



Talk to a Linde expert today to find out how the NITROBOOST™ System can enhance your operation. Visit lindeus.com/nitroboost to learn more.

more from your existing equipment – without costly expansion or additional shifts.

and keep production moving. This closed-loop, add-on coil heat exchange unit allows you to get

Regulatory Uncertai a New Direction for I

Making our world more productive The Linde logo, the Linde wordmark, and NITROBOOST are trademarks or registered trademarks of Linde plc or its affiliates. Copyright © 2025, Linde plc. 7/2025

Dig Carings











ADVERTISER // Contact Info

Further information on these companies can be found in the 2024 FOOD MASTER CATALOG. This index is published as a convenience. No liability is assumed for errors or omissions.



ABB

SEE OUR AD VISIT OUR WEBSITE



FoodChain ID

SEE OUR AD **VISIT OUR WEBSITE**



Food Master

SEE OUR AD **VISIT OUR WEBSITE**



Food Master

SEE OUR AD **VISIT OUR WEBSITE**



FoodSafe Drains

SEE OUR AD **VISIT OUR WEBSITE**



+

HRS Heat Exchangers

SEE OUR AD **VISIT OUR WEBSITE**



JYOTI Natural Foods

SEE OUR AD **VISIT OUR WEBSITE**



Linde

SEE OUR AD VISIT OUR WEBSITE



Lubriplate Lubricants Company

SEE OUR AD VISIT OUR WEBSITE



Precipak

SEE OUR AD VISIT OUR WEBSITE



Yaskawa

SEE OUR AD **VISIT OUR WEBSITE**









COVER STORY

COLUMNS



Going for Gold(fish): Inside The Campbell's Company's \$160M Cracker Plant Expansion

To enhance distribution in the western U.S. — and set new standards for packaging and capital project execution — The Campbell's Company has expanded its production facility in Richmond, Utah.



Focused Manufacturing Plant Shutdowns: Hope Is Not a Strategy

The focused facility shutdown approach, built around comprehensive planning and meticulous project execution, transforms a potentially disruptive shutdown into a highly productive period for essential upgrades and improvements.



Selecting the Right Plastic for Food Processing Equipment

As throughput rates continue to rise, so do the demands on traditional materials, equipment designers and maintenance personnel. Understanding the capabilities of a broader range of equipment material options allows for quality designs.



Using Digital Tools to Turn Hidden Yield Issues into Big Savings

Material loss analysis used to take too much time and effort, but manufacturers can get these insights quickly and easily by folding material loss analysis into a digitalization strategy.

FEATURES

+



Regulatory Uncertainty Points to a New Direction for Food Safety

Recent regulatory moves appear to shift the burden of food safety to manufacturers, but they're already taking steps to ensure quality food production — including designing facilities with safety in mind.



Get the "Edge" on Maintenance with the Right Equipment, Sensors and Software

It wasn't that long ago that maintenance systems were an afterthought to control systems.

Today, sensors and software focused on maintenance run on edge-based equipment, in parallel with control systems.

DEPARTMENTS

Editor's Note

Regulatory Watch

New Plant Products

Ad Index

Classifieds

Masthead

NEXT ARTICLE



BACK TO CONTENTS



















+













Processing Agents

Save time finding what you're looking for anytime, anywhere!

- Searchable by keyword and location
- Find detailed product information, videos, and more under any ★ company
- Submit a Request for Proposal (RFP) to suppliers of your choice with details on what you need with a click of a button



Trouble Brewing: Study Reveals Presence of PFAS in Beer

PFAS in the food supply have long been a concern, but a recent study shows that one of the world's favorite beverages can be susceptible to contamination.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) have been a topic of concern, given their resistance to degradation, their pervasiveness in the environment and their potential health effects.

Specifically, there has been much discussion about their prevalence in the food supply, since PFAS have been used as coatings for non-stick cookware, gasket sealants for food processing equipment, and grease-proofers for paper and paperboard food packaging. However, the industry has been phasing out the use of PFAS as grease-proofers for food packaging.

The U.S. Food and Drug Administration (FDA) has conducted significant testing, taking 1,300 samples from a range of fresh and processed food since 2019. The FDA notes that 97% of the samples of fresh and processed from its Total Dietary Study did not contain PFAS. Of those that did contain PFAS, 54% of those were seafood.

In a 2022 targeted seafood study, the FDA found that 74% (60 out of 81) of the samples of clams, cod, crab, pollock, salmon, shrimp, tilapia and tuna contained PFAS, but not at a level determined to be a health concern. Last year, the FDA asked the seafood industry to provide scientific data and information on PFAS in seafood, the surrounding environment and processing water, as well as mitigation strategies.

The FDA also tested bottled water in 2023 and 2024, detecting PFAS in 10 out of 197 total samples. The agency determined that none of the levels of PFAS detected would have exceeded the maximum contaminant levels (MCLs) set by the Environmental Protection Agency (EPA) if they were detected in public drinking water.

However, a recent study from RTI International, an independent scientific research institute, suggests that PFAS can find their way into beer — especially if it was brewed in an area where PFAS have been identified in the public water supply.

Published in *Environmental Science & Technology*, the study involved testing plain lagers and ales, including popular brands, international brands and beers brewed in areas where PFAS have been detected in the municipal drinking water.

Using a modified EPA Method 533, the study's first phase found that 11 out of 19 beers tested contained PFAS. Eight in 10 domestic beers brewed in areas with elevated concentrations of PFAS in drinking water — specifically in North Carolina, California and Michigan — had detections of at least one PFAS. One of the five popular national beers and one of three international beers contained detectable PFAS.

The second phase included testing 15 beers, with samples taken from five different cans of the same beer whenever possible. One or more PFAS were detected above the method detection limit in 13 of the 15 beers.

Broadly, the study's authors note that at least one PFAS was detected in almost all of the analyzed beers, and that the presence of PFAS weren't limited to those brewed in areas with PFAS in the drinking water. The study also revealed that some of the beers had PFAS limits above MCLs recommended by the EPA.

This research not only indicates the presence of PFAS in beer, but also the need for brewers — especially small or regional beer makers — to understand where their water comes from and how it's treated. Additionally, it underscores the importance of employing strong filtration and testing protocols. Lead study researcher Jennifer Hoponick Redmon hopes the modified method can help.

"Our adapted testing method offers a practical way to detect and address PFAS in beverages, including beer, which we hope can reduce exposure to these chemicals and make future happy hours relatively safer and healthier," she says. **FE**

NEXT ARTICLE



BACK TO CONTENTS



SMARTER INNOVATION: HOW TO STAY AGILE IN UNCERTAIN TIMES

ON DEMAND



Regulatory updates, supply chain shifts and evolving consumer demands keep the food and beverage industry in a state of constant change. To maintain a competitive edge and drive innovation, companies must be able to develop and maintain products with agility and accuracy.

Explore how digital tools help innovation teams keep up with evolving requirements and trends. Gain real-world insights from our customers on how they were able to shorten New Product Development (NPD) cycles and simplify change management with FoodChain ID's solution.



SPEAKER:
BRANDON WRIGHT
Strategic Account Executive,
Digital Solutions
FoodChain ID

GAIN EXPERT INSIGHTS INTO:

- » Managing regulatory shifts & labeling challenges: From the loss of key additives like Red Dye No. 3 to changes to FDA guidance documents on food allergens in the U.S., evolving regulations demand swift reformulation and labeling updates. Learn how to streamline compliance reviews and avoid costly delays.
- » Navigating supply chain challenges: Ingredient shortages, shifting tariffs and supplier changes make flexibility critical. See how digital tools accelerate impact analysis, supplier collaboration and reformulation, so you can pivot with confidence and keep products on shelves.
- » Adapting to changing consumer preferences: With growing demand for organic, non-GMO and clean-label products, manufacturers must innovate quickly while managing cost and compliance. Discover how automation enables faster, more informed decision-making to align with market trends.

Sponsored by



→



Photo courtesy: Getty Images / Matveev_Aleksandr

DAVE SEILER, BUSINESS DEVELOPMENT MANAGER, CURBELL PLASTICS, INC.

NOWADAYS, IT'D BE DIFFICULT TO WALK AROUND A FOOD PROCESSING PLANT BLINDFOLDED without eventually bumping into a piece of plastic — and for good reason.

The advantages of using plastics in food processing equipment are well-documented. While delving into these advantages is outside the scope of this article, three commonly cited benefits of plastics include eliminating the need for lubrication (which can trap and act as a contaminant), reduced weight relative to other materials (which can increase throughput rates while simultaneously reducing energy costs), and increased system life through superior wear performance.

Given the benefits of plastics, choosing to use one in an application is often fairly straightforward. However, identifying which plastic material to use can prove much more complicated. FDA-compliant engineering plastics, such as high-density polyethylene (HDPE), ultra-high molecular weight polyethylene (UHMW), acetal, nylon, polyethylene terephthalate (PET) and polyetheretherketone (PEEK), regularly compete for the same applications, but each material has distinct performance characteristics.

| | Tensile Strength (psi) | Flexural Modulus (psi) | Coefficient of Linear Thermal Expansion (in/in/ °F x 10-5) | Moisture Uptake (% at 24 hours) | Hardness (Shore D) |
|--------|------------------------|------------------------|--|---------------------------------|--------------------|
| HDPE | 4,000 | 200,000 | 9.0 | 0.1 | 69 |
| UHMW | 3,100 | 110,000 | 11.1 | slight | 64 |
| Acetal | 10,000 | 420,000 | 6.8 | 0.3 | 83 |
| Nylon | 12,400 | 410,000 | 4.5 | 1.2 | 80 |
| PET | 11,500 | 400,000 | 3.9 | 0.1 | 87 |
| PEEK | 14,000 | 590,000 | 2.6 | 0.5 | 85 |

Source: Curbell Plastics

+

HDPE is the cheapest material of the group. When the higher strength, broader temperature resistance or enhanced wear performance of higher-performance plastics are not required, HDPE is frequently specified. Mass market components such as cutting boards, food trays and cabinetry are often made of HDPE for this reason. On food processing equipment, HDPE machine guides are especially popular, though other HDPE components abound.

Despite its popularity, HDPE has its shortcomings. Notably, it is susceptible to warping or creeping at elevated temperatures. In addition, HDPE has been found to be roughly 100 times less abrasion-resistant than UHMW [1].

Besides exhibiting extreme abrasion resistance, UHMW also boasts a low frictional coefficient. It can handle higher loads than HDPE, making it a logical upgrade for applications such as sprockets, bearings, wear strips and conveyor guide components. Specialty-filled grades of UHMW are available for higher load applications, such as the curved portions of high-speed conveying systems.

Another advantage of UHMW is its cold temperature performance. UHMW maintains ductility and impact resistance under freezing conditions, often making it a strong candidate for components used in chillers and related equipment.

Acetal and nylon represent a significant increase in strength and stiffness from HDPE and UHMW. These materials can also stand up better to elevated temperatures experienced during steam cleaning operations.

As we observed with HDPE and UHMW, unlike with metals, the hardness of a plastic material is not directly indicative of its abrasion resistance nor its wear performance. In fact, acetals typically report higher hardness values yet exhibit less abrasion resistance than comparable (unfilled) nylons. In addition, under more demanding pressure and velocity conditions, nylons have been shown to wear at roughly half the rate of acetal materials in dry environments [2].

Despite the potential wear advantages, unfilled nylon materials are hygroscopic. At saturation, these materials are capable of absorbing upwards of 8% moisture by weight, which corresponds to 2-3% dimensional change. While complete saturation may be of more academic than practical interest, even in an environment with a relative humidity of around 50%, unfilled nylon tends to absorb around 1.5–2% moisture by weight [3].

Although every material discussed in this piece is readily machinable, acetal is widely regarded as the easiest plastic to machine. It is also readily obtainable in blue color for enhanced optical detectability.

