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Issue 3 • Volume 30 • 2022

Spotlight
Cost-effective Management of Potato Waste

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More, Better and With Less Waste

Tudor Vintiloiu - Editor in chief
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An estimated 1.3bn tons of food is wasted globally each year, one third of all food produced for human consumption, according to the Food and Agriculture Organization (FAO) of the United Nations, costing the global economy close to USD940bn each year. These missing food products are also linked to massive greenhouse gas emissions, wasted in homes, hospitality and foodservice, food manufacturing, retail and wholesale industries. The amount of waste and by-products of the potato industry is estimated to be around 12-20% of their total production volume. At the same time, consumers are pushing back by having an unwavering stance on sustainability and environmental responsibility, especially since the pandemic.

The amount of waste and by-products of the potato industry is estimated to be around 12-20% of their total production volume.

Potato processors might be tempted to dismiss market forces as something that only retailers need to worry about, but this would be a mistake: just as retailers must meet changes in consumer demand, so processors must meet the subsequent changes in retailer requirements. And those requirements are not only for greater quantities, but also for greater product quality and a responsible approach to sustainability.

Experts agree that international industry collaboration must focus on ensuring food loss is reduced throughout the farming and sorting process so that as much as possible of what we produce is being used. As for production-side food waste, repurposing of produce is a key solution. At the same time as buying more potato products, consumers' expectations are increasing, and they refuse to accept bad quality food. One reason for this is that improvements in raw material, food sorting and food processing have set in motion a circle of growth in standards: as product quality improves, so the 'new normal' sets higher expectations. And add to that the power of social media: the tendency of customers to share experience of good and bad quality in equal measure online fuels additional pressure on businesses to protect their brand.

To achieve their sustainability goals as well as the ever-higher product standards, processors are investing significantly in equipment, which helps reduce fuel costs, energy waste, air pollution and water consumption, all the while meeting the rigorous current market standards. All these factors mean that processors must reduce food waste, increase quantity, and improve quality - which sounds quite impossible until you factor in the relentless innovation and technological advancements suppliers are constantly bringing to market. ●

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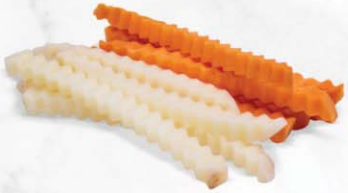


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New Utz Quality Foods Snack Facility Investment in North Carolina

Utz Quality Foods, a subsidiary of Hanover-based Utz Brands, recently acquired a 125,000-square-foot snack food manufacturing facility in Kings Mountain, N.C., for roughly USD38.4m from Evans Food Group Ltd. d/b/a Benestar Brands, a Chicago-based holding company for snack products brands. The facility will support the growing demand for Utz brands in the Southeast, Northeast, and Mid-South. The equipment will allow the company to enable multiline production of Utz's key sub-categories.

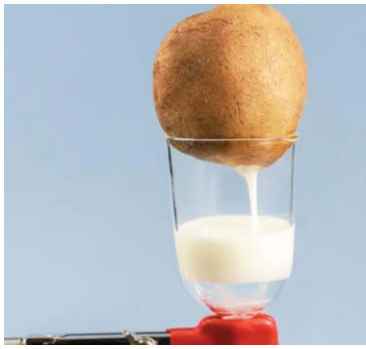
"With continued growth and excitement for our snack food brands, we are very excited to expand our roots in North Carolina, where we will be adding over 115 new jobs over time," Cary Devore, Utz Brands COO, said.

Potato-based Ingredients from a New Croatian Factory

Nutris.tech, a business segment of Nutris Group, that produces protein isolates, starch, and fiber from potatoes and fava beans, and supplies food industries in North America, the European Union, and Asia has opened a facility to produce plant-based ingredients in Novi Senkovac, Croatia, through a EUR30m (USD31.7m) investment.

The investment is a joint venture with SiccaDania, a company based in Denmark that provides engineering systems for the plant-based industry. Nutris.tech and SiccaDania tested technology developed by the University of Copenhagen that will be used in manufacturing at the facility.

A Way to Create Eco-friendly Plastic From Potato Waste



Since its founding in 2011, global manufacturer BioLogiQ has been working on a way to create eco-friendly plastic products made from renewable materials like potato waste.

"[…] We started making plastic from potato waste, specifically the starch from the potato waste," BioLogiQ CEO Steven Sherman recently told the Idaho Statesman.

BioLogiQ inserts its own "iQ technology" into other plastic products, called NuPlastiQ. The "iQ technology" contains substances like potato, corn starch, or naturally sourced glycerin obtained from vegetable oils and animal fats.

Plastics without BioLogiQ's technology take so long to degrade because the molecules are too large for microorganisms to eat. Over time, the plastic eventually breaks down into smaller pieces due to fragmentation, caused by sunlight and oxidation, until it is finally small enough for microorganisms to eat.

Rising Costs Boosted The Prices of Processing Potatoes in Belgium

Due to rising costs of inputs combined with firm demand, the Mintec Benchmark Prices of processing potatoes in Belgium rose by 11% in the two weeks up to April 20, 2022, and up 264% year-on-year (y-o-y).

"This rise follows a slight decline in prices in mid-March amid fears of trade disruption due to the Russia-Ukraine geopolitical conflict. The uncertainty led to many processors withdrawing from the free-buy market and relying on contracted supplies, yet, prices still remained well above 2021 levels," according to the above-mentioned source.

For the next period, the experts added, there is a lot of uncertainty surrounding potato areas for the 2022-2023 season within the NEPG (North-Western European Potato Growers) zone due to concerns over high input costs, which are adding significant financial pressure on growers.



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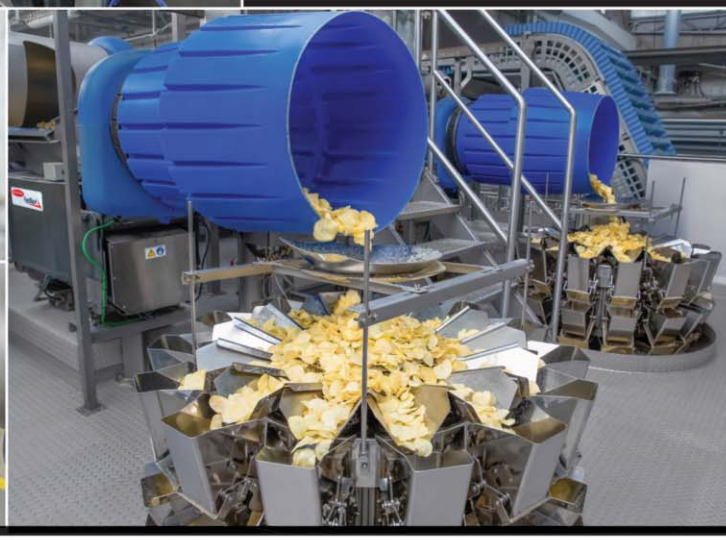

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Fewer US Spuds, Higher Prices in the 3rd Q 2022

Over the January – March 2022 period of Potatoes USA's Marketing Year, sales increased in USD by 7.2% but decreased in volume by 5%, compared to the same period in 2021. "Elevated prices in grocery stores lead to an increase in dollar sales compared to 2021. Volume sales were below 2020 when panic buying started but remained higher than in 2019. Prices grew by 12.8% compared to 2021, averaging USD2.02 per pound for total store potatoes," the latest Potatoes USA report shows.

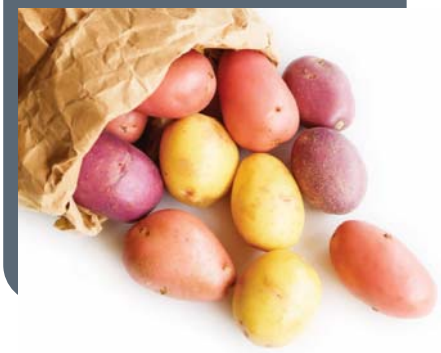
With the large increase in USD and decline in volume, unit sales are now included in the sales reports for all potato categories.

Potato chips increased in USD by 11.9% and declined slightly in volume by 0.6%. However, unit sales increased by 0.2%, showing a decline in potato chip package sizes.

ARS-developed French Fry for Fast-food Networks

ARS scientists released two new varieties of potatoes – 'Clearwater Russet' and 'Blazer Russet' – that will be used by McDonald's for French fries. The company has a high criterion for its spuds, having accepted only seven varieties to use in its fries over the years. With an annual farm value of USD4bn, the vast majority of potatoes are produced in the northern US States and are processed mostly into fries and chips. But potatoes are highly perishable, and the crop must be consumed, processed, or stored cold immediately after harvest.

The new releases include the 'Elkton', a new chipping cultivar with high resistance to internal heat necrosis that is proving to be extremely popular among growers in the South.



First Shipments of U.S. Fresh Potatoes to Mexico in >25 Years

The National Potato Council welcomed the news that the first shipments of U.S. fresh potatoes crossed into Mexico on May 11. The successful crossings signal the start of Mexico's process to restore full market access for U.S. fresh potatoes after decades of disputes and legal obstructions.

"This is an important moment for the U.S. potato industry and our partners in the federal government who have fought for decades to restore access to this vital market, but we know the work is not over if we are to keep the border open," said NPC President and Washington state potato grower Jared Balcom.

The shipments come after more than 25 years of regulatory and legal obstructions by Mexico, and one year after the Mexican Supreme Court ruled unanimously that U.S. fresh potatoes were legally authorized to be imported.

Haith's Market-leading Rota-Tip at World Potato Congress

The latest announcement coming from Haith reveals that the company will have a strong presence at the 11th World Potato Congress in Dublin (30 May – 2 June), with an opportunity to see Haith's equipment in use at some of Ireland's leading potato processors. Delegates visiting Meade Potato Farm, Sam Denningan and Company, and O'Shea's Farm as part of the congress' technical tour will see Haith potato washing and grading lines operating at each site.

Haith's strategic partner, GRIMME, will feature Haith's Rota-Tip S on its stand in the potato field event. The Rota-Tip S is part of the series of machines that won Haith a Queen's Award for Enterprise in the Innovation category last month and is designed to meet the needs of farmers, growers, and small to medium-sized packers.

How Data Gives Spud Growers a New Tool in the Fight Against Late Blight

GeoPotato, a geodata-driven early warning system for late blight in potatoes, has entered a full commercial roll-out in Bangladesh and could reach as many as 1m smallholder farmers in the coming years.

Devised by Wageningen Plant Research, Terrasphere, mPower, Bayer, and governmental institutions, GeoPotato's cutting edge technology employs a sophisticated risk assessment algorithm evaluating many factors impacting crop development on the field– including satellite data, weather forecasts, disease cycles, and crop biomass growth – to assess key risk factors for late blight development (susceptible host, conducive environment and pathogen presence) on a highly localized basis.

A New GBP6m UK Partnership for a Potato Protein Extraction Facility

Pioneering work to use potatoes to generate a plant-based protein that's ideal for vegan and vegetarian food products is being led by Branston in the first UK partnership with innovations company RootExtracts Ltd.

In this respect, Branston is preparing to launch a new GBP6m extraction facility at its Lincolnshire headquarters. RootExtracts Ltd has been set up specifically to focus on developing and commercializing this technology, following on from the work pioneered by B-hive Innovations Ltd., according to Agronomist & Arable Farmer.

The team began working on the most effective way to extract protein from potatoes in 2013, starting from a lab-based level and gradually scaling up to a commercially-viable operation.

The new factory will convert secondary grade low-value potatoes into functional plant-based protein, as well as generate starch-based products for a range of manufacturing applications.

SNACKEX 2022 - T Comes Together

SNACKEX 2022 is taking place on 6 – 7 July at Hamburg Messe in Germany. SNACKEX is the only 100% focused savory snacks and snack nut international trade fair in the world, which bring together the savory snack industry in a single-destination tradeshow and conference, serving as the pre-eminent business meeting place for the industry.

The trade fair provides a unique opportunity for industry professionals to buy, sell and network with top management, qualified buyers and key decision-makers. Attendees have numerous opportunities to interact with like-minded individuals at the exhibition and during the social functions that are an integral part of the event.

According to the organizers, the trade fair presents the entire range of products offered by suppliers for the production, processing and packaging of savory snacks and snack nuts.

This year, there are not only large numbers of returning exhibitors in all product segments, but also numerous companies that will be exhibiting for the first time. Every product category is represented on the trade show floor, from the classic lines consumers buy year after year, to the many new products introduced.

The SNACKEX conference features comprehensive sessions to give industry participants solutions and guidance on the critical issues that will help them more rapidly, efficiently and successfully develop their businesses in challenging market conditions. Savory snack industry executives attend SNACKEX to get solutions to the industry's most pressing challenges and to meet others who can help improve their products.

The SNACKEX 2022 trade show and conference program kicks off on Wednesday 6 July at the Hamburg Exhibition Hall also known as Hamburg Messe. The Welcome Reception networking event and conference registration are held on Tuesday 5 July. •

he Snacking Industry

CONFERENCE PROGRAM

Wednesday 6 July 2022

09:00 - 10:00 **Welcome & Introduction: Mathijs Peters, PepsiCo and ESA President**

Keynote, Rik Vera: Connect with many and engage individuals, the magic formula for the day after tomorrow

The world has changed dramatically over the last 20 years due to the digitization of society and customers. Companies that want to be in tune with the fast changes, need to adapt today to still be relevant tomorrow. To do that, they have to focus on the day after tomorrow and develop the right strategy while executing daily business.

Covid-19 has just exposed that the old normal was already slowly dying and the new normal is being born. We are in the "in between" zone, The Twilight Twenties. A zone that may be frightening but also full of opportunities.

What is the next wave of technology that is heading towards us and what does it mean for customers and business in the food sector? What is your North Star?

Find out why smart economies are the business models of the future, but especially how to become one, how to become part of bigger ecosystems or build them and what you can do today on your journey through the thrilling twilight twenties.

11:00 - 12:00 **Global Trends & Innovation in Savoury Snacks**
Javier Sanchez, Global OOH & Usage Director, Kantar

12:00 - 13:00 **Harnessing the power of nuts – global trends**
Honorata Jarocka, Senior Food & Drink Analyst, Mintel

14:30 - 15:30 **Green supply chain, a business opportunity! Panel session**
Panel session featuring:
David Wilkinson, Head of Agricultural Procurement, PepsiCo Europe.
Peter Kreijger, Sector Manager Crisps/KAM French Fries, HZPC Holland
Julie Adams, Vice-President, Almond Board of California
Irene Moreno, External Relations and Corporate Social Responsibility Manager, Importaco

Thursday 7 July 2022

09:00 - 10:00 **#From clicking to crunching – How we communicate about food: the rise of social, the role of clicks and the challenges ahead of us**
Sophie Hieke, Professor for Marketing and Communication, Munich Business School, and Research Strategy Advisor, European Food Information Council

11:00 - 12:00 **The retail of tomorrow**
Sebastiaan Schreijen, Senior analyst F&A Nederland, Rabobank

12:15 - 13:00 **The drive toward sustainable packaging: How savory snacks manufacturers can improve the circularity of their packaging?**

Panel session featuring:
Ly Vu, Team Leader Packaging Development Fried, Extruded and Nut products, Lorenz Bahlsen Snack-World
Heike Mahn, Head of Business Segment Foods & HPC, Senior Vice President, Constantia Verpackungen Deutschland
Monika Romenska, Regulatory and Public Affairs Manager, Extended Producer Responsibility Alliance (EXPRA).
Ian Richards, Director, Global Snacks Business, Wolf Packaging

Elea Technology - Pulsed Electric Field systems

Stand 510
www.elea-technology.com

With over 200 installed systems worldwide, Elea is the leading supplier of Pulsed Electric Field (PEF) systems to the food, beverage, and scientific sectors. PEF is able to restructure raw materials such as tubers, providing new product opportunities and enhancing process optimization for snack processing such as chips and French fry manufacturing. Benefits: water and energy savings, higher yield, smoother cut, less breakage, reduced oil uptake, better colour and improved quality. Elea provides a range of PEF Advantage Belt systems up to 70 t/h, but also a flexible solution for businesses looking for an output up to 7,5 t/h.

