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Trust, and Verify: Technology Leads Food Manufacturers Into A Smarter Era

Trust, and Verify: Technology Leads Food Manufacturers Into A Smarter Era

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INTRODUCTION

Bob Vavra,
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Consumers assume the safety of the food supply; manufacturers in food and beverage industry can make no such assumptions. As one expert in this e-book notes, the focus on safety today looks at responding to foodborne illnesses and contamination as opposed to preventing it. The enabling technologies address all manner of potential contamination, from pathogens to foreign objects. All of this is done with an eye toward making the food supply chain safer, smarter and more robust.

This requires a reliance on the digital information now widely available to all manufacturers. The data can point to operational anomalies and, in the regulated world of the FDA, can offer traceability to quickly respond when issues arise.

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CHAPTER 1:

Food Safety And Consumer Trust

FOOD PROCESSING

In today's episode, we're talking with IFS' Maggie Slowik to learn more about how food safety and consumer trust are both food manufacturers' biggest challenge, yet also a big opportunity.

In this episode, Maggie Slowik, Global Industry Director for Manufacturing at IFS, walks us through how food safety and consumer trust are related. We talk about what trends she's seeing as well as what's at stake if a manufacturer doesn't have good end-to-end quality management practices in place. We then spend some time talking about how food safety and traceability can lend themselves as opportunities for competitive differentiation. We dig into the current consumer mindset while also talking about the best practices of several food companies that have married transparency with consumer trust.

We end the episode with a discussion about technology's role in all of this and how IFS can help processors remain compliant with regulatory requirements while also building that customer trust.

Food Processing: *This question may seem obvious, but why is food safety so important? And quick follow up to that, what constitutes good practice?*

Maggie Slowik: Hi, Erin, and thank you so much for having me back on your podcast today. Can I answer in a very blunt way to you just to set the scene on this topic? Food safety is absolutely critical because it's essentially the license to operate for any food and beverage manufacturer. The industry as we know it is very heavily regulated around the world. And what this means is that food safety is driven by the establishment of well-documented procedures, including who exactly touched each material or critical process. But regardless of size or product, all food producers have a responsibility to manage the safety of their products and the wellbeing of the consumers on top, of course, of meeting the standards of the retailers that they work with. Because at the end of the day, it's about securing the shelf space and retail, right? So as far as regulations are concerned in the US for instance, we know that the FDA's Food Safety and Modernization Act lays down general principles, requirements, and procedures that really underpin decision making in matters of food as well as feed safety.

And interestingly enough, I think that the act, which was signed into law about 10 plus years ago, is transforming the nation's food safety system by shifting the focus from what

I would call responding to foodborne illness, to preventing it. And this predictive and preventive approach is really crucial nowadays, and I'll come to that later because the industry is really challenged by a lot of factors at the moment. And of course, I could go on about other regulations as well. In Europe for instance, you have the General Food Law Regulation, which provides an overarching framework for the development of food and feed legislation, both at union as well as national levels. But the point I think about regulation is that they differ based on the region and locality you operate in, and of course, the sub-industry that you're focused on as a manufacturer.

And all of that makes the issue of compliance really complex, especially given how large food manufacturing supply chains tend to be. And on the topic of regulations, you can also seek out certain certifications. There is, for instance, ISO 22000, which is an internationally recognized food safety management standard and quality certification that applies to any organization that participates in food production directly or indirectly. And the other thing to keep in mind is that these regulations are constantly changing. So it's a monumental task for food and beverage manufacturer to stay on top of these regulations, to stay updated, because at the end of the day, it also comes down to customer trust. And I will go onto that in just a little bit. Coming onto the second part of your question, Erin, what constitutes good practice? Well, of course, you need to maintain certain quality standards in the way you handle and process food in your factory as they are dictated by the various regulations and legal frameworks.

But at the end of the day, what matters is that you have that end-to-end traceability and not just within your factory, but also across your entire value chain. So in the case of a foodborne illness outbreak or contamination event, manufacturers must have efficient upstream and downstream tracking capabilities to rapidly find the source, the exact source of the product and where the contamination may have occurred. And this enables faster removal of the effective product from the marketplace and it reduces incidences of foodborne illnesses. That is the aim. But the more ideal scenario is to of course, prevent such contaminations before they even occur, and you will hear me saying this throughout this podcast, it really comes down to trust. And that is a key in a market that is incredibly competitive, where margins are razor thin. And now, look at the situation that we're facing, increased supply chain complexity as well as inflation. And that's just going to get worse.

FP: *What new trends are you seeing?*

MS: For starters, I will say that this is an incredibly dynamic industry. There are so many external influences, whether it's regulations, consumer preferences, or other factors. The industry has to constantly adapt and reinvent itself. But if I were to highlight some recent trends that are impacting food safety, I would start with definitely consumer preference and demand. And the thing to highlight here is that consumers are changing their preferences quickly and constantly. It's never staying the same. Think about alternative forms of protein, moving away from meat, less sugar or changing to organic, plant based and sustainable ingredients. I mean, we know all of these things as we're going through our grocery stores. You constantly see new products popping up, and these are all the things that consumers are demanding. And not only does it put tremendous pressure on manufacturers to keep on innovating, but also, we need to consider that when new food trends rise, new sets of food safety regulations and guidelines must also be released to ensure safety. And then, manufacturers will have to think about putting the right quality processes in place.

What also plays into that is the increase in healthier options, especially with the COVID-19 pandemic, consumers have become even more conscious of their lifestyle choices. We're going to see more of a proliferation in terms of demanding for new and healthier products down the line. And that's, as I mentioned, is posing certain challenges in terms of meeting, testing and quality requirements. And another trend that is on the rise is sustainability. The industry is responding to its environmental responsibility across the value chain, spanning across production, agriculture, the use of more natural and sustainable resources, all the way to more efficient ways of manufacturing and transport. And then, down to consumer levels including composting, packaging, recycling, and many other practices. And I'll talk about the consumer owners in all of this later on.