It is important to work with a knowledgeable supplier when exploring alternate versions of FDA materials. Just because a material is listed as compliant with industry regulations (such as the FDA), it does not automatically mean that the material is compliant in any form. For instance, molybdenum-filled nylon is not FDA-compliant from all sources. In the same way, pigmented materials (black, blue, etc.) require appropriate pigments to maintain relevant compliances, so not all blue-colored acetals are automatically "food grade."

When acetal and nylon lack the required dimensional stability for an application, PET becomes a viable option. PET provides increased sliding wear resistance over acetal and nylon. For even more demanding sliding wear applications, FDA-compliant grades containing a fluoropolymer additive with greatly reduced friction are commercially available.



Dave Seiler

is a business development manager for Curbell Plastics who focuses on high-performance engineering plastics. Born into a family of plastics professionals, Seiler has been involved with performance plastics his whole life. Seiler spends much of his free time reading academic literature on a diverse base of polymer materials. Seiler has an extensive background in polyaryletherketones and handles Curbell's DuPont Vespel Polyimide product line. Much of his work involves helping companies identify the best plastic materials for their applications in order to achieve quality improvements and cost savings.

PET displays broader chemical resistance to acids than acetal or nylon but is more prone to brittle fracture after extended exposure to strong caustics. PET is also susceptible to hydrolysis in the presence of continued exposure to steam.

The last material on our list is PEEK. PEEK isn't prone to creep, it doesn't absorb a ton of moisture, nor is it susceptible to hydrolysis. The disadvantage of PEEK is simple: it's expensive. Very expensive. For a stock shape, on a dollar per pound basis, PEEK costs roughly 15 to 20 times as much as acetal.

That said, downtime is also very expensive, so sometimes PEEK ends up being the lowest cost option. PEEK components are reliable and can operate continuously in environments as hot as 480°F. PEEK has even been shown to wear at less than one-fourth the rate of nylon in rolling contact situations [4].

As food processing throughput rates continue to rise, so do the demands levied not only on traditional materials, but also on equipment designers and maintenance personnel. Understanding the capabilities of a broader range of material options allows for quality designs that stock our shelves and keep our food clean.

Resources

- 1. Budinski, Kenneth. *Resistance to particle abrasion of selected plastics*. Wear, Elsevier, 1997, p. 304.
- 2. Quadrant High Performance Products and Applications Guide. Quadrant, 2017, pp. 11, 17, 19.
- 3. Sepe, Michael. "Dimensional Stability After Molding: Part 4." *Plastics Technology*. Plastics Technology, 25 Mar. 2013, https://www.ptonline.com/articles/dimensional-stability-after-molding-part-4.
- 4. Harras, M., et al. *Tribological behavior of selected engineering polymers under rolling contact*. Tribology International, Elsevier, 2010, p. 641.



YOUR SOURCE

FOR HIGH-PERFORMANCE, 100% SYNTHETIC, NSF H1 REGISTERED, **FOOD GRADE LUBRICANTS.**



Engineered from the ground up to provide unsurpassed performance in food processing facilities. These high performance, 100% synthetic lubricants provide extended lube intervals, multiple application capability, lubricant inventory consolidation and improved performance. All while maintaining strict H1 safety requirements.

Lubriplate's NSF H1 Registered Products Include:

HIGH-PERFORMANCE SYNTHETIC GEAR OILS

SYNTHETIC AIR COMPRESSOR FLUIDS

SYNTHETIC HYDRAULIC FLUIDS

HIGH-PERFORMANCE SYNTHETIC GREASES

HIGH-TEMPERATURE OVEN CHAIN LUBRICANTS

NSF H1 REGISTERED SPRAY LUBRICANTS







4

Newark, NJ 07105 / Toledo, OH 43605 / 800-733-4755 To learn more visit us at: www.lubriplate.com





INCLUDED AT NO ADDITIONAL CHARGE



Complimentary Extra Services Package

COLOR CODED LUBE CHARTS & MACHINERY TAGS
PLANT SURVEYS / TECH SUPPORT / TRAINING
LUBRICATION SOFTWARE / FOLLOW-UP OIL ANALYSIS





Photo courtesy: vgajic / Getty Images

BY COLE KRAUSE, STEPHEN SCHICKER, DANIEL SORENSEN AND MATTHEW STAGEMEYER

PRODUCTION IS THE LIFEBLOOD OF MANUFACTURING FACILITIES. Whenever production lines stand idle, facilities are losing money.

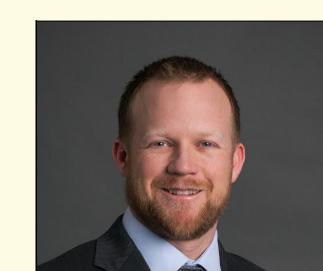
But occasional shutdowns are inevitable and sometimes necessary. Whether for maintenance issues or for facility expansion to accommodate growth, production pauses have a critical role to play in the long-term success of those facilities.

benefit out of those periods. The solution frequently being turned to is focused shutdowns. These provide a high-impact opportunity for manufacturing facilities to implement essential process updates and upgrades with minimal downtime, managing risks so facilities come out of the shutdown predictably.

The question that owners and operators must therefore answer is how to minimize shutdowns while wringing the most



Cole Krause



Stephen Schicker



Daniel Sorensen



→

UNDERSTANDING FOCUSED SHUTDOWNS

These outages, when meticulously planned and executed, minimize downtime and maximize the value derived from the limited operational pause. Work plans are developed down to the hour, with activities — such as maintenance tasks, equipment replacements and inspections — continuing 24/7 during the shutdown window. Successful implementation hinges on comprehensive planning and seamless coordination among all stakeholders, which can include everyone from corporate personnel to the plant and operations teams and beyond.

collaboration across multiple teams. Critical updates may include tie-ins to utility systems, new process or utility equipment, and necessary maintenance activities that would significantly hinder normal operations. The goal is to consolidate as much work as possible within those few-days-long windows. Effective collaboration is critical to the success of the planned outage and should include key team members, such as

These shutdown opportunities are limited, depending on the industry and operational needs, and require close

project stakeholders, subcontractors, vendors and facility personnel. It can be too easy to overlook some people or functions that might not have significant activities during the outage but play an important role at the beginning or end of the shutdown. Open communication channels and regular meetings keep everyone informed of the project's progress and any potential issues. Clear communication and collaboration minimize misunderstandings and see that all parties are working toward the same goals.



RISK ASSESSMENT AND MITIGATION

Shutdowns present inherent risks that must be managed proactively. Owners face challenges, such as lost production time, concerns over product quality due to system disruptions, and staff safety risks associated with high-intensity work environments. Project budgets and schedules must be met to avoid overruns and costly extended downtime.

Stakeholders supporting focused shutdowns also must navigate significant risks, including tight time constraints with minimal scheduling flexibility, safety hazards resulting from craft congestion and overlapping work activities, and quality assurance challenges under compressed timelines.

Especially at food manufacturing facilities, good manufacturing practices (GMP) play a role in managing risk. GMP can influence everything from how workers dress to what types of equipment can be used to lower risks and avoid contamination. It's important to factor equipment options into plans early since it can take extra time to source specialty equipment.

Proactive risk management, including detailed planning and early coordination, mitigates these risks and enables smooth execution of the shutdown and return to operation.

It is not unusual for timelines to change, but it is critical that they don't change too close to the outage date. Preliminary

plans might be built around a set duration, only for the shutdown dates to get shifted as they approach or for the window to grow or shrink. In light of this, flexibility is essential for all parties, taking into consideration how shifting timelines will affect the craft involved, plant support personnel and more. One of the highest risks for the owner is production not coming back on as planned. Quality assurance plans provide a framework for maintaining project standards. Vendor inspections help verify that all

These efforts help teams avoid nightmare scenarios in which equipment ships late or is built incorrectly. If customized, new equipment doesn't fit perfectly when the old equipment is pulled out, that poses grave risk to the success of the project, especially when there are mere days to pull off the work.

acceptance testing can validate that equipment is built and performs as specified, flushing out any problems well before

equipment and materials meet specifications before installation begins. Visiting fabrication shops to perform factory

A thorough risk assessment should identify and mitigate potential problems, considering a wide range of factors, including equipment failures, material shortages and unforeseen complications. For each identified risk, the plan should

include strategies for mitigation and contingency plans to address any issues that may arise.

SAFETY CONSIDERATIONS

crunch time.

+

Shutdowns require strict safety management to protect both personnel and assets. Permit requirements, such as lockout/tagout (LOTO) and hot work permits, must be met to maintain safe working conditions. All of this must factor into planning, as safety considerations go hand in hand with risk mitigation strategies.

Planning for safety in the execution of the outage is important for everyone involved. The high probability of overlapping activities affecting craft and frontline personnel working within limited spaces makes detailed planning vital.

Safety is a non-negotiable element of success.

Managing crew fatigue is also critical — overworked personnel are more likely to make mistakes that could jeopardize safety or project success. Planners must take into account the number of people in a given space and the hours they are present in order to avoid conditions that could create an unsafe environment.

Sanitation is another consideration that can be too easy to overlook. Hazards like combustible dust or slippery, oily

surfaces can create unsafe working conditions if not properly addressed. Appropriate planning should include scheduling time for a thorough cleaning before work begins. It's equally important to allocate time for operators to sanitize the workspace after completing their tasks. This not only helps maintain a safe environment, but also protects product integrity before the area returns to production. LAYING THE GROUNDWORK

It's hard to imagine a successful focused shutdown without the efficiency benefits of an integrated engineer-procure-

construct (EPC) project delivery approach. Engineers need to know details of how the work is going to be executed because that has a strong influence on the detailed design work. Seamless integration among engineering, construction and project controls personnel provides invaluable transparency for this purpose. Engineers also should be on-site or at least available for on-call support leading up to and then during the shutdown, when there's no time for a full-fledged request for information (RFI). This immediate availability is crucial for addressing

unexpected issues promptly and maintaining the project timeline. Front-end planning (FEP) is a critical phase that strongly influences the overall success of a focused shutdown. This phase begins with careful scope definition that reflects budget considerations. This establishes the basis for detailed engineering

design, procurement of necessary materials and equipment, and the development of a comprehensive schedule. Thorough FEP minimizes the risk of delays and coordinates efforts to see that all necessary components are available when needed. This proactive approach is essential for keeping the project on track and within budget. Timely procurement of equipment and materials is critical. Securing these items well in advance of the shutdown

minimizes the risk of delays caused by supply chain issues or unexpected shortages. This allows the team to see that all necessary components are readily available when the shutdown begins so work can proceed smoothly and efficiently. **OPTIMIZING THE TIMELINE**

Effective scheduling is at the core of a focused turnaround effort. The schedule should be meticulously planned to optimize the use of available time so all tasks are completed within the allotted window. This requires careful

consideration of task dependencies and potential bottlenecks. Any potential impact to processes or affected utilities must be assessed and addressed well in advance. Scheduling shutdown activities in hour-by-hour increments is the foundation that makes it possible to accomplish extensive project work within the tight shutdown window, optimizing sequencing for maximum impact. Planning for

multiple trades working on different activities on equipment within a congested workspace is akin to a coordinated dance. Everyone needs to know exactly where they need to be at any point during the shutdown. Pull planning is a valuable tool at this stage. This method involves bringing all relevant stakeholders together. Beyond understanding the current state and future state, everyone is engaged in planning the work to achieve buy-in. No single

accomplished. Some of the common time-saving strategies that may be employed include prework, prefabrication of critical systems, close evaluation of resource allocation, and shift planning to avoid overworking individuals dealing with stressful situations over the course of a few days of 24/7 project activities.

party dictates the sequence. It is a collaborative effort to develop an achievable schedule that all believe can be

SETTING THE STAGE FOR SUCCESS

Pre-shutdown activities, meetings and reviews are crucial for maximizing the efficiency of the shutdown itself. These activities can include tasks such as prerouting electrical cabling or piping, installing protective barriers, and preparing equipment for the upgrade or maintenance. By completing these tasks before the shutdown, valuable time is saved

during the critical outage window. This allows the team to focus on core tasks during the shutdown, leading to a more efficient and effective process. These pre-shutdown activities can significantly reduce the overall downtime required for the project. Pre-shutdown readiness reviews, scheduled at a regular cadence leading up to the outage, serve as key go/no-go decision points. All stakeholders must understand the plan — and their roles within it — and approve. Everyone must also be

ready for what follows the shutdown. One of the biggest overall risks of a focused shutdown is that the plant might struggle to run at rate upon startup. Success depends on the strength of the entire team; every role is indispensable to achieve the intended objectives. Startup and turnover planning are just as important as the execution of project work during the shutdown. Attention to every detail of the timeline minimizes the risks of surprises. Scheduling too much time for the shutdown can be as problematic as scheduling too little time. While downtime is a financial drain, early completion could result in an

idling plant that hasn't been crewed appropriately for the resumption of operations. Maintaining open lines of communication with the owner — such as through daily status updates — can help identify opportunities for an early, well-coordinated restart if progress allows.

