

# POTATO PROCESSING

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

Supporting the potato industry worldwide

Issue 2 • Volume 30 • 2022

**ANUGA**  
**FOOD**  
**TEC**  
**DIG 2022**  
**SPECIAL**

## Snacks

Flavors and Health  
Front of Stage

## Process

Optical Sorting Helps  
Processing Operations  
Gain Ground

## Spotlight

Operational Efficiency  
Through the Gathering  
of Analytical Data

## Markets

War and Insecurity  
Impact European  
Potato Markets

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# Potatoes and Politics

**Tudor Vintiloiu - Editor in chief**

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**T**he immediate impact of the Russia-Ukraine conflict on western companies has been quite dramatic, effectively disrupting operations at an unprecedented scale. But the fallout from the conflict may hold various direct and unintended consequences for foreign businesses - from disrupting trade and global supply chains to causing tension between overseas and domestic consumers. The outbreak of the Russia-Ukraine conflict sent shockwaves throughout the world and led to an unprecedented response from countries around the world in the form of sanctions and bans.

Companies engaged in direct trade with Ukraine, Russia, and Belarus, however, are feeling the most immediate impact of the conflict. Ukraine is now essentially closed to trade and business, while the situation with Russia and Belarus is more complicated. Western companies have to comply with the sanctions imposed by their countries of origin and will have to shut down many operations in order to conform with them.

*The dire situation unfolding in Ukraine is putting extreme pressure on the agricultural industry and decisions to be made regarding 2022 crops. Fertilizer and diesel have reached record high costs casting great uncertainty for the sector.*

However, in some cases, western sanctions could affect third country companies as well. US and EU technology sanctions on Russia, for instance, essentially ban any product containing US and EU-made technology from being sold to Russia. This has become an impossible situation and a serious blow to equipment suppliers worldwide that had running contracts with Russian companies, that had equipment to deliver, that had service and maintenance contracts to honor, or had to receive payment for goods already delivered. The conflict in Ukraine has virtually eclipsed the European finished-product potato markets as well

these days. Moreover, despite the world demand for the processed product being at an all-time high, there is much less activity in the free-buy physical markets.

"The dire situation unfolding in Ukraine is putting extreme pressure on the agricultural industry and decisions to be made regarding 2022 crops. Fertilizer and diesel have reached record high costs casting great uncertainty for the sector," the Irish Farmers Association's latest report shows. ●

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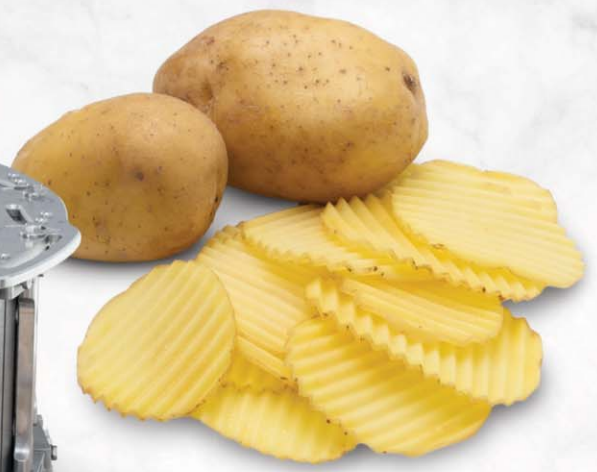
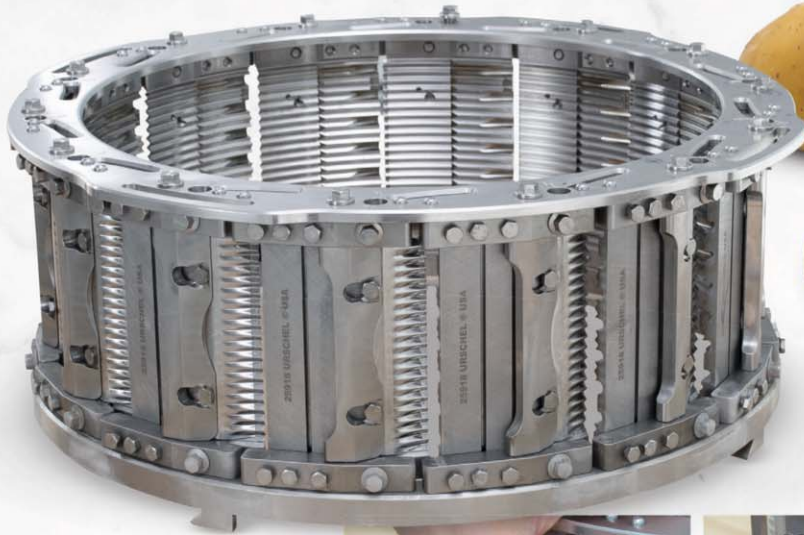
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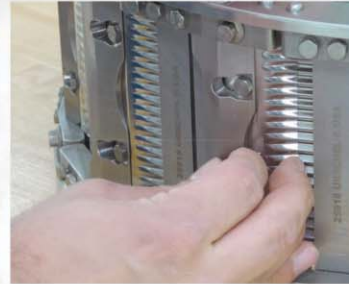
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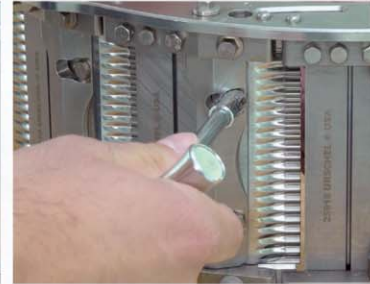
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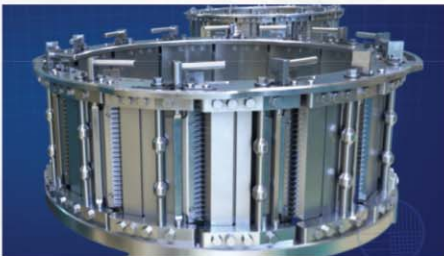


TIGHTEN

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## Sormac's Entirely Revamped Machine to be Revealed at Fruit Logistica



**A**t the Fruit Logistica (booth D07, hall 3.1) in Berlin, Sormac will be presenting the potato halving and quartering machine DMA, boosting the spud market. According to a recent press release, the potato halving and quartering machine have undergone numerous updates. It has a continuous processing system, which means less maintenance and a higher capacity. "The machine is also equipped with an innovative aiming system. This ensures

that the potatoes are perfectly aligned before they are sliced, resulting in a smoother end product," Sormac's experts mentioned. The machine can be equipped with cutting dies that chop potatoes into 2, 4, or 8 pieces. The dies are removable and easily exchangeable. The final new feature is a folding transport roller. Small parts that fall between the rollers are now discharged with each rotation of the aligning rollers.

## Raynbow: The Optical Sorter for Freshly Harvested Potatoes

**T**hanks to the Raynbow optical sorter from Raytec Vision, excellent results can finally be obtained even for unwashed potatoes. This machine can distinguish between potatoes covered with soil, clods, stones, and green potatoes. Moreover, the 3Way configuration allows dividing between waste and second choice, contributing to a saving of raw materials and increasing the sustainability of potato sorting. Hans Felbermaier, managing director of a family-own company, confirms in full these new features. "The introduction of Raynbow into the production process has brought countless benefits. First and foremost, sorting reliability, but also a considerable saving in production costs. Raynbow is a ductile machine that fits perfectly the producers' needs," Felbermaier mentioned.



## Kiremko Granted Steam Peeling System Patent

**T**he patent for invention number 11,185,103 has been issued for a steam vessel that – due to its innovativeness and robustness – gives an optimal peeling result and also lasts much longer than other peeling vessels, Kiremko BV has recently announced. According to a press release, this unique concept is reflected in the steam peeling vessel of the market-leading Strata Invicta steam peeler, developed by the globally operating company and its partners Idaho Steel and Reyco.

"This latest patent makes claims in connection with our technology that allows ultimate robustness in vessel design as well as very impressive yield improvements in steam peeling," Eric van Oorschot, one of the inventors, mentioned. "This and many other unique technologies have already been patented by Kiremko in most parts of the world. We are very happy that we have now been granted the patent in the USA."



## Tummers Optimizes Sorting With New Delta Roller Spreader



**A**fter taking a closer look at their sorting processes, the Tummers Food Processing Solutions engineers recently announced that they have improved the company's spreading machine's efficiency. The specially shaped rollers of the "Delta" Roller Spreader ensure a higher return and extended maintenance intervals. Tummers' new spreading machine is part of their

peeling process. After steam peeling, brushing, and washing, this machine spreads the product for an optical sorter that detects foreign objects and abnormalities. Due to gentle handling during spreading the products will damage less, resulting in a higher yield. The new Delta Roller Spreader is the result of Tummers' pursuit for continuous improvement. The machine-building company noticed bouncing movements at previous spreading methods with hexagonally shaped rollers and decided they could do better. "We eventually discovered that triangular rollers with a radius on the flat sides reduce the bouncing. This prevents product damage and improves the supply to the optical sorting machine, reaching higher returns as a result", Business Development & Sales Manager Edwin Langbroek explains.



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## Scottish Potato Seed Export Plan Sparked Outrage Over PepsiCo

**A**mid the invasion of Ukraine, PepsiCo has drawn criticism for agreeing to export 2,000 tons of Scottish seed potatoes to Russia in a deal worth almost USD800,000 (GBP600,000). The deal with Aberdeen-based seed potato growers, Saltire Seed, came with the approval of the Scottish government, Business Insider recently wrote, citing info's coming from Times of London. The same media source added

that a government spokesperson denied this and told The Times that it did not approve export deals. The agreement comes at a time when several major corporations have cut trade ties with Russia. PepsiCo recently announced it had suspended select beverage sales, capital investments, and all advertising in Russia. According to a statement, however, PepsiCo's CEO Ramon Laguarta said it would continue selling "other products in



Russia, including daily essentials such as milk and other dairy offerings, baby formula and baby food."

