

# POTATO PROCESSING

I N T E R N A T I O N A L

Supporting the potato industry worldwide

Issue 5 • Volume 31 • 2023



## Process

Waste to Starch: A Greener Path to Profitability

## Spotlight

Sustainability Is About the Journey, Not the Destination

## Products

Extruded Snacks: Shaping Up For the Future



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# A Big Change and the Small Steps to Reach It

**Tudor Vintiloiu - Editor in chief**  
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**A**s the demand for processed potato products continues to rise, so does the responsibility of industrial potato processors to address the environmental, social, and economic challenges associated with their operations.

Sustainability is a big word that's on everyone's lips lately and for that reason it tends to lose much of its meaning. It's becoming overused and people lose sight of what it actually means.

This issue delves into the multifaceted landscape of sustainable potato processing, offering a comprehensive overview of the crucial considerations that must underpin the endeavors of industrial potato processors.

In a rapidly changing world, the pursuit of sustainability is not a one-time achievement but rather an ongoing commitment to positive change and adaptation.

It is a statement that industry players are willing to continually reassess and improve their practices, values, and systems to align with the long-term well-being of the planet and its inhabitants. It fosters a mindset of

*In a rapidly changing world, the pursuit of sustainability is not a one-time achievement but rather an ongoing commitment to positive change and adaptation.*

perpetual innovation and responsibility, encouraging us to question the status quo and explore new ways of doing things. Along this journey, we encounter challenges and complexities that demand creative solutions and collaborative efforts. It's in these moments of challenge and innovation that true progress is made. Sustainability compels us to think beyond

immediate gains and consider the consequences of our actions on future generations, driving us to make choices that are not only beneficial today but also resilient and enduring.

In this issue's Spotlight we look at water conservation, waste management and energy recovery systems, and explore innovative technologies and practices that allow processors to minimize their carbon footprint. Read on to see how we can collectively work toward a sustainable and resilient potato processing industry that not only meets the demands of the present but safeguards the needs of future generations. ●

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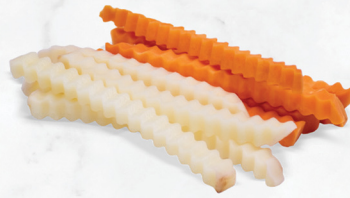
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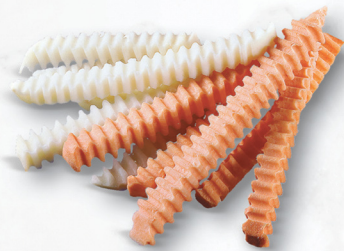
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## USD95m in PepsiCo Investments for the Nalbari Potato Chips Plant in India

For the development of an India Lay's potato chips facility, PepsiCo will invest USD95m. It is projected that the Nalbari plant, which is 17.8 hectares in size and is located in the northeastern province of Assam, will start operating in 2025. The initiative will result in 500 new direct and indirect jobs. PepsiCo has vowed to hire "at least" 75% female workers at its Nalbari factory, the

company's first in Assam, as part of a local training initiative. Potatoes for Lay's crisps will be obtained locally, with 50,000 tonnes expected annually from Assam state, and plans for a cold storage facility with a capacity of 60,000 tonnes of potatoes in the next "few" years. The Nalbari facility will use environmental practices such as 80% renewable electricity and locally sourced



packaging materials. PepsiCo announced its return to Indonesia in August, with intentions to build a food facility in the town of Cikarang, West Java. Bangladesh benefited from the company's investment as well, with a Lay's factory expansion project launched in June.

## New 930 sqm Innovation Center for CMP and FPS

An innovation center will be opened by Charlottetown Metal Products Ltd. (CMP) and Food Process Solutions (FPS) at the Canadian company's manufacturing facility in Prince Edward Island (PEI). The development of novel, creative, sanitary food processing methods will be the main focus of this large investment in both people and resources. "With this commitment, the FPS and CMP team will continue to strengthen their partnership with universities and colleges, various government agencies, strategic suppliers, and the food processing customers they serve globally," a recent press release reveals. Throughout 2024, the 930-square-meter Innovation Center will undergo renovations. Seven innovative projects are now in the works. The creation of a cutting-edge End-to-End Solution for packaged food goods was the first task to be finished. To handle the transfer, alignment, merge, and diverge of packaged food goods to and from chillers, freezers, and other processing equipment, several essential technologies were integrated into a forty-foot conveyor loop. Current projects concentrate on whole process line solutions that improve operational effectiveness by automating processes, utilizing less energy, and improving output.



## Lamb Weston Oceania Acquired Crackerjack Foods

A recent official announcement revealed that Lamb Weston Oceania is welcoming Crackerjack Foods to its Australian operations. "Crackerjack is a Victorian-based manufacturer and supplier of frozen potato-based products for the national food services industry, synonymous with potato cakes and battered snacks. As part of the acquisition, Crackerjack's current employees will join our team. We will also acquire Crackerjack's two processing lines, one in Keilor and a highly automated and purpose-built new facility constructed at Campbellfield. The acquisition offers Lamb Weston Oceania a new range of products that complement our current portfolio and increase the options available to our existing and new customers," according to Lamb Weston Australia. Lamb Weston is backing the potato cakes and hash browns market to grow strongly as Australians show a preference for pub dining over restaurants. As part of the agreement, Lamb Weston will take on Crackerjack's USD20m in yearly revenue. The market in Australia for "potato cakes," as they are known in Victoria, is estimated to be worth USD100m annually. They are known as potato fritters in South Australia and as potato scallops in New South Wales.



## A New EUR350m Agristo Factory for Frozen Potato Products



To facilitate the development of a food processing business on the site of its former sugar refinery in Escaudoeuvres, in the north of France, Tereos has signed a memorandum of understanding with Agristo on August 28, 2023. The Belgian company Agristo intends to establish a facility for the manufacture of frozen potato products. By investing EUR350m and creating 350 jobs, new markets for regional manufacturers will be opened. Production will reportedly begin in the second part of 2027. Tereos announced the termination of sugar production activities at its Escaudoeuvres location in March due to a large drop in its cooperative members' sugar beet surface acreage (down 20% in five years). "It's good news for jobs, of course, but it's also good news for regional agriculture, which can see new long-term market opportunities opening up and agribusiness developing. We're delighted to see this tradition of agriculture winning continue. This is Tereos' objective," Gérard Clay, Chairman of the Board of Directors of Tereos, mentioned.



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# Net Zero Project Strategy Research to Reduce the Potato Industry's Carbon Footprint

The potato supply chain is working on ways to reduce the carbon footprint of the crop as a result of climate change, driving extreme weather occurrences, and industry promises to reach net zero. According to Andrew Blair, field technical manager at Branston, the largest supplier of potatoes in the UK, a project funded by Innovate UK is looking into ways to cut the carbon footprint of the potato industry, from

growing through storage and transportation. The Branston's Net Zero project, now in its second of three years, is collaborating with partners - agritech company B-hive Innovations, the University of Lincoln, crop storage technologists Crop Systems Ltd, and numerous growers - to develop a method that will achieve the least amount of GHG emissions while still producing a commercially viable crop.



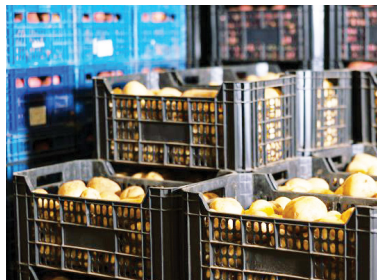
The project's major objective in this year's Net Zero field trials, which are being carried out with David Armstrong Farms in Lincolnshire and Arbikie Farming in Scotland, is to maximize crop nutrition. Although nitrogen fertilizer is a crucial component of growing a crop of potatoes, it also contributes significantly to the carbon footprint of the crop.

## Lemken Integrates Crop Care Business

Machinefabriek Steketee B.V., a Dutch company, will now be fully integrated by November 2023; Steketee will change to Lemken, and machines will be delivered in Lemken blue rather than Steketee red. "This strategic decision marks a milestone in the development of both companies and offers promising opportunities for future growth and innovation," according to a recent press release. Five years ago, the agricultural machinery specialist Lemken acquired Machinefabriek Steketee B.V., expanding its crop care product portfolio with implements for mechanical weed control and future-oriented camera-assisted machine guidance. In 2018, the common goal was to expand the site in Stad aan't Haringvliet in the Netherlands and to increase production capacity. This was done by building on Steketee's existing skilled and experienced local workforce of 50 employees. Since the acquisition of Steketee, Lemken has worked hard to maximize the synergies between the two organizations.



## Increased Competition Among the European Buyers



The demand for potatoes is expected to increase in the upcoming months. Production deficits have been observed in Poland and Southern European regions. As a result, there is now more rivalry among purchasers for available potato supplies, and exports have already begun. After the delayed harvest became available and reports of a larger crop than the previous year, the Mintec Benchmark Prices for Dutch

processing potatoes were assessed at EUR14.75/100kg on September 19th, down 37% y-o-y. Initial yield projections in the most recent update from the North-western European Potato Growers (NEPG), which was published on September 11th, indicate a return to multi-year averages. Since the August update, the EU Commission has increased yields by 1% to 34.7 t/ha, which is 2% more than the five-year average but 2% less than the crop expected in 2022–2023. Due to the increased planted areas, which are up 2.5% in NEPG countries, the production is expected to reach about 23m tonnes, which is a 1.3m ton rise from 2022 and closely aligns with 2021 projections.

## The Global French Fries Market is Experiencing a Sizzling Rise

According to The Business Research Company's French Fries Global Market Report 2023, the market for French fries is expected to increase at a strong compound annual growth rate (CAGR) of 6.9%, from USD13.37bn in 2022 to USD14.30bn in 2023. "This upward trend is expected to persist, propelling the market size to an impressive USD18.54bn in 2027, with a CAGR of 6.7%. A key catalyst for the French fries market growth is the surging demand for ready-to-eat products, which are redefining convenience in the culinary world," the analysts added. The market for French fries worldwide is highly concentrated, with a small number of prominent players setting the agenda. The top 10 rivals in 2022 combined controlled 36.73% of the global French fry market. With a sizeable 13.85% market share for French fries, McCain Foods Limited led the pack. Lamb Weston Holdings Inc., Farm Frites International B.V., JR. Simplot Company, The Kraft Heinz Company, Aviko B.V., Checkers Rally's, Albert Bartlett and Sons, Agristo N.V., and Agrarfrost were all in close pursuit.





## Scotland Resumes the Seed Potato Trade with Northern Ireland on September 30

The ability to trade seed potatoes between Scotland and Northern Ireland will re-open on September 30th. While trade with Northern Ireland is re-opening, sales of seed potatoes to Europe remain blocked since Brexit. NFU Scotland is calling on the UK Government to re-double its efforts to resolve this impasse, recognizing that there is significant intransigence at an EU level to seek a resolution. It strongly believes that any seed potato trade between the EU and GB must be reciprocal. A benefit of the Windsor Framework, ratified by the UK and the EU in March 2023, was the opening of 'green channels' that would allow the resumption of trade in some goods, including seed potatoes. Pre-Brexit, Scotland sold an estimated 2,500 tonnes of seed potatoes into Northern Ireland. Brexit saw the valuable trade in Scottish seed potatoes to all European markets, including Northern Ireland, lost overnight. Pre-Brexit, Scotland sold an estimated 22,000 tonnes of seed potatoes to European customers.

## J.R. Simplot is Reminding Potato Producers to Beware of Pink Rot

The potato processor J.R. Simplot recently issued a warning to growers warning them to watch out for pink rot as they start harvest. "If you know there's rot in there, tell your harvest operator, 'when you come to that low spot, pick up the harvester, drive over, and don't harvest those certain areas,'" Scott Graham, Simplot's raw agronomy manager, said, cited by the Manitoba Co-operator.

