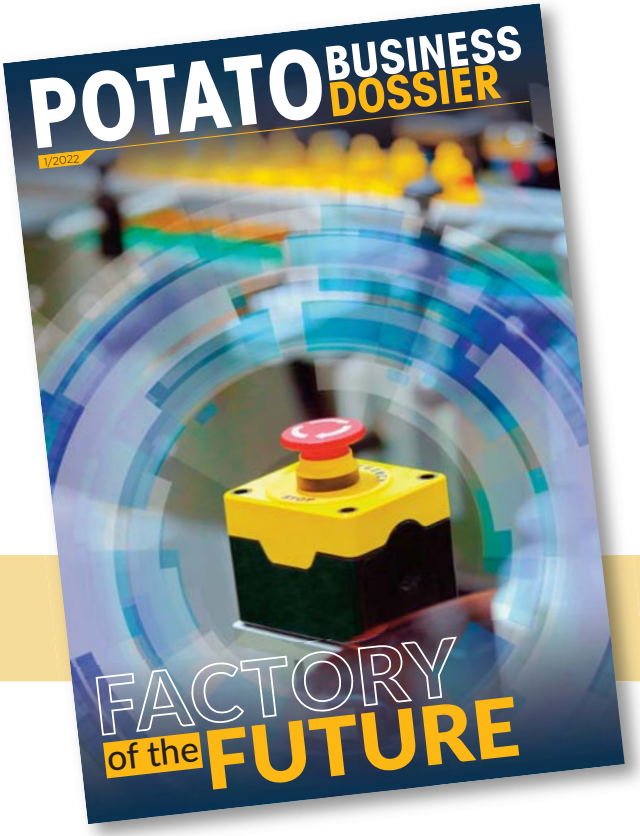
POTATO BUSINESS DOSSIER

1/2022

FACTORY of the FUTURE



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content

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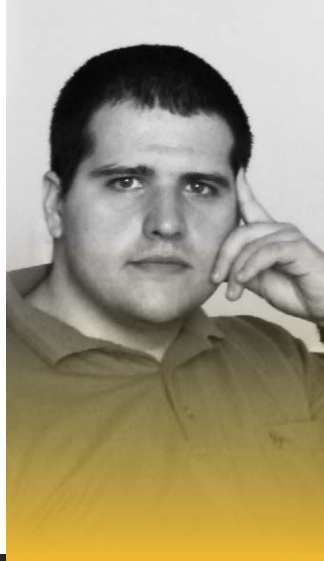
Tackling Now The Future Potato Processing Gaps



IONEL VĂDUVA
on-line editor

COMMENT

Ionel Văduva

As a result of continuously changing eating patterns, the demand for processed foods is increasing, leading to a further rise in potato processing as a fast-growing industry with greater opportunities for entrepreneurship. In response, farmers produce large yields of edible dry matter per hectare per day, ensuring that the ever-growing demand is met. However, the potato industry's outlook appears somehow bleak.

Spuds are a well-known winter crop that is farmed seasonally but consumed throughout the year. Furthermore, potato is primarily grown in the tropics and subtropics, and their harvesting season corresponds with the arrival of high temperatures, resulting in significant post-harvest losses. As a result, correct storage and storage quality are critical in tackling these issues.

Last year's statistics showed a plentiful supply of raw materials, but due to a scarcity of potato processing companies, only a small percentage of the total potato production is used for processing. High productivity with a short vegetative cycle is a big problem, requiring efficient post-harvest measures such as efficient transportation, cold storage, and market linkage management.

Sharing technology with new entrepreneurs and small-scale industries involved in potato processing will help in the elevation of different countries' marketing sectors and international export platforms for augmentation of the economic position.

During the off-season, potatoes can be processed for preservation by drying/dehydration and value addition in the form of grits, powder, flakes, granules, wafers/ chips, and canned slices, which may be stored for longer periods. During the season, when cultivars are abundant and are cheaply available, potato flour can be prepared and stored in air-tight containers which can later be used in place of the fresh form of potatoes in the off-season.

The potato processing industry is possibly one of the most effective ways of producing a cost-effective product that is not only functional but also long-lasting and helps with marketing convenience by reducing post-harvest losses. ■

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Future Processing

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

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

With so many capabilities under one roof, valuable developments and improvements are fast-tracked. Constantly partnering with processors and line builders, Urschel readily implements new methods and efficiencies to benefit the overall production line-up, both upstream and downstream from Urschel cutting equipment.

With so many different styles of potato products, there is a wide gamut of potato production facilities around the world. Production and needs vary from regional processors to global, mega-processors. Future decisions will be as diverse as the operations themselves.

ANALYTICAL EFFICIENCIES

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

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

Analysis of data to determine an upgrade in technology may be simple or more complex. For example, in the case of several kettle chip processors who performed a side-by-side comparison for kettle fill times between the Urschel standard 8-station head versus the MicroAdjustable SL14-station head. Calculations based on the number of batches and fill times were easily achieved. Further cost analysis and comparison of maintenance procedures and time yielded upgrading to a newer technology – the 14-station head – as a logical next step to improve the line.

Upgrading technology in one area of the line may lead to changing out of other stations. For example, standard chippers updating to the SL14 slicing head, in some cases, purchased larger capacity downstream equipment, such as fryers.

TECHNOLOGY IN PROCESSING

Upgrading technology to improve the quality of the end-product is a consideration. Processors are currently incorporating PEF (Pulse Electric Field) Processing. This process replaces or reduces the need to blanch or preheat treat. Pulsing electric waves move through the cell walls of potatoes. These waves perforate the cell membrane to create microscopic holes to release sugar and amino acids. This reduces acrylamide and lowers oil content.

Effectively softening the potato reduces impact during the cutting process to promote increased knife life and decrease costs. Conditioning the potato increases product permeability resulting in less product breakage and more in-spec product.

USE OF SCRAP

Cost efficiencies are linked to many variables. Items on a spreadsheet, such as the cost of oil and potatoes, or the type of potato being processed. The type of potato sold for chips/crisps is more expensive than the type sold for fries. Could this change in the future? Fry producers repurpose scrap into a multitude of other value-added potato products. Building on these products will continue to deliver strong profits in subsequent years.

