

IT'S NOT WHAT YOU'VE GOT... IT'S HOW YOU USE IT!

With so much process data being created on production lines today, **Suzanne Callander** reports on how confectionery manufacturers can best use this data to optimise their production processes.

Confectionery manufacturers are probably sitting on more process data today than at any point in the industry's history – this includes temperature and tempering curves, viscosity, moisture content, checkweigher and vision-inspection data, and cooling tunnel profiles. Despite the quantity of data now available on ever more digitised lines, a report from Schneider Electric – Beyond the Hype: Practical AI for Competitive Consumer Goods Manufacturing – estimates that 73% of industrial data still goes unused. This is one of the sector's biggest untapped opportunities, according to Neil Smith, CPG President, Schneider Electric.

"The instinct for many manufacturers is to chase higher line speeds to meet rising demand, tighter margins and growing product variety. But, because confectionery products are inherently delicate and can be sensitive to mechanical stress, timing, temperature and humidity, speed on its own isn't the answer," says Neil. "Push a line too hard without the right visibility, and you trade throughput for breakage, deformation and waste." The Schneider survey also found that UK food manufacturers appear to be more confident

in their data quality than the global average – 95.2% of UK decision-makers, compared to 85.7% globally. However, the survey also found that they are seeing higher production losses. An estimated 18.9% of manufacturing revenue is lost for UK food and beverage producers versus 17.2% globally due to downtime, waste, delays, rework or sub-optimal use of assets.

"These figures tell me that having confidence in your data is not the same as

acting on it," continued Neil. He believes that the key to successfully utilising process data is to get the data foundations right in the first instance. Much of the data on a confectionery production line will sit in unstructured, siloed, or incomplete systems that do not talk to each other. Before any AI or analytics layer can add value, data needs to be clean, contextualised and accessible. "Software solutions, such as the vendor-agnostic AVEVA PI System, show what's possible. It collects, stores, and contextualises high-frequency time-series data from sensors, PLCs, SCADA, and other OT sources into a 'single source of truth' for operations. "Without such solutions, you are building insight on sand," argued Neil.

The next step should be to focus on targeted improvements around the data points that move the needle, for example tempering and cooling tunnel temperature profiles, moisture content, checkweigher accuracy at depositing and packaging, and defect data from vision inspection. Employing AI-augmented vision to catch subtle coating or shape defects at full line speed, for example, is a high value, self-contained addition to existing automation

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systems that can replace offline or manual processes and will show a faster ROI than a plant-wide rollout.

Another important step is to treat the use of data as an organisational challenge as much as a technical one. Schneider Electric research points to the skills gaps in AI and data science as the single biggest barrier to scaling data-driven projects. "To

close this gap, we recommend training production and maintenance staff in practical data and AI skills and building cross-functional teams that bring together AI, quality and production specialists so adoption is shared and owned across the business," says Neil. Importantly, he also argued that overcoming industrial data challenges requires transparency about

what the technology does and does not do, and showing operators that solutions such as open, software-defined automation or Industrial AI can make their jobs easier as well as make the plant more productive.

Making transformation work

Confectionery manufacturers who are investing in connectivity and real-time data will usually be chasing the same outcomes - higher overall equipment effectiveness (OEE), shorter cycle times, better quality, and lower energy use. "Dashboards get built, but decisions will often still rely on gut feel and spreadsheets," says Dr Nuri Abukhshim, Digital Manufacturing Consultant, OMRON Industrial Automation Europe. "Budgets are spent, and a year later the KPIs look much the same. The technology worked, but the transformation did not."

According to Nuri, the reasons for digital transformation disappointment tend to cluster around the following recurring issues, and have little to do with the technology chosen:

- Process standardisation, or the lack of it: Connecting a machine to a data platform does not make the process





consistent, and data from an unstable process is unreliable as a basis for decisions.

- Digitising an inefficient process will simply accelerate the same problem: Skip process improvement and you get a faster, more connected version of existing inefficiencies.
- A gap opens between shop-floor data and management decisions: Data is collected at machine level but never reaches those responsible for capacity or quality targets, so the infrastructure serves reporting rather than decision-making.
- The state of the operational technology (OT) environment itself: A typical confectionery line includes machines from multiple manufacturers with different PLCs, some with no connectivity, and extracting reliable data requires IT and OT expertise that is often split across teams.
- Larger manufacturers will often carry a patchwork of systems built-up through acquisitions and one-offline investments: Adding a new platform, without first addressing this fragmentation will increase complexity rather than clarity.

Making good use of data

According to Dr Stuart Gilby, Director of FMCG at 42 Technology, a UK-based product development and manufacturing innovation consultancy, the competitive advantage lies not in having more data, but in making better use of what you have. Those who combine strong data foundations, targeted use cases, and operator engagement can

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significantly improve yield, consistency, and cost efficiency.

Stuart argued that one of the key challenges facing confectionery manufacturers trying to optimise their processes today is the need to gain a good understanding of what levers affect critical process and quality parameters. “Data needs to be tied to an outcome, but also to something you can control,” he says.

Offering an example, Stuart pointed out that, if the optimisation objective is fewer customer returns, then it is necessary to have unique traceable batch codes on each roll of packaging so that a product identified in the field can be related back to a manufacturing run. “Tracking which batches have been returned is a start, but a correlation to why they are being returned and what process you can control to reduce those returns is essential,” he continued. When optimisation targets are closer to the production line – such as uptime, waste reduction or scrap rate – data can be collected in real-time, but there will still be complexities to navigate

because it is important to capture all the relevant contributing variables.

