Novotek

Food For Thought

How can food and beverage manufacturers survive the modern manufacturing landscape

Foreword

The food industry is undoubtedly one of the most important in the world, responsible for providing sustenance to billions of people globally. Even a slight disruption to food supply or processing can have devastating implications on a nation.

This is particularly true in Europe, with food manufacturing being the European Union's biggest manufacturing sector in terms of jobs and value. Not only is the industry important in sustaining the 508 million people in the EU, it is also a key export sector.

Despite this importance, the food and beverage industry faces several challenges that threaten its effectiveness, competitiveness and value. A challenging blend of ageing equipment, ever-shifting consumer demand and price sensitivity have left a bad taste in the mouth of food manufacturers, subjecting them to slimmer profit margins, productivity dips and stressful market conditions.

It's no secret that automation and optimisation technologies, be they process controls, robotics, or manufacturing IT systems, will play a central role in helping the industry overcome its issues.

A recent food and drink report from consultancy firm BDO noted that 54 per cent of food businesses were increasing investment in automation. So, manufacturers are acutely aware that moden plant technology is advantageous, but there are questions about whether the systems being invested in are right for the business.

If food businesses are to maximise their profitability and remain competitive in a volatile market, they must choose the right technology to help them. In this whitepaper, we outline how food plant managers can choose the right system for their business, whether they are an innovator or simply someone looking to meet a set price point. We also look at how these systems can overcome the big issues facing the industry in 2019.

We've put this whitepaper together, based on Novotek's extensive experience in the food and beverage industry, to provide effective insight into automation and operations management IT. With the guidance provided in this whitepaper, food plant managers can choose the right system for the right reason to ensure their business is fighting fit for the future.

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The state (and future) of Europe's food and beverage industry

In its Data & Trends: EU Food & Drink Industry 2018 report, FoodDrinkEurope, an NGO representing the EU's food and beverage industry, noted that the sector's annual turnover was €1,109bn. One tenth of this (€110bn) was generated through export, with the EU having an overall share of almost 18 per cent of global food exports. These figures, along with the fact that the industry employs 4.57mn people to the tune of €101bn in wages each year, make the sector one of the biggest and most economically important in Europe.

More growth is needed, however. In 2015, the United Nations agreed its 2030 Agenda for Sustainable Development, including its sustainable development goals (SDGs) that it refers to as "the blueprint to achieve a better and more sustainable future for all". Food is critical to achieving these goals, with zero hunger being goal two and good health and wellbeing — something that diet will significantly contribute to — being goal three.

With a projected global population of nine billion by 2050, food businesses will need to operate efficiently if we are to meet the UN target. This is particularly important because the growing number means that, according to the Food and Agriculture Organization of the United Nations, one hectare of land will need to feed five people by 2050 — three more than it did in 1960.

Achieving this involves reducing food waste in the supply chain, improving manufacturing effectiveness and delivering higher efficiency.
This is because it will help businesses not only
make the most of ingredient yields, but also
because greater efficiency means greater flexibility to manage conflict in the supply chain — notably between retailers and manufacturers.

Often, we find that retailers push margins to their limits to attract customers. This price sensitivity affects manufacturer revenue, but retailers still expect the product to be produced without compromising its quality or safety. To be able to offer this financial flexibility, manufacturers must run operations at better margins.

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However, food and beverage businesses are widely known to generate relatively low margins , especially those who have historically run a limited, non-premium product line. Meeting retailer demands for price control, while also managing an increasing pace of product and packaging innovation creates pressure to maximise and adapt the use of existing plant equipment. Many plant managers attempt to do more with less, keeping capital expenditure (CAPEX) to a minimum and persisting with existing systems. Understandably, these systems are not as effective or efficient as newer ones, which limits the overall equipment effectiveness and performance of the plant. Changing this mentality of low margin equals low capital investment is one of the biggest challenges for the industry for 2019.

This is particularly important as food manufacturers continue their fight to keep pace with consumer interests, which is another big hurdle for the industry. As FoodDrinkEurope touches on in its report, there are many reasons why consumer interest is so difficult to pin down in modern times.