Hope is not a strategy. No one should start an intentional shutdown unless and until all parties know exactly what they

are going to do during the shutdown window. Every possible base should be covered and addressed in advance.

The focused shutdown approach, built around comprehensive planning and meticulous project execution, transforms a potentially disruptive shutdown into a highly productive period for essential upgrades and improvements. The result is more efficient and reliable operations, maximizing return on investment and minimizing operational disruptions while predictably emerging from the shutdown. FE





SMALL SIZE. BIGPOWER.

GA500 AC MICRODRIVES FOR INDUSTRIAL APPLICATIONS

The Yaskawa GA500 combines industry leading power density with a small footprint to deliver big power in a small package.

The GA500 goes up to 40HP. No one else goes higher. It also optimizes panel space because of its zero clearance, side-by-side mounting.

Want to learn how such a small drive can deliver so much power? Call Yaskawa at 1-800-927-5292.



FOR MORE INFORMATION: https://www.yaskawa.com/ga500













Photo courtesy: Getty Images / Brothers91

BY GREG SCHMIDT, SALES DIRECTOR OF INFORMATION SOLUTIONS, ROCKWELL AUTOMATION

KEEPING A LID ON COSTS IS A TOP PRIORITY TODAY as companies contend with high material costs, fluctuating energy prices and economic uncertainty. One area that's ripe for improvement and can deliver significant savings is yield optimization.

Sub-optimal yield can happen for a variety of reasons. However, businesses can only pinpoint where and why giveaway is happening if they can collect and correlate the right data. This is where many food producers fall short.

Getting a grasp on elusive yield issues and addressing them in real time is now an achievable reality. Producers can gain immediate visibility — not days or weeks after the fact — by unifying disparate data, creating actionable insights from that data and using digital tools to address yield issues at their source.

A DEEPER UNDERSTANDING OF YIELD LOSSES

Overall equipment effectiveness (OEE) is the gold standard for measuring how assets and the people operating them perform against target. And it can reveal the culprits of yield loss, like machine stoppages, performance anomalies and quality variances.

But OEE alone doesn't tell the whole story of yield losses. It only articulates what's happening at the machine level. It doesn't provide insights into what's happening deeper at the material level.

By tracking the journey of materials – from initial allocation and various transactions all the way to packaging – you can gain insight into where losses are occurring. This material loss analysis, combined with OEE, can give a complete picture of both yield losses and the production issues causing them.

analysis approach, where giveaways are no longer simply accepted as a cost of doing business.

With these insights, you can create focused efforts to address the losses. You may even find you can shift to a zero-based

Historically, a key barrier to material loss analysis was that it took too much time and effort. But now, you can get these insights quickly and easily by folding material loss analysis into a digitalization strategy.

DIGITAL TOOLS TARGET YIELD-LOSS ISSUES

+

A manufacturing execution system (MES) enables material loss analysis. It can collect real-time data from food manufacturing control systems to track food products from raw materials to finished products.

In the past, deploying an MES for material loss analysis was a complex, highly customized process that could take well over a year to complete in one plant. Modern MES platforms delivered as a software as a service (SaaS) standardize much of the process, including what's being collected from control systems, interface designs and transactions with business systems.

This approach is easier, less expensive and can cut project times down to three to six months.

Once you have access to your material loss analysis from your MES, you can deploy targeted solutions to address the root-cause issues. Al, in particular, holds great potential to mitigate yield losses while also increasing production efficiency.

OPPORTUNITIES FOR USING AI TO OPTIMIZE YIELD INCLUDE:

Closed-loop control of single operating units: A good place to start an optimization effort is with AI-based technologies that can improve the performance of a single machine.

For instance, optimizing fillers to minimize giveaways is a common challenge. An AI-based filling solution can use operating condition variables, such as speed, pressure and temperature, to predict the weight of product being put into a container. The solution can then use this information to make real-time control setpoint changes and optimize the process without any manual intervention.

This ability to achieve accurate fills on every product can help you realize big savings over time. One mayonnaise maker used an AI-based filling solution to fill packets with more than 99% accuracy. This helped the brand reduce overfill giveaway by more than 50% while also reducing the amount of product lost to underfilling.

SYNCHRONIZED CONTROL OF MULTIPLE OPERATING UNITS: All can also help optimize yield across a larger production line or process.

A model predictive control (MPC) solution, for instance, can monitor what's happening at various points in production and make control adjustments upstream or downstream to optimize yield. It constantly assesses current and predicted operational data and adjusts control targets when needed to reduce process variability.

One global dairy producer used MPC to optimize control of a drying process to ease regulatory compliance. Using sensor data, the MPC made predictive control adjustments throughout the line to reduce moisture variability and raise dryer throughput. This helped the dairy producer reduce quality variability by up to 42%.

ENHANCED MOTOR CONTROL: Drives learn a lot about the motors they control, including when they're experiencing anomalies. Knowing what your drives know can help you identify and address issues in their early stages. However, the sensors needed to get these insights have traditionally been cost-prohibitive.

Al-based solutions for virtual frequency drives create soft or virtual sensors that monitor the electrical signals for assets, such as pumps, fans and blowers. This can help food producers detect and identify anomalies, ranging from a loose or misaligned blade on a fan to a viscosity change on a pump to a ball-bearing fault in a motor.

With these insights, you can quickly address production anomalies, possibly before they impact yield.

OTHER OPPORTUNITIES

In addition to AI, several other digitalization tools and tactics can help you optimize yield.

For starters, your MES can do more than enable material loss analysis. It can also improve how operators work. For example, it can provide exception-based reporting so workers can quickly identify yield issues without needing to sift through large volumes of data. And it can give staff quick access to files, like CAD images, to quickly troubleshoot machine issues.

A digital twin, or virtual replica, of a machine, process or entire plant can also help you optimize production and reduce yield losses. Because a digital twin can realistically model and simulate how production operations run, it can help you identify and remove inefficiencies and waste from new production lines, process changes and product recipes.

A digital twin can also accelerate simulations of operations to uncover yield issues that happen infrequently. For example, an issue that only happens once a month in the real world can happen several times in mere seconds in a virtually simulated environment. This can make it easier to identify the root cause of issues.

Additionally, all these technologies capturing crucial knowledge about your operations helps create an insurance policy against worker retirements. Now, if an experienced worker leaves, crucial knowledge about production, maintenance or training won't leave with them. Instead, it will be preserved in your MES, digital twin or AI agents.

DON'T LET LOSSES LINGER

Every day that yield issues go unaddressed contributes to a bigger loss on the balance sheet. Even by taking a small step, whether it's proving the value of an MES with a small deployment or using AI to reduce giveaway on one machine, you can start realizing savings and generate momentum for minimizing yield losses across your enterprise. **FE**







MAKE CONSISTENT COATING YOUR SECRET SAUCE.

Reduce variability and raise the quality of frozen and prepared meals.



- · Perfectly "freezes on" sauces and seasonings
- Reproducible, high-quality taste results
- Longer shelf life from faster freezing



→

Freeze & Coating Tumblers for Frozen and Prepared Foods







of The Campbell's Company. BY ALYSE THOMPSON-RICHARDS SINCE ITS U.S. INTRODUCTION IN 1962, THE GOLDFISH CRACKER BRAND HAS MADE A SPLASH — generating \$1 billion

The Campbell's Company has expanded its Richmond, Utah, plant to 400,000 sq. ft. to make room for its fourth Goldfish cracker line. Image courtesy

The Campbell's Company has expanded its production facility in Richmond, Utah.

in annual sales in 2024. But to get more of the "snack that smiles back" into American homes — including those on the West Coast — The

Campbell's Company's cracker and cookie plant in Richmond, Utah, needed some help, says Tony Hernandez, director of site operations.

"Goldfish was on a very high growth trajectory," he says. "We were capacity-constrained, especially coming out of COVID. It highlighted the need to increase the bakery's output."

commissioning a fourth cracker line, expanding the plant's footprint by 100,000 sq. ft. to 400,000 sq. ft., and remodeling 75,000 sq. ft. of existing space.

Last year, the company completed Project FINN, a \$160 million expansion of the Richmond plant that included

for packaging and the company's process for executing capital projects. Further, the project earned an honorable mention for FOOD ENGINEERING's 2025 Plant of the Year. **SEEKING TO EXPAND**

Not only does the new line allow Campbell's to produce 5 million Goldfish per hour, but the project also set new standards

Much of Campbell's Goldfish production exists east of the Mississippi River, with plants in Willard, Ohio, and Denver, Pa., producing the classic crackers and a plant in Franklin, Wis., manufacturing Goldfish Crisps.

Campbell's Richmond plant is responsible for serving the western U.S., including the major markets of California and Texas. Even with three Goldfish production lines, the Richmond facility required support from Campbell's manufacturing network to meet the region's demand, Hernandez says.

"From a geographic perspective, it made sense to expand production out here," he says. "Prior to the expansion, we were getting support from Willard and Denver sending products out west because we couldn't produce everything needed."

"A lot of the wheat in America is around the Palouse area, which is in northern Idaho, and then along with the Utah Valley, so taking advantage of the local wheat production and connecting that with the flour mill building was really attractive," he says.

wheat in 2024, according to the USDA's National Agricultural Statistics Service.

Jason Roethig, senior director of engineering services and project execution, also pointed to the abundance of wheat

production in the area. Specifically, Utah produced 4.41 million bushels and Idaho produced 62.3 million bushels of winter

DRAWING ON EXPERIENCE Before kicking off Project FINN — named for the Goldfish cracker mascot, Finn — Campbell's corporate engineering team gathered best practices from the company's Meals & Beverages and Snacks divisions. Campbell's also assigned Marta H.

Mulyk as project manager, who was responsible for directing the overall project and managing the relationship with

design-build firm Dennis Group. "Dennis Group has been a very good partner for both Campbell's and the plant," Hernandez says. "They worked on a few projects previous to this, so they came in with a very good background and knowledge of the site. They're also local — they have a large office in Salt Lake City. It was very easy for people to travel to the site and get eyes where they needed to."



internal teams across leadership, maintenance, operations, R&D, quality and safety for a smooth startup. Meanwhile, Bruce Granbois served as Campbell's owner's representative.

"He was able to connect all the dots, and I believe if you ask Bruce right now, he knows everybody in that plant by name, including the construction managers," Roethig says. "People knew him, people appreciated him, and that was certainly a real big benefit to us to bring in Bruce."

U.S. and Europe for factory acceptance testing. Engineering work began in 2022, and Campbell's officially announced the expansion in July 2023.

