FOOD ENGINEERING

THE MAGAZINE FOR OPERATIONS AND MANUFACTURING MANAGEMENT

August 2025
Vol. 97, No. 8

Tillamook Opens First Ice Cream Facility Outside of Oregon

Communicating OT Cybersecurity Risk to Leadership

Unlocking Efficiency in Food Manufacturing with PLM Solutions

FOOD ENGINEERING's 48th Annual Plant Construction Survey

A bnp media PUBLICATION

www.foodengineeringmag.com

FOOD ENGINEERING

AUGUST 2025
Vol. 97, No. 8

SCROLL DOWN

COVER STORY

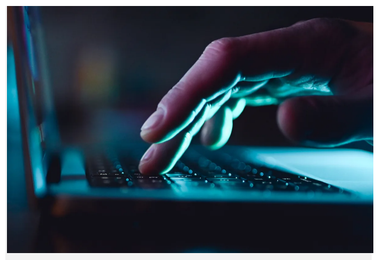
FOOD ENGINEERING's 48th Annual Plant Construction Survey

Despite economic uncertainty and other challenges, plant construction, expansion and optimization projects persist.

COLUMNS

How Digital Traceability and Facility Design Are Reshaping Food Safety

As manufacturers plan for increased demand, purpose-built facilities with integrated digital traceability systems will streamline compliance and enable faster, more accurate responses.



Unlocking Efficiency in Food Manufacturing with PLM Solutions

As new regulations emerge and standards continue to evolve, PLM software will be more than just a system — it will be a strategic imperative for manufacturers that want to stay ahead of the curve.

FEATURES

Tillamook Opens Illinois Ice Cream Facility

The Tillamook County Creamery Association (TCCA) recently opened a 68,000-sq.-ft. ice cream facility in Decatur, Illinois — Tillamook's first owned and operated plant outside of Oregon.

FEATURES

Plan Vision System Upgrades Carefully

Today's vision systems are more powerful than their earlier counterparts, and many processors choose to use vision, X-ray and metal detection systems to meet regulatory demands and ensure quality.

How to Communicate OT Cybersecurity Risk and Investment to Food and Beverage Leadership

Executives and boards are slow to adopt new OT cybersecurity tools, and the issue is complex for non-security plant professionals. To solve this issue, security leaders need to explain the risks and impacts for increased investment.

DEPARTMENTS

NEXT ARTICLE

food master

START YOUR SEARCH NOW

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**

From the Editor

Food Manufacturing Investment Continues – With Caution

FOOD ENGINEERING's 48th Annual Plant Construction Survey reveals food and beverage manufacturers are taking a cautious approach to capital expenditure, but even with economic uncertainty, the industry continues to invest in smart, sustainable manufacturing.

This year marks the 48th edition of FOOD ENGINEERING's Plant Construction Survey, our annual opportunity to ask architecture, engineering and construction professionals about what they and their food and beverage manufacturing clients have experienced over the last year.

Last year, survey respondents said their clients were taking a "wait-and-see" approach to capital expenditure with the uncertainty surrounding the 2024 presidential election. In 2025, our survey respondents say food and beverage manufacturers are still cautious when it comes to new projects — but this time because of economic uncertainty connected to inflation and tariffs.

"We're seeing some pause and reflection in advanced manufacturing projects, even those that were previously green-lighted, driven by uncertainty in funding sources — both government and private investment," says Russ Schertz, AVP of industrial manufacturing, Black & Veatch. "We've seen some of our food industry clients revisit capital expenditure strategies for projects that weren't already in the construction phase for the remainder of the year. The drivers here are more complex than just tariff concerns. While potential retaliatory tariffs certainly create uncertainty — particularly for commodity-dependent businesses that historically suffer when trade wars escalate — the bigger factors seem to be changing market conditions. Inflation has slowed considerably, which means these companies can no longer simply pass increased costs to consumers as they could during the height of inflationary periods. Commodity markets have also shifted, creating pricing pressures that make large capital investments less attractive."

Even with these political and economic concerns, food and beverage manufacturers continue to open and expand manufacturing facilities. FOOD ENGINEERING has reported on more than 30 projects since the start of 2025, with many announcements in May, June and July.

Specifically, there have been several developments in the dairy industry. Since April:

- Chobani announced plans to build a $1.2 billion dairy processing facility in New York
- California Dairies Inc. opened a processing facility in Bakersfield, Calif.
- Darigold began processing milk at its facility in Pasco, Wash.
- Cayuga Milk Ingredients completed its $270 million expansion in New York
- Tillamook opened an ice cream facility in Illinois – its first outside of the Pacific Northwest

We've also seen a lot of movement in the meat category, with Archer opening a second plant in California and JBS USA announcing plans to open a $135 million sausage facility in Iowa. Walmart is also developing its own beef processing facility in Kansas.

We've also seen incredible expansion in cold storage and processing. Frozen potato producers have opened facilities in Idaho within the last year, and Americold recently opened a distribution center in Canada, but these are only a few examples.

While these projects have likely been in progress for years, it's reassuring to know the industry continues to invest in safe, sustainable and smart manufacturing. Rob Raney, food and beverage manufacturing project director, Burns & McDonnell, agrees.

"The industry continues to see robust investment in new processing and distribution facilities, with dozens of major projects announced monthly across the U.S.," Raney says. "This includes not just new construction, but also expansions and significant equipment upgrades to boost capacity and efficiency. While new developments remain strong, there is also a notable number of network optimization projects, signaling a shift as companies modernize their operations. Despite ongoing uncertainty, the sector is experiencing steady growth. However, the landscape remains dynamic, with companies balancing expansion and modernization against the need to optimize existing assets and manage costs." **FE**

NEXT ARTICLE

BACK TO CONTENTS

Unlocking Efficiency in Food Manufacturing With PLM Solutions

As new regulations emerge and standards continue to evolve, PLM software will be more than just a system — it will be a strategic imperative for manufacturers that want to stay ahead of the curve.

Photo courtesy: Yuliya Taba / Getty Images

BY MICHAEL UMBACH, CHIEF PRODUCT OFFICER, REVALIZE

Michael Umbach

FOOD AND BEVERAGE MANUFACTURERS ARE FACING AN INCREASINGLY COMPLEX ENVIRONMENT — one shaped by shifting safety regulations, growing traceability requirements and the need to manage massive volumes of product data. These challenges are compounded by rising demands for supply chain transparency, sustainability and rapidly changing consumer expectations.

At the heart of this complexity lies a central challenge: evolving regulations and standards. In late 2024, for example, the FDA finalized a new definition of "healthy," tightening the criteria for when the term can be used on packaging and in marketing based on updated nutrition guidelines. At the same time, updates to the Food Safety Modernization Act (FSMA) introduced stricter traceability rules, requiring detailed recordkeeping throughout the supply chain to improve food safety and accountability. Though full compliance has been extended to July 2028, meeting these demands will require manufacturers to significantly enhance operational transparency and data management capabilities.

PRODUCT LIFECYCLE MANAGEMENT: THE GAME-CHANGING SOLUTION

To stay competitive in this rapidly evolving landscape, food and beverage manufacturers must innovate — beginning with how they manage and leverage product data. While AI and automation offer valuable support, a dedicated product lifecycle management (PLM) platform is emerging as the most effective way to streamline operations and stay compliant. PLM software acts as a centralized digital backbone, connecting teams, systems and information across the organization. It enables faster product development, shorter lead times, improved supply chain accuracy and stronger regulatory alignment — all critical for responding to both market pressures and tightening oversight.

The momentum behind PLM adoption is clear. Based on our recent report, *Smart Manufacturing 2025: Trends Shaping the Digital-First Era and Beyond,* which surveyed 500 decisionmakers across the U.S. and Germany, 64% of manufacturers have increased their investment in PLM software over the past year. This signals growing recognition of PLM software's value — not just as a tool for managing data, but as a strategic asset for navigating regulatory complexity and driving innovation.

TURNING DATA INTO COMPETITIVE ADVANTAGE

PLM software provides a single source of truth for product information, enabling more consistent, collaborative workflows across the entire lifecycle. From project management (the top use case, cited by 43% of respondents) to document control, product design and version management (each cited by 30%), PLM solutions reduce silos and streamline decision-making. These capabilities directly translate into measurable results: 41% of manufacturers report improved product quality and 37% cite better data management — both essential for staying compliant while accelerating time-to-market.

In an industry where even minor delays or missteps can lead to costly recalls or regulatory penalties, the ability to act quickly and confidently is a major competitive edge. PLM software gives manufacturers that edge by turning complex data into actionable insights.

ADDRESSING IMPLEMENTATION CHALLENGES

Of course, the path to successful PLM adoption isn't without its obstacles. One of the biggest hurdles is training — cited by 32% of manufacturers as a primary barrier. With steep learning curves and potential workflow disruptions, integrating a new system can feel daunting for teams already stretched thin by daily operations and compliance tasks.

However, organizations that invest in structured, user-centric onboarding — such as role-based training, interactive tutorials and ongoing support — are seeing faster adoption and better outcomes. Other key concerns, such as ensuring data accuracy (31%) and managing high initial costs (30%), can also be mitigated through user-friendly platforms, strategic planning and clear ROI frameworks. By addressing these implementation challenges directly, manufacturers can fully realize PLM solutions' potential to streamline operations and meet today's compliance standards.

THE FUTURE OF PLM SOLUTIONS: CLOUD AND ADVANCED ANALYTICS

As technology continues to advance, PLM software is poised to rapidly evolve, with advanced analytics and cloud-based solutions leading the way. By 2050, industry professionals expect advanced analytics (40%) and cloud-based PLM platforms (39%) to have the greatest impact on manufacturing. These tools are already gaining traction, offering capabilities that enhance both agility and insight.

