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Process

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Spotlight

Planning Ahead for a Healthy Expansion

Snacks

A Focus on Potato Flakes

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The End of a Challenging Year

Tudor Vintiloiu - Editor in chief
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The year 2022 has been a hard one for the entire potato industry. In addition to the great uncertainty surrounding the availability of potato raw material, concerns about the cost of energy, transport capacity, fertilizer, personnel and purchasing power have troubled the industry. In Europe yields per hectare varied and fluctuated more between nations, regions, and farms in 2022 than ever before. Large yield spreads, ranging from less than 30 t/ha to more than 65 t/ha, have been caused by local weather impacts (irregular temperature and rainfall distribution) and the use or non-use of irrigation. Reports from the NEPG show that in some parts of the continent results were so poor that some farmers weren't able to deliver the totality of their contracts. Between October 2021 and October this year, electricity prices have gone up by 280% (ranging from 50 to 500% increase). During the same period, diesel prices have

It is up to the growers, transporters and processors to find the right way to stay profitable and capitalize on the market opportunities that await them in 2023.

gone up by 55% (ranging from 34% to 95% increase). When one combines not only the higher production costs but also the trend of lower yields/ha (due to climate change, soil fatigue), then production costs per ton have risen and are rising even more, the NEPG experts say. They also advise that the negotiated contract prices and conditions need to take these

changes into account for the good of the industry. On the upside, according to USDA trade figures, this year has been quite successful for U.S. fresh potato exports. The USDA reported that fresh potato exports from the United States from October 2021 to September 2022 reached USD288.9 million, an increase of 10% from the previous year. Regardless of the current challenges, the global potato processing market is expected to grow from USD28.82bn in 2022 to reach USD35.37bn in 2026 at a CAGR of 5.25%. ●

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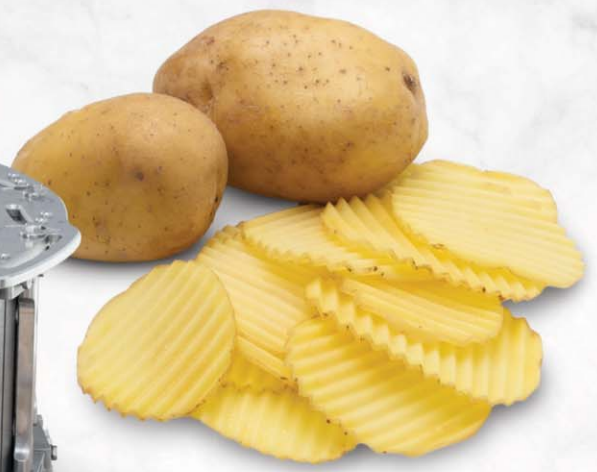
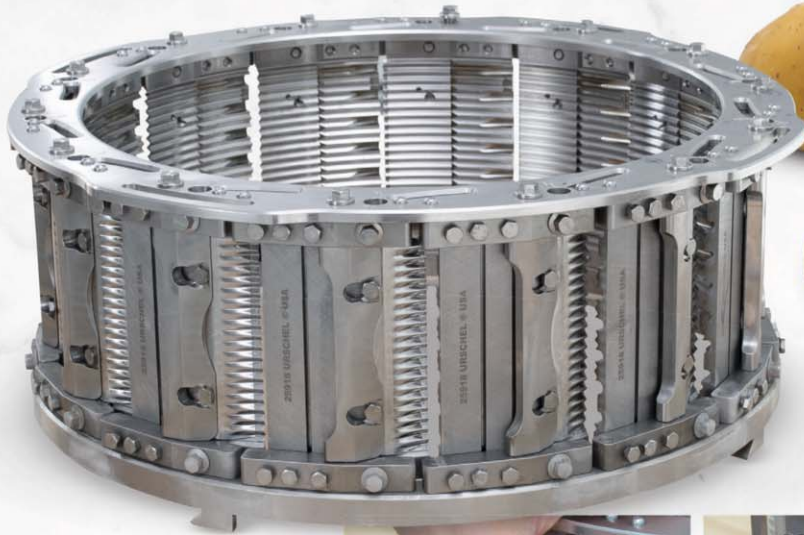
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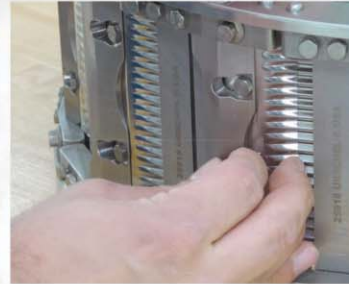
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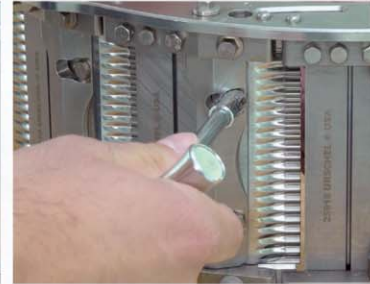
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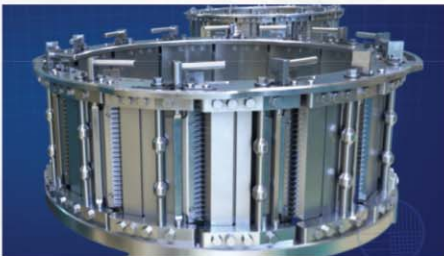


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Lutosa Opens a New Flakes Factory

The new flakes factory owned by Lutosa in Leuzen-Hainaut received its official opening in November. This brand-new, completely integrated factory is the result of an EUR45m investment by McCain in this important market. "This move meets the growing global demand for dehydrated products, a field in which the group has specialized for more than 30 years.



Furthermore, it will significantly improve working conditions for the company's

employees and increase its product range", according to a recent press release.

The improvement of the environmental impact receives 10% of the overall investment. With this new unit, there will be a 15% increase in energy efficiency, a 40% decrease in water use, and a decrease in truck traffic. This is a component of Lutosa's "Pledge to the World" CSR approach.

Sormac's Novel Potato Quartering Machine Has a New Alignment System

Sormac recently unveiled an innovative potato-quartering device. A novel straightening system and continuous processing result in more even cutting, less maintenance, and increased capacity.

"The big challenge when slicing potatoes is cutting even pieces. For this, the potato must be exactly in the middle of the knife. To achieve this, a new alignment system has been developed, which positions the potato exactly in the middle of the knife. The dies, optionally for cutting 2, 4 or 8 pieces, can be changed quickly and easily," a recent press release shows.

A continuous processing system is included with the novel potato-quartering machine. As a result, the device experiences less wear and needs less maintenance. Additionally, the continuous system enables the achievement of higher capacities.



Elea's New Belt System Presented at PEF Advantage Day

The annual PEF Advantage Day took place at Elea's facilities in

Quakenbrück, Germany, on November 16 and 17. The occasion was also used to celebrate the successful company's tenth anniversary this year.



Elea unveiled the newest belt system in its line on this particular occasion. For productions averaging up to 90 t/h, the PEF Advantage B 1000-850 was created. The machine has a greater throughput and capacity and is designed more compactly with all safety features. Even less energy and water are required for the new Elea belt system to function properly.

The event focused on PEF improving product quality, enhancing production process, increasing yield, saving energy, reducing costs, and bringing new product opportunities to the food, beverage, and biotechnology sector.

PepsiCo is Investing USD40m in Senselet Ethiopian Chip Brand



PepsiCo is investing USD40m in Senselet, an Ethiopian company that makes the SUN

Chips potato chips brand. The investment will be used to build a new snack production line and an additional potato chips production line inside the company's current facilities.

"[The] investment is further proof of the confidence that PepsiCo has in the potential of the country for economic growth. This cash injection will allow us to increase our production capacity for snacks tenfold. This also allows us to further leverage PepsiCo's expertise to help accelerate the growth of Senselet in Ethiopia by boosting its potato sourcing programs, as well as its manufacturing and go-to-market capabilities," Chris Wijnterp, general manager of PepsiCo's Foods unit in Ethiopia declared, cited by FMCG News Ethiopia.



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Vanmark's New Vibratory Conveying Equipment Unveiled at ANUTEK

In collaboration with its sibling firm PFI, Vanmark recently unveiled a new vibratory conveying equipment. The machinery was constructed in Bengaluru, India, by the local Vanmark team, the first project in a new local capability and relationship between the two brands. "Great collaboration between the PFI team here in the U.S. and the team at Vanmark India. Vanmark India continues to build on its

capabilities and offering to serve our customers in that region better. Excited

to see what's next!" Jack Grote, sales manager, Vanmark Equipment wrote on his LinkedIn page.

The result is an integrated line of Vanmark and PFI equipment, with PFI conveyors linking the peelers and hydrocutting machines from Vanmark to the other processes on the line. Potato chips and vegetables are two of the main uses for this kind of machinery in the area.

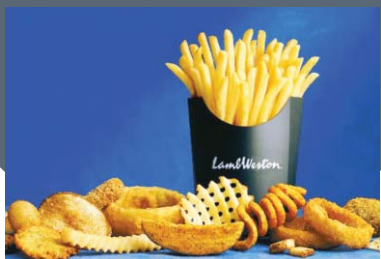


Lamb Weston Buys Out Meijer Stakes

Lamb Weston Holdings said it had reached an agreement to buy the remaining equity stakes in its European joint venture with Meijer Frozen Foods B.V. for EUR700 million in cash and Lamb Weston common stock.

"Lamb-Weston/Meijer was built over the last 28 years, and we're grateful to Meijer Frozen Foods for their longstanding partnership. The joint venture has served as a strong platform to drive growth in Europe and the Middle East, as well as to support our global customer base across our key international markets. This transaction firmly aligns with Lamb Weston's long-term capital allocation and acquisition framework, and we believe it will strengthen our manufacturing footprint by leveraging a truly global supply chain to better serve our customers and position us to take advantage of growth opportunities in Europe, the Middle East, and Africa," Tom Werner, President, and CEO of Lamb Weston said.

The management of Meijer Frozen Foods declared that it is proud of the company they have built together to create a market leader in Europe, according to Kees Meijer, the company's CEO.



The Latest Revolution in Horizontal Motion Conveying

Heat and Control's introduced its revolutionary horizontal motion conveying technology – FastBack 4.0 during Pack Expo International 2022 in Chicago. The novel machinery is the result of more than ten years of research and development and numerous international patents.

"Investing in continued innovation is at the heart of what we do at Heat and Control.

Ensuring high performance that provides results are a priority when we undertake design development such as FastBack 4.0," Tony Caridis, Heat and Control, Inc. President said. FastBack 4.0 retains all the benefits FastBacks are famous for and includes instant reversing capability, trouble-free – no preventive maintenance, no lubrication, no flexures, no linear bearings, no bushings, the longest design life, high-pressure washdown capability, fewer moving parts (by 70%), easy maintenance – only two wrench sizes needed for all operations – 13mm and 17mm, and a small footprint for both ease of installation and ease of sanitation.



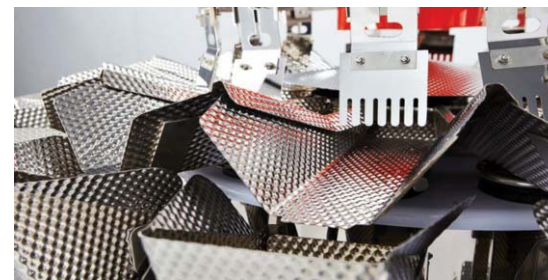
Ishida Europe Updates Its Line of Multihead Weighers

Ishida Europe announced it would launch a new line of multihead weighers in November, marking the 11th generation of the equipment.

When handling more challenging items, the product will offer unparalleled levels of speed and precision, according to Food Safety Africa. Right now, the company's top-of-the-line RV multihead weigher and its high-performance Inspira rotary bagmaker

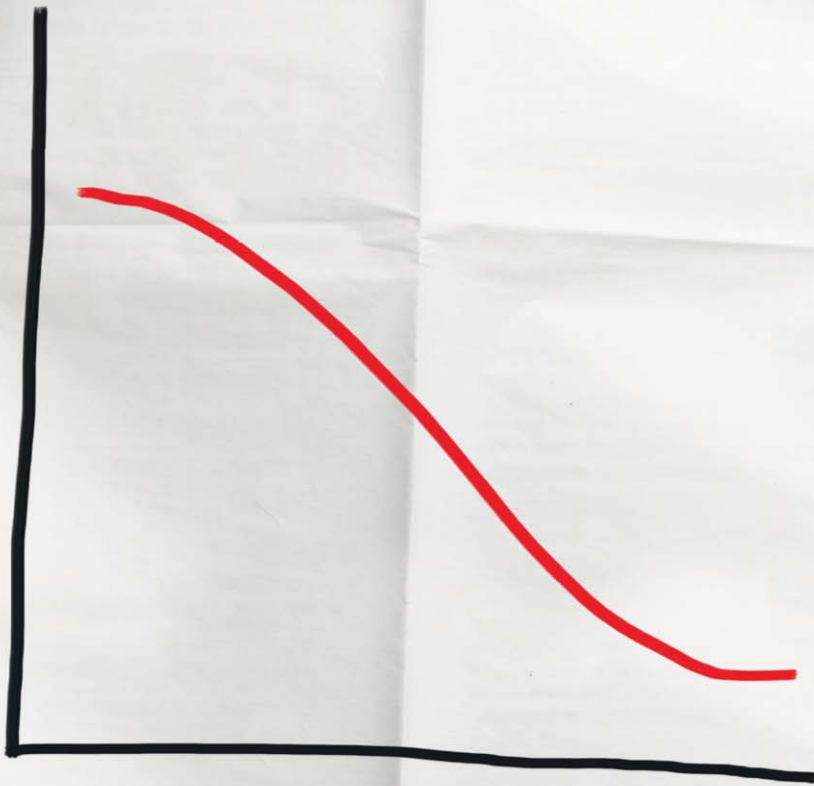
are combined into the Inspira iTPS (Integrated Total Packaging System).

With an efficiency of greater than 99%, the system can produce up to 200 bags per minute (bpm) of extruded snacks and up to 150 bpm of potato chips. The bagmaker can handle a range of films, including standard, metalized, recyclable, and biodegradable, as well as gusseted and block bottom bags, with the use of advanced software and servo-controlled variable seal time, jaw temperature, and jaw pressure.





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Turnkey Lines Are Always the Smart Choice

For many food manufacturers, the decision to invest in a turnkey line comes at a time when they are growing their business successfully. The decision can be influenced by many factors. Sometimes it is because they do not have the time and resources to dedicate to the project themselves. Often it can simply be because they want to avail themselves of a supplier's industry expertise and worldwide support in engineering, project management and after-sales service so they can maximize the quality of their investment.

