

FOOD FOR THOUGHT

How to improve food and beverage
manufacturing through actionable data



**Rockwell
Automation**

Make data the lifeblood of your food and beverage manufacturing

The rapid expansion of Industry 4.0 and the Industrial Internet of Things (IIoT) has created a dilemma for companies in the food and beverage sector.

The IIoT is recasting the role of data from a useful asset to the lifeblood that drives production decisions. Unfortunately for most food and beverage manufacturers, a combination of legacy equipment, skills gaps in an ageing workforce and the struggle to identify and measure the right data means they are not accomplishing anything close to the progress seen in other industries.

Learn how to

ACHIEVE TANGIBLE ROI THROUGH DIGITAL TRANSFORMATION

This ebook will show you that none of these obstacles is insurmountable, and that you can achieve genuine ROI by digitally transforming your food and beverage manufacturing.

Once you have finished, you will have an in-depth understanding of how to access and capitalise on your operational, business and transactional data to improve product quality and create more efficient production and packaging operations.

IMPLEMENT KNOWLEDGE- DRIVEN OPERATIONS

You will also learn how knowledge-driven operations can connect your people, processes and technology across every level for better collaboration, faster problem solving and improved innovation within your organisation and its supply chain.

As the world's largest company dedicated to industrial automation and information, we are specialists in digitally transforming manufacturing operations. We have helped organisations in more than 80 countries to translate the deluge of information into useful, actionable insights, and we have put this ebook together to help you understand how to achieve the same thing for your business.



Let's start by taking a look at how the right approach to data can **address some major industry pain points.**



You will learn how data can **improve production performance** with infrastructure changes that work straight away. We will also demonstrate how actionable data can be used to **reduce manufacturing complexity, increase flexibility** and **bring new products to market faster**, as well as **improving the maintenance schedules** of your capital equipment to be more predictive.

REMOVING THE GUESS-WORK AND VARIABILITY

Valuable data is everywhere in food and beverage manufacturing, but at the moment it is not being captured or used effectively to improve operations. As a result, your employees are relying on their own personal experience and judgement when making decisions, instead of basing them on accurate information.

Making plant-wide production data accessible to every level of your workforce would solve this problem, but your legacy equipment was not designed with today's connectivity in mind, resulting in data being produced in silos.

We will explain how you can integrate data across multiple systems and convert it more easily into formats that employees can instantly access, understand and use to make better decisions.

CREATING MORE EFFICIENT PRODUCTION AND PACKAGING OPERATIONS

Consumer demand for single-serving size, custom products has resulted in a recent explosion of SKUs, with the production process becoming significantly more complex as a result. The need to increase speed to market from idea to launch has also pushed food and beverage manufacturers further towards automated solutions.

Gaining better control of quality and costs

As consumer behaviour has moved towards purchasing locally sourced fresh foods, food and beverage manufacturers have had to adjust the raw products and recipes they use in production.

With an increased consumer focus on health benefits, and governments introducing additional regulations to improve food safety, there is even greater pressure to reformulate your products, meaning your need to manage commodity costs and improve yields has grown significantly.



This ebook will show how **actionable data can reduce cost and waste in your supply chain**, helping you to meet quality metrics and improve yields.

How to make your **data** work for you

Leveraging data through
knowledge-driven operations

Managing your data is not just about collecting data, but looking at the “right” data in your systems and creating reports that provide effective decision-making information for productivity improvements. Let’s explore how this can be done in a modern food and beverage manufacturing operation:



Collection



Accumulation and aggregation



Abstraction



Presentation



COLLECTION

Modern analytics begin with better connectivity of the systems that produce your data. By converging enterprise-level IT systems and plant-level operations technology (OT) systems, food and beverage manufacturers can unify two worlds of data that have historically remained separate.

This convergence – combined with enabling technologies like IIoT devices, wireless internet and new collaboration tools – helps eliminate information silos and creates a truly connected ecosystem.

It's through converging IT and OT systems that production software can access and collect data from a wide range of physical devices, like embedded sensors, smart machines, drives and other objects.