FAM Stumabo - industrial food cutting solutions

Stand 511
www.fam.be | www.stumabo.com

FAM Stumabo: Offering revolutionary insights and solutions for potato chips and other snacks
Cutting technology is evolving rapidly, with innovations constantly around the corner. Doing a good benchmark can bring significant efficiency and yield improvements. The potato snack segment uses centrifugal cutting technology to slice potatoes into various flat, crinkle, or other specialty cut chips and crisps. FAM Stumabo's Centris™ is the only slicer in the market with 12 & 16-station cutting head technology. Together we cut your product to perfection! Visit us at Snackex - Stand 511!

Heat and Control Complete Turnkey Solutions

Stand 221
www.heatandcontrol.com

Advancing food processing technology with creativity, passion, and unmatched expertise at a global scale. For over 70 years across food industries and applications, Heat and Control's specialised equipment solutions have set the standard for yield, efficiency, and safety. Offering complete turnkey solutions featuring integration from start to finish ensures full line efficiency and performance. Food Processing: From raw produce preparation and value-adding to frying, cooking, seasoning, and coating. Product Handling: Maintain efficient production at optimal capacity. Smart design and line management that achieves accurate feed, accumulation, and distribution flow. Includes conveyors, elevators, and proportional feeding systems. Potato products: Producing the world's best tasting potato chips, French fries and formed potato products, our systems are the workhorses of the industry.

Key Technology - Sorting & Conveying

Stand 632
www.key.net

VERYX® and Optyx® sorters improve foreign material and defect removal to optimize product quality and maximize yield. Ideal for potato chips, Optyx inspects product on the belt from above and in the air from below. VERYX excels in applications that warrant chute-fed sorting or benefit from belt-fed sorting totally in-air with top- and bottom-mounted sensors. Key's conveyors include Iso-Flo® shakers as well as Zephyr™ horizontal-motion conveyors, which gently move product at high capacities.

Kuipers Food Processing Machinery

Stand 303
www.kuipers.nu

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

Rosenqvists Food Technologies at Snackex 2022

Stand 416
www.foodtechnologies.rosenqvists.com

At Snackex, we will announce some important upgrades to our Star Wheel Frying system. This system is designed to fry snack pellets. At Rosenqvists Food Technologies, we have now updated the infeed section and we have also prepared a possible upgrade for more oil turbulence. If our customers wish to fry some extra difficult pellet shapes, both improvements will allow them to do this with ease.
Furthermore, we continue our work with RoastR, the new snack technology to roast snack pellet in salt. We have collected a lot of experience since Snackex 2019 and we are excited to continue this exciting journey with snack innovation. We believe the concept of a roasted snack pellet with 0% fat is interesting to explore for a lot of producers. A comparison between roasting and frying snack pellets is included in the know-how session of the show on July 6.
At Snackex in Hamburg, we will again invite our visitors to participate in a competition with the chance to win a cool outdoor exercise gadget. This time, the competition will turn focus to the way we fry potato chips. For how long and at what temperatures are we frying potato chips. In the frying system from Rosenqvists Food Technologies, there are so many possibilities for different product styles. Come and talk to us to see which styles are possible for you.
Rosenqvists Food Technologies is a Swedish manufacturer of processing lines for potato chips, snack pellets, peanuts and many other snack products. The company has more than 45 years of experience in designing, producing and starting-up processing lines. Minimising oil, energy and water usage and maximizing oil quality, efficiency and food safety are all objectives when designing machines from Rosenqvists Food Technologies.

Urschel Cutting Technology

Hall 4 - Stand 532
www.urschel.com

Visit Urschel to see the latest in food cutting technology. Explore the new MicroAdjustable® series of potato slicing heads for the Model CC. 14-stations replace the standard 8 to deliver increased capacity. SL-14 MicroAdjustable® .212V Cutting Head is equipped with the latest SlideLocc™ Clamping. This new clamping system expedites knife changeovers with limited tools needed. Leading processors around the globe rely on Urschel to deliver the future of cutting today.

Peeling Potatoes, Saving Profits

Reducing food waste is one of the most important objectives of this generation. Processors, retailers and consumers increasingly focus on the origin of food and expect food producers to adopt sustainable business practices. Thankfully much of the product loss incurred during potato peeling is preventable, and this not only increases the utilization of the precious potato, but also enables food processors to produce high-quality flavorsome dishes.

by Tudor Vintiloiu

Peelers are categorized by the way by which they peel: abrasives, steam or knives. Abrasive peelers have many varieties, first being continuous or batch processing, then by the style and aggressiveness of the abrasive used. Abrasive options include soft and stiff bristle brushes, carborundum, aluminum oxide grit coated surfaces and diamond dust for long wear with tough surface conditions.

SPEED, SIZE AND ENERGY

Vanmark offers continuous abrasive peelers and custom-configured rollers to each processor's product and application.

The feasibility of custom designs is dependent on the relationship between an OEM and processor, as collaboration, additional time and budget are necessary for throughout concepting and development.

"For this reason, we look to custom configure standard equipment for an application. In the last year, Vanmark has focused on bringing the quality and durability our peeling equipment has historically provided to large processors to smaller processors while being economical. This new equipment addresses lower processing rates, footprint constraints and utility consumption while being dependable and versatile," the company representatives told us.

One of the company's continuous peelers is tailored to potato chip processors with output of approximately 150-500 kg/hour. In addition to the peeler, Vanmark offers a full system with an even feeder conveyor and inspection table.

The main source of wastage is product waste from poor quality peeling, meaning good product is peeled off unnecessarily. Vanmark says their abrasive peelers combat waste with configurable roller types, speed and options for each application – from separating foreign material, scrubbing or removing skins entirely.

Though it has always made good business sense to eliminate waste, this necessity is now more important than ever because of the legislative and consumer led changes facing the food industry. For one thing, demand for frozen potato products for foodservice is increasing, meaning that there's greater pressure to increase volumes and throughputs, and more business for processors to win or lose. For example, the growth in production capacity of frozen French fries in new regions is growing each year rapidly, with each new processing line in China, Africa, and Brazil capable of delivering 150,000 tons each year.

In this context, achieving high-quality potato products from locally grown raw materials becomes essential. Innovation in potato seed has resulted in producing a wider range of new potato varieties that are more resistant to drought and wet, which is necessary due to climate change. This has helped improve the raw material consistency and quality delivered to food

processors, enabling them to improve their business and product quality. But this is only part of the solution. Technology and peeling solutions need to be adaptable to extract the maximum benefit of the available raw material.

"As the world continues to change and adapt to challenges, we see that food processors need to install new lines incorporating the latest technical solutions. And aging lines will need to be replaced to ensure the business stays competitive and survives," peeling expert TOMRA explains.

When caustic peeling machines were introduced to the potato industry in the 1950s, they brought the speed of automation at the expense of food waste: as well as dissolving the skin, these machines removed about 20% of the good flesh. This was improved in the 1960s when TOMRA introduced steam peeling, reducing potato loss to 13%. But still, there was room for improvement. Their most recent innovation, TOMRA's Peeling Control Module, takes steam use and energy saving to new heights.

WHY LATEST SOLUTIONS ARE MUST-HAVES

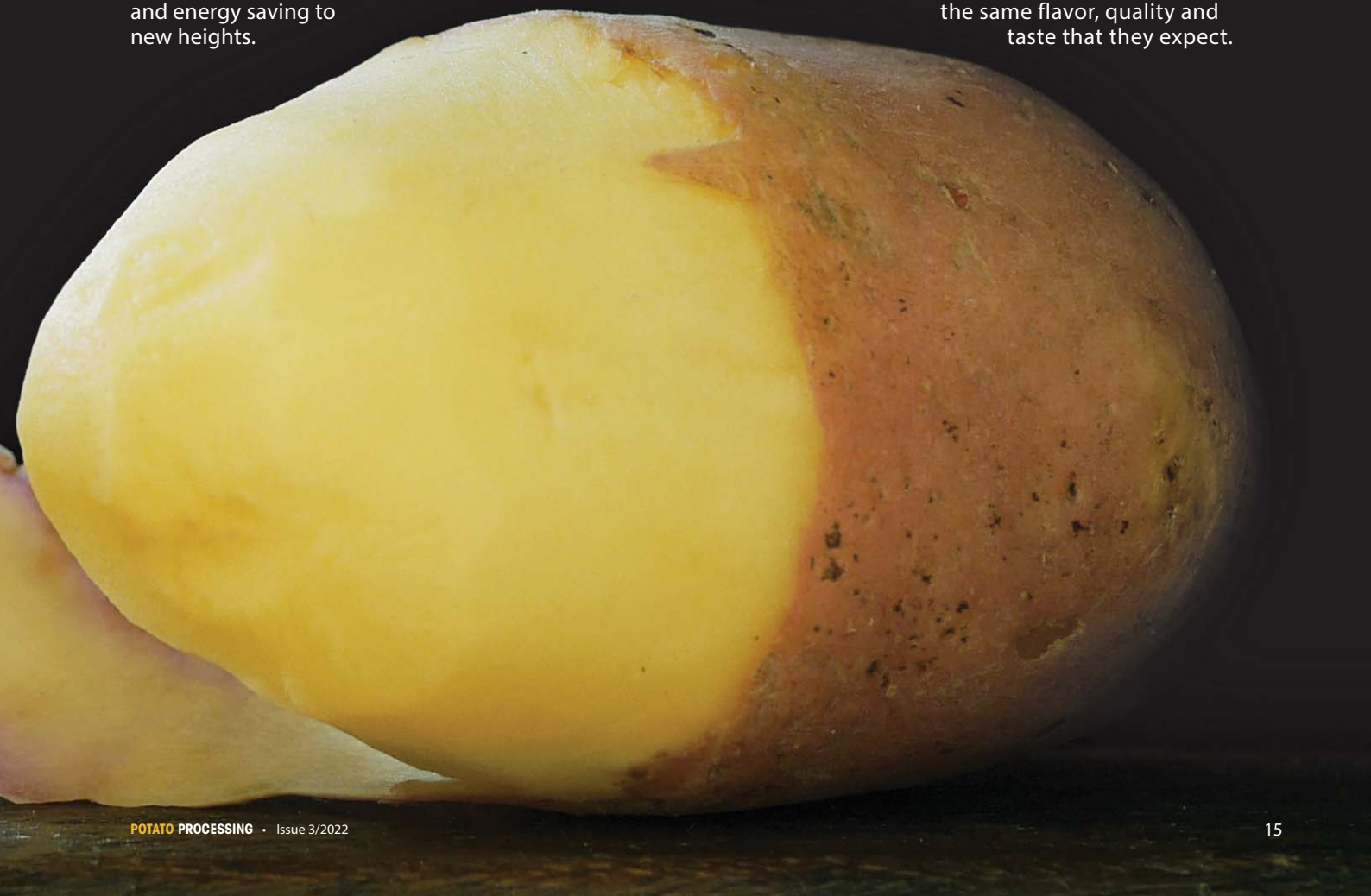
Understanding variations in potato variety, size, shape and quality has led to the development of the TOMRA Peeling module. According to the company, this solution is in use today and in service in many potato processing lines in North America, Europe, and Asia.

The Eco steam peeler's name reflects the fact that it consumes 25% less energy and 28% less steam than similar machines. The Eco peeler does this by changing the traditional process of fixed steam supply to a controlled steam management system. "A new patented peeling vessel with a unique steam valve design and an innovative product mixing design enables rapid heat transfer of the steam to the surface of each potato. This enables the processer to remove only the skin and avoid losing valuable potato flesh. The resulting energy efficiency saves a typical user (depending on local energy costs) about EUR60,000 to EUR100,000 per year," TOMRA points out.

Subsequently, the Eco peeler is followed by Dry peel separation solution, which avoids using water and brushes to remove the peeled skin in a centrifugal separation process. Separating the peeled skin without using water is not a new technique, but when placed at the heart of an automatically controlled peeling module, it allows users to leverage the strengths of the combined innovation to ensure high quality and high efficiency.

The Peeling Control Module (PCM) uses the TOMRA 5A sorter's multispectral imaging and super-stable peel classifier. The PCM measures peel, calculates optimal steam time, and accurately tracks peeling quality, so that steam and energy use are minimized while the product is readied for cutting with continuous peel quality.

A fully automated peeling module is helping processors achieve a high efficiency with different varieties of potatoes grown in different climates and in different soil, enabling them to deliver their unique potato products to new customers with the same flavor, quality and taste that they expect.



AUTOMATIC CLEANING

Vanmark has introduced a new option to its Peeler/Scrubber/Washer that automatically and effectively cleans the peeler bed and rolls in as little as 10 minutes - allowing for cleaning during production and dramatically reducing downtime during sanitation.

Vanmark's Preeler/Scrubber/Washer Clean in Place (CIP) System features upper and lower spray bars that provide thorough and consistent cleaning to the peeler bed and rolls. The minimum cleaning cycle time is 7-10 minutes, and optional controls automate operation.

"With the latest safety guidelines not allowing operators to clean peelers during production, we created a solution to do it for them quickly and effectively," says Vanmark Engineering Manager Kyle Huck. "Not only that, but it also assists with sanitation, which gets the peeler back online faster. We've also seen water savings through increased efficiency and lower water usage than the traditional pan setup. Our processor customers are excited about all of the possibilities the CIP System offers."

The Vanmark CIP System works with all roll types on various Peeler/Scrubber/Washer models and is available as a retrofit and on new builds.

The company's latest continuous peeler is tailored to potato chip processors with an output of approximately 150-500 kg/hour. In addition to the peeler, it offers a full system with an even feeder conveyor and inspection table.

"The main source of wastage is product waste from poor quality peeling, meaning the good product is peeled off unnecessarily. Our abrasive peelers combat waste with configurable roller types, speed, and options for each application – from separating foreign material, scrubbing or removing skins entirely," the company's experts also mentioned.

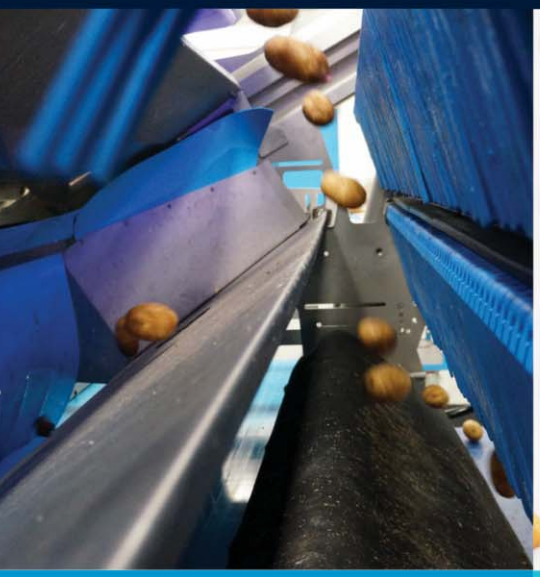
AS MUCH VALUE OUT OF THE SPUD AS POSSIBLE

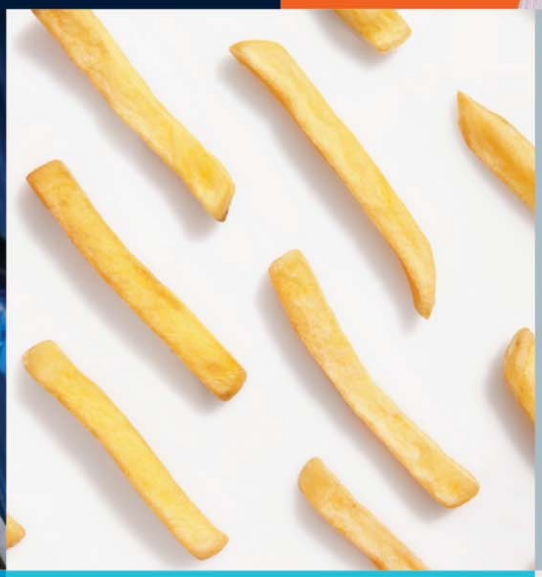
The majority of companies in the potato processing sector have the ambition to get as much value out of the spud as possible by making high-quality products that consumers are willing to pay for with as little waste as possible. Their experts often support growers by sharing best practices aligned with everyone's sustainable agriculture programs, to achieve the highest possible yield and quality per hectare and improve soil health.

More automated processes rendering actionable data are implemented in addition to sustainability targets, one of them being potato waste reduction. Digital connectivity will continue to be more critical as processors aim to achieve the highest possible automation level. •

TOMRA

Every Potato Counts. We transform global potato production, maximizing food safety and minimizing food loss, by making the most of each and every spud.





