food processing &
packaging solutions

» TNA feeding ambitions

a **TNA** whitepaper

just-in-time

4 steps towards a leaner production process

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With over 20 years of sales, marketing and business management experience within the food industry, Michael is responsible for further developing TNA's systems and processes in order to meet the global needs of TNA's expanding customer base. Much of this rests with supporting and encouraging global and local collaboration aimed at helping food manufacturers improve productivity and performance.

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introduction

In the fast-paced and convenience-driven snacks market, food manufacturers are increasingly looking for solutions that will simplify their production process, reduce costs and maximise production capabilities – all without jeopardising consistency in product quality. To meet such requirements, more and more food processors are turning their attentions to the just-in-time (JIT) philosophy as a way to achieve these goals. Originally, JIT manufacturing simply referred to the efficient production of goods to meet customer demand. Today, the term has come to mean so much more. Emphasis is no longer just placed on production efficiency, but also on plant efficiency, quality control, processing and packaging equipment, and supply chain security.

Intelligent equipment that is designed with simplicity in mind can help manufacturers achieve a more optimised, lean and efficient process. As such, the food processing and manufacturing industries are opting more and more for start-to-finish solutions that improve efficiencies and allow for a just-in-time production process.

So, how can manufacturers in the food industry apply a just-in-time philosophy to their processes to achieve maximum impact? Here are our four steps to success.

just-in-time

JIT is a Japanese manufacturing philosophy which has been applied since the early 1970s. The model was first perfected in Toyota manufacturing plants before gaining prominence and recognition worldwide. Originally grounded in the need to meet customer demand in a timely fashion, Toyota realised early on that they required involvement from everyone in the business, as well as optimum procedures for maximum output efficiency, and integrated programmes to meet quality standards. This realisation allowed the philosophy to further evolve and grow, encompassing elements integral to plant efficiency, quality control, sustainable operation and supply chain security.

When properly adapted to a specific organisation, JIT manufacturing has the capacity to strengthen a company's overall competitiveness in the marketplace. JIT manufacturing can be practised on its own or as one step in a lean manufacturing process.

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step 1

ensure plant efficiency

Complete plant efficiency is at the core of just-in-time manufacturing. This also helps achieve one of the main JIT benefits – cutting costs. Rising costs of raw materials, labour and energy, coupled with increased regulatory pressure, means that optimising efficiency is a key priority for the industry. Maximising overall equipment effectiveness (OEE) is critical to improve efficiency throughout the manufacturing process. OEE quantifies how well a manufacturing unit performs relative to its designed capacity, during the periods when it is scheduled to run. This is important both for the production line as a whole and the individual equipment within the line. For example, OEE can have a dramatic impact on overall costs since a connected, dependent system with no buffering will pass on all its inefficiencies to the next system. This can result in low line efficiency and hinder a JIT process. In addition to this, it's vital that the equipment incorporated into a manufacturing line fulfils its production requirements, whether it has a single function or is multifunctional. In a snacks plant, for example, this could be in relation to the product's bag size or the variety of flavourings run per shift.

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In today's ever-changing manufacturing environment, food producers often need to change the products they are producing or the flavourings they are using at a moment's notice. Ensuring the equipment can meet this need is critical to maximising efficiency on the line. Quick changeover times are essential in the manufacturing industry. Speeding up these processes helps manufacturers minimise downtime and maximise productivity. Coupled with this, investing in simple, high performance equipment will reduce the time needed to set up the machines between different products, while optimising uptime to increase overall product output. Features like fewer removable parts and easy to clean surfaces can also aid product changeover, as little time is spent making the equipment hygienic to process another product.

Collecting detailed and reliable data from as many parts of the production process as possible is key to monitoring the efficiency of each machine as well as overall efficiency of the complete production line. A well-planned, accurate setup with regular maintenance is important to achieve optimum process efficiency.

Control systems, such as programmable logic controllers (PLC) and supervisory control and data acquisition (SCADA) systems can be easily integrated into existing production lines, helping to expose any existing inefficiencies. Once analysed, data from these systems help plant operators target specific areas in which inefficiencies are most prevalent.

