



**Rockwell
Automation**

A DIGITAL RECIPE FOR THE FUTURE

Improve yield, quality and workforce effectiveness
in food and beverage operations with smart
manufacturing and digital transformation

Keep up or fall behind

The food and beverage industry is changing fast. Clean labels. Plant-based alternatives. Traceability. Sustainability. Grocery delivery. Population growth. The list goes on.

The coming together of new consumer trends and the proliferation of technology has left producers racing to keep up. And we're seeing complexity grow and productivity decline as a result.

7.2%
productivity

Drop in beverage and tobacco products and 3.1% drop in food manufacturing productivity (hours worked vs. output)

Citation: Productivity and Costs by Industry News Release, Bureau of Labor Statistics, April 23, 2019

67%
SKU count

Companies reporting a planned increase SKU count in 2020

Citation: Trends and Advances in Food Packaging and Processing, PMMI, January 2020

75%
understaffed

Companies reporting a qualified worker shortage

Citation: Digital Transformation Insight Report, Rockwell Automation, December 2019

50%
still planning

Half of food and beverage operations are still in the planning stages for digital transformation, lagging 11% behind other industries

Citation: Digital Transformation Insight Report, Rockwell Automation, December 2019

SMARTER. MORE CONNECTED. MORE PRODUCTIVE.

Despite the many challenges, leading food and beverage companies are using more flexible, efficient and responsive technology to get the most from their operations.

Companies that are winning are finding a way to:

- Launch new products quickly to meet changing market demands
- Flex operations around rapidly expanding SKU counts and label requirements
- Manage complexities of evolving channels and routes to market
- Comply with growing food traceability regulations
- Optimize workforce and asset utilization
- Leverage data to help meet yield, throughput and other productivity goals

So, where do we go from here? Look to the continually evolving world of smart manufacturing and digital transformation.



CASE STUDY

One artisanal cheese and yogurt maker increased productivity 20% by modernizing automation and simplifying controls.

REALIZING THE FACTORY OF THE FUTURE

Unifying disparate networks, improving visibility and tighter process control are a few benefits a modern digital factory can bring. Digital transformation also provides opportunities to:

- Follow the flow of ingredients and track yield throughout production
- Monitor key production areas and use insights to improve operations
- Respond to supply-chain developments for better on-demand production
- Manage and help prevent recalls in real time
- Drive efficiency gains for complex activities like changeovers

In addition, use of advanced technologies like machine learning, digital twins and robotic technology are poised to unlock \$72 billion in value in the food and beverage industry . Let's take a closer look.

A factory of the future can deliver:

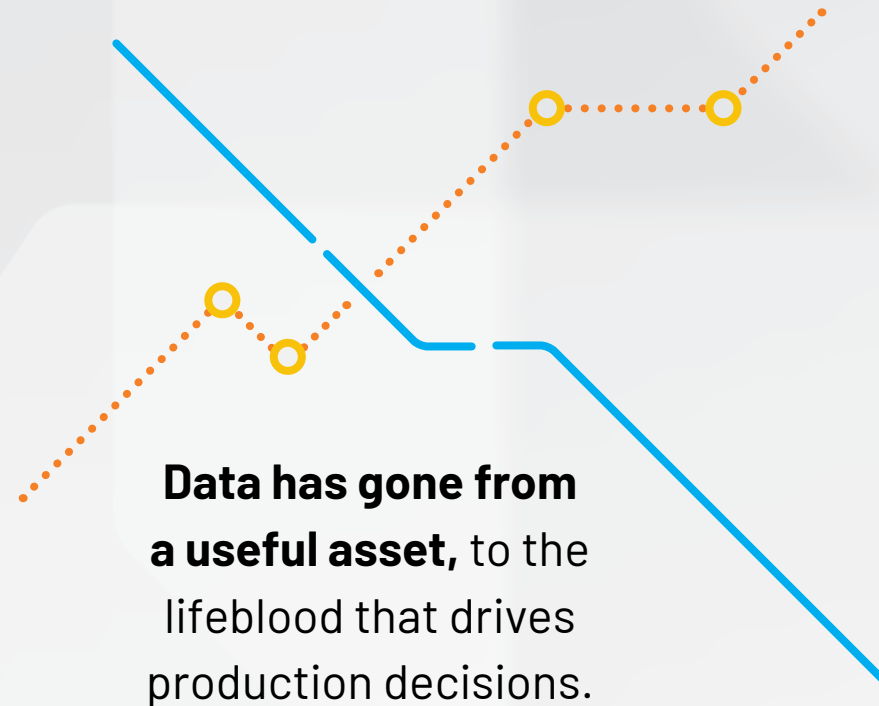
- Insight-driven operations
- Improved flexibility
- Faster time to market
- More secure operations
- Workforce productivity
- Greater yield