Cloud-based PLM software, in particular, offers exciting possibilities — allowing companies to scale effortlessly, manage larger and more complex datasets, and avoid costly infrastructure upgrades. Combined with real-time analytics, these platforms empower teams to make smarter, data-driven decisions — whether they are responding to a supply chain disruption, reformulating a product to meet new nutritional standards, or speeding up approval processes for new launches.

A PLATFORM FOR LONG-TERM INNOVATION

Overall, the future is bright for the food and beverage industry, as PLM software continues to transform how manufacturers respond to regulatory demands, consumer trends and market pressures. By centralizing product data, improving cross-functional collaboration and supporting compliance at every stage, PLM solutions lay the foundation for long-term innovation and sustainable growth.

As new regulations emerge and standards continue to evolve, PLM software will be more than just a system — it will be a strategic imperative for manufacturers that want to stay ahead of the curve, reduce risk and deliver the quality, transparency and agility that today's consumers and regulators expect. **FE**

NEXT ARTICLE

BACK TO CONTENTS

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

NSF Nonfood Compounds H1 Registered ISO 21469 Certified

PAREVE HALAL

See the NSF White Book™ for a complete list of registered / ISO 21469 certified products.

"It's the Film." PREVENTS WEAR and CORROSION LUBRIPLATE SUPER-LUBRICATION

Lubriplate®
Synthetic NSF H1 Lubricants

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

INCLUDED AT NO ADDITIONAL CHARGE

Lubriplate's **ESP**

Complimentary Extra Services Package

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

HOW DIGITAL TRACEABILITY AND FACILITY DESIGN Are Reshaping Food Safety

As manufacturers plan for increased demands, purpose-built facilities with integrated digital traceability systems will streamline compliance and enable faster, more accurate responses.

Photo courtesy: Getty Images / miniseries

BY JOHN SIEKIERDA, SENIOR DIGITAL TRANSFORMATION ENGINEER II, GRAY AES

Food production has advanced dramatically in the past two decades — faster equipment, more automated lines and increasingly sophisticated formulations. But unfortunately, when a contamination event occurs, many manufacturing facilities still turn to clipboards and handwritten logs to trace where an ingredient went or which finished products might be affected.

These traditional processes slow what should be swift, targeted responses. Sifting through lot numbers and pallet IDs can take days, forcing broad recalls that risk public health and drastically impact trust. Still, they exist because it's difficult to adopt modern digital frameworks.

Recent recalls offer a reminder of why effective responses matter. More people in the United States got sick from contaminated food outbreaks last year than in 2023. Total illnesses increased from 1,118 to 1,392, and hospitalizations more than doubled to nearly 500. High-profile recalls involved familiar brands and foods such as eggs and cinnamon.

These incidents highlight why many companies are now taking a design-first approach to traceability when planning new facilities. While no system fully prevents contamination, purpose-built environments with integrated digital capabilities give manufacturers better tools to reduce its likelihood and scope. And, with the FDA's Food Traceability Rule set to mandate near real-time digital traceability from farm to fork by July 2028, modernization can't be delayed much longer.

AUTOMATED SYSTEMS COLLECT VAST AMOUNTS OF DATA

Modern traceability involves following ingredients and finished goods through every stage of production and distribution — in both directions. That means knowing which pallet came from which batch, and which raw material lots were used in any given product.

Digitally driven systems capture this information automatically. Lot numbers are scanned as ingredients are added to the batch. Expiration dates and other quality data are verified to ensure nothing out of spec spec enters production. There's no more wondering whether yesterday's handwritten notes accurately logged the process.

When integrated with a manufacturing execution system (MES), these platforms also monitor and verify production parameters. For example, line cameras check every 10 cans to ensure labels and contents are correct. When discrepancies arise, the line is stopped immediately to reject suspect products before they reach consumers.

IoT sensors extend this oversight by continuously checking temperature, humidity and other environmental conditions. If process parameters stray from specification, an automatic hold is triggered to prevent compromised batches from moving forward.

The convergence of automated data capture, real-time monitoring and integrated quality systems sets the stage for a more responsive approach to food safety. However, achieving this level of traceability requires a strong physical foundation.

TRACEABILITY REQUIRES A PURPOSE-BUILT FOUNDATION

The most effective traceability systems function best in a facility designed to support them. That begins with planning for high-throughput networks, redundant power, dedicated control rooms and optimized data pathways. Without this foundation, even the most advanced tracking tools struggle to perform.

Modern facilities are increasingly built to support cloud-based systems that auto-scale seamlessly as they capture data from more and more batches, sensors and quality checkpoints. These systems often require performance tuning to keep traceability information accessible and easy to interpret as production and data volumes grow.

Therefore, most plants today need dual-network configurations — one for workplace operations and another for industrial controls. Without this separation, simple tasks like downloading a file can throttle bandwidth and interrupt production workflows. The newest facilities are being designed with dedicated operational technology (OT) networks that support secure, reliable communication between sensors, scanners, printers, MES software and cloud systems.

Planning for bandwidth isn't guesswork, either. Networks are engineered with plenty of headroom — often 200% or more — to ensure performance holds steady as data loads grow or new lines come online. IoT-enabled traceability tools, for instance, may continuously feed temperature, pH and humidity data into the system for each batch. That volume of input requires high-speed pathways and accelerated processing capabilities, as well as security protocols designed to keep data and performance protected from cyber threats.

Hardware matters, too. Advanced data capture technologies are evolving beyond barcodes and toward more sophisticated solutions. RFID tags on pallets now transmit comprehensive data and enable automatic updates as products move through facilities. Camera-based systems provide continuous quality verification by detecting packaging errors and labeling discrepancies that human operators might miss. Modular, API-driven systems can accept new sensors or protocols with minimal configuration — a necessity when regulations and labeling standards are regularly updated.

When these traceability capabilities are integrated into a facility as part of a deliberate design and construction approach, manufacturers can act faster to minimize product loss and safeguard public health.

TRACEABILITY INSIGHTS DRIVE OPERATIONAL DECISIONS

A modern traceability system makes the difference between a broad recall and targeted, effective actions.

Consider a sauce manufacturer that discovered tainted ingredients in its supply chain. Historically, this would have triggered a recall of 100,000 units produced over two weeks resulting in a potential financial and reputational disaster. With digital batch tracking, the manufacturer can instantly verify which lots used the contaminated ingredients and identify just 5,000 units from four batches. The batch codes can be communicated to distributors within hours to pinpoint the contaminated sauce.

Direct access to batch-level data and shipment records help coordinate a response, but the real breakthrough is that systems are proactive. They detect patterns that human operators can miss, like packaging line cooling issues that precede major spoilage events or supplier performance trends that signal brewing quality problems. IoT sensors serve as real-time watchdogs by automatically flagging deviations in temperature, humidity and other process parameters as they occur and holding batches before unsafe products reach the market.

Artificial intelligence (AI) and machine learning (ML) amplify these capabilities by using historical tracing data to forecast potential contamination events. Some systems identify correlations between environmental conditions, supplier lots and quality outcomes that would take human analysts weeks to uncover.

This level of precision redefines what traceability can achieve — and the very roles of operators, who no longer must agonize over incomplete spreadsheets.

DATA ASSURES QUALITY THROUGHOUT THE SUPPLY CHAIN

Digital traceability turns batch monitoring into an active, data-driven process that frees operators from manual tasks and leads to sharper oversight and safer food supply.

Workers who once devoted hours to record-keeping can focus on tasks that strengthen quality and consistency, such as monitoring batch trends in real time and making informed decisions about whether to hold production. Purpose-built systems surface this data clearly and enable operators to act when it matters most.

Instead of writing down lot numbers and temperatures on clipboards, operators watch live trend charts during batch runs. They verify processes while batches are running and instantly assess whether deviations fall within tolerance or require intervention. When parameters drift, they make data-driven determinations on whether to continue production or stop the line. The result is better yields and higher confidence in a safer product.

These benefits extend outside facility walls. Supply chain partners — from ingredient suppliers to retailers — gain a clearer view of product origins and handling, which builds trust and simplifies coordination across complex distribution networks.

Advanced transparency also becomes a point of differentiation in a crowded marketplace. In Loftware's 2024 Top Trends Report, nearly half of organizations cite ineffective recall management as the biggest risk of poor supply chain traceability, which is one reason many manufacturers now treat external transparency and granular, verifiable data as a competitive advantage. At the consumer level, Merck Animal Health reports nearly 40% of shoppers express a willingness to pay extra for traceability assurances, while only 67% have at least some trust in how their meat or seafood is produced.

Closing this gap is one part of a broader need to build traceability systems that adapt to the increasing demands of consumers, regulators and supply chain partners.

MODERN TRACEABILITY ACCOUNTS FOR PROCESS CHANGES

This flexibility requires manufacturing facilities and their digital traceability infrastructure to be designed and built with future regulatory expectations in mind.

The FDA's Food Traceability Rule initially covers high-risk foods, but in the future, it may demand more granular information from all food and beverage products. Partners may even expect data sharing and more integrated, digitally transparent value chains.

Manufacturers may find that these capabilities are increasingly about more than compliance. They will influence which companies they supply, which domestic or international markets they enter, and how strongly they position their brands.

AI will further reshape this space by informing process decisions, optimizing scheduling and guiding predictive maintenance, with today's data training more sophisticated AI models.

Traceability platforms may even extend beyond safety to track carbon footprints and water usage, making sustainability metrics essential to future requirements.

As manufacturers plan for these demands, purpose-built facilities with integrated digital traceability systems will streamline compliance and enable faster, more accurate responses that help protect public health. **FE**

NEXT ARTICLE


BACK TO CONTENTS

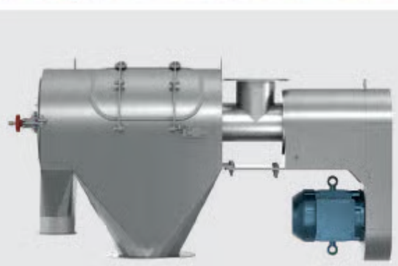
coperion

baker perkins · bakon · coperion K-TRON · diosna · gabler · kemutec · peerless · shaffer · shick esteve · unifiller · vmi

Unifying technologies

Unlocking possibilities

Scan the QR code to find out more



Coperion unites the leading technology brands in food manufacturing to deliver innovative system solutions for your operation.