The company also tapped senior operations and maintenance professionals at its Willard plant to provide expertise and

hands-on training for Richmond employees. Additionally, Campbell's dispatched operators to vendor shops across the

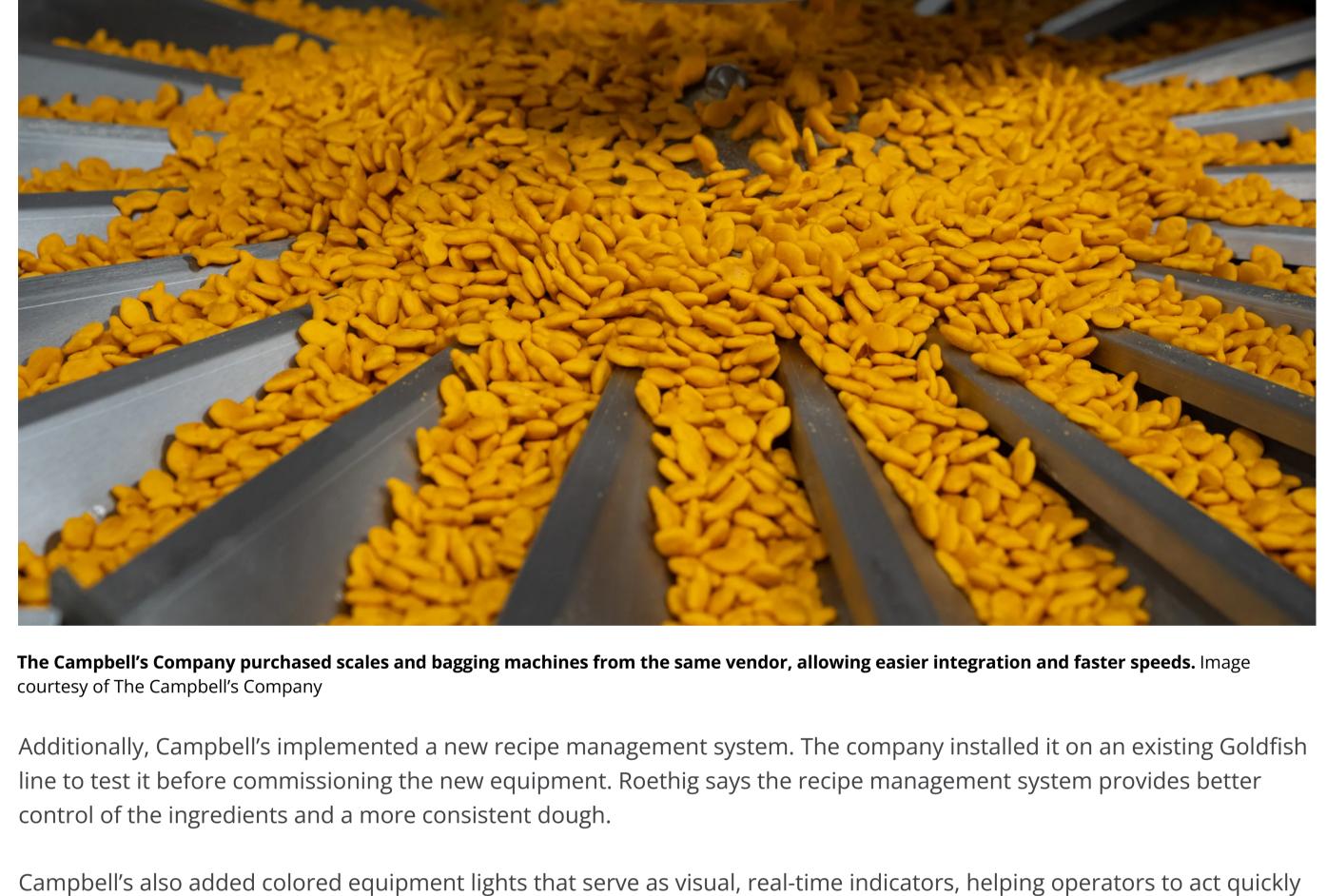
Campbell's turned to its equipment vendors to enhance flexibility, quality and speed. That included leveraging longstanding relationships, such as its 20-year partnership with Fallas Automation, as well as collaborating with new

For small-pouch packaging — a high-growth format for Campbell's — the company purchased scales and bagging

partners, Hernandez says.

DESIGN AND BENEFITS

machines from the same vendor to support seamless integration. This allowed the machines to achieve speeds that are 35% faster than anywhere else in the Goldfish manufacturing network.



and reduce time troubleshooting equipment concerns. As a result, their tasks have been simplified, allowing operators to oversee a larger area. **ON-SITE FLOUR MILL**

Flour is a key ingredient for Goldfish crackers, so ensuring a consistent, sustainable supply is paramount. Hernandez says Campbell's had concerns since the mills the Richmond plant previously sourced from were capacity-strained and aging, with one being more than a century old.

Following a best practice employed at the Willard plant, Campbell's reached out to milling companies it previously

partnered with to gauge interest in building a mill in Richmond.

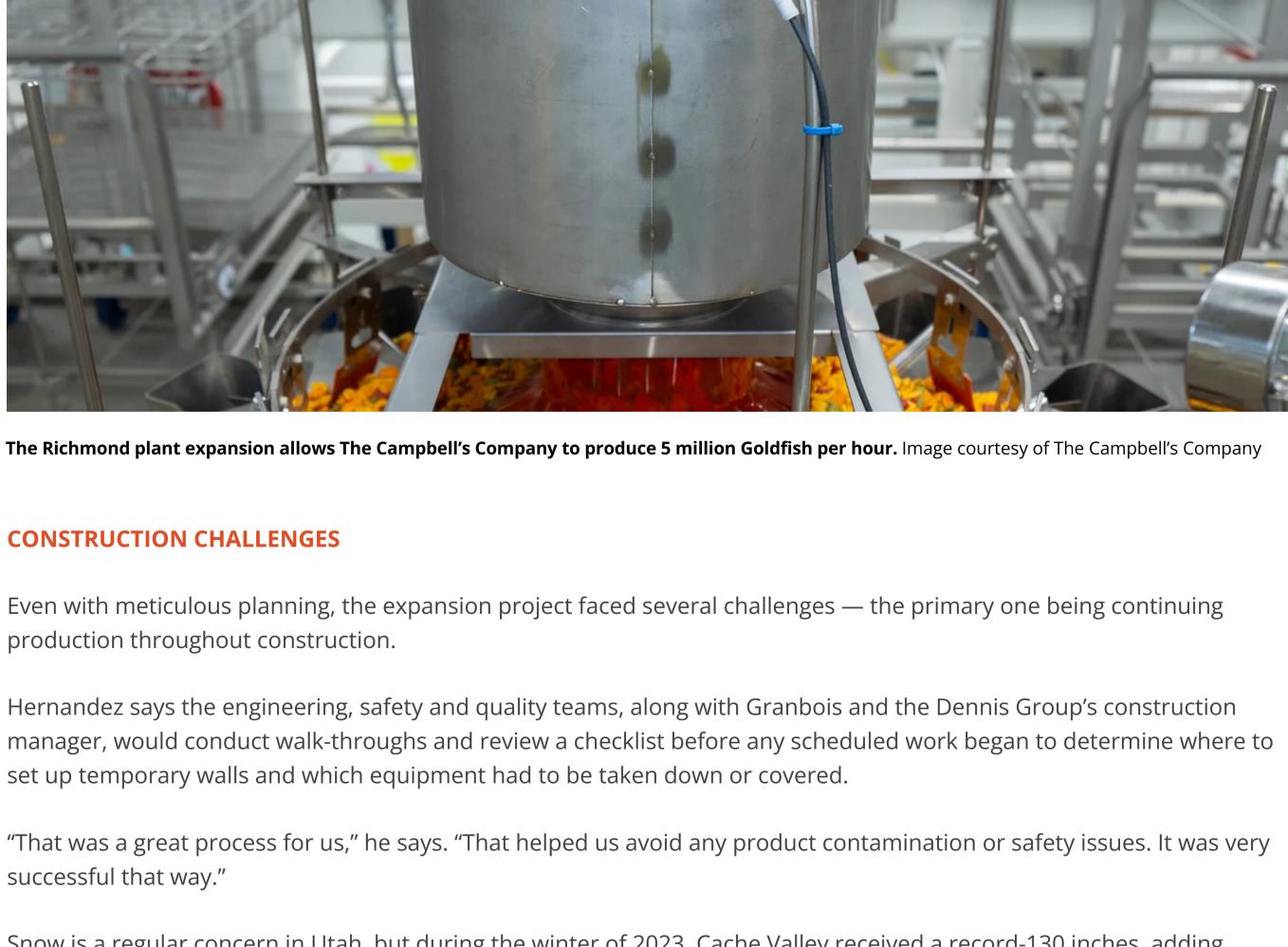
Drains for the

Food & Beverage

PHM Brands' Panhandle Milling and NIPPN Corporation answered the call, forming Utah Flour Milling LLC. While the company is partnering with Campbell's, Utah Flour Milling built, owns and operates the mill. As its primary customer, Campbell's receives 50% of the mill's 750,000-lb. daily output, and the flour is piped directly into the Richmond facility.

Industry Scan for Product TRENCH DRAIN SLOT DRAIN AREA DRAIN A division of Global Drain Technologies Visit us at **foodsafedrains.com** or call us at **855.497.7508** "That's been a huge win for us," Hernandez says. "It's a state-of-the-art milling operation, so the quality and the consistency are best-in-class. We've noticed a difference in the yields, in the flour and how it runs in our process for the better." Hernandez also points to the sustainability benefits of an on-site flour mill. The Richmond plant would receive six to eight truckloads of flour per day, but with the mill, the company has eliminated 2,236 truckloads and 1,472 metric tons of carbon dioxide equivalent (CO2e) per year. The mill also presents new opportunities for wheat farmers in northern Utah and southern Idaho. "It's another cool connection that the product we're making, sending throughout the country — the main ingredient, flour

— is from this area," Hernandez says. "It truly is a local flavor in the product. It's been great for the local farmers. They



Snow is a regular concern in Utah, but during the winter of 2023, Cache Valley received a record-130 inches, adding another layer of difficulty to construction and site work. Hernandez says the snow came in one to two storms a week, in

slipping and falling while doing difficult work already when you don't have the elements to worry about." Campbell's also experienced extra competition for Salt Lake City-area contractors, thanks to other major construction in the region, including the ongoing, \$5.1 billion improvement project at Salt Lake City International Airport.

Specifically, the company couldn't find a local electrical vendor to meet their timeline, but Mulyk brought in contractors that had worked on three of Campbell's Ohio facilities to supplement the local electrical group and divide the work. "Because they were a strategic partner with our Ohio sites, they were able to do that quickly and respond very fast at a

The Richmond plant's new Goldfish line began running at its full rate in the third quarter of 2024. The project, which spanned 394,539 work hours with no lost time and no recordable safety incidents, was completed on time and on budget. Campbell's also expects to add 85 jobs by 2027.

for the operations team. It's really making sure our standards are solid." Additionally, the Richmond expansion served as a proving ground for a safety and project checklist that Campbell's will roll out to every new capital project that requires operational readiness, Roethig says.

Hernandez says. "With any startup, you get new equipment, and there is a learning curve there for the maintenance team,

"This new, cross-functional operational readiness process helped us achieve a vertical startup to ensure optimal internal and external process operations," he says. "This enabled proper startup procedures, training, maintenance and vendor interactions with new operators and a world-class safety program. In addition, post-mortem lessons learned kept us more effective for improving in the future."

"We've proven that if given the opportunity, then we'll be successful with that in the future with the teams that we have here," he says. **FE**

+



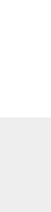


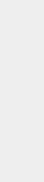


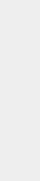


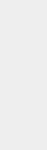


















increments of up to 12 inches. "From my perspective — from plant engineering — it was a safety concern because of ice buildup in the construction site," he says. "It was making sure the facility was kept clear, and snow removal was a priority to make sure people weren't

reasonable price because of our negotiated rates with them," Roethig says. **WHAT'S NEXT**

"We have hit our success criteria for startup, but we feel there is opportunity to continue to unlock efficiencies,"

Hernandez says there are no immediate plans to further expand the plant, but there is room if it becomes necessary. If it happens, the Richmond team will be ready.

JULY 2025 | VOLUME 97 | ISSUE 7





DON'T LET DOWNTIME EAT UP YOUR PROFITS.