Information and connectivity unleashed

Digital transformation is helping the industry uncover actionable data and redefining what manufacturing can be. Companies are benefiting from a holistic view of operations with communication flowing across people, departments and the organization.

- **The Industrial Internet of Things (IIoT)** connects assets and layers information, providing business intelligence and advancing operations.
- **Wireless, mobile and wearable technologies** create new ways to communicate, improving collaboration and efficiencies.
- **Scalable analytics** turn enterprise-wide data into actionable information for better, faster decision making.
- **A secure network infrastructure** based on EtherNet/IP supports seamless, real-time data sharing across your enterprise.

Before you can get the most from these technologies, you must first converge your Information Technology (IT) and operational technology (plant-floor systems) into a single network architecture.



INSIST ON DATA-DRIVEN DECISION MAKING

A converged network architecture can simplify how systems operate. With it, production software finds and collects data from embedded sensors, smart machines, drives and other physical devices. This manufacturing intelligence is the foundation for deeper analysis and informed decisions.

Let's look at four [IIoT enablers](#) that can help you improve asset utilization, track quality metrics, boost output and more.

1 Drive yield with enterprise manufacturing intelligence.

EMI software organizes, correlates and presents production information to help you spot issues quickly and adjust in real time. Quality managers can use it to track first-pass yield. And plant managers can monitor plant-wide data and metrics to help reduce costs and optimize production.

2 Track quality with a scalable manufacturing execution system.

MES software provides deeper, more immediate production visibility. This access helps workers verify quality, ingredients and the process itself. For instance, an MES can help you use the right ingredients in the right order based on shelf-life, resulting in less waste.

An MES can also provide the foundation for a strong food safety and quality system by simplifying traceability and compliance. This aids in supply chain transparency, which is becoming essential in meeting consumer demands for information, and to help prevent and manage recalls.



66%

of companies are using lot-level traceability as part of their food safety plan

43%

are using case-level traceability, up from 37% in 2018

54%

are using item-level traceability, up from 44% in 2018

Citation: State of Food Manufacturing Survey, Food Engineering, October 2019

3 Improve performance with analytics solutions. Data alone provides little value. But real-time analytics that contextualize data into meaningful information can help improve predictive maintenance, asset optimization and quality control. For example, analytics based on temperature, pressure, cook time and clean-in-place help to more proactively manage food safety and quality. And analytics on energy usage can help workers proactively manage load requirements, maximize system performance and ultimately reduce costs.

Pairing analytics with simulation technologies can help improve worker productivity as well. For instance, technicians can interact with the digital twin of a machine via virtual reality (VR) to test new configurations and identify potential issues, all without production interruptions.

4 Increase productivity with mobile technology. Mobile devices give workers immediate access to critical information, whether they're walking the plant floor or working remotely. Through mobile dashboards, auto-generated reports and notifications, they have the necessary context to make better decisions in the moment.

Wearable devices are also making an impact on the factory floor. For instance, augmented reality (AR) headsets are a convenient way to deliver digital work instructions and remote troubleshooting.



A large global food and beverage company used the ThingWorx IIoT platform across their enterprise. It provided role-based access to real-time data, driving a **5% to 8% increase in productivity.**

A SPOTLIGHT ON ANALYTICS

Analytics tools convert your raw data into descriptive, diagnostic, predictive and prescriptive information. When delivered through dashboards, the information can help with everything from production scheduling to preventative maintenance.