Are ambient conditions recorded? Do you know which mould/tool/carousel position a reject came from? Do you know exactly what the settings were when the product was made and, crucially, if the setpoints were changed, what was the observation that led to the operator making the change? “This data then needs to be analysed to find what actual changes made an impact,” says Stuart. “Using statistical process control (SPC) with machine learning/AI in the right places can help. SPC helps maintain consistency, while machine learning can uncover non-obvious correlations such as seasonal humidity that can affect sugar crystallisation. Now the data has provided you with a desired outcome, you need to provide clear, real-time visualisation and simple decision rules to frontline teams. But if this doesn’t align with operating experience it may be distrusted.”

To overcome this possibility, Stuart advises that operators are given training to help them understand the how and the why behind the decisions. Starting with high-impact cases first will help build trust across the team.

To turn your data ambitions into reality, Stuart advises focusing on the following:

Think about your data governance as soon as possible. A clean data structure with consistent labelling is essential before advanced analytics.

Build slowly and adapt as you go. Start with pilot projects on one line or process to demonstrate ROI before scaling.

Use data scientists to accelerate your learnings. If you don’t employ any, consider technology providers or consultants but



ensure they will help upskill internal teams as part of the work.

Build it as one team to drive cultural change. Ensure your data scientists, operators and R&D specialists can all work together and use the same language.

Standardising communication

Production systems will only ever realise their full potential when data is available consistently, in a structured manner and in real time. The weak link for data sharing often relates to legacy and proprietary interfaces from different manufacturers along with heterogeneous data models. Minebea Intec believes that this is why it is integration, and not digitalisation of processes, that pose the biggest data challenges for confectionery manufacturers today. "The bottleneck to successfully

improving production performance is no longer data acquisition - but its consistent use," says Nils Hubrich, Product Manager at Minebea Intec.

To manage this complexity, Nils argued that standardised communication structures are needed to allow systems to be connected in a way that is mutually understandable and this is where OPC UA (Open Platform Communications Unified Architecture) comes in - OPC UA is a platform-independent machine-to-machine communication protocol that enables machines and software to securely exchange data and context, regardless of the manufacturer.

OPC UA provides the description of individual measured values and also provides contextual information. This allows a system to recognise what is

being sent and what it means and this can transform data transmission into genuine, interoperable communication - an essential prerequisite for automated processes and data-driven decisions. "The decisive added value arises when data is not only available but is clearly understood within the entire system context - this is precisely what OPC UA was developed for," continues Nils.

This approach is further refined through so-called Companion Specifications, which define industry-specific data models and ensure that different devices and systems use the same structures and terminology. In production processes such as weighing and inspection technology, this standardisation is key. Whether it's the precise weighing of raw materials, recipe control or quality assurance, critical process data is continuously generated and



ingredient quantities can have a major impact on product quality, yield, and production costs. Data-driven solutions that are able to provide centralised recipe management and ensuring accurate formulation data is communicated directly to production can help improve consistency, reduce manual errors, minimise waste, and respond more quickly to changing ingredient costs or availability.

It is important to be able to make sense of the vast amounts of production data generated across a facility today. Too often, valuable information sits in siloed systems and so is not used to its full potential. The BRAIN2 software platform from Bizerba helps enable automatic collection and centralises production and process data, giving greater visibility into operations. "This allows teams to monitor performance in real time, identify inefficiencies, and make more informed decisions based on accurate data," says Craig.

Inventory management is equally important according to Craig. "Confectionery manufacturers need to maintain the right stock levels while controlling waste and ensuring traceability." For Craig, the key is connecting these areas together. "When formulation management, production data collection, and stock control are integrated into a single digital ecosystem, manufacturers can gain a clearer picture of their operations which enables them to improve product quality, increase efficiency, strengthen traceability, and ultimately make better business decisions based on reliable, real-time information," he concludes.

Ultimately, it appears that the confectionery manufacturers that will gain the greatest value from their process data will not necessarily be those collecting the most information, but those who are using it most effectively. Across every stage of production - from recipe management and weighing to quality inspection, environmental monitoring and packaging, the message remains the same - data only becomes valuable when it is accurate, contextualised, shared and can be translated into practical action.

Achieving this depends on strong data governance, standardised communication, collaboration between production, quality and IT teams, and giving operators the confidence and skills to act on the insights they receive. By taking a targeted, phased approach and focusing on solving real production challenges confectionery manufacturers will be able to use their process data to reduce waste, improve consistency, increase productivity and build the flexibility needed to remain competitive.

must be seamlessly integrated into higher-level systems - because even the smallest deviations will have an impact on product quality, material usage and regulatory compliance. "In weighing technology, minimal deviations often determine quality, costs and compliance - which is why it is so important that data is available consistently and without media breaks," says Nils.

The VDMA Guideline 40200 - which specifically applies the OPC UA Companion Specification for Weighing Technology - defines standardised data models and variable structures so that a load cell or a control system can be consistently integrated into existing production architectures, regardless of the manufacturer. This enables integration to become predictable - individual interface programming and time-consuming adaptations are reduced - and

production systems gain in transparency, flexibility and future-proofing.

Integration capability is also becoming increasingly important for the future expandability of production systems. Standardised communication will significantly reduce complexity, allowing systems to be commissioned more quickly, expanded more easily and operated more flexibly in the long term. At the same time, data availability improves along the entire value chain.

Recipe management

"One area where I can see significant opportunities for the use of process data is recipe and formulation management," says Craig Bennet, Solutions Software Specialist at Bizerba UK. Why? In confectionery production, even small variations in