By Tudor Vintiloiu

A turnkey solution is essentially related to automation and automation means increased efficiency and a decrease in long-term costs. In principle, a processor should invest in a turnkey solution when they decide they wish to avail of these benefits. With a turnkey solutions provider, manufacturers can be sure that every detail has been considered, no matter how small. Gone are the days of searching for the right technology, only to then find out that it won't communicate with existing equipment. From analyzing business needs to designing the technology to setting up control systems and training staff, a turnkey solutions provider takes full

responsibility for the entire project from start to finish.

"At **Kuipers**, the main solutions are delivered turnkey," says Valeria Lucinschi, Business Development Manager. "We believe this to be an important aspect of our technology as it gives us the opportunity to ensure efficient integration of various components within a line. In addition, we aim to pre-test all our plants before shipment. Efficient pre-testing can only be done when a plant is delivered in turnkey execution." When it comes to potato processing, the main solutions Kuipers offers are chips and French fry lines. These include various types of chips such as kettle-style or hard bite and either frozen or chilled French fries.

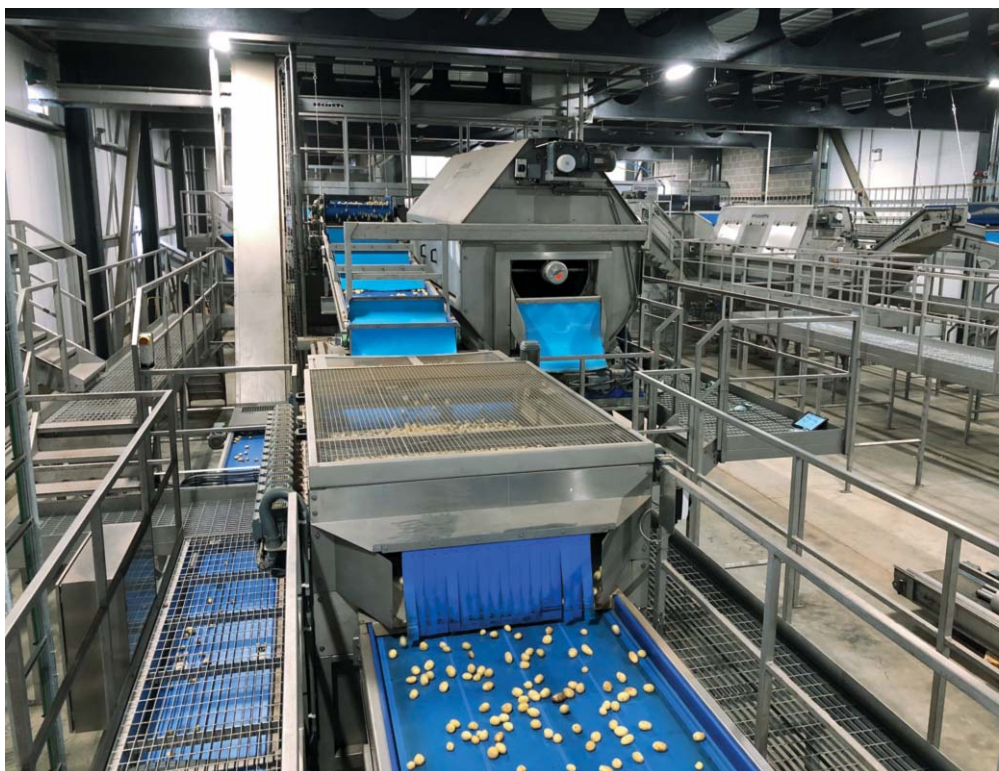
"Various unique features are incorporated within our lines. Kuipers' frying systems are without a doubt the main exclusive component, which contributes greatly to the quality of the end product as well as the overall efficiency within the line. A good fryer design combined with an effective process saves our clients huge costs by maintaining the frying oil turnover time low as well as the level of oil within the system," says Lucinschi. Another unique feature is the main support frame. Its design principle enables the specialists to use the shape of the sidebars as cable trays and mounting brackets for elements such as electric wiring or pneumatic air supply pipes.

CUSTOMIZATION

The specialist points out that each line should be customized according to the specific desired output. There are parameters within a system that must be in place for the snack producer to have any result at all. Customization of systems like those of Kuipers comes from two sides - the design and the process. The design is the essential base that must be in place and agreed upon according to the end product output. The process, on the other hand, is a molding force. It can be applied conventionally or fine-tuned to achieve different outputs. "A great example of this is Kuipers multi injection points frying system. A system that allows for great control over energy inputs throughout the length of the fryer. This gives the chips producer a unique opportunity to tweak temperatures and produce different types of chips, for example, kettle-style chips," says Lucinschi. Although customization is an essential element for a turnkey solution to deliver quality, Kuipers noticed a demand for more flexible solutions, without compromising product quality and efficiency.

SAVING RESOURCES

Innovative thinking and automation have helped a Welsh company become one of the greenest fresh



produce suppliers in the UK. **Puffin Produce** has seen its water usage reduce by 90% and the electricity used to wash and polish its potatoes decrease by 40% through a radical restructuring of its Withybush factory, which has seen four production lines replaced with two state-of-the-art lines. Huw Thomas, managing director at Puffin, asked Haith Group's sales

director, Duane Hill, to look at how the company could reduce its impact on the environment. "The progress we have made in efficiency improvements allowed us to remove the four lines from Puffin's factory and replace them with two, and doing so not only reduced their operating costs; it increased their throughput," said Hill. Everything on the new Haith lines is

sormac

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automated, from receiving and grading through to progress storage and packing. Before the new lines were installed, none of the water used in the factory was recycled. All of the discharge water was removed from the site by tankers. Today, very little water leaves the site, and 90% of the water used to wash the produce is recycled. The remaining fraction has further treatment prior to discharge with the solids being incorporated into a dry cake that can be returned to land. After being received and any stones removed, the crop enters Haith's Self-Cleaning Washer, which features the company's unique Clean-In-Place (CIP) functionality. This feature allows Puffin to programme when the washer is cleaned by a dosage system, which prevents bacteria from building up. Puffin can set the time at which the cleaning process takes place, at the end of a shift, for example. The Self-Cleaning Washer discharges the wastewater onto a coarse screen, which removes any large particles, skin, haulm and foreign objects. The wastewater is pumped to a finer screen, which sits above a balance tank, where a mixer

keeps solid matter in suspension. "We start the primary settlement process in the system by pumping the soil laden water through a serpentine flocculator" says Paul Ramplin, Technical Sales Manager, who oversaw the design of the water treatment system, this promotes agglomeration of the solids before they report into the Haith Lamella settlement tank. The now flocculated solids accumulate at the bottom of the settlement tank, where an automatic monitoring system starts a slurry removal pump at predetermined setpoints. The slurry is pumped from the Haith Lamella into a storage tank that is continuously mixed to keep the slurry in suspension. A pressure pump feeds the concentrated sludge to a multi-chamber filter press, this is where dewatering accrues and creates a dry soil cake, this can now be returned to land in a more manageable form. All of the treated water from the lamella tank is returned to Haith's washers. The 10% of water that cannot be recycled passes through a final biological treatment process before being discharged into the natural watercourse.

Haith also aided Puffin by designing all the drainage and the recycled water pumping system to and from the factory. "I think it is fair to say that Puffin has one of the most advanced potato process systems in the UK," continues Duane. "And by including all-electric drives and IE3 motors on the Rota-Tip TE box tippers, the Supa-Flume de-stoner and polishers, we have reduced Puffin's electricity usage too. At the same time, thanks to how we have developed and improved the efficiencies of our machines, we have also given Puffin the ability to increase throughput by over 10 tonnes per hour." Huw Thomas, managing director at Puffin, is delighted with how Haith's new line has transformed operations. "Improving the efficiency of a factory while at the same time lowering operating costs and reducing the impact on the environment is something a lot of businesses are trying to achieve. At Puffin Produce, though, thanks to our close working relationship with Haith and their talented team, we have been able to achieve that. It is fantastic that we can operate more efficiently, have the capacity to



handle even more produce in the future and can lower both our utility costs and impact on the environment."

MORE CAPACITY, LESS MAINTENANCE AND BETTER CUTTING RESULTS

Generally integrating or updating existing machinery should not present great challenges unless the machine suppliers are different. A turnkey solution is composed of many precise parts, which are planned and carefully designed from the beginning to function as a unit.

A recent example of an updated machine with high compatibility is **Sormac's** newly introduced potato quartering machine which boasts numerous improvements. An innovative straightening system and continuous processing lead to more even cutting results, less maintenance and more capacity. The big challenge when cutting potatoes is producing even results. To do so, it is important that the potato is positioned exactly in the middle of the knife. To achieve this, a new alignment system has been developed. The dies, which cut potatoes into either 2, 4 or 8 pieces,

can be changed quickly and easily. The potato quartering machine is equipped with a continuous processing system. This results in less wear, which means the machine requires less maintenance. Moreover, with the continuous system it's possible to achieve higher capacities. The capacity is flexibly adjustable up to a maximum of 32,000 potatoes per hour. And even at this high capacity,

the machine remains calm and steady without any floor fixations. The potatoes are supplied in 4 lanes via a vibrating chute that is part of the machine. This makes it possible to, for example, cut larger potatoes into 4 pieces on two lanes and smaller potatoes into 2 pieces on the other two lanes. A lower belt that allows undesired small parts to pass without cutting is available as an add-on. •



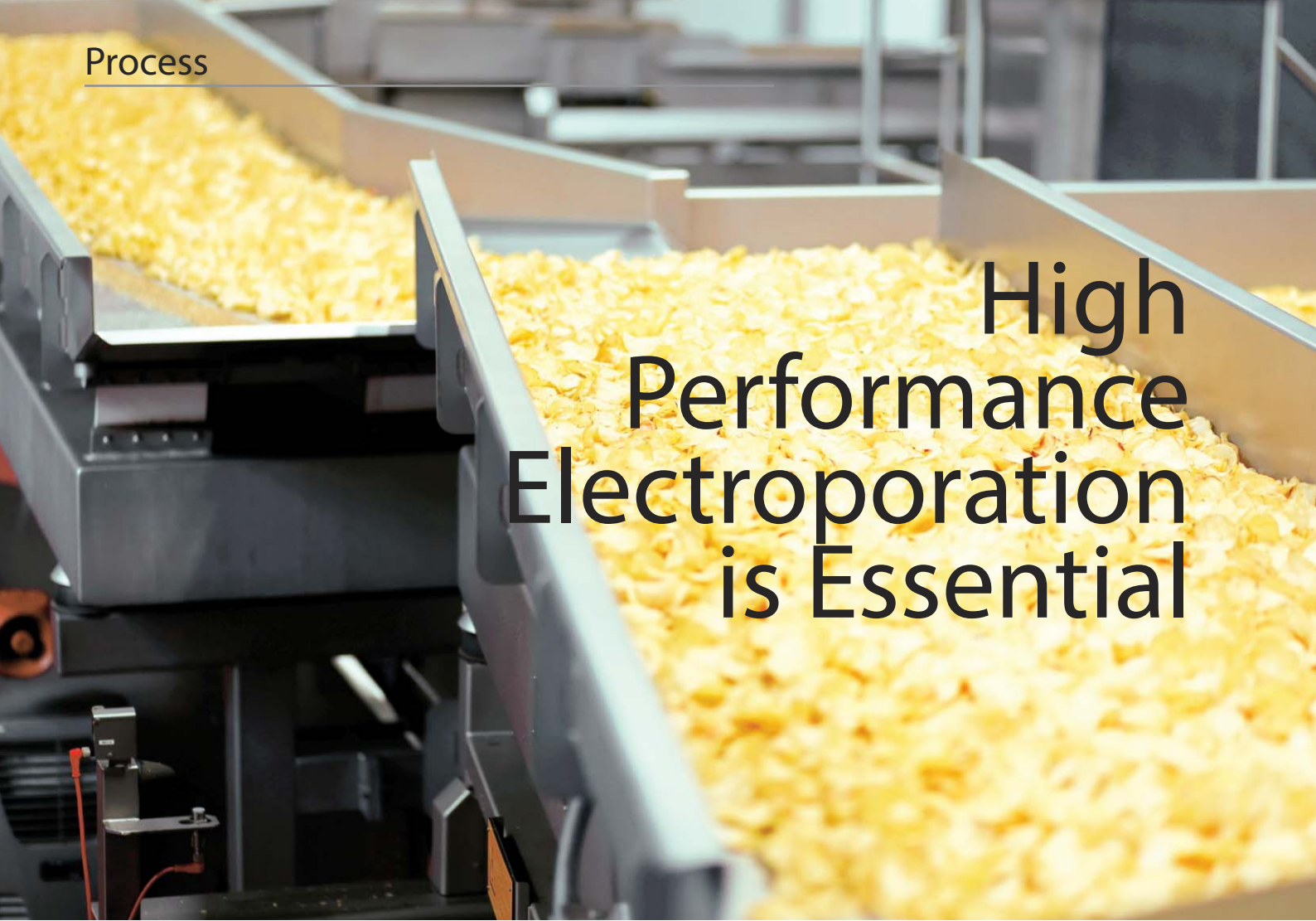
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High Performance Electroporation is Essential

Limited worldwide resources and unprecedented global turmoil call for a balanced approach to raw material, water, energy and nutritional content. Electroporation, also known as Pulsed Electric Field (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.

By Tudor Vintiloiu

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.

OIL SAVINGS

The recent sunflower oil shortage will have seen 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, uninterrupted production. Processors must find ways to optimize their process to save and preserve valuable and expensive resources. Processing equipment that 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.

