From traceability to efficiency
Automation is the key...

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CEO, Godrej Tyson Foods
From traceability to efficiency

Automation is the key...

Food & beverage (F&B) companies are expected to increase their investments in automation & control solutions to meet new regulatory requirements, increase efficiency in manufacturing and meet their supply chain & distribution objectives. In addition, the need for timely tracking of the goods is also likely to prompt growth of automation solutions. While companies are using manufacturing execution systems (MES) to bridge the gap between plant-level control and business systems automation, robots are revolutionising food packaging. Rakesh Rao explores the world of automation as manufacturers use it to gain a competitive edge in the marketplace.
ight profit margins in the food and beverage (F&B) industries are encouraging companies to invest in automation & control solutions to improve their efficiency and cut down on production costs. As the market is increasingly attuned to the advantages of automated production, there is considerable potential for growth in this sector. "Deployment of automation solutions in the global F&B industry remains strong, with the current annual growth rate of approximately 5 per cent. Simulation, optimisation and design software – used to improve production performance – are by far the fastest-growing categories. Plant asset management software, collaborative production management (CPM/MES) software, and AC drives are also witnessing a strong growth," informs John E Blanchard, principal analyst, ARC Advisory Group.

According to Baban Bhuriya, business development - Simatic IT MES, Automation Systems, IA-DT Group, Siemens Ltd, "Today, automation as a concept is well-accepted and appreciated by the manufacturers in the F&B industry. Most systems and solutions sought by the manufacturers are specified to be with built-in automation. The solution may require the use of classical programmable logic controllers (PLCs), distributed I/Os, operator interfaces, supervisory control and data acquisition (SCADA), vision systems and radio frequency-based identification systems. There is also a drive to migrate the non-automation systems/machines through retrofits & conversions to bring in automation concepts and to leverage on the benefits they offer."

Still at the outset

Although the importance of automation is well-understood, F&B companies are still lagging behind (as compared to other industries) in investing in it. "Customers (food processors) often fear of losing control of their processes. It is sometimes difficult for these traditional masters of food production to realise that they cannot be everywhere at all times in a huge plant. Responsible quality officers in plants are often concerned that automation and inline quality controls might take away their jobs, which in reality is not the case. It is important to make them understand that all technologies are not demons. One needs to see automation as a choice to improve teamwork by using it for one's specific need. Stable quality, high yield and better use of raw material, capacity & energy should be the ultimate target," states Holger Schmidt, Global industry manager - Food and Beverage, Endress+Hauser Messtechnik GmbH+Co KG.

He further adds, "Multinational companies would like their branded products to be developed in the same way across the globe. Well set-up systems allow companies to offer services even to remote places from their home base."

Hence, there is a need to highlight the positive impact of innovative automation solutions on companies in the F&B industry.

Safety matters

One of the most important reasons for the need of automation in the food production is the scale/size of the plant. In earlier years, the baker or brewer made his product from the beginning to the end, and was aware of all the steps, and thus, was in control of all processes.

"Today, production happens in shifts, sealed processes and demand high flexibility. Hence, it is important to ensure that the product is processed in the right manner. Automation, mainly based on inline measurement, can ensure that correct recipes are used and consistency is maintained. It shows how safety related operations, like pasteurisation have worked. Automated systems control all safety & quality related measures 24/7, and deliver data about the processes to help in tracking and tracing. Fully integrated systems give an opportunity to improve the necessary maintenance and calibration of sensors, based on interactive

Baban Bhuriya

business development - Simatic IT MES, Automation Systems, IA-DT Group, Siemens Ltd

Once some key F&B manufacturers adopt these solutions, we will see a real momentum in the demand for MES solutions in India. Legal and regulatory requirements may compel manufacturers to implement these solutions even faster.
Holger Schmidt
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Inventory control systems help optimise logistics. It is important to have all material available without spending much on storage, or even worse, risking the danger of spoilage. Inventory control systems help organise this efficiently, or integrate suppliers in doing so.

"Software/sensor systems. With these, the control system is checked regularly and one can know if it is still working fine," explains Schmidt.