People also play a rich role in contextualising information. As they work, data can be entered as actions are performed or as feedback to automated processes. For example, workers can report not only what action was taken, but validate that the proper workflow was followed.



ACCUMULATION AND AGGREGATION

Instead of sifting through raw data, accumulation uses a unified production model (UPM) to provide a cohesive view of disparate manufacturing data. Pulling the values from manufacturing and enterprise data, accumulation gains the information relevant for each level of your enterprise. This accumulation can happen at the device, machine, plant or enterprise level, or in the cloud.

Once accumulated, data is aggregated to serve the needs of the analytics software. This could include reducing data volume to a simplified state for a specific analytics application. It also could include segregating data for different applications, end users or organisations. **Aggregation is key to employees gaining the information they need, when they need it, anywhere in the enterprise.**



ABSTRACTION

With abstraction, complex data is reduced to concentrate on only the relevant information. An enterprise information system connects data that has been saved in multiple formats and collected from multiple systems, including control systems, MES, laboratory databases and ERP systems. A common approach is applied to establish consistent names for a variety of different data across an automation enterprise.

This is where the value of contextualised data really becomes apparent. Previously, for example, operators may only have seen a vessel's operating temperature while it was operating. Now, they can see that same data but in the context of when a specific raw material lot was mixed in. This provides operators with a more complete picture that can help them better understand quality concerns or other issues.



PRESENTATION

Finally, the contextualised information is delivered to employees to help them monitor operations and make better business decisions.

Information can be presented in different ways based on an employee's location, role and responsibilities:

- Browser and mobile dashboards
- Automatically generated reports
- Notifications, including text or email alerts

Good analytics begin with good data

With connectivity ensuring that the workforce has access to automatic monitoring and real-time documentation of the processes, you can then use analytical tools to examine quality data, machinery and equipment condition data, and process parameters.

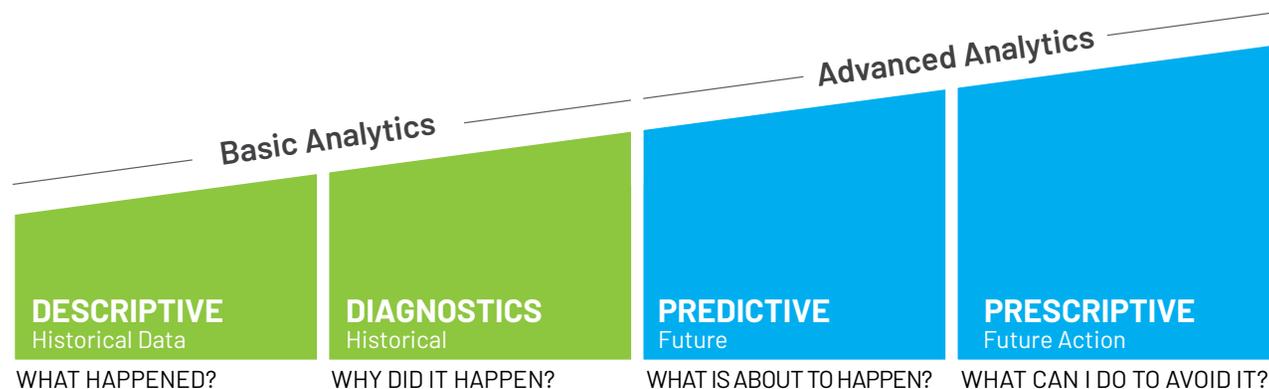
This information can be broken down into descriptive, diagnostic, predictive and prescriptive analytics.