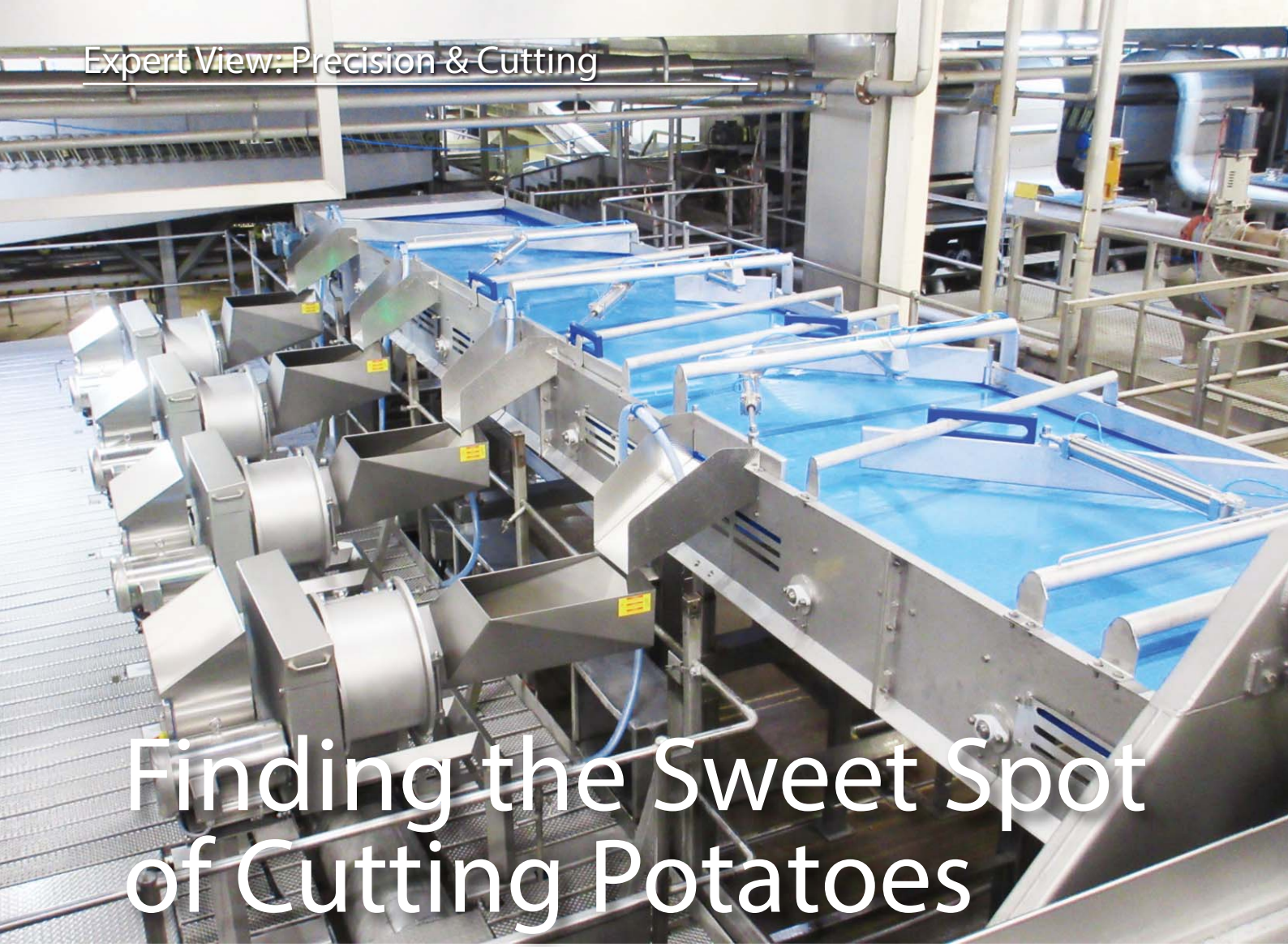
PEELING LINE

TOMRA 5A

TOMRA 5B

TOMRA 3A

www.tomra.com/food



Finding the Sweet Spot of Cutting Potatoes

Choosing the right potato cutting equipment is critical for any successful potato processing operation. Be it small, medium, or large operations for potato snacks such as chips, French fries, or other processed potatoes. Cutting technology is evolving rapidly, with innovations constantly around the corner. Doing a good benchmark can bring significant efficiency and yield improvements.

by FAM/Stumabo

The potato snack segment uses centrifugal cutting technology to slice potatoes into various flat, crinkle, or other specialty cut chips and crisps. FAM Stumabo's Centris™ with GapSet 12 and SureSet 16 cutting head technology is one of the top equipment used in this segment.

BENEFITS OF 12- AND 16-STATION SLICING HEADS

Slicing heads come with different numbers of slicing stations. Where traditionally, 8 cutting stations have long been the standard, FAM Stumabo has taken innovation of centrifugal slicing technology to a higher level, introducing several industry-first developments under its Centris product line portfolio with its revolutionary cutting head design with 12 and 16 slicing stations. The GapSet and SureSet 16 cutting head technology is the only cutting head technology with 16 slicing stations, offering the highest capacity and shortest cutting times for batch time operations available on the market while maximizing cut quality. Compared to the standard 8-station cutting heads, the FAM Stumabo 12 and 16 station cutting heads offer higher slice accuracy and consistency, significantly less scrap and starch loss, nearly no tapered slices, no thick end caps and, reduced oil uptake.

BATCH LINES OPERATIONS

Besides the apparent quality, high output, and yield advantages for continuous lines, Centris with GapSet and SureSet 16 significantly benefit high-capacity batch frying lines. Potatoes are cut into slices in a minimal amount of time at peak capacities, allowing the slices to enter the fryer quicker and better spread for optimized batch frying. This significantly reduces the risk of folded and soggy, sticking chips, making FAM Centris 400P with 16 stations your unique go-to solution for efficient batch frying operations. SureSet 16 and GapSet 16 slicing heads are available on the Centris 400P centrifugal slicers. Conversion kits allow easy retrofitting onto your existing slicers.
For smaller capacity processing lines from 50 to 150kg finished product (i.e. 8 batches per hour),

the FAM Centris 315P is your very economical slicing solution. It offers you a unique 12- station cutting head with GapSet technology. While this comes with similar advantages as the 16-station cutting heads, the 12-station slicing head provides a unique sweet spot between 8- and 16-slicing stations. Thanks to the machine's compact design, the quick ROI, peak capacity performance, and cut quality, it helps you achieve maximum yield and efficiency for your small and medium batch chips processing operation.

EASY OF USE AND CLEANABILITY ARE KEY

GapSet and SureSet slicing heads come with a slick, lightweight (12 kg) design leading to increased cutting head stability, avoiding starch build-up, and reducing cleaning time. When changing the blades, the knife area can be cleaned thoroughly so that product residue cannot build up. Thanks to the easy-dial high precision slice thickness adjustment on the SureSet 16 you don't have to worry about slice consistency when adjusting slice thickness.
The Stone Defender is an integrated system acting as an active crash protection system. The impact of foreign material is shifted to the blade and the clamp only. Foreign materials will no longer damage critical components of the cutting head, significantly reducing the TCO.

EASY LINE INTEGRATION

Both Centris 315P and 400P centrifugal slicing machines have been designed with maximum value for the user through simplified cutting operation and the lowest TCO. They are both equipped with a very reliable direct drive system, eliminating a maintenance-intensive gearbox, and guaranteeing production uptime. A hinged swivel cover saves space and time when opening the machine. Precisely located water spray locations help you reduce water usage by over 50% while still allowing optimal product flow in the slicer.
Both Centris 315P and 400P can be integrated into all leading brands of snack processing lines.
The unique Centris centrifugal slicer range with GapSet and SureSet cutting heads has taken off fast since its introduction in 2016. This technology has been a major leap forward for the industry and is currently helping processors around the world successfully produce a wide variety of cut shapes and sizes such as flat and crinkle cut (318V, 432 V, 538V), Julienne cut, ribbons, and sticks.

CUTTING POTATO SNACKS

The high-volume processing of potatoes into French fries and wedges (fresh or frozen) is typically done with a hydro cutter system, using water to feed potatoes at high velocity through a set of blades in a chip gun head.
Medium and low volume processing and specialty cuts such as crinkle fries and dices are best cut in mechanical drum dicers such as the highly popular FAM Tridis™ and FAM Dorphy dicers.

HIGH VOLUME POTATO PROCESSING

FAM Stumabo's hydro cutting heads and precision blades are your perfect solution for high-volume French fries and potato processing. They produce a clean cut with optimized length and high efficiency. Our hydro cutting heads are highly flexible, allowing a wide variety of cut sizes and shapes such as square cuts, rectangular cuts, and wedges to slices in flat and crinkle cuts. This is topped up by more specialty cuts such as the crinkle steak, beefeater, deep crinkle wedges, etc. Our Stumabo hydro cutting heads and blades can be integrated into all known hydro-cutting installations. We gladly think along with processors for the co-creation of new shapes.

LOW, MEDIUM, AND SPECIALTY CUT PROCESSING

More FAM Stumabo's best sellers in the French fries and processed potato segment are the Tridis and Dorphy mechanical dicers.
The Tridis 180P is the latest addition to the highly advanced Tridis potato dicer range. Based on its more extensive, ultra-high capacity 240P sibling, the Tridis 180P enables medium-capacity potato processors to achieve the same reliability and highest cut quality. It meets all the needs of any modern potato processor.
Since its launch, Tridis quickly gained its place in the potato segment and is now operating at significant potato processors worldwide, who rely on our Tridis technology for a wide variety of high-quality, flat, crinkle, deep crinkle fries, dices, and slices.
Dorphy is FAM's entry-level dicer and French fry cutter, perfectly suited for and well received by many smaller volume processors requiring high quality from an easy to operate potato dicer. We also

FAM Tridis 240 in production line

FAM Centris 400P with 16-station SureSet slicing head

have an extended range of shredding and grating solutions for various specialty potato products. Our cutting solutions are designed for easy integration into both new and existing lines from all major suppliers and are increasingly capable of upstream and downstream interaction, enabling lights-out production.

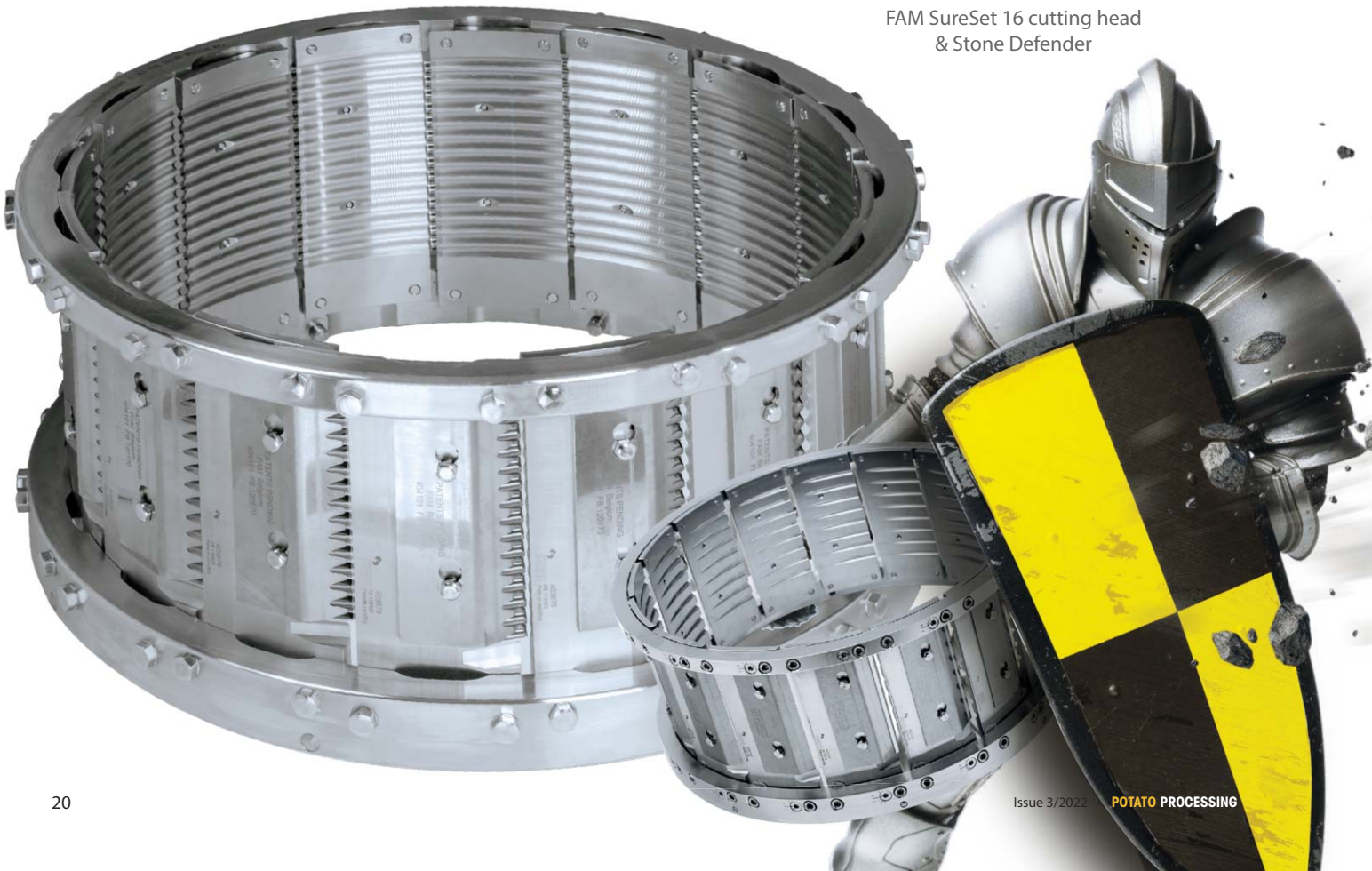
INNOVATION DEEPLY EMBEDDED IN OUR DNA

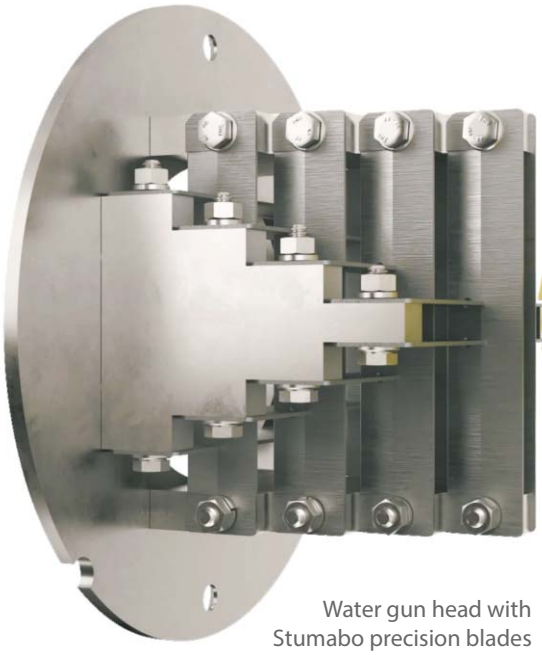
Innovating food-cutting equipment sits deeply embedded in FAM Stumabo's DNA and is a never-ending process in our company. We always strive to offer our customers better and even more efficient potato cutting solutions by focusing on continuous improvements and innovations related to cut quality, cut consistency, machine reliability, the total cost of ownership, sanitation, operator safety, and user-friendliness.
FAM Stumabo has a range of innovative cutting solutions dedicated to potato processing. Its cutting solutions are designed for even the most demanding production environments with the highest efficiency level at peak production volumes, with minimal downtime and the lowest TCO in mind.
The choice of the right blade is also critical to the cutting process: at FAM Stumabo, blades are made in-house from the best food-grade stainless steel materials. Modern, fully automated production methods guarantee that the same quality is produced blade after blade. Expert selection of the proper blade will contribute to more efficient cutting and a longer lifetime of the blades - the latter impacting the production cost on the customer's side again.
At FAM Stumabo, our innovative cutting solutions are often the result of co-creation. Joint development between integrators, the customer, and our cutting experts. Over the years, we have built up in-depth customer relationships that helped steer innovation in the industry and help potato processors find the most appropriate solution, often tailored to their specific needs.