I would also, and I think this is really fascinating because it's an area that's grown incredibly fast. I would highlight social media as is yet another trend, because in the age of Twitter and Instagram, information travels incredibly fast and the activity of social personalities reaches customers within just a few clicks. Food businesses often use this avenue for marketing, but at the same time, consumers and influencers can use these types of platforms to patronize brands and products once they've had a bad experience. Just a single bad experience will influence and people becoming more vocal on these platforms. And another trend just thinking about this, but more from a technology angle is the increase in automation of production, especially in light of a winding labor force that's really happening across the entire world at the moment.

And one example of automation is installing, for instance, AI enables sensors that detect food defects based on pre-uploaded information. And this innovation is often used to speed up quality inspection during the receiving of raw materials, but can also be applied to other use cases as well. So I guess, I would say that overall, the automation of processes have been proven to reduce the likelihood of errors, which can be a common case in the human workforce as we know. And we're also at a point today, where automation technologies and sensors have become much more affordable than they used to be. So, I personally expect an uptake in more of these types of technologies.

FP: *And what's at stake, if this isn't done well?*

MS: If a manufacturer does not have good end-to-end quality management practices in place, we are looking at potential cases of all sorts of things. I'm just going to list a few of those. Food poisoning, food spoilage, food contamination, allergic reactions, worse even, prosecution for contravention of food safety legislation and potentially, the closure of manufacturing facilities. However, the cost associated with poor food safety can be a mix of financial, social, and also the worst of all, a reputational nature, but could be a combination of all of the above. And if I were to list some financial costs, I mean, they're more obvious candidates. We're talking about factory downtime associated with investigations,

decontamination, the cleaning and the replacement of equipment. That is an underestimated cost sometimes for manufacturers. And then, there's also the administrative costs associated with processing recalls and investigations, informing the media in case it comes to a recall, damage compensation to retailers as well as to end consumers.

And then, of course, stock recovery. And this is really a mix of both financial as well as social costs. But I think the worst of all of these scenarios is reputational cost, in case it ever comes to recall or some sort of media scandal. And we all can think of at least one or two sort of recall incidents that have made big headlines and that's not good really, it puts off consumers and certainly doesn't make retailers happy by any means. The bottom line is much of the food industry really rests on trust. And so, a sense of safety and security has to be present if a consumer is willing to trial any manufacturer's product. And as I said before, food and beverage companies do want to get that shelf space in grocery stores. So retailers actually have a lot of power in that market space as well. It's not just down to consumers.

FP: *Let's go to the other end of the spectrum now. What opportunities are there?*
MS: Earlier on, I talked about the importance of traceability. And it's not just a matter of compliance with regulations, but I think also an opportunity for competitive differentiation might sound farfetched, but actually it's not. Because having access to granular real time data of any details, from sourcing to delivery in an extended way potentially, multi-site, multi-company and multi-regional. Manufacturers can demonstrate that they are viable and a trustworthy supplier and a trustworthy brand to the respective customer ecosystem. And that is what builds up to a more mature way of sort of food safety assurance and traceability. So it's all about capitalizing on this data and visibility and using it to build trust in the marketplace. And let's remind ourselves why by this matters in terms of competitive differentiation.

Consumers today, are way more knowledgeable and demanding about the foods that they purchase, and they have literally become information obsessed and they demand closer connection to the food brands that they purchase. So what they want is more in-depth product information beyond what is already provided on the physical label. And there's actually a research out there that shows that consumers are even willing to switch to another brand, if they cannot get this kind of transparency with the product that they're already familiar with. So there's a lot of value in disclosing this data to consumers. And I will give you an example. One of our customers at IFS Gaia Herbs, a leading US based herbal supplement brand, focused on organic farming from soil to shelf. And Gaia Herbs has a traceability program called 'Meet Your Herb.'

So a consumer can go online and they can enter the ID number located on the back of any Gaia Herb product to view all of the traceable aspects of each herbal component of the product. And they can also explore each individual herb to learn more about the uses and the history and the function. So it's a little bit like taking a virtual walk on the Gaia Herbs farms, it's really cool. So at the end of the day, consumers are increasingly buying into this type of information, which is all enabled by good traceability, of course.

FP: *What is the role of technology here? To what extent can companies take advantage of digital technology?*
MS: I think technology will play a great role in this shift to help businesses get a better handle on efficiency, quality, and traceability. And we have already seen progress being

made, but I think as technology is advancing in terms of functionality coming down, in terms of pricing, companies adopting more and more of this technology, I think we're going to see some paradigm shift happening here. Even though I will also say that there are still a lot of manual processes in place, including spreadsheets. There's really no way around not investing in digital technology, because it allows you to log and process massive amounts of transactions and product information, and it gives you that end-to-end traceability of the product's journey. And it all comes down to being able to access accurate real time information so you can act on it immediately if you needed to. That's incredibly powerful.

So remember, the trend is towards preventing problems as opposed to reacting to them. And this is where the value of real time data comes into. And also, in the past years, if you look at digital transformation and companies investing in IoT technologies, that has really helped to revolutionize food supply chains with sensors collecting a lot of data and not only report on conditions, but also to enable decision making within organizations. And let's just talk about a couple of examples here with what I'm talking about. In terms of IoT data collection, it could be anything from the temperature of the transportation truck to the source of ingredients. All of it can now be recorded using IoT enable devices. And also, product quality can be monitored as soon as the item leaves the field or the factory or the warehouse. Giving companies, again, real time automated and intelligent insight.

While it's great to have all of this information, at the end of the day, companies need a modern and flexible business software solution that is able to unify the data and the processes from different sources into one single database, giving users a single source of truth. Nothing could be more frustrating than having data in siloed places, knowing full well it's there, but not being able to access it because it could be, again, spread across in different formats and so, on and so forth. So you really want to have that single source of truth. And if your ERP can accomplish this, acting on the large volumes of data and providing actionable insights to your key stakeholders, then it is acting as a very strategic decision making tool. And that is exactly what companies should be aiming for when they're making technology investments and trying to really ensure that they're good at traceability and quality performance.

