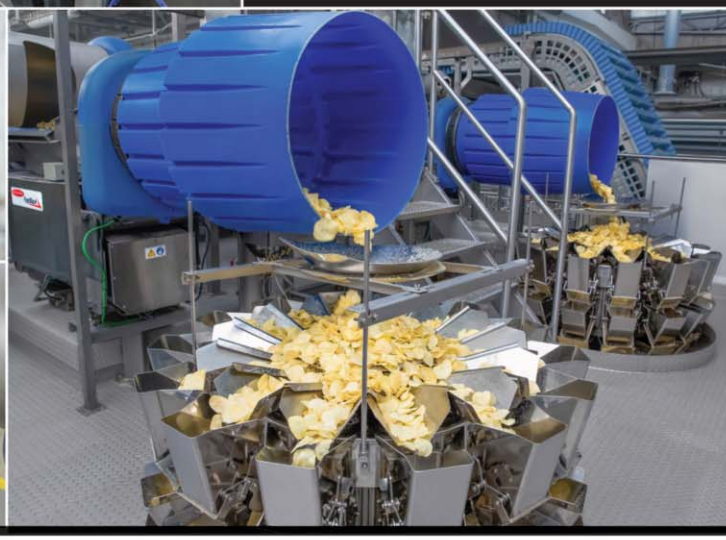
Complete Potato Chip Solutions **designed for your business**

- Potato Handling & Storage
- Peeling, Grading, Washing
- Electroporation
- Frying & Oil Management
- Salt & Seasoning Application
- Conveying, Sizing & Accumulation
- Energy & Pollution Control







Across industries and applications, we design specialised solutions.

Bringing together leading brands in processing and packaging equipment for the potato chip industry. Our solutions set the standard for yield, efficiency, and safety while producing the highest quality potato chips. Whatever your product needs, we can meet it with precision and passion.

HEAT AND CONTROL | FastBack | SPRAY DYNAMICS | MASTERMATIC

info@heatandcontrol.com | heatandcontrol.com

The European Processing Activity Continues to Be Very Strong

Although buyers are now much calmer, the potato processing activity is still quite high throughout Europe, the Irish Farmers' Association (IFA) experts recently announced.

In the UK, the demand for old maincrop is virtually entirely for whites, and quality samples are once more moving well. The market for old-crop Maris Piper potatoes is rapidly declining, but in the East, purchasers who are not yet persuaded that the new crop is suitable to have shown increased interest.

In Ireland, the retail markets remain static as school holidays are in full swing; demand for the processing sector is buoyant. More queens are coming onto the market this week as liftings are approx. 10 days ahead of last year. Yields are reported to be above average and eating quality is very good. Roadside sales are very slow to take off this year. The majority of home guard and premiere are now cleared.

"According to provisional IFA early planting figures, the area of earlies planted is slightly less than the 2021 area. The area of the premiere and home guard is similar to last year and a slight reduction of the area of queens," the report concludes.

Reasons for High Fresh and Processing Potato Prices

A recent forecast from RaboResearch's analysts shows that high input prices, a bullish post-pandemic market, and diminished weather concerns combine to boost 2022 projections regarding potato prices. Rabobank experts predict the annual average fresh potato and processing potato prices to increase to USD13.70 and USD11.00 per 50 kilograms, respectively. Average potato yield is expected to rebound around 6.6% year-over-year.

"We started in the fall of 2019, we had short supply. The following year, we planted less acreage because of COVID-19. So, that led to a smaller area which meant less supply. Then, last year, we had a very dry and hot season in the North Pacific region, and that led to one of the weakest yields in the last 10-15 years, which also led to a smaller crop. You add in the equation short supply, strong demand, that equates strong prices," Almuhanad Melhim, RaboResearch Analyst for Fresh Produce recently mentioned, cited by Market Talk. He added that the war in Ukraine impacted planting decisions this spring.

Pringles Potato Chips Under a New Roof

Kellogg's Board of Directors recently announced the approval of a plan to separate its North American cereal and plant-based foods businesses, via tax-free spin-offs, resulting in three independent public companies, each better positioned to unlock their full standalone potential. One of the three companies, Global Snacking Co., the future owner of the Pringles potato chips brand, is expected to enhance its leadership position in the global snacking, international cereal and noodles, and North America frozen breakfast categories, by focusing investments and capital toward building upon its strong growth momentum and profitability.

"Kellogg has been on a successful journey of transformation to enhance performance and increase long-term shareowner value. This has included re-shaping our portfolio, and today's announcement is the next step in that transformation. These businesses all have significant standalone potential, and an enhanced focus will enable them to better direct their resources toward their distinct strategic priorities. In turn, each business is expected to create more value for all stakeholders, and each is well-positioned to build a new era of innovation and growth," Steve Cahillane, Kellogg Company's Chairman, and Chief Executive Officer declared.

Calbee to Raise Prices Up to 20%

Calbee Inc., a Japanese potato chip manufacturer, will jack up prices of snacks and cereals in Japan by 5% to 20% beginning in September due to rising material costs. Following the announcement, its shares rose as much as 5.1% in Tokyo, the largest intraday gain in more than a month.

Due to a poor potato crop and higher material costs, the company has already raised prices several times this year. To the chagrin of chip fans, it was also forced to reduce bag sizes.

"Smaller rival Koike-ya Inc. also announced price increases this month, including for their popular spicy and sour product line that will take effect in September," Bloomberg wrote.

GM PiperPlus 1.0 Potato is Market-ready

Professor Jonathan Jones' group at The Sainsbury Laboratory in Norwich has successfully developed PiperPlus 1.0, a late blight-resistant Maris Piper potato that is ready for commercialization once the UK implements workable regulation for crops improved through genetic modification (GM).

Some wild potato relatives, such as Solanum americanum, are resistant to blight. Jones' team successfully isolated Solanum resistance genes and transferred three of them to the Maris Piper potato, conferring complete late blight resistance. This resulted in the creation of the PiperPlus project. The PiperPlus 1.0 potato is also resistant to tuber blight, a disease that affects tubers during storage and can result in significant losses after harvest.

A New Packaging Facility and Head Office for The Little Potato Company

The Little Potato Company and Leduc County officials celebrated the start of construction on a more than 200,000 square foot packaging facility and head office, a USD25m investment that will allow the local family business to expand production of its renowned creamer potatoes.

"This is a significant step for The Little Potato Company, which my Dad and I founded together in Edmonton more than 25 years ago. With the incredible support of our community, we are honored to continue to grow our business here and provide fresh, nutritious food to families across North America," said Angela Santiago, CEO of The Little Potato Company. Construction officially kicked off in April, supporting dozens of jobs in the region.

Blanching, With an Energy-saving Mindset

Blanching is usually performed in processing plants using steam or water, and the heat penetration to the core of the product is a function of temperature and the time it takes to achieve the desired result. The shorter the time spent by the food in the heat medium, the better its retention of color, solids and nutrients, and the greater the reduction in the leaching action.

By Tudor Vintiloiu

In the processing of potatoes, blanching is traditionally carried out within the range of 80–100 °C for short times between 20s and 15 min. Such high temperatures can lead to structural damage and loss of firmness in the vegetable tissue. Low temperature blanching, however, in the range of 55–75 °C, has been shown to improve the firmness of cooked vegetables and fruits, reducing physical breakdown and sloughing during further processing and providing an excellent and safe way of preserving texture.

BLANCHING EQUIPMENT

The process can be carried out with water or steam systems. Both immersion and deluge water blanching, whether achieved with a rotary, auger, double draper, or belt-conveying system, have one thing in common: product is exposed directly to food-grade water that typically ranges in temperature from 158°F to 212°F (70°C to 100°C). With steam blanching, product is exposed directly to food-grade steam that is typically 212°F (100°C) as it is conveyed within a chamber. Some steam blanchers use convection technology that forces the steam through the bed of product to increase the heat transfer efficiency. Other steam blanchers present the product in a single layer to achieve individual quick blanching (IQB). To minimize the product's exposure to heat, some steam blanchers follow the heat penetration stage with a holding stage that allows the core temperature of the product to rise without the addition of more steam. Most water blanchers and steam blanchers require steam that is produced by a boiler.

With water blanching, the steam heats the water and the product. With steam blanching, the steam is applied directly to the product. Because the boiler is one of the most expensive pieces of equipment to operate in a food processing plant, given the high cost of energy, steam

consumption has a direct and significant effect on energy costs. As opposed to the most modern water blanchers, steam blanchers use approximately half the steam. Compared to older water blanchers, steam blanchers can often reduce steam use by as much as 80%. The energy costs associated with the blanching operation mirrors this reduction.

Eima Engineering is one equipment manufacturing company that offers three types of blanching solutions: Horizontal blancher, Screw conveyor blancher and a Drum blancher.

In the case of the *Horizontal blancher*, the goods are fed in at an even, set rate. The conveyor is designed as a stainless steel wire hoop belt. The throughput speed can be set with a frequency inverter.The water is heated directly by an injector circulation process and generates a turbulent flow above the conveyor, stirring the product above the conveyor in order to increase blanching quality and reduce energy consumption.

The digital controller regulates the steam supply, measures the blanching temperature at three places, and supplies a measured amount of heated water.

The higher capacity *Screw conveyor blancher* features a controlled screw conveyor that transports the goods inside the blancher in order to achieve consistent quality. The product is discharged on the face side by a ferris wheel. This ensures consistent transport as well as a consistent blanching time. The speed can be set with a speed-controlled motor.

The water is heated by steam heating in the venturi nozzle. Water cycle with water inlet on the outlet end and water drain on the inlet side, both on the face of the delivery points.

The temperature is measured before and after the venturi valve. The flow rate can be set manually with a manual shutoff valve.

The *Drum blancher* can handle capacities of up to 30t/hr. Inside the rotating drum, the goods are transported evenly over inner augers to achieve consistent quality. Adjustable paddles mounted on the axial tube mix the product and push it into the water. The product is discharged on the face side. This ensures consistent transport as well as a consistent blanching time. The speed can be set with a speed-controlled motor. The water is also heated by steam heating in the venturi nozzle, and the same water cycle with water inlet on the outlet end and water drain on the inlet side system is present, as in the case of the Screw conveyor blancher.

DTS is another equipment supplier that specializes in auger blanchers for potato processing. According to the company, their blanchers are valued in the potato processing industry thanks to their high-quality precision construction and cost-effective engineering and manufacturing. "We supply auger blanchers in every capacity, from small to extra-large. Special versions of the blancher include our unique short-time high-temperature blancher with unique cross flow water circulation for efficient enzymatic inactivation, and the long-time low-temperature blancher designed for the efficient leaching out of reducing sugars," the company points out.

A variety of options are available, including integrated heating by direct steam injection or via a shell and tube heat exchanger, and outfeed through our unique independent-drive ferris wheel, auger outfeed or free float infeed/outfeed and by-pass flumes with manual or automated valves for product diversion. Other options include insulated body and lids to reduce energy loss and heat radiation to the plant, fully integrated service platforms with stairs and handrails, clean-in-place, etc.

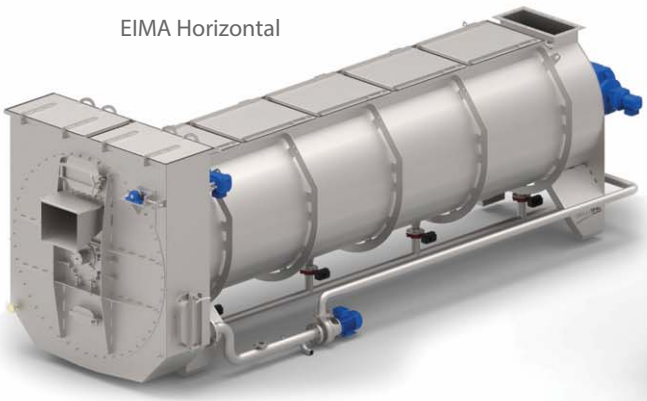
WATER USAGE

Like energy costs, water use and wastewater effluent are directly correlated to the volume of steam used. Steam blanchers require half the steam of water blanchers, therefore, half the volume of water is needed for the operation and half the volume of wastewater is discharged.