The Comitrol® Processor series line by Urschel will remain a popular option for the further reduction of potatoes. With several different models from which to choose, products may be reduced to coarse or fine purees. The line focuses on particle size reduction. A reduction head in a fixed position works with a high-speed impeller that precisely and incrementally shears the product to a specified target size.

VALUABLE OPERATOR RESOURCES

Labor and skill level is an ongoing topic. The necessity to manufacture operator-friendly

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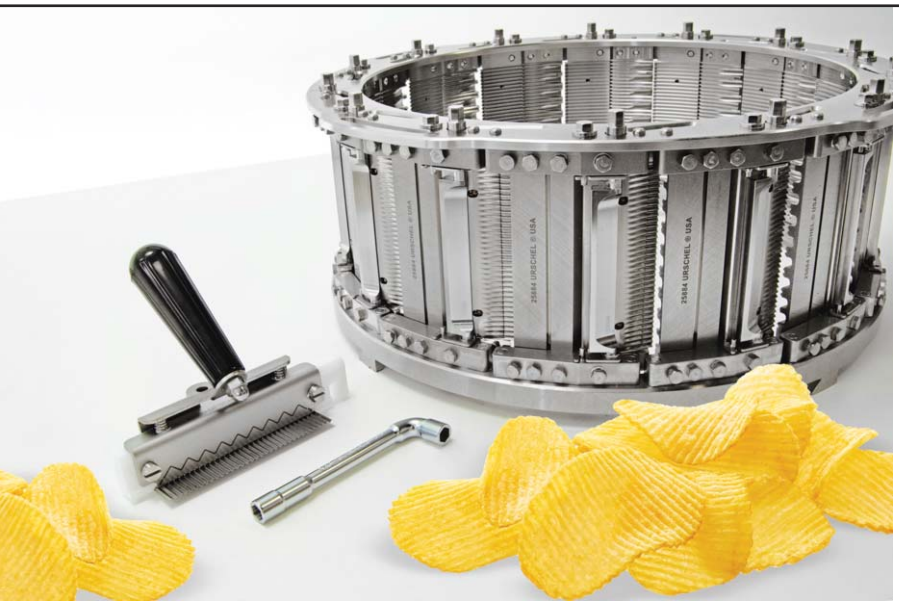


Partnering with processors around the world enables Urschel greater insight into the knives necessary for the processors of today and tomorrow. In-house capabilities remain strong with on-site metallurgy, engineering, and foundries working as a team to create new knives for future cutting applications.

capital machinery. Equipment operating at the push of a button with uninterrupted capability and limited downtime will remain preferred. Parts on cutting machinery are manufactured for quick, simple changeovers with built-in features, such as handles. This trend will continue. Simplifying the ability to run a line, limiting personnel and the skill level required, and manufacturing longer-running machines with even more durable components are essential as time goes on. Other items like trolleys and types of stands will continue to be designed to expedite routine maintenance. Urschel will continue to supply operator resources to assist lines with time-saving efficiencies.

CRUCIAL KNIFE TECHNOLOGY

In processing potatoes, inevitably foreign material in the form of rocks or sand occurs. New equipment is available to assist in filtering out foreign materials, but choosing the proper knife is an important factor. Knives will continue to play a crucial role in future cutting machinery. Urschel is constantly evaluating and testing new materials and exploring new manufacturing methods. Designing functional bevels and geometries unique to suit specific cutting applications will continue to be at the forefront. From low-cost knives to heavy-duty specialty knives, alloys are carefully chosen, and manufacturing methods are carefully aligned because details matter. Quality and creation of knives proceed in parallel. Overlooking details, such as all stainless steel knives and carbon knives must be fully detectable by metal detectors, could be detrimental to a processing line.

Food processors should evaluate and analyze available knives. Cut quality, wear-and-tear, and in-spec products may vary depending on knife choice. Numerous knives may exist to enhance production. Partnering with processors around the world enables Urschel greater insight into the knives necessary for the processors of today and tomorrow. In-house capabilities remain strong with on-site metallurgy, engineering, and foundries working as a team to create new knives for future cutting applications.

EXPANDING OPERATING PRINCIPLES

The cutting machinery designs of today have a firm foundation of excellence in engineering and craftsmanship. Moving forward, the main operating principles will remain constant, however, increased capabilities will continue to evolve. Capabilities will expand related to cut sizes and cut shapes. Shapes are intertwined with the increased manufacturing of specialty knives. The demand for new shapes has been on the rise and will continue to do so.

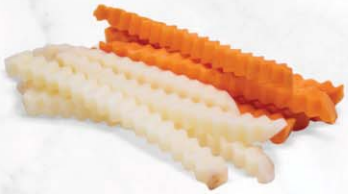
Increased growth in cutting parts and built-in feeding methods will occur. This growth will offer food processors ease of operation specific to their product requirements and time-saving efficiencies. As more and more products enter the marketplace, food processors seek solutions to the most

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

PAST-PRESENT-FUTURE

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



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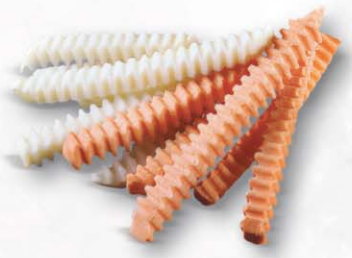


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Future Proof Your Factory for Sustainability

Sustainability is a key challenge for the food industry and processors globally are recognizing their part in safeguarding the future. As the world's population continues to grow, so does the demand for food products. In 2020, the global production of potatoes exceeded 359m tons and global demand for frozen potatoes is rising rapidly.

By Heat and Control

Greater volume of production is leading to increased pollution and waste levels, and many processors are now actively engaged in sustainability reporting. Global Reporting Standards (GRS) are helping processors assess (and define) their sustainability strategies, to better manage and understand their impact.

SUSTAINABLE POTATO PROCESSING IS POSSIBLE

To achieve their sustainability goals, processors are investing significantly in equipment that helps - reduce fuel costs, energy waste, air pollution, and water consumption - and meets the rigorous pollution control regulations of the worldwide agencies.

While modern processing equipment must address all the themes of sustainability - it must also improve efficiency and profitability - if it is to be adopted widely, in the future.

As interest in sustainable technologies grows, turnkey suppliers are helping processors plan their factories of the future and are assisting them to adopt or upgrade their existing equipment, to process more responsibly.