FP: *How exactly does IFS support its food and beverage customers to help them be compliant with key regulatory requirements and also, build that customer trust?*

MS: Sure. So first of all, we offer what I would call a comprehensive and industry specific solution that supports all phases of the product cycle. So it could be from new product development to marketing and sales procurement, manufacturing, and of course, delivery to the customer. And one of our best kept secrets is the fact that we combine ERP with

asset management and service capabilities, and this is all in one single database. And that makes us incredibly unique in the market as well. And what underpins all of these processes in quality management, we support customers with a range of things such as audits, non-conformance reporting, in-Process controls, and all of the quality instructions really are part of the shop orders. And at the end of the day, we also support international standards, including the FDA. And on top of this, we do offer end-to-end traceability capabilities to our customers, which allows them to not only maintain good quality standards across the entire value chain, but also trace their products both up as well as downstream. And that ability is incredibly powerful.

But the main benefit that I would highlight here is the fact that we are a single system that really has everything, and it comes with open ABI, allowing our customers to easily integrate with other systems if they wish to, for instance, [inaudible 00:19:35] systems. So it's incredibly flexible as well as modular, in that sense. And recently we have also built on our MES capabilities allowing us to integrate with machines on the shop floor to collect time data that is critical to quality control. So we're making continuous investments to ensure that food and beverage customers who are a very part of our manufacturing customer base are able to meet the challenges not only of today, but also of tomorrow.

FP: *Before we jump off, can you tell me or talk to me about how food safety relates to driving sustainability?*

MS: Let me just go back to what I mentioned earlier, and that is that the industry is facing pressures across a range of stakeholders, whether it's customers, investors, employees, and regulators, and they are demanding more sustainable products and certainly production and processes. What is the operational implication of this? What companies must be able to explain and account for the journey that products and their associated raw materials have traveled through. So achieving this requires not only access to complete and good data, but also the effective management thereof. In that sense, traceability is not only an enabler of quality, but also of sustainability, if that makes sense. So those companies that have a mature approach to traceability should be able to provide a

Hear the entire interview with Maggie Slowik on the Food for Thought podcast

complete product history download to both, customers as well as regulators and use this data to support with ESG reporting activities and goals overall.

But sustainability does not stop with the food manufacturer per se. There is a lot that the industry can do to influence consumer behavior, especially when it comes to waste. And this is a very fascinating topic, I think. We all are familiar with the data labels printed on the food that we buy. So often, we're seeing a use by or an expires on type of message in the back of the product. And of course, these messages are meant to provide useful information and advice about when a product is at its best. But, you could also argue that not only do these labels fail to communicate meaningful communication to consumers, but they're also worse, even encourage consumers to throw out what might be still perfectly good food. And I don't know about you, but I often, at least in the past, have tended to throw away food just by looking at the label without actually checking the condition of the food. And it's just something that we need to raise more awareness around and consumer education.

So the reality is that the date on these labels rarely indicates the actual food safety of a food product, rather, that tend to reflect estimates on when it will be at its peak quality or taste its best. And this means that large volumes of safe food are being needlessly thrown away each year. And in this context, I want to talk about another customer of ours, and they're called Yeo Valley. And Yeo valley is a UK based manufacturer of all sorts of organic dairy products, and they have decided to move from using use by to best before dates. And what this means is that their products are at the best before the state, but they can still be eaten and still taste good after the state.

So the company puts the owners back to consumers, encouraging them to make what I would call common sense decisions by storing products in the right way. Making sure that they are always under the right temperature and ensuring that they smell them before they eat them. And that is sort of discouraging, the sort of way society that we live in. And I think we need to see more of this type of consumer education going forward. And again, there's a lot that the industry that the food and beverage industry can influence. And actually just as I'm saying this, I just remembered that in the UK there's a big retailer brand here called Sainsbury's.

And back in August, they have begun removing best before dates from over 100 of their fresh lines, including items like pears, onions, tomatoes, and citrus fruit. And I know this might seem strange to some of us, but consumers can use common sense and certainly contribute towards the decrease of waste and really achieve a lot of impact from that perspective. So I think we are sort of heading into a very interesting direction and it just highlights the fact that not all owners on the industry, but also on consumers and customers, but they require a certain level of encouragement, nudging, whatever you might call it. And it must be in that sense, sort of collaborative effort.

FP: *Maggie, yet again, you've delivered such great information for our audience to consider. Thank you for joining me on this episode of the Food For Thought Podcast.*
MS: Thank you, Erin.

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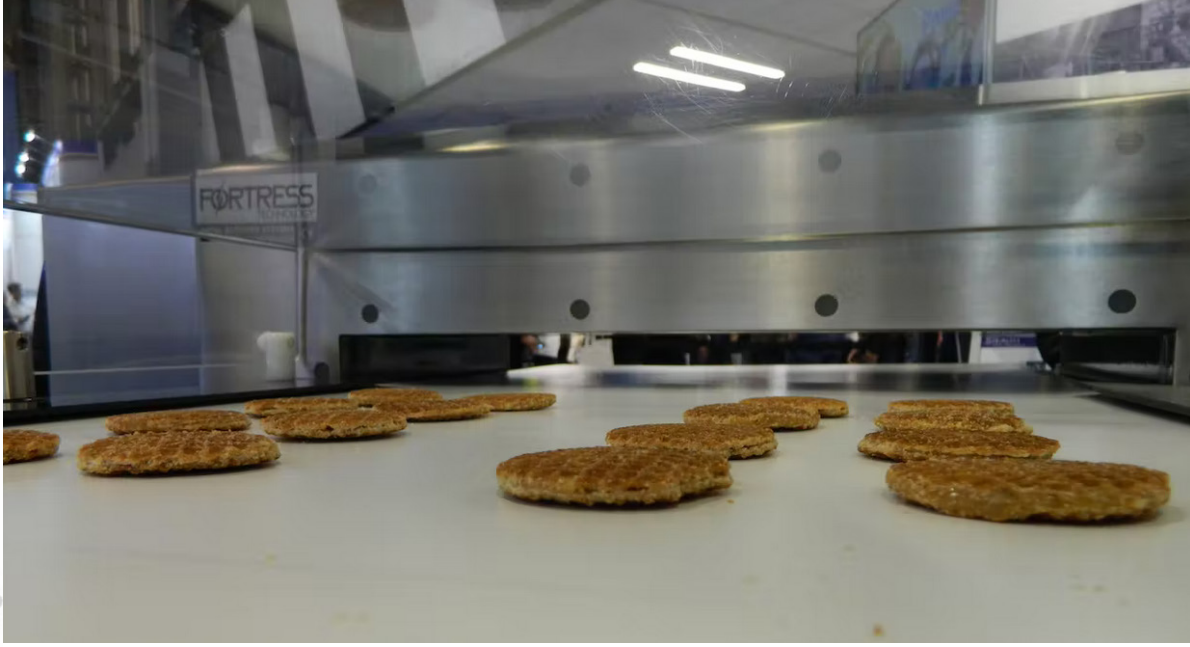