The quality of wastewater differs too. BOD (biological oxygen demand) loads and COD (chemical oxygen demand) levels, which reflect the content of soluble solids in the wastewater caused by leaching, differ greatly from one blanching application to another based on differences in the technology used as well as differences in the compositions of the products. For example, cut products leach faster through the cut sections compared to whole products where the membrane acts as a barrier.

Regarding differences produced by the technology, the BOD concentration can be higher in a steam blancher's wastewater, but the dramatic reduction in the volume of wastewater results in a significantly

EIMA Horizontal



EIMA Drum

EIMA Screw

DTS

lower overall BOD level released from a steam blancher compared to a water blancher. Since it costs less to treat high-strength, low-volume waste than a large-volume, diluted waste, steam blanching is the preferred technology from a wastewater perspective. Steam blanchers are increasingly replacing water blanchers in food processing plants that wish to reduce BOD and hydraulic waste loads.

HEAT RECOVERY

For the purpose of heat recovery, **Rosenqvists Food Technologies** introduced a complete system for re-using the energy from the frying systems. "A condenser is installed turning the hot fryer vapors into hot water. The hot water can then be used to run the drying system, blanchers and/or other systems you need hot water for in your plant. Pay-back time for the heat recovery system depends on the energy prices you experience. You can expect a return of investment in one to two years," says Magnus Kalling, Technical Manager, Rosenqvists Food Technologies.

"With the heat recovery system utilizing the vapors from your frying system, you can harvest up to 85% of the energy from the fryers to run the blanching system and other systems in your production."

Tummers' recently introduced E^{2}E-Condenser also minimizes the loss of energy from the steam peeling process by condensing and redirecting the steam so the excess energy can be used for other processes such as blanching or heating cleaning water.

"The use of the recovered energy needs a bespoke connection to the best available 'user', for example the blancher of the processing line. This connection will be a customer-made system, but in most cases this can be achieved with very limited changes to the overall system," head of sales Edwin Langbroek explains.

The E^{2}E-Condenser is the fourth generation of condensers and is developed by Tummers Food Processing Solutions together with the specialists of Solutherm. This model is the first one that does not cause any emission. In addition, it distinguishes itself from previous models by its lower cost and compact size. It is designed to be 'self cleaning' and only requires preventive scheduled inspections, being constructed entirely from stainless steel to eliminate corrosion issues.

Langbroek reveals that a typical processing line with E2E condenser will have sufficient energy to heat up the blancher with minimal addition of 'normal' energy. The expected ROI is thought to be between one and four years, depending on capacity, energy costs and various other factors.

Replace your thermal preheater with an Elea PEF Advantage Belt system

and use up to

90%

less energy

The Elea Advantage B 1, one of the 200 Elea systems installed worldwide

Powered by renewables, Elea PEF Advantage Belt systems are PEFect for the environment

Pulsed Electric Field processing opens the cells of raw product, improving cutting and accelerating blanching, drying and frying.

PEF replaces carbon-intensive thermal processing in the potato and vegetable industry and allows targeted use of electrical energy.

90% less energy and water consumption make it a PEFect solution for processors and the environment.

elea

To book a 30 minute PEF talk with an expert, visit elea-technology.com

Efficient Use of Resources Equals Profitability

Efficient use of resources is a big part of any company's sustainability efforts. Therefore, sustainability goes hand in hand with concern for costs and the goal to enhance competitiveness.

by Tudor Vintiloiu

Sustainability is a key challenge for the industry and potato processers globally are recognizing their part in safeguarding the future. In 2020, the global production of potatoes exceeded 359 million tons and global demand for frozen potato is rising rapidly. This greater volume of production is leading to increased pollution and waste, and many processors are now actively engaged in sustainability reporting. In this context, potato conversion, water and energy intensity, and carbon footprints are important measures – for both sustainability, and efficiency.

"Oil management is a prime area to address if you're seeking sustainability gains."

Greg Pyne, sales and marketing manager, Heat and Control

Before they can be turned into foodstuffs, potatoes must be peeled, sliced, destoned, and washed, processes that require a significant amount of resources. In recent years, hot washing systems and pulsed electric field (PEF) technology have largely replaced the traditional blanching process as the method of choice for removing excess starch before frying, making the whole process more efficient, but managing water usage while maintaining the quality of the final product remains a key challenge for food producers. Besides water and energy usage raw material utilization has a major effect of overall sustainability. Reducing losses during peeling and cutting has major impact on product yield. To achieve their sustainability goals, processors are investing significantly

in equipment to help reduce fuel costs, energy waste, air pollution and water consumption and meet the rigorous pollution control regulations of the world-wide agencies.
While modern processing equipment must address all the themes of sustainability, it must also improve efficiency and profitability, if it is to be adopted widely in the future. As interest in sustainable technologies grows, turnkey suppliers are helping processors plan their factories of the future and are assisting them to adopt or upgrade their existing equipment, to process more responsibly. In response to this challenge, Heat and Control's Sales and Marketing Manager, Greg Pyne outlines how the equipment manufacturer is creating positive change by offering potato processors the right equipment for a more resilient and sustainable food system.

OIL SAVINGS

Frying oil can be an expensive part of food processing and any step(s) the processor can use to reduce loss or waste of oil will likely result in greater business profitability. Oil recovery during production not only reduces energy usage but also translates into higher yields through cost savings. Where cooking oil is used during production of the finished food product, increasing the oil life has been a solution that many food manufacturers choose.
Custom designed, oil management solutions have been developed to maximize oil quality, reduce oil pollution, and maximize energy savings for sustainable and environmentally safe operations.
Pyne explaines: "Oil management is a prime area to address if you're seeking sustainability gains. One such system is the Oil Sweep® De-oiling system. This oil management solution is used by processors of French fries, potato wedges and potato co-products; to strip their fried products free of surface oil, prior to freezing and packing. Stripped oil is recovered through a bank of cyclones and returned to the fryer oil recovery system. Solid fines are separated, and reusable oil is transferred back into the frying system.
He continues, the typical oil pick-up on French fries is around 6-8%. While much of this oil is contained within the fries themselves, this system has been designed to recover most of the free surface oil, which results in increased yields and healthier finished products. In addition, less product surface-oil improves the performance of the defrosting and cleaning cycles of the pre-cooler and freezer and helps reduce oil particles clogging cooling coils in the pre-cooler.
Processors benefit from lower operational costs thanks to decreased downtime for maintenance, and energy savings (from greater cooling efficiency) can help them realize their sustainability goals. The Oil Sweep system can be retrofitted into existing lines and has low maintenance requirements.
Citing a recent installation as an example, Heat and Control delivered a complete French fry system which included the Oil Sweep De-oiling

system, and a flexible batter coating system which featured a two-stage, multi-zone cooking feature with customizable cooking conditions, for coated and uncoated French fries. The Oil Sweep system is now helping the processor achieve production capacities of 18,000 kg/hr (37,400 lbs/hr).
Another method is by using a heat exchanger to manage the use of oil. Low oil volume promotes fast oil turnover and inhibits the formation of free fatty acids. A rapid, uniform heat transfer allows a fryer to respond more quickly to changes in product load and protects oil quality by maintaining a low oil film temperature.

WATER SAVINGS

Within the processing plant, water is used for cleaning purposes of the whole potato, washing of chips slices, blanching of slices and of course for cleaning the processing line during planned production stops. Using water in the pre-line is a condition for long production hours. If water is used well, the less sugar, starch and debris ends up in the frying system which means the production can be run many days without the need for production stop. Therefore, water is a necessary investment for the longest possible production cycle.
Richard Rosenquist, project manager of Rosenqvists Food Technologies details some of the steps that can be taken in order to save this precious resource:

1. Clean the potato at intake
Potato is harvested in different ways and the soil condition varies a lot. At the potato intake, you can use a mechanical soil extractor removing most of the clay, sand or dirt that comes in with the potato. Cleaning the potato in a good way at intake gives you the best condition for using minimal water later on in your processing line.

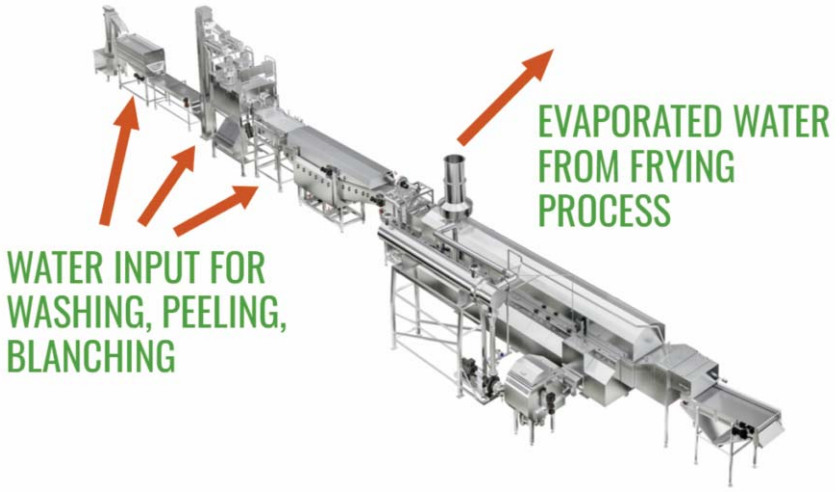
2. Re-use the water from slice washing and peeling
The water from the slice washing step as well as the peeling system can be re-used several times. By setting up a water circulation system, you can maximize the usage of this water. As mentioned earlier, avoid the risk for bacteria growth by securing low water temperature and limiting the time the water is used.

3. Utilize the waste stream from peeling and slice washing
Peel waste contains energy and can be used as a resource for animal feed or as fertilizer. It can also be converted into energy by installing a biogas system. The waste stream from the slice washer contains starch. Here, it is possible to convert the starch into a valuable product by installing a starch recovery system.

4. Monitor water usage for blanching
By measuring the sugar level in the blanching water, you can optimize the amount of water used in the multi-turbulent blancher. Low levels of leaked out sugar means you can lower the volume of water added in this process step.

5. Stop and clean as few times as possible
When cleaning out the frying system and all other machines, you will need to use a lot of water. Some of this water is not suitable to re-use because of use of detergents. By designing the processing line and by keeping the frying system as clean as possible, you only need to stop and clean perhaps once per week. This will save you significant amount of water and it will maximize your production capacity. The design from Rosenqvists Food Technologies always focuses on cleanability and your ability to run production over several days without unnecessary production stops.

6. Re-use energy from the frying system to heat up water
The hot vapor collected in the chimney of the fryer can be converted into hot water. This can be achieved with the help of a stack condensing system or other equivalent options. This smart investment creates a good source of hot water that you can use for blanching, cleaning or other purposes in your production plant. Make sure you re-use as much as possible of the energy utilized in your frying system. •



"By designing the processing line and by keeping the frying system as clean as possible, you only need to stop and clean perhaps once per week."

Richard Rosenquist, project manager of Rosenqvists Food Technologies

French Fry & Potato Co-product Solutions **designed for your business**

- Potato Handling & Storage
- Preparation & Electroporation
- Batter Coating
- Frying & Oil Management
- Energy Saving
- Pollution Control
- Seasoning & Conveying

Across industries and applications, we design specialised solutions.