Multiple technologies are already available which can reduce fuel costs, energy waste, air pollution, and water consumption. Working with a turnkey supplier is a great way for a processor to access expertise - and understand the new and emerging technologies - for sustainable potato processing.

CREATE POSITIVE CHANGE WITH THE RIGHT EQUIPMENT

Heat and Control's KleenHeat Heat Exchanger is a great example of a pollution control solution, which has been developed to combine the incineration of fryer exhaust pollutants with high-efficiency oil heating; to help processors meet emission control regulations.

This innovatively designed heat exchanger is a versatile oil heating, energy-saving, and pollution control solution which is described as 'Best Available Control Technology' (BACT) by regulatory agencies worldwide. KleenHeat exceeds the thermal efficiency of ordinary heat exchangers, which don't offer pollution control, and low oil volume promotes fast oil turn-over which inhibits the formation of free fatty acids.

KleenHeat offers processors high energy efficiency oil heating; with built-in pollution control to remove oil, odors, and particulates from the fryer exhaust. The rapid and uniform heat transfer facilitated by this equipment allows the fryer to respond quickly to changes in product load. This protects the quality of the oil by maintaining a low, oil film temperature. With KleenHeat, there is no need to invest in additional fryer pollution control systems, and a variety of sizes are available which can be provided: ready-to-run, pre-piped and wired, and fully compliant with US, EC, and Australian regulations.

MULTIPLE SOLUTIONS TO PROCESS MORE RESPONSIBLY

In potato production, it's no secret that oil management can be expensive. Custom-designed, oil management solutions have been developed to maximize oil quality - reduce oil pollution - and maximize energy savings, for sustainable and environmentally-safe operations. One such system is the Heat and Control Oil Sweep De-oiling system. This oil management solution is used by processors of French fries, potato wedges, and potato co-products; to strip their fried products free of surface oil, before freezing and packing. Stripped oil is recovered through a bank of cyclones and returned to the fryer oil recovery system. Solid fines are separated, and reusable oil is transferred back into the frying system.

The typical oil pick-up on French fries is around 6-8%. While much of this oil is contained within the fries themselves, this system has been designed to recover most of the free surface oil, which results in increased yields and healthier finished products. In addition, less product surface oil improves the performance of the defrosting and cleaning cycles of the pre-cooler and freezer and helps reduce oil particles clogging cooling coils in the pre-cooler.

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

In a recent installation, Heat and Control delivered a complete French fry system which included the Oil Sweep De-oiling system, and a flexible batter coating system that featured a two-stage, multi-zone cooking feature with customizable cooking conditions, for coated and uncoated French fries. The Oil Sweep system is now helping the processor achieve production capacities of 18,000 kg/hr (37,400 lbs/hr). This installation demonstrates how working with a single-source equipment supplier can help adopt or upgrade equipment to process more responsibly.

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359m
tons was the global production of potatoes in 2020.

WATER CONSERVATION

When water is used for product or equipment cleaning purposes; increasing the use of recycled water can offer many benefits. High levels of water usage are costly for processors. The Water Cleanup System from Heat and Control (used with the slice washing system) can reduce freshwater usage by up to 50%, over conventional slice washing systems. This system is designed to clean and reuse wash water, to concentrate starch and fines for more efficient removal, and this reduces sewer loading and burden on the starch recovery system in the line.

Also developed by Heat and Control is the Oil Mist Eliminator, which removes oil mist from the fryer exhaust - without water or high-horsepower fans - and a heat recovery system that recovers typically lost heat from the fryer exhaust stack. It condenses otherwise wasted steam to make hot water for blanching, sanitizing, or building heat, and it is the adoption of innovative equipment such as this, that will future-proof factories for sustainability.

Integration of new and emerging sustainable technologies - will help potato processors achieve greater production efficiency - and reduce their environmental footprint. When sourcing equipment, processors should look for solutions that incorporate innovative manufacturing designs; to reduce pollution and waste levels. Working with a turnkey supplier is the easiest and simplest way to do this and will help the processor achieve a significant return on its investment.

Established in 1950, Heat and Control is a privately-owned company with a global team that has built an extensive knowledge bank and developed a wealth of experience and expertise. Access to production and technical support from a network of engineers, food technicians, field service technicians, skilled tradespeople, and support teams provide food manufacturers with confidence to achieve production goals.■

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Remote Support, Service, Training and Auditing Help Spud Processors Be Compliant

Companies, institutions, and organizations have learned to deal with unique crises and disruptions in a virtual fashion as a result of COVID-19 economic repercussions, and "remote" is one of the top words of recent time. When it comes to the installation and use of equipment in the potato processing facilities, remote support, service, training, and auditing can help manufacturers stay compliant and hit their goals for production and efficiencies.

By Ionel Văduva

The numerous requirements that arose over the previous difficult year prompted several innovative solutions. Among those solutions was the rise of remote service and support in the spud processing industry to keep businesses operating and up to date on regulations. Technology is enabling better and more frequent communication platforms for virtual exchanges of many kinds. From high-quality cameras to advanced software, these technologies help processors keep machines running accurately and efficiently and stay compliant with food safety requirements and standards. Furthermore, these assistance technologies reduce travel expenses and climate consequences that would otherwise be incurred.

In addition to remote testing, training, and troubleshooting, the potato processing companies can participate in some remote and blended onsite/remote audits, as they work to comply with regulatory standards and requirements. Some agencies can extend certificates, while others, like ISO, are offering remote audits as a solution for some of the ongoing restrictions.

In the case of these remote audits, manufacturers need to test their communication technologies in advance to make sure they are working well during the audit and also provide a list of requirements beforehand, including HACCP plans and site documentation. They may also consider enhancing their current technologies with mobile, hands-free, or drone systems, given the fact that at least blended audits will be part of the process going forward.

KIREMKO REMOTE SERVICE STARTS UP FRENCH FRY LINE IN MOROCCO

Not long ago, Kiremko announced they have successfully started one of their processing lines, which was installed last summer, completely remote by using 'Augmented Reality' technology out of Kiremko HQ in Holland – a new experience for both Kiremko and Morrocan potato processor Fun Fries. When the COVID-19 pandemic prevented Kiremko's engineers from boarding planes, there was an opportunity for an innovative solution that Kiremko developed: the Kiremko Remote Service. This service uses an advanced headset equipped with a camera, sound and monitor, an Internet connection, and experienced technicians on both sides of that connection.