DOING A BENCHMARK PAYS OFF

Using state-of-the-art cutting equipment helps potato processors optimize their efficiency and yield. Successful cutting potatoes depends on many variables. It all starts with knowing the produce. Potato variety, size, shape, solid content, fresh versus stored, skin-on or skin-off, and steam-, abrasive- or knife-peeled process are just a few elements that are critical to successfully cutting potatoes.
At FAM Stumabo, we take great pride in understanding the complexities and challenges of cutting potatoes through our knowledge of the product, the production process, and the machine, cutting tools, and blade design.
Optimization of yield and efficiency is at the top of all potato and food processors' agendas. Potato processing plants, whether it's potato snacks, French fries, or other processed potatoes, are among the most sophisticated in the food industry, with many of the large processors even striving for 'lights-

FAM SureSet 16 cutting head & Stone Defender





Water gun head with Stumabo precision blades

out' processing with minimum operator intervention.
Our machines, cutting tools, and blade designs have focused on offering highly sought-after efficiency and yield by emphasizing cut quality, reliability, flexibility, user-friendliness, operator safety, hygienic design, and the lowest TCO. Our solutions are designed for easy integration into both new and existing lines from all major equipment suppliers

and are increasingly capable of upstream and downstream interaction, enabling lights-out production. It's exactly by our continuous focus on innovation and co-creation that we meet the industry's needs while bringing customer-oriented solutions.

'TOGETHER, WE CUT YOUR PRODUCT TO PERFECTION'

All of our dedicated FAM Stumabo potato slicing, dicing, and strip-cutting solutions have only one goal: to help potato processors cut potatoes to perfection for their specific application. Our produce knowledge and in-house design and manufacturing of mechanical cutters, cutting tools, hydro cutter heads, and precision blades allow us to offer industry-leading innovation in potato cutting in any cut shape, size and capacity.
Our fully equipped test centers around the world are available to let you evaluate product quality and appearance. This is just one way to help you test or create new products or refine existing ones.
Since our foundation more than 40 years ago, we have been growing our business significantly. We have been focusing on customer-intimacy, knowing your produce, and thinking along with you for the most efficient cutting solutions for your application that helps you grow your business.
Hence our firm commitment to potato snacks, French fries, and other potato product processors: 'Together, we cut your potato product to perfection'. •

Test lab environment

Saving Up on Oil

Oil filtration is important in any food processing area that uses fryer oil to create the finished product, such as French fries, potato chips, and other fried snacks. When oil is effectively filtered from a commercial deep fryer, it improves the profitability of the food processing and the quality of the food to the consumer.

by Tudor Vintiloiu

By using an oil filter, the fryer oil does not need to be replaced as often, reducing the expense of purchasing new oil while improving the fried food's profitability. The filtered oil is also darker than fresh oil and, when used for frying, provides a more appealing end product.

The quality of a commercially fried food product can depend on many things, but most importantly, the quality of the oil it is fried in. That balance of moisture, flavor, and crunch is the experience consumers enjoy and that commercial fried food processors try to achieve. Besides providing heat to cook in, the fryer oil becomes part of the end product - to a significant percentage in the case of potato chips. With good oil, food tastes better, is healthier, has an improved shelf life, and the oil lasts longer. An oil filtration system can remove solids and other waste or frying by-products while integrating smoothly into the industrial frying operation. Complete lines often include the frying unit, a heat exchanger to heat the frying oil, circulation pump, tanks for dirty and clean oil, a control system, and the oil filtration equipment. Fresh oil is continually added to the system, as there is some inherent drag-out of oil in the product leaving the fryer and integrated into the food product.

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

Het and Control Oilsaver 700 feature

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."

Filtered Oil: Before & After 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 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.

> *"The OilSaver allows Heat and Control to be flexible in creating the superior products we have been known for manufacturing for 70 years."*
>
> *Heat and Control*

Kiremko Primary Oil Filter

> *"Adding the Primary Oil Filter to the process enables processors to have a simplified circulation system with reduced oil volume."*
>
> *Kiremko*

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. •

> *"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."*
>
> *Rosenqvists*

Rosenqvists Continuous Oil Filter

KUIPERS
FOOD PROCESSING MACHINERY

The worldwide specialist in snack processing technology

Deliberate food specialist

Since 1985, our company has been specifically focusing on food processing technology, in particular industrial frying systems. Specialization, experience and in-depth knowledge allow us to deliver the optimal solution for your production needs.

Sustainable & innovative

At Kuipers, our team is driven to create sustainable solutions and relationships. We work on continuously developing our technology to ensure maximum efficiency within your factory.

Dutch origins, worldwide

Our systems are engineered, designed and manufactured in the Netherlands to be delivered to our worldwide client base which is now present in over 60 countries.

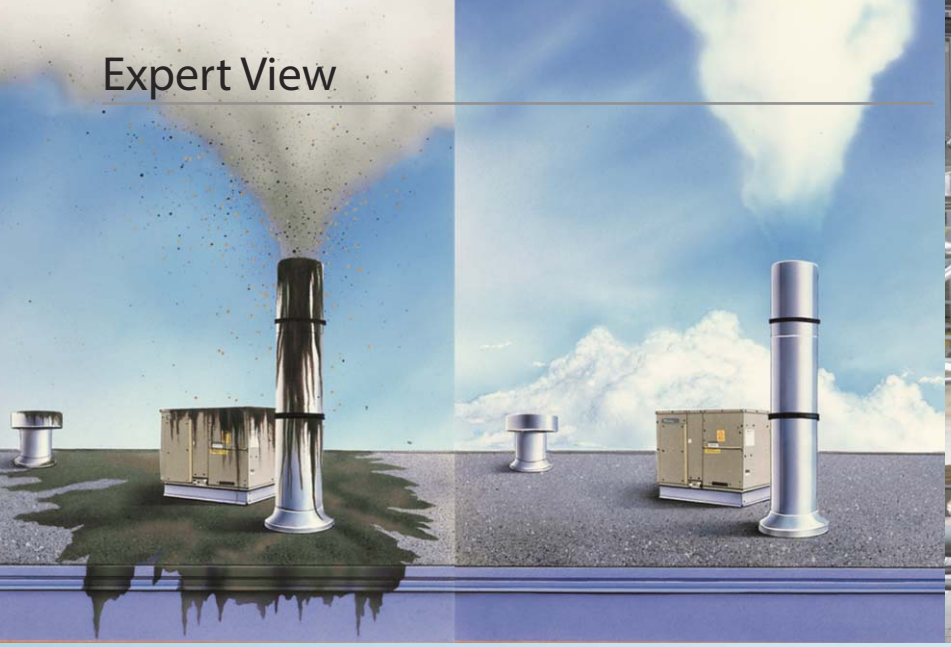
Custom design

To achieve the optimal result, we ensure our technology and processes are carefully crafted according to your product specifications. A custom line to help you deliver the tastiest snack on the market.

SNACKEX

visit us in Hamburg 6-7 July

Stand 303



Process More Responsibly with the Right Equipment

The world's population is projected to reach 9.8 billion by 2050, so the demand for food products, already high, is expected to grow even higher. The greater volume of production during the food manufacturing process leads to increased pollution and waste levels whereby creating a more sustainable food system becomes all the more urgent.

by Heat and Control

Sustainability is a key challenge for the industry and potato processers globally are recognizing their part in safeguarding the future. In 2020, the global production of potatoes exceeded 359 million tons and global demand for frozen potato is rising rapidly. This greater volume of production is leading to increased pollution and waste, and many processors are now actively engaged in sustainability reporting. Global Reporting Standards (GRS) are helping processors assess (and define) their sustainability strategies, to better manage and understand their impact.

SUSTAINABLE POTATO PROCESSING IS POSSIBLE

To achieve their sustainability goals, processors are investing significantly in equipment to help reduce fuel costs, energy waste, air pollution and water consumption and meet the rigorous pollution control regulations of the world-wide agencies.
While modern processing equipment must address all the themes of sustainability, it must also improve efficiency and profitability, if it is to be adopted widely in the future.
As interest in sustainable technologies grows, turnkey suppliers are helping processors plan their factories of the future and are assisting them to adopt or upgrade their existing equipment, to process more responsibly.
Multiple technologies are already available which can reduce fuel costs, energy waste, air pollution, and water consumption. Working with a turnkey supplier is a great way for a processer to access expertise and understand the new and emerging technologies for sustainable potato processing.

CREATE POSITIVE CHANGE WITH THE RIGHT EQUIPMENT

In response to this challenge, Heat and Control's Sales and Marketing Manager, Greg Pyne outlines how the equipment manufacturer is creating positive change by offering potato processors the right equipment for a more resilient and sustainable food system. With the objective of reducing carbon emissions Heat and Control's R&D teams have been developing new approaches and enhancing existing methods of use to create innovative solutions around water and energy reduction technology, waste treatment/reductions, utilization of reclaimed or reused material, and ways to be environmentally friendly.
A key challenge is reducing waste and pollution while at the same time finding ways to improve equipment design to increase production efficiencies both in the equipment and in the manufacturing process.

WATER CONSERVATION

Water use is a significant cost for potato processers and in some regions, sufficient water supply for processing can be a concern. The huge amount of water needed to peel, slice, destone and wash potatoes is contributing to increased rates of water consumption, organic waste, and wastewater volumes globally. But sustainable improvements which benefit the environment, and your bottom line are possible. An efficient potato washing system should be designed to use the lowest amount of fresh water to achieve the desired level of washing. Adding water clean-up and starch removal systems can further reduce this, saving both freshwater

use, and dramatically reducing waste-water discharge challenges. Cascading water from the cleanest parts of the system to the least sensitive unit operations is a complementary strategy.

Removing the surface starch and scraps/fines from potato slices before they enter the fryer will increase production uptime as it helps to ensure the fryer is running at optimal efficiency. Using dewatering systems that lift and separate product to remove surface water, starch, and particles from just-washed potato slices save fryer fuel usage because drier, cleaner product requires less energy to cook or to freeze.

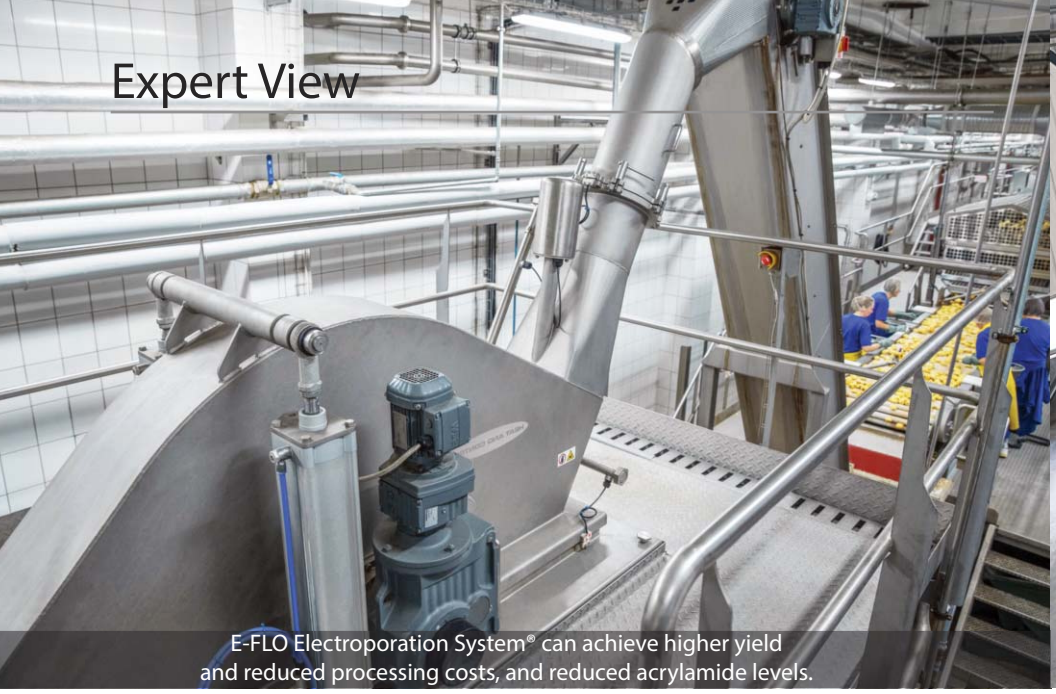
A water cleanup system (which is used with a slice washing system) will reduce freshwater usage by up to 50%, over conventional slice washing systems, says Greg Pyne. He further explains that additional reductions can be made through the use of Electroporation technology. In potato production, a necessary but costly part of the process is the need to blanch potatoes before cooking. By using pulse electric field processing technology to perforate the cell walls of the potato, such as the Heat and Control E-FLO® electroporation system creates micro holes that allow asparagine and sugars to be reduced and washed out of the potato in a cold-water wash. The tissue of the potato becomes more permeable, which can eliminate or reduce the need to blanch the product before cooking. Pulsed electric field technology can increase your yield and is another great example of innovative equipment which also reduces your energy consumption.

BETTER OIL MANAGEMENT EQUALS BETTER END PRODUCT

Frying oil can be an expensive part of food processing and any step(s) the processor can use to reduce loss or waste of oil will likely result in greater business profitability. Oil recovery during production not only reduces energy usage but also translates into higher yields through cost savings. Where cooking oil is used during production of the finished food product, increasing the oil life has been a solution that many food manufacturers choose.

Custom designed, oil management solutions have been developed to maximise oil quality, reduce oil pollution, and maximise energy savings for sustainable and environmentally safe operations. Explains Pyne, 0il management is a prime area to address if you're seeking sustainability gains.

One such system is the Oil Sweep® De-oiling system. This oil management solution is used by processors of French fries, potato wedges and potato co-products; to strip their fried products free of surface oil, prior to freezing and packing. Stripped oil is recovered through a bank of



E-FLO Electroporation System® can achieve higher yield and reduced processing costs, and reduced acrylamide levels.

cyclones and returned to the fryer oil recovery system. Solid fines are separated, and reusable oil is transferred back into the frying system. He continues, the typical oil pick-up on French fries is around 6-8 per cent. While much of this oil is contained within the fries themselves, this system has been designed to recover most of the free surface oil, which results in increased yields and healthier finished products. In addition, less product surface-oil improves the performance of the defrosting and cleaning cycles of the pre-cooler and freezer and helps reduce oil particles clogging cooling coils in the pre-cooler.

Processors benefit from lower operational costs thanks to decreased downtime for maintenance, and energy savings (from greater cooling efficiency) can help them realise their sustainability goals. The Oil Sweep system can be retrofitted into existing lines and has low maintenance requirements.

Citing a recent installation as an example, we delivered a complete French fry system which included the Oil Sweep De-oiling system, and a flexible batter coating system which featured a two-stage, multi-zone cooking feature with customizable cooking conditions, for coated and uncoated French fries. The Oil Sweep system is now helping the processor achieve production capacities of 18,000 kg/hr (37,400 lbs/hr).

Another method is by using a heat exchanger to manage the use of oil. Low oil volume promotes fast oil turnover and inhibits the formation of free fatty acids. A rapid, uniform heat transfer allows a fryer to respond more quickly to changes in product load and protects oil quality by maintaining a low oil film temperature.

HARNESSING WASTED ENERGY

Heat and Control has developed several heat exchangers that combine the incineration of fryer exhaust with high-efficiency oil heating to help processors meet emission control regulations.

When high-temperature air is introduced into a burner, less fuel is required for combustion. The combustion Air Pre-Heater utilises normally wasted exhaust heat to reduce the energy usage and increase the fuel efficiency of heat exchangers. Additional modules can be added to further increase the overall process efficiency by preheating make-up cooking oil, air, and water.

Combustion Air Pre-Heaters can be retrofitted to many existing Heat and Control heat exchangers to boost energy efficiency. In addition, the graduated density oil heating tube of the bundle provides greater thermal efficiency than existing models - far exceeding the performance of heat exchangers that do not remove pollutants.

Designing innovative ways to reuse previously exhausted waste gases can increase production efficiency and save energy costs while reducing carbon emissions. The Heat and Control Heat Exchanger with combustion air pre-heater (and Booster Heater) can preheat cooking oil to boost fryer production up to 11 - 15% with no extra fuel consumption, up to 85% thermal efficiency.