Technology for:

- Systems & Ingredient Automation
- Pre-Dough, Mixing, Forming & Dividing
- Depositing, Decorating & Cutting

coperion.com/fhn

FOOD ENGINEERING's 48th Annual Plant Construction Survey

A M King designed and constructed an expansion at Cheney Brothers' distribution center in Statesville, N.C. Photo courtesy of A M King.

BY ALYSE THOMPSON-RICHARDS

FOOD AND BEVERAGE MANUFACTURERS CONTINUE TO EXPAND THEIR OPERATIONAL FOOTPRINTS, but architecture, engineering and construction (AEC) professionals responding to FOOD ENGINEERING's 48th Annual Plant Construction Survey say a cloud of uncertainty is prompting their clients to take a cautious approach.

Survey respondents, including Max Mather, client development director, Hixson Architecture, Engineering & Process, note their clients are focused on optimizing the efficiency of their current operations, rather than launching large-scale construction projects.

"This shift is largely driven by economic pressures such as inflation, elevated interest rates and uncertainty surrounding tariffs," Mather says. "These factors have made companies more risk-averse, prompting them to prioritize upgrades and process improvements over new builds."

As the Trump administration's tariffs on imported goods loom, food and beverage manufacturers are weighing every project element, adds Carl Morse, vice president, A M King.

"Our clients are spending more time analyzing data, modifying systems and evaluating even the minor details of a project to confirm that they are allocating money in the proper places," Morse says. "Tariffs continue to cause uncertainty in the industry. However, the impending tariffs haven't impacted our clients' decisions to proceed with projects."

Even with current and impending tariffs, AEC professionals note supply chains have largely stabilized since the COVID-19 pandemic, but long lead times still exist, especially for electrical items.

Top 5 Trends Affecting AEC Firms

1. Capital availability

2. Scheduling equipment arrival to job site

3. Overall cost/controlling costs

4. Food safety: FSMA regulations/GFSI (design. layout, etc.)

5. Fast project deployment

"Supply chain inefficiencies continue, though the situation seems to be easing in some areas," says Mark Redmond, president, Food Plant Engineering, LLC. "More than shortages, lead time on the receipt of certain products — particularly electrical components and anything related to controls — is long. Thus, we have had to design certain components earlier in the process to preorder them."

Mark Hubbs, senior account executive for SSOE Group, also notes some manufacturers seek out single-source service providers to more efficiently manage their projects.

Top 5 Trends Affecting F&B Clients

1. Workforce availability (line workers)

2. Increasing production to meet demand*

2. Fast project deployment*

3. Food safety: FSMA regulations/GFSI (design. layout, etc.)

4. Flexibility in plant design to accommodate flexible manufacturing*

4. Site location related to transportation, logistics, utilities *

4. Workplace safety*

5. Allergen separation design

**indicates a tie*

California Dairies, Inc. recently opened a manufacturing plant in Bakersfield, Calif. . Photo courtesy of California Dairies, Inc.

"Owners having a single source of responsibility provide the owner with a simpler management structure and reduces owner's risk exposure to managing multiple service providers," he says.

Despite economic uncertainty and other challenges, plant construction projects persist. Within the last year, FOOD ENGINEERING has reported on several plant openings and expansions in the meat, dairy, ingredient and cold storage categories.

"The industry continues to see robust investment in new processing and distribution facilities, with dozens of major projects announced monthly across the U.S.," says Robb Raney, food and beverage manufacturing project director, Burns & McDonnell. "This includes not just new construction, but also expansions and significant equipment upgrades to boost capacity and efficiency. While new developments remain strong, there is also a notable number of network optimization projects, signaling a shift as companies modernize their operations."

AUTOMATION

Incorporating automation, as well as collecting and utilizing production data, remains important to food and beverage manufacturers, says David Overwine, automation engineer, Hixson Architecture, Engineering & Process.

"Clients want data/information from all things connected to the network and want remote access to their facility, securely," Overwine says. "The trend we see is the upgrading of the network architecture, its structure, and how to store the data. This can be anything from updating PLCs and equipment with Ethernet capabilities, updating the network structure, and adding data solutions software to collect the data for the next steps, e.g. a manufacturing execution system (MES). And with the newer buzz of AI products and software, in which the data/information needs to be in one location for it to work, upgrades will likely continue to be important to clients for years to come."

Manufacturers are implementing automation in raw material receiving and ingredient handling, process optimization, packaging and palletizing, warehouse and storage, and quality control and inspection, says Burns & McDonnell's Raney. He notes organizations often start with a pilot program to assess benefits before pursuing full implementation.

"With careful planning and realistic expectations, automation can significantly accelerate timelines, enhance operational efficiency and deliver a strong return on investment (ROI), making it a compelling choice for facility expansions and upgrades," Raney says. "Clients who approach automation strategically generally find that, over time, it provides clear value and measurable improvements to their bottom line."

Most survey respondents cite labor shortages as a driver for implementing automation in food manufacturing facilities — particularly for handling repetitive tasks, says Ronald L. Rens, president, Gleeson Constructors & Engineers, LLC.

"We see an increase in automation in processing, packaging and warehousing/logistics due to hiring challenges and the difficulty of retaining team members," Rens says. "There is also a growing trend toward automation in storage, shipping and packaging. These types of facilities typically take longer to build due to increased system complexity. With automation more sophisticated maintenance is required and it usually reduces flexibility."

Milo's Tea Company, Inc. recently opened a $200 million manufacturing and distribution facility in Spartanburg, S.C. Photo courtesy of Milo's Tea Company, Inc.

LABOR AVAILABILITY

While they influence automation adoption, labor shortages are also an important factor for site selection. In fact, workforce availability is the top concern for food and beverage manufacturers, according to the surveyed AEC professionals.

"The labor force challenge represents the most significant trend affecting our industry," says Russ Schertz, AVP of industrial manufacturing, Black & Veatch. "There simply isn't the labor force needed to support continued growth in the U.S. food market as it was traditionally designed to operate. This isn't just about wages, though higher compensation has become necessary. The fundamental issue is that fewer people are willing to work in manufacturing environments, particularly food manufacturing with its unique challenges."

Attracting and retaining talent becomes critical, and that need is translated into plant designs with improved employee facilities, says Hixson's Mather.

"Many markets have historic low unemployment levels and it can be tough to attract and retain employees with the typical salary-bonus-benefits packages," he says. "Amenities and more robust employee welfare areas are helping to entice and keep employees on board. Employee welfare areas are now gathering spaces, and companies are choosing to incorporate amenities such as on-site daycare, outdoor decks, basketball courts and comfort rooms for private use (e.g., nursing moms, prayer)."

However, Schertz adds employee safety and welfare features are not enough. They also need opportunities for cross-training, upskilling and career advancement.

"Companies that recognize the connection between facility design and worker satisfaction will have a competitive advantage in attracting and retaining employees," he says. "This isn't just about installing air conditioning or better lighting — though those help. It's about creating work environments that respect workers' time and intelligence while providing the tools and technology that make their jobs more efficient and engaging."

A M King recently completed a 70,399-sq.-ft. facility for MÜNZING North America's U.S. production headquarters in Clover, S.C., to expand its food-grade and non-food-grade additives business. Photo courtesy of A M King.

FOOD SAFETY

While the U.S. Food and Drug Administration has extended the deadline for the Food Safety Modernization Act's (FSMA) 204 Traceability Rule, food manufacturers continue to design facilities with food safety and traceability in mind.

In fact, survey respondents cite food safety as a Top 5 concern for both AECs and their food and beverage clients.

"Processors will be required to record events throughout the harvesting, cooling, packing, shipping and receiving of goods," says Tyler Goodwill, design leader, A M King. "They may then need to incorporate new machinery/equipment and infrastructure to accommodate new traceability systems. We continue working with our food processing clients to understand the rules they must follow and support their process by implementing sanitary design principles into the construction of their facility. These efforts will significantly mitigate food safety risks, protect their brand and help them avoid costly shutdowns."

Gleeson's Rens also points to the importance of ingredient handling and separation.

"There seems to be an increase on the focus on inspection of incoming material and eliminating potential contaminants from the process areas," he says. "Processors are looking for flexible spaces that can be converted quickly for alternate products. Line separation allows sanitation on a line while others remain in operation. This also helps manage allergens and reduce cross-contamination risks."

In addition to physical food safety concerns, manufacturers are increasingly facing the potential for cyberattacks. As Black & Veatch's Schertz notes, modern manufacturing equipment can serve as entry points into a company's operational technology (OT) system, making cybersecurity measures a necessity.

"Traditional food safety protocols and facility designs were developed around physical contamination risks and human safety concerns," he says. "The regulatory framework and design standards haven't fully evolved to address these digital threats, yet the risk is very real. A successful cyberattack on food production equipment could potentially affect product safety, disrupt supply chains or compromise the integrity of the food supply."

ALTERNATIVE PROTEIN

Jason Robertson, vice president, food and beverage, CRB, notes there are key differences in designing facilities for traditional protein and alternative protein production.

"While traditional protein facilities are optimized for handling biologically-derived raw materials with strict sanitation and cold chain requirements, alternative protein facilities often incorporate elements from both food and biotech manufacturing," he says. "These facilities typically demand flexibility to accommodate rapid innovation and scaleup, particularly for fermentation-based or cell-cultured protein processes. You'll also see strong emphasis on hygienic design, some cleanroom-like environments, and utility systems that support precision control and sterility — areas where life sciences design principles come into play."

Robertson also points to the many headwinds the alternative protein category faces, including funding, scalability, and consumer and retailer acceptance.