**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. According to the company, 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. The company warns that when pursuing the benefits of PEF, it is important for manufacturers to remember that a consistent process is essential to ensuring all potatoes receive treatment. The electroporation system they choose must be capable of efficient product handling

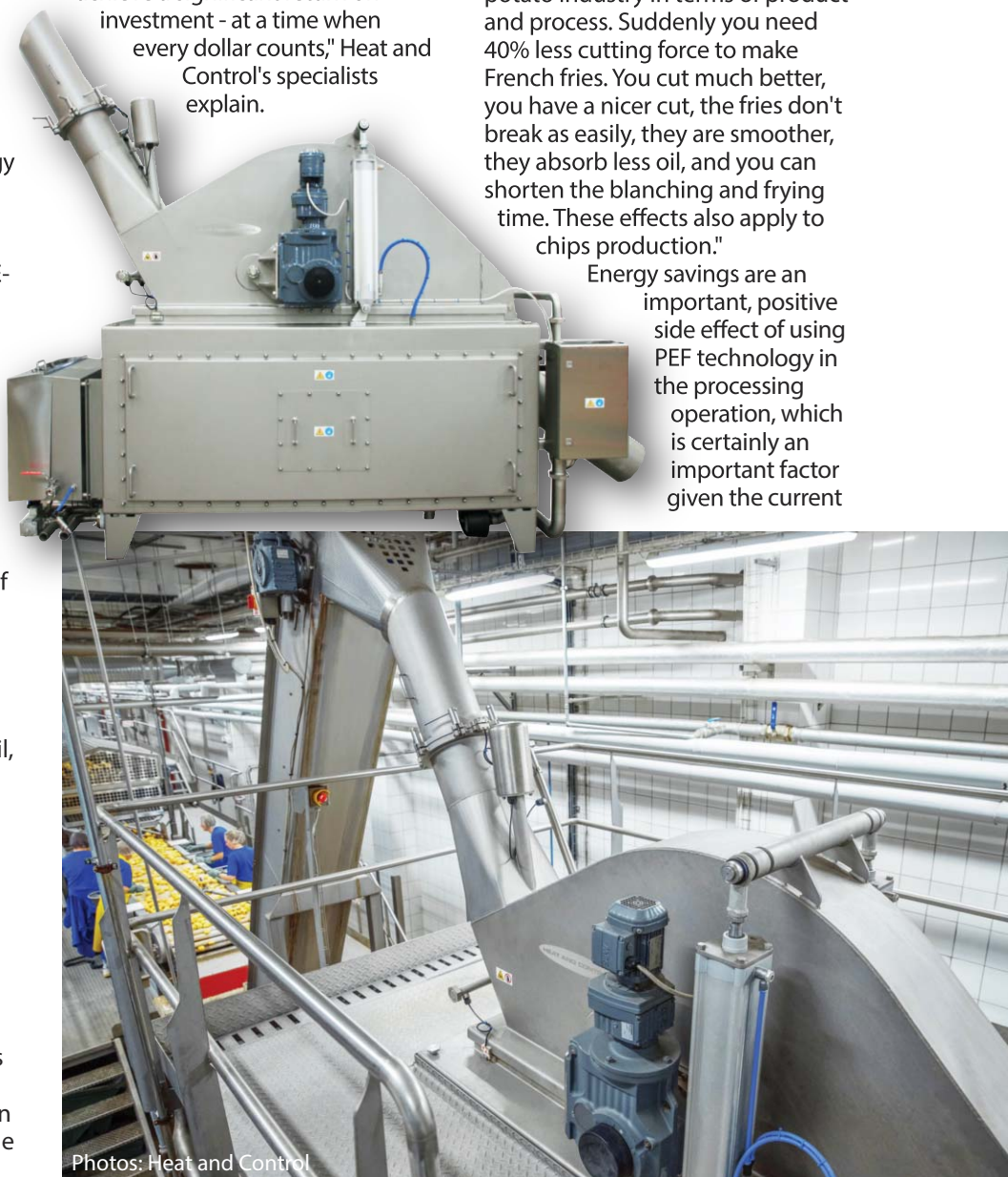
through the treatment chamber and high frequency pulsing. "Heat and Control's E-FLO is designed to pack the potatoes closely together to ensure the electric pulses pass directly through the potatoes and not through the surrounding water and this makes the energy transmission to the potatoes more efficient. 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's specialists explain.

MAKING A DIFFERENCE

In a recent interview, Mark de Boevere, Managing Director of **Pulsemaster** told Potato Processing International about the benefits and returns of using this technology for potato processing.

"PEF is a disruptive technology for the potato processing industry. [...] In the world of French fries, for example, that could mean traditional preheaters out, PEF system in. The goal of PEF treatment is cell disintegration. Drilling tiny holes in the membranes makes it easier for moisture to escape and evaporate, among other things, and has all kinds of benefits for the potato industry in terms of product and process. Suddenly you need 40% less cutting force to make French fries. You cut much better, you have a nicer cut, the fries don't break as easily, they are smoother, they absorb less oil, and you can shorten the blanching and frying time. These effects also apply to chips production."

Energy savings are an important, positive side effect of using PEF technology in the processing operation, which is certainly an important factor given the current



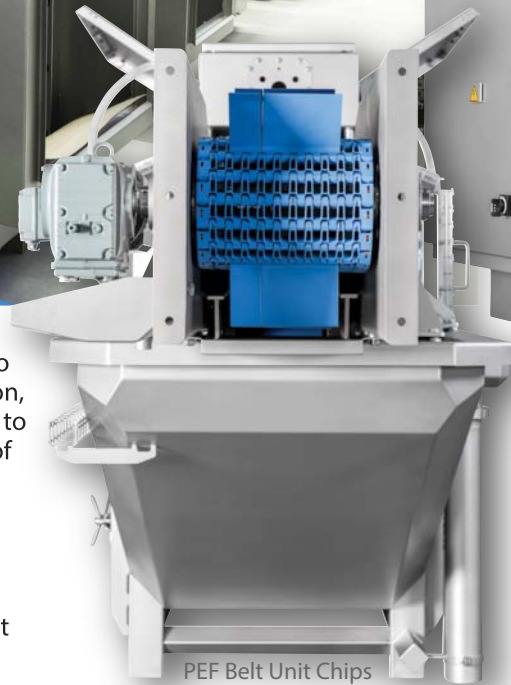
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Pulse Generator



PEF Belt Unit Chips

rising energy prices. Compared to conventional energy consumption, PEF is a much more efficient way to treat potatoes at the beginning of the production line. There is 30 seconds dwell time in the PEF treatment unit, and energy consumption is much lower. In addition, a company with a PEF system not only saves energy, but also follows the general trend toward CO₂ reduction. In one example, a customer installed a Pulsemaster PEF system at its plant. Water consumption was reduced by more than 100,000 liters per day, while 276 tons of CO₂ per year have been eliminated. Energy consumption was also reduced by around 33,000 gigajoules. Most systems are installed after peeling, followed by hydrojet cutting or mechanical slicing. Customers want to benefit from improved potato consistency and longer knife durability, after PEF treatment. "Pulsemaster continuous, industrial scale PEF systems have shown high process performance, reliability as well as applicability in the food industry worldwide. Our Pulsemaster systems are based around a Marx solid-state pulse generator, which creates a rectangular, unipolar pulse wave shape. These applied pulse generators have a proven track record in food industry and research applications. Especially for tubers and roots to make French fries and chips our Marx generators and robust PEF treatment units allow for higher throughput and processing of Big, Raw Peeled and Skin-on potatoes," de Boevere described.

BETTER YIELD

A higher overall yield of up to 2% was observed for a French fry line and a better quality product overall was obtained. "Thanks to the PEF treatment, the potatoes are cut with an optimal potato texture. This results in a significantly lower percentage of breakage of the French fries during further processing. A conventional French fry line with preheater may have 2,5-3% breakage. Processors can expect on average less than 0,5% breakage of fries after PEF treatment of raw potatoes, reduced broken particles, less starch loss, less fines and much less to none feathering also reduces frying oil uptake, up to 10% less oil uptake," de Boevere explains. Similar benefits can be obtained in the case of chips production, where PEF treatment causes a faster release of water during frying. When batch frying of chips up to 15 % capacity increase can be obtained due to faster water release. Easier cutting also means there is less wear and tear of cutting blades, leading to longer intervals between blade maintenance.

STEAM BECOMES OBSOLETE

"Preheaters are big, energy-intensive units, so if you take them out you don't have all this heat and steam. They also slow the process down, because preheaters require a lengthy residence time of anything up to 45 minutes, compared with a 30 second residence time and a one-second treatment time in a PEF unit. And if there is a hold-up in the line, you can stop the PEF system almost instantly. You don't waste energy heating it up or cooling it down," de Boevere pointed out. The PEF system is more compact and easier to control. Compared to the preheater, much less product is lost in the event of an incident or malfunction. PEF allows for faster water removal and can help to minimize undesired effects of blanching process on product texture.

MARKET

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. ●



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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.



R S Cockerill Leads the Pack in Digital Sorting



R S Cockerill was started in the 1930s during the Great Depression, when the founder rented a plot of land to grow food for the locals who needed it. Today, this family-owned and -operated business is one of the largest independent potato packers in the United Kingdom and distributes over 1,500 metric tons of potatoes in retail packs to supermarkets every week, and even more in bulk to food processors.

Their focus on top-quality potatoes at budget-friendly prices has helped drive their success. To maintain their high product quality and improve production efficiencies, Cockerill installed five of Key Technology's OCULUS digital sorters to inspect whole, washed potatoes at their retail packing facility in York, UK. "Before installing our OCULUS systems, we were sorting by hand – but there were challenges," said David Elvidge, Operations Manager at Cockerill. "We were struggling to hire enough staff due to the widespread labor shortage, not to mention manual sorting results are inconsistent at best. Workers will

remove the defects correctly for a while, but after a time they tend to remove too much or little as they get tired and their attention decreases. A good optical sorting system makes objective, black-and-white decisions to consistently remove the correct defects, hour after hour." "Prior to purchasing our first OCULUS back in 2014, we spoke with different suppliers and visited sites across Europe to see a variety of technologies in action. OCULUS was the clear winner. It not only achieves reliable results, it's also well-built and easy to operate and maintain. In particular, it has a remarkably straightforward user interface," said John Robinson,

Engineering Manager at Cockerill. "We were so impressed with our first OCULUS, we purchased four more in 2021." OCULUS identifies and removes potatoes with a range of surface abnormalities and diseases, including bumps and notches, skin discoloration, green colors and common defects like mechanical damage, scab, cracks and black dot. Plus, OCULUS can be programmed to reject potatoes that present dimensions above or below the desired length and width. To inspect the size, shape, color and surface texture of every tuber, OCULUS conveys the product over a series of rollers that provide a complete 360-degree view of each

potato to the color cameras. This unique approach achieves 20% more surface inspection than traditional cascade bulk sorters. A common challenge in the fresh pack potato industry is the inconsistent quality of incoming product, depending on the season and growing conditions. When a processor relies on manual sorting and defect loads are high, workers often have trouble keeping up and there may not be enough people available to meet production demand. By comparison, an advanced optical sorter will achieve consistent results at a high throughput, even when incoming defect loads spike, without needing to add manual laborers on the line. "Before installing our OCULUS sorters, each line needed four to eight workers dedicated to manual sorting. Now, thanks to OCULUS, we only need two people on each line," said Nick Larmour, Technical Manager at Cockerill. "At the same

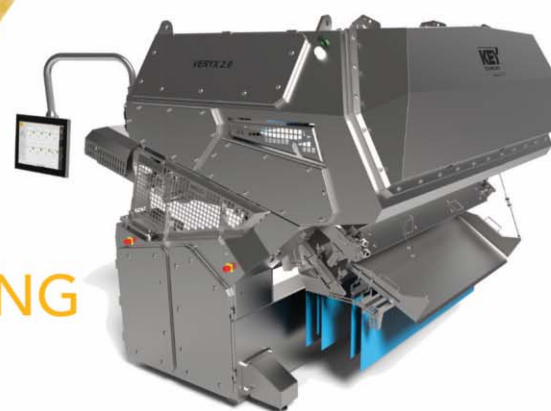
time, we've been able to increase line throughput by 20 - 25%, while achieving more consistent final product quality."

To handle their line capacities of two to eight metric tons of product per hour, Cockerill selected a midsize solution from Key's five OCULUS model widths available. All of Cockerill's OCULUS sorters are installed in-line at their facility focused on packing potatoes for retail customers. One line is dedicated exclusively to larger, baking-size potatoes, typically 65 to 90 mm. The other four lines handle a range of potato varieties, including fingerling, salad, whole white and red, as well as specialty potatoes. Prior to sorting, the potatoes are washed, polished and dried. After sorting, they are transferred to a weighing machine and then bagged into retail packs weighing between 500 grams to 25 kg, as well as into 350 kg bulk packs.

"Although customers always want to remove every critical and major defect, different SKUs allow for varying amounts of minor defects, so we always program the sorter at the beginning of each product run to achieve the exact specifications required. Sometimes the grade requirements will vary from week to week," said Bartosz Wozniak, Production Manager at Cockerill. "During a product changeover, it takes just a couple of taps on the touchscreen control panel to recall a recipe previously saved to the sorter's memory. Or, when we're running a brand-new SKU, it takes an operator less than five minutes to create a new sort recipe by selecting from a list of defect types and choosing the allowable amount of each that is permitted in the batch." "OCULUS takes photos of every 'good' and 'bad' potato, and we can scroll through each image one-by-one and rotate them 360 degrees



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A DURAVANT COMPANY

Case Study

on the user interface," added Wozniak. "In addition to capturing images, OCULUS can collect detailed data about the throughput and grading results, for example what percentage of the potatoes rejected had each type of defect and what size they were."

Cockerill purchased their first OCULUS sorter eight years ago for their fingerling potatoes, which is their most labor-intensive product to manually inspect. After seeing its success, Cockerill purchased four more OCULUS systems last year. These new sorters are equipped with the latest OCULUS software and sensors, including new high-performance cameras that offer twice the resolution as previous-generation cameras. When purchasing their four new systems, Cockerill also upgraded their original OCULUS to the latest technology.

"The OCULUS design is straightforward, so the sorter is easy to maintain. Since we have five virtually identical systems, we can easily shift personnel between them

and stock the same spare parts," said Robinson. "In terms of cleaning, we simply give the rollers and cameras a daily wet wipedown to help maximize sanitation and maintain the best sort accuracy."

Beyond removing defects and size sorting, OCULUS helps support high product quality with its gentle handling. Unlike traditional cascade bulk sorters, which cause bruising by inspecting potatoes in air as they freefall, OCULUS minimizes product drop by inspecting potatoes on its rollers. "Potatoes are like eggs – if you tap them the wrong way, they can be damaged. Our OCULUS systems really take good care of our product," added Wozniak.