Descriptive: Summarising events and describing what happened

Diagnostic: Associating events with root causes or reasons to detail why they happened

Predictive: Using modelling and machine learning to predict what is likely to happen without corrective action

Prescriptive: Understanding previous instances of similar events to provide guidance on what should be done to correct an issue or optimise performance



THE VALUE OF ANALYTICS

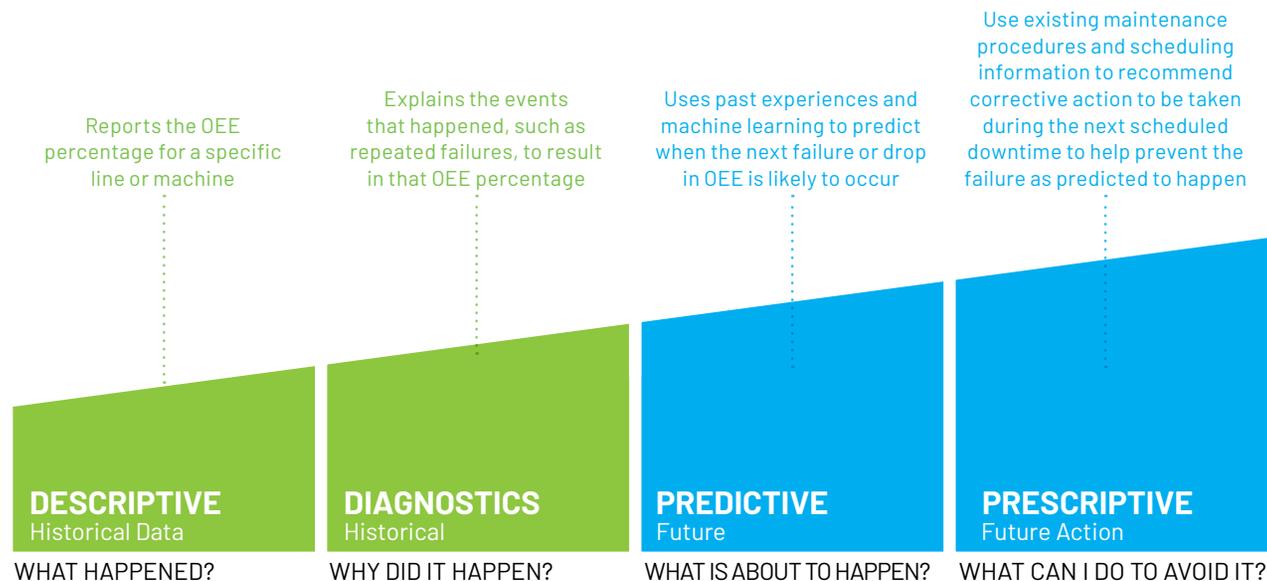
Consider a vital KPI like OEE

This information can be delivered to workers through dashboards to help improve decision-making in their specific tasks.

It can also be utilised at every level of your enterprise. Local maintenance analytics can provide visibility into an asset's performance to optimise its uptime. Solutions can tap into device data to produce real-time alerts about critical device and machine health.

On the other hand, **multi-plant analytics can help drive throughput and yield, tapping plant-level data to deliver real-time updates to operators and analyse machine or facility trends.** These analytics also enable OEM-based remote monitoring, which can identify asset maintenance needs and even predict failures before they happen.

On a macro-level, global analytics can help ensure operational conformity and compliance worldwide, by integrating production analytics with business intelligence tools to bring new context to production data and to analyse big data.



THE VALUE OF ANALYTICS

Getting the right data, to the right person, at the right time

One of the consequences of implementing knowledge-driven operations is that you can put relevant and contextualised information close to the user, and on the device of their choice. For example, it could be at the operator's workstation HMI or on a mobile device.

This information is now in the hands of the process engineers and operators where they need it, and where they spend most of their day. This is going to help them:

- Improve cycle time
- Increase equipment uptime
- Optimise maintenance schedules

For example, workers can quickly access information on failures, defects or errors and where they occurred, in order to fix issues faster and prevent future problems.

Data and information is also captured at the workstation in a common way, regardless of operator or locations. Incidents or actions are documented in real time. For example, downtime issues are captured with corrective actions that now allow more historical information to be available, to avoid those incidents or recover from incidents quicker, which can help reduce downtime and MTTR.