"Venture capital funding has slowed, and there are growing political challenges, including efforts in some states to restrict or ban the sale of certain alternative protein products," he says. "These pressures are affecting the pace of growth, and in some cases, delaying or scaling back capital projects in the space."

Black & Veatch's Schertz notes developing specific regulations for manufacturers of alternative protein products could reduce capital expenditure, making these facilities more economically viable and potentially accelerating market adoption.

"Current USDA standards treat all food products similarly, regardless of whether they're produced in enclosed systems, go through kill steps, or end up as powders that bear little resemblance to traditional meat products," he says. "A product might spend its entire production cycle inside tubes and emerge as a sterile powder yet still be subject to the same facility requirements as conventional meat processing. This regulatory lag creates unnecessary capital requirements for alternative protein facilities, at a time when the market is demanding cost parity with traditional products."

Shertz also points to operators that have worked with plant-based proteins for decades needing to update and expand.

"They're not newcomers to this space — Black & Veatch is currently renovating some of their facilities that are so old they predate modern approaches entirely," he says. "These established companies are now hedging their bets, investing in both traditional and alternative proteins rather than choosing sides. They're positioning themselves to be protein companies broadly, regardless of the source." **FE**

NEXT ARTICLE

BACK TO CONTENTS

Discover Heavy Duty, Precision Dicing

Rely on Urschel for rugged, high-powered dicers to maximize capacity.

- High capacity with precision cuts to maximize cost-savings.
- Reinforced outboard bearing keeps pace with formidable meat cutting applications.
- The sharpest knives team up with heavy duty spindles at powerful speeds to deliver the highest quality cuts.

Discover meat dicing with Urschel. ›

#1 Best Selling Provider of industrial cutting machinery throughout the world.

www.urschel.com

URSCHEL®
The Global Leader in Food Cutting Technology

Tillamook Opens Illinois Ice Cream Facility

Once the plant is fully operational, which will be as soon as next year, it will produce 15.5 million gallons of ice cream annually.

Tillamook Country Creamery Association recently opened an ice cream manufacturing facility in Decatur, Ill. — its first facility outside of Oregon — to better serve the eastern U.S. Photo courtesy of Tillamook.

BY MICHAEL LEVITT

THE TILLAMOOK COUNTY CREAMERY ASSOCIATION (TCCA) recently opened a 68,000-sq.-ft. ice cream facility in Decatur, Ill. It is Tillamook's first owned and operated plant outside of Oregon.

Tillamook sells more ice cream in the eastern U.S. than the western U.S., and it now has a facility closer to the eastern part of the country than Oregon. It is also able to source some ingredients from the Decatur area, including milk, which cannot be hauled for far distances.

The plant's opening comes as Tillamook's ice cream sales have increased, growing by 13% in 2024. The company also produces cheese, cream cheese and other dairy products.

"The Decatur plant is well-equipped to serve our valued customers with increased production capacity while driving supply chain efficiency from the plant to a growing footprint of national and regional retail outlets," says Mike Bever, executive vice president and chief supply chain officer at TCCA.

RENOVATION

Before Tillamook could open the facility, it needed to update and modify the layout for its purposes, as the plant is over 100 years old. The facility had previously been owned by Prairie Farms, but it ceased operations there in 2022, according to local news reports.

Tillamook spent between $65,000 and $75,000 to renovate the plant, which included putting a steel structure underneath the concrete, adding changing areas for both men and women, and inserting stainless piping for its mix tanks. The renovation also included moving around some of the facility's controls. Further, the company needed flash-freezing capabilities.

Mike Bever, left, EVP and chief supply chain officer, and CEO David Booth scoop ice cream during the grand opening ceremony for Tillamook's manufacturing facility in Decatur, Ill. Photo courtesy of Tillamook

"Renovating a shuttered facility is not for the faint-of-heart," says Nicole Bateman, president of Decatur's Economic Development Council, which worked with Tillamook to get the facility operational.

"We knew it was going to be a little bit of a challenge, but it turned out to be OK," adds Ruben Urrutia, director of plant operations for Tillamook's Decatur facility.

The Ice Cream Process

The plant will produce three of Tillamook's ice cream mixes: vanilla, chocolate and dark chocolate. The mixes consist of milk, eggs, cream, sugar and stabilizer. The stabilizer ensures the water crystals do not separate after freezing.

After the mix is created, flavors are added and it is moved to a continuous freezer barrel, where it is moved around and injected with air. Adding air makes the ice cream softer and creamier, helping its consistency. Then, the ice cream is pumped into a filler to add variegates.

Once all the ingredients have been added, the ice cream goes into a pasteurizer, which heats it above 185°F to kill any bacteria. Then it is sent to a homogenizer, where it is emulsified to spread the milk and cream throughout the mix. After, the ice cream goes to an aging tank for four to six hours so some fat molecules can be brought back and improve the ice cream's consistency.

To legally be called ice cream, a product must have at least 10% butterfat content. Tillamook's ice cream is around 13% butterfat, which is on the higher end of ice cream products. Eggs also add creaminess to Tillamook's ice cream, serving as a natural emulsifier.

But because Tillamook's ice cream is creamier than many similar products, the company had to ensure the facility's equipment could handle the thicker mixes, requiring replacing some equipment.

Ice Cream Packaging

The plant also creates the packaging for Tillamook's ice cream. A carton former wraps, rolls and attaches flat, poly-coated paper to turn it into a sealed ice cream carton, completing one carton every second. The facility also has a second carton-forming machine, so it can create 120 cartons per minute if needed. The carton lids are pre-made and added separately.

When the ice cream is filled into a carton, it has the consistency of soft-serve, but then it hardens to a firm shape when it sits in a freezer at -30°F for an hour and a half. Before it is put in the freezer, the ice cream runs through a metal detector to ensure it contains no foreign material, and it also goes over a scale to confirm it has the correct weight.

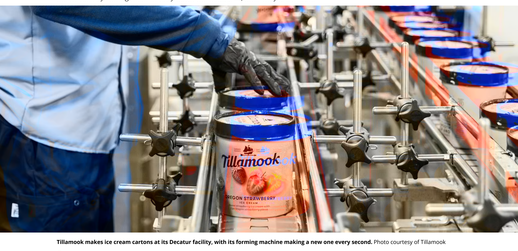
The ice cream filling machines at Tillamook's Decatur facility are automated but monitored by human workers. Photo courtesy of Tillamook

Getting Ready To Ship

Once the ice cream is done in the freezer, a shrink bubbler wraps six cartons together and sends them to a shrink oven to get put into a case.

After the ice cream is packed in a case, a worker will move the case to a pallet so that it does not shift while being transported across the country. Tillamook palletizes by hand, though it has plans to automate palletizing next year.

With every batch of ice cream that is created, Tillamook inspects several cartons every hour to verify that the ice cream is blended correctly, has the right number of mixtures or inclusions, and has a good spread of variegates. Tillamook tests the cartons by cutting them directly down the middle — after they are frozen.



Tillamook makes ice cream cartons at its Decatur facility, with its forming machine making a new one every second. Photo courtesy of Tillamook

Expansion

Once the plant is fully operational, it will produce 15.5 million gallons of ice cream annually, which could happen as soon as next year. However, the facility will produce 3 million gallons of ice cream in the first year while being operational for four 20-hour days per week.

Currently, the plant makes family-size and 3-gallon containers of ice cream, but it may make pints at some point, too. One difference in the production process between the family-size and 3-gallon containers is that the family-size ice cream goes into a spiral freezer, while the 3-gallon ice cream goes into a blast freezer.

The facility has already created 50 jobs in the Decatur area, with more to come as production ramps up. It also allows Tillamook to expand further if needed.

Joining A Community

Tillamook is doing more to help the Decatur area than simply opening an ice cream plant. The company has donated $50,000 to various community organizations, including the Decatur Park District, Macon County Fair and Good Samaritan Inn.

"Decatur isn't just where we are making more ice cream — it's where we're building new community partnerships, supporting revitalization and laying the groundwork for future growth," says David Booth, president and CEO of TCCA.

"The support that Decatur has given the Tillamook team here has been wonderful, so just to continue in that relationship, with the hospitality that everyone's shown us, and then to show all the folks that are coming on-site here to join the Tillamook team," Urrutia adds.

According to Bever, Tillamook did not want to be just another company that operated in Decatur. "We wanted to be part of the fabric of Decatur," he says. FE