We also developed the Heat and Control Oil Mist Eliminator that removes oil mist from fryer exhaust without water or high-horsepower fans and a heat recovery system which recovers typically lost heat from the fryer exhaust stack. This system condenses otherwise wasted steam to make hot water for blanching, sanitizing, or even building heat.

Another system which can decrease water usage is a Stack Heat Recovery System and it has the additional sustainability benefit of harnessing wasted energy and deploying that energy back into the processing plant. Systems such as these convert normally wasted fryer exhaust heat into usable energy for HVAC, equipment operation, sanitation, or food processing.

'Industrial heat waste' refers to energy which is produced during industrial waste heat processes and is not used during processing; this becomes wasted energy which is released into the environment.

The heat recovery system utilizes wasted energy by recovering typically lost heat from the fryer exhaust stack. It continuously transfers heat from fryer stack exhaust to water in a recirculation system for a variety of uses. The bulk of energy input to potato frying comes from evaporating water from the product. As a result, much of this energy can be reclaimed from the fryer exhaust by condensing the steam that is produced. Stack Heat Recovery Systems (SHRS) are tailored to the process and heat use of the processor.

"Recovered energy can be used for space heating (office and factory in winter) or to drive vapor absorption chillers which can provide AC for offices and packaging areas in summer," says Greg Pyne.

These are now developed

technologies increasingly seen in the industry. In some situations, the recovered energy is used upstream in the processing line itself – dryers for French fry and blanchers in French fry and potato chip lines are typical examples. There are many inputs into deciding which system is appropriate in each application, such as energy cost, government incentives, corporate policy, and environmental regulations.

"Of course, intimate knowledge of the actual food production process in question is critical to achieving the best solution," says Greg Pyne.

POLLUTION CONTROL

The KleenHeat® Pollution Control Heat Exchanger incinerates and removes virtually all odors, oil, and other particulates from fryer stack exhaust that would normally pollute the air and the area around a production plant. Our latest graduated density oil heating tube bundle provides 10% greater thermal efficiency than existing models and is fully compliant with international standards, including US, EC, and Australian regulations. Regulatory agencies worldwide recognize KleenHeat's pollution control method as the "Best Available Control Technology" (BACT) and increasingly require this equipment for new and upgraded fryer lines.

Low oil volume promotes fast oil turnover and inhibits formation of free fatty acids. Rapid, uniform heat transfer allows the fryer to respond quicker to changes in product load and protects oil quality by maintaining a low oil film temperature.

REDUCING ENERGY, WASTE, AND WATER CONSUMPTION

When sourcing equipment for their plants, food manufacturers should look for equipment that incorporates innovative manufacturing designs that reduce pollution and waste levels. Reducing the environmental impacts of processing can lower energy use, pollution, and overall costs and provide food manufacturers with innovative technology that will provide a significant return on investment and help create a more sustainable food system in the years to come. •

Cost-effective Management of Potato Waste

Waste is a delicate matter, as it can happen at any stage of the food production process. For example, during potato peeling, cutting or dicing within plants, high level of food loss can be generated, which is often unintentional wastage, usually resulting from using poor or outdated equipment.

by Tudor Vintiloiu

In recent years, food waste management has become a mammoth task for the food processing industry, as environmental legislations have become more stringent. Fortunately, equipment manufacturers have come to the aid of potato processors, by offering innovative technology, which has also been built to promote waste minimization.

The amount of waste and by-products of the potato industry is estimated to be around 12-20% of their total production volume. Potato processing generates waste in the form of peels, pulp and rejects. Potato peels, pulp and unmarketable potatoes can further be processed in starch plants, incorporated into animal feed formulations, or turned into ethanol. Thus the attempts to up-cycle the industrial potato waste will provide additional feed options for the livestock and make potato growing and processing more economical. Despite sustained efforts, food waste remains a problem in our society, with most of the food loss in some areas of the world occurring during harvest and storage, or not being eaten by consumers in the western economies. The FAO estimates that annually 30% of food produced for human consumption is either lost in the supply chain or wasted before it can be consumed. This means that 1 in every 3 calories produced is not eaten by people it was produced for.

REDUCING WASTE IS GOOD FOR BUSINESS

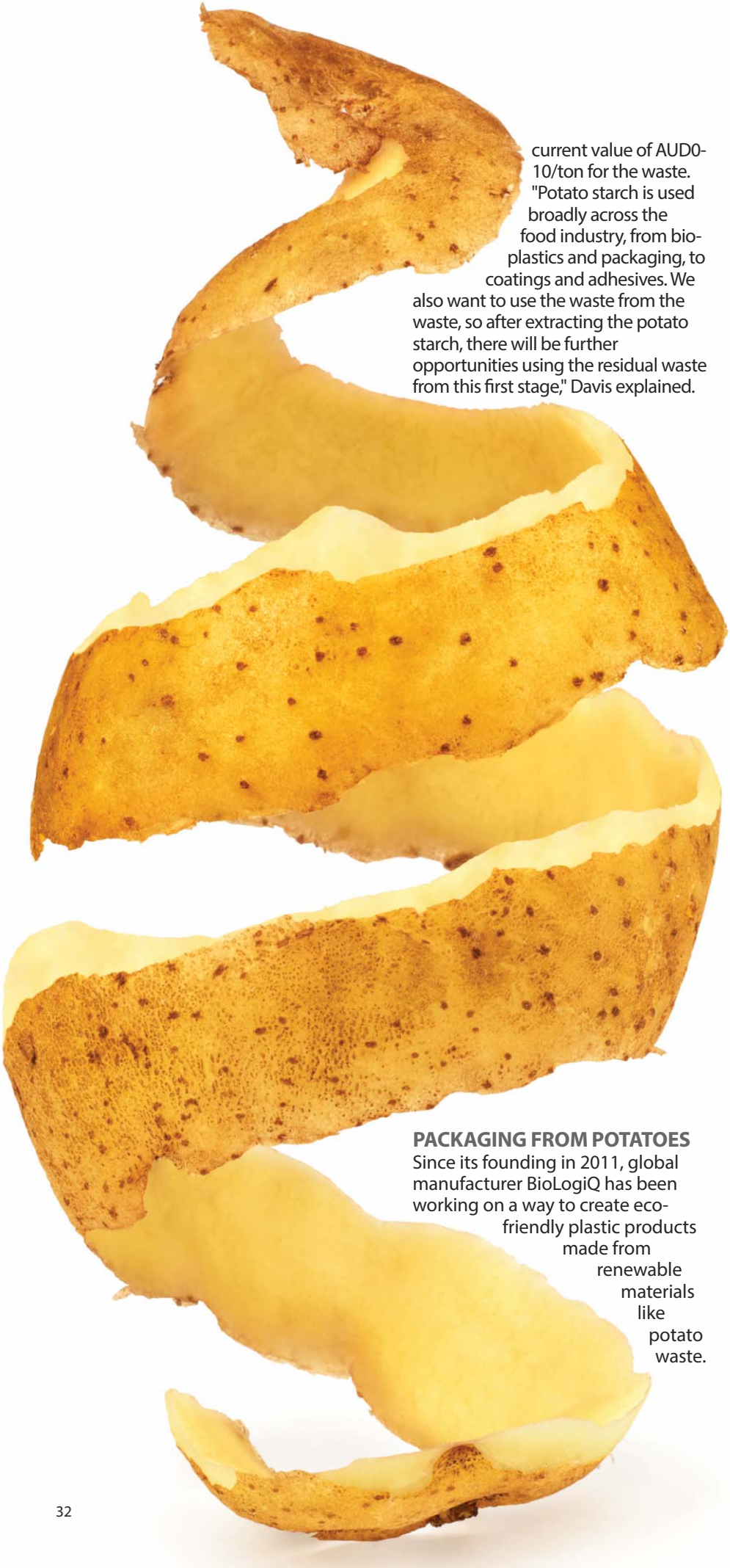
Lamb Weston/Meijer, one of the world's largest potato processors says they focus on increasing their potato utilization first. The next step is to prevent and reduce food loss and waste where possible, and the third step is to valorize all their by-products and waste streams, both ecologically and economically.

"We know that to make one kilo of fries, we need roughly two kilos of potatoes out of field. So what happens to that lost kilo? Half of this lost kilo is water evaporated during

storage, drying and mainly the pre-frying phases.
Another major contributor to raw potato weight loss is tare soil, debris and stones, which arrive from the farm stuck to the potato. Once this is removed, you have cut another 3-4% of each kilo. And then of course you have the potato peel, which account for up to 8% of the potato's weight. All potatoes, slivers and nubbins (approximately 20% of the total weight received), unsuitable to be turned into fries, are then processed into potato flakes. This is another high value product used as a food ingredient in a wide variety of foods," says Lamb Weston/Meijer in their sustainability report.
Annually, Lamb Weston/Meijer turns 1.7 million tons of potatoes into 890,000 tons of finished potato products. At the same time, they generate 436,000 tons of by-products and waste streams. Of this volume, more than 97% is valorized and repurposed or reused sustainably. This means over 300,000 MT of potato by-products (mainly potato peels) are repurposed and used locally as animal feed.
"We continue to investigate the use of high-quality white (native) potato starch, with the goal of using it in a better way. The starch is released when we cut potatoes into French fries. As a result of its strong adhesion and binding properties, it can be used in a range of industrial areas. However, we would rather find a way to use it as a food ingredient. We are currently looking into better options within this area," said the company.

ZERO WASTE & UP-CYCLING

Another large potato processor that is making strides in their waste reduction goals is McCain Foods. "Our Global Asset Recovery Program team is driving this innovative and high-potential agenda forward. With initiatives such as recovering starch from the potato flesh and extracting potato peel fibers to make flour and organic fertilizers, we're excited to see what can be achieved in the coming years. We may even be able to develop packaging from potato waste in the future," said the company.
Four of the largest potato producers in Australia also set out to convert 100% of their potato waste into commercial benefit through their partnership with the Fight Food Waste Cooperative Research Centre (CRC).
Over the next three years, The Mitolo Group, Zerella Fresh, Thomas Foods International Fresh Produce, The South Australian Potato Company, together with Potatoes South Australia, and The University of Adelaide will invest nearly AUD1m in this research and development to save up to 100,000 tons of potatoes currently going to waste every year.
Chief Executive of Potatoes South Australia, Robbie Davis, says that this is a fantastic opportunity for Australia as it is one of the largest potato growing states.
"We are seeing up to 40% of potatoes rejected because they do not meet retail specifications. At the same time Australia is importing 20,000 tons of potato starch each year, and it just doesn't make sense that we're not using these huge volumes of potatoes for alternative purposes," she said.
A large focus of this project is the potential development of an Australian potato starch industry, which would provide additional revenue for Australian potato companies; potentially AUD1000/ton for extracted starch instead of the



current value of AUD0-10/ton for the waste. "Potato starch is used broadly across the food industry, from bioplastics and packaging, to coatings and adhesives. We also want to use the waste from the waste, so after extracting the potato starch, there will be further opportunities using the residual waste from this first stage," Davis explained.

PACKAGING FROM POTATOES

Since its founding in 2011, global manufacturer BioLogiQ has been working on a way to create eco-friendly plastic products made from renewable materials like potato waste.

"[…] We started making plastic from potato waste, specifically the starch from the potato waste," BioLogiQ CEO Steven Sherman recently told the Idaho Statesman.

Traditional plastics are composed of polymers – a substance consisting of large molecules repeated many times – such as polyethylene and polystyrene. These polymers can take hundreds of years to degrade.

BioLogiQ inserts its own "iQ technology" into other plastic products, called NuPlastiQ. The "iQ technology" contains substances like potato, corn starch, or naturally sourced glycerin obtained from vegetable oils and animal fats.

When BioLogiQ's technology is combined with other plastic products, it allows the plastics to degrade faster because microorganisms that eat the plastics have a much easier time breaking down things like starch and glycerin. Up to 30% of a product can include NuPlastiQ.

Plastics without BioLogiQ's technology take so long to degrade because the molecules are too large for microorganisms to eat. Over time, the plastic eventually breaks down into smaller pieces due to fragmentation, caused by sunlight and oxidation, until it is finally small enough for microorganisms to eat.

FINAL CONSIDERATIONS

With environmental concerns at the forefront for many governmental organizations, as well as a rising number of customers, it will become increasingly important for processors to opt for efficient waste management solutions inside their plants. Next-generation equipment plays a major role in making the food sector more sustainable, efficient and profitable. But innovative scientific research can also bring its contribution to finding novel solutions. For example, scientists at Penn State's College of Agricultural Sciences have developed a new approach to more efficiently convert potato waste in ethanol. This process may lead to reduce production costs for biofuel in the future and add extra value for chip makers. •

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Flourish and Grow with European Potato Concepts

The frozen potato category is flourishing and with many years' experience, Belgian growers and potato processors are adept at responding to ever-changing potato trends and adapting their production to meet demand. Belgium is the world's No.1 exporter of frozen potato products, with 90% of its production exported to over 100 countries. In the UK alone, the frozen food category has grown by 13.5%[1] and over 400,000 more shoppers are now purchasing frozen products and the average household is spending an additional GBP25 a year on the category.

The rich, fertile soil, mild climate and long-held potato growing traditions ensure Belgian potatoes are the perfect, raw ingredient for innovative, potato concepts – and retailers have an almost unlimited choice of standard and bespoke products, formats, coatings and packaging. High quality certified seed combined with scientific research and the latest technology deliver fluffy interiors, crispy or crunchy coatings - and the unmistakable taste of Belgium. Retailers can select from a huge range of delicious, quick and convenient potato variants such as fries, mashed potato, Duchess, waffle, hash brown, potato flakes, granules and sliced potatoes, as well as the classic baby potato. In addition, restaurant-inspired concepts are driving growth as consumers seek tasty, in-home alternatives such as Rosti or Pommes Noisettes.

[1] Frozen Food Federation 2022, compared to pre-pandemic levels

SUSTAINABILITY

Alongside choice, quality and innovation, significant investment and efforts are contributing to the climate and environmental ambition of the Common Agricultural Policy (CAP), the Green Deal and the Farm to Fork Strategy. Significant efforts have already been made within the production methods of the Belgian potato sector to tackle packaging and plastic, reduce carbon footprint and water usage to help create confidence of a sustainable product with full traceability.

This includes initiatives like the Farm to Fork Strategy, which addresses the challenges of sustainable food systems and recognises the link between people, planet and profit.

A combination of efforts is allowing the market to contribute towards positive targets, such as those laid out by the European Commission like the goal to be the first climate-neutral continent by 2050.

A range of efforts have been taken to increase sustainability in potato production and processing in Belgium and the sector actively participates to reach the sustainability goals.

Climate Change Mitigation - Belgian producers are already taking energy-saving measures to reduce the energy consumption, like process optimalisation and heat recovery. There is also increasing investment into green energy via solar panels and biogas, and the sector focusses, where possible, on transport via waterways instead of road transport.

Climate Change Adaption – this means there is more research and development of new varieties of potatoes with better yields and which are less susceptible to diseases.

Biodiversity Conservation & Sustainable use of Natural Resources - farmers are maintaining small landscape elements on their farms, such as ditch sides, woodland edges and wild flower meadows. They also utilise field boundaries or maintain the natural vegetation. On their production sites, the processing companies increasingly pay attention to biodiversity. They place, for example, bee colonies and plant trees and forestry.

Sustainable Water Management – is achieved via smart farming whereby farmers receive up-to-date soil information. They receive a notification when the potatoes need water and how much, so not a drop too much is sprayed or wasted. The potato sector also uses as much collected and stored rainwater as possible. In addition to this, companies install their own wastewater treatment, so the purified water can be re-used.

Sustainable Soil Management - by applying innovative cultivation techniques like smart and precision farming, farmers can plant, fertilise and treat the parcels accurately, so every acre receives the perfect dosage on the right spot and none of the products and space goes to waste. Nor is there loss into creeks, streams or pods at the edge of the parcel.

Reduction of Food Loss & Food Waste - the potato sector works under the zero-waste food principle: no waste of potatoes, water or energy from the field to the consumer, and applies the value retention cascade in the case of unsold products to help find an alternative use for them. Fries that are too small for consumption are first processed into potato flakes. In a second phase they are evolved into animal feed and, if that is not possible sent to biogas installations. Potato peels are used for animal feed and starch is being utilised in the paper industry.