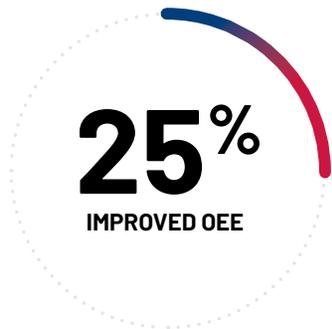
This standardised user experience also helps to ease transition for operators between work orders, machines and work stations. You can have your training and certification tied into the manufacturing system to ensure certified personnel are working on those operations, which will help eliminate mistakes in the process, due to human error.

When operators sign into their workstation HMI:

- They are validated
- They know what work order they are working on
- The proper documentation is delivered right to them

Mobile devices give workers immediate access to critical information, whether they're walking the plant floor or working remotely, while HMIs and industrial PCs provide access to anything from real-time performance information to production trends and daily throughput targets.

Controllers and other industrial devices can display on-device, which can reduce the number of HMIs required and deliver critical process information closer to its source. In addition, wearable devices, such as VR headsets are becoming increasingly commonplace as companies look for new and more convenient ways to monitor their operations or troubleshoot issues without stopping production.

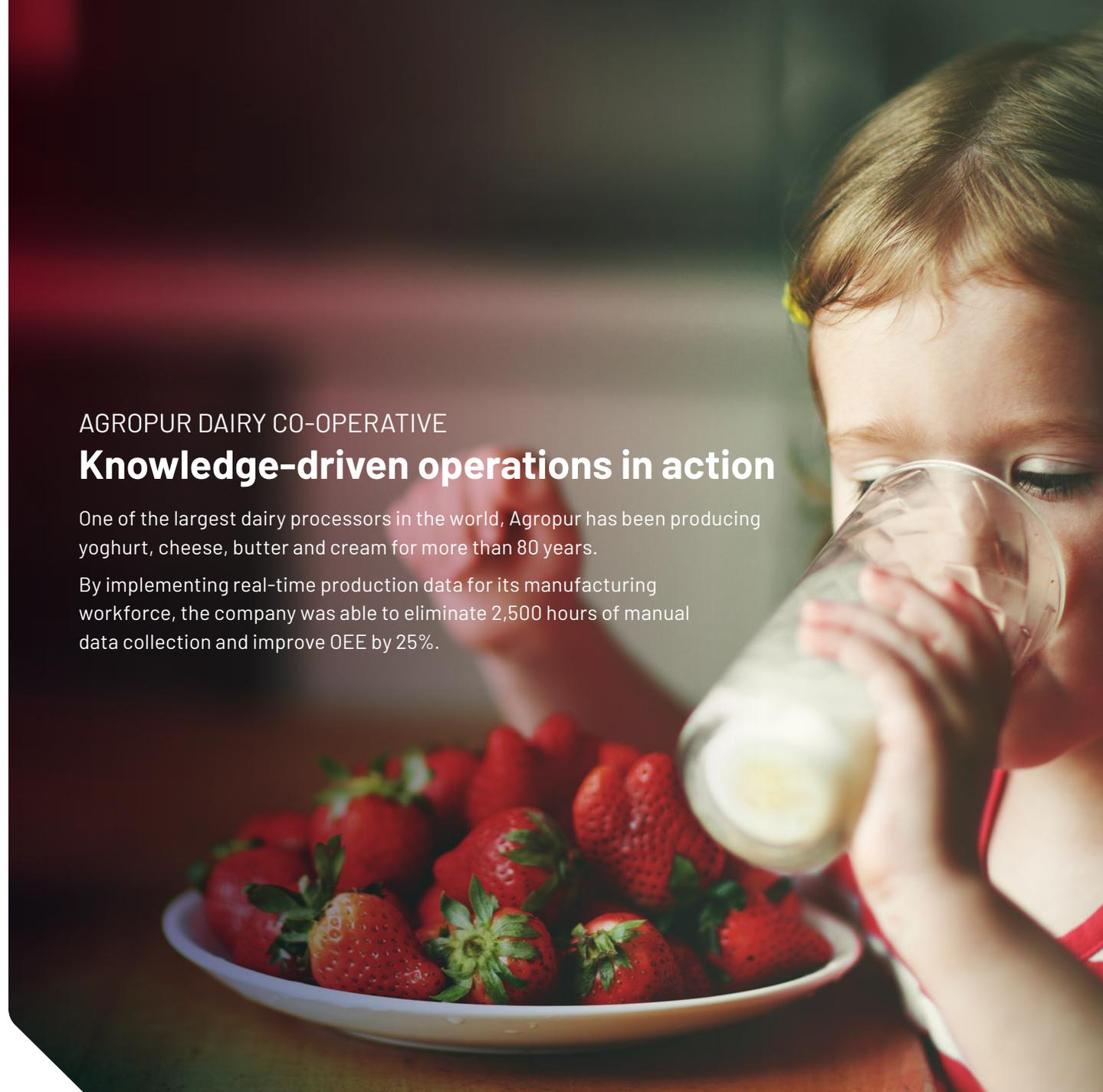


AGROPUR DAIRY CO-OPERATIVE

Knowledge-driven operations in action

One of the largest dairy processors in the world, Agropur has been producing yoghurt, cheese, butter and cream for more than 80 years.

By implementing real-time production data for its manufacturing workforce, the company was able to eliminate 2,500 hours of manual data collection and improve OEE by 25%.



Controlling quality and cost by removing variation

Conformance is key. Companies that rely on disparate systems and antiquated paper processes cannot guarantee consistent production quality. Workflows and business processes built on industry best practices should provide the basis for quality at every step of the manufacturing process.

Knowledge-driven operations allow you to model and enforce your plant's in-process quality regimens easily, efficiently and at a scalable rate, supporting your efforts to deliver quality products on time and to react quickly to quality issues.