NEXT ARTICLE

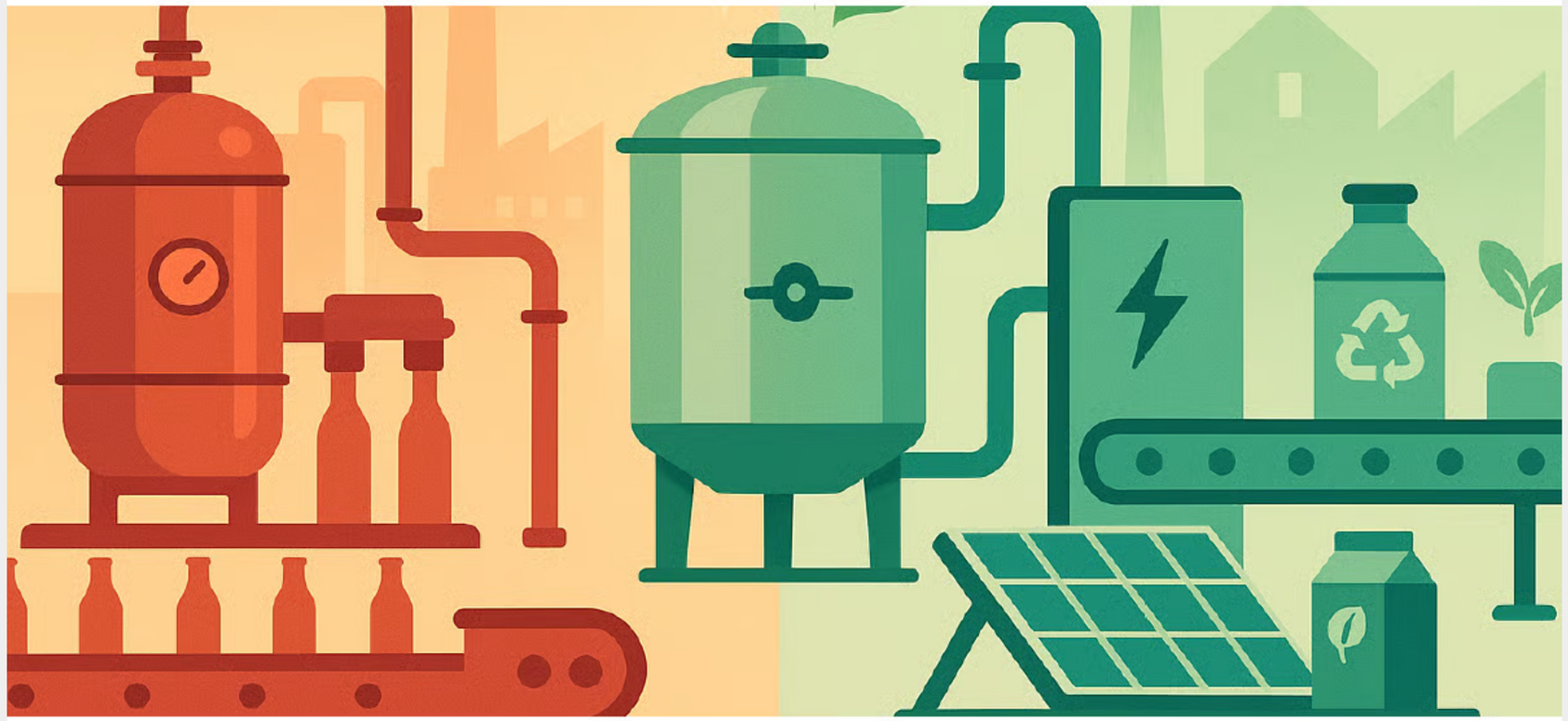
BACK TO CONTENTS

FOOD ENGINEERING

— WEBINAR —

ON DEMAND

DECARBONIZING PROCESS HEAT: WHAT YOU SHOULD KNOW AND NEXT STEPS



Driven by climate goals, business risk, client interest, and resilience considerations, food and beverage companies are increasingly turning their attention to decarbonizing their production processes.

In this session, Blaine Collison and Cihang Yuan from the Renewable Thermal Collaborative will share an overview of the primary renewable technologies being deployed in the market, resources available to food and beverage companies, and case studies/lessons learned from sector leaders.

Sponsored by

SEW EURODRIVE

IN THIS WEBINAR, ATTENDEES WILL:

- Learn about the primary renewable thermal technologies and the key considerations for each.
- Review a playbook for thermal decarbonization with renewables.
- Learn what tools are available for companies wanting to decarbonize their thermal energy use.
- Complete the session with a new set of resources and potential next steps.

SPEAKERS:

BLAINE COLLISON
Executive Director
Renewable Thermal Collaborative

CIHANG YUAN
Senior Program Officer, Climate and Renewable Energy
World Wildlife Fund

Plan Vision System Upgrades Carefully

Today's vision systems are more powerful than their earlier counterparts, and many processors choose to use vision, X-ray and metal detection systems to meet regulatory demands and ensure quality.

La Huerta installed a VERYX optical sorter from Key Technology on its IQF vegetable processing line. VERYX finds and removes all kinds of foreign material, as well as product defects, to help achieve food safety and quality while reducing labor and improving yield. Photo courtesy of Key Technology

BY WAYNE LABS

VISION INSPECTION SYSTEMS SERVE MANY PURPOSES — from verifying printed label and date information, spotting missing or malformed caps/closures to monitoring product quality (e.g., color, defects, shape). As "extended vision systems," X-ray inspection systems inspect internal contents and validate fill levels and confirm component presence/absence within sealed packages — to name a few.

To prepare for increased regulatory scrutiny and improve food safety, some food and beverage companies are employing both systems plus metal detection systems, aiming to have zero defects in quality and food safety.

Knowing when and where to apply these technologies is a big decision for smaller and medium-sized companies with limited budgets, but considering that a recall could potentially put a company and brand out of business, upgrading or installing new systems may be a given. Integrating these systems can be a challenge — both from an architectural/space requirement and a system integration standpoint. We look at some basic rules-of-thumb for upgrading existing inspection systems to installing new equipment.

UPGRADING MAKES SENSE

Over the past few years, inspection systems have undergone significant improvements. New high-resolution camera technology, improved inspection and identification tools, and even deep learning AI models have been introduced, providing improved quality and an expanded scope for deployment. The image quality and inspection tools on modern systems are a night-and-day difference from 10- to 20-year-old systems, says Andy Buteyn, senior vision engineer at Gray AES.

"As we see with cell phone technology, cameras have improved in terms of size, resolution and speed," says Tom Wright, general manager at SPI Automation, member of the Grote Company Family of Brands. The advantages offered by technology that's faster and more accurate are numerous. That would be one reason to consider either updating or replacing an older system. An updated or newer system offers a smaller footprint and better lighting; another reason is the increased focus on food safety.

And don't forget the controller. Your controller has the same issues as your vision system does: it ages, is no longer supported, and so on, Wright adds. "If you're in a situation where your control system needs to be upgraded, that should be a consideration in your vision upgrade."

With a newer system, current quality inspections can be replicated and improved, but additional inspections can be deployed to collect more detailed information, such as packaging or product measurements, text skew, color or material uniformity scores, Buteyn says. This information can be collected, stored and examined over time for production trending and future improvements.

"For end-of-line manual inspection of individual products, a camera system can be used before packaging to identify broken or low-quality products and redirect them to a reject station for manual verification or remove them from the process completely," Buteyn says. Additionally, shipping inspection camera systems can read the UPC on every unit put on a pallet to ensure the correct products are where they need to be. This is especially useful in a mixed pallet application. If integrated into an ERP or shipping distribution system, this vision system can also help scan shipping labels to ensure the right pallets are getting to the right trucks.

Unlike older systems, AI models and smart cameras allow a fast and efficient way to deploy inspections. These new systems take example images of good and bad products and can "learn" from these images what to flag as a defect or concern.

The decision to update an inspection system can be determined in part by looking at the current false reject rate or known quality issues. If the system is continually allowing suspect products to pass or overidentifying good products as bad, it could be time to look into a newer system, Buteyn says.

USING NEW FEATURES

"Generally, when we speak with a long-time vision inspection system user, they're usually surprised to learn just how far the technology has come," says Yuegang Zhao, KPM Analytics chief commercial officer. "We are seeing a trend towards more companies embracing the recent advancements in the field today."

When deciding new or upgrading, processors should ask whether their current system meets their needs, Zhao adds. "If there are new features, they can take advantage of or new measurements they want to make, then they may consider a new system. If it's just a hardware or software upgrade, that's a much simpler decision and investment."

Updating a machine vision inspection system allows a food processor to utilize new technologies both from a software and hardware perspective, says Tena Thambiaiah, solutions engineer at Peak Technologies – Machine Vision. The improvements in hardware technology, such as 3D sensors and GPUs, allow for much faster processing and a higher quality of inspection. This will create a faster inspection cycle, allowing the production line to run faster, as well as a better accuracy of the inspection itself. The availability of deep learning also allows for inspections that were previously not available — such as the quality of a fruit. Current technologies can be utilized to look for defects in a product such as missing chunks in chocolate bars, print quality on a label, the shape of a potato chip, etc.

X-RAY SYSTEMS — BEYOND VISION

X-ray systems let users see things they can't with vision, and thus, both X-ray and vision systems are becoming the norm at end-of-line inspection stations, which often use metal detection as well. While we've focused on getting new and junking older vision equipment, Eric Garr, regional sales manager at Fortress Technology, reminds us that with a bigger investment in X-ray inspection systems, inspection performance can be improved and data capture can be added to older systems. "Fortress Technology's 'Never Obsolete' guarantee allows customers to access the latest food safety software features without buying a new system. This helps to ensure processors are aligned to the most current food safety standards and practices. The benefits of these upgrades include advances in data logging, reporting and communications, as well as software that can improve detection sensitivity and reduce false rejects."

Upgrading technologies is generally recommended when specific needs arise, such as meeting new retailer requirements, improving the inspection performance in difficult applications or adding features like data capture. In this case, a metal detector at the end of line locates a wire fragment. Photo courtesy of Fortress Technology

Another benefit of the Fortress modular — yet customized approach — to machine integration is production lines can be retrofitted to incorporate smarter food safety solutions, Garr says. For example, X-ray systems are increasingly requested to provide a non-destructive form of testing and quality control, with many retailers now mandating them as an additional safeguard. These systems can identify possible quality control issues that other technologies may miss. For instance, the Icon X-ray inspection system can detect a wider range of contaminants, including metal, glass and certain plastics. While not explicitly vision, Fortress metal detectors are highly sensitive and efficient at detecting metal contaminants missed by X-ray. Both technologies complement each other and can contribute to reducing food waste, improving audit compliance and streamlining production processes, Garr says.

PLANNING SPACE REQUIREMENTS FOR NEW SYSTEMS

If you're already considering upgrading or replacing your inspection system, it makes sense to reevaluate the entire system — including controls and conveyance — to understand your full footprint needs, says SPI's Wright. Some vendors offer this system integration (SI) capability (as does the Grote Company Family of Brands).

SPI Automation worked with an ice cream manufacturer to help increase the efficiency of its automatic palletizing system. Photo courtesy of SPI Automation

Don't Wait to Call a System Integrator

Involve an integrator early. There's no cost to consult with an integrator. They'll give you their perspective. It's unfortunate to come into a situation where there's been a failure. Seeking an integrator's perspective beforehand helps processors save time and money.