### Banana Organic Tech to Protect Spuds from PCN



**T**he East African potato growers may now have a chance to fight against the invasive and highly destructive potato cyst nematode (PCN) thanks to the 'wrap and plant' organic technology. This solution involves enclosing potato seed before planting, in a thick absorbent paper that is made from the fiber of banana plants. This strategy provides a protective barrier for the plants against damage by PCN. "The banana-fiber characteristics make the 'wrap and plant' paper dense, rigid and sturdy, such that it remains intact in the soil while also allowing the plant's roots to germinate and thrive. Although the paper is durable, it is also biodegradable, and it eventually decomposes," Farmers Review Africa wrote.

## PEI Crisis Deepens - Potato Wart Found in a Third Field

**R**ecently, The Canadian Food Inspection Agency announced that it has detected the presence of potato wart in a third field in Prince Edward Island (PEI), near two other farms where it was initially discovered in October 2021. Last November, the federal government banned the export of seed potatoes from PEI, and the continental United States (US) market has been closed to all Island potatoes ever since. The officials mentioned that the latest find was not a surprise, considering it's common to detect potato wart in nearby fields during an investigation.



"The farm in question does not produce table stock potatoes and does not export to Puerto Rico," the Todayville Red Deer wrote, based on The Canadian Press report first published on March 9, 2021. According to the PEI Potato Board, the Island's potato industry lost more than USD25m before exports to Puerto Rico resumed.

## The 'Super Beetle' - 'Immune' to More Than 50 Insecticides



**T**he University of Wisconsin-Madison experts in entomology led an in-depth sequencing of the Colorado potato beetle's genome starting with 2018, to understand how this "superbug" can overcome new insecticides as quickly as it does. New research done by Sean

Schoville, a University of Wisconsin-Madison professor of entomology and his team, finds that the Colorado potato beetle achieved this feat largely by turning to a deep pool of diversity within its genome. This allowed different beetle populations across the US to quickly evolve resistance to nearly anything humans have thrown at it. The findings are unwelcome news for farmers and scientists hoping to turn the tide on the potato beetle's attacks. It seems unlikely, Schoville added, that even a brand-new insecticide would keep the pest in check for long.



## Smart Mechanical Weed Control Development Expands Operation

**A** new EUR18m Lemken factory integrating hoeing technology, a promising field for the future, benefiting from the global shift towards mechanical, camera-controlled weed control approach, is scheduled to open its doors at the end of 2023 and will employ at least 30 additional members of staff. The plant will be built in Dinteloord (North Brabant), the Netherlands, not far from the current facility. This new factory will also be connected to the Nieuw Prinsenland Agro Food Cluster as an additional benefit.

“The world around us is changing fast. That’s why everybody involved in the production chain needs to work together to ensure sustainability in food production. Primary agriculture, in particular, plays a pioneering role here. New technologies open up a wide range of possibilities. For example, by switching to smart mechanical weed control we can apply crop care products more precisely and gradually reduce their use. That’s why we have been going full steam ahead with the development, production, and sales of Steketee machines since 2018. We want to invest significantly more in product development to build on Steketee’s position as an innovator, for example with the use of artificial intelligence,” Anthony van der Ley, managing director of Lemken said.

## Europe’s Processing Sector to Ensure the Viability of Our Planet

**T**he European Potato Processors’ Association (EUPPA 2021) Sustainability Report shows how Europe’s potato processing sector is committed to upholding the sustainability of its raw ingredients, production processes, and final products to ensure the future viability of our planet. “It testifies very well to the sector’s great ambitions on the sustainability front. The sector works closely with partners at each stage of its value chain - from growers to consumers - to create together a more sustainable future and promote the social, environmental, and economic well-being across our supply chain,” EUPPA President Kees Meijer said, according to a recent special report highlighting progress made in recent years by the sector across key areas of environmental sustainability and corporate social responsibility. The document showcases a wide range of initiatives being taken by EUPPA member companies from farm to fork. These initiatives include not only innovative projects at the processing level aiming to optimist resource use but also successful measures taken together with farmers to protect biodiversity and soil health as well as reduce food waste. The report also stresses efforts made by EUPPA members when it comes to health & safety.



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# ANUGA FOOD TEC DLG 2022 The Rundown

Boasting around 1,000 suppliers, the world's leading trade fair for the food and beverage industry will be the most important meeting point in the spring of 2022. In 2021, the event had to be postponed until spring 2022 and is thus being staged as a "special edition" from 26-29 April. With its broad, cross-process approach, Anuga FoodTec will cover all aspects of the production of food and beverages. The focus lies on innovations and solutions for the entire value chain - from process technology, to filling and packaging technologies, through to food safety, from packing materials, to digitalization, through to intralogistics. In this Special section of **Potato Processing International**, we take a closer look at this upcoming Trade Show and what it means for the industry. In the following pages we will outline the different industry areas that will be featured at this edition and highlight some of the most important exhibitors you can encounter on the show floor. To wrap it all up, we asked **Matthias Schlüter**, Director Anuga FoodTec to provide us with insight from the organizers' point of view.

by **Tudor Vintiloiu**

## A View To



**A**s the most important international industry event after the COVID-19 pandemic, Anuga FoodTec offers the food and beverage industry an ideal information and ordering platform for all sections of the production, processing and packaging. This year's trade fair concept is designed as a "special edition", namely by linking up the compact physical trade fair with the high-reach digital platform AnugaFoodTec @home. Anuga FoodTec has already convinced numerous market leaders, medium-sized and smaller companies to attend the 2022 event with this concept. The high number of registrations applies for all product sections of Anuga FoodTec. According to a press release, the comprehensive depiction of all process steps from the processing of the raw materials through to the finished product is one of the key reasons why the exhibitors and visitors should participate at Anuga FoodTec.

"Due to the digital platform AnugaFoodTec @home being staged parallel to the physical trade fair, the exhibitors will benefit from an effective, digital expansion of their trade fair presence. The innovative format offers networking and contact options primarily also with those visitors and interested parties, who will still not be able to travel to the extent desired in the coming year," the organizers commented.

### NEW SEGMENTS

The new segments "Intralogistics", "Automation", "Digitalization", "Energy & Environment" and "Science & Pioneering" focus on important key topics of the food and beverage industry.

"**Intralogistics**" deals with the internal flow of materials and includes, for example, product groups such as conveyors, large containers, storage systems or

# wards the Future

industrial trucks. All global producers of food and beverages need intralogistics solutions.

Complementary topics such as warehousing and facility management are also touched on here.

**"Automation"** and **"digitalization"** are closely related. Switching processes from manual to automatic operation, i.e. machine operation, is an important challenge in the food and beverage manufacturing process. Digitalization connects the automated processes through innovative technologies that can control and network all applications according to demand and product.

**"Energy & Environment"** is one of the core fields in the production process of food and beverages. Energy, fresh water, waste and reprocessing are important factors in every production process that can be used to control costs and effort. In addition, these issues are moving strongly into the focus of the public, which increasingly expects food and beverage producers to have a clear attitude towards environmental issues. The area offers approaches to solutions and innovations at various levels across all process stages.

**"Science & Pioneering"** focuses on the future more than any other segment. Here, the experts are expected to identify today which solutions will be ready for the market in the next 5 to 10 years and where the industry is heading. In addition to start-ups and young, innovative companies, research institutes and universities can also participate here in the discussion about the future.

All segments will also be taken up by the event and congress program, where they will be discussed by experts and presented in different approaches with a view to the future.

## ANUGA FOODTEC @HOME

In addition to the presence fair, Anuga FoodTec offers additional information and networking opportunities on its new digital platform Anuga FoodTec @home. While the exhibitors of Anuga FoodTec can profile themselves through digital presentations in different formats, the virtual visitors have access to numerous contents and data offered by the trade fair. This is also relevant for all interested parties who cannot visit the trade fair. Anuga FoodTec @home offers them access to the relevant players in their industry, while at the same time providing exhibitors with an effective digital extension of their trade fair presence. At the same time, exhibitors can use an innovative lead tracking system to find out which visitors are interested in their virtual offer and contact them.

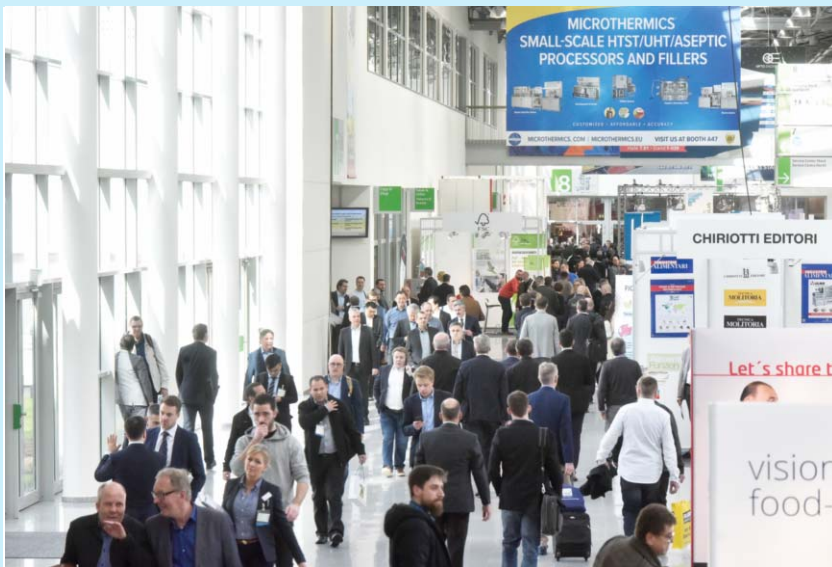
The event and congress program will also be partially mapped at Anuga FoodTec @home. On the other hand, selected parts of the very focused professional program can only be experienced at the fair. The lectures at Speakers Corner can only be followed at the fair and reinforce the live dynamics. The programs of the Main Stage and the Innovation Stage, on the other hand, will be offered both as a streaming service and on demand on the platform until 30 June 2022. On the Main Stage, for example, all the topics surrounding the main theme of Anuga FoodTec 2022, which is **"Smart Solutions - Higher Flexibility"**, will be highlighted. In addition, there will be a strong focus on the trend topics of the industry, which include the focal points of sustainability and alternative proteins. To this end, Anuga FoodTec has put together a series of compact conferences under the motto "Food4Future @ AnugaFoodTec22" in cooperation with NXFood, among others. The conference series will run on the Innovation Stage, so will also be offered digitally. •



# Anuga FoodTec 2022: Building Momentum for the Industry



In an exclusive interview for Potato Processing International, Matthias Schlüter, Director Anuga FoodTec, shared with us a few insights on the upcoming trade fair and the challenges it had to overcome as well as the long-awaited opportunities it brings for the industry.