Image: Fortress Technology

CHAPTER 2:

Safety gets smarter: Inspecting the new era of food safety

FOOD PROCESSING

Metal detection specialist Fortress Technology examines the different factors that are accelerating the need for smarter systems, and how intelligent inspection equipment is helping to usher in a new era of food safety.

Driven by ever-stricter safety regulations and the need for traceability across the supply chain, food manufacturers are increasingly turning to inspection solutions with improved precision and greater digital capabilities. Metal detection specialist Fortress Technology examines the different factors that are accelerating the need for smarter systems, and how intelligent inspection equipment is helping to usher in a new era of food safety.

Beyond identifying contaminants, smarter technology is being used within or alongside inspection systems to improve efficiency, compliance and, ultimately, profitability. As consumer trends, production methods and delivery platforms continue to shift at a rapid pace, the U.S. Food and Drug Administration (FDA) has addressed these changes with its New Era of Smarter Food Safety.

Building upon its Food Safety Modernization Act (FSMA), the initiative offers a new approach to food safety that involves leveraging technology and other tools to create a safer and more digital, traceable food system. In addition to offering advice on how to implement tech-enabled traceability, the FDA's blueprint outlines the need for smarter tools and approaches for prevention and outbreak response, new business models and retail modernization and food safety culture.

Although the 10-year plan was initially set for release in spring 2020, it had to be delayed until July due to COVID-19. However, the ongoing pandemic and the challenges it has presented to food suppliers has fast-tracked the need for more advanced inspection equipment with greater connectivity and data capture capabilities.

Digital testing for greater traceability

As new food legislation suggests, traceability is, and will continue to be, a key priority. The speed at which a food company can publicly pinpoint the source of a contaminant is

imperative and can minimize the damage caused by a recall. While inspection systems such as metal detectors and X-ray are an integral first step in quality control, proper management with regular testing is vital to ensure optimum protection is achieved.

In its blueprint, the FDA discusses the feasibility of remote, virtual and/or component inspections of foreign and domestic firms. This principle can also be applied to the testing process of metal detectors and X-ray machinery. Automatic digital testing software, for example, is starting to gain industry acceptance. This technology is designed to complement manual processes, allowing for tests and records to be activated automatically and even remotely if required.

Leveraging digital concepts for this critical step in food safety compliance provides manufacturers with a true measure of how each inspection machine is performing. Testing interoperability not only removes the risk of human error, but also reduces labor costs and safety hazards associated with manual checks, in addition to providing a reliable audit trail for traceability purposes.

From paper fail to digital trail

The next step in the new phase of food safety involves the elevation of systems that currently run on paper. As is shown by the recent spate of food recalls, paper-based recordkeeping is a chink in the armor of the progress of track-and-trace efforts. It also hinders traceability required to better understand and respond to the increasingly complex supply chain in the event of unprecedented circumstances such as the COVID-19 pandemic.

Images: Fortress Technology

Some food firms are turning to advanced systems that offer multi-orientation, multi-scan detection.

Digital tools with paperless audit software and data capture are helping to address these issues, allowing manufacturers and retailers to remove potentially unsafe products from the market more quickly and review the root cause for preventative measures. When moving forward with a track-and-trace initiative, food processors should seek inspection machinery specialists that can work alongside them to enable data collection and electronic reports.

Advanced new systems with data collection and paperless test routines will become more prevalent moving forward. For example, manufacturers might opt for a combination metal detector and checkweigher capable of pre-configuring every test by retailer code of practice and product being inspected. Integrated sensors can confirm when a check has been conducted, generating a dated digital due diligence report that is signed by the operative on the screen for full transparency.

Built-in data capture with remote access means QA managers can troubleshoot and generate reports from their phone, laptop or tablet, with the test parameters and machinery functionality all in one place. This is just one case that illustrates the future of food safety management, and where the availability of digital tools is helping to improve visibility and efficiency across the board.

The future of metal detection technology

To fully realize the prevention-based framework set out by FSMA, consideration must be given to make processes more effective and efficient. As much as food manufacturers must adopt inspection equipment with improved sensitivity levels, an equally important criterion is to eliminate false rejects.

Identifying metal within conductive products can involve changing the frequency to minimize the effect. However, this can have a devastating impact on the accuracy of a detector, as operators might lower the sensitivity to the point where contaminants pass through.

To overcome this issue, some food processors are turning to advanced systems that offer multi-orientation, multi-scan detection. Compared to the traditional single- or dual-frequency food metal detectors, this new methodology uses multiple coil sets to instantaneously drive the electromagnetic fields in different directions. Rather than missing a metal contaminant because it hasn't aligned with a specific field, it looks for signals over a broad spectrum, from various angles. The stronger disturbance from one field compensates for the weaker signal from another. In essence, it's like running numerous systems all at once.

Critically, this newest approach to metal detection addresses several previous limitations. Notably, orientation effect and identifying flat metal contaminants in product with a low side profile. Alongside eliminating the risk of false rejects and ensuring high sensitivity, in-built automatic product tracking and data capture software will further increase transparency and traceability.

X-ray or metal detection: Why there's room for both

The most common contaminant remains metal, for example fragments that break off during mechanical cutting and blending operations. However, glass from storage or packaging, hard plastics introduced by fatigued tools and equipment, and animal bones or other parts are all potential safety hazards, making X-ray an important tool for many

manufacturers today.