"We've always enjoyed working with Key. Whenever we have a question, it's easy for us to get in touch with them," said Larmour. "If needed, Key technicians can also access our OCULUS sorters remotely, helping us operate reliably at peak performance." Originally focused on potato and carrot farming, Cockerill has been a leader in British agriculture for

almost a century. These days, this second-generation, family-run business focuses primarily on supplying and packing fresh potatoes from third-party growers. However, they do still grow some of their own tubers, which helps them stay in touch with the changing nature of potato cultivation and the challenges faced by their grower suppliers. Overall, Cockerill's deep understanding of this industry and their focus on quality, service and value have helped position them as a leader in the UK potato market. "At the end of the day, our success rests upon the success of our customers, so it's vital we provide them with a reliably high-quality product, on-time at an affordable price. Our OCULUS sorters achieve consistent defect removal at increased throughputs while lowering labor requirements. Plus, they're so easy to run and maintain," said Elvidge. "This technology has transformed the nature of our business – we can't imagine having to operate without our OCULUS sorters again." •



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DALSORB®

www.dalsorb.com



DALSORB® Oil Purifier is a synthetic magnesium silicate-based adsorbent used for removing degradation byproducts from cooking oil. DALSORB® has been trusted by processors of fried foods for more than 20 years to extend the life of frying oil and improve overall product quality. Customers have reported 91% reduction in free fatty acids, 47% reduction in polar compounds, a 70% improvement in color, and lowered oil management costs by as much as 77%. We offer a fully-integrated program that includes product, training, delivery, performance, and support to help our customers to reduce and possibly eliminate oil discard.

EIMA ENGINEERING

www.eima.de



EIMA ENGINEERING has over 40 years of experience and specializes in technical and engineering services of machines and plants for the potato and vegetable industry. The portfolio covers de-stoning, washing, peeling, calibrating, cutting, blanching and frying, with different machines, depending on the product, process sequence and customer specifications. EIMA ENGINEERING plans, develops and manufactures all machines, equipment and control systems in-house. 100% made in Germany at the highest industrial level.

Elea PEF Technology

www.elea-technology.com



With over 175 installed systems worldwide, Elea is the leading supplier of Pulsed Electric Field (PEF) systems to the food, beverage and scientific sectors. PEF is able to restructure raw materials such as tubers, providing new product opportunities and enhancing process optimization for snack processing such as chips and French fry manufacturing. Benefits: water and energy savings, higher yield, smoother cut, less breakage, reduced oil uptake, better color and improved quality. Elea provides a range of PEF Advantage Belt systems up to 70 t/h, but also a flexible solution for businesses looking for an output between 1 and 6 t/h.

FAM STUMABO

www.fam.be | www.stumabo.com



FAM Stumabo are specialists in the design and manufacturing of industrial food cutting equipment and precision blades. We take great pride in knowing the difficulties and complexity involved in chopping potatoes and provide industry-leading innovation when it comes to potato cutting in any cut form, size, and capacity. All because of our product expertise, internal design, and manufacturing of mechanical cutters, cutting tools, hydrocutter heads and precision blades. Together we cut your product to perfection!

FLO-MECH LTD

www.flo-mech.com

With over 40 years of experience, Flo-Mech Ltd is a leading supplier of equipment to the food processing industry, providing a complete range of products and worldwide turnkey project management solutions including: Complete snack processing lines, Flo-Starch™ - Starch and water recovery systems, Flo-Therm™ - Oil heating systems with pollution control, Flo-Cut™ - Potato grading/halving equipment, Flo-Peel™ - Peeling systems, Flo-Flavour™ - Flavoring systems, Flo-Filter™ - Oil Filtration systems & fryer chimney filter systems, Flo-Dry™ - Energy efficient snack drying systems, Health & safety management, Energy & sustainability management.



FPS Food Process Solutions

www.fpscorp.ca

FPS Food Process Solutions produces the world's most hygienic French Fry tunnels. Our range of Individual Quick Freeze (IQF) tunnels implements a combination of pneumatic and mechanical fluidisation techniques for product separation.

This ensures careful freezing for a wide variety of food products, including French Fries.

Our industry-leading designs feature stainless steel welded enclosures with high-density polyurethane, flexible panel joints, and floors that prevent water pooling. In addition, our external motors and gearboxes protect components from the harsh internal environment, eliminating maintenance and hygienic concerns. Our optimised hygienic design includes smooth TIG welding, sloped surfaces, and minimal lap joints and bolting.

If you are looking to optimise your processing needs, whether it be new equipment, servicing or retrofit of existing equipment – FPS is your potato partner.



HEAT AND CONTROL

www.heatandcontrol.com

Advancing food processing technology with creativity, passion, and unmatched expertise at a global scale. For over 70 years across food industries and applications, Heat and Control's specialised equipment solutions have set the standard for yield, efficiency, and safety. Offering complete turnkey solutions featuring integration from start to finish ensures full line efficiency and performance.

Food Processing: From raw produce preparation and value-adding to frying, cooking, seasoning, and coating.

Product Handling: Maintain efficient production at optimal capacity. Smart design and line management that achieves accurate feed, accumulation, and distribution flow. Includes conveyors, elevators, and proportional feeding systems.

Potato products: Producing the world's best tasting potato chips, French fries and formed potato products, our systems are the workhorses of the industry.

Insort GmbH

www.insort.at

Insort GmbH is one of the worldwide leading companies providing real time sorting, monitoring and analysing solutions based on Chemical Imaging Technology (CIT®) for the food processing industry. Our expertise combines the latest optical sensor systems and digital signal processing with mechanic and electronic machine design specially developed to fulfil highest food processing standards. The machines branded as the "Sherlock" family set a new benchmark in performance and food safety. This year at Interpom, the latest machine development with breakthrough technologies for the potato industry was presented.



Kiremko B.V.

www.kiremko.com

Kiremko is a leading manufacturer of processing lines for the potato processing industry. By focusing on product development, continuous improvement, innovation, sustainable technology and cooperation, we add value for every customer. Together with our partners Idaho Steel, Reyco Systems, we innovate, design,

manufacture and install advanced processing lines worldwide; process potatoes into French fries, potato chips, potato flakes, pellet snacks, fresh cut and pre-cooked potato products, hash brown products and other potato specialties. Kiremko's strength is to deliver total solutions for the processing of potatoes, from the infeed of potatoes to the packaging line, with a high-quality end product as a starting point.



Kuipers Food Processing Machinery

www.kuipers.nu

Kuipers Food Processing Machinery engineers and manufactures high-end, innovative snack processing technology for products such as nuts, pellets, extruded snacks and chips. The company is a known specialist when it comes to frying systems and delivering turnkey lines for snack production. Since 1985, Kuipers has supplied food plants to more than 60 countries worldwide. The company's systems help small food producers, as well as multinationals, manufacture the tastiest snacks on the market in the most efficient manner.

KUIPERS
FOOD PROCESSING MACHINERY

Martin Lishman Ltd

www.martinlishman.com/potatoes

Martin Lishman manufacture and distribute potato quality equipment to help improve quality, increase yield and reduce rejections. The TuberLog Electronic Potato immediately identifies the causes of damage and bruising in harvesting and processing machinery. Our Potato Hot Box range will assess bruising levels at intake points within 12 hours and can also be used for disease and shelf-life testing. Our range includes dry matter and sugar testing equipment, temperature monitoring systems and quality control equipment suited to bulk testing and quality control before potatoes are processed or put into long term storage.

**Martin
Lishman**

Optimum Sorting

www.optimum-sorting.com

Optimum Sorting develops, builds, installs and services innovative optical sorting solutions for the food-, non-food and pet-food industry. All machines use camera and laser technology. Its commitment to continuous innovation and its collaboration with research institutes worldwide enable using the latest detection technology to solve the most complex sorting problems. Optimum Sorting high-end solutions, supported by a team with +1000 years of combined experience in optical sorting, ensure its clients can provide their customers with products of consistently high quality.

 **OPTIMUM
SORTING**

Pulsemaster - Pulsed Electric Field Systems

www.pulsemaster.us

As the #1 supplier of Pulsed Electric Field systems for better French fries and potato chips, the innovative Dutch-German company Pulsemaster continues to specialize in Pulsed Electric Field processing. Pulsemaster offers PEF-systems with capacities up to 80 tons per hour. With Pulsemaster PEF-systems huge improvements can be achieved in the production process of chips and French fries. Pulsemaster aims to apply this innovative technology - also known as electroporation - in the widest range of applications in the food industry. PEF technology meets the industry's need for natural and clean processes.

 **pulsemaster**

Raytec Vision SpA

www.raytecvision.com

Raytec Vision is a leading expert in optical sorting technology for food as well as X-Ray inspection for packaged products, providing a wide range of machines for safety and quality control. Raytec Vision SpA was founded in 2001 in Parma, considered the main center of the Italian food valley. The company's mission is aimed at achieving the highest quality standards in the food sector with the support of innovative machines, such as optical sorters for raw materials and for processed products, as well as x-ray inspection machines for packaged and unpackaged products.

 **ray
tec**
VISION
Innovation in Sorting Equipment

Rosenqvists Food Technologies AB

www.rosenqvists.com

Rosenqvists Food Technologies AB develops, designs and manufactures complete processing lines for the global snack food and French fry industries. We focus on the thermal treatment process with special know-how and expertise in blanching, drying and frying. Rosenqvists supplies complete lines for potato chips from 500 to 3000 kg / h and complete French fry lines from 2 – 15 t / h. We are experts in complete frying for coated fries and wedges (up to 25 t/h) and frying systems for potato specialties (up to 9 t / h). "Oil management" is our trademark.



Tolsma-Grisnich

www.tolsmagrisnich.com

Tolsma-Grisnich has been a pioneer for more than 75 years and leading specialist in the efficient storage and primary processing of potatoes, onions, and carrots. From the international potato capital Emmeloord, Tolsma-Grisnich serves its customers with smart, innovative, and concept-oriented solutions with which they demonstrably distinguish themselves. With high-quality customized solutions and intensive process supervision, Tolsma-Grisnich relieves its clients of all their worries and guarantees them the highest return.



TOMRA Food

www.tomra.com

TOMRA Food designs and manufactures sensor-based sorting machines and integrated post-harvest solutions transforming global food production to maximize food safety and minimize food loss, by making sure Every Resource Counts. The company has more than 12,800 units installed at food growers, packers and processors around the world for Confectionery, Fruit, Dried fruit, Grains and Seeds, Potatoes, Proteins, Nuts, and Vegetables. These solutions include advanced grading, sorting, peeling and analytical technology to help businesses improve returns, gain operational efficiencies, and ensure a safe food supply.

TOMRA Food operates centers of excellence, regional offices and manufacturing locations within the United States, Europe, South America, Asia, Africa and Australasia.



Tummers Food Processing Solutions

www.tummers.nl

Tummers Food Processing Solutions organizes innovative solutions around the world for processing potatoes and tubers from land to customer. We can do everything from A to Z for you as our customer, thanks to our extensive range of machines, our wide-ranging service provision, but most of all due to the way in which we work together with you. The company has become a leading manufacturer of machines, machine parts and complete production lines for potato and vegetable processing. The Tummers Group currently consists of four companies with more than 100 employees and it operates all over the world.



Urschel Cutting Technology

www.urschel.com

As the global leader in food cutting technology, Urschel continues to lead the world in the manufacturing and selling of commercial cutting equipment to food processing and allied industries. Founded in 1910 by inventor William E. Urschel, the company has continued to expand throughout its 100-plus year history keeping pace and adapting to the everchanging needs of the marketplace. Increases in productivity, energy-saving machinery, cleaner, more precise cuts, and developing new cut shapes, are just a few ways Urschel continues to rise to the demands of this dynamic industry.



More for Less - Recent Upgrades in Pulsed Electric Fields Processing

PEF processing is based on electroporation, a non-thermal effect forming pores in cell membranes. In potato processing the technique has turned into a standard process for texture management and cutting improvement. With more than 200 PEF systems installed in food industry, Elea is the market leader. This expert view will discuss PEF and its benefits in potato processing and highlight recent equipment design upgrades.

Stefan Toepfl, Elea Technology GmbH

PEF has an instant effect on tubers and roots as well as fruits and vegetables. Opening nanometer sized pores causes release of intracellular liquid and tissue softening. Dependent on concentration gradient in- and outside of the cells the uptake or extraction of soluble substances are accelerated. Being a volumetric technique PEF works independent of tuber size. The process and extent of tissue softening are controlled by pulse parameter such as electric field strength and specific energy applied. In contrast to thermal processing there is no delay after startup or when changing process conditions.

PRODUCT BENEFITS FOR FRENCH FRIES

Like after preheating, PEF induced texture softening improves cutting and results in less feathering and breakage. But, in comparison to thermal treatment energy and water consumption are reduced by up to 90%. Typical energy input for a PEF processing of potato tubers is 0.3 to 1.5 kJ/kg, corresponding to a temperature increase of 0.01 to 0.4°C. Process intensity is adapted during the season, being highest with fresh from the field crop or harder tuber varieties and lower at the end of the season. As a result, the average product length is



increased, and the starch loss into cutting and blanching water streams is reduced. That causes an up to 1.5% yield improvement for a French fries processing line. Due to less tissue breakage the oil uptake during frying is reduced by approximately 10%. As the electric field effect is instant and volumetric, there is no holding time requirement and no start up or shut down time need. Today approx. 150 Elea PEF systems are in use in French Fries industry with processing capacities from 5 to 75

t/h. Recent projects are increasing treatment capacity up to 100 t/h on single lines or treatment of non-potato raw material such as sweet potato, parsnip or cassava.

FRY THE PERFECT CHIP

Potato and vegetable chips processing is dependent on high quality raw material and optimized processing. Slicing quality and consistency are key factors, as performance of subsequent processing steps and product quality depend on them. During

slicing of potatoes and other vegetables PEF reduces tissue breakage and the number of fines and smaller particles. A smoother cut surface will reduce starch loss and the extent of free starch on product surface. This is beneficial for product yield and texture, as well as to reduce product stickiness and doubles during frying. Keeping starch in the slices contributes to improved texture and crunch. With reduced starch loss and improved cutting up to 2% yield increase can be achieved. Due to faster water release frying temperature and / or time can be reduced. On continuous frying lines – dependent on process line setup - up to 10% frying time reduction is possible, which in combination with a reduced final frying temperature results in less heat load and increased product quality. For batch frying up to 15% capacity increase can be achieved due to facilitated moisture removal. Most potato chips lines do not include a blanching step, but where applied, PEF can help to revert undesired effects of blanching on product texture. Less slice surface damage will result in less oil uptake, up to 15% for typical product and frying conditions. With today's frying oil costs, reducing oil uptake provides a major contribution



PEF treated sweet potato twist

toward fast return of investment. Less fines and particle carry-over into the fryer will also help to reduce oil degradation and increase frying oil lifetime. For raw materials such as carrots, parsnip, sweet potato or cassava similar benefits are observed. PEF will improve product cutting and allow faster water removal and reduced oil uptake. Reducing frying time and temperature will allow lighter product color and more natural product appearance. At present approx. 50 Elea PEF systems are in use in snacks industry, ranging from 1 to 12 t/h treatment capacity for single lines or up to 32 t/h where multiple slicing and frying lines are supplied from one PEF system.