"It was a fruitful experience, and I think this is the way to work in the future. Without glasses, I believe we could have gotten in trouble. The online communication on-site with the Kiremko team allows us to do the job as if the Kiremko team was physically on-site," Mustapha Laraqui, director of Fun Fries Morocco, commented on his experience with the AR glasses and the use of this new technology. Laraqui believes that with the advantage of the AR glasses, his technicians receive better training than in a conventional way. "It's already the present, and not something of the future anymore."

Matthijs Laks, project manager at Kiremko said this was the first time they started a line in this way, using the AR technology. "The AR glasses played a crucial role in this project. We were able to assist the customer remotely and start up the line, despite the travel ban that was in effect. Without this technology, it would never have been possible. The technology will further improve and Remote Service will increase our customer's possibilities in these uncertain times."

With the Moroccan market registering a double-digit growth each year, Mustapha Laraqui says they have all the resources to compete in the European market for some specific products. "We are the first potato processor in the country, although we are a country of potato farming. What is unique about Morocco is that we can get at least four crops around the year. Based on our farming affiliate company Allied Potato, we can harvest our crops at the end of September, in February, April up till July," said Laraqui.

He continued to say that because this was their first experience in this industry, they chose to order a full line, supplied by Kiremko. "We plan to produce coated fries and sweet potato French fries for export. So there is much more to come," Laraqui added.

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KEY TECHNOLOGY BRINGS SMART SOFTWARE SOLUTIONS FOR SORTING

The newly introduced suite of software solutions is called Key Discovery and it transforms Key's digital sorting systems into IIoT (Industrial Internet of Things) connected devices that collect, analyze and share data while sorting product.

By harnessing data about the sorting process and every object flowing through the sorter, Key Discovery can reveal patterns and trends that improve sorting and help control upstream and downstream processes.

According to an official announcement, Key Discovery provides actionable information that enables processors to optimize product quality, maximize yield, reduce downtime and minimize labor to increase profitability.

"The Industrial Internet of Things is a reality in the food processing industry. Key Discovery represents the next generation of our information analytics software solutions. With it, food processors can turn their digital sorters into advanced product and process information centers," Dave Crewe, senior vice president of AIS Engineering at Key Technology said.

Food processors can use the data provided by Key Discovery for a wide variety of process monitoring and line control purposes, depending on their needs. It audits the sorter's wellness, validates sort performance, and helps better manage output. Key Discovery can also monitor upstream processes to help identify issues and opportunities for improvement, and it can connect the sorter with other equipment and devices upstream and downstream on the line.

Key Discovery's configurable reporting enables processors to understand product batches in terms of their quality profile, measuring defect rates and the presence of foreign material as well as the color, size, shape, structural property, and/or chemical composition of the product, whether the data is used to make sort decisions or not.

THE TNA REMOTE ASSIST, A VIRTUAL COMMISSIONING, TRAINING AND TROUBLESHOOTING SERVICE

Using the latest Microsoft mixed reality technology, tna's experts can guide the company's customers through even the most complex commissioning projects or system repairs, quickly and efficiently.

"Whatever the challenge, wherever you are in the world, our experts are here to help," the tna's specialists said in a recent announcement.

The "tna Remote Assist" digital support service enables immediate access to tna's global expertise. Powered by the Microsoft HoloLens 2, the new product allows users to connect directly with technicians, share what they see in real-time, and receive precise instructions.

"From installation, testing and commissioning, to fault finding, troubleshooting, factory acceptance tests, and user acceptance tests, users can access tailored support remotely," the tna's experts explained.

According to a recent company release, from now on there is "no need to wait for in-person installation, service or training". Thanks to the "tna Remote Assist", the visits minimize downtime, maximize production and avoid project delays, save costs incurred by in-person visits, offer real-time assistance and support, and remote access to a wide range of solutions with the help of multiple experts at the same time.

"What you can achieve – remote diagnosis, remote troubleshooting, remote commissioning, software and firmware updates, configuration tune-ups, and consulting factory acceptance tests and more," is the firm promise of the developing company. ■



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Leveraging Data Analytics Software to Better Understand Product Quality

The major potato processing market players are constantly collecting, analyzing, and sharing digital data across their enterprises to monitor and control operations, for gaining elevated food safety, optimizing product quality, improving production efficiencies, and increasing yields. All these rewards come from focusing on information sets that can be turned into useful, actionable knowledge.

By Ionel Văduva

The next step in the big data saga will emerge from improved data integration throughout the food supply chain, from farm to fork, with each component collaborating to share information smoothly and safely beyond the walls of their entity to benefit the overall process.

Each spud processor needs to control the product quality they deliver to their customers while maximizing their process yield. In this respect, the sector players are increasingly looking for equipment that achieves performance parameters while easing use. The technology suppliers must deliver intuitive machinery, enabling a new operator without a technical background to learn how to use the equipment in less than an hour.

Among the common requirements, tech suppliers get from potato processors is the ability to leverage data analytics software to understand product quality and process trends better, to optimize the efficiency of the line operation. Data from a smart machine can improve the system's operations, conducting self-diagnostics tasks, sending smart alarms, performing auto-learning functions, and more. Integrating smart equipment on a line enables data from one system to improve other systems along the same production line. In between machines, unique sensors on the line, such as at the out-feed of a freezer or before packaging, can share the data they collect to monitor and control a wide variety of process parameters.

Outside individual machines and line integration, delivering data to the enterprise level allow the large-scale analysis of 'big data.' The ease of harnessing large amounts of valuable data is rapidly improving and, with larger data sets, comes the opportunity to develop more valuable insights and actionable information.

To be an efficient smart device within the Industry 4.0 framework, the flexibility to support a variety of data formats and connectivity protocols is essential. Proprietary formats are unlikely to scale.

"Today's sophisticated equipment often features advanced software that enables universal connectivity via OPC-compliant infrastructure. Many modern systems support integration with virtually any factory automation systems from any manufacturer, in addition to Modbus and Ethernet/IP devices and the creation of CSV and database files. Whether the data is collected off-line, on the plant floor, or remotely via connections to the factory's MES and SCADA systems, processors that can collect, analyze and share big data are empowered to make more informed decisions," Marco Azzaretti, director of marketing at Key Technology explains.