Global sourcing & distribution, increasingly rapid distribution, and the age of instant information can make even a minor non-life threatening, product quality incident devastating to a company. "Despite all the efforts deployed to ensure optimum product quality and all the precautions taken day-by-day, incidents do occur where inappropriate products reach consumers. Such products must be rapidly identified, located and removed from the market. Consumer confidence must be maintained and financial impact minimised. It is generally accepted that a company has 24 hour to identify the scope of the incident and provide an effective response plan in order to maintain consumer confidence. Lacking enough granular information, most companies broaden the scope of a product recall to ensure that the products do not reach consumers. More granular traceability is needed so that the manufacturers can limit financial loss and maintain consumer confidence in the company and the brand. The rise of global terrorism, growth of product counterfeiting, and the increasing number of high-profile incidents add to the continuing increase in business and brand value risk," observes Blanchard.

He further adds, "Automated record keeping of product genealogy from ingredient sourcing, throughout production & packaging operations, and the real time visibility of this information to everyone impacting product quality are improving the assurance of product quality and reducing brand risk. In fact, this is one of the main drivers in the purchase and deployment of CPM/MES software & systems in the F&B industry."

Agreeing with him, Linda Onnen, global market director - Consumer Products & OEM, GE Fanuc Intelligent Platforms, says, "Automation in the manufacturing process layered with MES software provides the framework for end-to-end product traceability from farm-to-fork. Furthermore, capturing and correlating process-, machine- and environmental data (temperatures, humidity, etc) lays the foundation to realise significant financial benefits. Moreover, process & machine tuning can be prioritised and executed more effectively with this data in hand."

An integrated approach
During this global economic crisis, F&B manufacturers are challenged by high raw material costs, rising energy prices, margin pressure from retailers, food safety concerns and rapidly changing consumer demands. "F&B producers are stressed to respond quickly to market changes requiring increased flexibility in manufacturing. MES provides the information and analytics to effectively address manufacturing issues - right from improving the overall operational effectiveness of manufacturing to produce products in the most cost-effective manner with the lowest amount of energy resources, to maintaining the value of the brand with product genealogy to assure its safety. MES solutions deliver manufacturing improvements that drive profit straight to the bottom line," opines Onnen.

MES is a system that manages the manufacturing resources (man, machine and material) in real time in the most optimal way. It bridges the gap between the business systems and shop floor applications & control systems, keeps track of the production in real time, logs the data during the production, and gives access to operators, supervisors & plant heads to keep them updated and in control.

"MES in F&B can be applied to many areas of the plant like primary & secondary processes, quality assurance, warehouse & material storage locations, etc. At a functional level, the areas of applications can be a manufacturing information system, overall equipment effectiveness & down-time management, tracking & tracing, genealogy of the manufactured products, packing & line management, quality integration into production processes, etc," states Bhuriya.

He further elaborates, "Siemens sees particular benefits for customers integrating quality processes with production processes, and has all offline, online and online quality management functionalities in store. Also, the integration possibilities to the business layer – or interoperability capabilities – are of utmost importance,
in order to optimally synchronise the business and being able to deliver at the right time, to the right customer, with the right quality order."

Explaining the importance of MES, Blanchard says, "Many systems can collect, store and analyse data electronically. However, many of these systems have not enabled performance improvement and better assurance of product quality in production operations because the data is not real time and visible to factory floor personnel who can act upon the data promptly & effectively to improve performance and ensure more consistent product quality. The recently developed CPM/MES systems with vertical industry-focused functionality and simplified integration with business systems like ERP, are providing significant performance and product quality improvement benefits to F&B manufacturers."

**Growth drivers**

The F&B sector promises huge growth potential for MES systems, as the need to comply with new regulations and timely tracking of goods is prompting companies to invest in automation solutions. Bhuriya says, "It is on the agenda of every manufacturer to calculate and monitor the return on investment on the products and systems installed in his plant. Apart from this, factors like flexibility in production, speed of response to constraints & exceptions, uniform availability & access to accurate data, supply chain efficiency, etc. are the other contributing factors for growth of MES. Manufacturers also attach increasing importance in using the same systems, allowing to introduce the same standard operating procedures and the same reporting throughout the company, or over different regional sites. This is why there are many enterprises in the F&B sector that have started 'harmonisation' projects, which in the end will work beneficial on the total cost of ownership (TCO) of manufacturing IT."

**Linda Onnen**  
**global market director - Consumer Products & OEM, GE Fanuc Intelligent Platforms**

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While global food processors are increasingly using MES, it is demand in the Indian F&B industry that is slowly picking up. Bhuriya says, "Once some key F&B manufacturers adopt these solutions, we will see a real momentum in the demand for MES solutions in India. Legal and regulatory requirements may compel manufacturers to implement these solutions even faster."