## What can visitors expect from this edition of Anuga FoodTec?

Following its postponement, Anuga FoodTec, the world's leading supplier fair for food and beverages, will now be held as a "Special Edition" from April 26 to 29, 2022. With its broad, cross-process approach and around 1,000 suppliers from 44 countries, the trade show covers all aspects of food and beverage production. The focus is on innovations and solutions for the entire value chain - from process technology to filling and packaging technology to food safety, from packaging materials to digitalization and intralogistics. Anuga FoodTec is the first comprehensive trade show for all areas of food and beverage production after the forced pandemic break. The industry should not miss this great opportunity to meet face-to-face

again and learn about innovations and technology advances, especially in view of the challenges ahead. First-hand information, technology demonstrations, live briefings on the latest processes can all be obtained by visiting the trade fair. Anuga FoodTec is also accompanied by a top-class congress and trade program that addresses the most important topics in the industry and thus provides additional impetus and the necessary exchange between participants. Complementing the presence trade show, the digital platform Anuga FoodTec @home offers extended opportunities for networking and information. This is primarily intended for post-fair work and also offers those customers the opportunity to find out about the latest developments

and exchange information with exhibitors who are unable to travel to Cologne in person this year.

## What are some of the novelties this edition brings?

Many of the innovations presented at Anuga FoodTec revolve around the central themes of the food and beverage industry: sustainability, resource efficiency, smart technologies, process optimization. Adapting recipes, alternative proteins, food safety and other requirements for modern nutrition are also on the agenda at Anuga FoodTec.

## How has the COVID-19 pandemic influenced this edition of the trade show in terms of attendance, exhibitors, logistics, etc.?

Anuga FoodTec has come through the pandemic reasonably well. This enabled us to postpone the trade show to this attractive April date in 2022. The fact that around 1,000 exhibitors from 44 countries are now gathering here in Cologne is a clear sign of the high level of acceptance that the trade show enjoys in the industry. We also assume that Anuga FoodTec, as the first trade fair after the pandemic, will be an important, indeed indispensable, point of attraction for trade visitors from Germany and abroad. The current visitor advance booking figures make us cautiously optimistic in this regard. In addition, our exhibitors will reach further interested parties via our digital platform Anuga FoodTec @home and can strengthen the networking character far beyond the period of the trade show.

## How will the potato sector be catered for in terms of products and exhibitors?

The potato processing industry can find the right contacts for different aspects of their production chain at Anuga FoodTec. For example, there are currently almost 200 companies specializing in the processing of potatoes and vegetables. The list of companies offering this service can be accessed via our advanced search in the exhibitor database at [www.anugafoodtec.com/exhibitorsearch](http://www.anugafoodtec.com/exhibitorsearch).

## What are some of the program highlights that visitors can look forward to?

The congress and event program at Anuga FoodTec is very broadly based to cover as many aspects of the industry as possible. We recommend that you get an overview before visiting the trade show so that you can specifically select the events that are important to you. To do this, you should use the event database, which can also be sorted by search terms. Of course, it's difficult for me to highlight

anything in the extensive and top-class program. But on our Innovation Stage, visitors will find numerous presentations on topics that will move our industry in the future, market research institutes will present the latest market figures, and our start-up exhibitors will introduce their companies. By the way, you can also find the presentations from this stage and the Main Stage "Smart Solutions - Higher Flexibility" on our online platform Anuga FoodTec @home, so that visitors can spend even more time with the exhibitors on site and watch the content afterwards in the comfort of their own offices at home.

## What are some aspects that would encourage visitors to attend this edition of Anuga FoodTec?

A.T. Kearny predicts that by 2040, traditional meat products will account for only 40% of global meat consumption. We are likely to see similar developments in the dairy and fish industries. Visitors to Anuga FoodTec in Cologne will find out how the industry can respond to this, how they can switch to alternative proteins and products

cultivated in the laboratory. After two years of the pandemic, it is high time for a face-to-face exchange between suppliers and decision-makers in the food and beverage industry. In Cologne, visitors can see the plants live and in operation, they can open the plants, touch them and establish a personal relationship with their interlocutors. This is something that has often been missed out on via digital formats in recent months. At Anuga FoodTec, visitors can find all the global solutions they need to produce their food or beverages in one place. You won't find this broad approach, across all sectors of the food and beverage industry and all phases of internal production, at any other trade show in the world. This saves visitors a great deal of time.

## Anything else for everyone to look forward to?

We are looking forward to this trade show, to the impetus it will generate in the industry, to the innovations that will ensure greater sustainability and more efficiency in the use of energy, water and primary materials. Our industry can do much more here. It will find the solutions for this at Anuga FoodTec. •



*“Complementing the presence trade show, the digital platform Anuga FoodTec @home offers extended opportunities for networking and information. This is primarily intended for post-fair work and also offers those customers the opportunity to find out about the latest developments and exchange information with exhibitors who are unable to travel to Cologne in person this year.”*

*Matthias Schlüter,  
Director Anuga FoodTec*

## Elea Technology - Pulsed Electric Field systems

Hall 10.1 - Booth No. B-069  
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PEF gently opens pores of plant and animal cells by applying short and targeted pulses. The technology is used primarily in vegetable and potato processing. Nearly all production steps are positively affected by PEF. Improvements can be achieved in cutting, blanching, frying, freezing and drying, to name just a few. PEF brings enormous cost reductions. In the production process of French fries and snacks i.e., a significant reduction in energy (up to 90 %) and water consumption (up to 80 %) could be achieved compared to conventional processes. Elea offers PEF systems with capacities up to 70 t/h. During Anuga FoodTec, the booth will be equipped with a fully operable PEF Pilot system, and product samples made with PEF will be available for tasting.

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Hall 10.1 - Stand E049a  
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## Kiremko b.v. - Idaho Steel/ Corda Invicta - Strata Invicta®

Hall 10.1 - Stand F20

[www.kiremko.com](http://www.kiremko.com)

Kiremko is a Dutch company founded in 1965 and based in Montfoort, The Netherlands. Together with our partners

Idaho Steel and Reyco, we are world leaders in the manufacture of product lines for the potato processing industry. We focus on sustainable technology and waste reduction, innovation and co-operation to ensure we give added value to every customer. We closely study each food-processing procedure, in order to develop and produce machines that are not only more powerful and efficient, but also low-maintenance and more water & energy efficient, without sacrificing the quality of the end product. That is what Kiremko's quality is all about.



IDAHO STEEL



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Hall 10.1 - Booth B030-C039

[www.raytecvision.com](http://www.raytecvision.com)

Raytec Vision is a leading expert in optical sorting

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



*Innovation in Sorting Equipment*

## Urschel Cutting Technology

Hall 10.1 - Stand C030-C038

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The Global Leader in Food Cutting Technology

## Tummers Food Processing Solutions

Hall 10.1 - Stand E010-E018

[www.tummers.nl](http://www.tummers.nl)

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



# Optical Sorting Helps Processing Operations Gain Ground

Optical sorters today are by far the best way to detect and eject unwanted materials, defective product, and product that's not to specification. Optical sorters' high-tech sensors see beyond the visible spectrum by also using infrared, ultraviolet, and other spectral imaging. This means optical sorters can recognize materials based on color, shape (including length, width, diameter, and area), and biological characteristics.

by Tudor Vintiloiu

**M**odern optical sorters found in potato processing plants are among the most advanced in the world. They're able to detect and classify a very wide range of defects and remove different types of organic and inorganic foreign materials while withstanding the production challenges inherent in the operating environment. According to **Marco Colombo, Global Potato Category Director, TOMRA Food**, it's not only the capabilities of optical sorters that matter - it's also about taking the right steps at the right time to maximize processing efficiency. A typical processing plant will have different areas where sorting occurs: the receiving area, peeling area, wet strip processing area, and tote room. It is important, for example, to remove foreign materials prior to cutting to protect the knives; to sort in the wet strip processing area to ensure the output satisfied agreed tolerances; and to use sorters to make optimal

use of the product by sending rejected product to a secondary stream (for example, a flake line). In the tote room the sorter runs a final check to see if the product output meets the required specifications on color and length, and conducts a final fore check prior to packing, making sure no foreign material reaches the packing area.

"While mechanical sorting may be able to remove obvious larger or smaller non-potato related objects such as rocks and dirt, and manual hand sorting could remove other obvious defects, optical sorting will consistently detect and remove both obvious and subtle defects as well as foreign and unwanted material," **Stephen Jacobs Head of Segment F&V, Bühler**, explains.

## CHALLENGING TASK

Potatoes are very varied in terms of size, shape and color and in terms of the defects they can have. "We see potatoes ranging from less than 10 grams to sizes in excess of 1000 grams; diameters from ~20 mm to diameters in excess of 100 mm, and

colors from white through yellow, red, purple, brown and multi-colored variants that are partially yellow and partially red or pink," says **Daniel Bengtson, Software Developer, Newtec Engineering A/S**. "Moreover, potatoes tend to leave a residue inside the machine as they shed dirt and loose skin, meaning that the computer vision system must be robust to a significant amount of dirt and discoloration of the environment being monitored by the cameras. In computer vision terms, the environment is cluttered and noisy compared with, say, sorting plastic trays of packed food, which can be done in a fairly clean and clutter-free environment."