HARNESSING THE DIGITAL SORTERS

Optical sorting is the most important puzzle piece in automating the inspection of cultivars at various stages throughout the process. The throughput of modern optical sorting devices combined with the accuracy and reliability in detecting product defects cannot be matched by any other technology, experts say.

"The potato processing industry would not have been able to achieve the exponential growth over the past decades without the 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, and product quality and save cost," Lukas Lackner, Insort vice-president said.

Digital sorters, which remove defective products and foreign material on almost all potato processing lines, contain hugely powerful sensors and are ideally suited to contribute to the digital data revolution. This is because they continually inspect 100% of what is flowing through the line and can recognize each object's color, size, shape, structural properties, and/or chemical composition, depending on the sorter's sensors. Digital sorters feature powerful computers that can process large volumes of data and are easily connected to the processor's enterprise.

Thru its 'Information Analytics' capabilities, a sorter can collect real-time data and generate reports about the sorting process and every product and object on the line, whether the data is used to perform the system's sorting function or not. The data can be harnessed to optimize processes upstream and downstream of the sorter, in addition to improving the sorter's performance.

Around the globe, the spud processors of all sizes are harvesting data from their digital sorters to help them improve their operations. For processors that operate multiple sorters on different lines or production facilities, data can be compared across systems to help managers optimize performance and achieve operational consistency.

TAKING THE RIGHT STEPS AT THE RIGHT TIME TO MAXIMIZE PROCESSING EFFICIENCY

Optical sorters are the best way to detect and eject unwanted materials, defective product, and product that are 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

Big data means digital technologies at the end of the day. Big data starts with the fact that there is a lot more information floating around than ever before, and it is being put to extraordinary new uses.

Digital sorters continually inspect **100%** of what is flowing through the line and can recognize each object's color, size, shape, structural properties and/or chemical composition.

can recognize materials based on color, shape (including length, width, diameter, and area), and biological characteristics.

"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 before 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 the 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 forecheck before packing, making sure no foreign material reaches the packing area," Marco Colombo, Global Potato category director, Tomra Food mentioned.

According to the company's expert, 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 with 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," Colombo concluded.

Big data means digital technologies at the end of the day. Big data starts with the fact that there is a lot more information floating around than ever before, and it is being put to extraordinary new uses. Big data is distinct from the Internet, although the Web makes it much easier to collect and share data. Big data is about more than just communication: the idea is that everyone can learn from a large body of information things that they could not comprehend when they used only smaller amounts.

The fastest and easiest way to achieve the best results is to partner with qualified suppliers that are ready to lend their expertise, all the sector experts say. Working with partners and integrators that know and understand the potato processor business and have deep experience with Industry 4.0 protocols is invaluable. Proprietary data formats and processes should be avoided in favor of systems that offer standard formats and connectivity protocols. ■

Get your updates right from the core of the potato processing industry

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POTATOBUSINESS DIGITAL

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Improving the Industry's Operational Competence Through Software-Hardware Synergy

Artificial intelligence, or AI, is a type of technology that can think and act similarly to a person. Computer technology or software combined with AI allows it to learn from human experiences and do tasks almost identically to humans. Machine Learning, or ML, on the other hand, is a type of AI that can self-learn without being programmed by referring to the data it receives regularly.

By Ionel Văduva

AI and ML are two important technological advancements that, if properly utilized, might alter a variety of industries, including the potato processing business. Sorting, grading, and examining both ingredients and products are some of the most typical AI applications. AI may also aid in two ways: by establishing standards and specifications, and by assisting in the identification of a cause if a product begins to deviate significantly from them.

Key Technology, a supplier of sorting systems, starts most applications with a baseline "sort recipe" of what the product should look like.

"However, the result is always a sorter that is custom-programmed specifically for the unique processing line on which it is installed, because each installation has unique definitions of a good in-spec product as well as the exact defects and the types of foreign materials and contaminants that must be eliminated," Marco Azzaretti, Key Technology director of marketing said.

The potato processing sector is one of the most important businesses among the different industries that sustain a relatively high employment rate globally. The human workforce plays an essential role in the smooth execution of the production and packaging of processed potato products. Due to the involvement of humans, this sector is sometimes failing to match the level of market demand and also lacking in food safety. To overcome these issues in the industry, software and hardware integration represents one of the best possible solutions. This approach is based on artificial intelligence (AI), machine learning (ML), or deep learning (DL) algorithms. By using the AI-based system, the potato processing and delivery processes can be efficiently handled and also enhance operational competence.

AI could significantly improve packaging, increase shelf life, and food safety by making a more transparent supply chain management system. With the help of AI and ML, the future of the potato processing industry is completely based on smart farming, robotic farming, and drones.

ML methods, such as principal component regression (PCR), hierarchical cluster analysis (HCA), support vector machine (SVM), partial least squares regression (PLSR), multiple linear regression (MLR), locally weighted partial least squares regression (LWPLSR), artificial neural network (ANN), and least square support vector machine (LS-SVM), have been widely used in food analysis.

SORTING AND PACKAGING OF PRODUCTS

One of the more laborious duties and time-consuming processes for production units in the spud processing business is the correct ordering and packing of goods. As a result, AI-based systems can manage such a time-consuming activity, reducing the risk of error while substantially increasing the industry's output rate.

The development of AI-based systems is a challenging task due to the irregularities in the shapes, colors, and sizes of vegetables and fruits. For developing an AI-based sorting and packaging system, a large amount of data is needed so that the system is properly trained and efficiently performs the task. Various R&D groups designed different systems for the same task. One of them is Tomra, which performs the sorting task in a very efficient manner. It improved production rapidly with an accuracy of 90%. In current situations, most of the product sorting and packaging tasks are performed by the automated system. By using such types of systems, industries gained some advantages such as faster production rate, high-quality yielding, and labor cost-cutting.