ABB Installation Products for food production applications, such as our T&B® Fittings Stainless Dome Drain, are built to outmuscle liquid ingress, outmatch contamination, and out-duel corrosion. At ABB, helping our food production customers maximize their productivity is always at the top of the menu. **Learn more.**



→

+

FOOD

O E TOC

MENU

BY WAYNE LABS MAKING SMART BUSINESS DECISIONS ON MAINTENANCE STRATEGIES means having current actionable information. In the past, data collection systems combined process control sensor data and managed it locally — often on a server

The Endress+Hauser SmartBlue App is useful for quickly commissioning smart sensors and wirelessly integrating them into cloud and edge

designed to handle history and provide trends to HMIs in the plant. While these systems provided data for managing and controlling the manufacturing process, they weren't configured to handle maintenance data/issues as well. Today, in addition to process sensors, wireless and wired smart sensors with local edge hardware accumulate data and process it on-site to monitor maintenance trends — and can also pass that data along to Al-based computerized maintenance management systems (CMMS) in the cloud to get the big picture on overall corporate maintenance

strategies. In this article, we look at edge devices, smart sensors and IIoT platforms. Though maintenance may have been an afterthought 10 or 20 years ago, it's now recognized to be as important as a process control or packaging system — because manufacturers no longer want to be surprised when a machine breaks down. Rather, they'd like to plan for maintenance in the same way they plan for a product or packaging changeover — no

surprises. What maintenance solutions you choose will depend upon the vintage of your equipment, your ability to handle capital expenditures and the decision to purchase new equipment with built-in maintenance functionality. Simply throwing a bunch of sensors at manufacturing equipment without a strategy will not necessarily create a long-term solution.

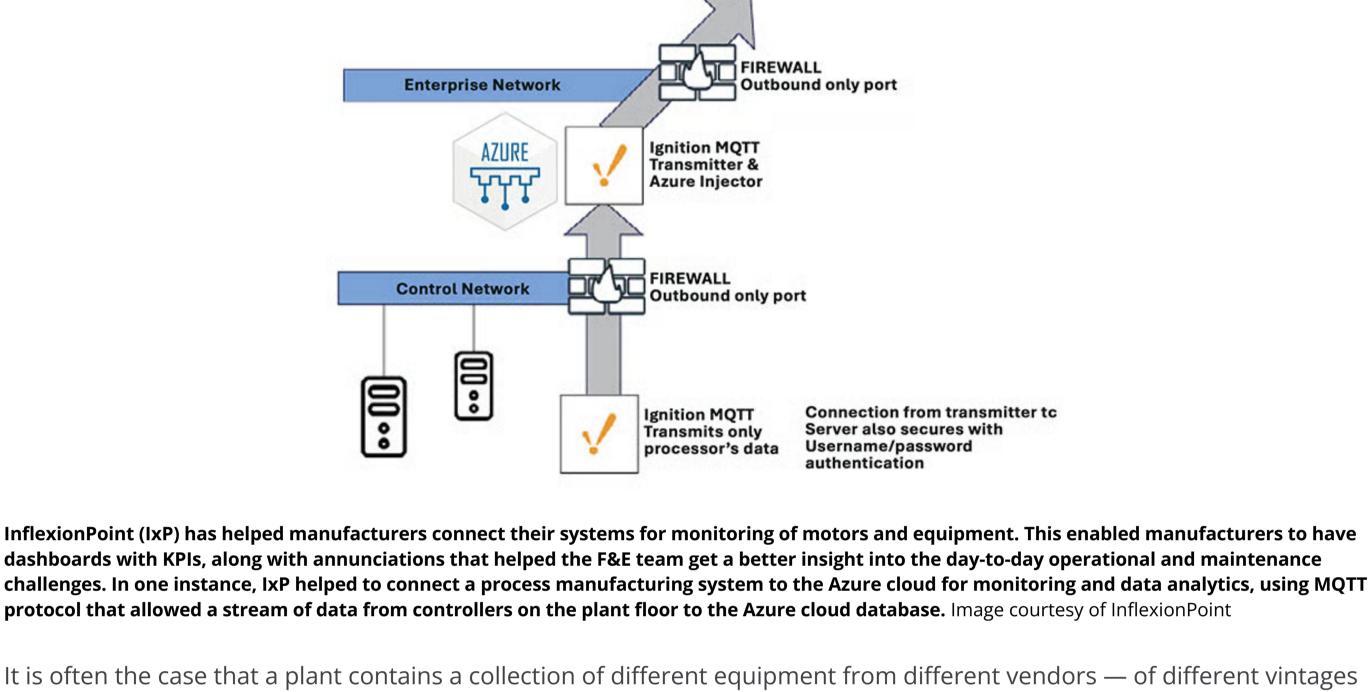
DETERMINE PROCESSOR NEEDS FIRST While smart sensors and other hardware solutions are important and can be applied broadly, it is typically better practice to focus on end users' holistic digitalization strategies instead of singular gateways, sensors or other individual devices,

says Jason Pennington, Endress+Hauser (E+H) USA director of digital solutions. "The primary question to ask regarding these broad digitalization strategies is: 'Who needs the data and where should it go?' When integrating these ideas,

monitoring systems. Photo courtesy of Endress+Hauser

challenges most often show up when moving OT data from host and parallel systems through middleware or APIs to the stakeholders who need to analyze it for insights." "It's best to offer a solution tailored to the specific system needs, but regardless, they'd all involve similar architectures to have sensors with built-in communication capabilities or sensors wired to smart IO blocks on the 'edge' enabled with communication protocols, such as MQTT, IO-Link, Ethernet/IP, Modbus, Profibus, etc.," says Guru Thakkar, director of engineering at InflexionPoint LLC, a Control System Integrators Association (CSIA) member. An intermediate layer device interpreting, refining and polishing those signals may be added (e.g. PLC or edge gateway) for reasons such as enhancing

the sensor capabilities, doing communication protocol conversion, and providing data store and forward capabilities, Thakkar adds. **Azure IoT Hub**

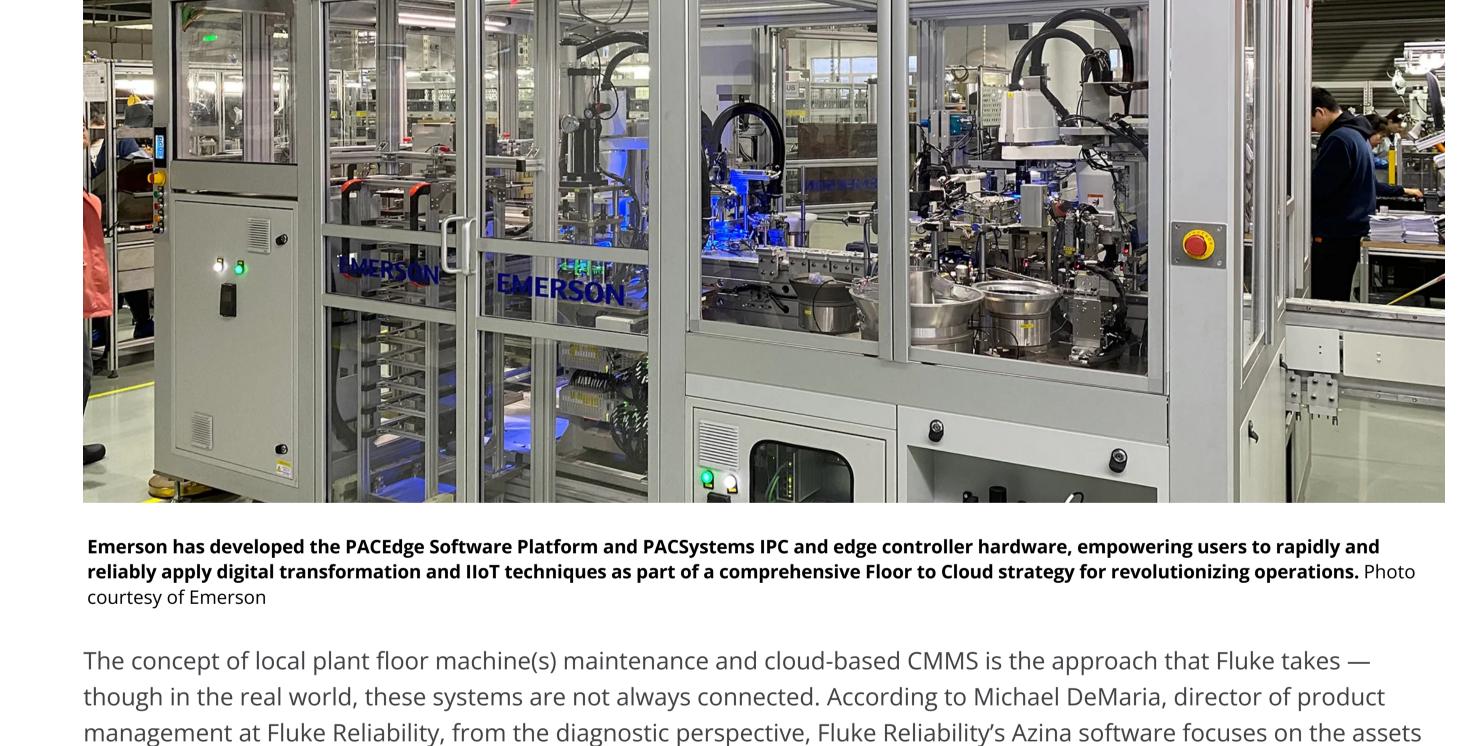


equipment is often designed with automation to support the standard operations — and not with the necessary telemetry to support asset health. Our engagement with our clients is to first assess and classify equipment into categories, based on the end user objectives and the level of telemetry available from the equipment."

— with differing levels of automation, connectivity and data collection, Thakkar says. "Even the most automated

NEWER CONTROL SYSTEMS BUILD IN MAINTENANCE EXTENDING TO CLOUD CMMS SOLUTIONS

Long-known for its process control systems, Emerson has developed the PACEdge Software Platform, installed on the PACSystems line of rugged industrial IPCs and edge controllers, says Bill Paczkowski, senior product manager of edge and industrial computers at Emerson's Discrete Automation. This complete solution offers a full line of capable, programmable and extensible software and hardware, providing connectivity, monitoring and automation for any edge and IIoT applications, big or small. Emerson has established this solution so end users, systems integrators and OEMs can simplify IIoT application development, deployment and administration as part of a comprehensive Floor to Cloud strategy.



themselves and captures relevant data to download into eMaint, a cloud-based software system that centralizes maintenance information. Then, eMaint executes a food processor's maintenance work order. "More often than not, it's common to come across a disconnected system in the industry, and Fluke Reliability is solving

that issue by providing software solutions that are interconnected and communicate with each other," DeMaria adds. HARDWARE SUPPLIERS BUILD IN MAINTENANCE FUNCTIONALITY Today, processing and packaging machine builders have an easier job of integrating maintenance, as their suppliers have done their homework. Festo, Omron Automation and Rockwell Automation are good examples.