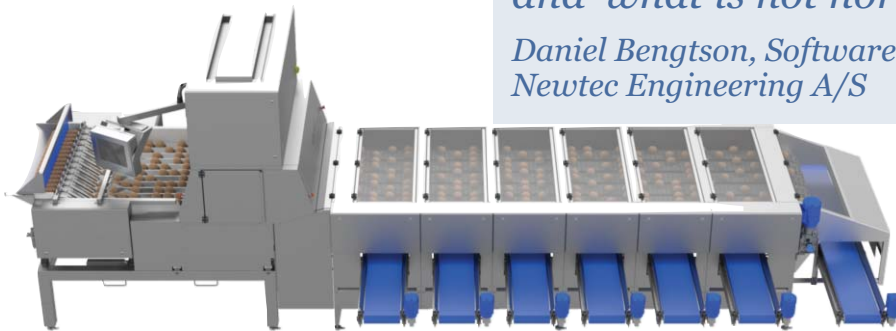
The huge degree of variation within "normal range" products also means that any machine designed for optically sorting potatoes must apply very advanced concepts of "what is normal" and "what is not normal". In comparison, if a machine was only supposed to sort out, say, defective plastic components or die-cast alloy



components of uniform size, color and shape, the task would be relatively easy, because any object which was observed to deviate from a defined norm would be relatively easily identifiable simply by identifying differences between the object and its reference standard. By contrast, potatoes vary significantly in nature and are not

*“The huge degree of variation within ‘normal range’ products also means that any machine designed for optically sorting potatoes must apply very advanced concepts of ‘what is normal’ and ‘what is not normal.’”*

*Daniel Bengtson, Software Developer,  
Newtec Engineering A/S*



manufactured by a controlled industrial process. This means there is no easily-expressible reference standard to compare with, the software specialist explains. The huge amount of natural variety in the products means that designing a competent optical sorting machine is as much an exercise in inventing powerful classification models as in designing a mechanical system that can reliably cope with the different product sizes.

"Additionally, it is our experience that the actual sorting requirements tend to vary from place to place, product batch to product batch, and from season to season. Making the machine easily programmable to allow the operator to quickly and reliably change the settings for the current business requirements is of key importance," he adds.

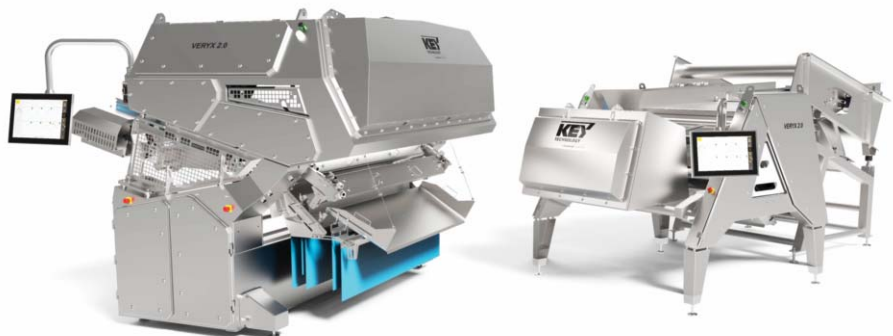
**Daniele Severi, Director of the Technology Division of Sorma Iberica** describes that thanks to the exclusive Hyper-Map system featured in their Sormatech sorter, the machine is able to detect even the smallest defects and the imperfections that are most difficult to spot. "Indeed, up to 2160 images are processed for every analyzed piece of fruit. The result is a 360-degree view of the surface of the fruit, which makes it possible to

detect, classify, and counteract the smallest imperfection." Their system uses the HyperVision platform, a cutting-edge multi-wavelength lighting solution, which uses a synchronized stroboscopic LED system (Visible, Infrared and Near Infrared). The system is based on the use of 3690 LEDs for each line of the optical sorter, in a domed refraction system, for superior lighting and classification of the fruits, at high levels of efficiency. The 360-degree view is obtained thanks to the 9 cameras on each line of the

sorter: 3 color cameras and 6 Nir cameras (an analysis method that exploits the material's interaction with near-infrared radiation), featuring digital Ultra-HD technology with superior optics. Optical sorting for potatoes differs from other types of calibration because it is done in environmental conditions that are extreme and highly corrosive due to the debris and dust that damage machinery. In this context, dedicated mechanical solutions are used to reduce friction and extend the life of machinery.

## PROCESS OPTIMIZATION & BENEFITS

For **Lukas Lackner, Vice President, INSORT**, optical sorting is the most important puzzle piece in



*“The challenge with detecting ‘process FM’ is that it often has the same material appearance, size and shape as good product.”*

*Marco Azzaretti, Director of Marketing at Key Technology*

*“While mechanical sorting may be able to remove obvious larger or smaller non-potato related objects, and manual hand sorting could remove other obvious defects, optical sorting will consistently detect and remove both obvious and subtle defects as well as foreign and unwanted material.”*

*Stephen Jacobs Head of Segment F&V, Bühler*



sorting is usually limited to sorting out 5-10% of the raw material. If the defect rate in the input products is higher, either the flow rate must be reduced, or many defective products will slip through because the manual sorters simply cannot move their hands quickly enough. To a competent optical sorting machine, it matters little whether the takeout percentage is 1%, 10% or 50%.

• **Sorting economy:** For the above reason, product batches that are otherwise not economical to manually sort due to very high waste percentage can be extremely profitable to sort by an optical grader. A packhouse with excess capacity may earn a significant extra profit by buying low-quality product batches at rock-bottom prices and sorting out the best few percent. Enabling packhouses to squeeze out the final few percent of good quality products from an otherwise bad batch increases the efficiency of food production, effectively reducing the carbon footprint of a given amount of tons of crops.

automating the inspection of product at various stages throughout the process. It allows processors to achieve unprecedented levels of Food Safety, product quality and consistency. "The throughputs of modern optical sorting devices combined with the accuracy and reliability in detecting FM and product defects cannot be matched by any other technology. The potato processing industry would not have been able to achieve the exponential growth over the past decades without implementation of optical sorting equipment. Optical sorting equipment is also providing a huge amount of valuable process data that helps processing companies improve their process, product quality and save cost," he explains. Some of the most important benefits such a line can bring to a processing operation are outlined by Daniel Bengtson, Software Developer, Newtec Engineering A/S:

- **Labor savings:** in many parts of the world labor costs have risen so much that sorting potatoes by hand is not economically feasible. Moreover, labor shortages also mean that low-paying job vacancies such as sorting potatoes are often difficult to fill.
- **Reduced space and energy requirements:** An optical sorter requires less space than the amount of staff, which would be required to do the same amount of work. And it does not require its environment to be as tightly climate-controlled.
- **Reliability and accuracy:** A high-quality optical sorter, when operated by a competent operator, and well maintained, will be able to run almost 24/7 with little supervision, and at the same time consistently outperform the typical accuracy of human manual sorting.
- **More consistent capacity:** If a reasonable rate of production flow is to be maintained, human

*“Besides technological advancements of detection technology and increased data processing capabilities the next big technology jump will be driven by classification algorithms and utilizing existing information in a better way.”*

*Lukas Lackner, Vice President, INSORT*





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



TOMRA 5A



TOMRA 5B



TOMRA 3A



*“Up to 2160 images are processed for every analyzed piece of fruit. The result is a 360-degree view of the surface of the fruit, which makes it possible to detect, classify, and counteract the smallest imperfection.”*

*Daniele Severi, Director of the Technology Division of Sorma Iberica*



• **New product types:** Optical sorting allows for producing products that were next to impossible to achieve using combinations of manual sorting and mechanical size graders. Mechanical size graders only grade by "overall diameter". But suppose you want a tight range of products of a given combination of diameter, length, weight and quality? The optical sorter can do that, taking out the rare, 1% ultra-perfect products that can be sold to upscale supermarkets at very high premiums.

### HIGH TECH AND AI

Artificial Intelligence (AI) plays a key role on the road to continuously improving the performance of optical sorting systems. "For example, our VERYX sorters use AI techniques to enhance the system's ability to accurately profile potato products dimensionally and to

identify unique types of foreign material that the sorter will see, eject and record. It also makes the sorter's recipes – the set of rules that drive the operation to deliver the target product specification – easier and faster for the operator to manage," says **Marco Azzaretti, Director of Marketing at Key Technology**. On this topic, Bühler's Stephen Jacobs further describes that optical sorters use algorithms to determine if the image that the camera is seeing has the characteristics of the good or defective areas. A decision is made as to whether the product should be ignored and left to go into the accept product stream or to be ejected into the reject stream. If the product is determined to be bad, the algorithm will decide on how best to eject it i.e., where to target the air blast for an accurate rejection.

Data can be taken from the sorter

and shown on a dashboard, highlighting different aspects of how the sorter is working, what decisions the sorter is making and any potential alarms both with abnormal product characteristics or maintenance issues.

Optical sorters are already utilizing different types of detection technology in order to increase the detection accuracy and reliability. Besides technological advancements of detection technology and increased data processing capabilities the next big technology jump will be driven by classification algorithms and utilizing existing information in a better way. "Machine learning and artificial intelligence-based classification algorithms will set new standards and unlock hidden potential of state-of-the-art detection technologies. Optical sorting companies have become more and more focused on



*“A hyperspectral sensor is excellent at detecting plastics but weak at detecting foreign materials such as glass or dark materials. On the other hand, a laser sensor is highly effective at detecting glass and a color camera is highly effective at detecting black discolorations.”*

*Marco Colombo  
Global Potato Category Director, TOMRA Food*

software programming and this trend will continue with the introduction of Artificial Intelligence. The progress on the software development front requires more powerful hardware in order to process the additional data load generated by these new tools," says INSORT's Lukas Lackner.