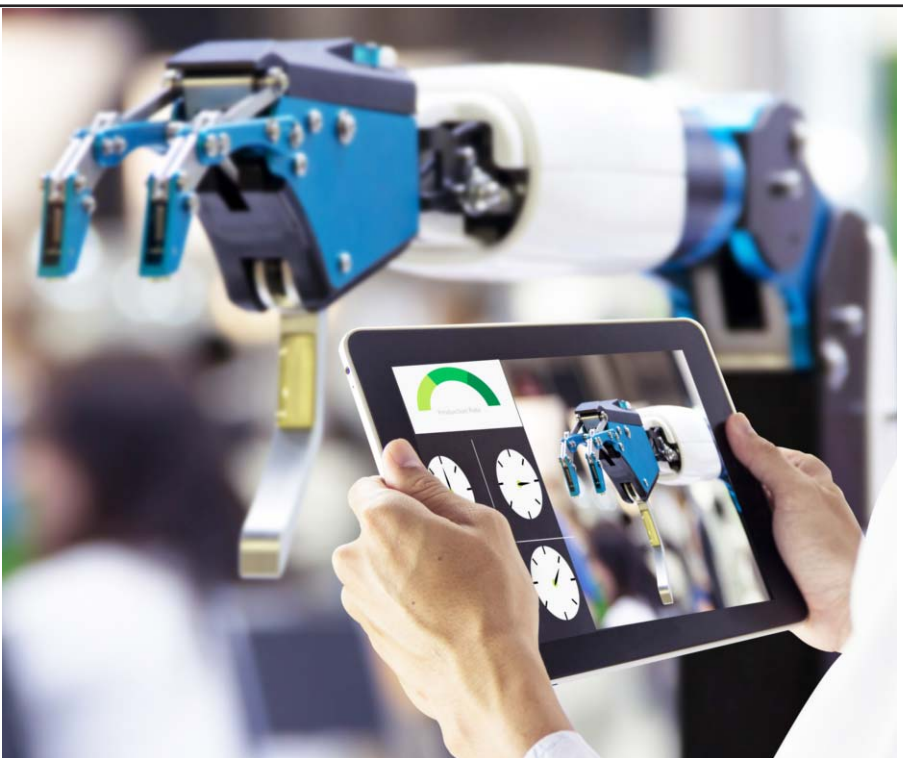
„At Tomra, we've used AI for decades, and we're confident that deep learning will continue to add tremendous value for recyclers. That's why we're investing heavily in software development to expand our deep learning capabilities across more applications. We want to bring innovative solutions to sorting challenges that cannot be solved with conventional technology," Sebastian Solbach, team leader of Application Development - Deep Learning R&D said.

The AI-based intelligent decision-making systems consist of various tools and methodologies, i.e., high-resolution cameras, laser-technology-based systems, X-ray-based systems, and IR spectroscopy. These tools and technologies are used to analyze every aspect of the food products such as fruits and vegetables at the input channel.

Conventional systems are only able to characterize good and bad products according to their appearance. By using Tomra's approach, it has been observed that the detaching and order problem can be improved by 5–10% in the case of potatoes only. The same type of problem was also handled by a Japanese company that uses a TensorFlow ML-based system and also achieved a remarkable outcome gaining significant benefit in their assembling unit.

Each organization found that the AI-based system works more precisely. The performance achieved for potatoes encourages the expansion of AI-based systems for others also. It can be further expanded

The employment of AI and ML in food production and eatery businesses is already taking the business to a new level by minimizing human mistakes in manufacturing and to a lesser extent leftover copious products.



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for different sections or departments of the food processing industry.

CHECKING THE TEXTURE OF A CHIP IN A NON-DESTRUCTIVE WAY

A photoacoustic instrument was created to check the texture of the chip in a non-destructive manner. A laser generating instrument, an auditory capturing device, and a data processing unit are all part of this system. A laser is directed towards the chip which when struck produces disturbance in the immediate surroundings and creates pressure waves (sound waves). These waves produce an acoustic signal, which is captured and forwarded to the processing unit. Here, the acoustic signal is filtered and a quantitative acoustic model is generated. This model consists of the key properties of the chip like how hard or fragile it is. A lot of data is generated during this process and then comes the challenge of making insights out of this data where machine learning models come into play. Many other sophisticated tasks are being augmented with machine learning. For instance, testing the weight of a potato before and after peeling. For this, the R&D team is deploying deep learning models with classifiers such as Random Forests. These neural networks are fed with the images of the potatoes and are trained to give an approximation of the weight by identifying the percentage of peel. This eliminates any chance of extra peeling of the potatoes.

AI has found its way into almost all departments at Pepsico; from maintaining tastes to avoiding wastage. It has given control over what goes into the process and how good the product is. Not only that Pepsico has one foot in managing the output as well, with its Snackbot. Snackbot is a robot that delivers chips on a university campus. This driverless bot manages to steer through different obstacles by employing machine vision techniques. It's being pushed out for optimization in domains never before envisioned, no matter how little. The transition to data-driven strategies is rapid. From product development to sales and marketing, there has been a tremendous improvement and companies are filling their pockets or at least saving them from spilling.

Every day the role of AI is becoming vital due to its capability to escalate hygiene, food protection, and waste management system. In the future, AI is going to transform the food processing industry because it has so much potential to generate reasonable and healthier productivity for clients and employees. The employment of AI and ML in food production and eatery businesses is already raising the bar to a new level by minimizing human mistakes in manufacturing and to a lesser extent leftover copious products. It enables low costs for packing as well as conveyance, increment in customer-pleasing, rapid services, voice searching, and more personalized orders. These business advantages can also be used by big food factories which will bring an obvious benefit in the long run. ■


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Power in the Hands of Spud Processors

In the potato storage and processing sectors, where the intense competition means that fine margins can make a large difference, user control panels and systems are a valuable addition to their specific processes, as well as in the fast-moving consumer foods sector more generally.

By Ionel Văduva

Control panels and systems can monitor and reply to processes and equipment across high volumes of product, performing consistently throughout long processes and offering a very cost-effective solution to the problem of monitoring and controlling many different metrics within the potato storage and processing sectors.
With the increasing processed potato demand, there has been a greater need for control and monitoring during the production process. With many producers selling to large retail chains, who operate on a large volume/small margin basis, details can make a real difference to the overall profitability and quality of the output of processed potatoes production lines.
One of the main purposes of control panels and systems within these specific food storing and processing industries is the maintenance of different values within certain limits. To ensure consistency and quality of output, guaranteeing that certain metrics are maintained within a specified range can be very important to the overall effectiveness of the process. This could be anything from temperature to the volume of frying oil within a controlled tank.