When retirees exit the workforce, intellectual property frequently walks out with them. Quite often, this occurs faster than new workers can be hired and trained. Enforceable workflows drive out variability through:

- Automated setup
- Work instructions
- Integrated quality processes

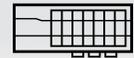
You can also verify quality, ingredients and process as part of the work order, meaning you'll know that you are using the right ingredients and in the right order so you don't waste anything that may have a limited shelf life.

In addition, knowledge-driven operations allow you to capture all maintenance activities to allow for analysis later, meaning you can improve root cause analysis, take corrective actions more quickly, and even proactively prevent potential quality issues from occurring in the first place.

Enforceable workflows automatically create records that detail:



PROCESSES



TOOLS



MATERIAL



OPERATORS



EQUIPMENT



TEST RESULTS

Records come complete with timestamps and electronic signatures, making it easier to demonstrate regulatory compliance.



30%
IMPROVEMENT
IN QUALITY

MULLINS FOOD PRODUCTS Knowledge-driven operations in action

Mullins Food Products manufactures and packages the finest custom sauces, ketchup, dressings and spreads for the most well-known and widely respected companies across the globe.

By digitally transforming its manufacturing operations, the company was able to reduce costs on its ingredient ordering, storage and tracking, and eliminate manual batch adjustments, improving quality by 30%.

Improving profitability through better OEE

Improving profitability hinges on improving OEE, so most manufacturers collect production data, but they may lack effective ways to analyse that data or miss critical data needed to identify real issues affecting cost and productivity.

Knowledge driven operations allow you to measure and analyse data continuously to determine key corrective actions required to reduce the things that reduce OEE. These include:

- Downtime
- Unproductive time
- Cycle time
- Scrap

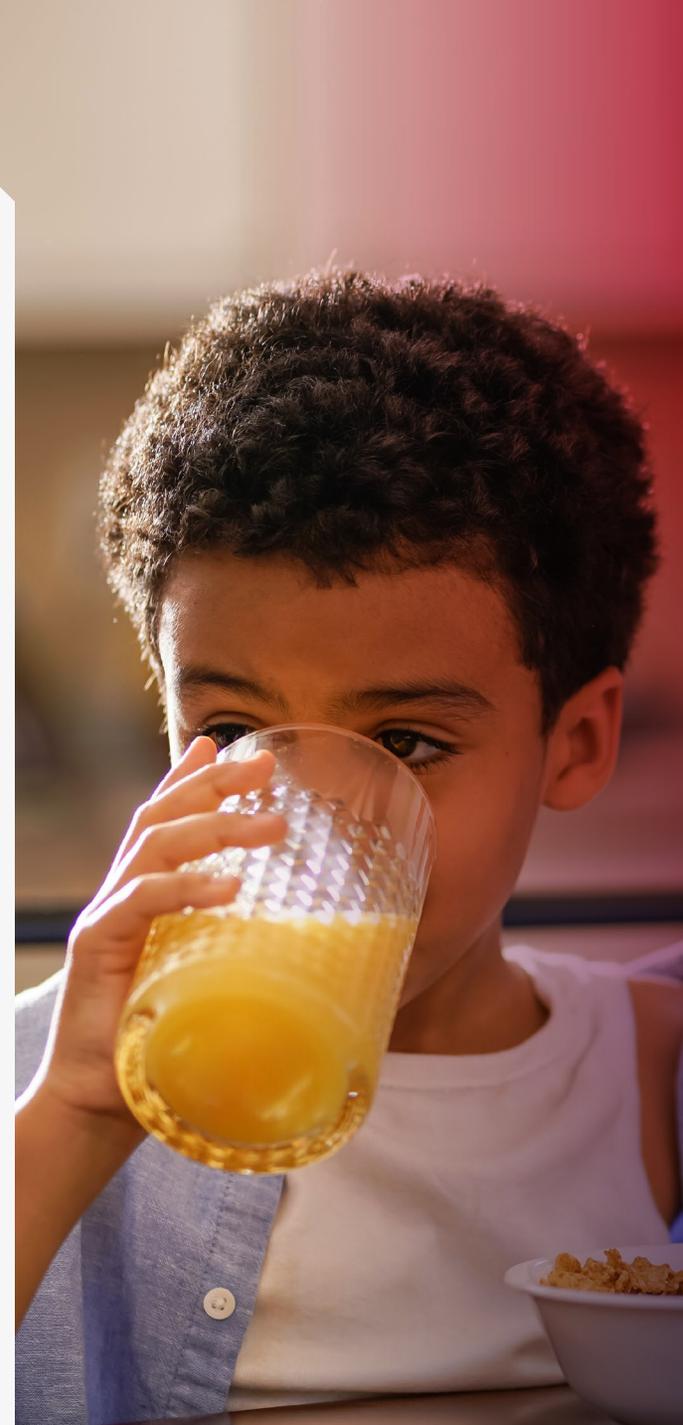
You can make sure you pinpoint which corrective actions will have the most impact, again and again over time.

Machines collect and log parameters such as alerts and measurements in real time, so deviations can be acted upon quickly and accurately. Sensors can also deliver vital insights into machine health, for example, showing when bearings require lubrication or are wearing out. This allows companies to:

- Undertake preventative maintenance
- Reduce downtime
- Extend the life of their assets

And because you have full traceability of your supply chain, you can minimise scrap from any potential recalled product by knowing exactly where those products are, from raw material to finished goods inventory.

For many manufacturers, energy represents the first or second highest (with labour being the highest) cost element. By making demand-driven decisions, companies can choose to run slower to save energy without sacrificing customer service or output.





Boosting production efficiency through better transparency

Knowledge-driven operations allow you to achieve a completely new level of transparency in the production environment.

Enforceable workflows break down organisational information silos to unite people with systems, helping manufacturers to improve productivity through:

- Greater collaboration
- Increased standardisation
- Stronger enforcement of best practice

And, because quality processes become integral to production activities, plants can learn more by allowing process data to be viewed in context of orders, products, suppliers and materials.

Using simulation software can also help optimise daily production goals by leveraging the “digital twin” of your manufacturing facilities. Simulation takes into account the variability in process times of each production step, as well as downtime events like the cleaning or maintenance of the equipment.