## STRENGTHS AND WEAKNESSES

Marco Colombo, TOMRA Food's specialist points out that different types of inspection sensors have different strengths. The best results are achieved by equipping each processing stage with the correct optical sorting sensors. "For example, a hyperspectral sensor is excellent for detecting plastics but weak at detecting foreign materials such as glass or dark materials which have a poor spectral signature. On the other hand, a laser sensor is highly effective at detecting glass and a color camera is highly effective at detecting black discolorations. TOMRA optical sorting equipment is modular, depending your line setup and needs we'll advise on which optical configuration is best suited and at which position in the line," he says. "A question that we get asked more and more often is how to detect internal defects or chemical compound defects, which are not visible outside the product. This, too, can be solved by using the right sensor in the right position. TOMRA's unique biometric signature identification (BSI) technology can identify the biological characteristics of objects, identifying chemical and molecular differences."

According to Marco Azzaretti, Director of Marketing at Key Technology, there has been a historically difficult task to accurately measure the dimensions of individual product pieces, such as the length of potato strips, when those pieces are bunched in a cluster. "It's also been difficult traditionally to consistently identify 'process FM' – that is, product-based residue from the fryer or other systems that can accumulate, then break free and be mixed into the product stream. The challenge

with detecting 'process FM' is that it often has the same material appearance, size and shape as good product. These previously difficult sorts are easy to achieve with VERYX, given our continued advances in sensor technology and intelligent software," he explains. In the end, sorters support sustainability and savings by reducing false rejects to minimize food waste. This means that a

higher percentage of the raw product coming into the line is processed into finished product. Additionally, modern sorters can improve sustainability by leveraging powerful software that transforms the system into an IIoT-connected 'information center' that collects, analyzes and shares big data about the sort process and every object flowing through the sorter. •



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# Battering & Breading Potato Products

Most formed potato products are coated with standard linear battering and breading equipment. Typically, it is a two-step system, battering with liquid and breading with a dry substrate.

by Tudor Vintiloiu

**T**he Potato processor demands high speed and high capacity throughput on their processing lines. Therefore it is essential to have the coating- and breading equipment configured to match those requirements. A challenge on high-speed lines is to have the breading substrate fully cover the products while keeping up with the rest of the line.

### KEY FACTORS

Batter viscosity as well as temperature needs to remain at a constant during the process. Variations in batter viscosity or batter temperature will affect the product weight and breading substrate pick-up ability. To control this, an automatic batter viscosity control system is required. This system will monitor and control the viscosity and temperature. Additionally, the system needs to have a large mixing capacity to keep up with the demand for batter in potato processing lines.

Key for controlling the coating application is the batter viscosity. It has the largest impact on the breading substrate pickup, quality and appearance. High-speed capable breading equipment will provide a constant bed of breading substrate to cover the products. This will result in a uniform and consistent breadcrumb coverage of the product. Careful breading substrate circulation will reduce crumb breakdown inside the breeder and give a high quality product finish.

### PRODUCTION STAGES

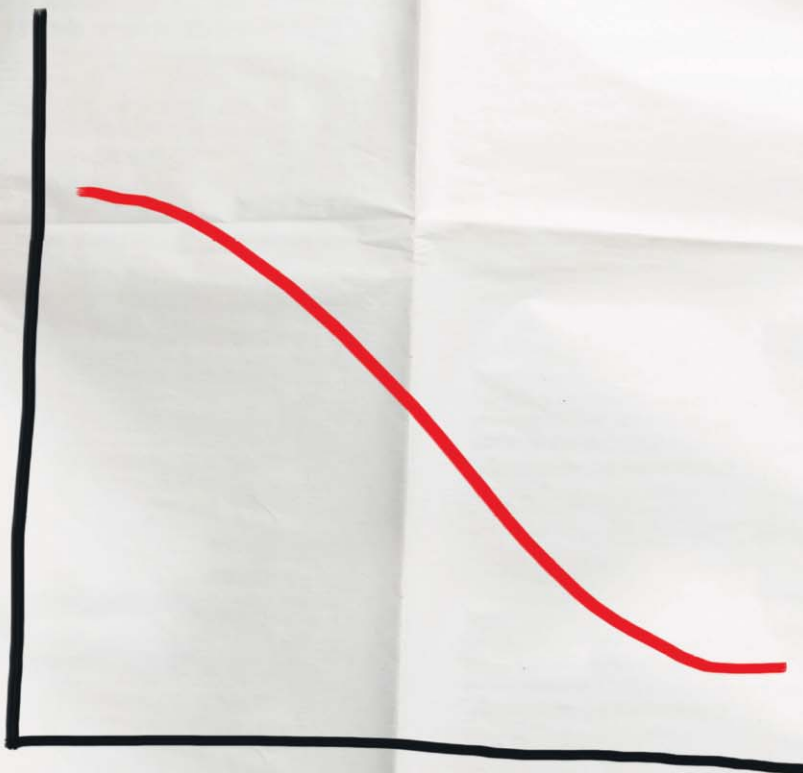
Coating systems for potatoes are typically a two-step system, battering first and breading after. The equipment needs to be configured for running consistently at high speed. Hydraulic drive for coating equipment is preferred due to its flexibility and speed capability. Hydraulic driven equipment is also reliable and resistant to thorough cleaning regimes. To remove excess of battering and breading materials

blower fans are used. For potato processing lines a remote blower fan is used. It offers a large blow-off capacity while the remote installation makes it more reliable and less exposed.

An automatic viscosity-controlled batter mixing system will keep a consistent quality batter in the applicators. Jacketed mixer and batter applicators will keep the temperature of batter under control while running. Conveyors between batter applicator and breeder are sometimes required to allow extra time for the coating to setup before proceeding to the next step.

**JBT's** Stein product portfolio offers various battering and breading machines as well as batter mixers and other related utilities. With hydraulic drive and built for high-speed capacities Stein's offering makes a perfect solution for today's high demanding potato processing lines. The renowned Stein brand has decades of experience running equipment for potato processing lines.

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## FLEXIBILITY

The Stein batter applicators are flexible and can be reconfigured for top submerger style application to overflow style in minutes. The Stein breadng equipment is designed for high capacity and flexibility. The machines allow for a swift change over of breadng substrate in a matter of minutes.

The PRoMIX batter mixer is the batter applicator that is used by processors all over the world. Its proven process control enables processors to provide a consistent product quality. The mixers only need minimal manual intervention during running.

Utilities as hydraulic powerpacks and central blower fans are

layer before it is baked in the oven. "This 'battering' or 'coating' is done to give the product certain additional properties, such as 'bite' (crispness), color or taste," the company explains.

## HOW IT WORKS

The first part of the Batterline is the powder handling part. The dry powder can be brought to the line in Big Bags or smaller bags. The powder is unloaded by a Big Bag station. From that point, the powder can be transported by a transport screw or by vacuum. Working with vacuum transport allows you to keep the dry part of the line separated from the wet part. The powder is transported to a

powder hopper, where the second part of the line starts. In the second part of the Batterline, the powder is mixed with water. A volumetric feeder doses the correct amount of powder into the mixing system, where it meets the correct water supply.

The batter is automatically mixed into the right ratio. The mixed batter goes to one of the buffer tanks where it can settle till ready. The batter mix alternately goes into one of the Buffer tanks, which gives a continuous flow of mixed batter. Once the batter is settled, it is pumped to the working tank, part three. The batter in the working tank, is pumped to the applicator. It passes one or more heat exchangers to guarantee the optimal temperature. The batter that is not left on the finished product runs back to the working tank and passes a filter in the process. All particles that come along with the batter, such as pieces of French fries, are filtered out of the batter and disposed of. •



available to provide turnkey solutions. Hydraulic systems run on a mixture of water and glycol, this is nontoxic, making it suitable for food processing equipment. The Batterline is a system designed by **Gpi De Gouwe** for high volume, continuous preparation of batter, as typically seen in the potato processing industry. The liquid batter is applied via an applicator, where product is covered in a thin





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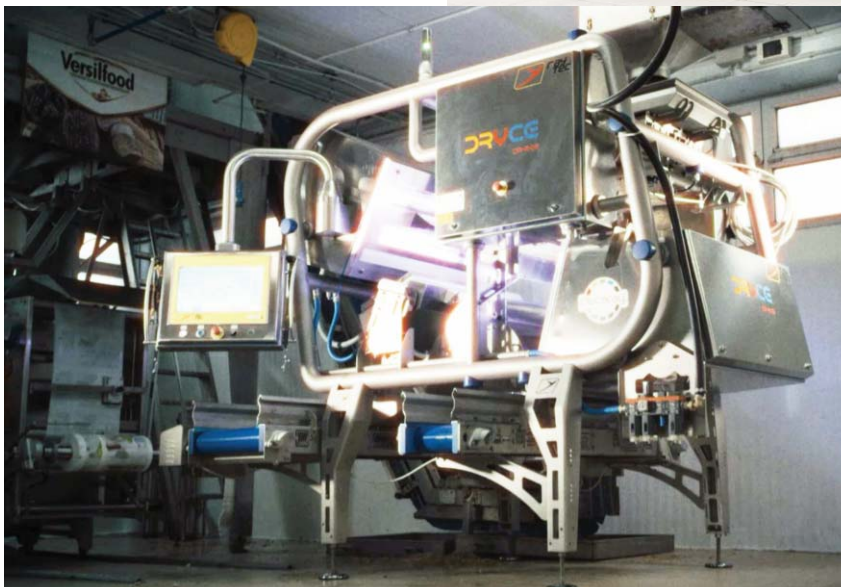


# Artificial Intelligence and Food Safety: Welcome to the World of Optical Sorting

Anuga Tech will be an excellent stage for Raytec to showcase its latest technology. The Italian company, specialized in optical sorting machines for safety and quality, has in fact much news to present to the world of the food industry.