Examination of this data then enables a customised plan of corrective action to be proposed and implemented. This may take the form of the installation of additional plant

sensing devices, the replacement of inaccurate pieces of equipment, or tightening and interlocking of control parameters within the existing PLC application code. All in all, the result will be a more efficient production process.

2 step 2
maintain quality control

When incorporating a just-in-time production process, the amount of product produced is specific to consumer demand. Without excess production or an inventory to rely on, it is essential to maintain quality control over products to minimise waste as much as possible. One way to achieve this is to incorporate traceability technology into your line.

Efficient traceability methods make it possible to identify the date or time and the exact location of any issue that arises throughout the processing stages. Risks can be identified and traced back to the source to isolate the problem, helping prevent severe issues such as contaminated or incorrectly packaged products entering the value chain. It can also save time should product recalls be needed as well as prevent costly waste by differentiating between products that are still safe and those that are not. Date coding all products that move through the production line is crucial. Bar codes are a simple and cost-effective way to implement traceability at the item level. Production data, such as time to market and product quality, can be built into the code to allow for easy tracking of each product.

Avoiding environmental contamination is vital to maintain quality control and efficiency throughout the manufacturing plant. Selecting equipment with limited moving parts and which utilises easy clean materials like stainless steel is an effective way to achieve this: it eliminates the lengthy downtime required for cleaning and reduces the risk of allergens and contamination.

The sanitary design of TNA's systems, for example, supports easy cleaning of the production line. All the company's products are made with food grade stainless steel to offer a resilient and simple to clean machine. What's more, they are built with minimal moving parts to ensure that products and residues do not collect between elements, which could lead to Hazard Analysis Critical Control Point (HAACP) or QA issues.

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To ensure an efficient manufacturing process while upholding consumer safety, operations and reputations, the topic of traceability must be recognised as an important part of just-in-time manufacturing. Indeed, associations and rule books have been established to tackle this very issue. The HACCP rules, for example, have been the defining standard for food safety management since the 1960s. It puts the onus on food manufacturers to prevent food contamination, rather than just responding to cases once they have occurred. The Food Safety Modernization Act (FSMA), introduced by the FDA in 2011, was designed to establish a risk-based and global systems approach to food safety, to provide greater safeguards to

the industry and consumers. And in the EU, implementing traceability systems has been compulsory since 2002 when the General Food Law came into force. These regulations make it clear that manufacturers must implement some form of traceability system to operate a safe and effective JIT process on an international scale.

3 step 3
select the right equipment

Having the right equipment with the right technology and features is essential for just-in-time manufacturing. With the right equipment, you'll reduce waste, minimise downtime and maximise the sustainability of your production line – all essential elements for a JIT process.

Selecting effective equipment can also contribute to waste reduction. The tna robag® 3ci series packaging system cuts waste up to 30 per cent while offering a corresponding 30 per cent increase in productivity.
The company also has extensive knowledge of product handling and product transfer which can help minimise product breakage to 0.3 per cent or lower. TNA's distribution solutions also come with a first in, first out feature that helps keep products fresh as they move through the manufacturing line, helping prevent spoilage.

Such intelligently designed equipment can contribute to lower raw material use too.
For example, oil is one of the most expensive ingredients in food manufacturing. In the case of snack processing, misting, overspray and giveaway are key problems. To limit waste and maximise profitability, manufacturers need a fully engineered solution that provides consistent oil spray to all parts of the production band.

Eyebrow technology from TNA enables spray patterns to cross over from each disc, achieving coverage from all angles. Plus, the company's spinning disc solutions can handle up to 2.5 litres of oil per minute per disc, of which 20 per cent is accurately sprayed onto the product. The remaining oil is captured, channelled back into tanks, filtered and re-used resulting in lower waste and raw material costs.