By simulating this, you can adjust your daily operations to better ensure you’re meeting your goals and customer demand. For example, you might change production from smallest to largest batches to those that have fewer change-over times.



KRAFT HEINZ ORE-IDA
Knowledge-driven operations in action

Owned by Kraft Heinz, the US frozen potato brand Ore-Ida lays claim to the most popular French fries in America.

When Kraft Heinz introduced production analytics and optimisation at its Ore-Ida facility, it increased production capacity by 10% and significantly reduced product variability. It was even able to use the subsequent ROI to invest in upgraded control system infrastructure and modernised plant automation.



What this means to your facility

Knowledge-driven operations deliver a level of consistency, quality and efficiency to your production that is impossible to achieve through any other strategic initiative. They offer a smooth, agile and scalable system to optimise decision-making even as your workforce changes. And because they can access data in any format, they are agnostic to any control areas and can fit across your entire supply chain.

Successfully implementing things like the IIoT can impact your facility in a number of other ways, helping you to ensure:



Faster time-to-market through on-time delivery and more successful new product introductions



Lower total cost of ownership thanks to better visibility into WIP & inventory turns, improved OEE performance and optimised energy consumption



Improved asset utilisation and optimisation, helping to identify and resolve bottlenecks, improve yields and reduce manufacturing cycle time



Better enterprise risk management, with fewer regulatory incidents and reduced customer rejects

ROI IS EASIER THAN YOU THINK

Projects can be easy and cost-effective to implement. Modern automation equipment is designed to generate production data and projects can be implemented with minimal disruption to operations. It also means you can start with a small pilot project and scale up, which typically leads to a rapid and positive ROI.

Most companies find that ROI from initial upgrades quickly fund more initiatives, and eventually deliver a seamless convergence of operations and information, increasing efficiency and productivity across the enterprise.

With many other manufacturers already enjoying IIoT success, it really is important to start investing now. Those with capable IIoT infrastructures enjoyed the largest productivity and profit increases.

IIoT SUCCESS

Manufacturers report that application of IIoT technologies to operations in the past year has resulted in:



72%

**INCREASED
PRODUCTIVITY**

69% of them had an
increase in profitability

Source: MPIIOT Study | 2017

ASSESS YOUR OWN OPERATIONS

The first step in developing your own knowledge-driven operations is defining which business goal it will help you meet or which production challenge it will help solve. Defining goals or outcomes upfront will help drive decisions about what data must be collected, what information must be delivered to workers at different levels, and what technology solutions will be needed.

After all, the key function areas have their own primary concerns, for example, IT cares about standardisation and network security, while operations is focused on labour productivity and OEE. These concerns, such as moving to regional production or maintaining quality standards, should be aligned to the needs of your business.

Identify expected improvement in each area of your operations



QUESTIONS

ASK YOURSELF ABOUT **Your facility**



Are there currently multiple, disparate networks?



Do you have an accurate inventory of your site's hardware, software and infrastructure?



How well are operations connected to enterprise and business systems?



Is your access to data limited due to islands of information?



Are you challenged with outdated controls and networks in your operations?

QUESTIONS

ASK YOURSELF ABOUT

Your production and profitability

-  **How is your site performing against your key performance indicators (KPIs)?**
-  **Can you compare machine, line or plant performance across sites?**
-  **Are you seeing performance discrepancies between your site and other sites that produce the same products?**
-  **What metrics do you want to capture that aren't being captured today or can't be captured with your existing system?**
-  **Can you not only measure OEE but also identify how to improve it?**
-  **How much can you save by identifying and reducing bottlenecks?**

QUESTIONS

ASK YOURSELF ABOUT

Your quality and efficiency



How do you report quality issues?



Is scrap a key business challenge that better production insights can help you solve?



How do you gain visibility as to where ingredients are in the manufacturing process?



How quickly can your quality operators create or build a quality plan?



How rapidly can you notify your manufacturing operations of a quality issue/concern?



Can you eliminate manual entry in favour of automated data collection?

Take your next step towards operational excellence

Visit our website to learn how to make the most of your actionable data.

Connect with us.    

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