Bringing together leading brands in processing and packaging equipment for the French fry and potato product industries. Our solutions set the standard for yield, efficiency, and safety while producing the highest quality straight cut, crinkle cut, wedges, curly fries, hash browns and potato gems. Whatever your product needs, we can meet it with precision and passion.

HEAT AND CONTROL | FastBack | SPRAY DYNAMICS | MASTERMATIC

info@heatandcontrol.com | heatandcontrol.com

Increasing Yield With Optical Sorting

Advances in sorting technologies are unlocking improvements in processing efficiencies and profitability, as **Sawsana Gourmat, Product Manager at TOMRA Food**, explains.

The objectives of potato processors are clear: to consistently meet quality specifications and food safety standards whilst maximizing potato recovery and yields. Or, as we say at TOMRA, making every potato count. Which isn't quite as simple as it sounds. To achieve these objectives, processors face multiple challenges:

Food safety and zero tolerance of foreign materials

Consumers don't expect or forgive food that contains foreign materials, which leaves processors with no margin for errors. It's essential to sort-out everything that doesn't belong in the final packaging.

Handling different potato varieties and managing variations in incoming defects

If the incoming product would be predictable and stable throughout the year, life would be so much easier. But processors have to deal with a constantly changing product while nevertheless delivering consistent quality in line with specifications.

Stricter regulations on use of chemical sprout inhibitors such as CIPC

This is to be welcomed because it leads to healthier cultivation and storage of potatoes, but it does mean that more defective spuds must be eliminated from the process.

Traceability

Processors need to know what went through their lines at a specific time. Having this information enables a better understanding of the process and can be crucial if there are any issues or complaints.

Understanding the process and products

As the industry becomes more demanding, and as some customers request even higher product quality, knowledge is power. Gathering more information - such as the color of good product, dry matter measurements, and detection of green potatoes - can show how to adjust the process to optimize yield.

Thankfully, technologies are available to help processors meet these multiple requirements. The industry's leading solutions provider for processors and packhouses, TOMRA Food, offers optical sorting machines, application-specific modules, multi-lane sorters, and the TOMRA Insight data platform. These solutions improve processing yields for a wide variety of potato products: everything from potatoes just taken out of the ground or storage to fresh pack, chips (crisps), French fries, other frozen products (such as wedges, slices, and hash browns), and dehydrated flakes and granules.

THE TASKS SORTERS HELP WITH

Three sorting platforms are ideal for potato processors, and each provides essential help at a different stage during processing.

To remove foreign materials and gross greens from potatoes after they are picked from the field or taken out of storage, before they go onto the processing line, the optimum solution is the TOMRA 3A. This machine – which combines pulsed LED technology with TOMRA's proprietary multivariant classifiers – removes foreign objects missed by mechanical systems while handling up to 100 tons/hour of freshly harvested crops. It also reduces storage needs, is easily movable, and saves on labor.

For sorting washed potatoes, three-way sorting with the TOMRA 5A, a premium bulk sorting and size grader, removes 98% or more of foreign materials. This machine detects and ejects even the most challenging defects, such as glass, as well as removing products that are misshapen or spoiled by rot, mold, or discoloration. Moreover, the TOMRA 5A has advanced functionalities including conditional sorting, which enables the sorter to take intelligent decisions based on the size of the potatoes matched with the size and

type of defects. This further improves product yields.
For wet and IQF products - French fries or chips - the best solution is the TOMRA 5B. Equipped with the latest camera and laser technology, with an on-belt inspection zone and 360° view, this machine analyzes color and shape defects with unequaled precision. And with software incorporating advanced algorithms, it can also sort by size and length-to-width ratio, meeting specifications whilst also maximizing the good-in-bad ratio and the recovery of saleable raw materials.
For potato flakes, the TOMRA 3C is most suitable. Combining high-resolution RGB cameras with LED lighting, plus laser or near infrared units, ensures exceptionally high sorting accuracy. This delivers high-performance color sorting to remove dark spots, discolorations and foreign materials. What surprises many potato processors is how sorters can do so much more than sort. These highly reliable technologies also accurately grade to specification, minimize false rejects, increase recovery rates, handle high throughputs, manage peaks in demand, reduce the need for manual interventions on the line, solve labor-scarcity problems, reduce downtime, and reduce the line's total cost of ownership. Optical sorters play an increasingly important role in potatoes processing as a tool to sort and a source of knowledge.

PUSHING BOUNDARIES

TOMRA believes 'Every Potato Counts.' This means supporting customers to make sure they meet quality specifications while optimizing yield. It also means that TOMRA's world-class research and development team is constantly pushing boundaries to reduce food waste. To see how, let's look at five key considerations when designing and developing optical sorters, and when calibrating them to individual processors' needs.

1. Product handling and line set-up
It all starts with advising processors on the best solution for what they want to achieve. It is crucial to understand the processor's specific constraints and challenges. What's the quality of their potatoes throughout the year? Is the defect load varying from, say, 5% to 30%, or from 10% to 50%? This information influences the choice of technologies and options, and then the machine set-up, to ensure a smooth process and keep quality in check.
Keeping the entire process in mind leads to improved products and innovative solutions. There are some good examples of this. Innovative infeed shakers have been developed to properly separate chips and remove as much oil as possible before the product goes to the sorter, resulting in fewer clusters, a better sort, and good product handling. Soft landing chutes have been created to avoid any product damage throughout the process. Highly efficient separation of defects by length has been made possible by developing a three-way sort: shorts with defects are used for other potato products and longer French fries with defects are re-processed. In addition, reverse sorting is employed when value can be added by recovering good product from the reject stream, which makes a big difference to overall line yield.

2. Detection capabilities
Different technologies are employed for different types of detection. Cameras, lasers, and hyperspectral solutions enable sorters to see what couldn't be seen before, improving performance and yield. Intense illumination of the product prevents shadows. Strategically locating the technology on the sorter makes it possible to capture unobstructed views of the product from different angles. And sensors optimize these technologies, ensuring the system is stable even when there are changes in machine-wear or environmental conditions such as temperature or humidity.

3. Advanced software capabilities
Software capabilities have really been a game changer in recent years, and will continue to unlock new possibilities. Smart algorithms can now calculate precisely what goes through sorters and define what to sort-out to reach quality targets and improve yield. Optimized de-clustering software allows the machine to be packed with product yet still have the ability to precisely reject a specific type of French fry or chip.
One of the latest software innovations, built into the flagship

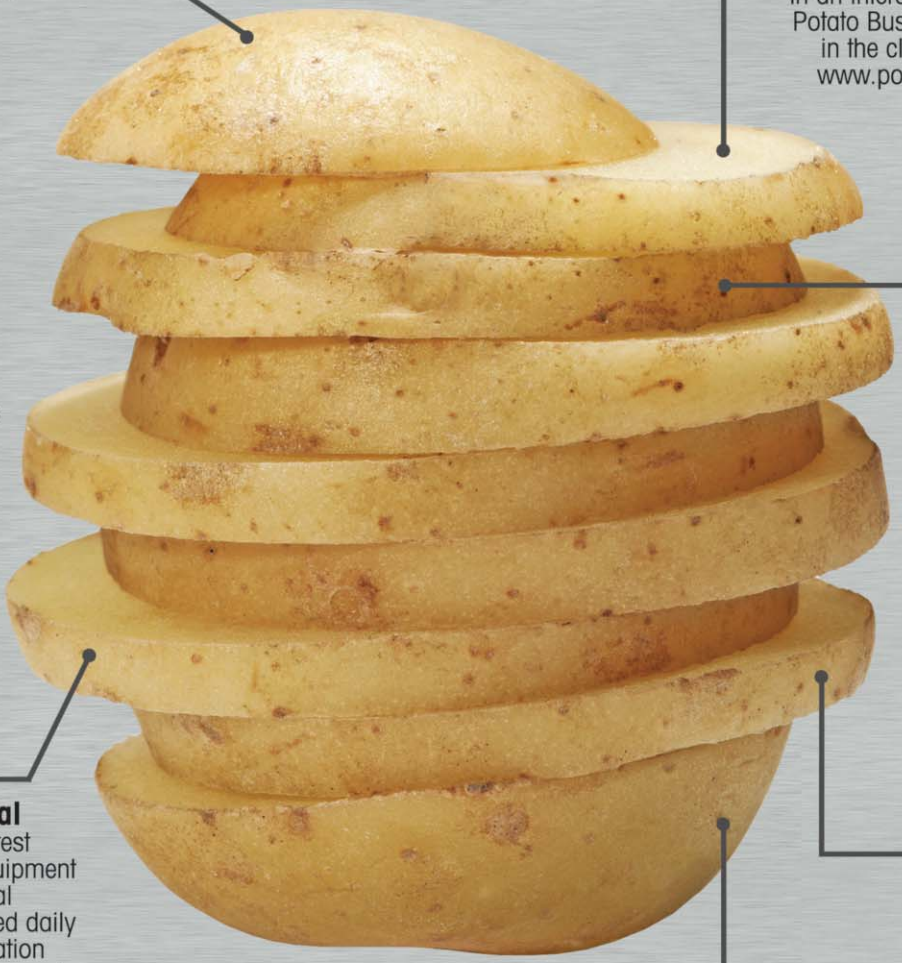
TOMRA 5B optical belt sorter, is Smart Ejection. This improves efficiency when producing French fries by employing a new de-clustering algorithm. Good-in-bad performance is improved by anything from 25% to 100%; accept-stream quality is improved by making even more accurate decisions on defect types and clusters; and false detection is reduced, especially of shorts in clusters, to minimize product waste and increase yield.
Artificial intelligence allows sorters to handle complex problems, often more accurately than humans and at faster processing speeds, even at high throughputs.

4. Data
Processors want to know more about the product they are handling in order to improve efficiencies and profits. And this is where the cloud-based data platform TOMRA Insight really helps. By gathering data from sorting machines in near real-time and storing it securely in the cloud, this subscription-based service turns sorting machines into connected devices with information that can unlock machine performance improvements. This data can be accessed from anywhere and across plants via web-based desktop and mobile devices – which means it's now possible to know at anytime and anywhere if a line is working efficiently, or if there's an issue affecting yield.
Acting on this data pays off in many ways. Downtime is reduced by monitoring machine health in near real-time, supporting the management of predictive and condition-based maintenance and preventing unscheduled machine shutdowns. Capacity is maximized by evaluating throughput variations in order to optimize sorting equipment. Operating costs are reduced by identifying gaps in production and analyzing potential root causes. Sorting to target quality is enhanced by having accurate material-composition data that enables decisions to be based on more detailed information. And businesses can make better strategic management decisions, based on hard data rather than just experience and instinct.

5. Ease of use
Finding and maintaining skilled employees can be a real challenge; getting them up to speed with advanced sorter technologies can take days; and even then, it's not always certain every operator will run the line optimally. That's why TOMRA continuously improves the usability of its sorters. Software has been refined to make controls more intuitive; tools introduced to simplify the cleaning process; and sorters are delivered to plants with pre-setting so that the customer only has to adjust sorting specifications. All TOMRA sorters also come with TOMRA ACT, TOMRA's most advanced user interface, which provides sorting information and real-time process data at a glance through easy-to-understand graphics. With this, user profiles can be customized, so that operators see a simple user interface with limited settings but an expert user can fine-tune the sorter to a more advanced level.