In the first place, Anuga will feature the optical sorter Curiosity, the first one with a totally hygienic design, which was first launched at the 2019 edition of Cibus Tec and which has been rewriting the rules of sorting automation. Thanks to its design and cutting-edge conception, Curiosity can be easily cleaned and can guarantee high efficiency with its highest resolution cameras. Another technological news, launched in 2021 but already gaining ground in the fresh-cut and green vegetable sectors, is the DOPPIA CLOROFILLA vision technology, which

improves the sorting analysis reaching an efficiency of 95% even when the contaminants are the same color as the good product. A reference application is green beans. In the case of contamination by datura, a weed particularly widespread in organic crops, DOPPIA CLOROFILLA has shown excellent results. The sorting machines equipped with this technology are able to easily discriminate between good products and contaminants, protecting the health of the final consumer and avoiding the risk of complaints. For what concerns the sorting of frozen and dry food, Raytec has developed a specific technology for its sorter Dryce. The DNA Trace technology has in fact obtained excellent results with frozen mushrooms in the identification of



With the Raynbow R-270, high capacities (up to 55 t/h) can also be achieved, and the 3WAY configuration drastically reduces waste by optimizing production and differentiating between A and B-series waste that can be collected and repurposed for other uses (such as becoming part of animal feed). All this and much more can be discovered at Hall 10,1 Booth B030- C039, where Raytec will exhibit together with CFT, one of the leading companies in food automation and Raytec's parent company. •

foreign bodies such as pieces of wood and cigarette butts, which are practically indistinguishable from the good mushroom. A result never obtained before and that will mark the future in the field of food quality. Last but not least, Raytec is having great achievements in the high sorting efficiency on unwashed potatoes with the optical sorter Raynbow. The machine is able to discard stones, clods of earth, and green potatoes while being able to identify potatoes covered with soil.





# Operational Efficiency Through the Gathering of Analytical Data

Internet of Things (IoT) technology is most valuable to food processing companies in its capacity to collect data. Companies that use data effectively will enhance operational efficiency, reduce costs, improve decision-making, and provide a better customer experience. And since the pandemic began, the already-strong opportunity to gain a competitive advantage by using data has become even stronger. There is far more potential data to be collected, and IoT is the best tool for the job.

by Tudor Vintiloiu & Ionel Vaduva

**H**istorically, the food processing industry has been slower than other industries in adopting emerging technologies. However, many are planning to increase investment in disruptive technologies such as the Internet of Things (IoT). But whether these companies will benefit from the employment of IoT depends on their IoT strategies. A strong IoT strategy with effective implementation will bring efficiency gains and competitive advantage and align product offerings with modern, post-COVID consumption habits. Companies without a strong

strategy will be caught out or overtaken by competitors.

## APPLICATIONS

IoT devices can manage a whole host of operational and quality-control procedures for food processors. These include traceability, maintenance and food safety benefits. Every food processing company has a common goal to deliver high-quality food to its consumers. But the quality of food items depends on multiple factors including storage. Necessary levels of temperature and humidity of food items have to be maintained, and

this is where Industrial IoT (IIoT) can make a difference.

IoT in the food processing industry makes it possible to monitor the equipment and processes round the clock. Irrespective of the staff's presence and closure of warehouses, the companies can easily monitor all the activities to ensure the quality of food and prevent heavy losses due to expired raw material.

## FOOD SAFETY

Many types of sensor can be used in IoT systems to monitor food safety in fields and during transport – e.g. temperature, humidity,



carbon dioxide, heavy metals – to provide warning of food hazards and signs of contamination. Any foodstuffs that have the wrong environmental conditions or are contaminated – either when handled on-site or during other processes – can be identified more easily. They can then be suitably treated or removed from a processing line before they affect a greater volume of foodstuffs or harm the consumer.

### TRACEABILITY

Companies build traceability systems to improve supply-side management, to increase safety and quality control, and to market foods with certain claims - such as whether a type of food was produced without genetic engineering. The benefits associated with these objectives include lower-cost distribution systems, reduced recall expenses, and expanded sales of high-value products. In every case, the benefits of traceability translate into larger net revenues for the company. But traceability is only one side of

the coin. Tracking food in the production process does absolutely nothing unless the tracking system is linked to effective control procedures.

### PROCESS OPTIMIZATION

Operational efficiency is essential for every industry sector and this includes food processing. Every company aims to achieve optimizations, and therefore, it is one of the biggest benefits of IoT in the industry. This technology can increase efficiency by bringing automation, integrating workflows, and connecting various business groups with the system. Managers can make better decisions by streamlining processes and implement them to ensure growth over the period.

### PREDICTIVE MAINTENANCE

Another well-known benefit of using connected technology is the ability to reduce energy consumption and run a predictive maintenance algorithm, which will further reduce operational costs. Here, smart devices or connected devices can effectively predict the need for maintenance in advance and show the real-time situation of power consumption from different devices. They can also send alert notifications to the management if any issues occur.

### REAL TIME MANAGEMENT

A processor can be constantly connected to a solution provider's expertise. The actors in this sector already have the sensors in place, collecting data. Cloud-based management, or the digital relationship, can enable a back-and-forth flow of information analytics between the processor and the provider. Both can see a dashboard that centralizes and synthesizes data in real-time for meaningful insights. IoT data management interconnects information to help customers realize new business models, optimize internal processes and achieve major cost savings. It allows customers to take advantage of process knowledge, full time, and make it sustainable.

### THE ROLE OF CLOUD COMPUTING

Machines are connected to ensure the seamless traceability of the entire process chain. The next evolution step is the direct communication between the individual system modules in real-time - M2M communication. Static solutions quickly reach their limits, because the intelligent factory comprises decentralized production environments with different components, each of which have their data sources. Without Cloud computing, the growing amount of data can no longer be processed and evaluated ad-hoc. The central challenge, in this case, is to synchronize the virtual representation of the production and the actual production it represents. Machines also have to independently report back information on their operational state to the maintenance personnel, for instance for predictive maintenance. Intelligent sensor systems take on a key role. In addition to values such as pressure, volumes, and temperature, these artificial "sensory organs" also measure oscillations and vibrations. Based on this status data, the production monitors itself to a large extent. Yet this alone does not suffice. Industry 4.0-compatible sensors have an enhanced interface, in addition to outputs for the system control, which allows them to be linked to Cloud services. Industry 4.0 is proving to be a direct pacemaker for the energy turnaround at the field level. More and more sensors are being implemented for the continuous monitoring of ramified production plants. The sensors themselves do not require batteries, since they send their data by radio transmission. They directly "harvest" the required energy from the environment via energy harvesting, meaning from processes that transform the energy available on-site from temperature gradients, solar radiation, or mechanical movements into usable energy. The market of energy harvesting systems is still in a very early phase.



## REAL-WORLD STRATEGIES

**Kiremko** is one equipment producer that has included in its portfolio a whole family of 'Guards', ranging from PeelGuard to WeighGuard, to KnifeGuard. OilGuard is the most recent addition, a system that measures and guards the oil quality in the Kiremko fryers for chips, pellets, and French fries. These 'Guards' are nothing more than data collectors in a processing line, with an ultimate goal of improving the performance. On this principle, Kiremko has based a strategy for the short term and the long term. Creating loops like a steam peeler with a PeelGuard is the level where Kiremko is at right now. At peeling, at cutting (with their KnifeGuard), and more steps in the process after that. "Our newest member of the Guard Family is the OilGuard - a data collection system to manage the oil quality in the fryer. Now the oil management is done by sampling, taken to a lab to check. The OilGuard does a quality measurement every few minutes, completely automated and, again, this data can be used to manage the fryer and the oil farm. Adjusting temperature, adding new oil, everything that is needed to make sure that quality levels of the oil are

consistent throughout the whole process. Another loop, but the next challenge is to go from loop to chain. How can data in peeling improve and manage cutting? Or does drying data improve frying? That is the real factory of the future," the company experts said. The collection of any data should be backed by a concrete purpose,



**Urschel's** specialists told us. The gathering of data is futile without a comprehensive plan. Mega-processors can analyze the solid nature of the potatoes, water use, starch loss, cut quality, and multiple comparables to increase cut quality, evaluate the sharpness and life of different knife blades, and determine cost analysis across the production line.

As a processor grows in volume, the customer may choose to invest with the help of a line builder to increase electronic sensors and gather analytics at each step of the line. Analysis of data to determine an upgrade in technology may be simple or more complex.

As more and more customers are becoming aware of the benefits of overall analysis of plant line operations, processors may choose to embrace the gathering of analytical data. The more data that is gathered, the more in-depth decisions may be possible to increase plant efficiencies. While the goals may be straightforward or more elaborate, the first step is to determine what types of improvements are necessary and to ascertain how to quantify the various objectives. •

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# Flavors and Health Front of Stage



Jonathan Thomas

As the market for potato-based snacks expands further, innovation levels should remain high. According to research carried out by Lumina Intelligence in the UK during 2021 (which surveyed the opinions of 1,000 adults), 75% of consumers ate bagged snacks at least once a week, if not more frequently, whereas only 11% did so less than once a month or never.

by Jonathan Thomas

Consumption of bagged snacks was highest amongst those aged 35-44, where almost two-thirds of respondents ate them more than once a week. This compares with less than a third for those aged 65 and over.

Eating habits continue to undergo fundamental changes, driven in part by lifestyle changes enforced during the pandemic. With people staying forced to stay inside for longer periods, the number of occasions for eating snacks widened – in many instances, these were eaten between meals, but there is also evidence of some consumers (especially those from younger age groups) now substituting snacks for traditional meals such as lunch and dinner. Innovation remains critical for

future market growth, especially since many potato-based snacks are attracting greater scrutiny regarding their alleged links with poor diets. Typical areas where innovation has included flavors, health and format/texture – these are now analyzed separately.

## FLAVOR TRENDS

Development of new flavors continues to represent one of the most widely used forms of NPD amongst manufacturers of potato-based snacks, 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 flavors, with younger consumers especially keen to experiment. Some of the world's

more unusual flavors are listed below – as can be seen, flavors based on local specialties remain a strong feature of the global market.