This is crucial, the expert says, because pink rot-causing fungi can grow and spread in the bunker through contaminated soil. Pink rot can affect tubers when they are in the field or if they are injured during harvest. The fungus sickness has recently been a problem for several Manitoba producers, according to the business. These issues prompted Simplot to highlight the virus in an August communication to producers this year. "Once they've dug it and they've put it in the pile with their healthy potatoes, they're in trouble. The biggest thing is to avoid harvesting and mixing rot areas of the field with healthy areas of the field," Graham added.



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→ THINKING AHEAD

# Fry to Perfection: The Science of Oil Filtration

A key element in the production of most processed potato products is frying, where the desired texture and flavor are imparted to the chips or fries. However, maintaining frying oil quality efficiently and consistently is paramount for product quality and operational efficiency. This is where frying oil filtration comes into play.

By Tudor Vintiloiu

**O**il filtration varies in complexity depending upon the system and materials that are utilized. In order to simplify the basics of oil filtration media or systems researchers have identified two basic types of filtration:

**Passive Filtration Systems:** These systems simply remove particulate from the oil through sieving. Passive filtration has also been called simply “filtration” by some. Examples of passive systems are filter paper, diatomaceous earth, bag filters, and steel screens. It can also be described as the mechanical removal of solids by screening or fine filtration. This is considered to be anything from 2 mm to 4 mm screens down to typically 50 microns. Other types of mechanical filtration, such as cake or depth filter pads, can go down to as low as 1 um.

**Active Filtration:**

Active systems are much more complex. These systems not only remove particulates but will remove oil-soluble

components from the frying oil. Active systems are also referred to as “treatments.” These include powders, impregnated paper or pads, and paper with active powders. Many potato processing plants employ continuous filtration systems, allowing for uninterrupted oil filtration during the frying process. This ensures consistent oil quality throughout production. Periodic oil testing is also conducted to monitor critical parameters such as total polar compounds (TPC), acidity, and color, providing insights into oil quality and condition. Advanced technology plays a pivotal role in optimizing frying oil filtration processes. Modern filtration systems utilize high-efficiency filter media to capture even the tiniest impurities, resulting in cleaner oil and a longer usable life. Automated control systems monitor

filtration parameters, such as temperature, flow rate, and pressure, adjusting them as needed to optimize filtration efficiency. Some plants even employ oil recycling systems that not only filter but also purify and recondition the frying oil, removing contaminants and maintaining oil quality over an extended period. Sensors placed within the frying equipment and filtration systems provide real-time data on oil quality, with data analytics tools processing this information to make informed decisions regarding oil replacement or treatment.

**POTENTIAL BENEFITS**

When evaluating any kind of system in a food processing environment, operators must look at both potential benefits and concerns.

Extending oil life is certainly the most obvious benefit, which will result in reduced oil usage and improved food-to-oil ratios. The food-to-oil ratio is a calculation that shows the amount of food fried to pounds of oil used. This can translate into significant savings for the processor and also means that the amount of oil that has to be discarded (waste oil) is reduced. Better food quality is another potential benefit. Food quality is a characteristic that depends upon the operator. It could mean improved shelf life, enhanced flavor, or improved overall appearance of the product. Lastly, maintaining oil quality within specified parameters helps potato processing plants adhere to regulatory standards, ensuring product safety and compliance with industry regulations.

**OIL SAVER BY HEAT AND CONTROL**

Heat and Control, Inc. a world-leading equipment manufacturer and food processing industry supplier, not long ago introduced the OilSaver Filtration System to its Oil Management System lineup. The OilSaver extends the life of frying oil with continuous high efficiency filtration down to 10 microns. The OilSaver preserves frying oil quality by removing solids (coating, crumbs, etc.) using high efficiency filtration during production while the fryer is in use. The OilSaver can be used with any fryer and keeps frying oil in good condition for coated protein

products, peanuts, snack foods, appetizers, and other fried foods. In addition, OilSaver's vacuum technology makes it the safest option on the market with no chance of spraying dangerous, hot oil from the system.

"This addition to Heat and Control's catalogue advances our oil filtration capabilities and provides our clients with a safer option for manufacturing facilities," said James Padilla, Director of Product Development at Heat and Control Inc. "The OilSaver allows Heat and Control to be flexible in creating the superior products we have been

known for manufacturing for 70 years." The versatile OilSaver accommodates up to 60 gallons per minute in a small area. The dry cake discharge recovers large quantities of oil and returns the recovered oil back to the fryer. Every component of Heat and Control's oil management solutions is designed to maximize oil quality and improve energy efficiency. With advanced control over oil heating, filtration, transfer, cooling, and storage, as well as rapid oil turnover rate, you'll be able to create fresh and delicious products. OilSaver's vacuum technology makes it the safest



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*“Once frying is initiated, the damage to the frying oil cannot be reversed. It can, however, be slowed, which is one of the principle benefits of oil filtration or treatment.”*



option with no chance of spraying dangerous, hot oil from the system. High efficiency slipstream filtration takes place during production while the fryer is in use. The primary benefit of the OilSaver is the ability to keep the frying oil in good condition on a continuous basis. Maintain consistent color, reduce generation of Free Fatty Acids, and minimize the chance of scorching and off-flavors.

### **KIREMKO'S PRIMARY OIL FILTER**

The Kiremko Primary Oil Filter (POF) is directly connected to the oil discharge of the fryer and filters the complete oil flow. With 10% - 15% less oil content compared to a conventional belt filter, the turnover time of the oil will be reduced significantly.

The frying oil pumped out of the fryer, is fed directly to the Primary Oil Filter and filtered. Adding the Primary Oil Filter to the process enables processors to have a simplified circulation system with reduced oil volume.

The machine distinguishes itself by its

simplicity and accessibility. The oil is led through a perforated screen, which is kept clean by flights that are sliding over the filtration screen. The flights are mounted to a chain, which is driven by a single drive and has no bearings, sprockets or other moving parts below the oil level.

The smallest available perforation is only 0,8 mm, which means the Primary Oil Filter ensures a finer filtration than most other filters that are available for this stage of the process. Due to the improved crumb separation, there will be less crumbs ending up in follow-up filtration steps, making these filters more efficient as well.

The quality of fried potato products highly depends on the quality of the oil that is used. The Kiremko Oil Guard measures total polar materials (TPM). The data collected allow constant monitoring of the oil quality. This inline measurements make sampling and lab testing redundant. This way the Oil Guard not only saves money in manpower, it also intensifies the sampling data. Depending on the

process and the end product the Oil Guards does three to six measurements per hour. In the testing phase we saw oil quality levels rise closer towards quality requirement levels, leaving the operators more than enough time to adjust, so no end product was lost. Again, a money saver. But the most important guarding functionality is the food safety. The Kiremko Oil Guard assures food safety specifications more than any other system in the world.

### **ROSENQVISTS' CONTINUOUS DRUM FILTER**

According to Rosenqvists, their drum filter can handle a large volume of vegetable oil in a short time thanks to its smart round design. This ensures that every drop of oil is filtered every 30-50 seconds. "We can filter anything from 2 000 liters to 14 500 liters per minute depending on the size of the drum filter. Filtering the oil is essential for good final product quality and desired production efficiency," the company's experts told us.

The continuous drum filter filters the oil through a perforated stainless steel screen. This screen has an electro-polished surface and forms a drum; the particles are collected on the outside of the slowly rotating drum. To reduce the overall oil volume in the filter, a displacement body is mounted inside the filter. A set of special design stainless steel scrapers transfers the debris and particles to the waste auger. The design allows for removal of both floating particles and particles that are collected on the filter screen. The perforated plate size can be made from 800 microns size.

The continuous drum filter is a stable design with the same life expectancy as other parts of the frying system from Rosenqvists Food Technologies. The filter is built using fully welded design, according to SS-EN 1672-2:2020 standard. The continuous drum filter is a full flow filter for all circulating oil in the system. When special products are produced, engineers complement the drum filter with further fine filtration using centrifugal filtration systems as well as other types of fine filters. A complementary filtration system handles a smaller proportion of the oil flow for maximum filtration efficiency. •

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# Waste to Starch: A Greener Path to Profitability

Potato starch, a crucial component in various industrial applications, is derived from potatoes through a meticulously designed technical process. In recent times, the focus has shifted towards sustainable practices in its production, particularly in the context of utilizing potato waste effectively.

**By Tudor Vintiloiu**

**T**he size of the global potato starch market was 4.1m tons in 2022, according to a recently published study by IMARC Group. The market is anticipated to develop at a compound annual growth rate (CAGR) of 2.66% from 2023 to 2028, when it will reach 4.8m tons, according to the estimates. The expanding vegan and health-conscious populace is the main driver of the worldwide potato starch industry. A favorable outlook for the market is also being created by the ready availability of raw materials for production processes and the booming product application in the processed meat industry to produce goods like bologna, frankfurters, hamburgers, and meatloaves. In addition, increasing product use in the paper and chemical industries due to their adhesive and solubility capabilities, as well as the simplicity of product availability in online retail outlets, are fueling the market's expansion. Accordingly, major market players are launching new product variations with specialized enzymes and organic materials to broaden their consumer base, which is improving the market outlook.

## **THE PROCESS**

The extraction of potato starch involves a series of well-defined steps that leverage advanced



technology for efficient results. It all commences with the careful selection of suitable potatoes. These chosen potatoes must meet specific quality criteria, including size, dry matter content, and the absence of defects.

After selection, the potatoes undergo washing to eliminate dirt and soil particles, followed by peeling to remove the outer skin, which contains minimal starch content. Subsequently, the peeled potatoes are grated into a fine pulp, creating the foundation for starch extraction.

The heart of the process lies in starch separation, which involves the use of centrifuges or hydrocyclones. These mechanical systems efficiently separate the starch granules from the remaining pulp and water, yielding a starch-rich fraction.

Once separated, the starch undergoes sedimentation and washing in specialized tanks,

allowing impurities to settle at the bottom. The starch is then subjected to multiple washing cycles to eliminate any residual impurities.

The next critical step is dewatering, which involves the removal of excess water from the starch. This is achieved through centrifuges or vacuum filters, resulting in a starch cake with reduced moisture content.

To ensure the starch meets commercial standards, it is subjected to a drying process. Modern facilities utilize specialized drying ovens or fluidized bed dryers for this purpose. The starch cake is dried to the desired moisture level, rendering it suitable for further processing and storage. Finally, the dried starch is milled into a fine powder and packaged for distribution to various industries.

## THE MARKET

**Royal Avebe** announced that it intends to enhance its market share

in the plant-based sector by extending its product line, developing mixes of potato protein and potato starch, and making the Dallmin, Germany, production facility appropriate for human meals. This involves investigating how potato starch and protein constituents may be used as substitutes for animal, synthetic, and petrochemical goods.

“With the starch potato as the base, we want to create even more distinctive value for our members, employees, customers, and society. And thus accelerate the transition to a more plant-based world. We are also opening the door for other plant-based proteins, such as field beans and peas,” Royal Avebe Chairman of the Board, David Fousert, said. The company decided that production lines and capacity will be adjusted in response to increased demand for plant-based meat and dairy alternatives, as well as plant-based construction



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materials, citing sustainability and innovation as critical motivators for this endeavor.

The fruit, starch, and sugar company **Agrana** also announced a substantial investment in this direction by building a second drum drying plant at the location of its potato starch mill in Gmünd (Lower Austria's Waldviertel District). Agrana plans to increase the production of technical special starches for the adhesive and construction industries with an investment of EUR23 million. The new facility is expected to be finished in July 2025, which would result in a doubling of the technical starch manufacturing capacity. "Due to legal requirements, technical sectors are increasingly relying on organic materials and, therefore, selecting starches as a sustainable alternative to oil-based products. The expansion of our facility is in response to this rising demand and safeguards the competitiveness of the Gmünd site," Norbert Harringer, CTO of AGRANA Beteiligungs-AG, mentioned. In



Europe, AGRANA is the market leader in both technical and organic starches. At Austria's sole potato starch mill, with a workforce of roughly 420, Agrana makes both starches for the food sector as well as starches for technical uses, such as in the construction, cosmetics, and pharmaceutical industries. Organic starches, organic sweeteners, and organic long-life potato products like purées, potato dough mixes, and infant formula are also produced at the Gmünd facility by processing organic potatoes. Agrana's starches are also used in the construction chemicals industry to produce cement and slaked cement construction materials, as well as starch ether for gypsum and slaked lime. These starches are utilized in the adhesives industry as an alternative to synthetic adhesives and are referred to as green glues.