It's important to look for a reputable integrator. Make sure specifications are defined and clearly understood before beginning a project.

For example, we worked with an ice cream manufacturer that struggled with its automatic palletizing system. Their efficiency rate was down to about 30%. There were frequent backups, downtime and recirculation inefficiencies due to layout and programming problems. The company worked with the vendor (another integrator) to address these issues for nearly two years without a resolution. To make matters worse, the vendor departed without resolving the problems, leaving the manufacturer frustrated and overwhelmed.

The company was referred to us. Through programming updates that adhered to best practices and standardized code, SPI improved the company's sorting, robot performance and integration between its conveyors and robots, as well as addressing pallet tracking. We stationed at least one engineer on site until the issues were resolved. The ice cream producer's efficiency rate jumped from just 30% to 95%.

Because SPI resolved the issues by updating the programming, it was able to work on a time-and-materials-based billing structure, meaning there was no major upfront fee.

— Tom Wright, general manager, SPI Automation, member of the Grote Company Family of Brands

It is possible for newer vision systems to take less space than legacy vision systems. According to Nick Francone, senior engineer/project lead at Actemium Avanceon, a Control System Integrators Association (CSIA) certified member, the processor can almost always plan on requiring less space for an upgraded vision solution compared to an existing solution that is performing a similar action.

However, Francone says, "Planning out the space requirement and confirming design specifications should still be paid close attention to avoid any last-minute surprises upon installation." Even if it will likely take less space to install a new vision system, there are possible situations where the new system takes up the same amount or even more space. That may be more likely to occur if the new system is performing actions that are largely different than the existing vision system.

As the trend in combining inspection equipment evolves, the main benefit to the end user will be more technologies together fitting in a smaller space, says Fortress' Garr. Standalone metal detector systems may be slightly more compact with innovative system designs built around the search head, but the metal-free zone must still be respected. Dependent on the application, X-ray is certainly becoming more compact as new, more efficient sensor technologies emerge, allowing for same or better imaging performance with a lot less X-ray power. Less power means less shielding required and more compact design opportunities.

Most camera systems have become smaller, but there are still large systems that have been introduced that would be worth the extra size, says Gray AES's Buteyn. Some new technologies may not be "bigger" but may occupy space in different ways, such as new mounting hardware, cable management and routing. Additional lighting systems or shrouding may be required to prevent shadows or inspection variability due to external environmental factors.

Certain rejection mechanisms may have different space requirements, too, says KPM Analytics' Zhao. "Let's take, for instance, a piece of raw bread dough leaving a dough former on its way to a proofing chamber. If the vision system spots a misshapen ball of dough, the user may only need a section of the belt to retract or bend down for the rejected product to fall onto a reworking conveyor. But if a foreign material is spotted, then an entirely different rejection method may be needed to remove that dough ball entirely from the processing line, so the foreign material is not again reworked into the product. The more rejection methods there are, the more complicated the line can become, too."

Rejection is an important component to consider when integrating or upgrading a vision inspection system. You can see a loaf of bread toward the middle dropping down a conveyor, then the conveyor on the right side of the image sends the product to the discard bin. Photo courtesy of KPM Analytics

These types of systems are called vision process control (VPC) technologies, Zhao adds. VPC systems are installed in areas that are typically difficult to have a human spotter (for example, before and after ovens or fryers). Also, VPC systems are generally over-line systems without integrated rejection, which takes much less space.

Then there are final product inspection (FPI) vision technologies, which serve as a final check of products before they are packaged. With rejection and complex camera systems, these systems may take more space.

INTEGRATING NEW SYSTEMS WITH THE OLD

We briefly noted before that upgrading a vision system without upgrading an associated control system can be problematic. Simply, legacy control systems are much more limited in their functions and capabilities compared to newer control systems, Francone says. This is often a much more important consideration when integrating industrial vision, since many vision systems in food manufacturing facilities also include integration with the MES infrastructure as well as process controls. It's the control system that acts as the "middleman" between the MES and the vision system.

"As a systems integrator, we have found ourselves in positions where we had to integrate new vision systems with older control systems — and the shortcomings and setbacks were certainly noticeable," Francone adds. "Much time and additional effort was required, in our specific case, to implement the necessary integration with the plant MES system via this obsolete control system." However, Francone says for integrating new vision systems with modern control systems, the effort is more straightforward and less time consuming.

In most cases, if an existing inspection system is in place, an upgrade will not require a large amount of additional programming or I/O requirements, says Gray AES's Buteyn. Modern inspection systems support standard communication protocols to send inspection data and images back to a system controller or PLC, file server and data historians. They can also have built-in I/O for a dedicated trigger or output to tell the line to reject or stop.

Most vision systems still support all traditional communication protocols such as Modbus, TCP, Ethernet IP, etc., says Peak Technologies' Thambiaiah. In addition, many of these systems are now able to utilize additional protocols such as HTTPS, MQTT, etc. This allows for the information to not only be shared with the current controls, but also to be shared with an ERP or WMS system.

Two things make upgrading easier. First, access to expandable I/O hardware is one of the most beneficial aspects that can support line integration between equipment. Second, common communications ease the task. Utilizing common and industry accepted communication protocols, such as OPC UA and Ethernet/IP, provides those with established data reporting processes the opportunity to manage their own data collection, Garr says. With these solutions by Fortress Technology, data tags defined by each food processor are converted in real time to an internal business database. These could be pulled into enterprise resource planning (ERP) or other structured plant monitoring systems, providing valuable oversight to support flexible production.

There are two core ways vision inspection systems can integrate with equipment at a plant, says KPM's Zhao. First, a vision system can interface with a processing line's PLC. Based on the vision data trends, the hardware can automatically trigger process adjustments such as changing oven temperature, line speeds, coolers and other similar applications.

Second, the vision system software can interact with factory automation software via OPC UA communications for data collection and analytics. Examples of factory automation software include WINSPC, InfinityQS ERP, Freshabilityand others, Zhao adds. The vision inspection data may uncover certain trends at the plant level to improve food safety and process control.

Zhao describes another approach to integration. "We have also worked with OEMs to develop custom applications for a plant's unique processing equipment. For instance, we worked with a tortilla counting stacker machine company to integrate our vision system with their machine. While our technology automatically inspects the tortillas for quality defects and foreign materials, the counter stacker will count the tortillas to ensure consistent product within each package."

GETTING UP TO LINE SPEED

Based on the food processor's line speed requirements, the appropriate hardware can be selected, says Peak's Thambiaiah. It is common practice to plan for a system that can handle the current line speeds as well as future line speeds. This allows the installation of a machine vision system without the fear of having to change it in the future.

The issue of vision systems keeping up with line speeds is something systems integrators face often when installing or upgrading new vision solutions, says Avanceon's Francone. He suggests the following basic steps:

- First, understand existing line speeds — especially minimum and maximum
- Select vision hardware and software to fit the application and keep up with line speeds
- Configure system parameters such as processing time and plan for position of trigger sensors
- Select lighting solutions
- Determine line speeds and processing times
- Test line speeds — minimum and maximum: Understand system performance at all line speeds
- Document all changes, work and data

If line speed maximums are planned to be changed on a line with an already installed vision system, the manufacturer should consider that vision system performance may be impacted by this change, Francone adds. The systems integrator or appropriate personnel at the manufacturing facility should ensure testing is done before the official change is made to the production line, so it is confirmed that the vision system can keep up with this new line speed.

"We understand that needs can change after installation and have processes in place to scale inspection capabilities to meet growing throughputs," says KPM's Zhao. This may require additional cameras, rejection methods and computing power, but it is all customized based on the user's unique needs. The more a customer needs their vision system to do, the more space and technical requirements may be needed.

A good rule of thumb is that around 20% of I/O or hardware space should be left open, says Gray's Buteyn. The deployed system should be robust enough to operate in its midband capability range. Hardware should not be strained to keep up, and inspection parameters or tools should be available to ensure future improvements can be easily developed.

Test, Test and Test

Whether you are looking to install a brand-new vision system or upgrade an existing system, one of the biggest lessons I have learned is the importance of testing. Test early, test thoroughly, test with real-world product (not just "close enough" samples) and test with the intention of making the system fail — so you can further error-proof it to ensure peak performance. Testing will bring a lot of errors and issues with the system to light. After time spent making adjustments, retesting, making more adjustments, resting some more — and so on, a new vision system will emerge that has the full capability to show night-and-day differences between its performance and the performance of the system it replaced. The latest technology used for vision inspection is quite impressive, and with the ever-growing world of AI, it is only getting more advanced and more capable of handling complex applications more efficiently than before.

In the world of industrial vision, it is usually nearly impossible to achieve an absolutely perfect system. However, in my experience with industrial vision in food and beverage facilities, with enough detailed design, clear requirements definition, rigorous testing, expert setup and configuration, and monitoring of performance as the system is started up, modern vision and X-ray inspection solutions are the most impressive and value-adding investments a manufacturer can implement in its facilities. FE

—Nick Francone, Senior Engineer/Project Lead, Actemium Avanceon, a CSIA Certified Member

NEXT ARTICLE

HOW TO COMMUNICATE OT CYBERSECURITY RISK AND INVESTMENT TO FOOD AND BEVERAGE LEADERSHIP

Executives and boards are slow to adopt new OT cybersecurity tools, and the issue is complex for non-security plant professionals. To solve this issue, security leaders need to explain the risks and impacts for increased investment.

Photo courtesy: Getty Images / MF3d

BY GRANT GERKE

IN THE SECOND HALF OF 2024, THERE WAS A 202% INCREASE IN OVERALL PHISHING MESSAGES COMPARED TO 2023, according to SlashNext's 2024 Phishing Intelligence Report. Why is this important for food manufacturers? Many companies' OT devices are connected to corporate IT networks, and attackers can gain access to the plant floor via these increased phishing attacks.