6. Service
Even though the industry's best optical sorters are robust and made to handle the demanding rhythm of a potato processing line, maintenance and servicing are important considerations. TOMRA optimizes the design of its machines for cleanability, accessibility, and maintainability, so that wear-parts can be changed easily. And various customer care packages ensure fast support whenever it's needed. This support can be provided by a field service engineer visiting the processor, or when appropriate, by the processor accessing remote support through the TOMRA Visual Assist app on a mobile phone.
Reducing downtime can be as important as improving yield. Doing both enhances processors' revenues and profitability. •

It's all about POTATO



POTATO PROCESSING INTERNATIONAL

Potato Processing International has been serving the global potato processing industry for 25 years and is regarded as a must-have information source for potato processors, equipments and ingredients manufacturers, as well as players in storage, retail and foodservice.
This business-to-business magazine is published six times per year and continuously strives to be the most comprehensive publication, containing in-depth articles, expert views from some of the most respected companies in the industry, exclusive interviews, as well as news and trends.

POTATO BUSINESS DIGITAL

Tailored specifically to meet the needs of the busy professionals in the potato industry, Potato Business Digital is the first industry standardized digital magazine for tablets and mobile phones. This quarterly online publication presents exclusive articles on various processing topics, as well as information on ingredients, food safety and storage innovation, in an interactive and dynamic form. Potato Business Digital is available in the click-to-read format on the www.potatobusiness.com portal.

POTATO BUSINESS Weekly Newsletter

The latest news, exclusive articles and interviews are delivered directly to your inbox with our weekly newsletter service, containing pertinent information from trusted sources, as well as industry insights and updates.

POTATO BUSINESS Portal

From breaking news to the latest innovations in processing equipment and potato products, the portal potatobusiness.com is updated daily with the most relevant information for all players in the potato processing and storage industries. Regarded as a trusted source of information, the website also contains exclusive blog articles and white papers on various current topics that concern the potato universe.

E-BLAST

- Custom e-blasts using specific segments of our e-database, depending on the client's needs, with measured results.
- Special e-blast covering major worldwide trade fairs.

SPECIAL PROJECTS

- May - Potato Business Dossier 1
- November - Potato Business Dossier 2

A COMPLETE COMMUNICATION PLATFORM

Forming Potato Products to Perfection

Formed potato products are produced from mashed or shredded potatoes. This may be a processor's primary process, or it could be a by-product of an existing production line. If the latter is the case, more yield will be obtained from the raw materials since by processing remaining potato pieces into an end product, waste is drastically reduced.

By Tudor Vintiloiu

Formed potato products originally started out as a co-product for the French fry industry. A revenue stream out of what was before considered waste. It has now grown to have dedicated form lines. Still using the slivers from French fries but only to supplement higher capacities. Making any number of formed potato products allows processors to increase their recovery. Parts of the potato that could not be cut into a nice strip would otherwise be sent to waste or as animal feed at a low price. A value-add product can be made through ingredients or almost any variation of shape.

THE PROCESS

During forming the potato dough is converted to the ultimate form of the end product for the consumer. Several types of forming machines are in use in the potato manufacturing industry. In the machines with forming moulds, the mould with the particular shapes is filled with potato dough from a hopper. The potato shape is ejected from the mould on a transport belt by a device with the same shape. Moulding machines are used for hash-browns, waffles and special strip or animal characters. Low-pressure extrusion machines are used for croquettes, etc.

In these extruders potato mash is pressed through small pipes and the resulting cylindrical sausage' is cut into croquettes. Special forming heads are needed to produce pommes duchesses and pommes noisettes. These are very much related to bakery machines, using rotating nozzles (duchesses) or diaphragms (noisetts). A third type of forming machine uses rotating drums in which the shape is molded e.g. for small hash-browns. **Provisur Technologies, Inc.**, is one company that offers a complete platform for food processing equipment including forming. Their VerTex equipment benefits by a

pivoting hopper and easily removable feedscrews, which are among the features that make it quick and easy to clean. Innovative features result in reduced downtime, lower maintenance costs and increased productivity. Moreover, The VerTex servo controlled dual lobe pump provides precise filling capability, low- and high-pressure filling capability, and ensures that product is not overworked and damaged in the pumping process. Because the system is fully enclosed, it has the added benefit of virtually eliminating product leakage.

"At Provisur we are continually innovating to find new ways to help our customers maximize the performance of their lines. New technology is always at the forefront. Our engineering and R&D teams are fully committed to deliver the best value equation. Our expertise is in designing and building advanced equipment and systems that promises operation efficiency, excellent product quality, flexible textures and shapes with higher throughput and uncompromising food safety," explain Provisur experts.

Along with their partners, Kiremko and Reyco, **Idaho Steel** offers full process lines for all major potato products. One of those being a complete form line. Using advanced 3D printing techniques, the different shapes they can make is only limited by imagination, company representatives told us. "We are always happy to work with processors to develop new shapes for them or to refine their existing shapes."

When discussing equipment flexibility, the company says

"While other forming equipment requires changing large barrels; we have developed quick, toolless insert that can be changed out effortlessly by operators."

Idaho Steel

this is a key feature of their Nex-Gem platform. "While other forming equipment requires changing large barrels; we have developed quick, toolless insert that can be changed out effortlessly by operators. Product change overs can be done in a fraction of the time and without a maintenance team," company experts point out. "Idaho Steel has always built the rotary former out of stainless steel and food grade plastics. What has significantly changed in regards to sanitation is the design and automation. Every part of the product path opens up for extreme access for inspection and cleaning. This is done with at the push of a button when needed as well as automatically as part of the timed cleaning sequence."
The machine's success has prompted Idaho Steel to be nominated for its Nex-Gem3 Rotary Former for the "Coolest thing Made in Idaho" competition. According to the company, Nex-Gem Formers are on every continent on the planet, except Antarctica. They are used to create some of the most iconic potato product forms, such as McDonald's hash browns and tater tots. Considering forming is a complicated process, resulting in a highly vulnerable end product, the Nex-Gem3 Rotary Former helps to take care of a number of issues for food producers.

FROZEN HASH BROWN PRODUCT R&D

Many methods are employed in the preparation of frozen hash brown potatoes and frozen hash brown potato products which are formed into individual cakes or patties for ultimate frying or deep-fat cooking by the consumer. The conventional process employed in the production of such potato products includes washing, peeling and otherwise preparing the raw potato, cooking the potato either in whole form or in slabs, shredding the potato or potato slabs into a hash brown consistency, and thereafter cooling the shredded potato product. Certain binding agents such as potato flour, potato flakes, wheat flour, rice flour and various types of modified corn starches are then mixed with this cooled, shredded potato product, after which the same is formed into patties or cakes of the size and shape desired. The formed patties or cakes are then transported to a freezer where the product is frozen and thereafter packaged.
One disadvantage of the conventional procedure is the necessity of adding binding agents such as potato flour, potato flakes, etc. to the shredded potato product to ensure that the cakes or patties will hold together during the forming step and during the eventual deep-fat cooking step. The addition of these binding agents not only increases the cost of the product, but also requires an additional mixing step which increases the amount of time necessary to prepare the hash brown product. According to a Simplot patent, the conventional shredding and cooling steps can be reversed to provide an improved process for preparing a frozen hash brown potato product in the form of cakes or patties without using additional binding agents such as potato flour, potato flakes, and the like. The potato slabs which exit from the cooking blancher are first cooled in a cold water blancher to approximately 50° to 55° F. after which they are further cooled by chilled air so that the internal temperature is between 40° and 45° F. The cooled potato slabs are then shredded into hash brown consistency directly into the forming machine which molds the shreds into a shaped form. Simplot has found that by cooling the potato slabs and then shredding as opposed to the conventional method of shredding and then cooling, the release of the natural binding material from the potatoes can be controlled and such natural binding material from the potatoes can be utilized in retaining the formed potato product in its desired shape without the use of additional binding agents. It has been found that hash brown potato cakes or patties prepared by this method will withstand final preparation conditions of deep-fat frying at temperatures of 365° to 375° F. for at least 21/2 to 31/2 minutes with no disintegration or breaking apart. •

"Our expertise is in designing and building advanced equipment and systems that promises operation efficiency, excellent product quality, flexible textures and shapes with higher throughput and uncompromising food safety."

Provisur

tna
food processing &
packaging solutions

the perfect bite

We put a lot into this one perfect fry.

tna rethink the conventional
tnasolutions.com

Scan me for more details

How PEF Processing Can Save Us

Pulsed Electric Field (PEF) is an emerging technology which offers significant processing benefits to potato processors. In addition to optimising production and creating a higher standard of products; PEF equipment can also help processors manage production's most expensive resources, such as raw potatoes, oil and water.

By Heat and Control

Limited worldwide resources and unprecedented global turmoil calls for a balanced approach to raw material, water, energy and nutritional content. PEF technology helps achieve industry critical goals such as enhanced food quality, decreased water usage, reduced emissions, increased energy efficiency, and the ability to utilize by-products from waste food.

French fries, potato chips, formed potato products, and root vegetables all benefit from treatment with PEF equipment which facilitates improved cutting of potatoes, higher product quality, increased process yields and reduced operating costs. A complementary reduction in acrylamide can also not be overlooked and demand for the technology has expanded from French fry processing into potato chip and snack foods.

Food processing innovation and trends in food science are driving factors behind the development of sustainable food processing techniques like PEF and the global food industry 'pulsed electric field systems' market is poised to grow by USD227.52m during 2020-2024.

At a time when potato processors are still suffering the flow on effects of the pandemic - recent military events now present yet another crisis for the industry and a shortage of sunflower oil is impacting the entire food industry. It's yet another challenge for potato processors who are already dealing with the rising costs of energy and raw ingredients.

Sunflower oil is a key ingredient in just about everything, from baked treats and savory snacks, to sauces, spreads and even baby food. The recent military crisis in Northern Europe has significantly decreased supply and supply will continue to be impacted until the conflict resolves. So much so that it is estimated that over 5 million tons of sunflower oil alone has been removed from the world market annually whilst the conflict continues.

As the most commonly used oil for processing potatoes into French fries or potato chips, it's a heavy blow for the potato processing industry. The sunflower oil shortage will see many potato processors forced to switch or blend oils and make changes to their production process.

At a time when operating costs are skyrocketing; utilizing the latest processing techniques and equipment is the key to continued production in uncertain times. Processors must find ways to optimize their process to save and preserve valuable and expensive resources. Utilizing an industry expert with decades of food industry experience opens the door to a wealth of knowledge and understanding - and experience in overcoming challenges such as this - to help you advance your operation during a time of turmoil. Working with a single source supplier provides access to all the innovative technologies, such as PEF, which are now on the market.

There are multiple technologies available which can reduce fuel costs, energy waste, air pollution, and water consumption in your operation. An industry expert can you help understand these new and emerging technologies and how they might work in your unique application.

FRYING OIL AND RELIABILITY OF SUPPLY

There is simply no way to predict how long the shortage of sunflower oil will go on for. During this time, innovative processing techniques and equipment will be key to maintaining profitability. Processing equipment which incorporates PEF technology can provide significant savings on oil and help you manage the expensive resource during this time.

Application of PEF makes the cut surface of the potato smoother, which reduces oil pick up and means there's less oil content in the final product. Depending on the raw potato type and quality, up to a 7% reduction in oil can be achieved.

Less free starch present on the surface of the chip also contributes to less starch in the fryer which can typically cause oil to degrade faster. The PEF process makes the potato tissue softer and easier to cut. The result is a smoother surface on the cut chip and ensures a higher starch content is retained in the outer layers of the chip rather than free on the surface. This means the product absorbs less oil during cooking - which translates to a significant reduction in oil expenditure over time.

As the global shortage of Sunflower oil continues, oil management is a hot topic for potato processors

E-FLO® ELECTROPORATION SYSTEM

Extensive research and development has gone into Heat and Control's own PEF solution: the patent protected E-FLO® Electroporation system. This innovative equipment sets the standard for French fry and potato chip production and is the only solution on the market capable of also delivering Acrylamide reduction.