The report highlighted five key areas that underpin food innovation, but they can easily be considered drivers of consumer interest:

- **Pleasure — exoticism of the product, the perceived level of fun and playfulness etc.**

- **Health — paying special attention to the health benefits of foods, or dietary considerations**

- **Physical — the aesthetics of the product**

- **Convenience — how easy a product is to prepare and how much time is saved**

- **Ethics — driven by Fairtrade products or products that don't use controversial ingredients such as palm oil**

Appealing to these interests requires production line flexibility for manufacturers. For example, a manufacturer that creates a protein-enriched variation of a product will need separate processes to the standard product. This can introduce changeover downtime or make managing production more complex but does open the brand to additional consumer segments.

Specific territories in Europe do have additional market stressors, such as the implications of Brexit impacting UK food businesses, but the three problems of price sensitivity, using legacy systems and wandering consumer interest remain consistent across regions. Technology does pose a partial solution to all three, but plant managers must be ready to invest intelligently

Identifying your technology adoption profile

There are two main profiles: the innovator and the price-sensitive purchaser.

Due to its stringent regulation and low margins, the food and beverage industry has traditionally been a slow adopter of new technologies. In recent years, we've seen this begin to change as more businesses open up to the possibilities and opportunities presented by automation and new tech. We've seen this with non-traditional vendors such as Microsoft and IBM, making moves into the factory side of the sector, but we have also experienced it first-hand in Novotek's growing work with food businesses across Scandinavia, the UK and the Benelux region.

This isn't a trend exclusive to Europe either. In its 2018 State of Food Manufacturing survey, US trade publication Food Engineering found that respondents noted automation as the single biggest trend in food manufacturing operations. This was by quite a margin too — 55 per cent of respondents cited this as the biggest trend, with efficiency coming in second with 15 per cent of respondents citing it.

The food industry's late move to automation and plant IT is both a blessing and a curse. While on one hand it does mean that the quality and effectiveness of automation is far higher than it was when other leading industries, such as automotive, adopted it, the late adoption means many food plant managers are still experiencing the teething problems and steep learning curve endemic to any new technology.

Food and beverage plant managers can overcome these barriers by developing an technology adoption profile for their company. This involves assessing your processes and determining what type of business you are, with particular attention to what you ultimately want to achieve.

There are two main profiles: the innovator, who wants to experiment and find new ways of operating and developing better products, and the "price-sensitive purchaser", who has the main aim of reducing downtime, minimising operating expense and maximising margins by making operations as efficient as possible. Neither is, strictly speaking, better or more effective than the other. It simply reflects a company's strategy and values, allowing them to make better investments.

Identifying whether your business is bold in its objectives or more risk-averse influences the types of enabling technology that you should invest in as a first step into process improvement.

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Automation for innovators

Setting automation and optimisation system strategies is relatively straightforward for innovative companies. To truly innovate, a plant manager must value insight into the range of factors that affect reliability and quality and see the full picture of their plant as new materials and processes are introduced. These manufacturers see that industrial analytics and data collection are valuable tools, and will prize connectivity to objective data sources such as control systems and sensors.

The first step to implementing these systems is to ensure the production facility is fitted with equipment that will generate and record data points in detail. At its most basic, this should include a supervisory control and data acquisition (SCADA) system connected to field controllers for an overview of the process itself.

With these measures in place, an innovative company needs a means of accessing and analysing this data from different perspectives, so everybody from the factory worker and technical programmer to the plant manager and chief executive can review and understand it in ways that are pertinent to their work andthe business processes

of their teams The highest performing innovators tend to rely upon a manufacturing execution system (MES), which works alongside their ERP and supply chain systems to manage production activity, while simultaneously collating data from sensors and automation against that tracking "backbone" to serve a number of uses, such as:

- **Automating the feed of information between enterprise and plant floor systems**

- **Digitising core production activities for automated SOP delivery and feedback of activity**

- **Improving coordination between departments with real time order status and near-term order completion projections**

- **Performance analysis and KPIs for throughput, quality and asset reliability**

- **Digitising quality and compliance activities**

Automation for innovators

The main purpose of these systems is to offer insight, which is the key to unlocking more value from processes. If everything is connected, then everything is visible, including the unexpected correlations between the interactions of materials, processes and people. A fault in a pump might lead to inaccurate filling of a batching vessel, which could in turn lead to quality issues and unexpected failures in a mixer or conveyance system if the initial mix is more viscous than expected, for example. Being able to quickly connect the dots between machines used, the quality of work in process goods and machine events means faster recovery time, and less lost production. A more positive aspect is that manufacturers can capture the combination of factors that lead to better than expected throughput and quality – and then systematise how those conditions are created (in some industries this is called capturing the "Golden Batch" profile).

