AI – ON THE LINE

how advanced analytics and artificial intelligence are transforming the production line

by James Blackman
Editor, Enterprise IoT Insights
The pursuit of cheaper, faster, and more varied production is intensifying. Factories are bustling with innovation experiments, as industrialists are availed of ever-more sophisticated digital tools.

But the manufacturing sector is competitive, and its grab for innovation, to raise its members above their rivals, is highly secretive. Indeed, distrust runs so deep that innovation is not just happening behind closed doors but behind long black curtains, hanging ceiling-to-floor – behind closed doors.

Not even staff can be trusted, it seems. This is the story German firm Software AG tells, anecdotally, when asked why the car industry is not crowing, yet, about its paint-shop analytics solution, developed with German robot maker Dürr, and rolled out by at least two prominent – unnamed, but not hard to guess – German car makers.

“IT’s like a secret recipe,” explains Bernd Gross, the company’s chief technology officer. “They’re configuring these machines and testing how to optimise production, to gain a percentage here and a percentage there. But they have these black curtains – I am not even joking. No one can look in, except for the team closest to the machine.”

He goes on: “I don’t know what their experience is, but that’s how they work. They’re afraid someone’s watching. I saw it with my own eyes – curtains, suspended from 20-metre high ceilings. It looks bizarre. But they can’t change.”

In fact, Gross is talking about a visit to a plastics factory in the US, and not about his customers in the automotive sector in his home country. “IT’s not just paranoid Germans,” he jokes. But the effort the tale evokes, in terms of both the pursuit and secrecy, makes clear how jealously the sector prizes innovation on the production line. It is where the industrial magic happens, after all.

The effort the tale evokes, in terms of both the pursuit and secrecy, makes clear how jealously the sector prizes innovation on the production line. It is where the industrial magic happens, after all. With analyst forecasts say demand for edge-based computer power the revolution is spiralling upwards. Revenue from the sale of artificial intelligence (AI) chipsets for edge inference and inference training will grow at 65 per cent and 137 per cent respectively between 2018 and 2023, according to ABI Research. Shipment revenues from edge AI processing reached $1.3 billion in 2017, and will climb to $23 billion by 2023, it says.

ANALYTICS TYPES

But future numbers are less interesting that current stories, and we should start over with Software AG – just because it appears to have seized on the opportunity of new production-line analytics more successfully than most other (often bigger) brands. Indeed, the Darmstadt outfit ranked highest (with familiars like PTC and Hitachi, as ‘visionaries’) in Gartner’s latest review of the top industrial IoT platforms.

Its work with the ADAMOS (ADApative Manufacturing Open Solutions) collective – founded with Dürr, as well as fellow German machine makers DMG MORI, and Zeiss, specifically to develop high-end process analytics for industrial machines – has borne fruit, notably with the first pair’s paint-shop robots for German auto plants.

Dürr, which makes the robots, has reworked its DXQ equipment analytics programme with Software AG to record,
analyse, and eliminate faults in the painting process. The software has so far been rolled-out to 10 factories, belonging to a certain premium car marque. “It goes plant by plant. You need to implement the software and train the people. You can’t just push a button, and it’s everywhere.”

But it will be rolled out generally, reckons Gross, even as its first customer keeps stum about its impact. “It’s a tricky question. No one is really talking. I ask the same thing,” he says of his first client’s reticence. “But it’s so compelling, It will be done by most of them.” A second German automotive icon has already picked it up, he adds.

The solution itself is an elegant example of production-line pyrotechnics, which replaces manual on-the-hoof inspections with automated real-time cut-offs as soon as the spray job goes awry. “A lot of data is coming off these robots – two million kilobytes per day. We are evaluating 230 different signals from each, at any one point in time – out of 100,000 data points we are collecting.”

It is standard procedure, he explains. Two hundred and thirty data points are sufficient to correlate live errors in the process; the rest are weeded out in the ‘co-creation’ phase, with the ADAMOS trinity of software provider, hardware maker, and factory operator banging their heads together to finesse the analytics. “You don’t need everything,” says Gross.