## SUSTAINABILITY

In recent years, sustainability has taken center stage in potato starch production. Efforts have been made to optimize resource utilization and minimize waste. Notably, waste materials generated during processing, such as potato peels and pulp, are now effectively up-cycled. These waste materials find purpose in applications like animal feed or biogas production, thus reducing overall waste and enhancing resource efficiency. Potato waste, primarily comprising peels and pulp, used to be considered a byproduct of starch extraction, often discarded or used for less valuable purposes. However, with a growing emphasis on sustainability, this waste is now recognized as a valuable resource in its own right.

**Potato peels**, which contain residual starch content, can be subjected to further processing to recover this starch. Advanced

separation techniques, including centrifugation or hydrocycloning, allow for efficient starch extraction from the peels. This recovered starch can then be integrated into the main starch production stream, significantly increasing overall starch yield while reducing waste. **Potato pulp**, another byproduct of starch extraction, is rich in organic matter and can serve various valuable purposes. One common application is in animal feed. After suitable treatment and processing, potato pulp can be turned into a nutritious feed ingredient, contributing to the circular economy by providing livestock with a sustainable and locally sourced food source. In addition to animal feed, potato waste, particularly pulp and other organic residues, can be utilized in the generation of **biogas**. Through anaerobic digestion, microorganisms break down the organic matter in the waste, producing methane-rich biogas that can be used for energy production. This not only offsets energy costs within the processing facility but also contributes to renewable energy generation and reduces greenhouse gas emissions. Furthermore, sustainable practices extend to energy management, with modern facilities implementing technologies such as heat recovery systems and energy-efficient drying methods. These measures significantly reduce energy consumption and associated carbon emissions. Water management also plays a crucial role, with recycling and reuse systems integrated into production processes. This not only conserves water resources but also minimizes wastewater discharge, contributing to environmental conservation. In terms of chemical usage, the industry has made strides in





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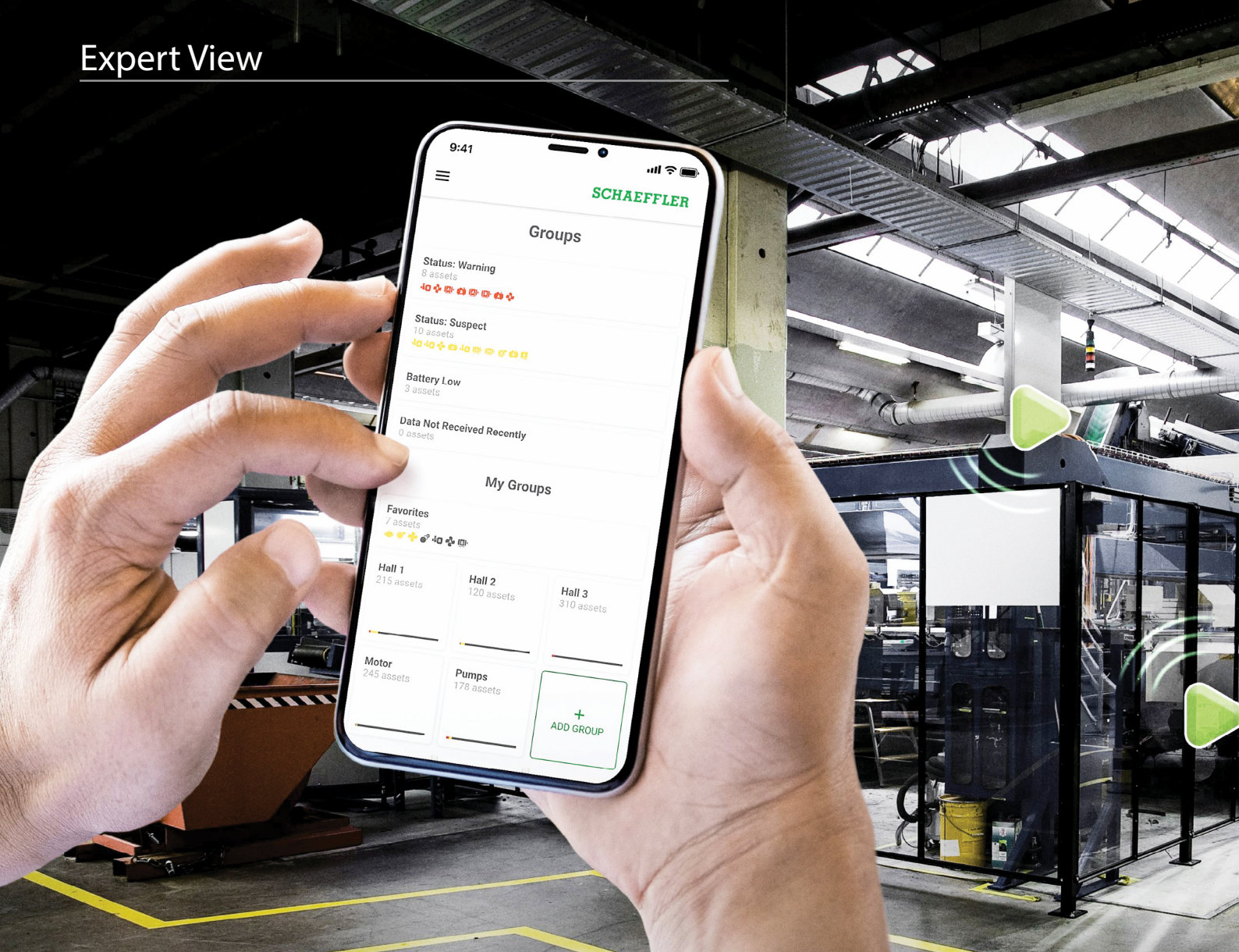
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# The Benefits of a Data-driven Approach to Maintenance

Although around-the-clock production in many potato processing plants is putting peelers, freezer fans, drum washing pumps and other critical equipment under a heavy strain, usually only a small part of a plant is continuously monitored. With new technologies available today, however, you can comprehensively monitor the condition of machines easily and efficiently, prevent unplanned downtime reliably and make your many maintenance tasks more plannable. In most cases, you do not even have to be a condition monitoring expert yourself.

## By Schaeffler Lifetime Solutions

**H**owever, up to 95% of all machines inside factories are either unmonitored or are monitored on an intermittent basis only. So it's no surprise that one of the most common sources of unplanned downtime is machine failure. Of course, machine

failure does not always lead to catastrophe. Monitoring for early detection of damage and defects does not necessarily make good economic sense for every machine or system, and costs associated with implementing a digital maintenance strategy may have been another

constraint for plant operators in the past. In addition, food processing plants have to adhere to highly specific manufacturing and maintenance requirements to meet safety and hygienic standards, which is why many plants have been hesitant in adopting new solutions.



The advances that a smart, data-driven approach to maintenance has added to the manufacturing world are changing industries worldwide. It is revolutionizing how plant operators manage and maintain their machinery for optimal performance and save big bucks by doing so. If monitoring conveyor belt bearings saves a coal miner in Southeast Asia 200,000 USD per hour, why should you not consider the same in food processing? If a Spanish cardboard manufacturer cuts the unplanned downtime he suffers from four incidents every year to zero, would you not like to achieve this as well?

Switching to long-term predictive and condition-based maintenance practices allows you to cost-efficiently transform your many tasks from being small-scope reactive to being large-scope proactive. And many production plants are taking first steps in embracing the opportunities that present themselves even in the complex environment of the food processing industry, as the examples in

this article show. But first: what exactly is predictive maintenance?

**Predictive maintenance revolves around condition monitoring and goes hand in hand with data analysis:**

**Condition monitoring** (CM) is the continuous monitoring of machines and systems to ensure their optimal

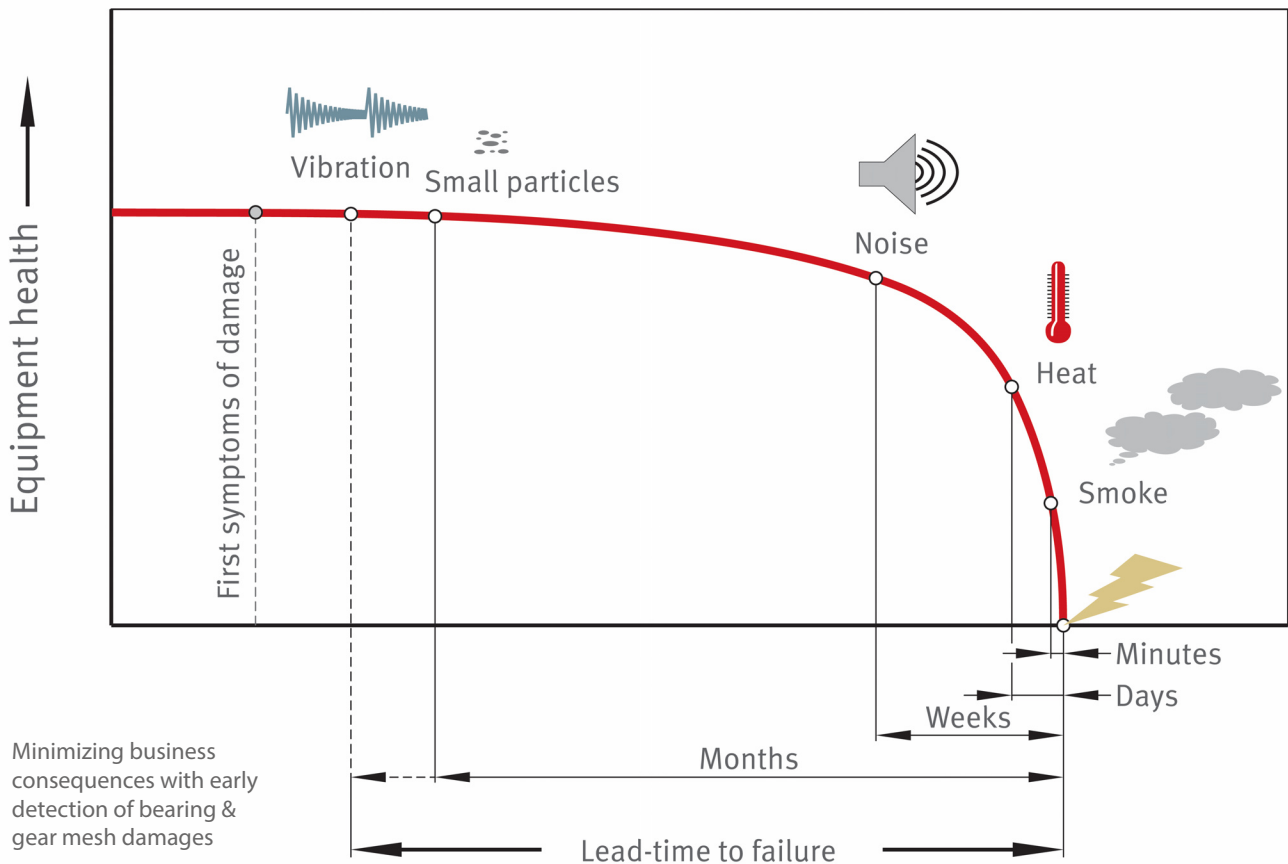
**Offline** condition monitoring, also referred to as manual diagnosis, can be cost-effective, but is often highly time consuming and requires a significant amount of preparation and execution time. In most cases, expert knowledge is required to analyze the data and assess the necessary maintenance measures. A key disadvantage of these solutions is the low log frequency. Manual measurements are usually only performed weekly, or even monthly, which increases the risk of defects going undetected, or of being detected too late.

utilization. CM results are incorporated into the planning of targeted maintenance measures with respect to the actual condition of components, taking account of various parameters. The efficiency of the monitored machine is increased and an overall reduction in downtime costs is achieved. Both handheld and remote CM devices are available. Remote online solutions are gaining popularity quickly as they allow you to monitor the health of your machines from the convenience of your desk or smartphone. And with wireless solutions you can now monitor your entire plant without having to run a single cable.