When it comes to adopting smarter technologies and approaches, it is not wise to pit metal detection and X-ray against one another. Depending on the application, both have a place in a food manufacturer's production line. Metal detectors are integral to identifying all types of metals, while X-ray machines are worth investing in if there is a contamination risk of other foreign materials providing these can be detected by X-ray. Testing before investing is advisable.

Factory layouts and the placement of inspection machinery is another important consideration. When working together, an X-ray system will favor an in-line position, whereas metal detectors are better located towards the end of the processing line, often after packaging.

While an X-ray machine will be able to detect things a metal detector can't and vice-versa, ultimately both are complementary technologies. The same can be said for advanced inspection systems and well-executed food safety programs. Smart technology must be implemented alongside more effective and modern approaches to preventative measures and safety strategies. As the supply chain grows increasingly complex, it is therefore essential to work closely with a solution provider who can help you to maximize the benefits of your equipment and keep pace with an ever-changing industry.

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Image: Flexray

CHAPTER 3:

The biggest foreign materials problem in food processing

CHRIS KEITH, VP of sales, Flexray

FlexXray's Chris Keith and a pair of industry experts discuss in-plant inspection, and what can go wrong due to limitations with inline technology.

Foreign material contamination affects all food and beverage processing plants and can lead to harmful impacts on business and consumer safety. It negatively affects food quality, safety and waste, and is harmful to a company's bottom line and brand reputation with the potential to ignite PR crises and/or lawsuits. With limited cost-effective options for rework, many plants struggle to find a solution after flagging product due to potential foreign material contamination.

FlexXray recently corresponded with two food quality and safety experts who possess a window into how processing plants face one of the greatest challenges in the food industry today: resolving foreign material contamination.

Meet Kye Luker and Taylor Lewis, two food quality and safety professionals with years of experience in the field. Luker has spent the past 18 years in the food manufacturing industry, while Lewis has 10 years of experience. Both now work for a leading third-party inspection company that assists processing facilities and plants with third-party inspection of contaminated product. Luker is the VP of Operations, and Lewis is a Food Safety and Quality Manager. Luker and Lewis work with processing plants daily as part of a team that communicates results of inspection findings to customers primarily involved in food manufacturing. All of their customers are considered processing plants.

In an exclusive interview, Luker and Lewis share their experience and advice surrounding food quality and safety — specifically what can go wrong when it comes to foreign material contamination due to limitations with inline technology and beyond.

Q. What is the greatest risk food processing plants face when dealing with product on hold due to potential foreign material contamination?

Kye Luker: The greatest risk, in my experience, is time. Food manufacturing has done a great job over the last 20 years to become more efficient, getting as close to "just in

time" as possible. With shelf space at a premium from the retail setting all the way back to ingredient production and packaging, processing facilities must make decisions around on-hold product to avoid downstream fulfillment outages immediately.

Taylor Lewis: Another one of the greatest risks to product on hold due to potential foreign material contamination, in addition to time, is the release of adulterated product into commerce. No company wants to find a failure in their food safety and quality system by the final consumers of their product. In addition to the safety of individual consumers of product, the costs of a recall are far greater than the logistical costs of withdrawing product. The devaluation of brand name, integrity and customer confidence can drive lower sales for much longer than the time it takes to remove product from commerce. Being armed with accurate information regarding the scope of a foreign material event is paramount when making hold/release decisions for these products.

Q. What are the most common foreign material contaminants in the processing plant setting?

Kye Luker: Metal. It's just the nature of modern manufacturing. There are thousands of ways to introduce metal into food products, and manufacturers work diligently every day to ensure that it does not enter the product stream. But, based on the number of mechanical steps involved in processed foods, it is just a matter of time before there is a metal incident. With good detection mechanisms, effective bracketing of on-hold product is easier now than ever. But due to processing speeds, most detectors are not capable of finding small sizes within their efforts to recover product.

Taylor Lewis: I agree with Kye. In my experience in the food processing industry, I have found that the most common foreign material is metal. Due to the nature of food processing, there will be metal-to-metal contact. Whether it be blades from grinders and extruders, or pumps, paddles and augers, the opportunities for metal-to-metal contact is very real. The inclusion of metal in product is a constant threat to food safety if not managed appropriately.

Q. What is your advice to a food processing plant that is currently facing a batch of on-hold product?

Kye Luker: I would additionally advise that you ensure that your containment steps are buttoned up and you have everything "suspect" properly bracketed. Next, ensure that you have a dedicated team focusing on root-cause analysis to prevent the issue from recurring. Finally, evaluate the time and cost-benefit transparently about using a third party to help you in recovery so you can get back to focusing on the next batch of good product you are going to make.

Taylor Lewis: My advice to a food processing plant facing a batch of on-hold product would be to fully consider all options with the priority of keeping non-conforming product out of commerce. Before deciding to shut down production to rework/re-inspect, or "cutting losses" and deciding to condemn product, consider the use of third-party inspection. The speed, efficiency and accuracy of results yielded by third-party inspection can allow orders to be met, and correct root causes to be identified helping to prevent future occurrences. All of this takes place without an impact to production.

Q. When should a food processing plant rework internally?

Kye Luker: If you "catch" the issue early on before the product gets to the final processing

Image: Dreamstime

stages, it probably makes more sense for a manufacturer to address the issue internally. Detection steps, though, are typically only addressed once the product is in its final form and rework is a tenuous exercise at that time. Modern detectors — as advanced as we are with technology — are still limited due to product and SKU diversity and the speeds of manufacturing. As a processing facility tries to increase a modern detector's sensitivity to focus on different types and sizes of foreign material, false reject rates increase exponentially.

Taylor Lewis: Processing plants are designed to produce, not to rework. I have never worked at a processing facility where space was not a limiting factor. In the design of processing facilities, it makes the most financial sense to use space available to maximize production and focus on the elimination of hazards rather than the rework of hazards. Equipment design is optimized to work at its best when running inline at line speeds. While this is great for production, it can have difficulties when a foreign material is potentially present and rework is necessary. In my experience, many inline machines are unable to detect product inside packaging. Added packaging costs and the potential for additional foreign material inclusion with accidental re-introduction of packaging into the product is another threat to product safety when reworking product internally.