**Robots at work**

While MES has increased the production efficiency in the F&B industry, robots are revolutionising food packaging. One of the biggest barriers for companies not taking up robotics is because of the perception of high costs involved. However, recent technological advances have made robots more cost-effective, providing viable alternatives for almost any function of the food packaging operation, like pick & placing, feed placement and palletising.

Onnen explains, "Robotic usage is increasing in F&B manufacturing, particularly in the packaging area where it provides flexibility in building custom- or mixed-case pallets that are challenging for traditional high-speed packaging lines. In addition to fulfilling retail requirements for custom pallet shipments, robots reduce packaging errors, damaged products and labour hour."

The ability of robots to perform many key tasks has increased considerably. Better technology means robots to be more flexible and offer a whole range of options within the production process, particularly picking & packing, and not just for end-of-the-line palletising. Robots can also help keep energy costs in check and improve hygiene by less human intervention.

"New vision control and sensor systems have improved the capability of robots dramatically. They are more adaptable and can be employed on any number of tasks on a production line. Robots can be used for end-of-line routine applications. They can also be used for primary processing and repetitive operations because they can work out the height & width of different items. This technology has been tried and tested in other industries and is now available in the food & drinks sector as well," elaborates David Cheeseman, commercial director, CenFRA Ltd – Centre for Food Robotics and Automation, UK.

Incorporating robotics into a line can play a pivotal role in laying the groundwork for a sustainable future. During the current economic situation, experts believe that investing in robotics
David Cheeseman
commercial director, CenFRA Ltd

Robots are more adaptable and can be employed on any number of tasks on a production line. Not only are robots used for end-of-line routine applications, they can also be used for primary processing and repetitive operations because they can work out the height & width of different items.

could be a positive move that will help companies reduce & control operating costs, and provide a platform to achieve long-term growth in the business as well.

On the horizon

Globally, companies are using automation not just to make their processes & supply chain efficient, but also to utilise energy optimally. "Sustainability is an emerging trend in F&B manufacturing, driving automation needs for energy monitoring & control, water usage monitoring & reduction, waste-to-energy reclamation and overall manufacturing efficiency improvement," opines Onnen.

Schmidt informs, "We are still improving the technology to ensure best use of raw materials and energy. More companies are using inline quality controls, enabling automated system to adjust the process, if the result is not in the expected line. This is mainly due to the fact that reliable and cost-effective process sensors are now available to measure values like density, viscosity, turbidity, particles, chemical or physical features."

Energy monitoring systems help to optimise the use of often most costly part of the food production - compressed air, steam, water, refrigerant, wastewater, etc. Optimisation saves money without the quality level being dropped. Schmidt feels that automation systems can support to show trends, make backgrounds visible and decisions easy. "Inventory control systems help optimise logistics. In the age of just-in-time production, it is important to have all material available without spending much on storage, or even worse, risking the danger of spoilage. Inventory control systems help organise this efficiently, or integrate suppliers in doing so," he adds.

According to Blanchard, some emerging trends in automation in the F&B industry are:

- More sustainable manufacturing and packaging
- Increased deployment of production & packaging operations management software
- Increase in product quality due diligence and tracking & tracing requirements & systems
- Increasing plant physical security requirements from retailers and regulators
- Better automated bi-directional exchange/visibility of information between business and factory floor operations. This includes more NEMA4x HMIs on the factory floor providing information directly from and to the business system for order scheduling, order status, performance metrics, etc

Given the high levels of investment in the F&B industry in Asia, the growth prospects for automation technology looks promising both in the short as well as long term. Automation vendors are also gearing up to tap this opportunity. "F&B is the largest industry for Endress+Hauser. Having established in Europe, we are now eying opportunities in emerging markets. This year will not be easy for us, as large projects are kept on hold. But in the long term, we will improve our position in regions like India, Middle East and South America," informs Schmidt.

Emerging opportunities

Labour issues, the need for traceability, food safety and competition from low-cost global manufacturers are fuelling the growth of automation in the sector. Growing appreciation of new technologies and their benefits is likely to encourage customers to replace their existing automation and control systems with new ones. Automation will allow food manufacturers & distributors to achieve a consistent pattern of positive growth and return on equity through manufacturing leadership.

"TCO becomes an important consideration in today's challenging environment, as companies are looking beyond the initial equipment acquisition cost to understand the flexibility available through a given equipment choice. Equipment builders are responding with solutions that offer future expansion to handle not only today's requirements but also future needs," concludes Onnen.