For **predictive maintenance** now, the current condition of a system is not only considered by means of defect analysis or causal investigation, but also optimized with the aid of accompanying measures. This is intended to further reduce the probability of a future failure in the long term. The measures used can include an analysis of the machine history, special measurements to determine natural frequencies or phase relationships as well as improvements to the operating condition in the form of precision balancing and alignment. Predictive maintenance builds on the findings obtained from condition-based maintenance and optimizes measures and costs.

The combination of around-the-clock vibration-based condition monitoring and predictive

**Online** condition monitoring does the measuring for you. Theoretically, an online measurement can be performed every second, thus reducing the probability of pending damage going undetected. Good online solutions are largely automated and thus help to ensure that maintenance personnel spend the maximum possible amount of time on other, more important tasks. Ideally, they require no expert knowledge. To comprehensively monitor the majority of your machines, wireless solutions are the best choice. Wireless sensors can be easily installed on existing assets.



maintenance measures are the players that have taken industrial maintenance to new heights. Now machines that could not be monitored before, or only infrequently, can be monitored without involving a lot of labor or endangering maintenance personnel. Early fault identification and analysis for literally every imaginable point in your processing plant allow you to take appropriate measures to reduce downtime and optimize your maintenance. It is almost like when a control light on the dashboard of your car indicates it is running low on oil, or that the tire pressure needs to be checked: You are informed of the situation, can assess it and decide if this is an issue that requires your immediate attention, or if it can wait until the next scheduled maintenance interval.

When considering comprehensive monitoring of your entire machine pool, you will encounter machines which operate in a wide variety of applications and are therefore subject to miscellaneous requirements:

### PROCESS RELEVANCE

Continuous monitoring is strongly recommended for machines with high process relevance. Even simple online systems can help to provide continuous feedback on machine conditions. With respect to the possibility of consequential damage, you want to consider systems that offer extensive functions. Route-based manual monitoring is not suitable, as this only provides selective insights into the condition of the machine.

Simple and inexpensive solutions are suitable for less critical machines. In order that the large quantities associated with this machine group can be monitored cost-efficiently, it is particularly important that the solution can be installed, commissioned, and used with considerable ease and speed.

### OPERATING PARAMETERS

Machines with continuous speeds and loads often have a lower process relevance. The large machine number involved makes rapid installation, configuration, and use of the solution

a key feature. The solution should perform most tasks automatically in these applications.

For applications with alternating speeds and loads, the condition monitoring system must be flexible. Numerous interfaces are required for the purpose of exchanging the speed or other information with the machine controller. The measurement tasks can take account of the different operating conditions and thus provide more precise analytical results. The analytical tool should be easy to install, configure, and use.

### AMBIENT CONDITIONS

In potato processing, operating conditions vary considerably depending on what is being produced, ranging from wet, dry and humid to hot and cold and everything in between. From the moment tubers arrive from the farm until they are turned into French fries or potato chips, they pass through numerous production stations. They are exposed to high and low temperatures. They move through the slicing system at

approximately 60 kilometers per hour, meaning machines must perform at record speeds. Furthermore, a processing space can become toxic because of dirt or when the cooling process is disrupted. Careful monitoring must take place to ensure that machine component wear particles and operating fluids do not contaminate any food being produced. If this happens, the cost and impact on profit can be significant, as everything on a production line at that particular time will have to be thrown away. For the varying and, in some cases, harsh ambient conditions involved in such applications, online condition monitoring solutions can prove a viable option. The solution should perform most tasks automatically in these applications.



intelligence. The choice and combination of suitable technologies plays a decisive role in making the solution easy for the user.

**How much expert knowledge is required for efficient condition monitoring?** Thanks to modern IoT solutions, there are user-friendly automated condition monitoring systems available today for which

through self-sufficient learning mode. Automated analysis functions provide easy-to-understand information so you can implement pertinent actions upon components that require them. End user feedback confirms that the application of Schaeffler's modern CM solutions is very intuitive and easy to use, so monitoring components with constant operating conditions, such as motors, pumps and fans, is possible without any specific expertise at all.

### EXAMPLE FROM PRACTICE

A global potato processor was seeking a comprehensive condition monitoring solution that is easy to use and provides early warnings. The manufacturer opted for Schaeffler's cost-effective wireless OPTIME condition monitoring solution. Shortly after the first sensors were installed, numerous faults were displayed on the OPTIME app. Reason: The pre-alarm value on a motor was exceeded and the trend curve increased significantly. It turned out that the purge plug at the fryer air scrubber exhaust fan was loose and leaking oil – The plug was replaced, and the bearing was relubricated. Motors have been running smoothly since. Currently, almost 300 OPTIME CM sensors are monitoring motors, gearboxes, pumps and fans at the customer's plant.

When an acute machine problem occurs that cannot be detected or eliminated by the monitoring mechanisms already in place, you can always turn to an external partner for more in-depth analysis. Experts can provide on-site as well as remote support when you need it, e.g. via troubleshooting or boroscope inspection, depending on the application.

Condition monitoring systems can be complex, which is one of the reasons why in the past comprehensive online vibration-based monitoring has been avoided by many companies. In the majority of plants, vibration condition monitoring is still performed manually in addition to some isolated wired online vibration measurement for the most critical machines. But due to the huge quantity of assets in a processing plant, only a small part of them can actually be monitored this way. As a result, costly unpredicted failures still happen regularly. With today's AI technologies this no longer needs to be the case and experience shows that a clear digital maintenance strategy can reduce the overall maintenance costs considerably. The game changing technologies that make this possible are mainly low power electronics and wireless technologies, platform technologies and artificial

literally no prior knowledge is required. Sensors do all the necessary monitoring for you, alarm thresholds are set and adjusted automatically

Depending on the analytical tool in use, additional expert knowledge may also be required for the continuous monitoring of machines with dynamic process requirements such as alternating loads or rotating directions.

### EXAMPLE FROM PRACTICE

A renowned potato processor was experiencing reoccurring failures of one of their boiler systems. Schaeffler experts recommended fast installation of a wireless OPTIME sensor for condition monitoring. Soon, a damage in one of the electric motor bearings was diagnosed. It turned out that the motor had to be replaced. While the customer acquired a new motor and necessary spare parts, Schaeffler kept an eye on the wear progress to ensure no unplanned shutdown would occur while the motor was still in operation. After replacing the motor, Schaeffler's bearing failure analysis revealed that the initial damage was caused during bearing installation at the repair shop already. The service provider was contacted and a Schaeffler expert provided training on the best practices and right tools for bearing handling, mounting and dismounting. The customer was very satisfied, not only to have found the root cause of the reoccurring failures but also to learn how to prevent them in the future.

The data that is collected by your online monitoring system can be viewed and analyzed by an external partner from afar. You receive regular status reports that keep you informed on the conditions of those machines, are notified in case of unwanted changes in machine statuses and are provided with recommended actions when warranted. This way you have an expert by your side at all times – without him physically having to be on your site.

And of course, you could also become an expert yourself. Obtain training from experts with long-standing experience and become acquainted with the range of simple, automatic, and technically sophisticated solutions. Training opportunities for vibration diagnosis, for instance, start with basic knowledge and can be expanded to certification seminars on various levels according to DIN ISO 18436-2.

Can condition monitoring save money? Yes, it can! In most cases, savings and even return on invest are already achieved following the initial activation of the alarm, simply due to the prevention of consequential damage. Avoided production downtimes constitute additional significant savings. But using modern solutions for remote condition monitoring provides you with an entire array of benefits:

**Better maintenance planning:** No more replacing of spare parts “just to be safe” although they are still working. Early detection of possible failures enables in-time replacement or repair, allowing better planning of maintenance activities and stock keeping.

**Availability of professional resources:** Reduce the time spent on monitoring to a minimum and free up your maintenance team for other, more important tasks.

**Easy and safe access in hard-to-reach places and hazardous areas:** Where manual monitoring is difficult or even endangers your team members, the risk of neglect is high. Checking up on demand, only when indicated in the app on your smartphone, not only saves time and effort, but also increases occupational safety. Maintenance by exception - from a safe distance.

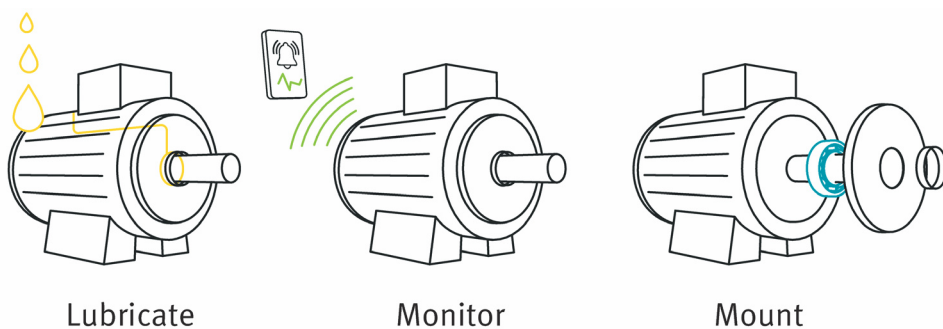
**Agility to changing production requirements:** In food processing, ever changing product expectations and requirements necessitate the regular modification and extension of processes. With wireless condition monitoring, you can switch your production dynamically to different product demands most flexibly and without costly re-arrangement of cables.

## EXAMPLE FROM PRACTICE

A global potato processor installed OPTIME CM sensors in their processing plant. One day, a temperature trend alarm was issued on a barrel washer pump. Also, changes in the vibration spectra were seen. Closer inspection revealed that the oil seals had failed, and the pump had been depleted of oil, causing temperature to rise up to 224°C. Failure of the overheated bearings was imminent. Repair of the equipment could be prepared and a catastrophic failure, which might have also involved a fire inside the plant, could be prevented.

**Decrease CO<sub>2</sub> footprint:** There is a correlation between vibration and power consumption in rotating assets. In case of unbalance, for instance, or when a bearing is insufficiently lubricated, power consumption increases. Condition monitoring helps you keep your machines running smoothly without unnecessary extra friction, thus keeping vibration under control.

**Reduce waste:** Reducing the risk of failure of the recirculation pump of your fryer, for instance, you do not have to worry about having to throw away burned, half-finished products and exchanging the oil in the fryer. You waste less and produce more.



## Solutions, Expert Services and Trainings

Schaeffler Lifetime Solutions offers a comprehensive range of products, services and solutions for industrial maintenance. It is designed to support maintenance professionals over the entire life cycle of a machine, from mounting and alignment tools required during installation, to award-winning condition monitoring technology, to remanufacturing and an ever-expanding selection of lubricants and lubricators. This is coupled with expert services in the form of on- and off-site condition monitoring, troubleshooting, training and more.

The success of a condition monitoring system is primarily dependent on how well the solution is tailored to your requirements. When choosing your partner, look at the continuity and the portfolio range of the solution provider rather than at continuous changing specifications. Pay attention not only to the available hardware and software, but also to the service and training concept, as well as proven experience.