Where typically car manufacturers run manual checks on every tenth paint job, and check over or respray the previous nine to be sure, the new system from Dürr and Software AG stops the line at once, showing the painting error and flagging-up the fault in the machine.

“We stop the process right away. The other nine cars are unaffected. And the operator knows exactly where the problem is, as soon as it arises – because the nozzle’s gummed-up, and there’s not enough liquid in the mix, or whatever it may be.”

The trickery comes in the algorithmic shuffle of three treatments of machine data, in streaming analytics, time-series analytics, and batch analytics. These are pooled in Software AG’s Cumulocity IoT platform – in this case, an edge-based version of the system that has turned heads at Gartner.

The first of these analytics tools, based on Software AG’s Apama product, is key: it embeds the rules (iterated through the co-creation process), analyses the data, and issues the ‘alarms’ as a live-feed off the production line. “That’s the real-time analytics part,” says Gross.

The time-series engine, based on its TrendMiner product, trawls historical data, as it arrives and as it is stored, to reveal the errors in the painting – “what happened when the job went out of sync; the patterns and the fingerprints”. These are rendered in a visual dashboard, for factory-line operators to take appropriate action, and re-spin the cycle.

The final piece, the batch analytics, organises the traditional ‘big data’ rules, as provided by any number of business intelligence (BI) programmes. Software AG’s innovation has been to create a ‘data hub’ interface that exposes the data, in this case from the auto-plant paint shop, in third-party BI engines such as Tableau and Microsoft Power BI.

“There are so many batch analytics engines around. We didn’t want to reinvent the wheel,” says Gross.

PARALLEL CASES

There are other powerful examples of how advanced analytics, verging on AI, is transforming the production line, whether in carplants or food factories. Quality assurance

“We stop the process right away. The other cars are unaffected. The operator knows where the problem is, as soon as it arises – because the nozzle’s gummed-up, or whatever.”

Bernd Gross, chief technology officer, Software AG
(QA), such as with paint shops, is a primary recourse for high-end analytics, and considers the product on the line directly.

A neat example – detailed in these reports before, but worth a second look – comes from Microsoft, via Swiss technology firm Bühler.

Bühler has developed an optical sorter to remove carcinogenic corn kernels, infected by a mould called aflatoxin, from the production line in food processing plants. In the Bühler solution, corn gets fed from a truck to a hopper, and into a chute, and falls at 3.5 metres per second as a waterfall-like corn-feed in front of an ‘AI-enabled’ camera setup.

The cameras project UV light to illuminate the grains; a telltale fluorescence shows up the aflatoxin, and high-speed air jets shoot contaminated kernels into the bin – as they fall! (The exclamation point is fully warranted.) The rest passes into shipping containers.

Microsoft is providing the analytics tools. Diego Tamburini, the company’s principal industry lead for manufacturing within its Microsoft Azure division, says: “We’re talking milliseconds; just imagine: the corn kernel is falling at speed, and the machine finds time to take a picture, process it, make a decision, and take an action.”

The Bühler solution, called LumoVision, processes 10 to 15 tonnes of maize – or an entire truckload – in an hour. It was tested with Italian agricultural cooperative Capa Cologna, and shown at Hannover Messe last year. The phone has been ringing off the hook ever since.

Another example of rarefied production-line analytics, achieving major QA gains compared with old manual techniques, comes from HPE and Foxconn, which have developed a machine version of Where’s Wally? to discern the manufacturing equivalent of striped hats in discrete electronics, and raise the alarm.

It is a symbiotic arrangement, using HPE edge components to automate the QA process on a Foxconn production line carrying HPE servers at a factory in the Czech Republic. The system, developed with video analytics firm Relimetrics, is being positioned as a support line for the standing workforce, to relieve it of duties it was never really qualified for in the first place.

“Things are getting smaller, things are getting more varied, and yet we need more precision,” comments John Gallagher, operations manager of Foxconn, speaking at the opening of HPE’s new innovation lab in Geneva earlier this year. Batch sizes are small and production is swift. The production line for HPE servers jumps to a new configuration every three or four units.

Human eyes are fallible, and increasingly unsuited to checking for assembly errors in shrinking electronics. “People miss a lot of things,” he says. The new edge system catches the faults before they cause delays, and makes good on Foxconn’s quality promise, a crucial consideration for any supply business.