SAVINGS POTENTIAL

PEF implementation delivers savings at various levels of the production chain. Replacing preheating and reducing blanching time, less starch release, increased yield and a reduced oil uptake will result in reduced energy, raw material and frying oil expenditure. On a standard sized French Fries line of 30t/h final product output the water and energy savings can amount up to 20 million kWh of thermal energy and 60 million liters of processing water in comparison to preheating. Reduced starch losses will generate up to 500t of extra yield per year, whilst oil uptake is reduced by up to 700t per year. Other product quality benefits



Elea PEF Advantage B 1 system in Amica chips production in Italy



Elea PEF Advantage B 1 system

such as more consistent product quality or color improvement and the potential to use different raw materials or cuts provide further process and financial benefits. In potato chips processing yield increase and reduced oil uptake contribute towards a fast payback. Dependent on raw material quality and product shape up to 1.5% yield increase is achieved due to less starch losses. On a 1,300 kg/h final

product line an annual extra yield of up to 47t is observed. Less fines or doubles as well as reduced fryer heat load will reduce level of defects and increase product yield even further. Lowering the oil content from 33 to 28% translates to up to 175t less oil consumption per year. Again, product benefits such as better crunch or lighter color will provide extra benefits. Our PEF experts are available to

discuss expected benefits and return of investment as well as for line optimization to make use of the full savings potential.

PROCESS CONTROL AND OPTIMIZATION

With increasing PEF energy input pore size increases and besides water also sugar or starch are released. The more the better is not the right approach here, as it may

Elea CutControl, allows for precision process control and optimized treatment conditions



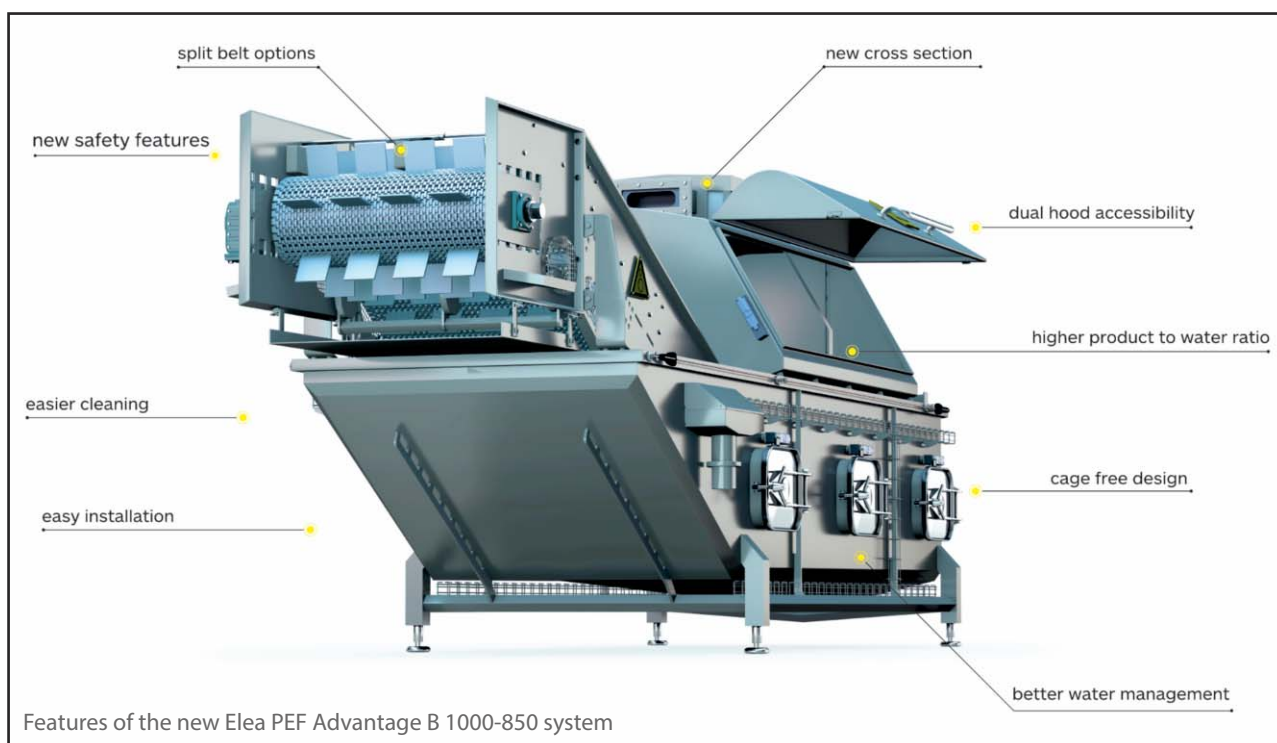
cause undesired solids and yield losses. For process monitoring and optimization Elea has developed two tools: PEF Control and Cut Control. PEF Control is based on impedance measurement to detect the number of open cells in a tissue and to predict mass transport improvement e.g. in extraction, infusion or drying processes. Cut Control measures compressing and cutting force for tubers and hence allows selection of suitable processing parameters dependent on raw material variety, season and desired cut. Together with our clients as well as line integrators we have run in person or

OUR LARGEST PROCESSING SYSTEM

All Elea systems are designed with a focus on ease of operation and reliability. This year we have launched the new B1000-850 system. We have distilled the know-how and experience of 10 years of industrial scale potato processing into the design, capable of processing up to 100t/h. The design features the largest free cross section on the market for hassle free product transport and to achieve high product load ratio and maximum energy efficiency. Similar than for our B1-200 and B10-320

WHAT'S NEXT AND WHERE TO TRIAL?

Our PEF experts work closely with clients to provide tailor made solutions to best suit individual requirements. Current development work focusses on process optimization and product development for new shapes or using so far underused crops. PEF enhanced infusion and uptake of color, flavor or active ingredients allows to impact on product taste and appearance. PEF can not only be used for tissue softening, but in



remote supported installation and line optimization projects. Making use of our own video support app the process is handled from first trials in pilot scale through proof of principle testing at place to system installation, startup and commissioning. Remote diagnosis and support are available for customer service as well as product development. When integrating a PEF system into turnkey projects or for retrofit, our team of experts is available to maximize overall line performance by optimization of process equipment and settings on all stages of the production line.

models all safety features are included into the vessel design, no extra safety fencing is required. The system can host different belt types and is suitable for sinking or floating products. Other new features include enhanced water management, easier cleaning and servicing and new pulsed power cabling for increased maximum length. For smaller treatment capacities the new B100-535 (up to 32t/h) and new B10-535 (up to 20t/h) are available with same design features. With same footprint and power level those new designs allow processing more for less.

combination with thermal treatment can also be used to manage tissue texture by targeted pectin modification. That allows to reduce texture degradation during cooking or canning of potatoes and other vegetables. The Elea pilot hall in Quakenbrück, Germany is available to develop the best solution for your potato product. Making use of our network of regional agents and technology partners demo activities or on-site-trials in your area or your production can be arranged. •



Planning Ahead for a Healthy Expansion

Modernizing and upscaling operations to meet the latest spike in consumer demand is no easy task for any processor, and to ensure its success, a few things should be considered. Certain manual processing steps may be proven and effective, but they may not be enough to keep up with an increasingly stringent regulatory environment and fierce industry competition.

By Tudor Vintiloiu

When increasing production capacity, potato processors need to fully understand inefficiencies in their supply chain and identify bottlenecks. Before strategically growing production, producers must bring their systems up to date so they can handle the additional throughput. Scaling entails more than just gaining more throughput and speed. Finding the ability to control

various core elements like sorting parameters and process adjustments in real-time is crucial. According to experts, it's important to invest upfront in a strong supply chain plan in order to prevent disruptions caused by seasonality, changing consumer preferences and global crises. Producers should consider if they have enough equipment and personnel to manage increased production and if products have enough shelf life to sustain the timeframe of production.

AUTOMATION

One way to streamline production and grow the business is to automate key processes in the manufacturing operation. Major actors in the sector have been dealing with automation for years, thereby making the technology more available and affordable. Smaller players might not have had the financial strength to invest in such technology in the past, but as the equipment needed becomes more user-friendly and

affordable, the time for smaller companies to invest in automated systems is already here.

Tuber processing technology has in many cases not been changed radically over the last decades, so modernizing older equipment might be a more affordable way to automatize production. Labor costs are reduced by investing a fraction of the cost compared to new equipment. The modernized machines might not be as future-proof as newer machines, but it gives companies without the financial strength to invest in new machines the possibility to compete with modern automated production lines.

The cost of modernizing the system controls is most likely not going to be anywhere near the cost of buying a new system. If the system already in use is estimated to last for a long time, a profitable solution would be to replace the system control with modern equipment, thereby giving the company a more cost-efficient way to modernize and automate its production line.

The age of digitization has introduced a new era; one where the latest technology, such as the IoT (Internet-of-Things) is transforming how companies operate. These technological

advances have the potential to improve not only the potato processing industry's efficiency but also the consumer experience.

Maintenance and repairs are made simpler through IoT, as a fault can easily be identified by the intuitive user interface (UI) and addressed quickly by staff.

Beyond operational benefits, IoT can ease the burden administrative jobs put on staff, while also creating a training experience that is standardized, effective, and fast. Through IoT, employees can, for instance, access automatically generated reports via tablets, or use a smartwatch to manage issues along the supply chain. Eliminating variations in training and ensuring that every new employee learns the same information, in the same way, can also have a positive impact on productivity.

A processor can be constantly connected to a solution provider's expertise. The actors in this sector already have the sensors in place, collecting data. Cloud-based management, or the digital relationship, can enable a back-and-forth flow of information analytics between the processor and the provider. Both can see a dashboard that centralizes and synthesizes data in real-time for

meaningful insights. IoT data management interconnects information to help customers realize new business models, optimize internal processes and achieve major cost savings. It allows customers to take advantage of process knowledge, full time, and make it sustainable.

DATA ANALYSIS

The collection of any data should be backed by a concrete purpose, Urschel's experts point out. The gathering of data is futile without a comprehensive plan. Mega-processors can analyze the solid nature of the potatoes, water use, starch loss, cut quality, and multiple comparables to increase cut quality, evaluate the sharpness and life of different knife blades, and determine cost analysis across the production line.

As a processor grows in volume, the customer may choose to invest with the help of a line builder to increase electronic sensors and gather analytics at each step of the line. Analysis of data to determine an upgrade in technology may be simple or more complex. For example, in the case of several kettle chip processors who performed a side-by-side comparison for kettle fill times



between the Urschel standard 8-station head versus the MicroAdjustable SL14-station head. Calculations based on several batches and fill times were easily achieved. Further cost analysis and comparison of maintenance procedures and time yielded upgrading to a newer technology - the 14-station head - as a logical next step to improve the line. Upgrading technology in one area of the line may lead to changing out of other stations. For example, standard chippers updating to the SL14 slicing head, in some cases, purchased larger capacity downstream equipment, such as fryers. Cost efficiencies are linked to some variables, the company's engineers added. Items listed on a spreadsheet, will reveal the cost of oil and potatoes, is closely linked to the type of potato being processed. Potatoes sold for chips/crisps are more expensive than those sold for fries. "Could this change in the future?" Urschel's representatives asked themselves. Fry producers repurpose scrap into a multitude of other value-added potato products. Building on these products will continue to deliver strong profits in subsequent years. The Comitrol Processor series line by Urschel will remain a popular option for the

further reduction of potatoes. With several different models from which to choose, products may be reduced to coarse or fine purees. The line focuses on particle size reduction. A reduction head in a fixed position works with a high-speed impeller that precisely and incrementally shears the product to a specified target size. More customers are becoming aware of the overall analysis of plant line operations. Processors may choose to embrace the gathering of analytical data. The more data that is gathered, the more in-depth decisions may be possible to increase plant efficiencies. The goals may be straightforward or more elaborate. The first step is to determine what types of improvements are necessary and to ascertain how to quantify the various objectives.

AN EXCITING FUTURE

The processes of producing a frozen French fry or a potato chip are the same today as they were 40-50 years ago. During these years, important improvements have been introduced such as multi-flow frying systems, 3-step washing systems, multi-turbulent blanching, pulse electric field technology, possibility of defatting products

and other. Alternatives to frying in vegetable oil can today offer options, such as hot air expansion or salt roasting. Rosenqvists, as well as other suppliers, can certainly offer more versatile processing solutions, which are safe and easy to use and secures a satisfactory level of food safety. Thanks to this evolution, new innovative products are launched to meet consumers' interest in new products. We can see the interest in new raw materials, re-discovering traditional organic ingredients and a continued focus on health aspects. But the question how we will produce a French fry or potato chip forty years from now is a tough one? "The honest answer is that I don't know", says Sales Manager Fredrik Rönnerberg at Rosenqvists Food Technologies. "We work in a very exciting industry and we will see what the next steps will be. We will most probably see more usage of large data collections and automatic systems supporting our clients to optimize processing operations and maintenance. I believe we can do more to lower cost, monitoring and maintaining product quality and save both energy and water. In the end, our job is to make it easy and efficient to use our processing equipment." •





PROCESSES



PRODUCTS &
INGREDIENTS



MARKETS



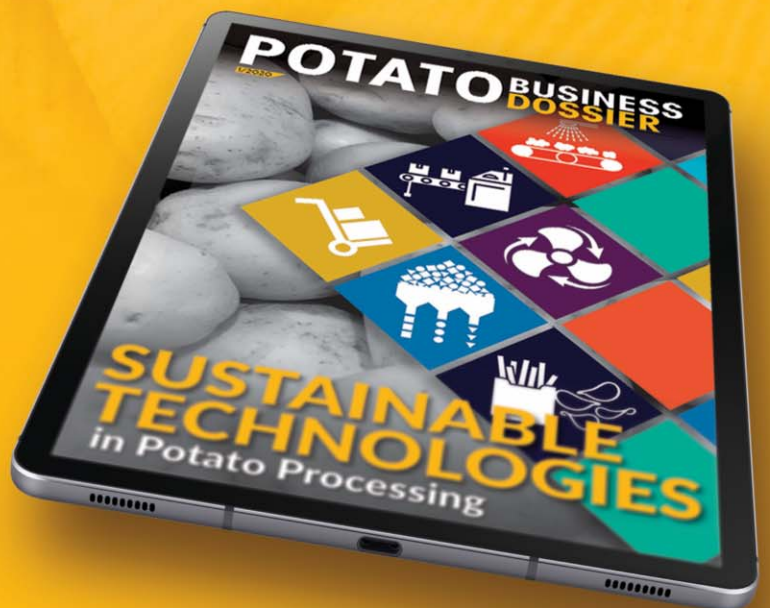
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Future Processing

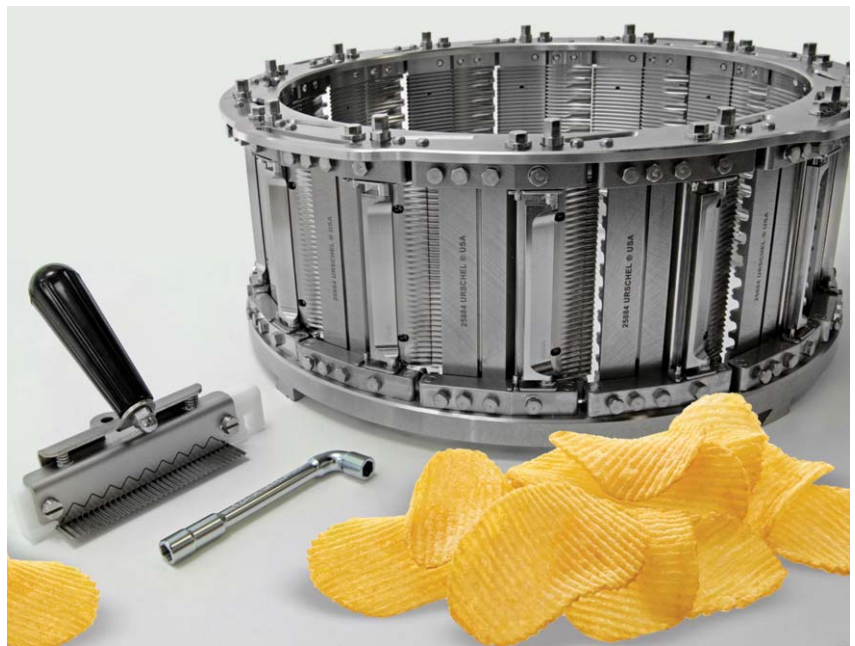
As the recognized global leader in industrial food cutting technology, Urschel is continuously adapting to the ever-changing needs of processors. As an engineering/manufacturing company, every part and every process behind each part is consistently reviewed and refined.