"We provide industrial apps (Festo AX Motion Insights Electric or Pneumatic) for specific use cases — monitoring pneumatic cylinders and our own electric drives — for predictive maintenance (PdM) of pneumatic and electric actuators," says Frank Latino, Festo global product manager for electric automation. The apps are containerized, so they can run on a

model or from a PLC. The data will be analyzed and presented in a dashboard. The dashboard includes a health score

(e.g., decreasing during wear, and thus predicting failure). An MQTT broker is also provided in the container, so any

system can subscribe to the results, including cloud-based CMMS, MES or ERP systems.

multitude of Windows- or Linux-based edge devices. The apps will collect data from Festo devices, following a specific data

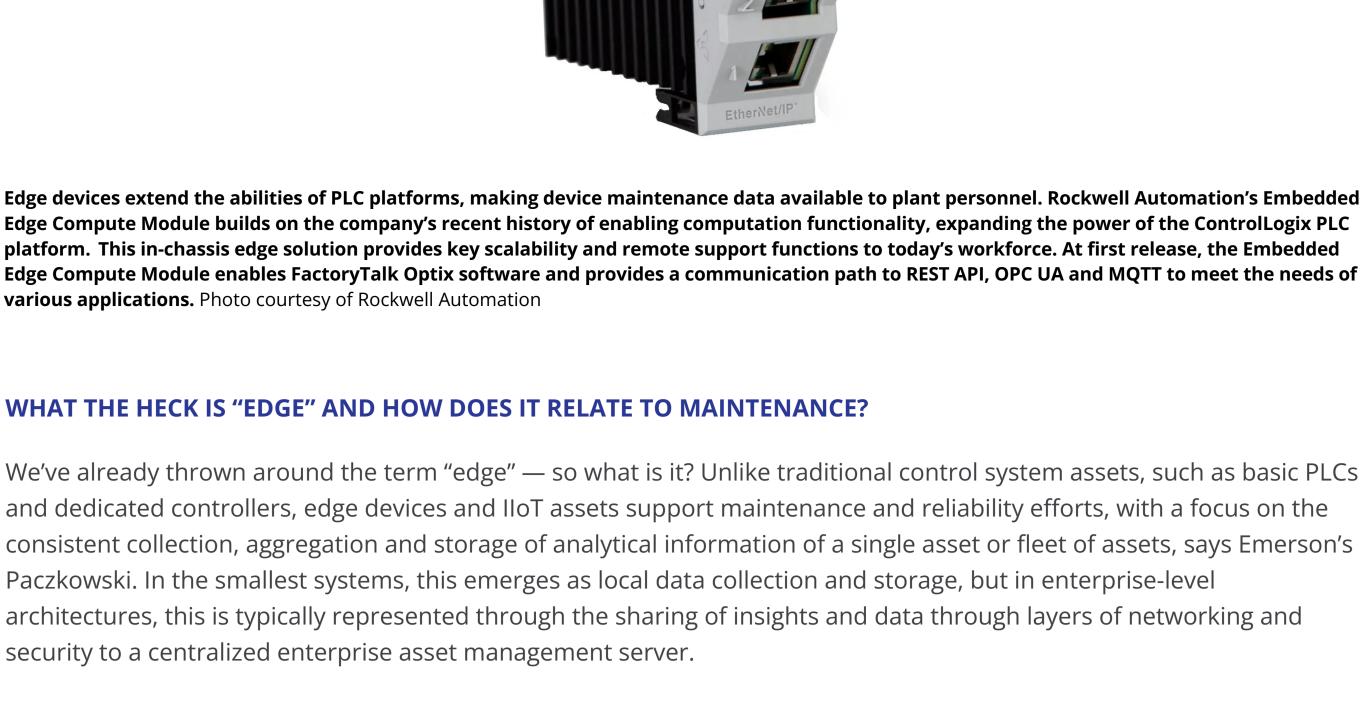
Industrial Intelligence



functions with its manufacturing customers, says Lance Fountaine, Rockwell Automation global account industry consultant. This includes a focus on drives, network and data infrastructure, edge computing, cloud computing and maintenance applications.

• Some examples of technologies in the Rockwell Automation ecosystem include: • Infrastructure: PowerFlex Drives, Stratix Switches, Smart Objects • Edge: FT Optix, FT Analytics (Vision AI, Guardian AI, Logix AI, Pavillion 8); IIoT - FT DataMosaix, ThingWorx Maintenance Apps: Fiix CMMS, Fiix ARP.

1756-CMEE1Y



sometimes cannot be passed through a PLC or OT architecture can be processed in an edge device. Having the information on a device in the plant can facilitate faster responses to adverse events or serve up reports to the appropriate personnel, alleviating the need to manually dig deep into a process historian database or physically check on field equipment before analyzing events."

The edge device can quickly collect and analyze data in the field since there is minimum latency time due to its proximity

systems can subscribe to this data with a much lesser frequency but still get accurate results since the data has been pre-

and the bandwidth of most industrial ethernet networks, says Festo's Latino. The corporate cloud-based maintenance

processed. The benefit is accuracy and speed of the analyzed data.

adequately, depending on how they are doing.

More specifically, E+H's Pennington says, "For maintenance purposes, an edge device can acquire data that has historically

been trapped in devices as technical debt. For example, diagnostic data or dynamic condition monitoring information that

Key word here is quick — waiting for a work order from an enterprise CMMS slows things down. "Edge devices allow engineers to make small-level, quick decisions to ensure that a machine is running in the right condition," says Fluke's DeMaria. "For example, a company operating a critical asset that must be shut down once vibration hits a certain threshold needs to be equipped with an edge device to execute a fast response to any machine failure, mitigating an expensive mistake." Being able to have real-time information readily available at all times is crucial to make informed decisions based on the current status of a machine or an asset. It's not only about gathering data, but also about sharing it in a comprehensive

collecting accurate data — to visualize and analyze it on the go. This way, they are able to properly address each machine

Summing up, an edge device can provide many technical capabilities in support of a maintenance strategy, says Rockwell's

Fountaine. These could include collecting, storing and/or forwarding real-time sensor data; processing large volumes of

data for a soft-sensing process measurement; triggering events based on known or unknown asset anomalies; or even

way for users to understand what's happening, adds Omron's Garcia. Cloud-based monitoring allows users — while

running real-time analytics to make adjustments for improved asset health or performance. Edge data that is forwarded to a cloud-based IIoT platform can be integrated to CMMS or be used for more advanced learning and analysis, in support of asset health or asset life cycle management. **Just What are Edge Devices?**

The edge device(s) essentially acts as an interface between assets on the plant floor and the higher-level enterprise

capabilities to be able to push data using more than one protocol. Many edge devices can monitor more than one type

maintenance events. The enterprise software systems can gather long-term data and maintenance events and analyze

the data, enabling predictive maintenance capabilities as well. The IIoT approach used here bypasses the dependency

software systems, often bypassing the middle layers like PLC and SCADA. They usually have communication

of condition at equipment level and may be able to process data locally to some extent and trigger alerts or

on existing devices and infrastructure, enabling targeted data collection directly into enterprise systems.

— Guru Thakkar, director of engineering, InflexionPoint, LLC, a CSIA Member IS IT WORTH FITTING OLD EQUIPMENT WITH MAINTENANCE SENSORS? Success with integrating existing brownfield assets into a complete IIoT solution often relies on a greater depth of knowledge in the methods of collecting data from a variety of existing systems and sensors and transmitting it to higher-

level computing resources, says Emerson's Paczkowski. OEMs are typically the best source of truth for updating legacy

assets to incorporate IIoT. But, capital expenditures on depreciated equipment are typically minimized to optimize ROI

Older equipment can be monitored for various conditions and failures by adding the right sensor(s); these sensors can

communication capabilities, Thakkar adds. Usually, the installation is most cost-prohibitive, and the comparative thinner

margins in the food industry do not help the situation. The trick is to go with battery-powered, wireless sensors whenever

possible to reduce the installation cost. Use feature-packed software platforms with a variety of communication and

analytics capabilities, such as Inductive Automation's Ignition, to make the overall deployment even more cost-effective.

have either onboard capabilities with integral communication protocols or smart blocks with wired or wireless

and reduce operational risk. Enterprises prefer to channel resources into modern, scalable technologies rather than

MQTT protocol particularly is very resilient, efficient and supported over Ethernet or Wi-Fi networks. Aggregating status via edge gateways strategically placed in various areas of the plant and forwarding that data further can help make these systems cost-effective while avoiding data loss.

prolong the life cycle of outdated systems.

IIoT implementation.

"We could think that implementing these technologies might be a big challenge as an initial investment, [but] getting to understand what to monitor and how to address each asset is important as well," says Omron's Garcia. Understanding how each IoT device or system interacts with their current infrastructure is vital to implement each properly. Sometimes, the challenge with IIoT is how much easier it has become to install and collect data from a variety of sensors that are potentially task- or use case-oriented, says E+H's Pennington. That can be a great thing, but it can also produce islands or fragmented data when the edge device or devices are considered as part of a larger IT infrastructure. Holistic

planning and a fundamental understanding of the larger digital landscape, vision and systems are a must for success in

Smart IIoT sensors have been designed to properly monitor equipment, regardless of age, says Omron's Garcia. They can

be configured to detect variations on specific parameters, like vibration or current, and knowing beforehand how those

are moving throughout a working day can provide meaningful insights into the machines' status. A motor, for instance,

Things go better if there is a suitable industrial network already installed in the equipment, says Festo's Latino. Examples

would include EtherNet/IP or Profinet. Not having this type of network would be a barrier to installing IIoT systems since

has an operating specification, like operating at a temperature of 40°C or below a specific current value.

they rely on a flow of information from various sensors and devices throughout the equipment. Getting the data directly from the PLC can be possible, but it will depend on the connectivity possibilities of the PLC. As stated previously, Rockwell has an agnostic approach to data integration for sensors, Fountaine says. There are many sensors available today that can measure vibration, temperature, torque, level, etc. Besides the cost of the sensor, the challenge for many of Rockwell's manufacturing customers is the ease of data integration. Rockwell's edge and IIoT solutions simplify integration by using standard data integration protocols (e.g., OPC UA, MQTT, etc.), and enabling the contextualization and aggregation of data from a multitude of sources. This makes the data readily available and easier to

monitoring and pervasive sensing can help provide depth and context to assets and systems that extend beyond a primary variable. When integrated together in host systems and core+peripheral sensors are combined, these setups provide a much broader view of processes and their overall health, the surrounding operational environment and potential up and downstream impacts of the entire process — as opposed to a series of individual components. —Jason Pennington, Endress+Hauser USA Hardwired vibration and current sensors can be used to monitor motors and provide telemetry on acceleration, velocity, temperature, resistance, current or degradation. Thermal imaging sensors can also be used to provide

information on temperature in a specific area. All of these devices are able to communicate their information through

an industrial protocol (either Ethernet IP, Modbus TCP or serial communication). With this protocol, they can share

A variety of devices are available that can be connected to IIoT platforms via native protocols that these platforms support, or via communication gateways, such as Kepware, Ignition Edge, RedLion or others. A small sample of IIoT sensors include:

consume for both technology practitioners and end users.

Sensors for Maintenance Applications

• IFM AL13 series IO-Link Master that supports configurable analog and discrete IO per sensor port. • Siemens SIMOTICS Connect 400 or ABB Ability for motor monitoring • VEGAPULS 31 level sensors with IO-Link

offers several edge-based soft-sensing and AI capabilities that can detect asset events, initiate notifications, or even

- Turck CMVT Series Rockwell PowerFlex and Kinetix motor controllers with onboard diagnostic capabilities. This is often neglected when we talk about monitoring for maintenance purposes, as simply by attaching the VFD to network, a good amount of relevant and contextualized data can be collected.
- Guru Thakkar, InflexionPoint LLC Rockwell has an agnostic approach to data integration and can support a multitude of wired and wireless sensor capabilities. These sensors can be integrated at the edge or directly into the IIoT platform. The right approach is usually determined based on whether or not there is value-added functionality that can be derived at the edge. Rockwell also

adjust operations in real-time to protect the asset or maintain operations.

THE HUMAN FACTOR IN PLANNING MAINTENANCE "When our team visits manufacturing plants over the course of a weekend, we've found machines that were healthy and

operating well to suddenly developing a fault and failing," says Fluke's DeMaria. "This taught us that it's no longer possible to take a snapshot one day a month and then see how that trends another month later. It's important to remember that even with today's technology — where we have all the ability to put sensors on a machine to see how performance is developing — the most important component to factor in is the human one. Automation has the ability to gather enormous amounts of data and decipher it, but human analysis is essential in being able to identify what the customer really needs from the machine — i.e., knowing the exact parts to order, how soon they need to be delivered in order to shift around the production line to mitigate the risk and what's needed to keep operations at the volume needed."

of the time on each mixer, and they were not getting adequate results and consistency in their mix. By monitoring vibration and current sensors, they were able to notice that there was an overload happening within the motor that caused misalignment; therefore, a lot of vibration was happening inside the motor. Once these monitors were installed, they received alarms through an indicator on the machine, and eventually, we managed to connect these devices to their internal control system to send alert messages to maintenance workers, who were deployed once a warning alarm was triggered. This resulted in less downtime and scaling up their activities to not inspect their motors so frequently, saving them time and money. —Juan Carlos Garcia, Omron Automation

NEXT ARTICLE

Many traditional process sensors can report information about failures, alarms and overall device status. Condition

information with other control systems as long as they also speak that language, like Rockwell's FactoryTalk or Siemens MindSphere. —Juan Carlos Garcia, Omron Automation

—Lance Fountaine, Rockwell Automation

Troubleshooting Potato Chip Mixers

A chips producer uses mixers to blend all their necessary ingredients for a uniform potato chip mix. These mixers use three motors (one vertical, two horizontal) for a smooth operation. They had some issues with one of the motors most

JULY 2025 | VOLUME 97 | ISSUE 7

Credit: Photo courtesy of Getty Images / Smederevac

BY GRANT GERKE

IN MARCH, THE U.S. DEPARTMENT OF AGRICULTURE (USDA) eliminated two committees that consulted with the agency on food safety. A spokesperson for the agency stated that the National Advisory Committee on Microbiological Criteria for Foods and the National Advisory Committee on Meat and Poultry Inspection were eliminated due to fiscal and non-science reasons.