Using an MES does offer a distinct advantage in this regard, as its access to data throughout the plant and supply chain means that it can develop highly realistic digital representations of operations. These digital twins draw from performance data, both in real-time and historically, to create a detailed map of physical assets and processes. With this insight, plant managers can effectively and accurately monitor and control these assets, while also running predictive simulations, using intelligent algorithms in the program itself to test changes with a high degree of reliability.

This is where innovative companies can truly be innovative. It allows them to see how their systems interrelate and operate, allowing them to experiment by changing digital twinning programs to identify new, effective ways of running their operations. Whether this means swapping production schedules to maximise results or introducing new product variants into production plans using identified capacity, the insight of a digital twin gives plant managers the power to revolutionise their processes in novel ways.

Enabling technology for meeting price points

The second automation profile is for businesses that value efficiency and operate with a mentality of making more with less. This is a popular mantra for many businesses in the food industry, which is why automation systems and even robotics have recently become of interest across the sector.

If you're a price-sensitive purchaser, your main focus will be on drawing as much value from each asset and process as possible. This helps the business remain profitable despite fluctuating market conditions, whether it's price sensitivity from retailers or shifting demand from consumers. As such, the automation systems for these companies will be focussed on optimising asset performance, boosting overall equipment effectiveness – creating predictable outputs that allow for better meshing of the factory with the rest of the supply chain and logistics machine.

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A starting point for this, as with innovative companies, is to have insight into processes and equipment. For cost-conscious companies, the best value arguably comes from using an Internet of Things (IoT) platform such as GE Digital's Predix that offers extensive benefits for managing assets. Predix is a particularly good example because the platform includes a specialised machine learning artificial intelligence (AI) that can help managers and engineers to automatically adjust processes if they operate beyond traditional parameters, while also allowing plants to introduce predictive maintenance.

The machine learning maintenance of Predix effectively analyses historic data from a large number of input data sources and monitors assets in real time. The algorithms spot trends and correlations between data, which may not be immediately obvious to workers, and highlight it to maintenance and continuous improvement teams. For example, if a machine goes offline on occasion and these instances coincide with specific members of staff servicing them, or certain products being processed, then the platform can highlight this to the manager, who can accordingly assess the engineer's training or determine if a product line should use a different machine.

Because the platform sends alerts to maintenance engineers and managers, it means that less work hours are devoted to spotting trends or conducting unnecessary maintenance. The platform effectively guides the maintenance schedule to a predictive, as-needed basis, freeing up managers to focus on other tasks while keeping downtime to a minimum.

Further to this, we're seeing augmented reality (AR) play an increasingly useful role in speeding up maintenance work and helping field-service staff identify component problems faster. An example of this is with PTC's AR technology, which is a low-investment technology that allows maintenance engineers to use their smartphone to view a digital render of components on a system. This render can be linked to the company's IoT platform to visualise real-time performance data, while also showing engineers which specific parts need attending to and how to access them. Maintenance managers can use this same technology to remotely support a factory engineer to resolve certain issues.

These technologies effectively allow a plant to keep its systems running smoothly, minimising downtime and bolstering productivity, while allowing the plant manager to prepare for uncontrollable market conditions.

Enabling technology for meeting price points

Irrespective of which automation profile a company fits, it's clear that automation technologies possess the potential to help food manufacturers overcome the issues ahead of them.

Whether it's innovating new flavours or operating highly efficiently to accommodate lower retail prices, automation will be pivotal in keeping food brands appealing to consumers and retailers alike, tackling two of the biggest universal challenges in Europe's food and beverage sector. The final challenge of ageing equipment will be resolved as a by-product of adopting new technologies, which both highlight ineffective equipment for which overhaul or replacement is needed and add new effectiveness to existing systems.

Food and beverage production will always be a demanding industry, but there's no reason why manufacturers can't make their margins healthier and create flexibility within their factories. With the right approach and the right technology, Europe's food industry can stay fighting fit for years to come.

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