It is also time-inefficient to rework/re-inspect a product with inline systems. Not only are there labor costs, lost production and potential for foreign material inclusion, there is also potential for loss of product quality, as many times product is opened from packaging and exposed to potential temperature abuse during the slow rework process. For ready-to-eat items, the double handling of exposed product can be particularly challenging as many items do not have other forms of microbial control once product has been removed from packaging.

5. When should a food processing plant partner with a third-party inspection service?

Kye Luker: I think everyone involved in food manufacturing understands the nature of mechanical operations and that eventually something is going to break or fail or go wrong that is going to cause a problem. Creating relationships with good vendors that can support you when things go awry is beneficial even if the need or frequency is not substantial. It is like a fire extinguisher; you hope to never use third-party inspection, but it's best to have it available, know where it's at and maintain it just in case.

Third-party inspection is not a replacement for your own in-line detection. It is just different. It is a service that can slow the inspection process down to gain detection levels that otherwise are not achievable or repeatable in a manufacturing setting. This service is

also provided by personnel who are focused daily on inspection tasks alone.

Taylor Lewis: Third-party inspection services can help plant management make confident and accurate decisions around inspecting finished goods to determine their suitability to enter commerce. Third-party inspection processes are optimized to see the smallest level of foreign material inclusion in the most efficient manner. At the company where I work, we don't even need to remove product from its packaging to inspect product, reducing packaging cost for our customers, increasing the speed that we can inspect, eliminating the possibility of unintentional inclusion of packaging in products inspected, preventing temperature abuse of inspected product and eliminating the need to unpackage ready-to-eat product where it can potentially encounter additional microbiological hazards. Third-party inspection services are not a substitute for an adequate in-line inspection system for food processors. The flexibility that a third-party service provides allows machines to be run at speeds to optimize detection levels at the sacrifice of line speeds needed to achieve profitable production in-house.

6. Why would a food processing plant not take advantage of third-party inspection?

Kye Luker: For as many improvements that food manufacturing has made over the last 20 years, it can still be difficult to break some habits or long-held beliefs. The more abstract reason I often think about is that people do not want to share their failures. Some facilities might think, "If we take care of this in the plant, no matter how expensive the rework or reinspection process is, then at least we keep this in-house." As mentioned before, that way of thinking diverts attention away from a processing facility's primary skillset: manufacturing food.

Taylor Lewis: In my experience, there have been many instances when food processing plants do not reach out for the help of third-party inspection when they should. I believe that food processing plants have the tendency to overestimate their own capabilities while simultaneously not fully understanding the capabilities of third-party inspection. The food manufacturing industry is full of many intelligent, well-educated individuals with many years of experience. This has led to many great innovations and allowed the industry to keep up with the increased demand for safe and quality food for an ever-growing population. Unfortunately, this has also created a framework where many food processors can be confined by their own collective experience. Not fully knowing or understanding the capabilities of third-party inspection leads many decision-makers to not even consider third-party inspection when encountering a product hold scenario.

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CHAPTER 4:

Selecting the best drainage systems for food and beverage processing

JOSEPH BOVE, VP of Design Engineering, Stellar

Poor drainage in a food and beverage facility can impede the sanitation process and greatly affect overall food safety. Meanwhile, proper drainage design speeds up cleaning and reduces health and safety risks for both workers and production.

Whether you are building a new facility or upgrading an existing one, it is vital to have a well-designed drainage system throughout your processing areas. In fact, the North American Meat Institute (NAMI) lists the prevention of liquid accumulation as one of the top three principles of sanitary facility design.

Poor drainage in a food and beverage facility can impede the sanitation process and greatly affect overall food safety. Meanwhile, proper drainage design speeds up cleaning and reduces health and safety risks for both workers and production.

When done incorrectly, your facility's drainage system can contaminate ingredients and products that then must be discarded, directly impacting your bottom line. In addition, recalls caused by product contamination can damage both your company's reputation and your product category.

What is the best type of drainage system for a food plant?

Even with robust cleaning measures in place, the wrong drainage system puts your facility at elevated risk. Therefore, it is critically important to consider the various aspects that impact drainage design during the schematic design phase and select a type of drain that best meets your facility's needs.

Trench drains

Trench drains are a common type of drain used in food and beverage facilities. These recessed systems consist of a trough with a drain channel throughout. Channels vary in size depending on the facility's needs. These drains work well to collect fluids. However,

trench drains are often covered with a heavy grate, which can make them difficult to maintain and clean thoroughly.

Slot drains

Slot drains are pre-sloped and pre-assembled systems that are strong and durable. These drains feature a slimmer drain channel compared to trench drains, which eliminates the need for heavy grates that are difficult to clean. Their rounded design allows for easy cleaning and maintenance, making them more sanitary than trench drains. Slot drains can also be used with a clean-in-place (CIP) system, allowing your cleaning process to be automated.

Point drains

Point drains collect water from a single device and are often found at the center of a sloped floor region. They are typically installed in areas that need drainage funneled to a singular point or a defined area.

The downside is multiple devices are required to drain large floor areas. Additionally, point drains generally require more excavation and support for proper installation, which can be expensive and labor-intensive.

5 top considerations for drainage

While the type of drain is important, other considerations are also prudent when selecting drainage options for a food-safe facility.

1. Location

Consider the location of your drains and how they are spaced apart. Drains that are spaced too far apart have the potential to create standing water, resulting in microbial growth, such as listeria, salmonella, E. coli and other hazards that can be incredibly harmful — or even deadly — to humans.

It is important to have enough drains placed appropriately throughout a space to allow liquid to flow freely to the collection point. A good rule of thumb is to provide one drain per 600 square feet of floor area.

2. Materials

Material selection plays a significant role in the food safety of a facility. While drains come in a wide variety of materials, not all are suitable for food and beverage processing. It is best to specify FDA- or USDA-recommended food-grade stainless steel.

Drain body materials need to be cleanable, rust-resistant and capable of withstanding high-temperature and corrosive chemical cleaning solutions. The drainage piping will require similar characteristics.