The E-FLO was originally created as a solution to reduce acrylamide formation during frying - without making fundamental changes to the manufacturing process - and without compromising on taste or quality. But the technology went on to surprise and delight designers with a host of other, just as valuable processing benefits. The advantages of this processing method has seen many food processors across various industries incorporate the technology into their processing lines and those who are not already using it, are looking into it.

Through its utilization of PEF; the E-FLO system achieves higher yields and a shorter, cheaper production process. As the Sunflower oil crisis continues - every process must be scrutinized, analyzed, and optimized, and oil management could make or break the operation. Adopting a PEF system is an excellent way for a potato processor to manage the impact of the Sunflower oil shortage now, and in the future.

The E-FLO system achieves a 5% reduction in oil content which on 2000kg/hr of potato chips translates to just under 3000L of oil, per day. This represents a huge saving for the operation. Using equipment such as the E-FLO System can provide very real cost savings for processors, at a time when oil management is critical, and oil prices are skyrocketing. A turnkey supplier can help you adopt, or upgrade your existing equipment, and it's a great solution for customers who might be struggling to find oil during this time, because of the shortages. Working with an experienced food industry expert also helps you bring your best products to market if alternative recipes and ingredients are being considered. The shortage of Sunflower oil will mean many processors are forced to substitute with other, less desirable oils. The oil savings achieved by upgrading to a system such as the E-FLO are so significant that it could reduce the need to resort to switching, or blending with other (potentially more expensive) oils.

As interest in sustainable processing grows, a PEF system can also help the operation address key sustainability goals. A greater volume of production is happening globally, despite the world's challenges, and many processors are seeking to better manage and understand their impact. They're investing significantly in equipment which helps them reduce fuel costs, energy waste, air pollution and water consumption - and meet the rigorous pollution control regulations of the various world-wide agencies.

In recent years, the potato processing industry has made good progress in key areas of environmental sustainability and corporate social responsibility. Key players are acknowledging their part in a shift towards greater sustainability; and the right equipment will allow them to process more efficiently and be more profitable, while achieving their sustainability goals.

ENERGY COSTS AND AVAILABILITY

The Heat and Control E-FLO system is far more energy efficient than any prior technology, and it is equipment such as this, that will future proof factories and help manage energy costs and availability. This topic is also high on the agenda for potato processors in 2022. Understanding the potential impacts of climate change on potato production is crucial. Modern processing equipment has been designed for improved energy efficiency and can help offset rising costs originating from raw materials, oil and energy.

Utilizing a PEF system is a way for a potato processor to manage the impact of the Sunflower oil shortage now and in the future

The right equipment is crucial in times like these, and savvy processors must take advantage of food processing innovation to reduce unnecessary spending on energy. Reducing or eliminating the need to blanch potatoes saves a vast amount of energy - and achieves valuable cost savings for a processor. For context, a PC-50 sized blancher typically uses around 3600kg/hr of steam (approx 2330kW) whereas Heat and Control E-Flo uses only a 60kW Pulse Generator, to achieve the same results - with further valuable processing benefits.

In addition to the huge energy consumption required by blanching, the blanching process also creates starch loss, which can decrease yield. But potato tissue which is processed with PEF technology becomes more permeable, and this is why the need to blanch it prior to cooking is removed (or reduced), and also why the length of time to perform any required blanching is reduced significantly. This translates to a greater yield because output is increased and the application of PEF has delivered a more robust potato, with less breakage and a cleaner cut.

Emerging markets for PEF systems are expected in countries where agronomy faces challenging conditions such as India, Egypt and similar regions. Processors in these areas will enjoy a very fast ROI, thanks to the reduced energy costs they gain when adopting a PEF system. In addition to a significant increase in yield and better-quality products, processors could see a ROI - in less than 2 years - which is achieved purely from their energy savings as a result of reduced and/or potentially eliminated blanching. In addition to the increased yields achieved by PEF systems - via reduced starch losses and fines creation - processors using the technology will typically have less water turnover in the equipment and this means less overall water is used. Reduced water consumption is a key sustainability goal for all potato processors and yet another advantage of using a PEF system.

ADVANTAGES OF PEF TREATMENT

- A shorter, cheaper production process which makes better products
- Significant savings on valuable resources like oil and water
- Reduces energy and water consumption
- Minimises industrial waste
- Contributes to food security & safety, and nutritional security
- The optimization of PEF protocols leads to sustainable environment and economy

When pursuing the benefits of PEF, it is important to remember that a consistent process is essential to ensuring all potatoes receive treatment. The electroporation system you choose must be capable of efficient product handling through the treatment chamber and high frequency pulsing. Heat and Control's E-FLO is designed to pack the potatoes closely together to ensure the electric pulses pass directly through the potatoes and not through the surrounding water and this makes the energy transmission to the potatoes more efficient.

When sourcing new technology, processors should consider industry-leading solutions which incorporate innovative manufacturing designs and set the standard for yield, efficiency and sustainability. Working with a turnkey supplier is the easiest and simplest way to do this - and can help you achieve a significant return on investment - at a time when every dollar counts.

Heat and Control has been setting benchmarks in food manufacturing process efficiency for over 70 years and our French fry and formed potato product systems are the industry standard. We process a broad range of styles, including straight cut fries, crinkle cut fries, curly fries, potato wedges, and variety of potato co-products. Our industry leading equipment delivers processing efficiency through optimization and seeks to reduce wastage of raw materials and energy and we are committed to helping you bring your best products to market. •

For more information on the advantages of PEF or the E-FLO Electroporation system, get in touch at info@heatandcontrol.com or visit www.heatandcontrol.com

PROCESSES

PRODUCTS & INGREDIENTS

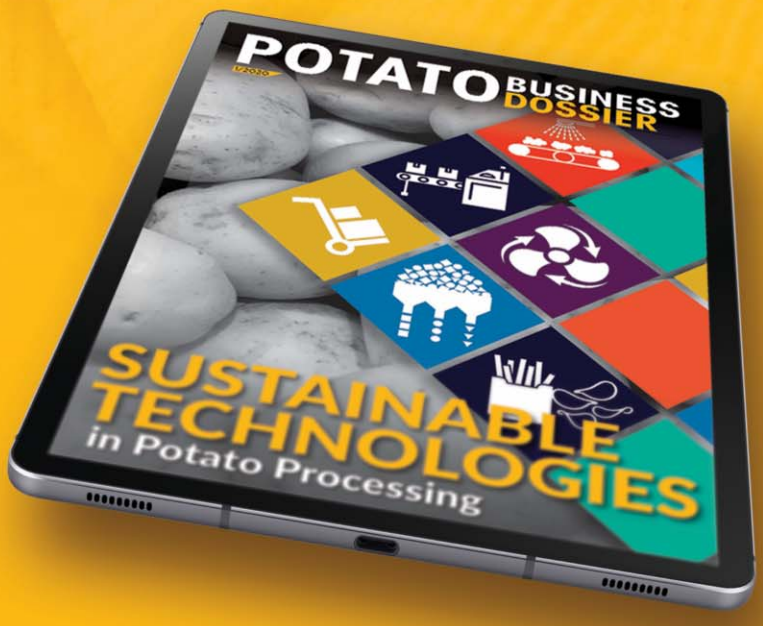
MARKETS

PACKAGING

AGRO & STORAGE

you always know
when you need to know more

POTATO BUSINESS DOSSIER



4 **times a year**

POTATO BUSINESS DOSSIERS

are added-value online products, filled with useful information and rich reports on potato industry topics. Access your complimentary copy on **potatobusiness.com**

Belgium Potato Concepts Deliver Quality and Innovation for UK

The processed potato market is estimated to be worth over GBP2.5bn in the UK, up from GBP1.5bn just 10 years ago[1]. The UK market is naturally a key focus for Belgium producers, not only because of the evident growing appetite for processed potato products but also the proximity. This proximity makes the two nations natural trading partners – allowing for reduced food miles and produce to arrive in the best possible condition.

It is clear the processed potato category is flourishing. With many years' experience, Belgian growers and potato processors are adept at responding to ever-changing potato trends and adapting their production to meet demand. With diversity of offering and exceptional quality, Belgian grower Bart Nemegheer discusses why it is an ideal time for wholesalers and retailers to look to Belgium to maximise their processed potato sales.

THE PEOPLE BEHIND THE POTATOES

Bart and Anja Nemegheer are the driving force behind 'De Aardappelhoeve'; which translates to 'The Potato Farm'. Passion for agriculture is in their blood. Since they took over the farm from their parents in the early 1990s, they have been strongly committed to expanding the company's potato offering. Today, the company specialises in growing, storing, washing and packaging both conventional and organic potatoes. The company recently started with the production of a freshly processed potato range, like potato slices, cubes and croquettes.

Bart Nemegheer, manager of De Aardappelhoeve, believes that if UK retailers are looking for quality, Belgian growers are who they should be speaking to. "Belgium and its neighbouring countries combine the ideal soil and the appropriate climate for a rich diversity of potato varieties with the world's highest average yields. The secret behind Belgian potatoes? Their natural and well monitored cultivation process. It all starts with the use of high quality and certified seed, making Belgian potatoes very fleshy and giving them their tasty and natural yellowish colour."

The Belgian potato processing industry incorporates the most modern, environmental and sustainable European technologies and quality systems. Continuous investment and technological innovation keeps Belgium at the forefront of the potato industry, resulting in new, higher performance equipment and automation, expansion of storage capacity, enhanced food safety and new packaging concepts.

[1] Statista May 2022, Turnover of enterprises manufacturing processed and prepared potato products in the United Kingdom (UK) from 2008 to 2020

It is investment in tech innovation, where Nemegheer believes De Aardappelhoeve has made the most recent improvement to its produce. "We rely on a high-tech tracing system for scanning and tracing potatoes. It not only helps keep an excellent overview of stock, the system also bundles purchase quotes, packing orders and invoicing. This way it is ensured that everything – from ground to mouth – is monitored and remains traceable."

"We operate our own lab where the potatoes are inspected upon arrival.", says Nemegheer. "Depending on the purpose of the potato, various parameters are tested, such as the underwater weight and the baking or cooking quality. The quality is assigned according to customer requirements. Before harvest, samples are taken regularly. In this way, the quality is guaranteed and estimates can be made early on which destination the potato will get: fresh or processed."

SHAPES OF THINGS TO COME

Bart Nemegheer believes the company's focus on diversity of offering and innovation in product development is key to De Aardappelhoeve's success in the UK. Potato croquettes, fries, baby potatoes with marinades, pre-cooked potato products, and sweet potatoes with spice mix have all been introduced to De Aardappelhoeve's range. These products are packed with flavour and can be prepared in the oven, airfryer, microwave or deep fryer. Bart Nemegheer says, "The lockdowns and working from home caused people to cook more and explore at-home alternatives, which resulted in consumption of potatoes and potato products to rise sharply. With the newly added range of mainly processed potatoes, De Aardappelhoeve wants to focus on the convenience this diverse range of products offers consumers. Demand for such products has already been observed for several years, and we expect this to continue."

It is therefore in these potato categories that Nemegheer believes UK wholesalers and retailers have scope to make the biggest gains. "Embrace product innovation and dare to give new potato products a place in the shelves.", says Nemegheer. "There is huge opportunity for retailers to put innovation into the fresh and frozen processed produce aisle. If you can also offer inspiration to customers through recipe development and testimonials, the category can grow into a top performer for your business."