For food processors interested in a JIT process, incorporating innovative frying technology is a must to keep operating costs lower, ensure product quality and boost efficiencies. For example, continuous oil filtration systems help remove particulate material from the fryer during cooking. Typically, the oil is passed through a filtering system to remove both large and fine particles. The filtered oil is then blended with fresh oil and pumped back into the machine to return oil levels to the optimum level. This helps reduce the amount of money spent on changing out oil and produces fried goods of optimum quality, making just-in-time manufacturing possible.

Innovative solutions and producing high-quality products also helps limit waste, which is not only required for JIT but also has a positive impact on a company's sustainability – a notable benefit of JIT. Material waste is a challenge for any plant manager and can affect the entire production cycle. By installing sensing equipment at selected points, plant operators can monitor and identify when product and material waste occurs. The logged data will also provide a detailed report to keep on hand for review, eliminating the risk of fines from regulators and supporting a safe and efficient JIT operation.

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To achieve successful just-in-time production, processing and packaging systems should also be energy efficient. TNA's conveyors, for example, are extremely energy efficient – it takes approximately one amp to run the tna roflo® VM 3, allowing packaging lines to significantly reduce their carbon footprint. The tna roflo® VM high throw conveyor vibrates at a natural frequency of 18Hz at 30 degrees for a stroke length of 10mm (±5mm) on a dimpled pan, enabling manufacturers to easily improve their

green credentials. Effective control systems facilitate the monitoring of energy use and prevent unwanted emissions from packaging operations. This contributes to an efficient and sustainable manufacturing process that satisfies JIT criteria.

In today's environmentally-concerned climate, the right equipment featuring innovative technology will bring together efficiency and sustainability. Driven by consumer demand for greener, more environmentally-friendly packaging products as well as rising energy costs, plant managers require solutions and technologies that can help improve their productivity while saving money and reducing their carbon footprint – all natural steps to just-in-time manufacturing.

4 step 4

secure the supply chain

Tightening up the supply chain is crucial in achieving a JIT manufacturing process. There are several ways this can be achieved. Firstly, managers should think about partnering with a single-source supplier who is able to offer turnkey solutions for the complete production line. This simple step can save a lot of time and paperwork. For example, it provides a single point of contact, meaning plant managers get access to a complete range of technology, services and skills faster without having to spend extra time finding multiple suppliers to fill various manufacturing needs. A single-source supplier with facilities located around the world also deliver the added benefit of holding a global inventory of spare parts for faster equipment repairs and a decreased interruption to production flow.

In addition, the actual sourcing of spare parts and services when using a variety of suppliers can take a significant amount of time. Multiple calls to different representatives in a range of time zones regarding service schedules and shipping arrangements wastes time and hinders productivity. As a result, this can lead to additional downtime potentially harming the company's overall operational efficiency.

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Finally, solutions developed by a single-source supplier are generally designed, assembled and installed so that each component communicates more effectively with another component. This helps maintain production flow as well as just-in-time manufacturing goals. Standalone machines from different suppliers are often unable to operate at the optimum levels, reducing the overall efficiency of the line. Furthermore, different machines often employ different software. By working with a single-source supplier that has control system expertise, plant managers benefit from a greater visibility over their entire production line, ensuring movement between each production phase is seamless and any potential waste is minimised.

summary

Simplifying their production process while guaranteeing quality is the fundamental aim of food processors today. And by adopting a just-in-time approach, they are better placed to achieve such goals. A single-source supplier like TNA, who offers turnkey solutions, works in close partnership with food producers to help execute a lean and efficient process and achieve maximum benefits from their just-in-time manufacturing.

If you would like to find out how TNA can help you choose a system that suits your needs then please contact us at www.tnasolutions.com or email us at tnateam@tnasolutions.com

TNA is a leading global supplier of integrated food packaging and processing solutions with over 14,000 systems installed across more than 120 countries. The company provides a comprehensive range of products including materials handling, processing, cooling and freezing, coating, distribution, seasoning, weighing, packaging, inserting and labelling, metal detection and verification solutions.

TNA also offers a variety of production line controls integration & SCADA reporting options, project management and training TNA's unique combination of innovative technologies, extensive project management experience and 24/7 global support ensures customers achieve faster, more reliable and flexible food products at the lowest cost of ownership.

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