3. Avoiding grates

While most trench drains rely on grates, these are hard to clean and can even be dangerous for workers. Grates need to be cleaned regularly. With constant exposure to fluids and natural acids from foods, as well as the heavy weight of machinery, they often weaken and break down over time. This can lead to injuries and add to drain maintenance costs.

4. Ease of cleaning

While FDA- or USDA-approved food-grade stainless steel is bacteria-resistant, it is also important to consider the ease of cleaning. Removable grates, lids, drain baskets and P-Trap assemblies must be considered when selecting drainage devices.

5. The pitch and type of flooring

The floor surface is equally important as the type of drain installed. For any drainage system to work, floors must have a specific pitch (or slope) to allow water to flow and prevent standing water. The floor surface should meet or be flush with the drain device, so water will not dam up where the two surfaces meet.

Selecting the proper type of drainage system is an essential component of designing a food-safe facility. Improper drainage can be hazardous for employees and harbor pathogens and bacteria that lead to food contamination, recalls and production pauses, all of which impact a facility's bottom line and reputation.

As a design-build firm, Stellar can recommend drainage systems best suited for your facility as early as the pre-planning stage of the design process. Our team can quickly adapt to provide optimal solutions — all while minimizing cost, delays and other potential issues — to help create a drainage system uniquely suited to your facility's needs.

About Stellar

Stellar is a fully integrated firm focused on planning, design, pre-construction, construction, refrigeration, mechanical & utility, building envelope, and total operations & maintenance services worldwide. Visit the company's blog at www.stellarfoodforthought.netor learn about its projects at stellar.net.

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CHAPTER 5:

Harnessing the power of sunlight: A modern approach to aseptic food packaging

STEVE WEST, XENON Corporation

Since at least the 1960s, aseptic food packaging has played an important role in keeping food safe for consumers. Yet in that time, there have been few real innovations. In fact, chemicals and heat are still the most common methods for sterilizing food packaging, just as they were decades ago. That may finally be changing, as Pulsed Light technology has emerged as a highly effective alternative with potentially many more uses than traditional methods.

Aseptic packaging is the process of sterilizing food packaging separately from the product and then sealing it under sterile conditions as quickly as possible. This has many benefits, such as preventing contamination, reducing the need for refrigeration, extending shelf life, and preserving taste and nutrition.

Yet as important as this process is, the techniques that are used have not changed significantly in decades. This has limited their application as well as their effectiveness.

For example, chemical treatment with chlorine, peroxyacetic acid, or hydrogen peroxide is effective, but chemical residue can cause allergic reactions or illness, especially if it leaches into the product. Many chemicals require special disposal. Heat treatment via hot steam, water, or air is often used in combination with chemicals. This can kill bacteria on many different kinds of packaging materials, but comes at a high energy cost. Heat can also compromise the integrity of some packaging materials, limiting its usefulness.

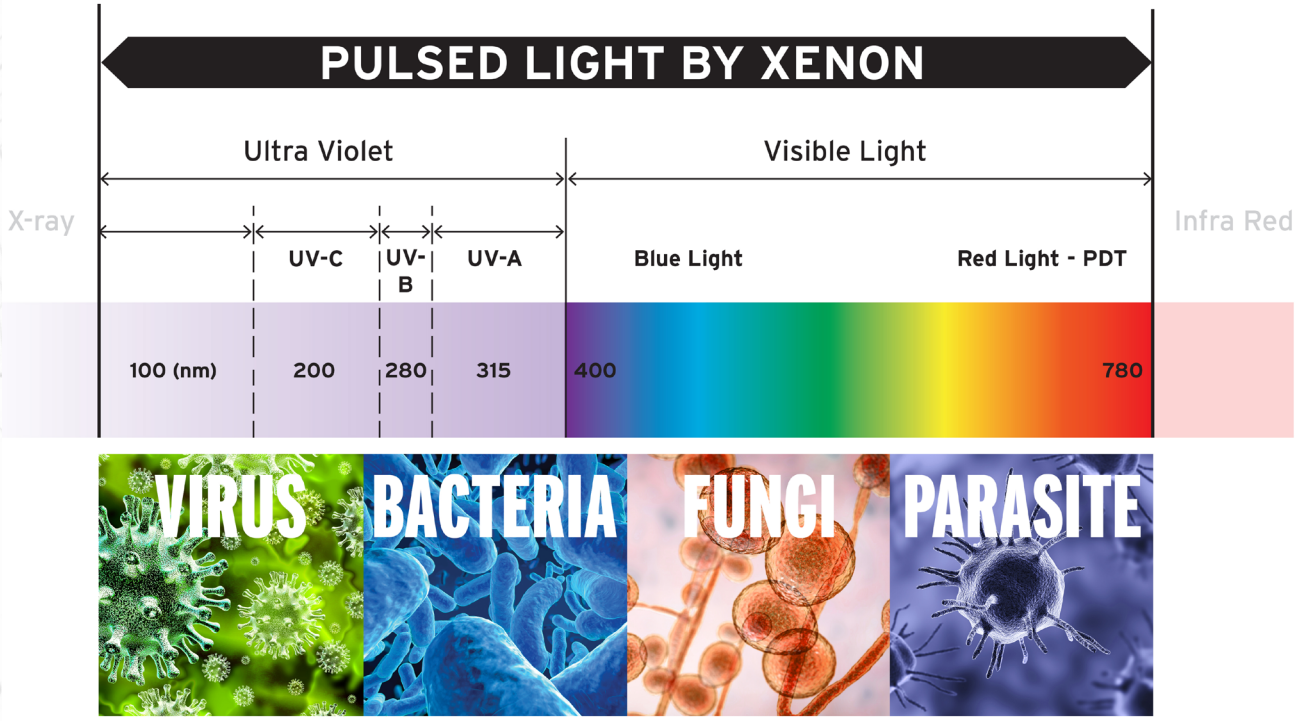
Other aseptic packaging methods include retort processing and Modified Atmosphere Packaging (MAP), but like chemical and heat treatments, they can negatively affect some packaging materials and can be expensive to implement and maintain.

Clearly, aseptic packaging is a field that is ripe for innovation and improvement, and a technology called Pulsed Light is emerging as the answer.