FOOD ENGINEERING also revealed that inadequate authorization was another top threat for food manufacturers, via Infosec's OT Top Security Threat for 2024 report. The report says the threat is "inadequate authentication and authorization, inadequate or nonexistent authentication and authorization control measures that can allow unauthorized individuals to gain access to OT systems."

Cybersecurity threats are coming from many angles, and many food manufacturers are still using legacy security approaches. This article will discuss how more investments can be made for OT network security and how to convince boards to provide more support and investment.

COMMUNICATING RISK AND IMPACTS TO THE BOARD

Food manufacturers' OT networks are vulnerable in 2025, but many manufacturing boards and executives have been told corporate enterprise networks are secure. However, enterprise IT networks are not OT networks. For boards, the right risk profile for OT networks needs to be established and identified.

So is this happening?

In arecent FOOD ENGINEERING webinar on cybersecurity, Patrick O'Brien, assistant director of engineering at exida, polled attendees and found that only 33% have had an OT cybersecurity risk assessment and 11% have OT-focused policy and procedures. At the same time, IT-focused cybersecurity risk assessments came in at 55%.

"This means some companies are doing IT risk assessments but not employing OT risk assessments," O'Brien says. OT network cybersecurity investment is moving slowly due to many issues, such as a lack of precise requirements from chief information systems officers (CISOs) or leadership by executive management.

Another challenge is identifying risk as it relates to production, volume and uptime. "The key to getting buy-in from CFOs and CEOs for OT security projects is highly dependent on the CISO's ability to translate the real cybersecurity risks to operational risks that the board already has identified," says Grant Geyer, chief strategy officer at Claroty. Claroty is a supplier of cyber-physical systems protection and asset visibility services.

CISOs and security leaders need to speak the board's language and avoid discussing the numerous cyber vulnerabilities that can happen. The focus should be on overall risk against key performance indicators (KPIs), benchmarks and business metrics.

"The more that a CISO can demonstrate an appreciation of the broader context and speak the language that the audit committee cares about, the stronger the chance that an OT security initiative will speak the love language of CEOs and CFOs and will resonate," Geyer adds.

"At a board level, we need to have a very simple conversation about what risks do we want to accept and the ones we want to mitigate," notes Robert M. Lee, founder and CEO at Dragos, Inc., during a recent webinar on OT cybersecurity investments.

During the webinar, Lee discusses how CISOs can paint a broad brush when it comes to security technology requirements, which can lead to confusion for board members. Lee says what can emerge is a "piecemeal strategy or a peanut butter spread of what capabilities, which can also lead to board-driven metrics or standards that don't mean anything at the OT level."

Boards are driven by their peers. "The reality of what a board is doing partly is benchmarking its peers, totally appropriate, and scenario planning," Lee says.

In a 2024 FOOD ENGINEERING article, Alexandre Peixoto, cybersecurity business director at Emerson, talked about recent OT investments in food and beverage, and specifically, investing in Managed Detection and Response (MDR) technology. Peixoto divides customers into two camps when it comes to cybersecurity approaches: cyber-for-protection and cyber-for-convenience.

Cyber-for-protection includes traditional defense-in-depth approaches between IT and OT networks. "For these customers, the most important consideration for cybersecurity is to defend their control systems against a potential cyberattack, which could lead to an OT process upset," Peixoto says.

According to Peixoto, cyber-for-convenience customers are employing defense-in-depth strategies but also trying new technologies such as MDR in OT environments and are open to zero-trust security framework strategies.

At the board level, Lee believes new security investments can be won with the proper framing. "Boards want to hear about capabilities that can be delivered and how we are trying to reduce risk with operations," Lee says.

The risk at the OT level is many low-level connected devices, such as fieldbuses, programmable logic controllers (PLCs) and industrial networking equipment. Adding security patches at the OT level helps when identified and MDR tools can help in this area.

According to Dragos' 2025 OT/ICS Cybersecurity Report, interest in identifying attacks against low-level equipment and networking keeps increasing among manufacturers. The report suggests that most fieldbuses are insecure by design and can include these networking protocols: Modbus/TCP, CODESYS and CIP.

The report says these layered networking protocols pose a substantial risk and there is a general lack of detection mechanisms for attacks in this area. The report describes the layered networking risk as "turducken" protocols, and the company plans to address this issue by offering greater visibility for detecting attacks and identifying potential misconfigurations.

The report cites that "to protect fieldbus equipment, the Industrial Control System (ICS) community awareness must change. A common assumption is that field devices, and especially instruments and actuators, are insecure-by-design. What is not well-considered by owners is the accessibility of this equipment."

As systems become more connected in the food and beverage segment, these risks will keep growing. Security leaders need to be clear with board members about risk and the impact on operations and production.

"As OT assets tend to be unpatched and even obsolescent, the new imperative is to remove entire classes of risk through securing user-to-machine, machine-to-machine, and cloud-to-machine communications," Geyer says. "Security and risk leaders need to adjust to this new imperative to enable the business to execute on their Industry 4.0 ambitions responsibly." **FE**

NEXT ARTICLE
Must See PRODUCTS
BACK TO CONTENTS

fm food master

Start your search today

Find everything you need , right here!

- Cannabis Equipment
- Engineering Design & Construction Services
- General Plant Equipment
- Used Equipment
- Dry Processing Equipment
- Food Industry Associations
- Instrumentation, Automation
- Packaging Equipment & Materials
- Refrigeration, Cooling, Chilling/Freezing Equip.
- Services

www.foodmaster.com

MUST SEE **PRODUCTS**

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

JOHNSON CONTROLS

PENN System 550

The PENN System 550 is a modular electronic control solution that provides temperature, humidity and/or pressure control. When a refrigerant leak is detected, the technician is notified which A2L refrigerant sensor detected the leak through Modbus communications, simplifying and expediting maintenance and repairs. System 550 is designed so that in the future, sensors for detecting A3 refrigerant leaks (e.g., R290, Propane) can be used, preparing for the future as low-GWP refrigerant regulations continue to evolve.

SENSAPHONE

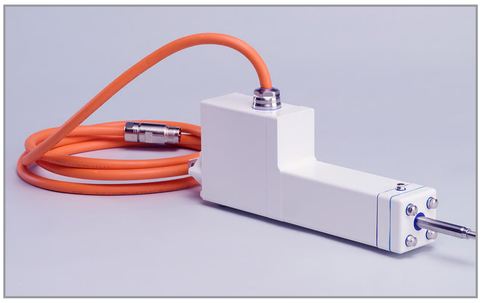
Sentinel and WSG30 Remote Monitoring Systems

Designed for use in commercial food storage, cold storage warehouses and food processing facilities, these systems provide 24/7 real-time monitoring and instant alerts to prevent product loss. When paired with temperature sensors or probes, these Sensaphone systems monitor the interior coolness of standard commercial refrigerators and freezers, as well as ultra-low freezers (down to -109°F/-85°C). They also function as data loggers that store historical temperature readings.

CURTISS-WRIGHT

GTF Exlar Actuator

The GTF is designed to offer numerous configuration options, including an IP69K washdown variant, critical for motion applications with potential food contact. As with all Exlar integrated actuators, the inverted roller screw, servo-driven design and compact form make the GTF ideal for builders of hygienic machinery to incorporate into their designs.



ATC DIVERSIFIED ELECTRONICS

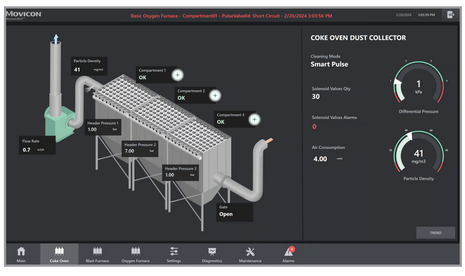
SENSERT Remote Process Monitoring System

With this cloud-based monitoring and alert system, a variety of sensors can be wirelessly connected via remote I/O or hardwired to the SENSERT base unit. The SENSERT system works with commercially available sensors that conform to 0-20 mA, 4-20 mA, 0-5 V or 0-10 V. The system can monitor a variety of conditions, including temperature, humidity, vibration and pressure. Data is monitored in real time and can be accessed via web portal or mobile app. Alerts are triggered based on customizable thresholds.

EMERSON

Dust Collector Monitoring & Control System

The Dust Collector Monitoring & Control system is a pre-engineered and customizable solution that enables manufacturers to monitor and track the performance of their dust collector systems, ensuring compliance with emission standards. This solution not only lowers operating costs but also extends the life of bags and pulse valves while reducing the waste of compressed air or gas due to leaks. Designed to meet emissions regulations, the Dust Collector Monitoring & Control solution effectively detects leaks early, minimizes compressed air waste, and prolongs the life of dust collector system components.



NEXT ARTICLE

Manufacturing NEWS
Regulatory Watch

BACK TO CONTENTS

FDA Begins Review Process for ‘Food Chemicals’

Photo courtesy of Getty Images Plus / Samohin

The U.S. Food and Drug Administration reports it will conduct a post-market review for certain preservatives and whitening agents.

The U.S. Food and Drug Administration reports it is launching a systematic review process for “food chemicals,” beginning with certain preservatives and whitening agents.

In May, the agency said it will undergo:

- A modernized, evidence-based prioritization scheme for reviewing existing chemicals. A draft will be released for public comment soon.
- A final, systematic post-market review process shaped by stakeholder input.
- Developing an updated list of chemicals under review, including BHT, BHA and ADA. The FDA will also take steps to expedite its review of chemicals currently under review such as phthalates, propylparaben and titanium dioxide.

The FDA says it will continue to share information about the status of this work on its public. The agency has conducted post-market reviews on a case-by-case basis, often in response to citizen petitions or new scientific evidence. The agency says the new framework will be “proactive, science-based and built for long-term impact.”