These moves, combined with extended waivers that allow pork and poultry to maintain higher line speeds, show a willingness by current agencies to shift the burden to food manufacturers, ingredient suppliers and farmers for safety resources.

regulatory environment," says Jennifer McEntire, founder at Food Safety Strategy. "And with the scientific tools to link outbreaks — such as whole-genome sequencing — communication using social media and proliferation of plaintiffs' attorneys, it leaves the food industry quite vulnerable."

The federal food safety backstop is gone and cuts have been well-publicized. "Outbreaks will happen, regardless of the

The USDA's leadership and vision for food safety and a digital transformation have been steady since 2012, but brands are now adjusting to the new landscape.

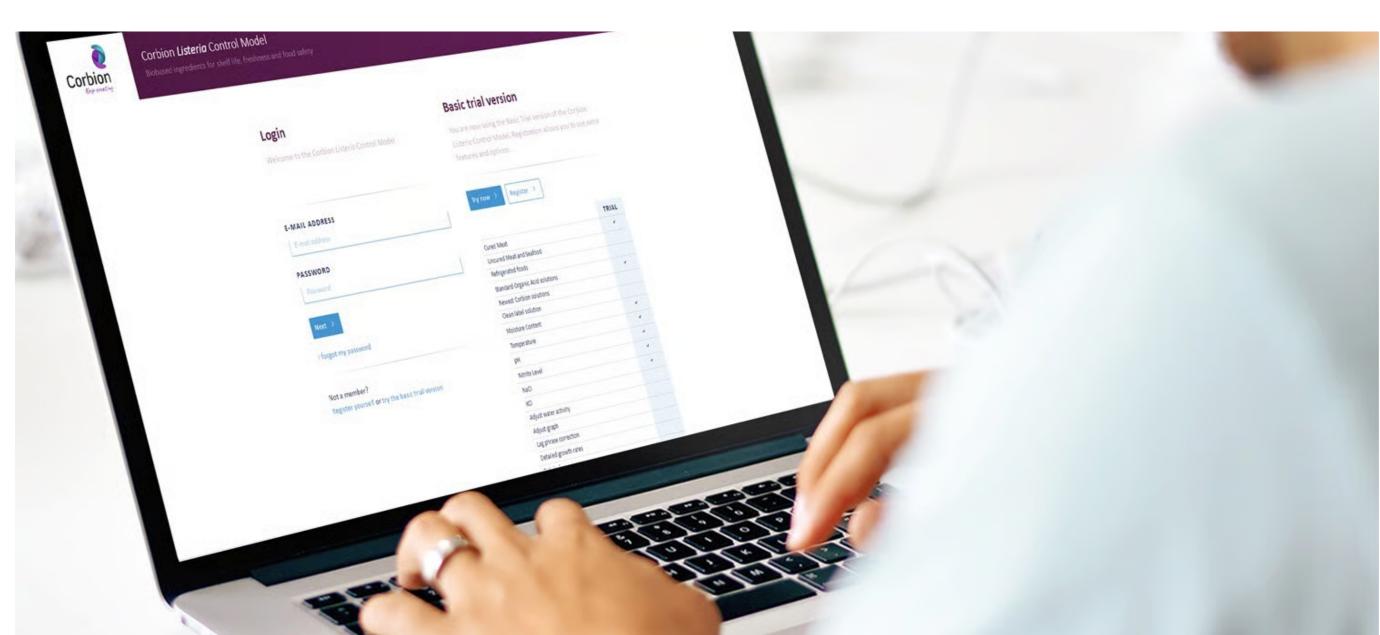
"Food safety is foundational, but in this regulatory gray zone, it's also a moving target," says Kari Barnes, regulatory standards manager at TraceGains, Inc. "As oversight shifts from federal to state level, the risk of inconsistency rises. Brands must double down on internal controls and digital traceability to maintain standards and consumer trust, regardless of who's holding the rulebook."

TraceGrains offers a supply chain digital platform specializing in a range of applications for food manufacturers, including formula, quality and audit management. The platform facilitates digital documentation, with the goal for ingredient suppliers to automate, centralize, standardize and streamline their processes for more transparency with consumer packaged goods (CPGs) companies.

However, with the uncertainty and cost controls in 2025, food manufacturers may move dollars away from large traceability projects. "Without regulatory pressure, we have heard that many food producers will likely move towards smaller, ROI driven investments — such as adding smart equipment — rather than sustaining large-scale traceability cloud initiatives," adds Dave Cirullo, industrial key account manager at METTLER TOLEDO.

While Rule 204 is delayed for 30 months, the road to supply chain transparency is not lost on companies. "During this time of uncertainty, reliable food safety strategy is critical to staying ahead in the market," says David Charest, SVP of functional ingredients and solutions business at Corbion. "With the delay in the traceability rule, companies will execute a more holistic approach with the supply chain and food safety."

To engage in a systematic approach, Corbion, an ingredient supplier, offers its Listeria Control Model predictive modeling tool, which projects listeria growth based on specific characteristics of the food product.



Corbion offers a Listeria Control Model predictive modeling tool that projects Listeria growth based on specific characteristics of the food product. Photo courtesy of Corbion.

"A customer can enter different parameters, see the prediction and evaluate solutions that can be used for a particular product," Charest states. "The tools can produce a PDF, and this can be part of their scientific information supporting the validation for the use of a solution in a particular product." In addition, the Listeria Control Model is based on real-world and laboratory micro-validations.

LARGE CAPEX STILL COMING

+

Even with business uncertainty, food manufacturers are plowing forward with investments in automation upgrades, system software and next-generation greenfield plants. Companies leading the way include Bauducco Foods, Lineage and Tyson, which partnered to expand its footprint, and Hershey opened a new chocolate plant in April.

Large companies are embracing transformative changes in the industry. "Consumer tailwinds are pervasive, but they are especially focused in several key areas and pockets of growth where we've seen the consumer continue to evolve, and that creates opportunity for us," said Michele G. Buck, chairman, president and CEO, said at the 2025 CAGNY Conference.

For food safety and greenfield plants, this can mean better plant design. "We're seeing a shift from reactive cleaning to proactive facility design, and it's overdue," says Viking Kristjansson, VP of sales engineering at FoodSafe Drains. "Food facilities and plants are starting to get smart with floor slopes, grateless drain systems, reduced underground piping and fully weldable stainless infrastructure that eliminates harbor points."

"Major pathogens continue to be a challenge, including L. monocytogenes, salmonella and pathogenic E. coli (and more than just O157:H7)," McEntire says. According to a report by the U.S. Public Interest Research Group (PIRG) Education Fund, the number of Americans with confirmed illnesses caused by contaminated food rose by 25% in 2024 to a total of 1,392 cases, up from 1,118 in 2023.

"It's very difficult to build sanitation on top of bad design," Kristjansson adds. "Linear drains are being used to replace extensive underground drainage grids (piping) that are hard to clean and prone to costly clogs."

Additionally, biofilm is another critical control point in plants. "A drain that is not well-designed or properly maintained acts as a carrier of contamination," Kristjansson says.

As regulatory oversight becomes murkier, the onus is on companies to improve food safety programs and focus on continuous improvement. "Too often, we have seen testing and calibration strategies based on 'that's the way we've always done it," Cirullo says. METTLER TOLEDO recommends workforce comprehensive training programs, ISO 9001:2015 quality guidance and life cycle management via ISO 9001:2015 - PDCA.

Moreover, reformulations for legacy products are changing food manufacturing, with consumers' emphasis on protein and fewer carbohydrates, across all demographics.

At the recent Future Food-Tech conference in Chicago, CPGs' use of new ingredients was a popular topic. "We're in this great reformulation period," says Edward Shenderovich, cofounder and CEO of Synonym. "Every CPG is interested in reformulation and there's a lot of pressure, such as regulatory, financial and consumer, to reformulate, but it's not clear to what."

"With changing consumer and regulatory expectations impacting the formulations of some foods, only time will reveal any unintended consequences, whether on the microbial or chemical food safety sides," McEntire adds.

One of those unintended consequences may be allergens. "Undeclared allergens have quietly become the leading cause of recalls, pointing to deeper issues with label accuracy, formulation change and cross-contact controls," Barnes says.

For large food manufacturers, traceability with suppliers remains a huge priority and essential for growth. "We also have to have our traceability programs in order, along with our hazard analysis and critical control point (HACCP) programs," Charest adds. "Manufacturers look to us and other suppliers if there's an issue and want to trace back the raw materials." **FE**

NEXT ARTICLE



JULY 2025 | VOLUME 97 | ISSUE 7



Start your search today

Find everything you need, right here!

Cannabis Equipment

+

- Food Industry Associations
- Construction Services
- Instrumentation,
 Automation
- General Plant Equipment
- Packaging Equipment & Materials

Q Used Equipment

Refrigeration, Cooling, Chilling/Freezing Equip.

Ory Processing Equipment

Services

www.foodmaster.com

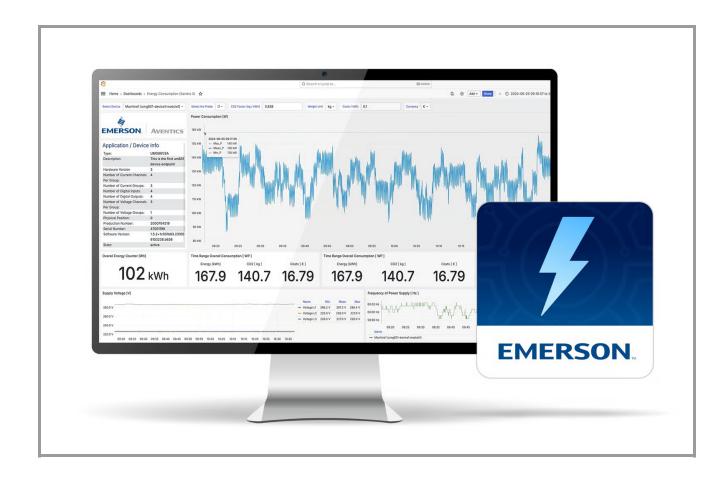
MUST SEE PRODUCTS

A compilation of the newest food engineering technology and plant products.

EMERSON

Energy Manager

Emerson's Energy Manager provides energy measurements in real time, allowing plant managers to quickly view values and see savings opportunities, such as idle consumption and peak loads. The software's dashboard provides asset-specific energy use, associated costs and CO₂ emissions for up to 10 end points (expandable to 50 endpoints with a license). Scalable and easy to integrate with new or existing energy meters, the software is available either pre-installed on edge hardware, such as the PACSystemsTM RXi2-BP industrial PC, or as a standalone application that can be installed in a virtualized environment.



GEA

E-Bake G2 Oven

This second-generation oven is engineered to produce cookies (both soft and hard dough) and crackers, offering a compact footprint, advanced airflow design and modular flexibility. Its design is optimized for electric operation — no gas integration — enabling CO₂ emission reductions while achieving repeatable baking products. The baking chamber has been redesigned with a reduced internal volume, which minimizes heat loss and positions heating elements closer to the product, improving thermal efficiency. The inclusion of micro-convection technology, featuring localized airflow systems, ensures heat distribution and reduces temperature gradients across the baking surface. A new configuration of electric resistances supports targeted heat generation, contributing to a potential energy consumption reduction of up to 40% compared to the previous generation's gas-fired model.