GROWING FOR GOLD

Sustainability is an issue that is clearly a growing influencer on consumer purchase. In fact, the IBM Institute for Business Value (IBV) recently conducted a survey of 16,000 global consumers and found that more than half (51%) of respondents say environmental sustainability is more important to them today than it was 12 months ago[2].

It is a focus that is of particular significance to De Aardappelhoeve, Nemegheer says, "For us, a sustainable business means striving for maximum returns with minimum impact on people, the environment and nature. It is not just a philosophy, it is a mindset that actively directs our decision making and actions."

Although this sustainable approach influences many aspects of De Aardappelhoeve's business, a particular area of speciality is organic farming. Bart and Anja Nemegheer are investing significant time and resources to experiment with different varieties to reduce the need for herbicides and pesticides, while also experimenting with more sustainable fertilisation and crop protection processes. Introducing more tech solutions into the farming process also means Bart and Anja Nemegheer have been able to optimise the use of fertilisers or crop protections. "At De Aardappelhoeve, smart farming and precision cultivation are integrated," continues Nemegheer. "All our tractors are equipped with GPS control and eco modes. This allows us to accurately plant, fertilise and treat the plot. Every field gets the perfect dose in the right place. By doing this, our space and resources are used optimally."

EU FROZEN POTATO PRODUCTS FROM BELGIUM

EU farmers, producers, and exporters all work in close partnership to grow, pick, process, and pack quality Belgian products, sustainably for UK consumers. To find out more about frozen, chilled and fresh formats, packaging and the supply chain, please visit https://www.belgianpotatoproducts.com/en. •

FRESH FROM BELGIUM

Co-funded by the European Union

The compiler of this publication is solely responsible for its contents. The European Commission is not liable for any use that may be made of the information contained therein.

[2] IBM, Institute for Business Value (IBV), Balancing sustainability and profitability, April 2022

Breadings & Batters for Potato Products

Coated foods continue to represent a popular meal option for both in-home and out-of-home eating occasions. Although the market is still dominated by products based around proteins such as poultry and fish, it also encompasses other forms of coated foods, such as potato croquettes.

By Tudor Vintiloiu

Breadings are even finding their way onto "artisanal Belgian croquettes" formed from seasoned mashed potatoes. The global market for food coatings (of which batters and breadings represent a significant sector) is worth an estimated USD3bn at present and growing. Much of this growth is being driven by the desire of manufacturers of coated foods to offer new taste profiles and flavors, as well as improved textures. In some instances, the popularity of ethnic cuisine has influenced coatings – for example, tastes from the Deep South in the US remain a perennial favourite, as evidenced by the proliferation of products promoted as 'Southern Fried.' Coatings derived from Indian, Chinese, Mexican and Japanese cooking have also come to market as the sector has developed.

In typical foodservice practice, the batter is provided as a dry mix to which water is added at the unit restaurant level. At the retail level, coated foods are prepared in bulk, packaged frozen, and heated at home. The development of optimum coating formulas is dependent upon the stresses to be encountered during subsequent processing. The requirements for freezing during prolonged storage and the final reconstitution by heating predominate here.

After application of a coating, the food may be either partially or completely cooked by frying or oven heating before being frozen. In some cases, however, cooking at this stage may be excluded entirely.

BATTER COATINGS

Parfried and frozen potato strips, commonly referred to as French fries, are conventionally prepared by cutting whole potatoes into elongated strips of a desired size and shape, and then partially cooking the potato strips by blanching in water or steam. Thereafter, the potato strips are partially fried, or parfried, in hot cooking oil followed by freezing for packaging, shipping and/or storage. Prior to consumption, the parfried and frozen potato strips are reconstituted or finish prepared typically by finish frying in hot oil. French fried potato strips of this type are utilized extensively in restaurant and food service operations, and particularly in so-called fast food restaurants wherein it is desirable to produce a finish cooked product with a substantially optimized set of quality characteristics and with a finish-preparation time that is as short or fast as possible.

More specifically, one major objective of potato processors is to provide parfried and frozen potato strips which can be finish-prepared with a combination of taste, color, odor, and textural attributes selected for optimum consumer palatibility. For example, it is highly desirable to provide parfried and frozen potato strips, which, after reconstitution, exhibit a light and tender but crispy and golden brown exterior surface encasing a soft and mealy interior, which is neither too dry nor too soggy. Such batter coatings, however, sometimes contribute to increased toughness in the finish prepared product, and may also contribute to various off flavors associated with ingredients used in the batter coating. Moreover, batter coatings undesirably increase the overall production costs for the French fry strips, both in terms of the cost of the coating ingredients and the inclusion of additional processing steps to prepare and apply the coating to the strips prior to parfrying.

OIL UPTAKE

Through the years concerns have grown regarding negative health consequences of fried foods. These concerns are generally associated with the addition of fat to the food during the frying process.

Several variables can impact the amount of oil absorbed during frying. Other than optimizing the frying process, an approach to reduce the amount of oil absorbed by food during deep frying is to apply a coating designed for that purpose. Some materials form a barrier that can reduce the ability of oil to penetrate into the food. The Dow Chemical Company has developed a suite of products under the brand name WELLENCE™ Smart Fry for this purpose.

They contain methyl cellulose, a material with the unusual property that the viscosity of formulations increases with increased temperature. Therefore it can be applied as a thin, low-viscosity batter that, when heated, forms a gel. The gelled formulation inhibits oil entering the food, reducing fat uptake generally by more than 30%. The batter can even have the added benefit of reducing some of the water loss from the food, leading to a moister product. Whether incorporated into batters currently used on the food, or applied as a thin topcoat over an existing breading or directly onto unbattered food, these coatings do not negatively impact flavor or texture profiles of fried food.

ACRYLAMIDE PREVENTION

The presence of acrylamide in food products has been studied in different countries and many food organizations have affirmed that deep-fried potato chips contain high amounts of acrylamide. In addition, it was reported by Mestdagh et al. that the ratio of fructose to glucose impacted both the color and acrylamide levels of fried potato strips, with higher fructose concentrations favoring acrylamide formation.

Any factor, such as food formulation, pH, water content, temperature, and frying time can influence the Maillard reaction, which is responsible for acrylamide formation.

To prevent acrylamide formation during the frying process, some precautions have been reported. The simplest precautions refer to the use of potato blanching either with water or acidic solutions, containing, for example, ascorbic acid or citric acid.

Recent studies demonstrated that a hydrocolloid-based coating was successfully used for the reduction in acrylamide formation due to its capability to increase water retention. For the same reason, hydrocolloid-based coatings were also effective in reducing oil uptake as they provided a reduction in the heat transfer coefficient during frying.

It is worth noting that, due to their low cost and their colorless and tasteless properties, researchers believe that hydrocolloids may be adopted in the future as strategies for consumers, but also enterprises that produce commercial fried foods to maintain a lower acrylamide content. •

Europe & Asia Lead the Way

Jonathan Thomas

Flavor innovation for potato chips is still lacking in the US compared to Europe and Asia. In many countries, sales received a boost from the pandemic and the rise in snacking as consumers were prevented from leaving the house.

By Jonathan Thomas

To counter the constant threats posed by other snack foods, innovation levels remain high within the sector – two of the most significant areas of activity are flavors and textures.

FLAVOR TRENDS

Development of new flavors continues to represent one of the most widely used forms of new product activity amongst manufacturers of potato chips and crisps. According to Jonathan Roberts, Senior Brand Manager for PepsiCo's Walkers Max range, "taste is incredibly important as it remains the number one driver when it comes to choosing a snack." For this reason, many markets in regions such as Europe and Asia now feature a wide and diverse range of flavors.

In Western Europe, there now exists a huge and diverse range of flavors within markets such as the UK – for example, there are believed to be up to 75 varieties of cheese and onion, as well as over 120 for meat-based flavors for potato crisps. However, traditional favorites continue to dominate the market, especially as far as households containing children are concerned. Demand for potato crisps offering bolder or more unusual flavors tends to be heavily skewed towards adult-only households, such as empty nesters or those yet to start a family.

The UK market for potato crisps is dominated by Cheese & Onion and Ready Salted flavors, which account for over 40% of sales. Market leader Walkers (which is owned by PepsiCo) states that Cheese & Onion represents its bestselling flavor

in the UK, alongside Ready Salted, Salt & Vinegar, Chicken and Prawn Cocktail. Most consumers in the UK appear to opt for a handful of favorite flavors and stick with them when purchasing potato crisps. Nevertheless, the UK has continued to experience a growth in demand for potato crisps offering hot or spicy flavors in recent years. Research from The Grocer magazine indicates that almost 60% of UK consumers aged 18-34 regularly eat spicy foods derived from cuisines such as Indian, Mexican and Chinese, while it is those aged under 45 that are most positively inclined towards new flavors of potato crisps and other similar snacks.

According to PepsiCo, the spicy flavors sector has been one of the fastest growing within the UK market for potato crisps, with the company having extended its Walkers Max range with new Fiery Prawn Cocktail and Hot Sauce Blaze varieties during June 2022. The Walkers Max range had already featured potato crisps with bold flavors, examples of which included Punchy Paprika, Hot Chicken Wings and Sizzling Flame Grilled Steak. However, not all product launches within this sector have proved successful. In 2020, KP Snacks extended the McCoy's range with new Fire Pit flavors, examples of which included Flame Roasted Peri Peri, Flame Scorched BBQ Ribs and Flame Smoked Chorizo. As of the spring of 2022, however, this range appears to have been discontinued.

Bolder flavors are also evident in many Western European markets. In Germany, for example, Intersnack's leading brands include Chio and Funny-Frisch Chipsfrisch. The latter's range features several spicy variants, examples of which include Pepperoni, Hungarian, Oriental, Currywurst, Hot Chilli Mayo and Chakalaka (which is a spicy bean-based relish from South Africa). Another Intersnack brand is Estrella, which is prominent in the Scandinavian and Baltic regions. Its Sour Cream & Onion is the most popular flavor in the Swedish market and includes bolder flavors such as Hot Chilli & Sour Cream and Sweet Chilli.

"Compared with regions such as Europe and Asia, levels of flavor innovation have typically been on the low side within the large US market. This might be considered surprising, given the wide diversity of cooking styles and cuisines, which exist within the US food industry."

The turbulent environment created by the pandemic resulted in a wave of new product activity influenced by nostalgia throughout much of the food industry, with consumers turning their minds back to happier times. Flavors associated with foods and meals from yesteryear were apparent, examples of which included Bangers & Mash and Fish & Chips. Elsewhere in the UK market, the Golden Wonder brand (which is now owned by Tayto Group) was recently extended with Chip Shop Curry and Beef & Onion flavors, which returned after a long period of absence and aimed to capitalize on this growing consumer demand for tastes associated with past times.

Another recent trend has been the introduction of potato crisps emphasizing the provenance and heritage of regions or countries via their flavors. In the approach to Christmas 2021, the UK premium snack brand Made for Drink launched a new range named English Potato Crisps, which fell into this category. Introduced in partnership with English Heritage, the crisp flavors were English Truffle, Dorset Sea Salt, Malt Vinegar & Sea Salt and Unseasoned Yorkshire. The range was initially exclusive to customers of Fortnum & Mason, before it became more widely available via online retail channels at the start of 2022.

Compared with regions such as Europe and Asia, levels of flavor innovation have typically been on the low side within the large US market. This might be considered surprising, given the wide diversity of cooking styles and cuisines, which exist within the US food industry. Nevertheless, a large percentage of the US population still gravitates towards plain-flavored potato chips as a first choice, rather than actively seeking out novel or innovative flavors. According to data from Statista, plain varieties were eaten by over 191 million consumers within the country during 2022, way ahead of flavors such as Barbecue and Sour Cream & Onion.