Flexible analytics tools can address needs across the organization, from simple monitoring to complex event processing.

- **Machine level:** Asset performance and machine health
- **Plant level:** Yield trends and failure prediction
- **Enterprise level:** Operational conformity and compliance

OEE analytics in action

Blends new machine learning with real-time scheduling information and existing maintenance procedures to recommend what actions to take and when to prevent predicted failures



Flex into more SKUs, more speed

Consumers are changing the scope and complexity of what and where companies are asked to deliver: sustainable packaging, clean labels, healthy ingredients, rainbow packs, online ordering and convenience shopping are just a few. It all means more recipes, smaller batches and countless configurations.

Smart manufacturing can give you the flexibility needed to keep up, or pivot production quickly. And advanced technologies provide new advantages for today, and the future.

- **Reduce complexity** with scalable process control
- **Be first to market** using multi-purpose equipment that can change between product, size and configuration with the push of a button
- **Simplify operation and maintenance** with unified machine control
- **Gain flexibility** with automated solutions based on the latest in mechatronics



The average number of NEW SKUs per brand owner is up 42% from 64 new SKUs in 2017 to 91 new SKUs in 2019.

Citation: Brand Owner Packaging Study, L.E.K. Consulting, April 2019

EXPECT MORE FROM YOUR CONTROL SYSTEM

Individual process control is no longer enough. Leading CPG manufacturers are implementing plant-wide controls that improve speed to market, reduce changeover time and drive operational efficiencies.

A modern distributed control system (DCS) can integrate your disparate automation processes into one plant-wide system. And features like online editing, batch management and diagnostics help keep your plant running optimally.

A key feature of a [modern DCS](#) is an open-source EtherNet/IP foundation. This enables:

- Off-the-shelf asset compatibility
- Secure, reliable, robust network infrastructure
- Flexible, compliant operations
- Open, secure networking

Rethinking process control

For DuPont, DCS means Data. Control. Simplified.

A modern DCS gave DuPont's nutrition and health division the flexibility and scalability they needed to deliver functional ingredients to food companies around the world. Today, their process and clean-in-place operations benefit from increased operational availability and data acquisition, easier maintenance, better cost control, and future scalability.

And this modernization was made easy with seamless system history integration and more than 2000 I/O points transitioned, commissioned and tested in only two weeks.



FAST TRACKING FACTORY TO FORK

Chances are, your plant floor is comprised of a series of standalone machines, integrated to complete a line. This disparate ecosystem means longer setups and changeovers, as well as inefficient data gathering and operations. All slowing time to market.

But, advances in mechatronics are turning islands of automation into fully integrated machine solutions for greater speed and flexibility.

1 Robotics has been a staple of automation for decades. But it often came with proprietary controls that added complexity for operators and integrators. Today, best in class factories are running [robotics applications](#) on the same standard programmable automation controller (PAC) technology that controls the rest of the machine – coordinating motion and simplifying operation.

Thanks to machine learning, contemporary robots are also easier to program than traditional systems. And producers can address infinite product and packaging shapes and sizes because of the responsive, adaptable nature of robotics operating in three dimensions.

2 Linear motor technology, notably independent cart technology (ICT), helps you quickly accommodate changing demand, smaller lot sizes and more SKUs. Where conventional conveyance limited you to a preconfigured path and pitch, ICT uses magnets to precisely control motion of each cart independently. That means that carts can speed up or slow down intelligently based on where other carts are in the system. We'll talk more about this in a bit.

Flexible machine delivers 97% OEE

A Rockwell Automation PartnerNetwork™ machine builder worked with us to develop an assembly, filling, packing solution that uses a dual iTRAK® system for precise positioning and robots for pick-and-place functions. The secondary iTRAK® can be leveraged for dispensing material, staging another product, or running two SKUs simultaneously. With a required OEE of 85% for the solution, this flexible machine surpassed expectations and is currently achieving 97% OEE!

3 Automated changeover systems are minimizing, and even eliminating, the need for manual intervention and machine resets for each new product or packaging configuration. Even more, new servo drive functionality is making this technology more cost-effective than previous solutions.