“We are prioritizing our resources and leveraging gold standard science to create, for the first time, a systematic post-market review program that consumers can trust and rely on,” said FDA Commissioner Martin A. Makary.“Only by improving the safety and transparency of the food supply and ensuring consumers can make healthful food choices will we overcome the long-standing trajectory of chronic diseases.”

Earlier this year, the FDA announced plans to phase out petroleum-based synthetic dyes from the U.S. food supply. The agency also began exploring rulemaking to eliminate the process that allows companies to self-affirm substances as “generally recognized as safe” (GRAS) without FDA oversight. **FE**

NEXT ARTICLE

Masthead

BACK TO CONTENTS

FOOD ENGINEERING

Volume 97, Number 8

For subscription information or service, please contact

CUSTOMER SERVICE:
Phone: (800) 952-6643
foodengineering@omeda.com

EDITORIAL

EDITOR-IN-CHIEF
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 Stauft
Director Operational Technology
SugarCreek

Hugh Roddy
Vice President Global Engineering & Project Management
Chobani

Christie Lagally
CEO
Rebellyous Foods

Bob Wolpert
Chief Administrative Officer
Golden State Foods

Gail Becker
Founder and CEO
Caulipower

Wayne Labs
Senior Contributing Technical Editor

PRODUCTION

PRODUCTION MANAGER:
John Talan

ART DIRECTOR:
Cory Emery

ADVERTISING

PUBLISHER:
Michael Leonard - Southeast
AL | AR | GA | LA | MS | OK | TX
(847) 315-0577

ASSOCIATE PUBLISHER:
Sam Wilson - Midwest
IA | IL | IN | KY | MI | MN | MO | ND | OH
SD | TN | WI | Manitoba | Saskatchewan
(847) 405-4075

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

SALES STRATEGIST:
Wayne Wiggins Jr. - West
AK | AZ | CA | CO | HI | ID | KS | MT | NE | NV
NM | OR | UT | WA | WY | Asia | Australia
British Columbia
(415) 387-7784

CLASSIFIED ADVERTISING:
Jennifer Izzo
(847) 226-6729

MARKETING

MARKETING:
Rachel Beaubien
Sr. Advertiser Marketing Manager
(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.

DIRECTORIES

DIRECTORY DEVELOPMENT MANAGER:
Erin Mygal

BNP MEDIA CORPORATE

CHIEF HR & INFRASTRUCTURE OFFICER
Rita M. Foumia

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

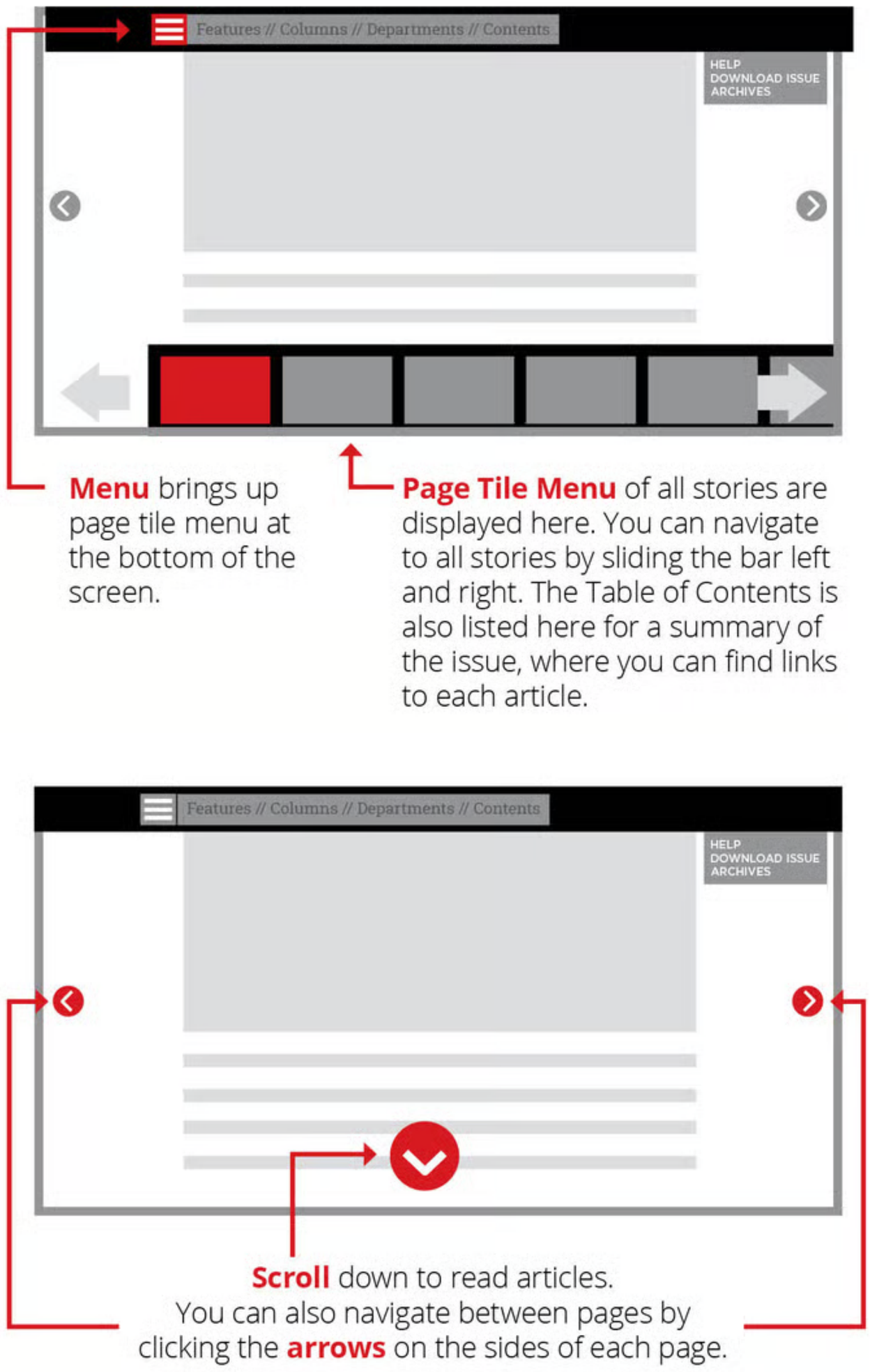
foodengineeringmag.com

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. **Change of Email Address:** Send an email to: foodengineering@omeda.com

For subscription information or service, please contact Customer Service at: Phone: (800) 952-6643
Fax: (847) 291-4816. Email: foodengineering@omeda.com

BACK TO CONTENTS

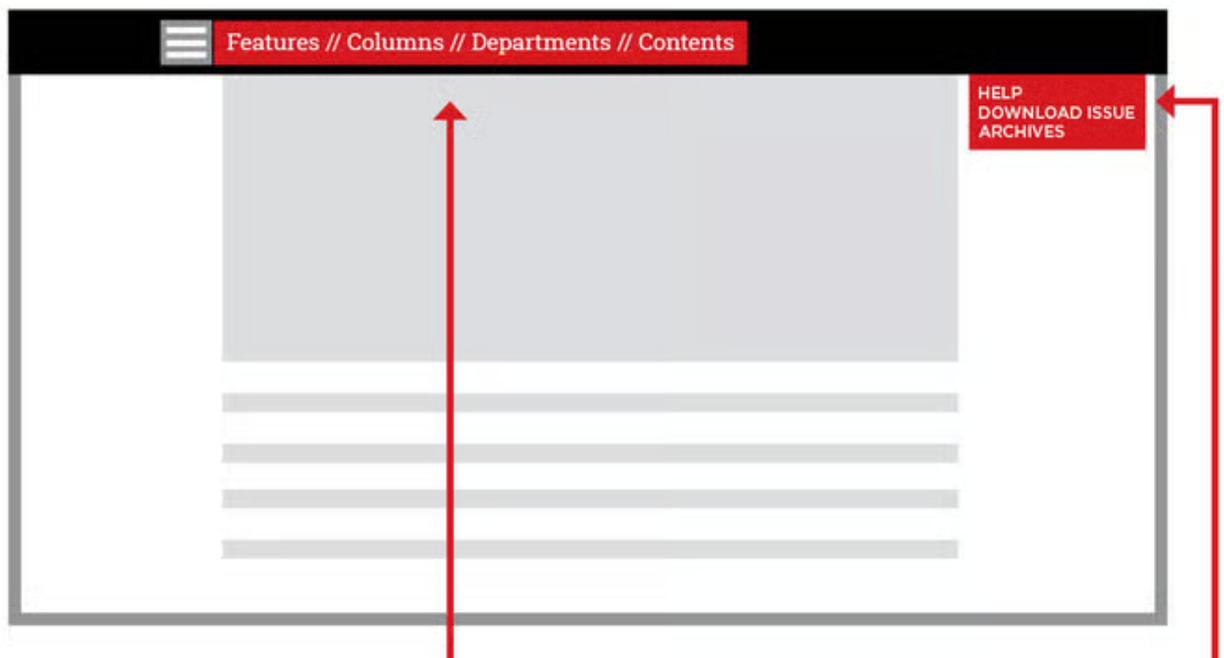
eMagazine Navigation Guide



Menu brings up page tile menu at the bottom of the screen.

Page Tile Menu of all stories are displayed here. You can navigate to all stories by sliding the bar left and right. The Table of Contents is also listed here for a summary of the issue, where you can find links to each article.

Scroll down to read articles.
You can also navigate between pages by clicking the **arrows** on the sides of each page.



At the top of each page is a **menu bar** that will drop down to navigate you to the features, columns, departments and Table of Contents.

To the right, or bottom of the page (tablet/mobile), a menu bar with help, download issue and archives. **Download issue** allows you to download the entire issue as a pdf for offline reading. **Archives** will take you to a listing of past issues.

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.

Updated 01/12/2022