As of 2022, plain varieties of potato chips are regularly purchased by 58% of the US population. This figure decreases to just over a quarter (26%) for barbecue-flavored products, while Sour Cream & Onion is a favorite for just over a fifth of US consumers. Compared with parts of the world such as Western Europe,

Leading Potato Chip Flavors in the US by number of consumers and penetration, 2022

Flavor	Nr of consumers (million)	Penetration (%)
Plain	191.2	58
Barbecue	87	26
Sour cream & onion	69.7	21
Salt & vinegar	48.1	15
Cheese	39.1	12
Jalapeno	29.2	9

Source: Statisa/Trade sources

penetration of cheese-flavored potato chips remains low.
Certain reasons have been put forward for this lack of flavor innovation in the US market compared with other parts of the world. According to Jason Cohen, CEO of the research firm Gastrograph AI, the way market research is usually carried out is not conducive to the development of new or interesting flavors of potato chips. The people most frequently chosen for 'taste tests' tend to be heavy users, i.e. people who eat potato chips four times or more during an average week. This not only skews research towards those most favorably disposed towards the traditional big selling flavors but also excludes potential consumers who might buy into the category more frequently if more innovative flavors were present.
Furthermore, US manufacturers of potato chips can often be unwilling to take risks in this area, since they need flavors that appeal to a large percentage of the population to justify the resources devoted to their production. Many US retailers are also similarly conservative, unwilling to stock flavors of potato chips unfamiliar to consumers that might not sell.
Although plain-flavored potato chips remain popular with over half of the US population, there has been some evidence of increased demand for products with more novel taste profiles, especially amongst the younger age groups whose diets tend to be more cosmopolitan. According to the summer 2022 edition of Frito-Lay's Snack Index (which surveys the opinions of 2,400 US adults), 35% of consumers stated that innovative flavors were likely to influence their purchase choice for potato chips, ahead of recommendations (28%) and brand loyalty (21%). Outdoor and/or summer gatherings were identified by the research as a popular occasion for experimentation with potato chip flavors.
Consumers in both the younger and older demographics expressed an interest in flavor innovation. In both the 18-34 and 35+ age ranges, 42% of consumers expressed a preference for flavor combinations, examples of which included sweet and spicy and tangy and salty. This compared with 21% for flavors based on regional dishes or cuisines and 15% for potato chips featuring international flavors. Meanwhile, the Lay's Around the World blog (which gives examples of some of the company's more novel flavors from outside the US) appears to command a loyal following amongst consumers.
In recent years, more US consumers have apparently been willing to experiment with spicy or bolder flavors, especially millennials and members of Generation Z. PepsiCo's market leading Lay's range, for example, contains flavors such as Limon (a natural lime flavor especially popular with Hispanic consumers), Dill Pickle and Chesapeake Bay Crab Spice. The Ruffles range owned by the same company now includes varieties such as Hot Wings, Zesty Cheddar, Flamin' Hot BBQ and Flamin' Hot Cheddar & Sour Cream.
Flavor innovation is also widespread in many Asian markets, where tastes can be quite different

to western palates. According to the aforementioned Lay's Around the World blog, some of the more interesting flavors of potato chips have emerged in Thailand in recent years – examples include Crab Curry, Wasabi Mayo, Seasoned Seaweed and Hat Yai Fried Chicken. Elsewhere in the Asian region, some of the more popular flavors within the Lay's range in China include Cucumber, Blueberry, Lemon Tea, Italian Red Meat and Hot & Sour Fish Soup.

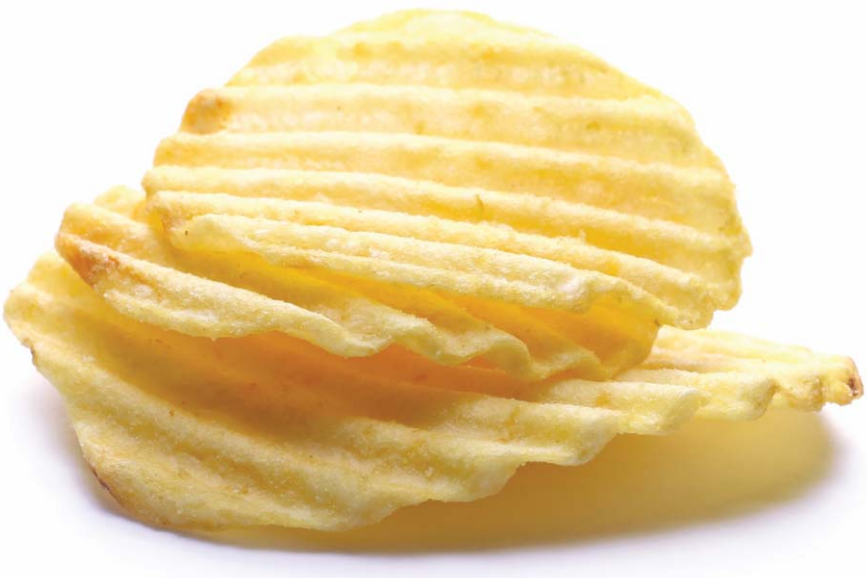
TEXTURES

The market for potato chips and crisps also features different textures, which provide a different mouthfeel experience for consumers. Consumers appear to be relatively well-disposed towards these products – the summer 2022 edition of Frito-Lay's Snack Index found that 21% of US consumers opted for potato-based snacks according to texture. Manufacturers have been experimenting with thicker, crunchier products usually promoted as 'ridge cut.' These are popular with consumers for several reasons – as they have a greater surface area, they are more suitable for eating with dips, while they are also sturdier and less prone to breaking. However, the ridges tend to absorb more oil than regular varieties, which has led some to question their nutritional profile. Many of the thicker ridge cut chips and crisps are positioned at the higher end of the market and therefore command more premium prices. Most of the world's leading suppliers compete within this sector. In the US, for example, PepsiCo's range includes the Ruffles brand, which is also available in Double Crunch for a thicker taste experience. With a share approaching 10%, the Ruffles brand is one of the largest within the US market for potato chips. The same company supplies the Walkers Max range in the UK. One of the leading brands of thicker ridge cut crisps in the UK market is McCoys, which is owned by KP Snacks and regularly purchased by up to a third of UK households. As of January 2022, the McCoys brand was worth over GBP134m at the retail level, having increased in value terms by over `15% from the previous year.

"The desire for different textures has also contributed to the growth of the market for batch-fried products, or kettle crisps/chips as they are often called. Unlike their conventional equivalents, these are produced using a process known as batch cooking, whereby the potato slices are rinsed in cold water to release starch before being stirred in an oil-filled kettle and cooked at relatively low temperatures."

The desire for different textures has also contributed to the growth of the market for batch-fried products, or kettle crisps/chips as they are often called. Unlike their conventional equivalents, these are produced using a process known as batch cooking, whereby the potato slices are rinsed in cold water to release starch before being stirred in an oil-filled kettle and cooked at relatively low temperatures. During this process, the crisps are continuously raked to prevent their sticking together. This cooking process results in harder and crunchier products.

The market leader is Kettle Chips, a brand available in parts of the world such as the US, the UK and the EU. In the UK, it claims a leading 40% of the market for premium crisps, having launched a new advertising campaign in the run up to Christmas 2021. This was targeted at a younger audience and aimed to spread awareness of the range of tastes and flavors offered by the Kettle brand. According to latest research from YouGov, the brand is viewed favorably by two-thirds of the UK population. Its share of the US market is considerably lower at less than 5%, on a par with Cape Cod, which cooks its potato chips in a similar fashion to Kettle. •



Potato Starch: Steady Boat in Turbulent Waters

With dietary starches gaining favor as tools for health maintenance, potato-based resistant starch has started to garner interest due to its specific health attributes. Research efforts in the potato starch market have revealed the multitude of benefits demonstrated by resistant starch in metabolic and gut microbiome health.

By Global Market Insights

Potato-derived starch, especially in a cooled state, can resist digestion in the small intestine and travels directly to the large intestine where it is fermented into metabolites such as butyrate, acetate, propionate, and others essential to microbiome and gut health.

INPUT COST VS. CULTIVATION AND STARCH PRICES

In recent years, potato growers have been facing increasing challenges, arising mainly from the significant surge in input costs, including fertilizer, fuel, labor, and electricity, to name a few, which have asserted a great influence on planting decisions for the 2022-2023 potato season. According to the NEPG (North-Western European Potato Growers), in January 2022, production costs grew by nearly 15-20% as compared to January 2021.

The prices of fuel, natural gas, and electricity have reached unprecedented levels, which have affected potato cultivation, where these inputs play essential roles. The ever-increasing natural gas prices, for instance, are driving up fertilizer costs to record highs, which has made growers hesitant to use the products, in turn impacting planting areas in upcoming seasons.

While this has stymied potato cultivation to an extent, the demand for starch derived from potatoes continues to grow year by year. Despite market uncertainties, global demand for potato processing remains strong, which is driving growers in some regions to focus on increasing their planted areas.

In Europe, for instance, several potato starch industry players are poised to witness a favorable growth trajectory despite prevailing market conditions and the influence of the COVID-19 pandemic. This includes Royal Avebe, which is on track to achieving its strategic target for a USD 105 (€100) performance price by FY2024/2025, having announced a USD 98.65 (€93.30) performance price for FY 2020/2021. Among the key reasons behind this achievement was the strategic direction following a 2-year period where low market supplies and higher native starch prices proved beneficial for performance price.

In the Netherlands, the year 2020 observed a better growing environment for starch potatoes than the previous ones. This trend was also observed in other European nations, where the cultivation and consumption of starch potatoes have increased significantly.

WHEAT DEMAND AND PLANTING STRATEGIES

Current events like the COVID-19 pandemic and the ongoing Russia-Ukraine war have left supply chains in shambles, creating food insecurity on a global scale. Access to important mass-produced grains like rice, corn, and wheat has become difficult, which has created significant food gaps, given that these grains are among the basic necessities for

nourishment worldwide. In an attempt to tackle this issue, governments across the globe are encouraging crop farmers to diversify their cultivation to encourage a better food supply.

In regions like Canada, India, and the U.S., farmers are being encouraged to plant more wheat. Farm subsidies over the past few decades have also been focused on enhancing the development of crops like wheat and corn. While beneficial from the perspective of food security, this focus has created certain obstacles to the growth of industries associated with alternative staples, like the potato starch industry, which is dependent on optimized potato cultivation.

The industry is facing further challenges as potato cultivation in nations like India becomes difficult, due to plummeting prices in the current year. In 2021, the rapid rise in potato prices encouraged farmers to grow potatoes on a larger scale. In 2020-2021 potato production rose to 53.69 million tons from the 48.56 million tons produced in 2019-2020, a trend that drove farmers to cultivate more potato crops. However, in the new year, an unprecedented rise in input costs like fuel, labor, and fertilizers and a sharp decline in potato market prices have made the cultivation of this crop unprofitable for farmers. Trends like these could not only drive growers to diversify to other crops like wheat but also create an uphill battle for related sectors like the potato starch industry.

DISRUPTIONS AND CHALLENGES IN POTATO CULTIVATION

For the past two years, consumers worldwide have been battling intermittent shortages in various food products, first due to the novel coronavirus outbreak and more recently due to the challenges arising from the Russia-Ukraine war. Although the situation was anticipated to improve in 2022, this ongoing conflict has instead intensified the issue, with crops like potatoes becoming the most recent addition to the list of food items in short supply.

While relatively less affected than other commodities like sunflower oil or wheat, which are cultivated mostly in Ukraine, the intensification of the conflict has blocked the supply chain and trade of potatoes to a great extent, increasing the food insecurity burden.