RESPONSIVE CONTROL PANELS

With highly responsive sensors sending information to the main hub of the control panel, the panel can then respond by controlling the necessary equipment to bring the deviation back within the specified limits for that process.
Control panels can be constructed to be compatible with the equipment required within the potato storage and processing industries. This implies that they can effectively control these values across several different processes, making them particularly valuable assets for ensuring quality is maintained across a large product output.
Together with controlling the processes of manufacturing food products, control panels also have a role to play in prolonging the life of the stored spuds and processed potatoes themselves. Their capacity to monitor and control equipment can also be effectively used in auditing temperature in storage and food warehouses. Controlling temperature through control panels, whether it is to maintain high or low-temperature conditions, is important in keeping products fresh and cool without the additional use of preservatives with products, which can affect the taste and require the introduction of chemical solutions to products. Similarly, high temperatures are often required in the process of sterilization. This is also very important to ensure high standards of hygiene in the potato processing industry, with a great deal of regulation around the sterility of manufacturing equipment used in its production processes.

POTATO STORAGE CLIMATE CONTROL SYSTEMS

A typical potato climate control system consists of high voltage electric motors driving fans, hatch motors, compressors, and pumps which are controlled by a low voltage control panel with relays, safety switches, circuit breakers, etc. This control panel can be controlled manually or by a climate control computer. To measure temperatures, humidity, and CO_2, measuring units are used to measure and present data to the storage operator. Benchmarking units are, most of the time, integrated into the climate control computer. As of the end of the control line, remote control of a storage by e.g. mobile phones is possible by climate control computers which are connected to the internet.
Among the newer developments in the electric system layout is the use of more electronics in the control panel. This results in better control and more information available in the climate control computer. The rotation speed and power consumption of motors and compressors can be read from a distance as alarms can be shown in case of failures of certain parts of the electric system.
One company that specializes in producing a wide range of devices in the field of industrial automation is akYtec from Germany. They have a diverse product portfolio that can easily automate climate control systems for potato storage.
Their proposed system can provide supervision of indoor and outdoor air temperature and humidity, the temperature in air distribution ducts, and product temperature, control of fans and inlet and outlet air dampers, control of air conditioning, heating control, and alarm.
“The SPK207 control panel serves as the main system unit. The panel displays setpoint values and current values of the system parameters. Manipulating with a touch screen, the operator can switch operation modes, supervise system parameters and get information about both the status of individual units and the system status in general,” the company’s experts explain.
Due to the input modules, the signals from temperature and humidity transmitters are amplified, filtered, and converted into digital form. Robust RTD temperature transmitters with different probe lengths can be used for measuring product temperature and our DTS125L – for outdoor temperature. The PKG100-CO_2 carbon dioxide transmitter can be

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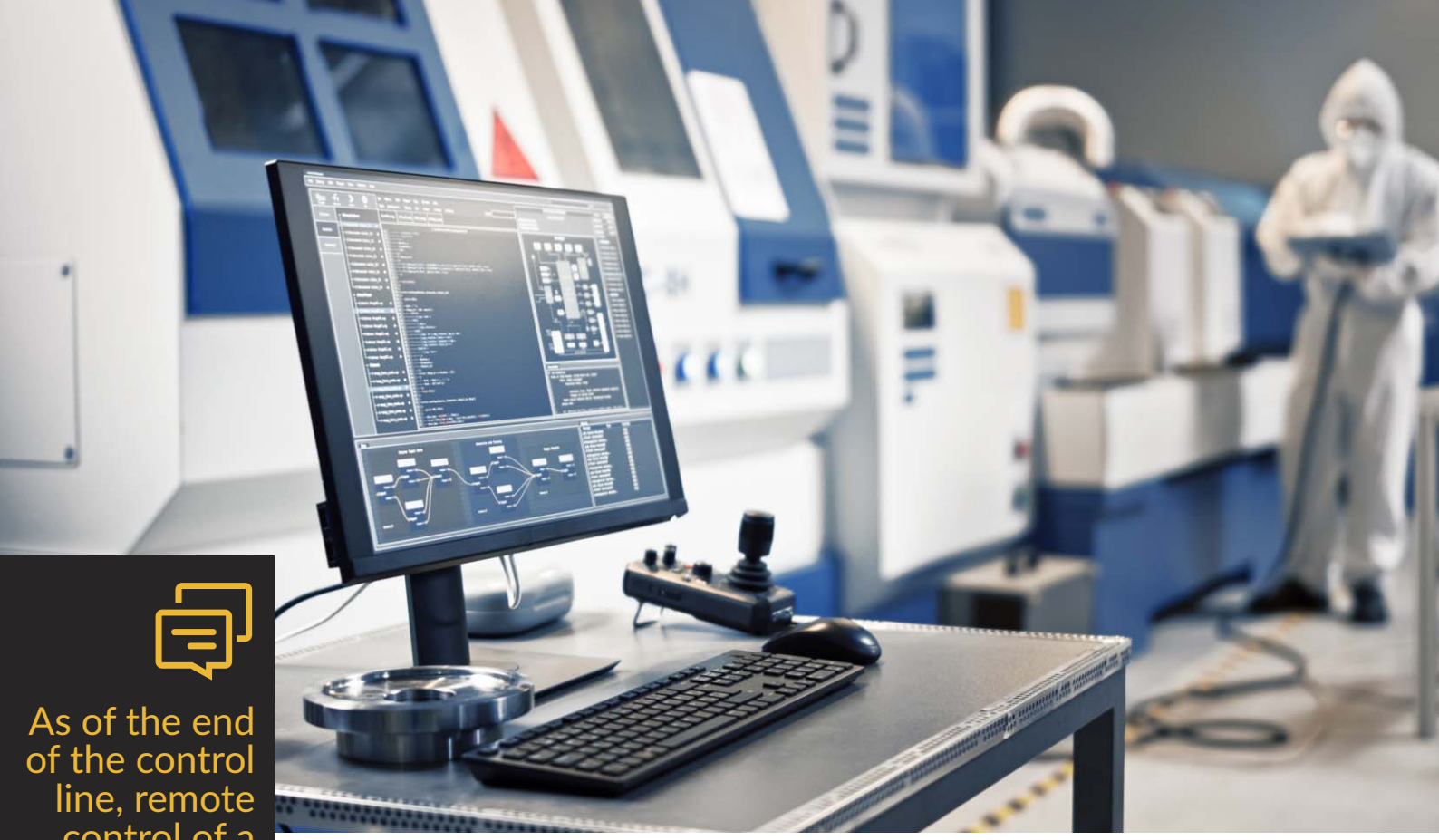
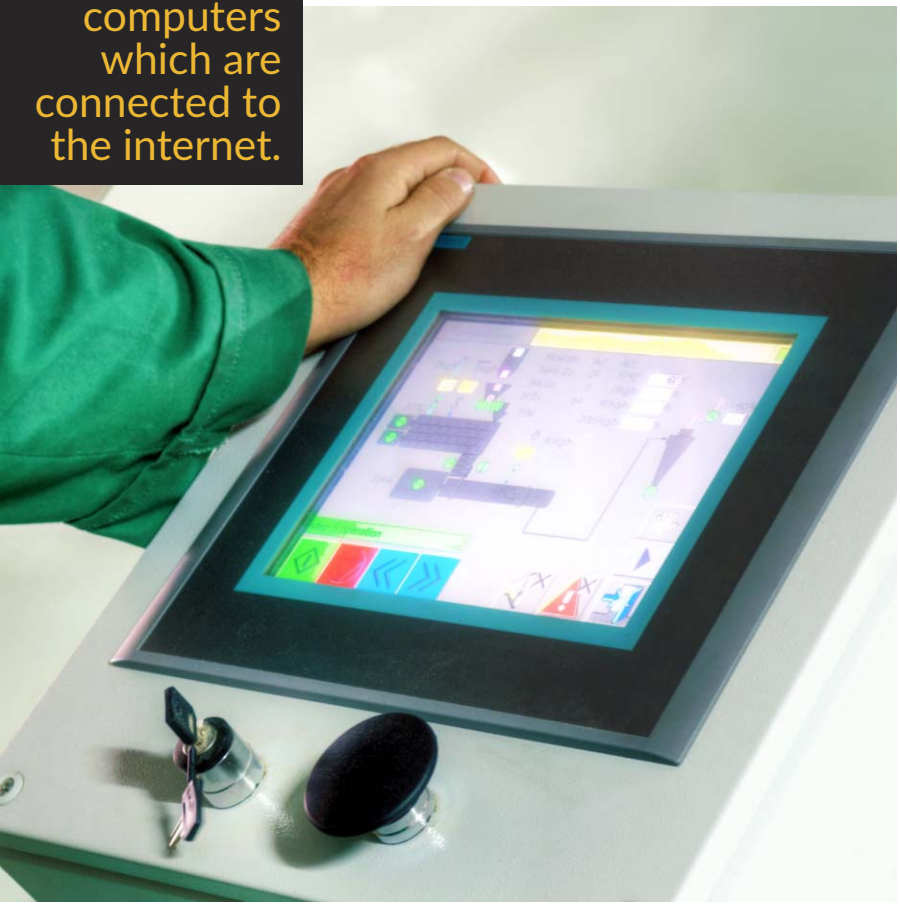


