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Food Safety:

Five steps for improving your food safety program.





Rockwell Automation

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One-quarter of consumers indicate they are willing to pay 10 percent or more for a product that is new or innovative, and one-third will do so for a craft version of food or beverages.

Source: Deloitte Survey: Shoppers Continue to Leave National Brands Behind, Deloitte, June 23, 2015

Modern challenges

When it comes to food safety, there's no room for compromise. Yet today's markets present new challenges to ensure safety and quality in consumable products.

Driven by more diverse consumer demands and greater competition, food and beverage makers are **producing more SKUs than ever.** This has introduced greater complexity into their production processes and supply chains, requiring that they manage food safety and quality across a broader product spectrum.

Meanwhile, global food and beverage **regulations continue to evolve:**

- About one-third of respondents in a recent Food Processing survey* said they are certified in one of the Global Food Safety Initiative (GFSI) standards, while about another third are considering certification
- Impending regulations in Europe and Latin America are changing requirements regarding food labeling and allergen declaration
- Greater oversight is occurring in China following new food-safety law amendments
- New regulations in the Food Safety Modernization Act (FSMA) shift the focus from contamination response to contamination prevention

New regulations that require food and beverage producers to **incorporate traceability requirements** also are on the horizon.

Amid these internal and external changes, food and beverage producers also must continue to be more proactive to **identify and resolve issues that lead to product recalls.** Recalls are costly in the short-term and have a detrimental long-term impact on brand loyalty, insurance premiums, employee retention and more.

*Manufacturing Trends Survey: Better Days Ahead, Food Processing, Jan. 7, 2015

Each year, contaminated food sickens **48** million Americans, of whom 128,000 are hospitalized, and 3,000 die.

Source: A Bug in the System, The New Yorker, Feb. 2, 2015

The right recipe

So how do you recommit your operations with a heightened focus on food safety in the face of these wide-ranging challenges?

There is no magic bullet. But taking an enterprisewide approach – one that embraces information-enabled technologies and automation – can help you address food safety across your operations while increasing productivity.

This approach involves five key steps:

1. Get connected
2. Secure your networks
3. Employ a risk-based preventative control program
4. Implement product traceability
5. Improve operational efficiency

1.

By connecting sensors and other monitoring systems into a functional network, it will be possible for manufacturers to easily monitor the storage conditions of various raw materials to ensure that factors, such as temperature and humidity are at their proper levels... the same network functionality can be used to monitor complex production processes in real time, allowing for adjustments to be made as needed, as opposed to analyzing data post-production when it is too late to save a spoiled batch.

Source: Is the Internet of Things the Food Safety Solution of the Future? Food Online, June 11, 2015

Get connected

How well do you understand the variables in the heating, cooling, weighing and filling processes that can impact your products' safety and quality? What visibility do you have of the supply chains, where your raw materials originate and finished products are sent? These are questions that must be answered in the age of smart manufacturing.

Of course, smart operations are connected operations. For the future of information-enabled manufacturing to truly take hold, disparate networks and "islands of automation" must become a thing of the past.

Perhaps the most significant step involves converging your operations technology (OT) and information technology (IT) systems into a single unified network architecture, which Rockwell Automation refers to as **the Connected Enterprise.** This lays the foundation for seamless connectivity and greater collaboration among the many people, processes and technologies that impact product safety and quality.

Now, you can identify opportunities to use enabling technologies, such as **mobile platforms, cloud computing and Ethernet.** While the Connected Enterprise provides the foundation for greater connectivity, these technologies serve as the actual tools that can help you improve visibility into safety- and quality-related processes. They also enable easier viewing and sharing of that information across the enterprise.

2.

Processors must ensure the safety of their foods, requiring security of the facilities and supply chains, which must include cybersecurity. Someone bent on adulterating an ingredient or a finished product no longer needs to be physically present to do so.

Source: Plant floor cyber security – is it on your agenda? Packaging World, June 29, 2015

Secure your networks

Security is a top concern for anyone opening their operations up to greater connectivity and digital collaboration – and with good reason. The multibillion-dollar global counterfeiting industry thrives on stolen intellectual property. Data breaches can occur by way of sophisticated cyber attacks or something as simple as an unguarded industrial computer port.

Internal missteps can jeopardize your proprietary information as well. This could include poor cable identification that leads to misconnections or a worker mistakenly accessing the wrong program and making recipe changes.

Network security directly impacts food safety and quality. As more manufacturers bring their quality-critical applications onto the network – from irradiation processes to managing proper heating and cooling temperatures – they must take the necessary measures to ensure a robust security program is in place.

One of the most fundamental principles of information security is that of "defense in depth" – the idea that threats are mitigated by a number of complementary measures, meaning that a threat can still be countered even when individual measures fail.[1]

Source: Improving EU Cyber Security Through Better Community Building, Security Europe, 2014

Defense-in-Depth security

The breadth and ever-changing nature of today's threat landscape means that a "security through obscurity" approach is no longer viable. Instead, a multilayered security approach is needed that builds several lines of defense across multiple levels of your network infrastructure.