To find out how plants from different industries all over the world are implementing predictive maintenance practices, visit: <https://medias.schaeffler.de/en/success-stories>

# It's all about **POTATO**



## **POTATO PROCESSING INTERNATIONAL**

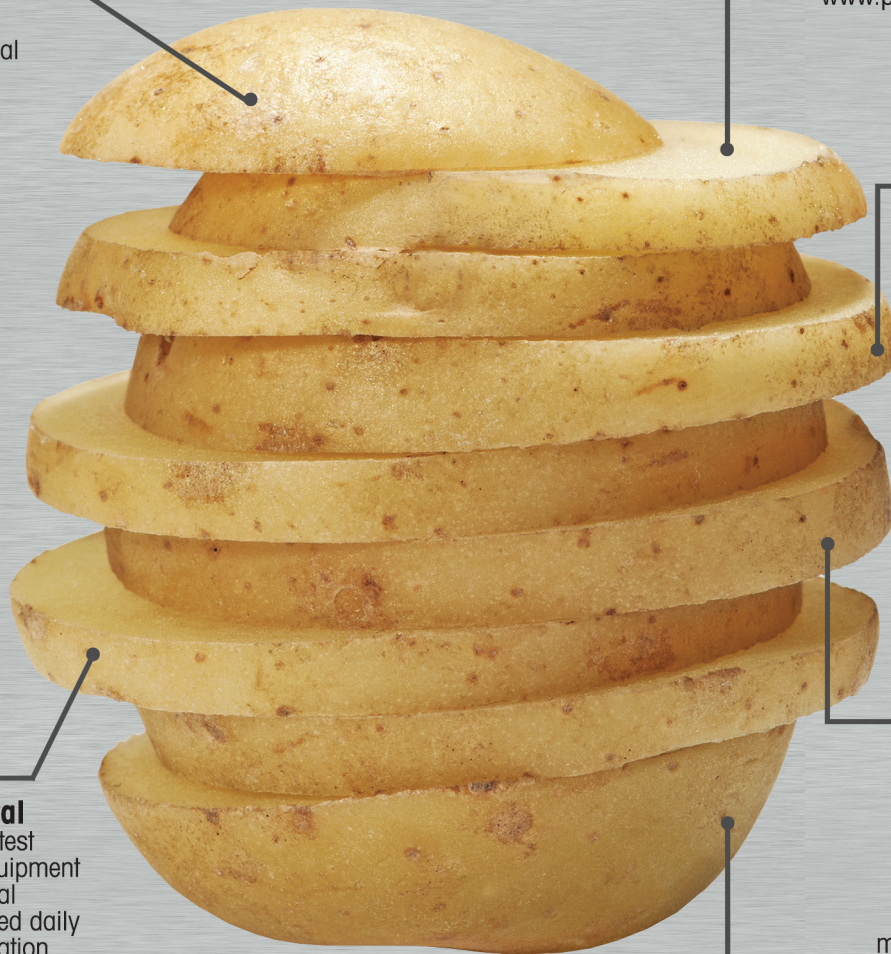
Potato Processing International has been serving the global potato processing industry for 25 years and is regarded as a must-have information source for potato processors, equipments and ingredients manufacturers, as well as players in storage, retail and foodservice.

This business-to-business magazine is published six times per year and continuously strives to be the most comprehensive publication, containing in-depth articles, expert views from some of the most respected companies in the industry, exclusive interviews, as well as news and trends.



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## **POTATO BUSINESS DIGITAL**

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



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# Sustainability Is About the Journey, Not the Destination



Becoming sustainable as a large or small food processor is determined by many factors: reducing costs and carbon footprint, being resilient to market fluctuations and supply chain woes, living up to consumer's expectations about food waste or climate change. It is a business-motivated strategic change and it cannot be done without addressing how the business is organized.

**By Tudor Vintiloiu & Jo Ilie**

**A** sustainable business is an enterprise that operates in a way that minimizes its negative impact on the environment, society, and the economy. It is a business model that strives for long-term success while considering the well-being of future generations. While perfection is a constantly moving target, striving to come closer to this ideal is on everyone's mind. In the potato processing industry, a sustainable business has three main areas of focus: energy - both sourced and spent -, waste reduction, and ingredient sourcing. To ensure future growth - potato processors must continue finding innovative ways to remain competitive and manage the industry's key sustainability challenges. Managing the high cost of energy and increased commodity prices will be critical to maintaining profitability and a competitive edge in the industry. Research and development is driving an evolution of energy efficient food processing equipment and multiple technologies are already available which reduce fuel costs, energy waste, air pollution, and water consumption. Optimizing water use during processing is an area that is critical for sustainability - and cost savings.

#### OPTIMIZING WATER USE DURING PROCESSING

As a natural product, potatoes require a significant amount of water to process. Subsequently water use is a significant cost for potato processors and in some regions, sufficient water supply for processing can also be a concern. The huge amount of water needed to peel, slice, destone and wash potatoes prior to processing contributes to significant water consumption, organic waste, and wastewater volumes globally. But sustainable improvements, which benefit the environment, and the bottom line, are possible - through water recovery. Processing areas of cleaning, starch management, and in some cases blanching, consume significant amounts of water. A potato chip

processing line may use around 20 to 50 m<sup>3</sup>/hr of water and the corresponding amount of wastewater this generates must be disposed of and often after treatment of some kind.

French fry processes also consume large amounts of water for washing, blanching, pumping and cutting of potatoes.

Optimization of water use in the potato processing industry is a key environmental performance indicator and is based on water use ratio. For example, European potato processors use on average 3-8 liters of (fresh) water per kg of finished potato product. This ratio varies based on the type of final potato product, packaging material used, processing requirements for specific products, efficiency of the operation and water volume reused for processing after purification.

Members of the European Potato Processors Association (EUPPA) are currently leading the industry with their serious efforts to significantly reduce direct water use. All members are harnessing technology to conserve and reuse water by re-using and recycling water (to some extent) in their own processing facilities where possible. Water recovery is an excellent solution for processors globally, and particularly for those in areas of the world where water supply is a problem. However, even where water is plentiful - it can be expensive to buy and dispose of, so there are always benefits to reducing water use.

Water for processing is typically recycled and reused to wash soil from incoming lots of raw potatoes, while complying with legal requirements. Re-using and recycling water does not impact any food safety and product quality and complies with all applicable regulations.

#### HEAT RECOVERY

The energy used for processes such as frying is normally lost in the exhaust gasses in a percentage as high as 25%. For industrial companies it is not easy to determine which options they



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have to recover heat from their processes. Often corrosion and fouling problems make additional heat recovery from flue gas and exhaust air even more difficult. Heat recovery can be used in different ways, the most obvious one being by directing the recovered heat to the next production stage. A less obvious way of using energy resources responsibly and sustainably comes from Suikerpark, which is a neighborhood in Veurne, Belgium that is part of an innovative project that repurposes heat from a local PepsiCo's snacks plant and transforms it into sustainable energy. The Veurne site releases heat vapors as a byproduct of cooking and baking. When real estate developer Ion wanted to find inventive environmental solutions for Suikerpark, PepsiCo proposed an idea: What if some of the heat released during the process of making snacks could be put to use? "Using a condenser, we capture the vapors from cooking and heat a water circuit from 50°C up to 80°C," explains Frank De Clercq, Maintenance and Sustainability Manager at the Veurne snacks plant. From there, the heated water is transported to the houses at Suikerpark, where it flows through the central heating system into radiators and hot water taps. The first homes have been warmed with the technology starting in 2022. The



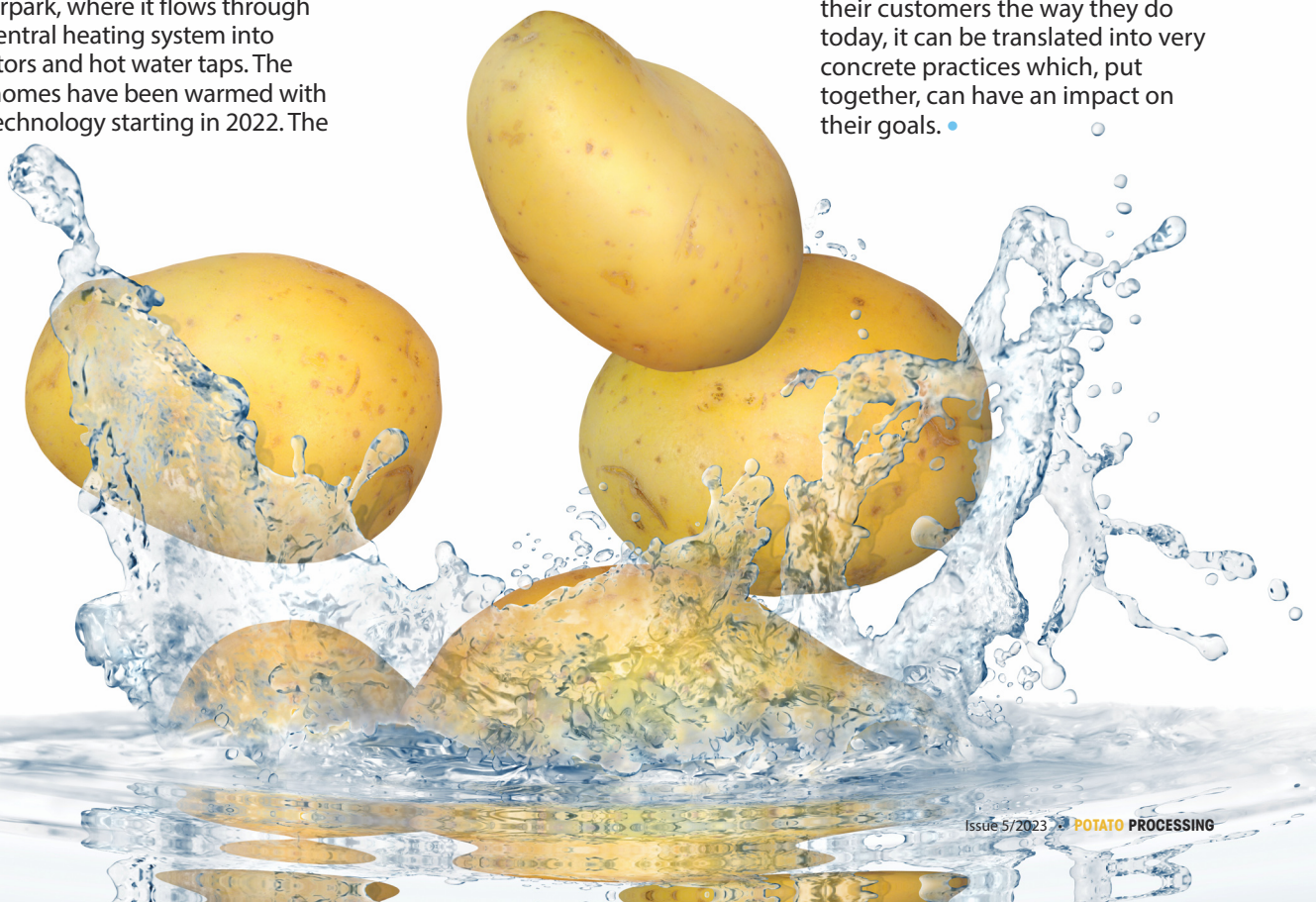
heat generated at the Veurne plant helps reach net zero emissions and replaces heat that would normally be sourced by burning natural gas," De Clercq explains.

For smaller factories, switching to green energy or investing in cutting-edge technology might not be as easy and within reach as it is for the big companies, but that doesn't mean management can't evaluate the production process and improve practices and policies where there is proof that energy is wasted in a preventable way. For them, a good sustainability practice is to build a local supply chain whenever possible.

### SHAPING THE FUTURE

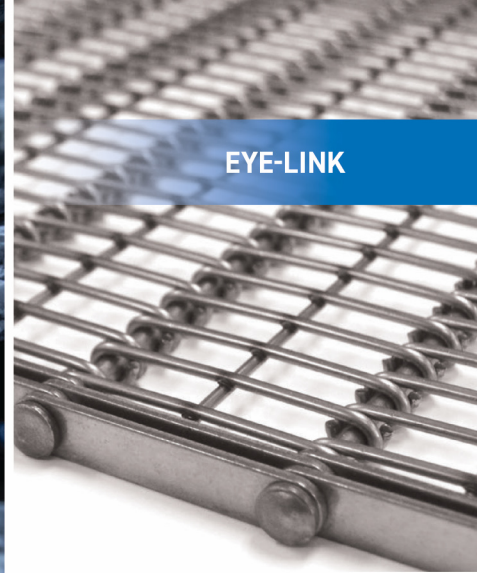
Over the next years, the demand for high quality, safe, nutritious processed food will continue to

increase as the global population and affluence surges. This will impose an enormous burden on the environment, which in turn, will put pressure on food processing equipment manufacturers to respond by making progress in creating solutions aimed at reducing the carbon and water footprints of products and the amount of waste generated. In addition, processors should aim toward using renewable energy or process waste to produce energy, something that creates demand for appropriate technology. Sustainability is a word that pops up everywhere these days and it might seem sometimes that it has lost its meaning. But for businesses that want to contribute to a better world, one in which they can continue to do their jobs and serve their customers the way they do today, it can be translated into very concrete practices which, put together, can have an impact on their goals. •





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# APAC Potato Processing Market on the Rise

The Asia Pacific (APAC) has the largest market for potato processing in the world and it is also the fastest-growing region in the world.