Organic Production - a lot of producers are engaged in organic potato farming and companies are doing a lot to help producers make the shift to organic farming. In fact, several companies have participated in initiatives around sustainable development and achieved sustainability certificates. All products meet the strictest European quality and food safety standards.

EU FROZEN POTATO PRODUCTS FROM BELGIUM

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

FRESH FROM BELGIUM

Co-funded by the European Union

Conflict Drives Producers to Search Frying Oil Alternatives

The availability of sunflower oil for various frying applications has been severely impacted worldwide by the recent Russia-Ukraine conflict. Coupled with rising commodity prices, it is proving a serious challenge for snack food manufacturers who are struggling to afford such escalated raw material costs in their frying fat choices. Market dynamics however indicate it is likely that food manufacturers will look elsewhere to circumvent their losses.

by Tudor Vintiloiu

Ukraine is the largest exporter of sunflower oil in the world and accounts for 46% of the USD7.42bn global market. In terms of overall oils and fats consumption, sunflower oil typically accounts for about 9% of global consumption and almost the entire quantum is used as a food commodity.

To understand just how difficult the situation has become for companies and sectors relying on sunflower oil from Ukraine and Russia, one need only look at the recent price increase. From a 2020 low of USD685 per ton, the cost has skyrocketed to an all-time high of USD1,665 per ton as of mid-March 2022, according to Mintec.

Rapeseed, soy and palm oil are also experiencing shortages due to drought in South America and export restrictions in Indonesia, and prices are skyrocketing.

FINDING ALTERNATIVES

According to Dr. Kalyana Sundram – Council of Palm Oil Producing Countries (CPOPC) Consultant, the most likely solution for this could be their return to using palm olein as the frying fat of choice in many snack food-manufacturing facilities.

Market forces, particularly in the Asia, Middle East regions are already signaling this makeover. For food manufacturers this would still be an easy switch since there is a large body of readily-available data on how best to re-adopt palm olein on its own or in combination with other palm fractions for the fry and snack food industries.

The rise of sunflower oil for fried snack foods has been a relatively recent phenomenon. Regular sunflower oil is relatively high in polyunsaturated (PUFA) linoleic acid, which is about 60% of its composition. At this high PUFA content it is unsuited for use in commercial frying since the oil oxidizes rapidly and rancidity will set in quickly in the packaged fried foods.

Plant breeders, using hybrid or even GMO sunflower varieties achieved a flip in its fatty acid composition increasing its monounsaturated oleic acid content from 30% to at least 80% while concurrently cutting down its PUFA content. These high oleic sunflower oil versions are more resistant to oxidation during high temperature frying and were seen as a viable commercial option.

Environmental concerns over palm's cultivation practices and sustainability triggered consumer resentment against palm and flipped the market in favor of the high oleic sun oil.

RECIPE CHANGES

In UK, as a result of the recent shortage, manufacturers of products including snacks and potato chips have been forced to alter their recipes and replace sunflower oil with refined rapeseed oil on very short notice.

Many have been unable to change their label in time, which has prompted The Food Standards Agency (FSA) to issue a warning. In a statement, the FSA said: "The majority of the UK's sunflower oil comes from Ukraine and food businesses here are reporting that supplies of sunflower oil are likely to run out in a few weeks with some businesses already experiencing severe difficulties. This has led to some food manufacturers urgently replacing sunflower oil with refined rapeseed oil before being able to make the change on the label. We are therefore advising that food products labeled as containing sunflower oil may have instead been produced using refined rapeseed oil and consumers should look out for additional information being provided by retailers and

"It's currently all hands on deck with the potato processors."

Christophe Vermeulen, Belgapom CEO

"At the European level, there is only a few months' worth of supply left."

Nicholas Courant of the food federation FEVIA

> *"One likely solution for this could be their return to using palm olein as the frying fat of choice."*
>
> *Dr. Kalyana Sundram, CPOPC Consultant*

manufacturers to stay informed."
The FSA added that the risk of this substitute is "very low" and allergies to rapeseed oil are rare.

ECONOMIC FALLOUT

Belgium's frituurs (the chip shops for which the country is renowned) are also seeing their sunflower oil supplies dwindling.
"It's currently all hands on deck with the potato processors," said Christophe Vermeulen, the CEO of sector federation Belgapom.
The war has had a significant impact on Europe's imports already, with empty supermarket shelves and high prices, but experts say it is bound to get worse. "At the European level, there is only a few months' worth of supply left," said Nicholas Courant of the food federation FEVIA to De Morgen.
Potato processor Aviko has told the BD.nl that the current situation forced them to use alternative frying oils, which would make its chips more expensive. 'Our biggest delivery company – responsible for 70% of what we use – has stopped since the invasion of Ukraine,' chief purchase officer Dick Zelhorst told the paper. Even if alternative oils were readily and cheaply available, replacing sunflower oil at such short notice demands a complex logistical operation because of the strict rules on packaging and food safety. Nicholas Courant of the food federation FEVIA explains that the process of complying with the rules and testing the taste and texture is a process that normally takes a year. "Now it would have to be done in a few weeks. That is a mission impossible," he told De Morgen.
An immediate challenge is therefore to develop safe alternatives to sunflower oil that can be used as like-for-like replacements in food products. Understanding the deep science associated with its functional and nutritional properties, will be key to enabling food manufacturers to quickly respond and future-proof their organizations against further market disruptions. •

> *"Our biggest delivery company - responsible for 70% of what we use - has stopped since the invasion of Ukraine."*
>
> *Aviko chief purchase officer Dick Zelhorst*

PEF Induced Product and Process Improvements in Potato and Vegetable Chips Industry

Pulsed electric field (PEF) processing is now considered a standard process technology for use in the potato and vegetable processing industry. Applying high voltage pulses opens the cell membrane of roots and tubers as well as other fruits and vegetables and allows for quicker and easier water release from the cells. This effect termed electroporation reduces the turgor pressure and leads to a number of process, quality and sustainability benefits including enhanced yield (cutting, slicing and conversion), improved product organolpetics (taste, texture and appearance) improved nutritional credentials through reduced oil uptake.

by ELEA

This article reviews PEF impact on the different stages in a snacks processing line based on industrial scale experience from Elea PEF users.

WHY USING PEF?

PEF has been in use at industrial scale, since 2010. At present Elea has installed over 175 units in the potato and vegetable processing industry worldwide. Whilst many users prefer not to disclose the use of PEF in their production processes, others are openly communicating the use of PEF and it's induced product and sustainability benefits for their own marketing purposes. Recently published reports include PEF's usage in various countries and companies e.g. at Amica (Italy), Kanaan (Croatia), Tayto (UK), Pizzoli (Italy) and BemBrasil (Brazil).

Being based on electrical energy the technique allows the replacement of thermal or mechanical cell disintegration techniques, or tissue softening with a reduced energy input, water and time requirement. Other than for ohmic heating, where alternating current is used for fast and volumetric product heating, PEF use is based on a non-thermal effect of pulsed power, electroporation. Voltage rectification and pulse modulation are done using solid state switching technology allowing high treatment capacity applications. Solid products such as fruits, roots or tubers are often treated making use of belt systems, while products that can be pumped (liquids/slurries etc) are typically treated in pipe systems. Elea pulse modulators are designed to allow a large free cross section for high throughput treatment whilst avoiding product clogging. Elea has developed a range of systems from 1 t/h up to 100 t/h in single lines, which can be operated from 0 to 100 % of their capacity. The PEF treatment is independent of size and shape of the material being treated, and product segregation by size or shape pre-treatment is not required. Dependent on product properties such as size and density as well as throughput of the material, horizontal or vertical electrodes are applied. Being a continuous process with a small footprint PEF integration into existing lines is simple. The process can be applied to products with the peel on or off, and both options are in today in industrial scale operations, with no impact on PEF efficacy. There are considerations and implications for water utilization and cleaning regimes in plant if PEF is applied pre peeling, but the efficacy of the PEF treatment is unaffected. The dwell time of the material from entering to exiting the PEF treatment chamber is approximately 10 seconds, but the PEF treatment itself happens in fractions of a second as the material passes between the electrodes.

CUTTING AND SLICING

The first and most directly visible PEF effect is observed at the stage of cutting. Reduced turgor pressure as a result of the micro holes created in the cells through the electro-perforation process (PEF), results in a softer, and easier to cut product matrix. This allows for cleaner, and smoother cuts, with less cell damage / disruption and starch loss during slicing (this is true for all types of slicing technologies, and different shapes/ cuts). The more efficient slicing enabled by PEF treatment results in less damage, and shattering, reduced scrap and fines generation, and reduces breakage during the process. These slice improvements directly increase yield and product quality.

The extent of cutting force and breakage reduction is dependent on PEF intensity as well as raw material quality. PEF intensity is described by electric field strength applied (0.5 to 1.5 kV/cm) and specific energy input (typically 0.5 to 1.5 kJ/kg for white potatoes, and 1-2 KJ/Kg for materials like sweet potatoes). Typically, a cutting force reduction of up to 50 % reduction can be achieved at the these treatment levels, and this can be accurately measured and quantified through the use of the CutControl cut force meter from ELEA. Harder produce such as sweet potato or cassava benefit from improved cutting and slicing even more than potato. Seasonal effects play a role in the quantity and amount of the

benefit observed and achieved through the use of PEF. Fresh crop shows higher cutting benefits.
A PEF treated, softer product will reduce knife wear as the product is easier to cut, and will not cause the blades to blunt as quickly.. Not only will this reduce the yearly costs for blades, but it also significantly reduces the amount of time taken to conduct blade changes during regular operation, as well as reducing maintenance requirements and down time.. As PEF softens the potato and allows for higher compression, a slight increase in slice thickness is observed that has to be accounted for, by adjusting the cutting head after PEF is first turned. This should be recorded and monitored over the year, and updated process specifications considered. The cutting improvement will result in less cell damage and a reduction of starch loss during subsequent washing and processing steps. Typically, a 10 % reduction of starch losses and in consequence a 1 to 1.5 % solids yield increase is observed. In addition to a higher yield the effect will reduce starch loss in process water, reduce starch accumulation in the fryers, reduce water/waste / effluent processing costs and improve product texture.

WASHING

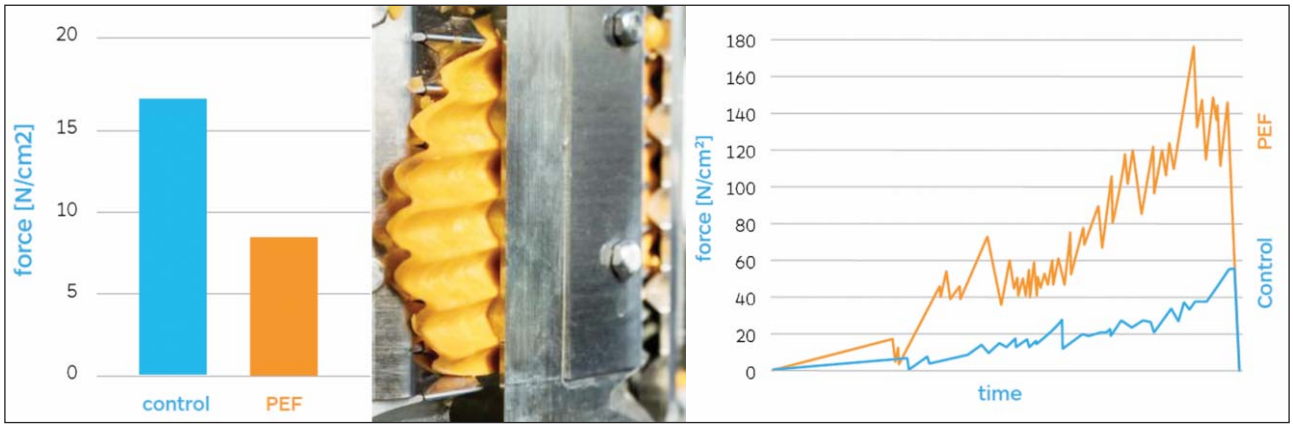
In continuous frying lines typically a washing step is applied to remove surface starch from the slices and reduce the accumulation in the fryer. PEF induced pores in the cell membrane will improve the efficacy of the washing step as more starch is retained inside the cells and not released onto the surface of the slices, thereby requiring less washing. As less starch is carried over less water will be required. Typically washing time and water temperature can be reduced, for most products a blanching step is no longer required, allowing substantial improvements of product crunch and texture. The washing step will also aid the removal of the liquid components inside the cells including reducing sugars and amino acids, resulting in less undesirable process by products (ie sugar browning/ defects).

POTATO CHIPS FRYING

Heat and mass transfer are limited by water mobility within the tissue structure. As PEF opens the cell membranes, this allows for faster water diffusion and heat transfer rate in the potato slice. Increase water movement and availability within the slice opens the route for various process improvements to be made. In most cases an increase of production capacity by 5 to 10 % is seen – given sufficient fryer heating and heat transfer power rating is available. Improved heat transport and moisture release allows for a lower frying temperature and or reduced frying time to be achieved. Both are critical for operational efficiency, product quality (color / texture / nutritional values etc.) and sustainability. The extent of Maillard reactions - typically occurring at temperature levels above 120°C in low moisture environments - can be reduced, resulting in brighter and more consistent product color. The potential reduction of frying time and temperature is dependent on type and design of the fryer used, in most situations a temperature reduction of 3 – 5°C fryer output temperature and a frying time reduction of up to 10 % has been achieved maintaining final product moisture levels in the desired range. Due to the increased starch content, it is also possible to achieve the same or crunchier texture with an increased moisture content i.e., instead of 1.5% aim, a move to 1.8 or even 2.0 % can be achieved.
Besides reducing frying heat load, the smooth cut surface has a positive effect on frying: oil uptake and adhesion on the slice are substantially reduced. Oil influx typically occurs through cracks formed during slicing and subsequent washing and tumbling steps. After PEF implementation a 2 -3 % reduction in oil uptake in absolute numbers or 10 % reduction in relative numbers is achieved without undesirable effects on product texture and taste. These changes are due to the PEF having an effect on the raw material and process itself i.e. 2increased starch / solids retention in the cells, optimized frying conditions, and finished product organoleptic specifications. Considering current frying oil pricing the reduced oil uptake is the single largest contributor towards a fast return of investment. To harvest that potential some adjustments on the processing line will be required. PEF treatment intensity, slicer setup as well as frying curve impact in oil uptake – their careful selection allows to optimize product quality towards a low oil uptake or to maintain a desired level.

BATCH FRYING

Kettle or hand cooked chips are produced in batch frying lines, without an intermediate washing



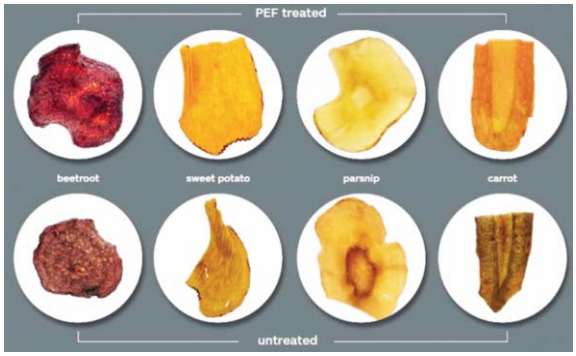
Cutting force reduction with PEF Potato chips texture measurement with and without PEF

step. PEF allows the reduction in frying time and temperature, and /or increased batch sizes leading to more consistent product quality and higher yields. Faster moisture release as well as a reduced stickiness due to less free starch on the slices allow an up to 10 % increased batch sizes . Batch frying can have a bigger impact on product quality and organolpetics (i.e. texture / color) compared to conventional standard fryers. As a result optimizing the PEF treatment alongside the specific products attributes, and operational capability (i.e. fryer types, sizes, heating source etc.) is important and needs to be considered when selecting a PEF treatment level. Typically lower treatment levels are used in products being processed in a batch line compared to those processed in a continuous fryer. To optimize treatment conditions for varying raw material quality Elea has developed adapted analytical tools: PEF Control and Cut Control which measure and quantify the cutting force reduction and increase in electrical conductivity of the materials/ substrates respectively. With optimized conditions final product shows increased crunchiness as well as improved color and consistency.

VEGETABLE CHIPS FRYING

PEF is the perfect solution for vegetable chip processing. High sugar levels of sweet potato, carrot or beet root and high oil uptake may result in color and texture problems.