That's what a defense-in-depth (DiD) security approach aims to accomplish. A DiD security approach addresses both internal and external security threats across six areas of focus:

1. **Physical Security:** Guards, gates, lock-in/block-out devices, physical access control
2. **Network Security:** Firewalls, IDS/IPS, switches and routers, DMZ, VLANs
3. **Computer Hardening:** Antivirus software, application whitelisting, HIDS, software-patching best practices
4. **Application Security:** Authentication, authorization and audit integrated into control-system applications
5. **Device Hardening:** Adjusting out-of-box device configurations in areas, such as change management and restrictive access
6. **Policies:** Defining security technologies and how they are implemented; shaping processes and procedures for employees

Rather than being tacked on after the fact, your DiD security should be holistically developed to serve as a natural extension to your manufacturing processes.

Similarly, using an open network architecture, such as EtherNet/IP versus closed proprietary networks, will enable you to easily incorporate more security solutions from more vendors. That means you can integrate commercially available antivirus software, patches, intrusion-detection tools and other hardware or software to create a more dynamic network and better stay ahead of threats.

DiD security is recommended in:

- The IEC 62443 standard series (formerly ISA 99)
- The Australian Government Information Security Manual (ISM) Principles 2015
- The Indian Department of Information Technology's National Cyber Security Policy
- The National Institute of Standards and Technology (NIST) Special Publication 800-82
- The U.S. Department of Homeland Security's external report INL/EXT-06-11478

3.

The USDA issued recalls for more than 18.6 million pounds of meat and egg foods in 2014. Undeclared allergens were by far the leading cause of recalls, accounting for nearly **45%** of the USDA's 94 recalls issued.

Source: United States Department of Agriculture, Food Safety and Inspection Service Summary of Recall Cases, Calendar Year 2014

Employ a risk-based preventative control program

With your operations connected and secured, you need to be able to access and act on your process control data to initiate a proactive approach to managing your food safety program.

Replacing slow and outdated paper-based information gathering methods, software can automate the collection and visualization of process control data to give you deeper insights into your manufacturing processes.

With the right technology, you can apply a more proactive approach to your food safety program. This preventative approach can help to comply with regulations as follows:

Real Time Monitoring of Critical Control points in Your HAACCP Plan: Get real time process control information on parameters such as temperature, pressure, flow rate, cook time, line speed and clean-in-place (CIP). Create food safety dashboards to have a holistic view of critical control point performance across the plant.

Data Trending and Statistical Process Control: Obtain early warning when certain thresholds are met or before the process is out of spec for a more proactive approach.

Corrective Action Logs: Use 'monitor' and 'alarm' functions to gain visibility if certain process parameters are out of spec. Record when the required corrective action was taken. Leverage this information to meet regulatory rapid response requirements such FSMA.

Records Management and Verification: Visualize real time data and access historical data. Leverage trends, correlations and generate time stamped reports quickly – without having to dig through paper based reports.

4.

Implement product traceability

Implementing a risk based preventive controls program enabled by the right technology is only one piece of the food safety puzzle – employing product traceability is also of critical importance and essential to your recall plan.

The pressure is on globally to increase traceability in the food supply chain. In China, new regulations require greater traceability for infant formula. The latest British Retail Consortium (BRC) food-safety standard also includes stronger traceability requirements, and it is required for certification in all GFSI standards. In the U.S., increased traceability requirements are expected in upcoming FSMA revisions.

Implementing a **supply chain track-and-trace system** can help you comply with these emerging regulations, and help protect your products against potentially dangerous counterfeits and supply chain diversions. A supply chain track-and-trace system also can offer additional business benefits, such as helping you conduct more efficient product recalls and supporting customer-targeted marketing programs.

Designing a system in-house can be tempting, but can lead to long-term issues, such as support difficulty and parts shortages. Instead, consider using an out-of-the-box system that can be easily integrated into your lines. Also, to ease the integration process and minimize production disruptions, consider using a standardized system that was designed at the MES level. This can help ensure interoperability down to the machine level and up to the enterprise and cloud levels.

FSMA final rules will include tracing legislation, which we can expect to improve the traceability capabilities of the U.S. food industry and, hopefully, in time, move the country up from a "trailing" position to a leading position in the global arena.

Source: Supply Chain Traceability, Quality Assurance Magazine, Feb. 12, 2015

"You have to show that you have very, very robust quality systems in place, and you have to show that there is a link between your manufacturer, the brand that you're packing, and the importer in China as well, so you have full traceability."

Ken Thomas,
General Manager, Australian Dairy Park

Source: Chinese infant formula registration 'very intense,' ABC, June 5, 2014

5.

Improve operational efficiency

A secure, connected infrastructure can play a critical role in strengthening your food safety program and can help with regulatory compliance such as FSMA, but the benefits do not end there. It can also be used to improve product quality, asset utilization, yield and energy usage.