- Baked Bacon Cheese with Seaweed – Thailand
- Baked Scallop with Butter & Garlic – Thailand
- Seafood & Octopus – South Korea
- Wasabi & Steak – Japan
- Hot & Sour Fish Soup – China
- Cucumber – China
- Mint Mischief – India
- Vegemite – Australia
- Red Caviar – Russia
- Currywurst – Germany
- Mushroom – Czech Republic
- Buffalo Wings & Blue Cheese – Canada.

To the above can be added flavors based on fruit. In the Chinese market, for example, PepsiCo's Lay's range includes potato chips with



blueberry and kiwifruit flavors, as well as durian, a strong-smelling fruit native to the country. However, evidence from leading western markets such as the UK and the US suggests that the traditional favorites still command a loyal following. 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. That said, there now exists a huge and diverse range of flavors within the UK potato crisps sector – for example, there are believed to be up to 75 varieties of cheese and onion, as well as over 120 for meat-based flavors. Furthermore, the research carried out by Lumina Intelligence found that 45% of UK consumers typically gave 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. In recent years, the UK market has witnessed a growth in demand for potato crisps with flavors marketed as ‘hot’ and/or ‘spicy.’ At the start of 2021, the market leading Walkers range was extended with a new Flamin’ Hot variety, which followed on from the launch of Flamin’ Hot Wotsits the previous year. The first half of 2021 also witnessed the appearance of new Walkers MAX crisps produced in

partnership with KFC. Two new flavors were launched, namely Kentucky Fried Chicken and Double Crunch Zinger. According to owner PepsiCo, the spicy flavors sector is one of the fastest growing within the UK market for potato crisps, increasing by around 13% per year at present. Another launch within the hot and spicy sector took place at the end of 2020, when KP Snacks extended the McCoy’s range (which is currently worth over GBP132m per annum) with new Fire Pit flavors.

These appeared in Flame Roasted Peri Peri, Flame Scorched BBQ Ribs and Flame Smoked Chorizo varieties. During the summer of 2021, PepsiCo further extended the Walkers range with its new Taste Icons range.



These were described as limited edition crisp flavors inspired by restaurants and ethnic cuisine, possibly in response to the enforced lockdown periods during the pandemic, which meant that consumers were unable to visit their favorite foodservice establishments. The new flavors included Fish & Chips, Beef Madras, Thai Green Curry and Chicken Burrito, with the launch forming part of a wider promotional campaign whereby consumers could obtain a GBP5 discount when visiting participating restaurants. This was later described as one of the most successful launches by Walkers for some time. Similar trends have been observed within the US market, where consumers are increasingly inclined to experiment with bolder flavors. 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 be 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 much of the brand activity to have taken place recently. The Ruffles range owned by PepsiCo, for example, now includes varieties such as Flamin' Hot BBQ and Flamin' Hot Cheddar & Sour Cream. These have been 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. The growing penchant for bolder flavors has also been apparent within the kettle chips sector. A recent addition to the Kettle range in the US 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. A recent addition to the same brand within



the UK market was Steakhouse Barbecue flavor, which was launched to meet the rising consumer demand for snacks flavored with seasonings based on barbecued meat. Although more US consumers are gravitating towards bolder and more innovative flavors, the traditional favorites remain popular. According to latest data, plain 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.

### **HEALTH-RELATED NPD**

Pressure from the health lobby remains as strong as ever, with the result that manufacturers of potato crisps and chips are under sustained pressure to offer consumers products with improved nutritional profiles. This has led to the emergence of products offering a myriad of health claims and benefits – examples include low or reduced sodium, saturated fats and/or calories, as well as crisps and chips free from artificial additives and ingredients and products manufactured using a baking (rather than frying) process.



The fact that crisps and chips are continually linked with poor diets means that this trend is unlikely to abate any time soon. In the UK, new governmental restrictions concerning the promotion and sale of so-called HFSS foods (i.e. those with high levels of fats, sugar and salt) are due to come into force in October 2022. These new regulations will prevent the marketing and advertising of such foods on television prior to the watershed time of 9pm, as well as via online channels. The legislation will also introduce restrictions on the placement and promotion of food and drinks considered HFSS in supermarkets and convenience stores. This impending legislation has already resulted in the launch of new products by manufacturers of

potato crisps carrying health credentials. In March 2022, the Walkers range was extended with new crisps featuring 45% less salt, in flavors such as Lightly Salted, A Dash of Salt & Vinegar and Mild Cheese & Onion. Elsewhere in the UK market, Tyrrells has also introduced non-HFSS varieties into its range of potato crisps, one example of which was Mediterranean Herb, which was launched during the early months of 2022. In the US market, PepsiCo's Lay's range includes Better for You potato chips, which contain 50% less sodium than regular varieties. It remains to be seen to what extent this move towards healthier products affects the market for potato-based snacks in the future. According to PepsiCo, foods featuring lower salt levels are now present in over 70% of the UK's households, which suggests that a sizeable demand exists for these products. However, the Lumina research quoted earlier does indicate the presence of a significant consumer base for which health plays little or no role when purchasing bagged snacks such as potato crisps. According to the research, just over a third (34%) of respondents usually buy a mixture of less healthy snacks and those carrying some form of health concession, whereas only 20% make a consistent effort to purchase better-for-you (BFY) snacks on a regular basis. Another finding from the research was that a quarter of consumers claim not to consider health when buying bagged snacks. At 36%, this figure is highest amongst those consumers aged 65 and over and tends to decline with age, falling to 31% for those in the 55-64 range. Health appears to be more important for younger consumers, with only 16% of those aged 25-34 saying it does not represent an important buying consideration. This figure increases slightly to 17% for those aged 35-44. For the time being, health claims such as low levels of salt and/or saturated fats will dominate the global market for potato chips and crisps. However, the market has

witnessed some response to the growing popularity across much of the world of gluten-free foods. Many potato-based snacks supplied in the US by PepsiCo's Frito-Lay are either free from gluten or gluten ingredients, whereas the Pom-Bear range from Intersnack is marketed on a gluten-free platform. Leading supplier of gluten-free foods Dr Schär is also present in the market – its range includes Curvies, potato-based snacks similar in appearance and texture to Pringles. These are sold in countries such as the UK and Ireland in Original and BBQ flavors.

### FORMATS & TEXTURES

Snacks such as potato chips and crisps were recognized as one of the beneficiaries of people staying at home during lockdown periods in 2020 and 2021. One effect of this trend in markets such as the UK was a decline in the number of single-serve products typically eaten on impulse occasions, which corresponded with a growing demand for sharing and multi-pack formats, which are more suitable for in-home snacking. According to data from Nielsen, UK sales of multipacks of snack foods grew by almost 16% in the year ending December 2020. These formats remain especially suitable for in-home consumption, with future demand likely to depend upon whether people feel inclined to go out socializing in the post-pandemic world. Texture also represents a frequent source of innovation within the market for potato crisps and chips. Recent trends appear to indicate a growing demand for thicker, crunchier products, many of which are positioned at the higher end of the market and therefore command more premium prices. Elsewhere, the desire for different textures has also contributed to the growth of the market for batch-fried products, or kettle crisps/chips as they are often called. These are prepared using a process known as batch cooking, which results in harder and crunchier products. •

# Quality Evaluation for Processing Potatoes

Undesirable storage conditions lead to physical and chemical quality loss in stored potatoes, which affect their consumer acceptability. Appropriate storage environment should maintain tubers in their edible and marketable conditions by preventing large moisture losses, spoilage by pathogens, quality deterioration, and sprout growth.

by Tudor Vintiloiu

**W**hile cold storage may provide the necessary environment to prevent loss of weight, spoilage and sprouting, the quality of potatoes continues to change as a result of physiological activity. Low-temperature storage can cause freezing injuries, which causes tubers to become soft and unusable. On the other hand, higher storage temperatures will result in greater quality loss and increased respiratory activity and hence lowered shelf life. Sub-optimal handling, poor tuber quality, and deficient post-harvest storage can lead to significant amounts of waste. According to a research paper on "Kinetics of quality change associated with potatoes stored at different temperatures" by F. Nouriana, H.S. Ramaswamy and

A.C. Kushalappab, the authors point out that quality of potatoes is a combination of various physio-chemical and nutritional characteristics, which are greatly influenced by storage conditions. Good-quality potatoes are firm, relatively smooth, and without any defects, sprouts and unfavorable colors. However, these factors may vary according to the degree of maturity, harvest time, variety, and storage conditions. One of the first quality judgment criteria considered by processors and consumers alike, is the visual appearance and color of the potatoes. Abnormal colors cause the product to be rejected by the client. In addition to influencing the purchase intent, color often is a predictor of other quality characteristics such as flavor and taste in raw products and is easier

to measure. In addition to color, the product texture is of primary concern as an indicator of product quality. Texture is usually quantified as the product's resistance to an applied force. Potatoes undergo considerable changes in texture during storage depending on the temperature employed.

## SAMPLING CHARACTERISTICS

Probably the greatest limiting factor in the successful evaluation of a new potato cultivar is the sample for product evaluation. How many samples are needed and from where should they be obtained? The sample must be representative of the cultivar as it is grown in the region in question and must be selected at random. A poor, inadequate sample is worthless for evaluation of product quality if one is attempting to identify the true



potential of the cultivar. An initial weight of each sample is required for determination of storage losses. The storage facility must have proper ventilation and must have climate control to maintain a relative humidity of 85% or higher. The recommended storage periods for sampling are 1 month, 3 months, and 9 months. Samples should be taken in order to evaluate for given quality attributes or characteristics. These include size and shape, specific gravity, peel, defects, pulp temperatures, flesh color, and sugars (reducing and non-reducing). Other quality aspects are best evaluated as the sample is being processed or after manufacture. Size and shape are of particular importance in determining the suitability of a cultivar for potato processing. Large, round tubers are preferred by the chips processors since their shape facilitates removal

of the peel with minimal peel loss and the size provides chips which can be sized for the consumer. Chippers may use medium to small potatoes for individual serving-size packages for control of product weights. French fry manufacturers prefer large potatoes but require that they be oblong to long in shape to produce long fries with minimal losses.