PEF treated vs untreated vegetable chips samples



PEF treatment and subsequent washing allows for enhanced extraction of reducing sugars, optimization of the frying curves/process and reduced browning during frying. Improved cutting results in less tissue breakage, higher yield and reduced oil uptake. I.e. for sweet potato chips a yield increase of 2.5 % and a 15 % oil uptake have been observed. PEF performs well with atmospheric frying as well as vacuum frying.

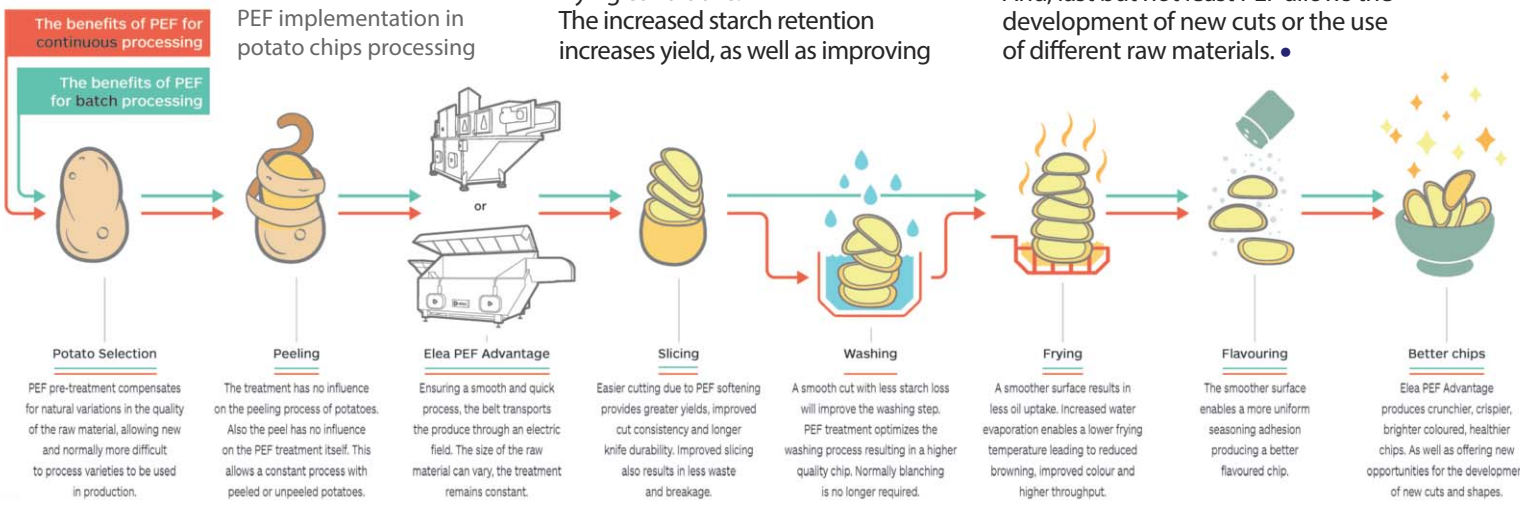
PEF IMPLEMENTATION AND PROCESS CONTROL

Continuous operability and a small footprint make PEF easy to implement into an existing line. Electrical energy, about 1 kWh per ton of product to be processed and processing water, about 30 l per ton are required . Subsequent processing steps can be adjusted and optimized to meet product specification and customer requirements. The amount of time and effort involved in validating and qualifying the benefits of PEF are similar to that of introducing a different potato variety and include adapting washing and frying conditions.
The increased starch retention increases yield, as well as improving product crunchiness, which if desired can be reverted by raising final product moisture without the usual drawbacks on texture and shelf life.
During and after a PEF system is commissioned, our expert team is ready to support utilizing all PEF benefits and line optimization.
All ELEA units measure energy input in real time, in combination with the analytical Cut Control and PEF Control to highlight the product and process improvements achievable.

SAVINGS AND SUSTAINABILITY BENEFITS

For a processing line of 1,300 kg/g finished product or 5,400 kg/h raw material and an annual production of 5,200 h yield increase and oil savings have been monitored in comparison to investment and operation costs. Yield increase and oil uptake reduction have been major contributors towards return of investment calculations and deliverables. After PEF implementation starch loss has been reduced by 10%, corresponding to an extra yield of 90 t/h, reduced breakage and fines are leading to an additional final product yield of 22 t/year. Oil usage has dropped from 2,350 to 2,120 t/year, an annual oil saving 230 t. Based on individual line capacity, raw material and energy pricing expected savings and benefits can be estimated. In addition, reduced blade wear and PEF enabled quality improvements on color and texture are important. And, last but not least PEF allows the development of new cuts or the use of different raw materials. •

PEF implementation in potato chips processing



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Jonathan Thomas

Local Flavors Lend Inspiration

The development of new flavors continues to represent one of the most widely used forms of NPD amongst manufacturers of potato-based snacks such as crisps and chips, in response to the ongoing growth in consumer demand for more adventurous and novel taste profiles. To that end, the global market for potato chips and crisps continues to witness the emergence of bolder and spicier flavors, with younger consumers especially keen to experiment.

by Jonathan Thomas

It is estimated that a handful of key flavors account for the bulk of consumption within the global market. These include traditional favorites such as plain/salted varieties, as well as flavors based around cheese, meat (most commonly chicken, beef and pork/ham), sour cream and various spices, notably paprika. For this reason, it may be reasonable to assume that consumer tastes are comparatively similar across the globe, especially since some common trends – such as the growing popularity of more intense flavors – are apparent in numerous regions. However, local tastes and ingredients continue to influence NPD within the market. As manufacturers must cater towards a more demanding consumer base, it seems likely that they will continue to seek inspiration from regional cooking and eating habits, as well as from the growing global market for ethnic foods.

EUROPE – BOLDER FLAVORS IN DEMAND

Many European markets have witnessed a growing demand for potato crisps and chips with flavors described as 'hot' and/or 'spicy.' In the UK, for example, the Walkers range was extended with a new Flamin' Hot variety early in 2021, which followed on from the launch of Flamin' Hot Wotsits the previous year. According to owner PepsiCo, the spicy flavors sector is one of the fastest growing within the UK potato crisps market, increasing by around 13% per year at present. Other recent UK launches within this sector have included new Fire Pit flavors for KP Snacks' McCoy's range (which appeared in Flame Roasted Peri Peri, Flame Scorched BBQ Ribs and Flame Smoked Chorizo varieties), as well as a Steakhouse Barbecue flavor for the Kettles brand. An extensive range of flavors was unknown until comparatively recently within the German potato crisps market. However, tastes have become far more cosmopolitan in recent decades, driving demand for the kind of novel flavors found in other parts of Western Europe. A recent addition to the Funny-Frisch range owned by Intersnack was a new Hot Chili Mayo

flavor, while the same company's range of kettle crisps includes varieties such as BBQ and Sweet Chili & Red Pepper. In the Italian market, the Lay's Xtra range of ridged crisps owned by PepsiCo contains a Barbecue flavor, which is said to offer a more intense taste experience.
In Scandinavia, the Norwegian and Danish markets are dominated by the KiMs brand, which is owned by Orkla Group. This brand includes spicy variants such as Mexican Fiesta and Hot Reaper. Further east, PepsiCo's Polish portfolio includes Lay's Strong, intensely flavored crisps in varieties such as Hot Pepperoni, Cheese & Jalapeno and Chili & Lime. Elsewhere, PepsiCo has also added new bolder flavors such as Chili & Lime and Spicy Paprika to the Lay's range in Russia, although the future dynamics of this market remain unclear due to the current political situation.
Another noteworthy trend in some European markets has been the development of chips flavors based on popular meals. During the first half of 2021, PepsiCo extended its Walkers MAX range in the UK with new chips produced in partnership with KFC. Two new flavors were launched, namely Kentucky Fried Chicken and Double Crunch Zinger, while KFC-branded chips have also appeared further east in the Polish market. Also in 2021, PepsiCo further extended the Walkers range with its new Taste Icons range. Described as limited edition chip flavors inspired by restaurants and ethnic cuisine, the new flavors included Fish & Chips, Beef Madras, Thai Green Curry and Chicken Burrito. This was later described as one of the most successful launches by Walkers for some time.
However, evidence from many leading western markets suggests that the traditional favorites still command a loyal following.
According to research carried out by Lumina Intelligence in the UK during 2021 (which surveyed the opinions of 1,000 adults), 45% of consumers typically opt for a few favorite flavors when it comes to bagged snacks and stick with them. This habit is especially ingrained amongst consumers aged 65 and over (58%), but less so for those aged 25-34 (38%) and 35-44 (37%). At 23%, the percentage of consumers who are always keen to try out new flavors of snacks is highest for those aged 35-44.
It is estimated that plain/ready salted versions and Cheese & Onion account for around 45% of the UK market, ahead of flavors such as Salt & Vinegar and meat-based varieties. Elsewhere in Europe, paprika is a common favorite in countries such as Germany and the Scandinavian nations, while the Lay's range in the Benelux region includes crisps featuring iconic local flavors. These are Mayo and Frisian Andalouse, the latter of which is a sauce made from a blend of mayonnaise, tomato puree and various spices.

US – REGIONAL TRENDS

Throughout the US, the traditional favorites remain popular as far as potato chips are concerned.
According to latest data, plain/salted remains the most popular potato chip flavor amongst US consumers, ahead of varieties such as Barbecue, Sour Cream & Onion, Salt & Vinegar and flavors based upon cheese. According

to PepsiCo's Frito-Lay US Snack Index, 89% of consumers claimed the presence of tried-and-tested favorites was important when purchasing snack foods during summer occasions. Around two-thirds of respondents claimed to stick with classic and/or traditional flavors when purchasing potato chips.

That said, the large and diverse US market offers some intriguing examples of regional differences in potato chip flavors, due to the variances in local tastes. One notable example is Hawaii, which has a distinctive cuisine due to its geographical isolation and its heavy use of local ingredients such as seafood and tropical fruits. This can be illustrated by the Hawaiian Kettle Potato Chips brand owned by Utz Snacks, whose flavors often combine sweet and savory varieties and offer a tropical taste. The range was recently extended with a new Moloka'i Sweet & Spicy variant, which carries hints of pineapple and chili flavors. Other flavors in the range at present include Mango Habanero and Luau BBQ, which carry strong links with traditional Hawaiian cooking.

Elsewhere in the US, flavors based around barbecue-style cooking and products such as ribs enjoy a strong following in the more southerly parts of the country. Although barbecue cooking enjoys widespread popularity, distinctive regional differences do exist across the US, therefore offering plenty of scope for manufacturers of potato chips to develop unique flavors based on local tastes. It is generally accepted that the four main regional barbecue cuisines within the US are as follows:

- Kansas City – there is a strong emphasis on 'burnt ends', i.e. fatty and flavorsome pieces of meat, while brown sugar is a widely used base ingredient, together with molasses to increase sweetness.
- Memphis – the emphasis with this style of barbecue is pork and pork ribs, which are prepared in either a wet or dry fashion.
- Carolina – this style focuses on slow-roasting an entire hog during a process that can take up to 24 hours, thereby providing different textures of meat, although some areas prefer to focus upon selected cuts. The Carolina style also encompasses distinctive barbecue sauces, such as Lexington and Piedmont.
- Texas – brisket is the meat most often used with this style of barbecue cooking, which is typically smoked for up to 18 hours.

In the US, there are five types of barbecue sauces, which can frequently differ by region and offer a range of different tastes. They are based on one of the following ingredients: tomatoes, vinegar, mustard, mayonnaise or Worcestershire sauce.

Elsewhere in the country, potato chip flavors in states such as Florida are strongly influenced by the presence of a large Hispanic community. For this reason, flavors such as Limon and Salsa are evident. Cheese-based flavors are well to the fore in Wisconsin (as might be expected, given its strong dairy industry heritage), while flavors based on Dill Pickle are popular with consumers in New York.

Recent innovation in the US market has been driven by the increased inclination of more consumers to experiment with bolder flavors as tastes become more cosmopolitan. According to the latest version of PepsiCo's Frito-Lay US Snack Index (which surveys almost 2,200 adults and appeared in the summer of 2021), almost one third (32%) of respondents claimed to prefer new spicy and bolder flavors, up from 25% the previous year. This figure increases to 45% for younger consumers in the millennial and Generation Z age brackets.

This trend can be illustrated by recent brand activity. PepsiCo's Ruffles range now includes Flamin' Hot BBQ and Flamin' Hot Cheddar & Sour Cream varieties, which were developed in conjunction with stars from the National Basketball Association (NBA). More recently, the Ruffles range has been extended with new Double Crunch potato chips in Hot Wings and Zesty Cheddar flavors. Within the kettle chips sector, a recent addition to the Kettle range was Krinkle Cut Habanero Lime, which offers distinctive hints of spicy pepper and citrus flavor. Bolder flavors are also well to the fore amongst the company's classic range of kettle chips – examples include Backyard Barbecue, Korean Barbecue and Jalapeno.

REST OF THE WORLD

Although many flavors are common to numerous regions and countries, there is also evidence of local tastes within the global market for potato crisps and chips. In Latin America, flavors geared towards Hispanic tastes are apparent in markets such as Mexico – examples from PepsiCo's Sabritas range include Habanero, Limon and Flamin' Hot. Further south within the region, crisps with meaty flavors are popular in countries such as Argentina and Brazil, which rank amongst the world's leading providers of beef. In Argentina, the Lay's range includes a Picado flavor, which emulates the taste of charcuterie at typical barbecue occasions.

Local tastes and ingredients are also evident within the African region. In the South African market, PepsiCo's Simba range of crisps includes Chakalata (which is a spicy tomato bean relish), as well as other bold flavors such as Mexican Chili, Smoked Beef and Chili Biltong. As is the case in Europe, Australian consumers also appear to be gravitating towards hotter and spicier flavors for their chips. The Thins brand supplied by market leader Snack Brands includes flavors such as Peri Peri and Hot & Spicy, as well as a Himalayan Pink Salt limited edition.

It is arguably within the Asian and Far Eastern regions that the world's most diverse range of chip flavors can be found. Many of these are highly unusual by western standards, based as they are around local ingredients, meals or styles of cooking. In the case of countries such as Japan, flavor innovation has been driven to a large extent by the increased penetration of imported potato crisps and chips, which has forced domestic manufacturers to expand their ranges to cater for a wider diversity of consumer tastes.

In the Chinese market, the Lay's range was extended during the second quarter of 2020 with new locally-inspired flavors – examples included Peking Duck, Spicy Duck Neck, Salted Duck Egg and White Rabbit Candy. Other leading flavors include examples based on specific meals (e.g. Hot & Sour Fish Soup), as well as Cucumber, Lemon Tea and potato chips with blueberry and kiwifruit flavors.

In Japan, Nori Shio (a mixture of seaweed and salt) remains a favorite with many domestic consumers, as well as Jagariko (baked potato and butter) and Wasabeef, a combination of beef and Wasabi spices. Flavors based on seaweed have also appeared in the Thai market, while the popularity of fish and seafood across much of the region is reflected in the presence of crisp flavors such as Seafood & Octopus in South Korea. •

NA Potato Market Challenges and Outlook

The impact of inflation on consumer goods and agricultural inputs, trade disputes with important industry partners, and the war in Ukraine are all factors that influence the market outlook for the North American potato industry.

by Tudor Vintiloiu

The potato industry depends on an efficient transportation system to move product from the farm through the supply chain to the end consumer. Unfortunately, current supply chain disruptions are creating severe shortages of vital inputs for potato production and inflating prices for those fortunate producers who can secure supply.

FERTILIZER SHORTAGE

Farmers across the Atlantic region in Canada say their operating costs have increased significantly with fertilizer imports from Russia under sanction, and some are looking for alternatives, according to a recent CBC News report.

"We're pretty frustrated with the whole thing this year, it's really stressful," said Brian Adams, owner of Hilldale Potato Inc., in New Denmark, near Grand Falls in New Brunswick. Adams said he paid about USD700 per ton of fertilizer last year and is being quoted about USD1,300 per ton this year.

"All costs are up this year, machine repairs, fertilizer or sprays," he said. "It's going to bring our cost of production up dramatically." Adams estimates that his operating costs overall will increase by over 60% this year.

The Atlantic provinces rely heavily on fertilizer imports from Russia, Belarus and Ukraine. Fertilizer Canada CEO Karen Proud said about 85% to 90% of all nitrogen fertilizers used in the eastern provinces come from Russia.