By Expert Mike Jacko, Vice President of Applications & Product Development at Urschel

With so many capabilities under one roof, valuable developments and improvements are fast-tracked. Constantly partnering with processors and line builders, Urschel readily implements new methods and efficiencies to benefit the overall production line-up, both upstream and downstream from Urschel cutting equipment. With so many different styles of potato products, there is a wide gamut of potato production facilities around the world. Production and needs vary from regional processors to global, mega-processors. Future decisions will be as diverse as the operations themselves.

ANALYTICAL EFFICIENCIES

More customers are becoming aware of the overall analysis of plant line operations. Processors may choose to embrace the gathering of analytical data. The more data that is gathered, the more in-depth decisions may be possible to increase plant efficiencies. The goals may be straightforward or more elaborate. The first step is to determine what types of improvements are necessary and to ascertain how to quantify the various objectives. The collection of any data should be backed by a concrete purpose.



The gathering of data is futile without a comprehensive plan. Mega-processors can analyze the solid nature of the potatoes, water use, starch loss, cut quality, and multiple comparables to increase cut quality, evaluate the sharpness and life of different knife blades, and determine cost analysis across the production line. As a processor grows in volume, the customer may choose to invest with the help of a line builder to increase electronic sensors and gather analytics at

each step of the line. Analysis of data to determine an upgrade in technology may be simple or more complex. For example, in the case of several kettle chip processors who performed a side-by-side comparison for kettle fill times between the Urschel standard 8-station head versus the MicroAdjustable SL14-station head. Calculations based on the number of batches and fill times were easily achieved. Further cost analysis and comparison of maintenance

procedures and time yielded upgrading to a newer technology – the 14-station head – as a logical next step to improve the line. Upgrading technology in one area of the line may lead to changing out of other stations. For example, standard chippers updating to the SL14 slicing head, in some cases, purchased larger capacity downstream equipment, such as fryers.

TECHNOLOGY IN PROCESSING

Upgrading technology to improve the quality of the end-product is a consideration. Processors are currently incorporating PEF (Pulse Electric Field) Processing. This process replaces or reduces the need to blanch or preheat treat. Pulsing electric waves move through the cell walls of potatoes. These waves perforate the cell membrane to create microscopic holes to release sugar and amino acids. This reduces acrylamide and lowers oil content. Effectively softening the potato reduces impact during the cutting process to promote increased knife life and decrease costs. Conditioning the potato increases product permeability resulting in less product breakage and more in-spec product.

“More customers are becoming aware of the overall analysis of plant line operations. Processors may choose to embrace the gathering of analytical data. The more data that is gathered, the more in-depth decisions may be possible to increase plant efficiencies.”

USE OF SCRAP

Cost efficiencies are linked to many variables. Items on a spreadsheet, such as the cost of oil and potatoes, or the type of potato being processed. The type of potato sold for chips/crisps is more expensive than the type sold for fries. Could this change in the future? Fry producers repurpose scrap into a multitude of other value-added potato products. Building on these products will continue to deliver strong profits in subsequent years. The Comitrol® Processor series line by Urschel will remain a popular option for the further reduction of potatoes. With several different models from which to choose, products may be reduced to coarse or fine purees. The line focuses on particle size reduction. A reduction

head in a fixed position works with a high-speed impeller that precisely and incrementally shears the product to a specified target size.

VALUABLE OPERATOR RESOURCES

Labor and skill level is an ongoing topic. The necessity to manufacture operator-friendly capital machinery. Equipment operating at the push of a button with uninterrupted capability and limited downtime will remain preferred. Parts on cutting machinery are manufactured for quick, simple changeovers with built-in features, such as handles. This trend will continue. Simplifying the ability to run a line, limiting personnel and the skill level required, and manufacturing longer-running machines with even more





durable components are essential as time goes on. Other items like trolleys and types of stands will continue to be designed to expedite routine maintenance. Urschel will continue to supply operator resources to assist lines with time-saving efficiencies.

CRUCIAL KNIFE TECHNOLOGY

In processing potatoes, inevitably foreign material in the form of rocks or sand occurs. New equipment is available to assist in filtering out foreign materials, but choosing the proper knife is an important factor. Knives will continue to play a crucial role in future cutting machinery. Urschel is constantly evaluating and testing new materials and exploring new manufacturing methods. Designing functional bevels and geometries unique to suit specific cutting applications will continue to be at the forefront. From low-cost knives to heavy-duty specialty

knives, alloys are carefully chosen, and manufacturing methods are carefully aligned because details matter. Quality and creation of knives proceed in parallel. Overlooking details, such as all stainless steel knives and carbon knives must be fully detectable by metal detectors, could be detrimental to a processing line. Food processors should evaluate and analyze available knives. Cut quality, wear-and-tear, and in-spec products may vary depending on knife choice. Numerous knives may exist to enhance production. Partnering with processors around the world enables Urschel greater insight into the knives necessary for the processors of today and tomorrow. In-house capabilities remain strong with on-site metallurgy, engineering, and foundries working as a team to create new knives for future cutting applications.

“Partnering with processors around the world enables Urschel greater insight into the knives necessary for the processors of today and tomorrow. In-house capabilities remain strong with on-site metallurgy, engineering, and foundries working as a team to create new knives for future cutting applications.”

EXPANDING OPERATING PRINCIPLES

The cutting machinery designs of today have a firm foundation of excellence in engineering and craftsmanship. Moving forward, the main operating principles will remain constant, however, increased capabilities will continue to evolve. Capabilities will expand related to cut sizes and cut shapes. Shapes are intertwined with the increased manufacturing of specialty knives. The demand for new shapes has been on the rise and will continue to do so. Increased growth in cutting parts and built-in feeding methods will occur. This growth will offer food processors ease of operation specific to their product requirements and time-saving efficiencies. As more and more products enter the marketplace, food processors seek solutions to the most.

The DiversaCut® line has expanded. Additional models now offer belt-fed discharge options for controlled exiting into totes. The large DiversaCut 2110A® Dicer can now be purchased with this feature. The Sprint 2® Dicer also offers a belt-fed discharge.

PAST-PRESENT-FUTURE

Ever-changing, advancements in potato processing will continue to keep up with consumer-driven expectations. Processors are realizing the benefits of comparison analytics to increase line efficiencies. Taking advantage of newer technology could decrease costs and improve end-product. Time and labor savings are set to increase as more ergonomic elements continue to be designed. Manufacturing companies will continue to expand on resources available to operators. Broadening development of knife technology, including alloys and blade edges, will emerge to align with specific cutting applications. Improvements in cutting machine design will build on existing sound operating principles to increase capabilities in volume and cut shapes. •



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Processing Market Expands Despite Challenging Growing Season

The year 2022 has been a very challenging one for the entire potato industry. In addition to the great uncertainty surrounding the availability of potato raw material, concerns about the cost of energy, transport capacity, fertilizer, personnel and purchasing power have troubled the industry.

By Tudor Vintiloiu and Ionel Vaduva

Industry reports show that the processing industry has created considerable capacity and will try to utilize it as much as possible by conserving raw materials and creatively handling the available potatoes. Raw material conservation has already begun, with potatoes from the 2021 crop still being processed for a long time. The potato processing market consists of the sale of potato products that undergo a wide

combination of heat treatments, cooling, dehydration, and frying systems or freezing stages. The main types of processed potato products include frozen, dehydrated, chips and snacks, and others.

The global potato processing market is expected to grow from USD28.82bn in 2022 to reach USD35.37bn in 2026 at a CAGR of 5.25%, according to a report published by The Business Research Company.

Households, fast food chains, and

restaurants use processed potato products to make dishes such as French fries, soups, salads, potato snacks, and others in a fraction of the time as they are already partially prepared.

Western Europe was the largest region in the potato processing market in 2021. Asia-Pacific is expected to be the fastest-growing region in the forecast period.

Growing consumer preferences for convenience foods to save time and



effort are the main driver of the potato processing market. The lifestyle, tastes, and preferences of consumers are also rapidly changing. Consumers are increasingly shifting toward convenience foods due to a lack of time to prepare home-cooked food and a willingness to experiment and explore different tastes. As a source of daily nourishment and a time-saving option, processed potato products are used in most convenience food.

According to the study conducted by OnePoll in partnership with Farm Rich on 2,000 Americans in 2020, more than 69% of respondents preferred to continue with comfort food in the post-pandemic era. Due to an increase in customer preferences for convenience foods, there has been an increase in the growth of the potato processing market.

As a result, the companies operating in potato processing are focusing on expanding their existing manufacturing units and establishments of new processing facilities to meet demand for both domestic and international customers.

INVESTMENTS

In December 2020, McCain Foods, a Canada-based frozen food products manufacturer announced a USD200m investment in a second potato processing plant in China to lead innovation in frozen potato products by increasing capacity and specialized production capability. In March 2021, Lamb Weston Holdings, a USA-based food processing company announced that it would build a new frozen French fry processing facility in Ulanqab, Inner Mongolia, China, with a capacity of more than 250 million pounds of frozen French fries and other potato products per year.

In September 2020, Aviko Rexona, a Europe-based manufacturer of fresh, frozen, dried, and specialty potato products, acquired the Pfanni instant potato plant for an undisclosed amount. With this acquisition, Aviko would manufacturer potatoes into branded products (mashed potatoes, dumplings, gnocchi, and instant snacks).

It will help the company to grow faster in the market and expand its

presence in potato granules and flakes sector across the globe. Pfanni is a German-based manufacturer of processed potato products, such as mashed potato powder and dumplings.

CHALLENGING TIMES FOR GROWERS

Although the agricultural sector has invested a lot in infrastructure, state-of-the-art technology and irrigation capacity in recent years, weather ended up being a decisive factor for yields this year.

In many parts of the world, the 2022 growing season for potatoes was challenging. Spuds, like many other crops, have suffered greatly as a result of the hot, dry weather. Given that the top-producing countries estimated a lower yield, a reduction in the world supply was anticipated.

By the end of Q4 2022, potatoes are anticipated to trade for EUR22.07 per 100 kg, according to projections from experts and Trading Economics' global macro models. In one year, the market participants predict it will trade at EUR25.62 per 100 kg. Potatoes increased roughly EUR1/100KG or 5% since the beginning of 2022, according to trading on a contract for difference (CFD) that tracks the benchmark market for this commodity. Historically, potatoes reached an all-time high of EUR33 in February 2019. The COVID-19 pandemic has driven the demand for fresh potatoes worldwide in supermarkets and grocery stores, as people stocked up on inexpensive food. The lockdown also increased the demand for fresh potatoes in developing countries. The industry tried to divert the potatoes to market directly instead of processing them, as the demand for fresh potatoes was relatively higher than that for processed ones. Many market players were reluctant to store the crop, especially given the current high prices, thus the enormous increase in energy expenses was a major source of worry this year.

At the beginning of the season, potato exports were flourishing. However, due to the rising prices, certain countries, particularly African ones, found potatoes to be too

expensive. Thankfully, there was support from Eastern Europe, and those nations were a little more prepared to pay the prices, providing an opportunity to expand exports.

FEW NATIONS IN EUROPE CAN CLAIM A 100% SUCCESSFUL HARVEST

The Netherlands and northern Germany are two of them. The potato market in Germany was quiet yet successful. In some areas of the country, the proportion of fresh floury cooking batches rose, the EU stats show. The relationship between supply and demand was often linear. Demands were somewhat undermined by the fact that valuations weren't always stable, but they generally held steady, with concessions being the exception. In 2022, the crop volumes in northern Germany were anticipated to be lower than the previous year. Additionally, several Belgian makers of French fries started making extremely early purchases in Germany. The effects of the climate crisis caused a decrease in the 2022 German potato harvest. According to estimates, harvest volume fell to around 10.3m tonnes in 2022, representing a 9% decrease from the previous year or a 5% decrease from the multi-year average. Data shows that the German average yield was around 38 tonnes per hectare, a 12% decrease from the previous year and an 8% decrease from the multi-year average. The cause is the unusually hot and dry summer months. There were harvest losses, particularly with non-irrigated potatoes.

LESS THAN THE HISTORICAL NORM

The Swiss growers also faced difficulties during the 2022 potato season. The plants originally thrived after the potatoes were mostly sown in favorable conditions. But as early as June, many heat waves appeared. Potato crops do not thrive in heat or drought; plant development in the potato crop drops dramatically above the ideal temperature of 25°C. As a result, conventional potato yields in 2022 were roughly 10% lower than they were over the previous five years



on average. However, yields were still substantially 10% more than they were the wet year before. On the other hand, 2022's yields of organic potatoes were above average. Nevertheless, the total harvest in 2022 was less than the historical norm. However, according to Swiss Patat, this year's tubers have very good quality.