ROCKWELL AUTOMATION AND PEPPERL+FUCHS

ThinManager Tablet Solutions

Together, Rockwell Automation and Pepperl+Fuchs now offer a complete portfolio of ThinManager-ready products designed to meet the needs of any customer application. This includes everything from dedicated HMIs and industrial, boxthin clients to a new range of tablet products by Pepperl+Fuchs. The Tab-IND and Pad-Ex tablets are available with the ThinManager BIOS onboard and no other preinstalled OS. This allows users to boot firmware directly from the ThinManager and transforms the tablets into centrally managed endpoints that provide mobile visualization for frontline workers — in harsh industrial and hazardous environments. It also increases the cybersecurity of the solution. Pepperl+Fuchs offers hardware solutions for two application areas: non-hazardous and hazardous areas.

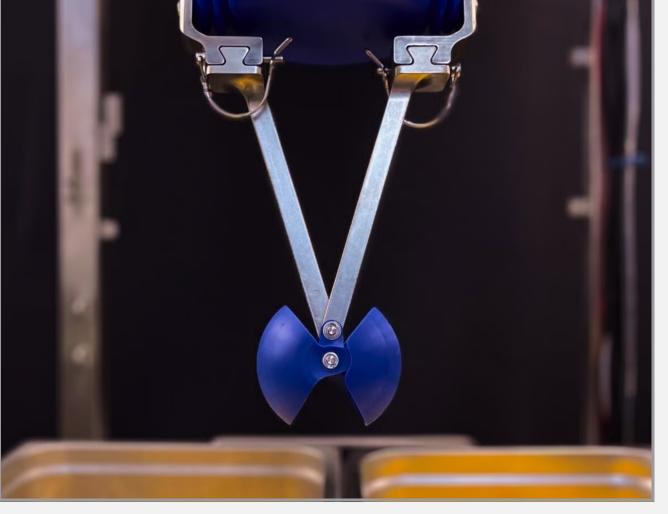




CHEF ROBOTICS

C-001748

Chef Robotics' C-001748 robotic module is now NSF-certified, meaning it adheres to strict food safety and cleanability standards. Chef's Al-enabled meal assembly robot operates alongside workers on food production lines, picking and placing ingredients from conveyors into trays. The robot has been certified against NSF's commercial food equipment standard "NSF/ANSI 169 - Special Purpose Food Equipment and Devices."



ANKO FOOD MACHINE

EMP-3000

The EMP-3000 Empanada-Making Machine tackles production challenges with a modular filling system, allowing for easy filling changes. Operators can swap the filling system in five minutes. Forming and labeling empanadas before their delivery is achieved in one step using replaceable molds that can be custom-made to imprint the producer's chosen brand logo on its border. The EMP-3000 processes raw and cooked ingredients while maintaining the firmness of granular fillings up to 10 mm in size. The machine's clamping mold mechanism that turns the dough wraps and filling into authentic-looking and branded empanadas uses an upgraded in-house design to ensure longevity.







REGULAT

FDA to Update Standard of **Identity for Canned Tuna**



Photo courtesy of Getty Images Plus / Kritchai Chaibangyang

Based on recommendations submitted for major tuna packers, the final rule is expected later this year.

The U.S. Food and Drug Administration (FDA) plans to update the standard of identity for canned tuna, as well as its standard for fill of container.

Initiated by a citizen petition from Bumble Bee Foods LLC, Starkist Co. and Tri Union Seafoods LLC, the proposed rule would replace the pressed cake weight method with the drained weight method to determine the standard fill of container.

The rule would also expand the use of potential flavorings and reduce the upper limit of vegetable extractives to 2.5% of the volume capacity of the container. Additionally, the rule would clarify that canned tuna may "be in one or more of optional packing media," including edible vegetable oil, olive oil or water.

The proposed rule would also remove references of requiring an optical comparator for color determination to allow for use of electronic color meters in determining Munsell values.

The FDA issued the notice of public rulemaking on Aug. 25, 2023, and it accepted public comments until Nov. 24, 2023. The final rule is expected in October 2025.

NEXT ARTICLE

Masthead

BACK TO CONTENTS

FOR SALE BY OWNER

Click Boxes Below to Learn More

FOR SALE BY OWNER

Operating Retorted Foods Factory 45000 ft² building on 4 acres near Philadelphia Airport



PVT label Flexible Pouches and Cans made with Fresh, Natural Ingredients

- Four FMC Steam/Water Spray Retorts
- Four Vertical Still Retorts for can baskets Vegetable Processing Machines
- HP Boilers, Air Compressors and Tanks
- 6" incoming water supply line2 deep water wells for geothermal
- 3 phase power with several panels
- vijai@jyotifoods.com, 484-494-8458











ENGINEERING

Volume 97, Number 7

ay in D

For subscription information or service, please contact

CUSTOMER SERVICE: Phone: (800) 952-6643

foodengineering@omeda.com

FDITOR-IN-CHIFF

EDITOR-IN-CHIEF

Alyse Thompson-Richards

EDITORIAL

Alyse Thompson-Richards 847-405-4050

EDITOR

Michael Levitt 248-244-6257

SENIOR CONTRIBUTING TECHNICAL EDITOR:
Wayne Labs

NEW PRODUCT SUBMISSIONS: feeditors@bnpmedia.com

EDITORIAL ADVISORY BOARD

Anthony Doss, MBA, P.E.

SVP Engineering Smithfield Foods

Samara Heaggans

Director Process Quality Engineering
Feastables

William R. Aimutis, Ph.D.

Executive Director NC Food Innovation Lab

Dan StauftDirector Operational Technology

Hugh RoddyVice President Global Engineering & Project Management

SugarCreek

Chobani

CEO Rebellyous Foods

Christie Lagally

Bob Wolpert

Chief Administrative Officer

Golden State Foods

Gail Becker

Founder and CEO
Caulipower

Wayne LabsSenior Contributing Technical Editor

PRODUCTION MANAGER:

PRODUCTION

John Talan

ART DIRECTOR:

ADVERTISING

Cory Emery

PUBLISHER:

Michael Leonard - Southeast

AL | AR | GA | LA | MS | OK | TX

(847) 315-0577

Sam Wilson - Midwest

IA | IL | IN | KY | MI | MN | MO | ND | OH

SD | TN | WI | Manitoba | Saskatchewan (847) 405-4075

ASSOCIATE PUBLISHER:

SALES STRATEGIST:

John Brandt - Northeast
CT | DC | DE | FL | ME | MA

| MD | NC | NH | NJ

NY | PA | RI | SC | VA | VT | WV

Quebec | New Brunswick Ontario/Toronto
(201) 412-7060

(201) 412-7060

→

Wayne Wiggins Jr. - West

AK | AZ | CA | CO | HI | ID | KS | MT | NE | NV

NM | OR | UT | WA | WY | Asia | Australia

SALES STRATEGIST:

British Columbia (415) 387-7784

CLASSIFIED ADVERTISING:

Jennifer Izzo

(847) 226-6729

MARKETING:

Rachel Beaubien

Sr. Advertiser Marketing Manager

(249) 786-1260

(248) 786-1269

AUDIENCE MARKETING:

Karen Talan Senior Audience Development Strategist

Leigh Wendinger
Associate Director Audience Growth & Retention

Adriene Cooper
Food Automation & Manufacturing Symposium and Expo Manager

(847) 405-4120

LIST RENTAL

Please contact your sales representative.

VOLUME REPRINTS

Email **reprints@bnpmedia.com** for information.

DIRECTORY DEVELOPMENT MANAGER:

DIRECTORIES

Erin Mygal

CHIEF HR & INFRASTRUCTURE OFFICER

Rita M. Foumia

BNP MEDIA CORPORATE

CHIEF MARKETING OFFICER

Ben LeDonni

CHIEF PRODUCTION OFFICER
Vincent M. Miconi

CHIEF FINANCIAL OFFICER
Lisa L. Paulus

CHIEF CREATIVE OFFICER
Michael T. Powell

CHIEF OPERATIONS OFFICER
Nikki Smith

CHIEF EVENTS OFFICER
Scott Wolters

CHIEF MARKETING OFFICER
Ben LeDonni

PANEL AND RESEARCH DIRECTOR

Ariane Claire

BNP Media Helps People Succeed in Business with Superior Information

CONTACT FOOD ENGINEERING

Phone: (248) 362-3700 Fax: (248) 362-0317

> 550 W. Merrill St. Suite 200

Birmingham, MI 48009-1443

foodengineeringmag.com

FOOD ENGINEERING Volume 97, Issue 6 (ISSN: Digital 1937-4429) is published 12 times annually, monthly, by BNP Media II, L.L.C., 550 W Merrill St., Suite 200, Birmingham, MI 48009-1443. Telephone: (248) 362-3700, Fax: (248) 362-0317. Copyright 2024, by BNP Media II, L.L.C. All rights reserved. The contents of this publication may not be reproduced in whole or in part without the consent of the publisher. The publisher is not responsible for product claims and representations. **Change of Email Address:** Send an email to: foodengineering@omeda.com

BACK TO CONTENTS

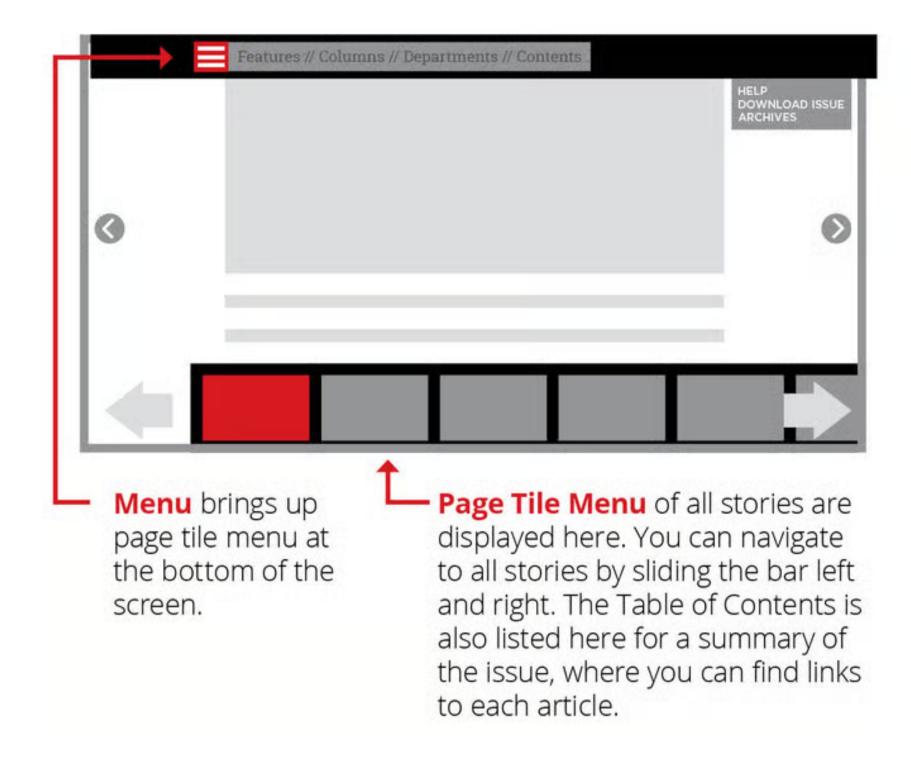
Fax: (847) 291-4816. Email: foodengineering@omeda.com



For subscription information or service, please contact Customer Service at: Phone: (800) 952-6643

⊕ = toc

eMagazine Navigation Guide







Zoom To zoom on desktop view, use your browser's zoom commands. Zoom In: Control + on PC Command + on Mac Zoom Out: Control - on PC Command - on Mac To zoom on tablet and mobile views, pinch your screen.

pdated 01/12/2022