As of the end of the control line, remote control of a storage by e.g. mobile phones is possible by climate control computers which are connected to the internet.

used to provide an optimal CO_2 concentration in the room. The quantity of modules depends on the storehouse capacity and the quantity of the involved transmitters.
Based on information received from the transmitters, the system switches operation modes. There can be several operation modes available in the system: recirculation, airing, cooling, air humidifying or drying, heating and ventilation. Each mode is represented on the control panel screen in the form of a signal lamp or a text form.



CONTROL PANELS AND SYSTEMS BECOME MORE AND MORE SOPHISTICATED

All sensors, motors, valves, and data points offer endless parameters and settings to monitor for a processing line operator. The challenge for Rosenqvists Food Technologies experts is to make the operators' jobs as easy as possible.
“We need to highlight the right information and simplify both view and operation of the control panel (HMI) in the best possible ways. With our frying systems for potato chips, our clients can produce a wide range of different products; classic chips, batch-style chips, potato sticks, different thicknesses, various raw material characteristics, and different production throughput. They all require their specific settings in terms of movement of product, water usage for cutting and washing, water temperature for blanching, temperature profiles, and times for frying. Our objective is to make it easy for the operator, by selecting a recipe for the product they want to produce, during a shift,” the company’s experts said.
Rosenqvists also have built-in supporting functionality like their versatile frying system supports operation with an Automatic Set-point Temperature Adjustment (ASTA). Using this tool enables the operators to keep the desired temperature profile in the fryer. ■

POTATO PROCESSING
INTERNATIONAL

2022 Feature Planning

1 JANUARY/FEBRUARY
Ad closing 17.01/Publishing 28.01

Key Exhibitors Road Map and Event Agenda

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

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

Spotlight
- Cleaning and sanitation

Markets
- Western Europe

Products
- Better for You potato products

Ingredients
- Lowering salt sontent

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

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

2 MARCH/APRIL
Ad closing 14.03/Publishing 25.03

Key Exhibitors Road Map and Event Agenda

Processes
- Sorting
- Process monitoring
- Seasoning & coating

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

Spotlight
- Smart production & Industry 4.0

Markets
- Eastern Europe

Products
- Potato-based snacks, drinks and innovations

Ingredients
- Flavors and seasonings for chips and fries

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

Trade shows: Anuga FoodTec | 26-29 Apr

3 MAY/JUNE
Ad closing 09.05/Publishing 20.05

Key Exhibitors Road Map and Event Agenda

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

Expert View
- Precision in cutting equipment
- Sustainability in production

Spotlight
- Waste management

Markets
- North America

Products
- Local vs. international tastes in potato snacks

Ingredients
- Frying oils

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

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

4 JULY/AUGUST
Ad closing 18.07/Publishing 29.07

Processes
- Blanching, frying
- Forming and extruding

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

Spotlight
- Increasing efficiency in potato processing

Markets
- South America

Products
- Potato chips flavors, textures and trends

Ingredients
- Batters, coatings

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

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

5 SEPTEMBER/OCTOBER
Ad closing 05.09/Publishing 16.09

Processes
- Cooling and freezing
- Dehydrating

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

Spotlight
- Traceability along the potato value chain

Markets
- APAC/ANZAC

Products
- Frozen French fries in retail & foodservice

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

6 NOVEMBER/DECEMBER
Ad closing 07.11/Publishing 18.11

Processes
- Turnkey projects
- PEF technology

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

Spotlight
- Increasing production capacity/Future-proofing processing operation

Markets
- Global market predictions for 2023

Products
- Flakes, pellets and mashed potatoes

Ingredients
- The future of potato snacks 2023

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

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