According to the UN's FAO (Food and Agriculture Organization), Ukraine is known as the third-largest potato producer, with over 20.8 million MT harvested in 2020 alone. Despite these massive production levels, Ukraine has historically needed to import nearly 0.3 million MT of potatoes from other nations like Poland and Romania, mainly due to massive domestic consumption of the crop.

The war between Ukraine and Russia, however, has not only restricted local potato production but also created a barrier to potato trade as well as post-harvest losses due to the destruction of potato warehouses, which could put a strain on potato starch production in the region. As a result, the potato starch industry is now characterized by availability uncertainties, as shockwaves from the crisis weigh heavy on the flow of raw materials.

To respond to these issues, several initiatives are being taken by global authorities to help revive the potato industry in Ukraine. An example of this is the UktoUkraine initiative, which introduced its third project, dubbed Victory Gardens, in April 2022, to supply vegetable seeds and gardening equipment to Ukraine via Poland, to help communities tackle food shortages. Funds raised through the UktoUkraine initiative would be utilized to purchase onion, potato, carrot, beetroot, and various other seeds in Poland, which would then be delivered to communities in central and western Ukraine.

The United Nations, through the FAO, has also doubled its initial request of USD50m to over USD115.4m, to prevent further deterioration of food security in Ukraine and help local farmers plant potatoes and other vegetables during the spring season, thus preventing potential disruption to winter crop harvesting.

Ranked as the most consumed crop in the U.S. and the fourth-most consumed crop in the world, closely following rice, wheat, and corn, as per the USDA (U.S. Department of Agriculture), potatoes continue to gain popularity as an essential part of diets worldwide. This could, in turn, present lucrative opportunities for potato starch industry growth over the forthcoming years. •

The Race for Simple and Effective Anti-sprout Solutions

Inhibiting the sprouting of potatoes is a vital step needed during potato storage in order to have a steady supply of produce available for the processing industry. Sprouting degrades the quality of tuber along with releasing α-solanine and α-chaconine, which are harmful for health.

by Tudor Vintiloiu

Along with the ban on CIPC within the European Union, growers and store owners found themselves scrambling to find a solution that could fill a huge gap in their workflow. Sprout suppressants, available in the market, were either costly, ineffective or complicated to use. Or at least that was the initial reaction. Driven by the rampant demand, a race to explore new sprouting suppressant compounds that are cheap, non-toxic and reasonably efficient ensued.

Sprouting is one of the most significant challenges in the postharvest storage of potato tubers and throughout the entire supply chain, as it reduces the quality and quantity of marketable produce, thereby resulting in financial losses. Severe losses are incurred due to potato tuber sprouting and sprout growth since these cause alterations in tuber physical properties, such as reduced turgidity, induced shrinkage, and weight loss.

Potato tubers are mainly consumed fresh, resulting in a yearly demand, and necessitating extended postharvest storage of tubers after harvest. Currently, common strategies for long-term storage of potato tubers include storage at low temperatures between 2–4 oC (90–95% relative humidity) or between 8–12 oC (at 85–90% relative humidity) and/or the use of chemical compounds that act as sprout suppressants.

Finding a suitable sprout suppressant that could match the efficiency of CIPC has been quite daunting. Several promising alternatives have been identified.

RESTRAIN STOPS SPROUTS

ETHYLENE GAS SYSTEM FOR POTATOES

ANTI-SPROUTING FOR POTATOES

Restrain uses natural ethylene gas which keeps your potatoes dormant and prevents sprouting. Using ethylene gas means you won't leave any residue in your crop or storage facility, allowing you to deliver potatoes which can be used immediately for processing.

- **Works in all stores**
- **No waiting time**
- **Excellent fry colours in trials**
- **Capacity MAX 5000 TONS per system**

Restrain

RESTRAIN.EU.COM

For instance, S-carvone is a naturally occurring monoterpene that inhibits potato sprouting. Other promising compounds with significant potato sprout suppression properties include ethylene, 1,4-dimethyl naphthalene, maleic hydrazine, and 3-decen-2-one. Essential oils, and chemical components of essential oils such as monoterpenes, have also been tested and used as suppressants of sprouting in potato tubers with a significant level of efficacy.

WHAT TO CONSIDER

Critical parameters that must be taken into consideration in the evaluation of chemical compounds for use as potato tuber sprout suppressants for the extension of dormancy and tuber storage management include the type of cultivar, chemical nature and bioactivities of the compound, dosage, storage temperature, and mode of application, among others.

Ethylene is one of the most effective sprout inhibitors for potatoes in storage. The method is cheap, easy to use and can be used independently by growers.

Sprout inhibitors come in all shapes and sizes. But most methods can't be applied unassisted. Contracts often run through an intermediary and growers need specialists with advanced equipment to periodically distribute the sprout inhibitor in the warehouse. Due to safety concerns, in some instances it is not allowed to enter the storage area for a few days after the administration. And if the potatoes have to go to the processor, there is a waiting period that can be up to 30 days.

According to **Restrain**, a company that offers a popular ethylene-based sprout inhibitor, using ethylene prevents many of these problems. Adrian Briddon, technical manager, Restrain, explains: "At Restrain, growers are direct customers of the company. There are no intermediaries involved. You purchase an ethylene generator and jerry cans with ethanol yourself. Then you can place the generator in your shed, connect it and start it up. The technology does the rest. The generator automatically and continuously distributes the natural gas through the potato storage." During a sprout inhibition treatment with ethylene, growers can easily enter their storage. "Ethylene is completely harmless, so there is no risk of damage to the health of the manager, the potatoes or the storage shed. Ethylene also leaves no residue on or in the potatoes. This allows potatoes to be processed directly from storage. There is no waiting time," Briddon adds.

A scientific paper called "Evaluating Ecologically Acceptable Sprout Suppressants for Enhancing Dormancy and Potato Storability: A Review" compares some of the available sprout suppressants available, but concludes that a definitive winner is hard to establish due to the multitude of variables (such as storage temperature or cultivar type) involved in the storage of potatoes.

1,4-dimethyl naphthalene (1,4-DMN), is a naturally occurring and endogenous methyl-substituted naphthalene in potatoes, and is another popular alternate sprout inhibitor. It is a volatile compound that contributes to the flavor and aroma of baked potatoes and was isolated from potato skins and then synthesized for use as a plant growth regulator.

In particular, the chemical suppresses sprout production and etiolated development in stored potato tubers, thereby prolonging the effective storage period and preserving tuber quality. Because the chemical has reversible effects, it may also be utilized on seed potatoes. 1,4-DMN is commercialized in synthetic form as 1,4Sight®, 1,4SHIP®, and 1,4SEED®.

Compounds such as S-carvone, are a volatile monoterpenes in the **essential oil** of caraway, mint, and dill, which have potent inhibitory bioactivities on the sprouting of potato tubers at continuous low headspace concentrations. In addition to its sprout suppression bioactivities, S-carvone inhibits bacterial and fungal growth, thereby presenting secondary benefits, such as suppressing storage pathogens.

Other essential oils with reported potato sprout suppression activities include those obtained from eucalyptus and coriander.

With essential oils, several treatments are necessary during storage to sustain sprouting inhibition, and because the essential oil manufacturing process is quite expensive, these types of sprout suppressants are challenging to put on the market. However, compared to CIPC, essential oils provide no difficulty when storing potato seeds in the same facility as the treated potatoes since their impact is reversible, and their volatility makes it easy to clean the storage facility's air of any chemical residues. They also provide secondary benefits as they can diminish the rate of accumulation of reducing sugars in stored tubers, which are responsible for browning in processed potato products.

CULTIVAR TYPE

The same research concludes that genetic variability is a significant basis for the differences in crop cultivars, so reaching a decision on the most effective sprout suppression alternative is quite difficult. Moreover, the responses of different cultivars to chemical compounds are often shaped by their genetic make-up. With respect to sprouting, potato cultivars vary in the length of their dormancy periods, so the development and optimization of suppressant application regimes need to consider the potato cultivar to be treated. •

2022 FEATURE PLANNING

1 JANUARY/FEBRUARY
Ad closing 17.01/Publishing 28.01

Key Exhibitors Road Map and Event Agenda

Processes
- Conveying systems and belts
- Pre-cleaning, washing, de-stoning

Expert View
- Conveyors and the transfer of potato products
- Remote maintenance and customer service
- Cutting technology advancements

Spotlight
- Cleaning and sanitation

Markets
- Western Europe

Products
- Better for You potato products

Ingredients
- Lowering salt sontent

Storage Special
- Handling potatoes to & from storage
- Bulk vs. boxed storage

Trade shows: Potato Expo | Jan 6-7, Fruit Logistica | Feb 9-11, International Potato Technology Expo | 24-25 Feb

2 MARCH/APRIL
Ad closing 14.03/Publishing 25.03

Key Exhibitors Road Map and Event Agenda

Processes
- Sorting
- Process monitoring
- Seasoning & coating

Expert View
- Optical sorting - increasing yields
- Automation - ensuring a reliable and flexible production flow

Spotlight
- Smart production & Industry 4.0

Markets
- Eastern Europe

Products
- Potato-based snacks, drinks and innovations

Ingredients
- Flavors and seasonings for chips and fries

Storage Special
- Automated climate control
- Potato monitoring & quality assurance

Trade shows: Anuga FoodTec | 26-29 Apr

3 MAY/JUNE
Ad closing 09.05/Publishing 20.05

Key Exhibitors Road Map and Event Agenda

Processes
- Cutting, peeling, slicing
- Energy and water saving
- Oil filtration systems & de-fattening

Expert View
- Precision in cutting equipment
- Sustainability in production

Spotlight
- Waste management

Markets
- North America

Products
- Local vs. international tastes in potato snacks

Ingredients
- Frying oils

Storage Special
- Power saving and sustainability
- Storage design and construction

Trade shows: WPC | May 30-June 02, Europatat Congress | 29 - 30 May, Snackex | 06-07 June

4 JULY/AUGUST
Ad closing 18.07/Publishing 29.07

Processes
- Blanching, frying
- Forming and extruding

Expert View
- Latest frying technology developments
- PEF applications and advantages

Spotlight
- Increasing efficiency in potato processing

Markets
- South America

Products
- Potato chips flavors, textures and trends

Ingredients
- Batters, coatings

Storage Special
- Sprout suppressants in storage
- Sensors and data gathering

Trade shows: Potato Association of America Annual Meeting | July, Potato Europe | 6-8 September

5 SEPTEMBER/OCTOBER
Ad closing 05.09/Publishing 16.09

Processes
- Cooling and freezing
- Dehydrating

Expert View
- IQF freezing for French fries
- Drying - innovation in selt and drum dryers

Spotlight
- Traceability along the potato value chain

Markets
- APAC/ANZAC

Products
- Frozen French fries in retail & foodservice

Storage Special
- Refrigeration and long-term storage
- Disease Management

6 NOVEMBER/DECEMBER
Ad closing 07.11/Publishing 18.11

Processes
- Turnkey projects
- PEF technology

Expert View
- Complete lines for processing
- Conveying systems & inspection tables
- Batch vs. continuous frying

Spotlight
- Increasing production capacity/Future-proofing processing operation

Markets
- Global market predictions for 2023

Products
- Flakes, pellets and mashed potatoes

Ingredients
- The future of potato snacks 2023

Storage Special
- Storage challenges and cost-saving solutions
- Store preparation and hygiene


Like our page and join our online community:
www.facebook.com/Potatobusiness
Follow us on Twitter:
http://twitter.com/potatobusiness
We will update regularly on our activities,
upcoming features and show attendance.
Join our group on LinkedIn search for:
Potato Processing
International News
POTATOBUSINESS
on social media