By **Ionel Vaduva**

Its high growth can be attributed to factors such as its huge consumer base and large production quantities of potatoes in developing parts of the region such as China and India. Factors such as the expansion of the fast-food industry are expected to drive the market growth in the region going further. Geographically, the APAC potato processing market accounted for the highest revenue share last year, and it is poised to dominate the market over the period 2022-2027 owing to factors such as high fresh potato production, rapid recovery of the food-service industry, and increasing consumer spending on ready to cook meals owing to COVID-19 restrictions.

In fact, in the next five years, according to experts, the APAC potato processing market should reach USD8.94bn and is estimated to reach USD13bn by 2027. This forecast is a decrease, compared to the growth of about 11.76% per year, registered in the 2015-2019 period.

On the other hand, Market Research analysts show in their latest report that the processed potatoes market in APAC was equal to USD3.73bn (calculated in retail prices) in 2015. By 2025, the processed potatoes market in this region is forecast to reach USD8.55bn (in retail prices), thus increasing at a CAGR of 6.34% yearly for the period 2020-2024. The average consumption per capita

in value terms reached USD3.16 per capita (in retail prices) in 2015. Over the next five years, it grew at a CAGR of 6.48% yearly. In the medium term (by 2025), the indicator is forecast to slow down its growth and increase at a CAGR of 4.50% yearly.

## PROCESSING POTATO TRENDS

The market for potato processing is also experiencing significant growth due to the many technological advancements in the sector. These new technologies have allowed potato processing businesses to increase productivity, decrease waste, and create new and inventive products, like flavored fries. Additionally, these developments





have improved product quality control for potato processors, allowing them to guarantee that every batch of potatoes is processed uniformly and following high standards for quality and safety. In addition, ongoing research and development regarding processed potato quality measurements or processing control are expected to create an opportunity for the market to grow in the future.

Thus, the Asia-Pacific potato processing market is significantly impacted by technological advancements because they enable manufacturers to operate more effectively, save money, and seize new opportunities. The development of novel potato products that meet shifting consumer preferences has also been facilitated by the adoption of new processing techniques like high-pressure processing and microwave drying.

#### **APAC'S FROZEN POTATO MARKET**

The APAC frozen potato market was valued at USD12,18bn in 2019 and is projected to reach USD16,91bn by 2027; it is expected to grow at a CAGR of 4.3% from 2020 to 2027, according to the same research company. In terms of volume, the region is expected to reach a consumption volume of 12,596.34 KT in 2028, registering the fastest-growing CAGR over the forecast period. The factors propelling this growth include

growing urbanization, improving lifestyles of people, rising per capita income, and increasing demand for convenience food. Moreover, the growing popularity of frozen potatoes across countries such as Japan, India, and China is also driving the regional market.

In the Asia-Pacific region, potato is grown on about 7.3 million ha, producing about 121.7 million MT of potatoes with average productivity of 16.49 MT/ha. The contribution of the Asia-Pacific region to the world area and production of potatoes is 39.3% and 37.7%, respectively.

#### **FRESH POTATO MARKET TO GROW IN 2021-2031 PERIOD**

When it comes to fresh potatoes, various industry players are increasingly focusing on establishing successful collaborations, acquisitions, and joint venture activities to enhance their respective customer bases. These players are also growing their supply capabilities to meet customer requirements on a local and global scale. This factor, paired with promising industrialization prospects in developing economies of the APAC region, such as China, India, Taiwan, Indonesia, etc., are expected to create massive business opportunities for key players over the 2021-2031 period. APAC is poised to hold a significant share of the global fresh potatoes market. The region is also expected

to register the highest growth rates over the forecast period. The increasing population and growing food industry in developed and developing economies in the region will increase the demand for fresh potatoes. The robust growth of food processing is also likely to provide lucrative opportunities for the development of the market. Potato can be found in many diets today, but in the Asia-Pacific region, consumption varies significantly from country to country. In China and India, potato constitutes a kind of staple food, while in the other countries, consumption stands at much lower levels. Therefore, the market for potatoes in the APAC depends on mostly the population growth in China and India, as well as the increase in their incomes, which together would lead to an increase in the volume of potatoes consumed.

The economies of the key countries of the region - China and India - are projected to face steady growth, thereby continuing to be a key driver for global economic growth. The population of the APAC is also predicted to grow gradually, according to the UN forecast, thereby demanding more food products and potatoes among others. That's why driven by increasing demand for potatoes in APAC, the market is expected to continue an upward consumption trend over the next seven years. •

# Shaping Up For the Future



Jonathan  
Thomas


Extrusion technology is one of the most established and widely used techniques used within the global food processing industry. It encompasses the compression of food products through tiny openings in a holed die or plate using single or a sequence of screws, after which they are cut to a pre-determined size via the use of blades. They are then baked at high temperatures, prior to being enclosed within a container.

**by Jonathan Thomas**

**A**lthough food extrusion was originally used for processing foods such as fruit, vegetables and grains, its use has spread to include snack foods, breakfast cereals, bread, biscuits, croutons, some varieties of pasta products,

textured vegetable protein, confectionery, dried pet foods, baby foods and beverages. Its popularity has been boosted by the fact that it has come to be seen as an eco-friendly and energy efficient food processing method, reducing cooking times and creating a more

compact process than other types of manufacturing. It is also capable of eliminating potentially harmful microbial organisms, given that the cooking process takes place at high temperatures. The food industry uses both cold and hot extrusion processes. The



cold extrusion process is used to gently mix and shape dough without direct heating or cooking with the extruder and is primarily used in the manufacture of food products such as pasta. Meanwhile, hot extrusion technology is used to transform the raw materials via the use of high temperature conditions. It is this process which is mostly used in the manufacture of extruded snack foods. The extruding systems typically used in the manufacture of potato-based snacks can also be classified according to their pressure rating. These include high-pressure systems (which typically operate in the 2,800 psi range), medium-pressure systems (which operate in the 1,200 psi range) and low-pressure systems, which operate in the 150 psi range. Extrusion technology continues to develop in response to changing market demands and conditions. After the extrusion process, snack pellets are dried to stabilize moisture content and then expanded. A variety of choices exist for the expansion process, ranging from deep oil or fat frying (which involves immersion of the products in hot oil and offers a relatively

short cooking time of under a minute) to expansion using hot air (which can help to reduce oil content of the finished product) and microwave heating. Manufacturers of extruded snacks mostly use either single-screw or twin-screw technology. Single-screw extruders tend to be lower in cost and therefore more affordable, mostly because they feature a simpler design and do not offer the same type of capabilities as twin-screw extruders – for example, they do not provide the same quality in terms of mixing and heat transfer. However, they are easier and less costly to maintain for operators. Twin-screw extruders are becoming more widespread within the food processing industry, as companies seek to diversify their product range and enhance quality levels for their foods. Although they represent a higher capital investment, twin-screw extruders are a better proposition for the manufacture of snack foods in a range of different shapes, sizes and designs. The co-rotating screws provide a better heat transfer during the process, as well as allowing operators to add various ingredients to the mixture to

improve or enhance their quality levels in terms of taste and/or nutritional profile – typical examples have included fruits, vegetables, protein, fiber, vitamins and ancient grains. Other advantages offered by twin-screw extruders include the following:

- Greater productivity – as twin-screw extruders are more adaptable than their single-screw equivalents, they can handle a wider range of raw materials and recipes. Furthermore, they do not experience a fall in performance when the screws wear out.
- Improved mixing – the components of twin-screw extruders allow a more precise modification of the amount of shearing or mixing, enabling greater control over the quality and strength of the mixing process.
- Greater flexibility – this is due to their ability to handle a range of processing operations simultaneously, such as cooking, mixing, chilling, heating and melting. In contrast, single-screw extruders are hampered by their reliance on capacity and spin rate.
- More precise control of temperature.



- Efficient heat transfer via the connective screws.

According to latest data from Precedence Research, the global market for food extrusion technology was worth over USD76bn in 2021. Between 2022 and 2030, annual growth in market value is forecast to average around 4%, reaching USD110.7bn. Europe has the largest regional market, accounting for 45% of global sales in 2021. Savory snack applications account for the largest sector of the global food extrusion technology market, ahead of breakfast cereals. From a supply perspective, the global market for extrusion equipment used for snack pellets is wide and diverse. In the US, American Extrusion International claims leadership of the global market for equipment used in the manufacture of snack foods. Based in Illinois, the company's customer base numbers over 600 firms, spread across more than 100 countries. Its range includes single-screw and rotary head extruders, which offer a variety of die shape possibilities – examples for snack foods include balls, curls, stars, tubes and pinwheels.

Another US-based producer of extruded snack technology is Reading Bakery Systems, which supplies a worldwide customer base. Operating manufacturing facilities in both the US and China, its product range includes both high-pressure and low-pressure extruders, as well as sheeters and rotary molders. The

company's extrusion equipment is used in the manufacture of a wide range of snacks, examples of which include fried potato ring systems, as well as stackable chips, pretzels and popped snacks. Hourly output for its low-pressure snack food extruder is between 200kg and 1,000kg. Other companies present in the market include the German-based firm GEA Group, which has revenue worth over EUR5.16bn in the last financial year, as well as an order intake of more than 5.67 billion. Its extruder equipment (which appears under the xTru brand) can produce snack pellets using potato derivatives, cereal flours and various other vegetables, such as legumes. Also present within the market for twin-screw extrusion technology is the UK-based company Baker Perkins. The company's range includes the SBX Master, which is used in the manufacture of extruded and filled snacks, including both shaped and premium varieties.

### MARKET SIZE & TRENDS

According to data from IMARC Group, the global market for extruded snacks was worth more than USD49bn in 2022. During the period leading up to 2028, global market value is expected to increase by an annual average of around 4%, reaching over

USD62bn. Much of this growth is likely to result from growing worldwide demand for ready-to-eat snacks due to their convenience and versatility, as well as the emergence of more products featuring innovative taste profiles and textures. The world's largest regional markets are Asia-Pacific, North America and Europe. Extruded snacks are manufactured using ingredients such as potatoes, rice, wheat flour, tapioca, corn and various pulses. Although the potato-based products sector remains the market's largest, some of the recent growth has been most apparent for extruded snacks made from wheat flour and tapioca, mostly for their superior health profiles (e.g. being high in dietary fibers). Elsewhere, the growing popularity of plant-based diets in regions such as Europe and North America has increased consumer interest in extruded snacks made from lentils and beans, which are recognized as a good source of fiber and protein.

At present, however, many manufacturers of extruded snacks are experiencing shortages of raw materials such as potatoes, corn and tapioca. It has been estimated, for example, that the amount of land used to grow potatoes will suffer a 10% drop during 2023, which could in turn lead to a 10%

reduction in the annual global harvest. This follows on from the historically low harvest experienced in 2022, which was caused by drought conditions across parts of the world and reduced plantings by farmers. Extruded snack manufacturers are therefore struggling to meet the increased demand caused by this reduced availability of raw materials, with the rising costs impacting upon their profit margins.