Since the beginning of September 2022, there has been a modest demand as France's potato harvesting has been going well. In general, national yields had variations depending on the cultivars and plots. Since the beginning of September, trade activity has been usually moving at a moderate pace. The different categories were promoted in supermarkets to make it easier for customers to make purchases and even to promote impulse spending. In collaboration with their suppliers, brands were promoting the "affordability" of potatoes for all homes, regardless of income level. Additionally, efforts were made to guarantee that potatoes are advertised at a price that was convenient for the buyer. Although the export market was stable, operations were slowed down by transportation issues, which affected particular destinations more than others, such as Spain. Along with the structural shortage of drivers, there was also the rising expense of transportation. The reduction in Spanish fruit and vegetable production lessened exports to the rest of Europe and, as a result, lowered the number of

trucks available for France to transport its potatoes. The demand for potatoes in Italy was reasonable, but some of it was driven by speculators. Costs were also increased. To save money, the retail industry seek product, even if they were of poor quality. To increase their profits, several businesses searched for more affordable goods. During October and November 2022, the traders worked more and without as much margin. Costs, however, increased: with the same consumption, the electricity bill went from USD12,000 to USD40,000 in just one month. Due to the lower yield in Italy's north, prices were higher than in previous years.

U.S. SPUD HARVEST FARES BETTER COMPARED TO EUROPEAN YIELDS

Spanish potato production went down drastically from 2021 as a result of fewer acres being planted in all the producing regions and significantly lower yields as a result of the weather's effects. The primarily modest sizes have been significantly impacted by the drought. This has caused potato prices to soar and hit record highs, along with the sharp rise in production, handling, and packing costs. Given that France anticipated a significantly lower harvest as well, both the fresh and processed industries are very concerned about a possible scarcity this winter. Given that inflation is already harming the economy and the purchasing power of consumers, prices may continue to rise and have an impact on demand.

The 2022 U.S. potato harvest was 'a lighter crop' than what spud growers were 'historically used to', according to market experts, but 'a little bit better than last year in terms of yield'. Data shows that U.S. potato production was 7% lower in 2021 than the average production of the preceding five years, resulting in the U.S. potato shortage of 2022. This potato shortage has meant stores, restaurants, and individual consumers have struggled to find potatoes, much less reasonably priced ones. By the end of September or the beginning of October 2022, the U.S. spud crop was fully harvested and stored, offering significant relief to stores, suppliers, and restaurants across the country. Once the potato shortage of 2022 was over, French fry and potato chip makers increased production, and restaurants returned to their regular menus.

SOUTH AFRICA

Two years in a row frost hit the South African Limpopo Province, which also experienced very favorable prices. Sales have increased by 6% during the Autumn of 2022, suggesting that the surplus that this season's expanded potato hectares and high market supplies had caused has been addressed. Limpopo has sold 1.3m more bags since the year began than it did on average over the previous five years. On the other hand, since the year's beginning, the Northern and Northeastern Cape and the Free State have each sold 2.5m and 2.3m 10 kg bags, respectively, less than their average. During the Autumn of 2022, potato prices decreased by a further 10%, reaching slightly over EUR2 per 10kg bag. When compared to this time last year, when frost damage curtailed the harvest and briefly created a shortage, potato prices are between 40% and 60% lower.

CHINA

Last, but not least, China increased its exports despite reduced yields. The country shipped around 220,300 tons of fresh or chilled potatoes (excluding seeds) from January to August 2022, up about 2.57% from the same time last year. The total export value was about USD119.65m, up about 6.43% from the same time last year. •

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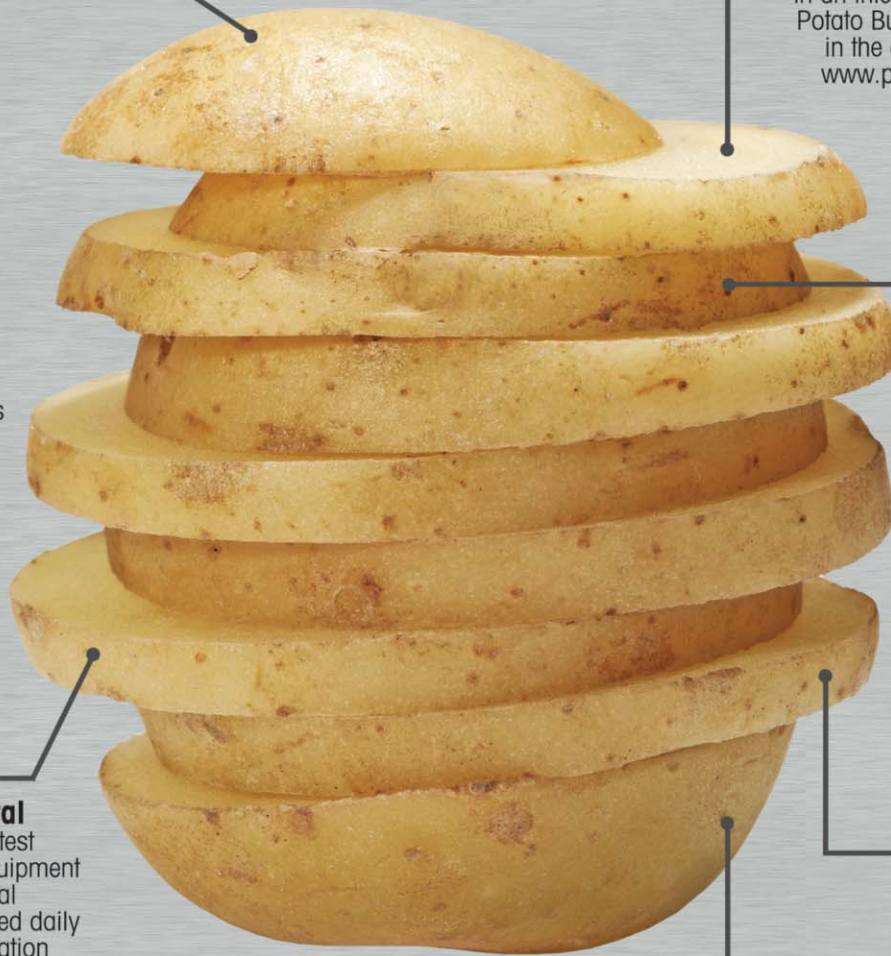
POTATO PROCESSING INTERNATIONAL

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.



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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.



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A COMPLETE COMMUNICATION PLATFORM

A Focus on Potato Flakes



Jonathan Thomas

Global demand for potato flakes continues to increase, despite the numerous challenges faced by the industry in the post-pandemic world caused by economic and political uncertainties.

By Jonathan Thomas



Potato flakes are a widely used ingredient in the manufacture of many types of food and beverages, offering benefits such as thickening (where they represent an alternative to cornstarch and wheat flour) and binding (especially for products such as sausages and other meat-based foods). They are also popular within various applications of the bakery industry, where they can perform a similar role to potato flour. Potato flakes are flat chunks of dehydrated mashed potatoes. They are prepared via a cooking and mashing process, after being crushed by rollers on the surface of a drum. They then undergo a quick-drying process, which raises humidity levels to a specific value. Afterwards, the sheets are broken and ground to the required density to yield the potato flakes. Given that the potato starch retains its absorbency, the flakes can easily be rehydrated. During the manufacturing process, various ingredients may be added to improve the texture, color and appearance of the potato flakes.

MARKET SIZE & TRENDS

Estimates regarding the size of the global market for potato flakes vary according to source. Fact MR valued the market at USD6.3bn in 2021, whereas Future Market Insights (FMI) estimated global sales were worth more than USD7bn during 2022. However, most sources agree that the market is set to experience strong growth within the coming years, averaging around 6-7% per annum during the rest of the current decade.

Much of this growth is likely to come from the ongoing expansion of the processed and convenience foods industry in less developed parts of the world. Manufacturers in countries such as China and India are expected to continue turning towards products such as potato

flakes to improve the texture and consistency of processed foods such as soups, sauces and baby foods to cater for an expanding and more affluent urban consumer base. Moreover, the comparative lack of large-scale food processing facilities in these parts of the world compared with the west should continue to provide opportunities for manufacturers and exporters of potato flakes in regions such as North America and Western Europe. The market is also expected to derive some future benefit from the perception of potatoes (and, by extension, potato flakes) as a source of beneficial nutrients, thereby appealing to health-conscious consumers. Potato flakes are rich in carbohydrates, as well as proteins and minerals such as calcium and potassium. This is likely to further enhance their appeal for processed foods where health represents a major market driver, with baby foods one notable example. On a related note, technological advancements are also anticipated to play a role in the future growth of the market. More manufacturers of potato flakes are now demonstrating a greater interest in technologies capable of retaining the nutritional and sensory attributes of potato flakes for their customers. Companies are also coming under greater pressure to improve water and energy efficiency during the manufacturing process, largely on environmental grounds. This has led to the adoption of non-thermal processing and membrane processes within the industry, whereby water is reused for tasks other than potato processing and more energy-efficient technologies (e.g. molecular interactions via microwaves) are being utilized. One sector which is expected to witness significant growth over the coming years is the market for organic potato flakes. More companies are now entering this category, to address the burgeoning consumer demand for potato-based products positioned on a non-GMO platform. In many instances, organic potato flakes carry accreditation from bodies

such as the Soil Association. Some of the world's leading organic farming nations at present include India (which contains over 835,000 certified organic producers), as well as Uganda, Mexico, the US and Australia.

A common use for potato flakes is to make mashed potato, one of the most popular side dishes in global cuisine. Mashed potato represents a suitable accompaniment to a variety of different foods – examples include sausages, meats (e.g. chicken and lamb), fish cakes and a range of vegan and vegetarian options, with bean-based dishes well to the fore. Furthermore, mashed potato represents one of the most common leftovers in the world's kitchens and can be used in a range of different applications. Aside from being used as a topping (e.g. for shepherd's or cottage pies), it can also feature in the manufacture of foods such as potato croquettes, potato cakes, soup and gnocchi. Mashed potato is also an integral part of various regional dishes throughout the world – one example is Ireland's colcannon, where it is mixed with cabbage or kale.

Much of the recent growth in demand for mashed potato can be attributed to the emergence of new flavors within the category. Although cheese remains a popular favorite, the market now encompasses mashed potato flavored with herbs such as garlic, as well as bacon. Mashed potato also carries obvious appeal for many of the world's more health-conscious consumers, owing to their low levels of salt and saturated fats. The fact that mashed potato is also suitable for those following vegan or vegetarian diets should also aid future growth of the sector. Although mashed potato remains a favorite amongst large chunks of the global population, it must still compete against several other widely used methods of cooking. In the UK, for example, research carried out by supermarket group Tesco during the middle part of 2022 found that roasts were the favorite type of cooked potato amongst adults, chosen by 49% of respondents. This figure declines to

43% for French fries and/or chips. Mashed potato occupies third position in joint place with baked potatoes, mentioned by 30% of the survey's respondents. However, the research did reveal some distinct preferences regarding age. French fries and chips were far more popular with younger consumers (i.e. those aged 18-34), while this age segment was also more positively inclined towards cooked potatoes such as hash browns.

Separate data from research carried out by Tesco towards the end of the previous year indicates that, for some consumers at least, mashed potato could start to make inroads into the traditional Sunday dinner. The research from 2021 found that 40% of UK consumers felt that mashed potato should replace roast potatoes during this distinctive meal, which many consider a staple of an average week. While it seems unlikely the popularity of roast potatoes on Sundays will undergo any dramatic fall any time soon, it does indicate there remain areas of opportunity for suppliers of mashed potato to explore.

Mashed potato is also one of the most popular meal accompaniments with US consumers, even allowing for the sizeable competition across the country from French fries. In the US market, mashed potato appears to be slightly more popular with older consumers, while it tends to be most frequently eaten during seasonal meals such as Thanksgiving.

INDUSTRY SUPPLY & NPD

Most of the world's leading suppliers of potato products compete within the potato flakes and mashed potato sectors. Some have been expanding their manufacturing capabilities in recent years, to take advantage of market growth and the expansion of the food processing industry in less developed parts of the world such as India and the Asia-Pacific region. Many of the North American and EU-based suppliers are keen to highlight the provenance of their potatoes in their marketing and promotional activities.



A leading supplier across much of the globe is Lamb Weston, which supplies a range of potato products in more than 100 countries worldwide. Its foodservice range in the US includes mashed potato varieties such as Lightly Seasoned and Roasted Garlic, as well as Red Skin and Sweet Potato. The fact that the potatoes are sourced from Idaho plays a strong role in the marketing of Lamb Weston's products. Lamb Weston is also a major producer of potato flakes, with its Meijer operations in the EU region having an annual output of around 52,000 tonnes. During 2020, the company expanded its capabilities with the construction of a new facility in Kruijningen in the Netherlands, which can manufacture

30,000 tonnes of potato flakes per annum. More recently, its Nigerian subsidiary extended its range in the spring of 2022 with Pouno Potato Flakes, which featured unique orange colored packaging. These were positioned as a healthy option for consumers and can be used in a variety of applications. As might be expected given its global presence, McCain also represents one of the leading suppliers of mashed potatoes and potato flakes. Its UK range includes Mashed Potato, which is sold via retail channels and can be cooked in microwave ovens. Within the foodservice industry, meanwhile, its Chefs Solutions range includes Simply Mash, one of whose benefits is a quick and convenient

preparation. Elsewhere, potato flakes are largely supplied to customers in the industrial and foodservice sectors, where they are used in the manufacture of savory sauces and fillings.

One leading European-based company is Aviko, which forms part of the Dutch-based Royal Cosun, a global agricultural co-operative. One of its main business units is Aviko Rixona, which produces potato flakes and potato granules for retail, industrial and foodservice applications. These are supplied from production bases in the Netherlands and China to manufacturers of products such as snack foods, sauces and soups in more than 60 countries. In recent years, Aviko Rixona has increased its production capabilities in both Belgium and Germany. Aviko also ranks as a leading supplier of instant mashed potato to foodservice customers in markets such as the UK.

Another company headquartered in the Benelux region which has a presence in both the potato flakes and mashed potato sectors is Lutosa. In April 2022, the company announced it would shortly change its name to Belviva, to stress its

Belgian heritage, as well as the provenance of the potatoes used in the manufacture of its products. Its range includes a variety of mashed potato products, such as Gourmet Mash, Ready Mash and Belgian-Style Mash.

One of the most well-known brands in the UK market for instant mashed potato is Smash, which was popularized in the 1970s with its iconic TV adverts involving Martians. Smash now forms part of the Batchelors range, which also encompasses foods such as soups, pot noodles and pasta sauces, and is ultimately owned by Premier Foods. One of its leading rivals is the Aunt Bessie's range, which includes instant mashed potato in Original and Carrot & Swede varieties. The present owner of the Aunt Bessie's brand is Nomad Foods, which acquired it back in 2018 from William Jackson & Son Ltd.