In Prince Edward Island, the potato board reported that farmers are seeing fertilizer prices increase by 75% to 100% this year. Because of this, farmers in the region have had to look for alternative solutions to common fertilizers or limit their intake.

FRESH SPUD STOCKS

California, Colorado, Florida, Idaho, Maine, Michigan, Minnesota, Nebraska, North Dakota, Oregon, Texas, Washington, and Wisconsin held 6.55m metric tons of spuds in storage on April 1, up 3% from April a year ago.

Potatoes in storage accounted for 31% of the cultivar states' 2021 production, up slightly from 30% a year earlier, the USDA Potato Stocks report mentioned on April 14. The indicated potato disappearance, at 14.27m metric tons, was down 5% from the same period last year.

The 985,565 metric tons of potato's season-to-date shrink and loss accounted for was 1% higher than the same time last year, the USDA experts added.

The same aggregated USDA data shows that the spud processors in eight US states used 7.87m metric tons of potatoes for the season, up 6% from April 2021.

According to USDA's experts, the potato stocks survey is a probability survey that includes a sample of approximately 830 growers, processors, and storage facilities that are contacted to obtain the quantity of potatoes stored as of the first of the month, as well as monthly shrinkage and loss information.

The monthly processing data is collected from a census of all known potato processing facilities in Colorado, Idaho, Maine, Minnesota, North Dakota, Oregon, Washington, and Wisconsin.

PEI POTATOES

Through its official voices, recently, the Government of Canada has declared that it is committed to restoring full market access for PEI potatoes to the United States (US) and will continue to support potato growers as they head back to the fields and prepare for the upcoming growing season.

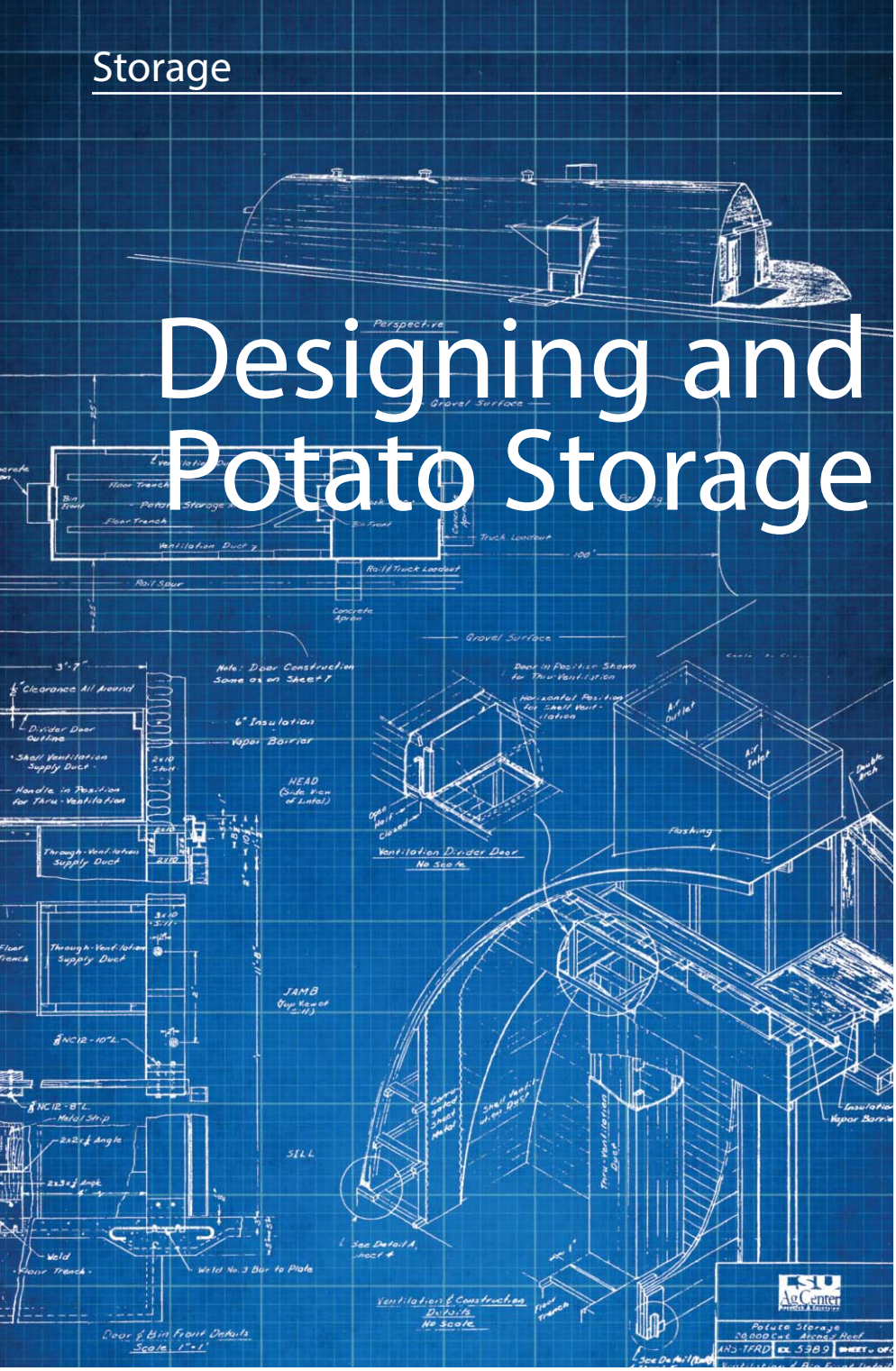
"Reopening the United States border for most PEI potato exports came at a critical time for the industry," according to a recent press release.

As part of continued efforts to support the long-term prosperity of PEI's potato industry, Budget 2022 provides USD28m in additional funding. This year's financing will include a USD16m over two years, starting in 2022-23 to the Atlantic Canada Opportunities Agency to

support long-term investments and assist in stabilizing the PEI potato sector and supply chain.
Another USD12m over two years, starting in 2022-23, will be allocated to the Canadian Food Inspection Agency (CFIA) to accelerate the investigation into the latest detection of potato wart to help prevent its spread and to allow for full trade to resume with the US as soon as possible. The CFIA will use the funds to fill over 35 positions to accelerate the soil sampling and testing, including an expansion of current laboratory capacity. This will help maximize CFIA's efficiency in completing the ongoing investigations related to the most recent findings identified in October 2021, which are targeted for completion in 2023.
Beyond the federal support allocated to PEI's potato industry in Budget 2022, the Government of Canada has also provided a Stay of Default for 2021 outstanding potato advances. "These have been granted to provide growers with additional flexibility to repay an estimated USD20m in advance payments. Potato growers who received support from the Prince Edward Island Federation of Agriculture (PEIFA) 2021 Advance Payments Program (APP) and are in good standing are eligible for the Stay of Default," a recent press release shows. In addition, potato seed growers may also be eligible for compensation under the Potato Wart Compensation Regulations (PWCR). Compensation under these regulations is another tool to support growers. PEI exports of fresh potatoes are vital to the Island's economy, and all of Canada.

MEXICO MARKET EXPANSION

A recently agreed work plan between the United States of America (US) and Mexico agriculture officials states that the entire Mexican market would be open no later than May 15, 2022, for all US table stock and chipping spuds. On April 5, US Agriculture Secretary Tom Vilsack and Mexico Secretary of Agriculture and Rural Development Victor Manuel Villalobos Arambula announced that the US and Mexico have concluded all necessary plant health protocols related to expanded US fresh potato shipments. Recently, the National Potato Council appreciated the 'positive announcement' and thanked Secretary Vilsack and the teams at USDA and USTR for their efforts to ensure that Mexico lives up to its bilateral trade obligations.
"Given the history of this 25-year trade dispute, we are waiting to declare victory until we see durable exports of both fresh processing and table stock potatoes throughout all of Mexico as required by the November 2021 signed agreement. We hope the April site visit by Mexican officials will be the last hurdle we need to clear and that no last-minute roadblocks will be erected before Mexico finally – and permanently – reopens its border to U.S.-grown potatoes," the NPC press release states.
Despite the restriction of US fresh shipments to only the 26-kilometer border region within Mexico, the country is the second-largest market for fresh potato exports, purchasing 124,449 tons valued at USD60m in 2021, according to the National Potato Council's representatives.
The US potato industry estimates that access to the entire country for fresh US potatoes will provide a market potential of USD250m per year, in five years, according to the NPC statement. Mexico is the largest export market for US potatoes and products valued at USD394m in 2021. •



Designing and Building Potato Storage Facilities

The basic building prerequisites for optimum potato storage are good thermal insulation in the roof and walls, no illuminated areas, consistently low storage temperatures, as well as a tight and dry warehouse. Furthermore, appropriate technical equipment for drying and cooling is required so that there is no degradation in quality. Both the wall design and the type of construction depend on the type of storage: boxed or bulk storage.

by Tudor Vintiloiu

Stored tubers are living organisms, which produce heat through respiration and lose moisture (shrink) through respiration and evaporation. An ideal storage environment must be provided if the tubers are to be stored up to 10 months.

Tubers go through different storage phases (curing, cooling, long-term storage and marketing), each requiring a different environment. To meet all of these requirements the potato storage must be designed to:

- Maintain tubers at a desired temperature by exhausting the heat of respiration and circulating cool fresh air through the pile.
- Maintain a high relative humidity to promote wound healing at harvest and to prevent tuber desiccation (shrink)
- Provide oxygen for tuber respiration
- Remove carbon dioxide, the by-product of respiration and other deleterious gasses, which affect tuber quality.
- Deal with adverse storage conditions where the tubers are wet, rotting, chilled, frozen or too warm.

STORAGE STRUCTURE

Almost any type of building can be adapted to store potatoes, however, commercial rigid frame steel buildings are not normally used because the exposed steel beams and columns are difficult to insulate. The most common storage buildings are concrete, wood stud and pole frame, and metal quonset. The factors that vary between various building types are capital cost, durability and longevity, and the type of insulation required for the exterior building envelope. Regardless of the type of building, the design should ensure that the structure can withstand the forces exerted by the stored potatoes, wind and snow.

Design and construction can typically require quite a bit of time; therefore early planning is required to ensure the storage is ready at harvest time. According to Adrian Cunnington, AHDB's Head of Crop Storage Research, the capital cost of a bulk store with load-bearing, insulated retaining walls is higher than for a box store. But when the capital cost of

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boxes is added, box storage is more expensive overall. Deep bulk piles benefit from positive ventilation but can lead to pressure-bruising problems if the crop is stored more than 4 m deep or is excessively ventilated. Box storage is more complex to ventilate uniformly. However, box stores help with separation of different stocks and provide more flexibility for crop movement and marketing. Depending on their size, age and quality, boxes can be stacked up to eight high.
It should be noted that potatoes from individual fields often behave differently in storage, requiring individual management. Ideally, the potatoes from each field should be stored in a separate bin, but since smaller bins cost more per hundredweight, storage management is compromised when storing potatoes from different fields in large bins. AHDB's Potato store managers' guide gives the following considerations when it comes to the insulation of a potato store.

INSULATION

The quality of the insulation will determine to a large extent how well a potato store performs. Insulation is a key factor for a potato store, much more so than it is for general-purpose buildings. Maintaining temperatures above freezing point is seldom a problem, given the quantity of heat produced in a large store. However, any heat that leaks into a store has to be removed by ventilation or refrigeration, which adds to the cost of electricity. In addition to implications on cost, the avoidable operation of environmental control equipment will always increase water loss from the crop. It is, therefore, as worthwhile to use insulation to limit heat ingress into the store as it is to minimize the effects of cold weather.
A light-colored, reflective, external surface will reduce unwanted solar radiation gains. Nearly all insulation materials have their performance reduced significantly by small increases in their moisture content. The use of vapor barriers to protect insulation is only effective in the high humidity conditions found in potato stores where composite metal/polyisocyanurate (PIR) sandwich panels are used. These are commonly used for newly built stores at thicknesses of up to 120 mm. Other systems for upgrades offer, at best, little more than a vapor check. This tends to limit the choice of insulation to either spray or board polyurethane or, occasionally, EEP board (e.g. Styrofoam). If moisture 'drive' across insulation cannot be prevented, or if the insulation is inadequate, condensation will form within or on the structure, reducing its effectiveness and risking moisture deposition on the crop.

OPTIMAL STORAGE ENVIRONMENT

Good store management should ensure crop temperatures are as uniform as possible to minimize the risk of condensation. Sensors, therefore, need to be added and be sufficiently accurate to measure differences as small as 0.5 degrees Celsius. Ventilation is a critical process in storage, as the movement of air through the potatoes is the primary means of regulating the crop condition by drying, cooling, heating, humidifying, or adding chemical treatments. Specific strategies are needed for key processes, such as drying and initial pull-down, to holding temperature, and for the use of refrigeration.
Many companies offer turnkey solutions for store climate management, which needs to balance a multitude of variables in order to ensure the best possible storage conditions. The storage temperature affects the curing and wound healing processes, disease spread and severity, the sugar-starch relationships, and respiration. Respiration, in turn, influences dormancy or sprouting, and weight loss. It is also essential during the entire storage period to maintain a relative humidity level above 90% to prevent weight loss.
"The challenge is to adapt the climate computer to the required circumstances and at the same time the weather conditions can be an obstacle in achieving this. So, in the ideal situation, we need ventilation, refrigeration and heating to have all tools available when needed," says Jan van Maldegem, Tolsma product manager. "The computer has to be set to the right phase: drying/wound healing, storage or heating and the settings have to be made in accordance with the situation of the crop. Then the climate control computer will run the algorithm and start its job."
Air movement may not be necessary during the curing period, because the heat and moisture generated by the potatoes may provide an environment that is favorable for wound healing, but subsequently it becomes an important factor to consider.
"Many of our units use ambient ventilation when the conditions are correct and only run the refrigeration system when required. We believe the quality of the stored crop is the primary job therefore the equipment needs to run when the crop needs it regardless of energy efficiency. We choose specific fans for each project to keep energy efficiency at an optimum. We work hard with our suppliers and our internal production to make sure we use the best materials available to try and keep the cost of maintenance low and the longevity of the equipment high," says Adam Fryer, commercial director, Farm Electronics. •

2022 FEATURE PLANNING

1 JANUARY/FEBRUARY
Ad closing 17.01/Publishing 28.01

Key Exhibitors Road Map and Event Agenda

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

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

Spotlight
- Cleaning and sanitation

Markets
- Western Europe

Products
- Better for You potato products

Ingredients
- Lowering salt sontent

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

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

2 MARCH/APRIL
Ad closing 14.03/Publishing 25.03

Key Exhibitors Road Map and Event Agenda

Processes
- Sorting
- Process monitoring
- Seasoning & coating

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

Spotlight
- Smart production & Industry 4.0

Markets
- Eastern Europe

Products
- Potato-based snacks, drinks and innovations

Ingredients
- Flavors and seasonings for chips and fries

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

Trade shows: Anuga FoodTec | 26-29 Apr

3 MAY/JUNE
Ad closing 09.05/Publishing 20.05

Key Exhibitors Road Map and Event Agenda

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

Expert View
- Precision in cutting equipment
- Sustainability in production

Spotlight
- Waste management

Markets
- North America

Products
- Local vs. international tastes in potato snacks

Ingredients
- Frying oils

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

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

4 JULY/AUGUST
Ad closing 18.07/Publishing 29.07

Processes
- Blanching, frying
- Forming and extruding

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

Spotlight
- Increasing efficiency in potato processing

Markets
- South America

Products
- Potato chips flavors, textures and trends

Ingredients
- Batters, coatings

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

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

5 SEPTEMBER/OCTOBER
Ad closing 05.09/Publishing 16.09

Processes
- Cooling and freezing
- Dehydrating

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

Spotlight
- Traceability along the potato value chain

Markets
- APAC/ANZAC

Products
- Frozen French fries in retail & foodservice

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

6 NOVEMBER/DECEMBER
Ad closing 07.11/Publishing 18.11

Processes
- Turnkey projects
- PEF technology

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

Spotlight
- Increasing production capacity/Future-proofing processing operation

Markets
- Global market predictions for 2023

Products
- Flakes, pellets and mashed potatoes

Ingredients
- The future of potato snacks 2023

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


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