Extruded snacks are most often produced using either single-screw or twin-screw extrusion technology. Although the former has dominated the category in the past, recent growth has been higher for the twin-screw sector for various reasons, not least the greater desire amongst manufacturers to provide higher quality and more complex products to satisfy today's increasingly demanding customers. Twin-screw systems are better positioned to produce the variety of shapes, sizes and formats sought in the current marketplace, as well as offering greater levels of productivity due to faster processing and quicker changeover times. On a broader level, potato-based products represent one of the major sectors within the global market for snack foods, where they compete against alternatives such as chocolate, confectionery, biscuits, cakes, pastries and fruit-based snacks. Penetration of snack foods amongst the global population remains high – in the US, for example, research from the International Food Information Council (IFIC) found that 73% of consumers claimed to snack at least once a day during 2022. Separate data from YouGov found that 65%

of US consumers often snack between meals, a figure which decreases to 58% for the UK, 44% in Germany and 30% in France. According to the latest edition of Mondelez's State of Snacking report (which surveyed the opinions of consumers in 12 countries and was published early in 2023), 71% of consumers snack at least once a day, with the snacking habit most deeply ingrained amongst the younger age groups. Despite the rising cost of living, 75% of people always find room in their budgets for snack foods, a figure that increases to 80% for millennials. This is largely because snacking is often seen as comforting – the research found that 60% of consumers believed that snacking helped them to take their minds off the many issues facing the world at present.

### SNACKS AS MEAL REPLACERS

More consumers now appear to be turning towards snacks as alternatives to the traditional meals. Much of this can be attributed to the adoption of busier lifestyles in the post-pandemic world, with people working longer hours and spending less time in the company of their families. According to the Mondelez research, the percentage of consumers skipping at least one main meal a day grew from 30% in 2013 to 40% in 2021, during which time the frequency of snacking in the morning has increased significantly. In 2022, over 60% of consumers claimed to eat snacks for breakfast (up from 50% two years earlier), while a similar percentage turned to snack foods as an option for both lunch and the evening meal. With 64% of

consumers preferring to eat many small meals during a typical day (rather than three large ones), the snacking habit appears unlikely to diminish as far as eating patterns are concerned.

Some of the key findings from the latest version of the US Summer Snack Index released by Frito-Lay and Quaker include the importance of packaging, together with a desire for products suitable for sharing occasions. The research, which was released in May 2023, found that 79% of US consumers are more likely to purchase conveniently packaged snacks, while 52% expressed a preference for individually packaged snacks. Furthermore, 63% described ease of sharing as a key attribute when seeking out food and snacks. The research also highlighted that parents purchasing snacks for their children are drawn to products offering variety, convenience and interesting flavors.

These research findings suggest that global demand for extruded potato-based snacks should remain at reasonably high levels over the coming years. More moderate growth appears to have returned to the global snack foods market after the surge in demand experienced during the pandemic, when in-home snacking increased amongst bored housebound consumers seeking treats or other food-based sources of escapism. While health concerns are expected to remain as high as ever, manufacturers will also come under greater pressure to develop a wider range of potato-based snacks catering towards more demanding consumers, incorporating new flavors, shapes and textures. •

## *Solving the Sodium Dilemma:*



# Strategies for Lower Sodium Potato Products

The drive to reduce sodium content in processed potato products is largely driven by increasing consumer awareness of the health risks associated with excessive sodium intake. Potato processors, in response, are seeking innovative ways to meet these demands without compromising taste and product quality.

**By Tudor Vintiloiu**

**A**pproximately 90% of Americans consume more than the 2,300 mg of sodium recommended daily; therefore, the Food and Drug Administration (FDA) has recommended short- and long-term sodium reduction goals in food products. Chips producers have mostly been wary of committing to this path since there can be consumer rejection of salt-reducing strategies, particularly when these strategies noticeably alter the taste, texture, or overall sensory experience of the potato products. Some consumers have developed a preference for the traditional taste of potato chips or other potato-based snacks, which are often associated with a certain level of saltiness. When manufacturers significantly reduce sodium content without effectively



compensating for the loss of salt flavor, consumers may perceive the products as bland or unsatisfying. Recent studies suggest the overall liking of reduced sodium potato chips could be improved with the addition of flavor enhancers. Moreover, reduced sodium product liking can be maintained or improved when paired with ingredient labeling and sodium reduction education.

## FLAVOR ENHANCERS

Incorporating natural flavor enhancers is a proven method for reducing sodium content while preserving taste. Ingredients like herbs, spices, and umami-rich components can impart a savory flavor profile, compensating for the reduction in salt. Processors can experiment with these enhancers to strike the right balance and maintain product palatability. A gradual reduction in sodium content can also be achieved through salt blending. This approach involves mixing reduced-sodium salt with standard salt, with the proportion of regular salt diminishing over time. The gradual transition allows consumers to adapt to the taste change, minimizing the risk of product rejection.

## COATING TECHNOLOGIES

Applying a thin salt coating to potato products post-processing is another effective method for sodium reduction. This coating not only ensures an even distribution of seasoning but also allows for precise control of sodium levels.

Manufacturers can adjust the coating thickness to meet specific sodium targets while maintaining product appearance and texture. In certain scenarios, ion exchange resins can be utilized to selectively remove sodium ions from the seasoning blend before application to the potato products. This process effectively reduces the overall sodium content while preserving the desired flavor profile. Careful monitoring of resin performance is essential to maintain consistent product quality. Reevaluating the ingredients used in seasonings can make a significant impact on sodium reduction. Processors can opt for alternative salt sources with lower sodium content, such as potassium chloride. However, it's essential to consider the potential bitterness associated with potassium chloride and implement strategies to mitigate this taste issue.

## CONSUMER EDUCATION

Transparent labeling and informative marketing campaigns are crucial for managing consumer expectations during the transition to lower-sodium products. Communicating the health benefits and flavor innovations associated with reduced-sodium options can foster consumer acceptance. Employing sensory analysis techniques allows potato processors to fine-tune product formulations. Sensory panels can provide valuable feedback on taste, texture, and overall consumer acceptance, helping processors make informed decisions regarding sodium reduction strategies.

## LIMITS AND REGULATIONS

"Most people in the U.S. consume too much sodium. The majority of sodium consumed comes from processed, packaged and prepared foods, not from salt people add to their food when cooking or eating," said Susan Mayne, the director of FDA's food safety and nutrition division. Earlier this year, the FDA issued a proposed rule to change the standards of identity (SOIs) for foods that include salt. The proposed rule

would permit the use of safe and suitable salt substitutes while giving industry more flexibility in reducing sodium levels in foods and beverages, according to the FDA. Standards of identity typically describe what a certain food must contain and what ingredients are optional, according to the FDA. Some also prescribe a method of production or formulation. More than 250 SOIs exist in the United States, but most of them currently do not permit the use of salt substitutes in place of salt.

The proposed rule would use a "horizontal" approach to updating SOIs, which means it would affect multiple SOIs and apply across various foods and food categories. "Today's action is another step forward in our efforts to improve nutrition and reduce chronic disease by providing manufacturers another tool to lower the use of sodium in food production," said Robert M. Califf, MD, FDA commissioner. "This approach may help reduce Americans' sodium intake and lower their risk of hypertension, a leading cause of heart disease and stroke." The proposed rule would not list specific salt substitutes. Instead, it would cover ingredients or combinations of ingredients used as salt substitutes. The proposed rule defines salt substitutes as safe and suitable ingredients, or a combination of ingredients, used to replace some or all of the salt in a standardized food.

## FUTURE OUTLOOK

It is undeniable that achieving lower sodium content in potato processed products is a multifaceted challenge that demands a combination of technical expertise, innovative ingredient selection, and consumer engagement. Potato processors must carefully assess their specific production processes and consumer preferences to determine the most suitable sodium reduction methods. By adopting a holistic approach that balances health-conscious consumer demands with flavor preservation, potato processors can navigate the path towards lower sodium content while maintaining their competitive edge in the market. •



# Putting on a Show at Potato Europe 2023

The successful conclusion of PotatoEurope 2023, which took place on September 6 and 7 in sunny Kain (Tournai), included almost 10,000 visitors from all over the world and exhibitors who could reflect on a wealth of beneficial encounters.

By Tudor Vintiloiu

**R**egarding attendance figures, the organizers are especially happy that PotatoEurope has established itself as a regular fixture in the potato industry, with almost 10,000 people attending each of the last three Belgian editions in a row: in 2015, there were 9,520 visitors, a number that increased to 10,683 in 2019, and this year, the organizers were happy to welcome another 10,089 professionals. "The main strength of this event is that it is a highly international trade fair both in terms of exhibitors and visitors. The number of foreign visitors rose to 33% (25% in 2015 and 27% in 2019), representing over 50 different

countries. The 208 exhibitors (225 in 2019) from 16 countries appeared to be generally satisfied to very satisfied. What appealed to them the most? Firstly, the visitor profile, which revealed that every attendee is professionally active with some aspect or the other of the potato chain, as well as the wide range of exhibitors representing the entire chain. Secondly, one of the strongest assets of this event is that the exhibitors can reach a very international audience. As a result, even local players get the opportunity to expand their field of activity," according to a recent press release. The harvesting demonstrations all

went down without a hitch. Despite the dry conditions on the demo days, the harvesters had a great operating surface thanks to the rain a few days previously. The guests were able to obtain a thorough understanding of the 12 machines' capabilities and differences thanks to a net harvesting area of around 20 hectares. There was a lot of curiosity in the five loading lines as well. The ever-expanding alternatives for cleaning and classifying the product drew a lot of attention. "The organizers were satisfied to see that there was also ample interest in the demos of alternative haulm desiccation

methods and mechanical weed control. The increasingly urgent social pressure on our sector to work more sustainably is causing more and more farmers to realize that other techniques are needed. During PotatoEurope 2023, they were able to see some of these techniques in action and compare their results," the PotatoEurope 2023 organizers mentioned. Although less consistent across the four fields used, crop yield was higher than during the previous iteration. This was mostly caused by the unfavorable weather during planting in the spring and the subsequent severe drought. Challenger and Fontane seed potatoes were utilized, just like in 2019. The 24 harvested potato hectares produced an average yield of more than 50 tonnes/hectare. On the eve of the event, PotatoEurope 2023 was officially opened with a 'Kick Off' event at the Tournai City Hall. About 150 guests attentively followed some fascinating talks on the future of potato cultivation in the Euro-region, innovation in the machinery sector, and the potato sector viewed through an American lens. The evening ended with a reception serving refined, high-quality potato dishes. PotatoEurope was organized by Fedagrim, but the success of this edition is attributed to the special cooperation of their partners ILVO, CRA-W, CARAH, FIWAP, and PCA. The next edition of PotatoEurope will take place in Villers-Saint-Christophe, France on 11 and 12 September 2024. You can find more information about this at [www.potatoeurope.fr](http://www.potatoeurope.fr).

#### EXHIBITOR HIGHLIGHTS

Visitors at **Tomra's** booth were the first to see in action the latest-generation Tomra 3A sorting machine. Already one of the most effective sorters of foreign material for potatoes at harvest and out-of-storage, the Tomra 3A now takes sorting and product classification to even higher levels of accuracy by utilizing advanced AI. The Tomra 3A is an optical sorter with dual functionality. It



removes foreign materials from the crop before storage and classifies the potatoes by size after storage. It can be used as a standalone solution or integrated into mobile trans-loaders or mechanical crop cleaners. Now that AI is embedded in the Tomra 3A's image processing, it evaluates pixels in a more sophisticated way when assessing objects passing down the line, seeing how pixels are shaped against each other, and looking at a cluster or an object as a whole before classifying and sorting. This makes it even better at distinguishing between potatoes and dirt clods or lumps, which other machines incorrectly see as potatoes. The Tomra 3A's effectiveness is matched by speed: it detects and ejects up to 90% or more of all foreign materials – such as rocks, stones, soil clods, wood, bone, plastic, glass, metal, and rubber – while handling up to 100 tons of potatoes per hour. By scanning objects with near-infrared, the Tomra 3A also removes green potatoes. Introducing AI has also improved Tomra 3A's ability to classify the product. Extensive validation tests have shown that, depending on flow, it can measure potatoes by width and length with 95.3% overall efficiency, output, and connectivity. "This machine was already best-in-class, and now it's even better. It

delivers cleaner potatoes and higher yields while reducing dependence on manual labor at times of labor scarcity. It's also easy





to use, clean, and maintain. PotatoEurope was a good opportunity to demonstrate this machine's remarkable capabilities," Marco Colombo, Tomra's Global Category Director for Potatoes, said. Also on display at the trade show was the I-CropVision, the modular version of the CropVision, which could be previewed at the **DOWNS** stand. The I-CropVision, which incorporates the same technology and offers the same benefits as the CropVision, has been added to DOWNS's line of optical potato sorters. According to the company, all potato producers can now benefit from CropVision's unique performance by integrating the I-CropVision free-standing device into existing installations.