The development of new flavors of instant mashed potato continues to represent a cornerstone of the strategy of Idahoan Foods. Based in one of the leading potato-growing parts of the US, the company leads the market for instant mashed

potatoes, which can be prepared with the addition of boiling water and are suitable for meal occasions ranging from brunch to main courses. Some of its flavored varieties draw upon regional or local ingredients, examples of which include Wisconsin Cheddar and Vermont White Cheddar. Its most popular flavors include Four Cheese and Buttery Homestyle.

In the summer of 2022, its range of flavored mashed potato was extended with a new Chicken Broth variant. This introduction followed research carried out by the company that discovered 80% of US consumers make mashed potatoes at least once during an average year, and that of these, 40% use chicken broth as an ingredient. According to the company, US consumers continue to demand new and innovative flavors to satisfy their more cosmopolitan tastes. The previous autumn, Idahoan Foods had commenced a new promotional initiative named the Mashed in America Tour. This has seen the company travelling over 60,000 miles through more than 20 states, giving the US public free samples of its flavored mashed potato. •





Unlocking Efficiencies in Potato Storage

Ensuring a store runs efficiently is a critical part of managing a potato production system. Now more than ever, there are huge cost pressures on all parts of the supply chain and, therefore, it is just as important to minimize operating costs in storage as it is to maximize returns from the enterprise.

By Tudor Vintiloiu

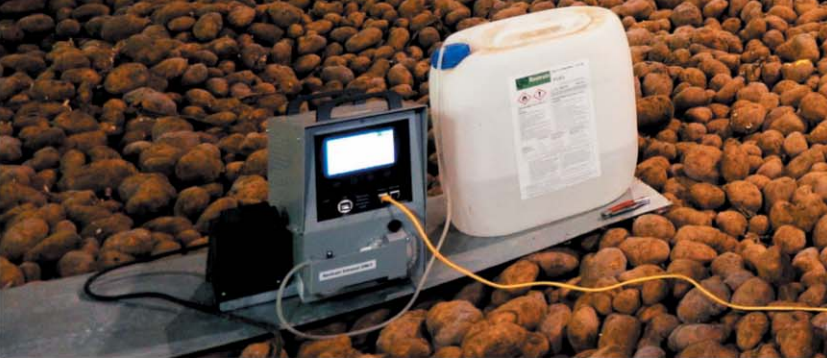
Having a good control of the store is crucial so that it only incurs costs when delivering a benefit. This control extends to such aspects as servicing and calibrating the store equipment before use, loading the store correctly, operating the ventilation system and ensuring the airflow is optimized, minimizing air leakage, and so on. Store management is a complex process and there are multiple points at which problems and inefficiencies can occur and jeopardize the prospect of success. In a previous interview, Ray Andrews, MD at Crop Systems Ltd,

walked us through some of the more common inefficiencies found in potato storages. He said that operators should check the entire system and make sure all parts are working efficiently, and that the air travels through the crop without short circuits, because that would mean the air isn't doing its job and the equipment doesn't function efficiently. Problems could include inefficient coil temperatures, icing up, longer and more frequent defrosts and increased running periods. Cleanliness of all equipment is crucial – fans need to be clean to run efficiently; underfloor lateral ducts need to be

checked professionally to ensure they are distributing the air as required; all refrigeration coils should be washed down as dirt attracts moisture which encourages icing on the coils (including the condenser coils) which will keep them from working properly. Furthermore, operators should monitor for damage all the time, and repair as required. Some foam types soak up moisture during the storage period, so when the store is empty, operators can leave store ventilation and doors open to help it dry out. Today's insulation is normally 100mm, but it should be noted that insulation could keep

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.



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stores



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the cold from getting into the store, which can increase cooling costs during the winter. Insulation needs to be efficient – but so too does the use of ambient air during cold periods. “Crop Systems Limited offers four key options: TaperStor uses tapering ducts and laterals to achieve balanced airflows throughout the store; for box stores our Posistor system offers effective suction no matter how wide the store’s louvres are open; and WarmStor can warm up potatoes coming out of store very efficiently so they are in ideal condition for processing. Our SmartStor controller can be original or retro fit

to any store, and enables operators to monitor and manage stores remotely, so they can check whether the store is operating efficiently no matter where they are, and adjust equipment remotely as well. That includes adjusting all fans, louvres and fridges as required; as well as monitoring energy usage and changing settings if needed,” says Andrews. Lastly, upgrading the storage system should really be a constant effort – the moment something goes wrong it could be costing the owner money. Operators need to check if all current systems are capable of delivering cost effective energy use, specifically looking at

the COP of the system. They should also check for corroded or damaged coils and refrigerant leaks. If the equipment is still serviceable and has enough power to perform, then one can upgrade the control system, so as to plan the energy usage better and take advantage of lower tariff periods. Above all, the Crop Systems specialists says to avoid defrosts which can consume a lot of energy and remove moisture from the store, leading to weight loss and turgidity. Also operators should remember that newer glycol cooling systems can have 60% less refrigerant content, which – over the lifetime of a typical system – could be equivalent to a large proportion of the purchase cost. “Balanced airflows are important. One should aim to get as much of the air going out from the fans through the crop as possible, so it brings the respiration heat back to

the coil. The key is to avoid ‘short circuits’ – the routes the air might take without passing through the crop. Positive suction systems in ambient systems maintain the airflow through box stores. Tapered ducts and laterals – as used in our TaperStor – use specifically sized gaps to ensure even airflow is maintained throughout the store,” Andrews concludes.

BOX STACKING

Good box stacking is the foundation of efficient air movement, and it is important to develop a system that supports optimum ventilation. This can be as simple as marking a layout on the floor to ensure minimal gaps between boxes and no obstructions to air flow. “A positive ventilation system that moves air through the potatoes ensures more uniform air movement, though passive

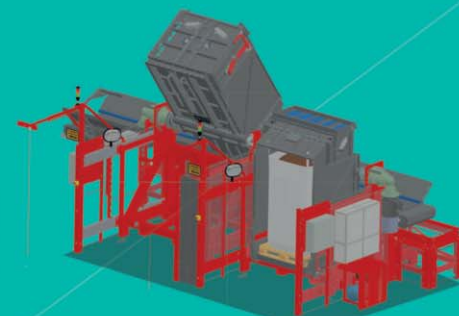
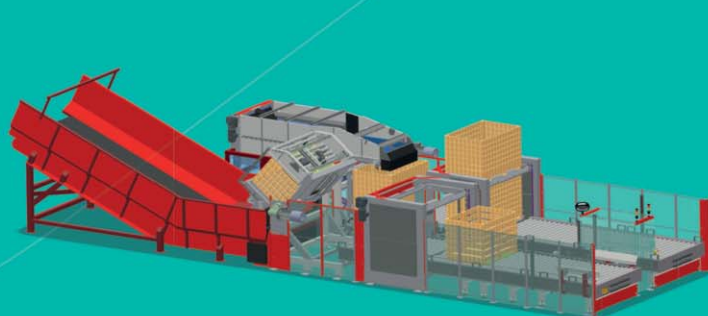
ventilation by passing air along pallet apertures can also be effective,” says Dr. Stuart Wale, potato consultant and researcher at Scotland’s Rural College (SRUC). The specialist also advises to ensure boxes of the same height are used in each column. Stacks should be at the same height and ensure that there is enough room at the back of the store, about 1m, for the air to fall back down and pass back along pallet slots. “Over-filling stores frequently restricts effective ventilation,” adds Dr. Wale.

AIR MOVEMENT

Poor air movement can lead to a loss of quality through uneven temperatures and condensation. It also increases costs as more energy is consumed to attempt to keep temperatures uniform in those areas where airflow is poor, or boxes are poorly stacked. “Ventilation is not just there to dry

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potatoes as they enter the store, but also to remove heat of respiration. When potatoes are moved, respiration rises and they give off heat; if this is not controlled it could lead to the build-up of temperature gradients and, ultimately, condensation," says Dr. Wale. Air will always take the path of least resistance, so where boxes are poorly stacked the air will be able to exploit gaps to travel back to the ventilation unit without passing through or over the potatoes. "Use of a plenum or an air divider curtain can help to prevent short-circuiting and make sure air is used to best effect in overhead-throw stores", advises Adrian Cunnington, of AHDB. Ensuring stores are well-sealed will not only support efficient air movement but support the performance of alternative sprout suppressants such as ethylene or mint oil. "These volatile substances need good air circulation within the store to properly distribute through the crop, but air leakage from the building is a concern. On a windy day it is not uncommon to see two to four air changes an hour in a poorly maintained store which would make the cost of

applying ethylene or mint oil expensive," says Cunnington. "The best way to assess a store's air tightness is to stand inside, turn out the lights and see where the light is coming in. I have seen instances where the gaps add up to nearly three-square metres which is equivalent to leaving a door open. In these situations, it will be very difficult to retain expensive chemical," he adds.

CO₂ EXTRACTION INSTEAD OF VENTING

The skyrocketing energy prices in 2022 are a huge challenge for potato growers. After all, ensuring good storage conditions in storage areas with the aid of fans and cooling installations costs a lot of electricity. As a result, the margins of growers are under considerable pressure. Fans consume a lot of electricity. In addition, if they run for a long time, they can deteriorate the storage conditions in the potato storage, according to Adrian Briddon, Technical Manager at Restrain. "Internal ventilation mixes the air in the storage into a homogeneous mass. If the CO₂ level then becomes too high, growers have to ventilate their warehouse for a long time to drive off enough

carbon dioxide. However, this also leads to fluctuations in temperature and humidity. Those changing conditions can lead to weight loss and poorer baking colors in potatoes. To then straighten the temperature again, the cooling installation must be switched on. This again consumes a lot of electricity."

LOWER THE CO₂ LEVEL AND KEEP OTHER CONDITIONS THE SAME

Restrain's energy-efficient CO₂ extractor only switches itself on when the carbon dioxide level in your store gets too high. Briddon explains how the solution works: "The extractor extracts the excess CO₂ without affecting the other conditions in the storage facility. The grower places the extractor low to the floor, where the CO₂ level is highest. The exhaust exits through a hole in the wall. This can often simply be done via the existing nebulization port where CIPC used to be injected." According to Briddon, the biggest difference between the extractor and ordinary fans is that the hatches of the shed can remain closed. "In February 2021, growers had to deal with outside temperatures of -18 to +18 degrees Celsius. At such times, it was impossible for them to ventilate their sheds without drastically deteriorating storage conditions. This led to very high levels of carbon dioxide in sheds, which is bad for baking colors. The CO₂ extractor prevents this."

VENT TIMERS VS. CO₂ EXTRACTOR

Some growers work with timers on their fans to save energy on purifying the air in the storage of CO₂. According to Briddon, this is not ideal: "Every time growers air out their warehouse unnecessarily, this is at the expense of moist air in the storage. That can lead to additional weight loss. To minimize these losses, ventilation must be smart and energy efficient. That is why Restrain's CO₂ extractor only kicks in if the CO₂ value gets too high." •

2023 FEATURE PLANNING

1

JANUARY/FEBRUARY

Ad closing 16.01/Publishing 27.01



Key Exhibitors Road Map and Event Agenda

Processes

Sorting, Pre-cleaning, Washing, De-stoning
Energy and Water Saving

Expert View

Cutting/Slicing/Dicing
Sustainability in Production

Spotlight

Cleaning and Sanitation

Markets

Western Europe

Products

French Fries in Retail and Foodservice

Ingredients

Batters, Coatings

Storage Special

Refrigeration and Long-term Storage
Sprout Suppressants in Storage

Trade shows: Potato Expo 2023, Fruit Logistica 2023

2

MARCH/APRIL

Ad closing 13.03/Publishing 22.03



Key Exhibitors Road Map and Event Agenda

Processes

Conveying Systems and Belts
Process Monitoring

Expert View

Automation - Ensuring a Reliable and Flexible Production Flow
Drying - Innovation in Belt and Drum Dryers

Spotlight

Smart Production/IIoT/Industry 4.0

Markets

North America

Products

Chips and Potato-based Snacks

Ingredients

Established vs. New Flavors

Storage Special

Storage Challenges and Cost-saving Solutions
Storage Design and Construction

Trade shows: World Potato Congress, Interpack 2023

3

MAY/JUNE

Ad closing 08.05/Publishing 19.05



Key Exhibitors Road Map and Event Agenda

Processes

Cutting, Peeling, Slicing
Seasoning & Coating

Expert View

PEF Applications and Advantages
Frying Technologies and Advancements
Optical Sorting - Increasing Yields, Reducing Waste

Spotlight

Alternative Energy & Increasing Efficiency

Markets

Eastern Europe

Products

Hash Browns and Croquettes

Ingredients

Frying Oils

Storage Special

Power Saving and Sustainability
Sensors and Data Gathering

Trade shows: Europatat 2023

4

JULY/AUGUST

Ad closing 17.07/Publishing 28.07

Processes

Blanching, Frying
PEF Systems

Expert View

Cutting Accuracy and Equipment Reliability
IQF Freezing for French Fries

Spotlight

Supply Chain Management & Logistics

Markets

South America

Products

Flakes & Mashed Potatoes

Ingredients

Seasonings for Chips and Fries

Storage Special

Automated Climate Control
Potato Monitoring & Quality Assurance

Trade shows: Potato Association of America Annual Meeting

5

SEPTEMBER/OCTOBER

Ad closing 04.09/Publishing 15.09

Processes

Oil Filtration Systems & De-fattening
Cooling and Freezing
Starch and By-products Processing

Expert View

Remote Maintenance and Customer Service
Complete Lines for Processing
Conveying And Product Transport

Spotlight

The Road to Sustainability

Markets

APAC/ANZAC

Products

Extruded Potato Products

Ingredients

Salt

Storage Special

Disease Management
Handling Potatoes to & from Storage

Trade shows: Potato Europe 2023

6

NOVEMBER/DECEMBER

Ad closing 07.11/Publishing 18.11

Processes

"Forming and Extruding"
Turnkey Projects
Waste Management/Upscaling

Expert View

Batch vs. Continuous Frying
Cutting vs. Hydrocutting
Pulsed Electric Field (PEF) Processing

Spotlight

Increasing Production Capacity

Markets

Global Market Predictions for 2024

Products

Seasoning Trends

Ingredients

Better for you/Clean Label

Storage Special

Store Preparation and Hygiene
Bulk vs. Boxed Storage

Trade shows: British Potato 2023



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