4 Line-integration solutions can help you configure, control and analyze line performance from a standard operator station using a common equipment interface. This simple, repeatable integration provides optimization of current production equipment as well as quicker deployment of future lines.

Bringing all of this together on a standard PAC is a transformation that:

- Simplifies machine operation and maintenance for your workers who only need to learn one system.
- Speeds up system communication and motion control.
- Provides one unified source for information for improved visualization, reporting and analytics.



70% of food manufacturers said flexible, fast changeover was the number one improvement **they sought on new food manufacturing equipment.**

Citation: Trends and Advances in Food Packaging and Processing, PMMI, January 2020

A SPOTLIGHT ON INDEPENDENT CART TECHNOLOGY

Most food and beverage companies are getting by with conveyance that was not designed for today's needs. This all means highly manual system configuration, lost time and product during transitions, and production bottlenecks. But advances in technology have introduced a better way to move.

Independent cart technology can transport products with a wide range of weights and dimensions, making it ideal for everything from high speed, precision product assembly to complex packaging applications. And while ICT performs exceptionally in longer run situations, even greater value is found in its ability to dramatically reduce changeover times – often from hours to mere minutes. In addition, producers benefit from:

- Fewer parts to worry about
- Reduced energy consumption
- Ability to quickly start and stop loads without losing control

HOW ONE INVESTMENT CAN OPEN UP THE FUTURE

Chocolate confectioner Lotte Wedel faced an increase in demand and variety that threatened to max out their capacity, space and what their current conveyance could handle.

The need for intermittent stops to accommodate multiple packaging counts greatly limited machine speed. With that in mind, they set out to find a high-speed continuous motion packaging solution that could manage longer dwell times without effecting overall output.

With the deployment of an intelligent track system, they gained:

- 50% throughput increase, from 120 to 180 units per minute
- 1 minute changeover times, allowing flexibility on packaging counts, sizes and shapes
- OEE increase, reducing mechanical wear 5%

“Lotte Wedel can now use a wider variety of product counts on the same machine, without having to worry about extended infeed processes slowing the machine down.”

– Rainer Bersch, Area Manager, Design & Order Processing



Drive workforce productivity

One of the biggest hurdles facing the food and beverage industry is a shortage of skilled workers. This means doing more with less and playing catch up instead of planning for the future. In fact, 20 percent of companies report lower yields and the inability to expand as a direct result of workforce challenges .

There are many things you can do to protect your operations from a shrinking skilled labor pool – from reskilling your current workforce to educating and recruiting the next generation. But one of the most immediate steps you can take is using [digital workforce solutions](#) that simplify and enhance your workers' jobs and make the most of people you already have.



68% of food and beverage executives say increasing workforce productivity is their number one reason for digital investment in the next three years. Tied for number one with reducing unplanned downtime.

Citation: Digital Transformation Insight Report, Rockwell Automation, December 2019

Smarter utilization

Oftentimes, your existing infrastructure can be leveraged or reconfigured to provide workers with actionable information relevant to their work. And by contextualizing role-specific instructions you can reduce job complexity, especially for less-experienced workers.

Workforce solutions also enable real-time performance tracking. For instance, you can monitor planned versus actual results or see how long a process is taking to help uncover ways to improve productivity times. This can help you be more responsive to work-flow needs and ultimately reduce your time to market.

Enhanced safety

A safe worker is a productive worker, and even this can be enhanced with a more holistic digital approach to workforce enablement.

By integrating your safety and machinery control systems as one, you not only help mitigate risks but also reduce unplanned shutdowns caused by older hardwired systems. Additionally, collecting safety incident data can help you identify risks and make adjustments in areas where safety-related shutdowns are occurring.

Expanded resources

Support services can augment your existing workforce when qualified talent isn't locally available.

For example, remote services can provide continuous machine monitoring, data collection and live support, if your maintenance team is understaffed and overwhelmed. These services can be especially valuable for critical processes, round-the-clock operations and operations based in remote locations.



Turnover rates have reached
41.5% on average in the
food and beverage sector.