It is more important than ever that you take advantage of technologies that improve asset utilization to meet demanding production goals and support faster changeovers while also maintaining high product quality.

Manufacturing intelligence tools, such as metrics applications and data-rich dashboards, can report on *how* your machine is performing, as well as *why* it's performing at that level. This can help you improve OEE while also delivering more consistent batches, even as raw materials or processes vary.

A **process automation system** that delivers predictable batch processing, consistency between batches and event-based information can be critical to helping you reduce process variability and achieving consistent product quality.

Mixing optimization solutions can help manage process changes and ingredient variability to improve product consistency for applications ranging from single repeatable processes to large processes that have complex batch and sequencing requirements.

To help manage a growing number of product varieties, packaging options and new products, a **configurable line-control solution** can enable easier integration of discrete production lines and use production analysis to help you monitor key quality metrics.

Mondelez Makes RAPID Integral to its "Line of the Future"

RAPID Line Integration™ [solution from Rockwell Automation] enables users to configure, control and analyze line performance from a standard operator station, thereby reducing the total cost and time of deploying and optimizing packaging lines.

What's more, its built-in OEE reporting capability eliminated the need to incorporate additional reporting software after the line is set-up. It represents a major departure from the traditional approach of integrating the line control first and the performance management later.

Source: Mondelez embraces the future with integrated control solution, Packaging World, Jan. 9, 2015

Success Story

Manufacturing intelligence supports FSMA compliance and improves yield

With new preventive measures against foodborne-illness hazards set to be implemented within the FSMA in 2015, a leading packaged meats producer sought to upgrade the manufacturing intelligence capabilities at one of its facilities to support the new guidelines.

Tasked with producing several dozen varieties of meat-based products, the company needed to better manage its large number of product variations and the changeovers taking place on the plant floor every day. Product changes impact variables in the production process, from cooking times and temperatures to raw material amounts and combinations – all of which could result in quality deviations. And because operator data was manually entered, searching for the root cause on quality-deviation issues was cumbersome and time-consuming.

The company wanted a manufacturing intelligence solution that could improve visibility into production processes and ensure compliance with the looming FSMA requirements. As an added benefit, the improved visibility into process variability would also help the company reduce and improve yield.

The company chose to use the FactoryTalk® software suite from Rockwell Automation. The software integrates with the Rockwell Automation Integrated Architecture® system for plant control and leverages an EtherNet/IP™ network architecture. The integrated system can deliver plantwide insights with the ability to drill down into each production area production area to monitor critical control points and improve efficiencies and product quality.

The system pulls more than 1,500 data points, giving plant personnel the ability to monitor across numerous production and packaging processes. Information is displayed on dashboards available via PCs or viewed from anywhere in the plant on Microsoft® Surface™ tablets.

In addition to giving plant personnel greater insights into their operations and supporting compliance with the new FSMA requirements, the system has helped the company cut its inedible waste nearly in half. As a result, the company is saving over 1 million pounds (or 450,000 kilograms) of product annually.

Challenge

The lack of visibility and real-time reporting during production led to an increased amount of inedible product and posed potential food-safety compliance risks.

Solutions

Manufacturing Intelligence

- FactoryTalk VantagePoint® and Historian software from Rockwell Automation gathers, stores, aggregates, correlates and presents production information to operations, so variances are more easily identified and corrected in real-time
- Microsoft Surface tablets extend operator mobility and collaboration between plant-management functions

Integrated Architecture System

- Standardized on the Logix control platform and EtherNet/IP for scalable, seamless, real-time communications structure and single design environment

Results

Reduced Waste

- Decreased inedible goal by half, from 1.6 to 0.8 percent, resulting in nearly 1 million pounds of product saved annually
- Eased record keeping and reporting
- Obtained real time visibility into critical control point performance

Approximately 20 to 30 percent of victims in foodborne illness outbreaks seek legal action against the companies whose products sickened them or their family members.

Source: Report: About 20-30 Percent of Foodborne Illness Victims File Lawsuits, Food Safety News, May 26, 2015

Summary

Unsafe food and beverage products can have devastating and long-term consequences.

The most significant toll is always human. That toll can extend to your operations in the form of massive worker layoffs. Financial impacts can be wide-ranging, from wasted product, recall efforts and plant shutdowns to drawn-out litigation costs. Meanwhile, the reputation damage and loss of trust resulting from these incidents rarely can be quantified.

How prepared is your operation to prevent or identify safety and quality issues before they reach consumers? Where do you fall short?

Taking action to mitigate any shortfalls will require investments, but those investments are likely miniscule compared to the full scope of costs that would result from a major product recall.

Remember: Your brand and your business are represented in every food or beverage item that rolls off the line. A comprehensive approach to protecting product safety and quality can strengthen your reputation, satisfy increasingly scrutinizing customers and regulators, and ultimately boost your bottom line.

Get connected.

Secure your networks.

Employ a risk-based preventative control program.

Implement product traceability.

Improve operational efficiency.

To learn more about how you can bring these five steps to life in your operations, contact a Rockwell Automation representative.

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Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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