#### PRESERVING QUALITY

The quality of potatoes is established in the field and can only be preserved during post-harvest. After harvest, tuber quality management aims to delay dormancy break and limit weight loss and sweetening of potatoes. Senescent sweetening is a natural process that occurs as a result of tuber aging; it is irreversible and involves cellular breakdown. Following cellular breakdown, structural and non-structural

carbohydrates are depolymerized by hydrolytic enzymes. To delay this process, correct storage conditions are crucial. Cold storage is commonly used to control sprouting, yet temperature management depends on the intended market: tubers for the fresh market can be stored at temperatures below 7°C while tubers destined for the processing market need higher temperature (8–13°C) to preserve frying quality. Quality loss is also caused by 'cold-induced sweetening' when sucrose hydrolysis leads to reducing sugars accumulation; although it can be partially reversed by temperature reconditioning.

#### SUGARS AND BROWNING

Reconditioning involves holding the potatoes at 21°C (70°F) for 1, 10, and 20 days. After each reconditioning period, a 5-lb sample is removed for processing



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and reevaluated for specific gravity and glucose and sucrose contents. Evaluating the stored tubers for chipping will give the best indication of the effect of the storage on tuber quality, since browning may be more pronounced. Low levels of reducing sugars are preferred in processing potatoes since when tubers are cooked at high temperatures (>120 °C) the Maillard reaction can occur. During the Maillard reaction, reducing sugars are responsible for the browning (non-enzymatic reactions) of the product (French fries, chips) and, as a side effect acrylamide may also accumulate.

**SPROUT CONTROL AND CO<sub>2</sub>**  
Since the ban on CIPC, continuous ethylene supplementation is currently the most used solution for sprout suppression during storage yet, it can induce sucrose hydrolysis (ethylene-induced sweetening). A recent study has shown that this type of sweetening can be prevented with a single application (24 h) of 1-methylcyclopropene (1-

MCP) prior to early and late ethylene supplementation. The impact of CO<sub>2</sub>, another storage extension gas, on frying quality is less clear. Studies on processing potato varieties showed negative effects on fry color when ethylene and CO<sub>2</sub> were applied together. Despite this, cultivar, gas concentration and timing, and seasonality strongly affect responses of tubers to CO<sub>2</sub> treatment.

### DISEASES

Storage diseases are not curable, but there are ways to help limit pathogen spread from diseased to healthy potatoes, thus keeping the problem from getting worse. Appropriate storage management depends, however, on proper identification of the disease responsible. Pathogen identification will also help in making future field management decisions. Most of the pathogens responsible for tuber decay in storage can take advantage of damaged areas on tubers such as nicks, cuts,

abrasions, broken knobs, or shattered areas. It is important to identify these disease entry points and examine each tuber's natural weak points such as the area of stolon attachment, the lenticels, and the eyes. The Canadian Horticultural Council says that a good storage management program is the only way to limit the impact of pathogens on the stored crop and avoid losses. While some warning signs exist - such as a pungent smell, depressions in the pile, water in the ventilation ducts and hot spots in the pile, early detection of soft rot is now possible with the use of infrared thermometers. "These devices, which look like radar guns, can be used to measure temperatures at the top of the pile. Areas of potential breakdown will show up as 'hot spots', often as much as three weeks before other symptoms are noticeable. Records of all storage conditions should be kept daily so that if problems arise there is some way of determining the cause," the scientists concluded. •



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# War and Insecurity Impact European Potato Markets



Russia's invasion of Ukraine means the food inflation that's been plaguing global consumers is now tipping into a full-blown crisis, potentially outstripping even the pandemic's blow and pushing millions more into hunger.

**By Tudor Vintiloiu**

**A**ccording to the French National Interprofessional Potato Committee's (CNIPT) analysis of the consequences of Russia's invasion of Ukraine, the situation there could amplify the widespread galloping inflation experienced in most of the EU countries.

Moreover, the sector could face a sharp increase in the potato production costs not only for farmers (fertilizers, seeds, energy) but also for the industry where the cost of gas has an important weight as well as the amounts of packaging. CNIPT especially stresses out that strong tensions are expected in energy matters (Russia is the first exporter of natural gas to the EU with 44% of its imports) and by extension in the price of nitrogen fertilizers. Tensions over oil have already risen. Along with this, logistics flows would thus be

interrupted due to difficulties related to transport (road and sea), costs, and lack of drivers. According to Agronews Castilla Y Leon, for Ukraine, the war could affect current conservation potato flows to Central and Eastern European countries. This country is a major producer of tubers, but due to its significant domestic consumption, it remains a net importer of around 250,000 tons each year. Its main suppliers are Poland, Lithuania, and Romania. France exports little directly to Ukraine but sends significant flows of potatoes to neighboring countries that it re-exports to Ukraine. "The consequences of the war could therefore be important for the sector due to the rebound effect," experts say. When it comes to Russia, it also imports frozen fries (and other processed potatoes), up to 100,000

tons, exclusively from the EU (Netherlands, Poland, Germany, Belgium, and France). The conflict could lead to a paralysis of these flows, which would be transferred to other destinations.

Despite the world demand for the processed product being at an all-time high, there is much less activity in the free-buy physical markets recently.

"Exports of frozen product to Russia – which have been halted – are reported to account for around 5 to 7% of total frozen product exports (12,000 to 20,000 tons of raw potatoes) per month but this could 'easily' be taken up by demand from Asia," the Irish Farmers Association's latest report shows. In Ireland, markets and consumption have leveled off recently, 'probably' due to a combination of factors such as post-pandemic lifestyle and the

current inflationary model. "The dire situation unfolding in Ukraine is putting extreme pressure on the agricultural industry and decisions to be made regarding 2022 crops. Fertilizer and diesel have reached record high costs in the past week casting great uncertainty for the sector," the IFA experts also pointed out. Due to the escalating fuel prices, forward prices for potatoes are not being offered at the moment and buyers are having to accept on-the-day quotes. Reports show that prices for fresh potatoes are currently steady, but export markets are still weak and supplied mainly by seed tops. "Demand from Eastern Europe had been falling off but the large influx of Ukraine citizens may create fresh interest. Transport cost is a huge issue at present. [...] Plantings have also been delayed across the U.K. due to wet weather conditions,"

says the IFA report. Recent wet weather conditions have also halted plantings in Ireland over the past few weeks. "As markets re-adjust post-pandemic, growers are reminded to be mindful of this when planning for the 2022 season. The cost and availability of fertilizer remain to the fore for growers along with rising energy costs. A similar sentiment is echoed across Europe," the IFA experts stressed.

**PROCESSING POTATOES**

Potato processing activity in the NEPG zone (Great Britain, Belgium, The Netherlands, France and Germany) is 'good and running' at the maximum of the current possibilities and processors need potatoes, the North-Western European Potato Growers (NEPG) representatives recently announced, even though the war in Ukraine is making potato markets hesitant on the end of the

current and upcoming season. "Following the Russian invasion in Ukraine, potato markets have been somewhat hesitating during the last weeks. But there are no reasons for much change in free buy prices or sales of processed products in the European Union and abroad," NEPG experts added. They mentioned also that there is a certain degree of uncertainty regarding frying oil availability and costs (for the coming weeks and months, for next year), as well as logistical difficulties (drivers and trucks, containers and shipping) and related higher costs. The NEPG's representatives spoke recently also about the sky-high production costs and very good cereal and maize prices that could influence spud plantings. "Beginning of this year, production costs for the oncoming season were expected to grow by 15 to 20%. Gas, petrol, and electricity have



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seen tremendous prices since the Russian invasion of Ukraine began. The same occurs for fertilizers, mainly for Nitrogen and Potash. [...] And these increases multiplied by 2, 3 or 4 will inevitably have consequences on all the prices of raw material and products entering the potato value chain," according to the press release. The NEPG's experts added that some potato growers have made contact with processors with whom they have (or were planning to sign) signed contracts, asking for higher prices or more flexible conditions. "All actors in the potato chain face higher production costs. To make sure that growers get a fair price, traders and processors should be able to sell packed or processed potatoes at a higher price to the retail. And consumers will have to pay more too," they also declared, adding that the climate change (a dry and hot spring and summer for example) could make things still more complicated.

## LOOKING TOWARDS THE FUTURE

Growers must realize that despite this very important crisis, the NEPG countries (and others worldwide) will continue to need potatoes and potato products in the future. "Contract conditions and uncertainties in production costs have to be carefully taken into account before any decisions regarding the importance of individual potato acreage and

plantings. Difficulties related to growing potatoes (land availability and renting prices, consequences of new national and/or CAP regulations on subletting) could also influence potato plantings this season and in 2023," NEPG's experts concluded.

## FRYING OIL

An imminent shortage of sunflower oil as a result of Russia's invasion of Ukraine has producers of Belgian fries concerned about their ability to maintain supplies. "It's currently all hands on deck with the potato processors," Christophe Vermeulen, CEO of sector federation Belgapom, told De Morgen.

About 200,000 of the 435,000 tons of sunflower oil used each month in Europe originate from Ukraine, with another significant portion coming from Russia. Combined, the two countries represent three quarters of the total European supply.

"At the European level, there is only a few months' supply left," said Nicholas Courant of the food federation FEVIA.

Alternatives such as rapeseed oil, soya oil or palm oil are also experiencing shortages due to drought in South America or export restrictions in Indonesia, and prices are skyrocketing.

Even if those oils were readily and cheaply available, Courant explained that switching is also a complex logistical operation. Complying with the strict rules on packaging and food safety, or simply testing the taste and texture, is a process that under normal circumstances takes a year.

"Now it would have to be done in a few weeks. That is an impossible mission," Courant said.

The sector is therefore asking for a more flexible framework that would allow them to pivot, as is being considered in France in the form of a website on which producers can post the adapted recipe of products, without having to reformulate each package. •



# 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 content

### 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, Europat 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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