Citation: Automation and talent challenges in US consumer packaged goods, McKinsey & Company, April 2019

A leading dairy processor wanted to give its workers real-time access to actionable information. An IIoT solution that integrated their control and information systems provided the functionality and insight needed to eliminate 2500 hours of manual data collection and uncover additional production time.

A SPOTLIGHT ON IOT FOR WORKERS

The potential for IoT to transform the modern workforce is already being realized. From on-machine maintenance instructions to more intuitive interfaces and advanced predictive analytics, quality, speed and even security are reaching levels previously unattainable.

Mobile devices can deliver information to less-experienced workers in an interactive, familiar format. Thin client technology with role-based access can make sure workers only access authorized tools and content. And AR is helping companies manage workforce challenges in new and creative ways:

- Overlay hands-free standard operating procedures on a machine or digital repair instructions for faster recovery.
- Replicate real-world production scenarios in training to better prepare workers for their jobs.
- Capture and digitize critical knowledge of experienced workers before they retire.



Cybersecurity: From risk to reward

Smart machines, cobots, advanced analytics, mobile access, wireless data sharing and decentralized plant control enable more efficient, nimble and productive food and beverage operations. They also introduce a broader attack surface to protect.

Just ask the global food producer who lost \$84 million from a single cyberattack. No organization is immune.

But the once unwelcome expense of cybersecurity could actually be a competitive advantage. Getting it right can mean more uptime, fewer product recalls, real-time remote support and the bottom line benefits from more reliable operations.

Some considerations to keep in mind when developing an [industrial security program](#) include:

- **Know your vulnerabilities.** Begin with a security assessment to identify your risk areas and potential threats.
- **Think holistically.** A multilayered approach like defense-in-depth can establish multiple fronts of defense.
- **Be proactive.** Go beyond endpoint protection and virus scanners. Hunt out infiltrations before they wreak havoc.
- **Respond to threats.** Achieve resolution faster with real-time detection services and active threat management.
- **Remain vigilant.** Implement or reassess things like security policies, patch management, mobile access and your Industrial Demilitarized Zone.

There were 105 million attacks on IoT devices in the first half of 2019. That's 7 times more than the same time the previous year.

Citation: IoT Under Fire, Kaspersky, October 2019

A COLLABORATION MINDSET

What was once a simple function like patch management, is a totally different issue for the continuous operations often found in food and beverage plants. And IT-centric service level agreements that measure response time in hours instead of minutes can cost millions in lost productivity.

Traditional IT or operational technology (OT) departments and processes can't tackle today's new connectivity demands and devices alone. It requires a collaborative cyber-strategy. One that constantly evolves with new technology and bridges these traditionally siloed departments.

Managing the security risks of a modern operation is critical to protecting your information, assets, workers and the environment. To do that effectively, you need a cross-functional committed team, and partners you can trust.

DON'T LET BEING CONNECTED TURN INTO BEING INFECTED

Threats come in more forms than ever: physical and digital, internal and external, malicious and unintentional. And with food safety on the line, loss of control over quality or production poses great risk.

Protecting your networks and facilities against this fast-changing threat landscape is a tall order. But, together with our industry-leading partners such as Cisco, Microsoft and Panduit, we share your commitment to security.

The right mix of services from automation providers can help you to reduce:

- Regulatory incidents
- Project timelines
- CAPEX
- OPEX



Are you ready?

There's no question that digital transformation and smart manufacturing can wholly transform your manufacturing operations.

Relevant, real-time and role-based information can enable more informed decision-making at every level. And holistic solutions that bring together robotics, equipment and automation control allow the flexibility needed to meet changing demand. Together, it all creates nearly endless opportunity for process improvement and competitive advantage.

Still, two-thirds of companies that pilot digital manufacturing solutions fail to move into large-scale rollout. Why? Uncertainty of how to move forward in such complex organizations and infrastructures, and risk of the unfamiliar.

However, creating your factory of the future is not a solo endeavor. Rockwell Automation brings expertise in manufacturing, supply chain, IT and the food and beverage industry to help plan, implement and scale digital transformation and smart manufacturing solutions.

To get started addressing challenges big and small, contact your Rockwell Automation sales representative or [learn more here](#).

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