The Pulsed Light alternative

Pulsed Light consists of a series of intense bursts of UV-C light, generating a lot of energy but little or no heat. Basically, it's the power of sunlight, harnessed and focused in high-powered pulses of several megawatts.

(Note that Pulsed Light is distinct from low-energy UV light which is used in dermatology and even some consumer applications. Pulsed Light is orders of magnitude more powerful.)



Each pathogen is vulnerable to a particular bandwidth of light. (Virus and bacteria can be destroyed by the UV spectrum, for example.) Pulsed Light by XENON generates the full spectrum of light, so is effective against all forms of contamination.

Pulsed Light is highly effective at killing pathogens, working at the DNA level by enzyme inactivation and destruction of nucleic acid. Further, Pulsed Light is non-thermal, chemical-free, gas-free, and works in just seconds.

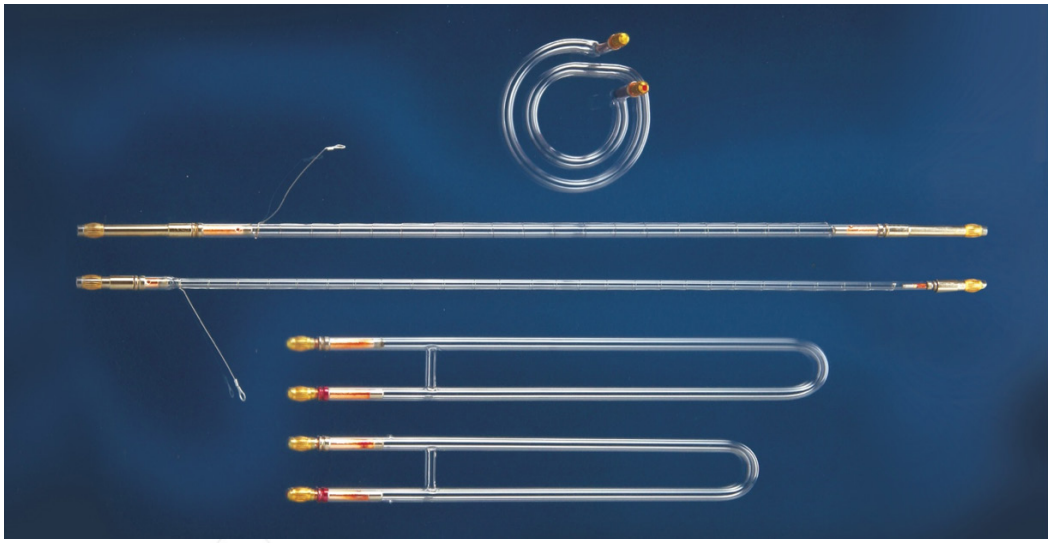
Since it does not produce any byproducts or affect the physical properties of packaging materials, Pulsed Light can fit into a variety of production environments. In fact, it is approved by the FDA for use with food products, so in many cases it can be applied after packaging without fear of harming the food itself.

What the research shows

Pulsed Light has been proven to be effective at destroying pathogens in numerous research studies. For example, Penn State has done extensive research verifying its effectiveness, including one study that showed Pulsed Light can be used to safely disinfect the outside of chicken eggs (nature's own packaging!).

Meanwhile, at Cornell University, researchers have been investigating Pulsed Light, and in particular food packaging. Led primarily by Dr. Carmen Moraru, professor and chair of Food Science, their research shows promising results. In many of Dr. Moraru's experiments, Pulsed Light quickly destroyed stubborn pathogens like listeria and E. coli without degrading food products. Additionally, microorganisms that were exposed to repeated Pulsed Light treatments did not gain any resistance.

"We know that the FDA cannot embark upon this journey alone and, to be successful, it's equally important for food companies and technology firms, as well as government agencies and consumers, to join us in this effort." ***fda.gov***



XENON PurePulse technology is available in lamps of many sizes and shapes to fit most packaging applications. Lamps are manufactured by XENON Corporation.

What goes into a Pulsed Light system?

A typical Pulsed Light system consists of one or more flashlamps, power supply, air-cooled housing, and controls. Depending on energy requirements, a Pulsed Light installation may be able to run from a standard power outlet but sometimes requires a high-voltage source.

Pulsed Light's effectiveness depends on direct exposure to the light generated by the specialized lamps. In other words, it works on surfaces that are directly in the "line of light." The flashlamps must be at the right distance and angle to achieve full exposure, combined with the right energy and timing of flashes for the given application.

Since each food package is different, testing is required to find the optimum setup. This is why XENON Corporation manufacturers its PurePulse technology in a wide choice of lamp sizes and shapes, making it relatively easy to incorporate into any food packaging environment.

Pulsed Light in production environments

A great advantage of Pulsed Light is that it can be used practically anywhere in the food production and packaging process, including with materials and foods that other aseptic techniques cannot be used with.

Thus, Pulsed Light can be an additional measure in combination with other techniques, a replacement for less effective processes, or an entirely new application. For example,

XENON's PurePulse technology delivers high energy, precision operation and repeatable performance from the power supplies, custom lamps, and every electrooptical component in the system.

Pulsed Light can be used in the traditional prefilling stage, but it can also operate in-line to provide continuous sterilization during and after the packaging process.

Once a system is installed, Pulsed Light runs with lower maintenance and energy usage than chemical or thermal methods.

Pulsed Light can also be applied in other areas of food processing, such as conveyor systems for continuous sterilization. It can even be used to help sanitize floors and air systems. Almost any food safety system can be improved by adding Pulsed Light as an additional layer of defense.

Ready for the challenge

As the FDA says, the future of food safety is in the hands of the entire food industry working together. New technology must provide part of the solution as we continue to improve our defenses to foodborne illnesses. Pulsed Light is such a technology.

To be effective in food safety, a Pulsed Light solution must deliver consistent, repeatable performance from the power supplies, lamps, and every electrooptical component in the system. It's a technology that requires high energies and precision operation. But with experienced engineering help and a reliable Pulsed Light vendor as a partner, there's no reason why food processing and packaging companies can't incorporate Pulsed Light into their operations.

Pulsed Light is safe, effective, versatile, and proven. It's technology that's ready to take on the challenge.

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