The I-CropVision, as an independent version of the CropVision, has the advantage of being able to be integrated into existing installations regardless of manufacturer, location, or year of manufacture. All potato growers can now reap the benefits of this one-of-a-kind optical sorter. This new format is quite adaptable. It can be installed in an existing COMBI grader during harvest, behind a box tipper for shipping potatoes, or in the center of a size or packing line. It will find a home with any producer because it is completely autonomous. The I-CropVision employs the same time-tested technology as the CropVision, namely an Artificial Intelligence system that classifies all potatoes (green, chopped, deformed, rotten, and so on) as well as garbage. The product is driven to one of three outputs by double-effect ejector fingers: good product, second quality, or waste. "When global potato consumption is increasing by 4.5% per year and lack of labor is continuously increasing, the I-CropVision optical potato sorter is becoming an essential tool for all potato growers," Damien Dubrulle, Managing Director, explained. In the field of potato breeding and seed development, **Solynta** has highlighted their revolutionary Hybrid True Potato Seed (HTPS) which is a perfect example of the numerous possibilities and advantages it brings to the world of potato cultivation and production. "Our new robust hybrid potato varieties grown from true potato seed offer many advantages for potato growers," said a recent company announcement. According to Charles Miller, Solynta's Director for Strategic Alliances and Development, the company's hybrid potato breeding is transforming the potato industry by leveraging hybrid breeding to produce resilient new potato varieties that start from hybrid true potato seeds (HTPS). "To enable this change, we must encourage industry-wide collaboration, science-based regulations, and accessible

resources and education," Miller summed up.

Also present at Potato Europe, **ILVO** has demonstrated how drones using cameras and artificial intelligence (AI) can effectively help with early disease detection. In a potato field, beetle populations start at a certain location. Determining that location early allows farmers to control the pest in time. That knowledge allows farmers to take targeted control measures and treat very precisely. Drones and AI can detect not only Colorado potato beetles, but also other pests, weeds and diseases. For example, hyperspectral sensors can detect *Phytophthora* and *Alternaria* before they are visible to the naked eye. These early observations contribute to more effective spraying.

The Diagnostic Centre for Plants at ILVO presented at the fair innovative methods to quickly and accurately detect potato diseases. "Innovative techniques allow us to make accurate diagnoses in the lab or on site in the field. Using RNA & DNA sequencing, we can determine exactly what disease is present. There are also tests for farmers to perform their own analyses in the field," the company explained. The tests for farmers can be compared to the self-tests for COVID-19 and can be used to verify what the farmer perceives visually. The DCP is the place to go for examination of diseased plants and for detection of pests in soil, water and stock commodities, among other things. •





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# Potato Handling Equipment for Efficient Crop Movement

When it comes to storage management, the seamless handling of crops is essential to ensure the preservation of quality and efficient distribution. Potatoes stand as a staple crop with year-round demand, necessitating a meticulous approach to their handling within storage facilities.

By Tudor Vintiloiu

**T**o meet the demands of this critical task, storage managers rely on specialized equipment designed for the precise handling of potatoes - from unloading them upon arrival to sorting and grading for quality control.

### POTATO UNLOADERS

The process commences with the unloading of bulk potato deliveries from transport vehicles, primarily trucks and trailers. Potato unloaders are specialized machines crafted to facilitate the smooth and damage-free transfer of potatoes from the transport vehicle into storage bins or conveyor systems. This equipment often employs conveyor belts, chains, or augers to ensure a gentle yet efficient transfer of potatoes, minimizing any potential damage to the crop. Traditionally, potatoes are picked up by hand and carried in baskets or bags to bulk storage areas

in potato production environments that lack or have limited mechanization. Tubers for trade, long-distance transport, and/or long-term storage or processing are picked up by hand and handled in bags in semi-mechanized settings where part of the operations is manual, such as planting and hoeing. The spuds are stored in bulk or pallet boxes of 1 or 1.5 tons in fully mechanized potato settings. The fully automatic harvester either discharges the lifted tubers directly into a trailer that continuously follows the harvester or is equipped with a 3-15 ton hopper that is emptied into a trailer regularly. The taters are transported to the store on a trailer with a capacity of 10-30 tons, where they are emptied into a feed hopper with the same capacity, which acts as a buffer. To remove soil and clods, the hopper exit is equipped with a set of cleaning fluted rollers with adjustable distances.

Where growers choose a first grading operation into two sizes (the grades are stored in separate compartments), a conveyor belt empties them into a telescopic bulk piler swinging. Its movements ensure that no soil cones form while depositing, obstructing an even flow of ventilation air and that the dropping height never exceeds a certain distance, e.g. one meter. All machine speeds and angles are set manually or remotely, with the storekeeper using a handheld device. Some conveyor belts, particularly those used to fill boxes, have a nodding tip to reduce the drop height. When pallet boxes or large bags are used, the feed hopper empties into a conveyor belt connected to a box filler (dipping elevator). Optionally, the harvester's hopper discharges into a pallet box at the field, which is then transported to the store. A cascading mechanism is used to reduce the drop height when using

large bags with a capacity of around one ton. All systems should take into account costs, speed of operations, drop height, and, as a result, tuber damage and the distribution of tubers and loose soil.

### CONVEYOR SYSTEMS

Conveyor systems serve as the workhorses of potato handling equipment, underpinning the seamless movement of potatoes within storage facilities. Their flexibility and versatility cater to the transportation of potatoes from one processing stage to another. These conveyor systems come in various configurations, including belt conveyors, chain conveyors, and screw conveyors, each tailored to specific operational requirements. Their design and material composition are optimized to withstand the demands of potato handling, ensuring durability and reliability.

One example is the most recent double conveyor belt generation from AVR, which is called the Python. Due to characteristics like the moving elevated edges, this dual conveyor has a high capacity and is very potato-friendly. Additionally, the AVR Python is incredibly portable and simple to use.

Python is the perfect partner for crop handling because it is quick, product-friendly, adaptable, and simple to operate.

The AVR twin conveyor is characterized by a stable, strong frame that also provides a high degree of maneuverability. "The machine has been designed to allow both conveyors to be positioned at all possible angles relative to each other. Thanks to the independent height adjustment of the product intake and discharge outlets and the electronic length adjustment, the Python can be installed in every position on the line," according to a recent press release. The machine can be transported by just one person thanks to a tandem structure with four casters and primary wheels that can rotate 360 degrees. Conveyor belts are cleverly designed with raised edges so that the product never makes contact with the metal frame components, ensuring a very gentle product flow. Drop heights are

kept to an absolute minimum thanks to a completely adjustable transition between the first and second conveyor belts and a drum with a maximum diameter of 160 mm. The ultimate result is a conveyor system that is very product-friendly.

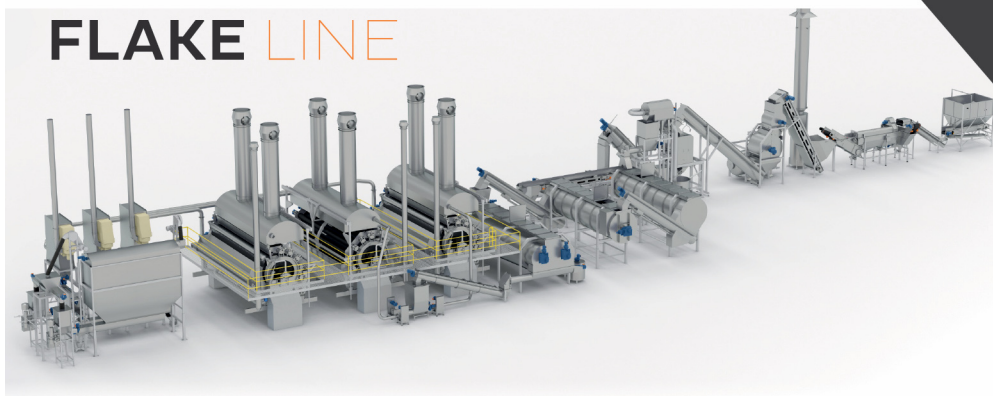
Additionally, the elevated edges form a trough to allow for the safe transportation of huge quantities. The Python also lends itself nicely to hand crop inspection because the area in the middle of this

trough stays completely flat. The purpose of the AVR twin conveyors is to reduce user workload. They come with a lot of features as standard, like a frequency converter, an electronic length adjustment, and a belt control system that eliminates the need for readjustments. Additionally, Python can connect with all other AVR machines in the line thanks to the installation of AVR Line Control software.

## TUMMERS FOOD PROCESSING SOLUTIONS

Process lines from Tummers Food Processing Solutions offer high efficiency and reliability. To obtain the highest quality end-product, the Dutch machine building company will work closely together with you. Depending on your requirements, the possibilities are endless. With the greatest ease of use, Tummers process lines transform your potatoes into fries, slices or wedges, and potato flakes.

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## POTATO SORTING AND GRADING EQUIPMENT

Quality control is paramount in the potato industry, and this is where sorting and grading equipment takes center stage. Utilizing advanced optical technology, these machines meticulously inspect each potato for defects, size variations, and foreign objects. They are instrumental in ensuring that only high-quality potatoes proceed to storage or packaging, thus enhancing the overall market value of the crop. This technology-driven approach provides accuracy and consistency in the grading process, a critical factor in the potato handling chain.

Commonly, the separator is followed by crop inspection, either manually or increasingly via advanced optical sorting equipment, which removes stones and rotten crop from the load, minimizing the risk of damage that can lead to a deterioration in longevity. Both manual inspection and optical sorting facilities can also remove already deteriorated/bad crop from the load, again reducing the risk of such tubers passing through to storage.

Storing crops by variety and/or size in bulk or boxed potato storage is an issue that Tong experts have been tackling. According to the company,

the spud crop can be easily 'labeled' and the contents of each box are recorded much easier too, whether it is by size or variety. To make the process of recording what crop is in each box, Tong offers data capture technology which can be specified as an option on new models of Tong box filling equipment.

"The data capture module is designed to offer enhanced features to Tong's popular box weighing platforms, and works by scanning barcodes on boxes and subsequently recording vital crop statistics, enabling accurate and automated collation of crop information in real-time," the Tong experts said.

The box scanners automatically record each box's identity and assign crop statistics including the box weight and grade size of the crop, as well as time-stamping when the information is recorded. The technology takes potato stock control to a new level by assigning traceability information from the crop's load reference data, including details such as batch number, grower, and variety. All data relating to that box is then automatically sent via ethernet connection to the operator's SQL stock-control database, making stock control much more efficient and accurate,

whilst allowing each box to be fully traceable to its source.

The box data technology removes the need for manual recording of box contents, increasing the accuracy of crop data, and automatically communicating this back to the stock database. Alongside minimal energy consumption and significantly reduced running costs, Tong's Blue-Inverter Technology also sees standard mechanical chain and sprocket drive arrangements replaced by direct driven shaft-mounted motors, for simple and efficient running as well as much easier maintenance.

## CONCLUSION

In the world of potato storage management, these three pieces of equipment, unloaders, conveyors, and sorters, represent integral components in the process. Their efficient operation reduces labor requirements, decreases the likelihood of crop damage, and elevates the overall quality of the stored potatoes destined for market. In an industry continually evolving, their integration with advanced technologies, such as automation and control systems, further enhances their capabilities. •



# 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/IoT/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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