These two examples take big data analytics to a new level, bringing higher-order intelligence to the automation of the production line. They both employ this technique of ‘computer vision’, whereby data from rapid-fire imaging is filtered through hard-worked algorithms at such a pace that the latency of the QA process is set to almost zero (‘real time’).

Or to effectively zero, at least. The wheat is sorted from the chaff (the bad seeds and assemblages, in these cases), without disrupting the rest of the production line. These twin examples advance the Dürr/Software AG setup insofar as they introduce video. But the impact is equivalent; the latter pairing has achieved the same by interrogating existing data, without introducing data-hungry video feeds, it might be noted.

Importantly, this capability to keep the production line humming is new. The disruption of laboured manual checks is reduced significantly by these AI solutions, and productivity and profitability are raised as a result. Which, again, explains the deathless pursuit (and paranoid secrecy) of industrial innovation, which is jumping with new digital tech.
AI has powerful potential to boost growth, quality, and productivity. But how fast can you unleash its power? KPMG can help you scale AI quickly to accelerate insights, automate processes, and enhance decision-making, all while inspiring human creativity. Learn more at read.kpmg.us/ai

Anticipate tomorrow. Deliver today.
The sector is awash with parallel examples of creeping AI-inspired digital change, not just in the field of QA. Some are almost commonplace, as with asset management and predictive maintenance – which the Dürr/Software AG also references, and which can be covered off even with simpler point-based analytics solutions.

Others, as with the clunking implementation of augmented and virtual reality (AR/VR) is more tentative – albeit irresistible, and building a head of steam. But AI-in-QA is arguably the ‘killer app’ for elite-level analytics in factories.

“Sometimes finding defects is not humanly possible. That is where it comes in – to inspect very microscopic integrated circuit designs, say. It is used in the live production line, rather than having 10s or 100s or even 1,000s of people doing QA at the back-end,” comments Viral Chawda, principal for innovation and enterprise solutions at KPMG.

REAL CHANGE

These cases, as detailed above, glimpse at real digital change, as described in the dream of Industry 4.0, which posits that everything inside the factory becomes fluid, and the supply side – to the production line, and back through the preceding supply of materials – jumps in lightning response to the vagaries of demand (rather than to the availability of supply).

The factory, in the middle of this ‘demand chain’, has come full circle, from craft production in the first industrial age, through mass production in the global age, and a new compulsion towards hyper-customisation and the idea of a ‘lot-size of one’. The concept is the entire system is threaded with data – down to IoT sensors on robot arms on the factory floor – and programmed to flex with this live-wire demand.

This new flexibility calms fears about overstocked inventory, as well. “The whole world woke up when Lehman Brothers went bankrupt,” comments Claes Nord, an experience specialist at industrial tool maker Sandvik Coromant. “No one wants inventory. It’s all about just-in-time, small batches.”

Top tech for industrial AI

Factories are bringing intelligence to the production line in a number of ways. Most are focused on integration between machines on the factory floor and leveraging sensor data for actionable insights.

Texas-based software firm Epicor identifies certain examples: shop-floor scorecard systems for reviewing performance, touchscreen human-machine interfaces (HMIs) for reporting human-related tracking data, and automated Poka-yoke systems for preventing errors.

Andrew Robling, the company’s senior product manager, also runs through the enabling technologies enterprises are using integrate intelligence into their production processes, as follows.

**OPCA / MTConnect**

“For connecting to the PLC on machines to capture key details, like machine state, cycles, parts produced and scrap.”

**IoT devices**

“To track and maintain temp, pressure, vibration etc; enabling alerts for errors that fall outside of an acceptable range.”

**Visual systems**

“Spatial modelling (digital twins) to confirm products / parts are made to spec.”

**Touchscreen interfaces**

“Human machine interfaces (HMI) connecting people and machines, devices.”

**Execution systems (MES)**

“MES solutions for full statistical process control and quality control.”

**Edge analytics**

“Triggering next-best-actions to act on errors, such as automatically rejecting a part that doesn’t meet specifications.”

Industrial revolution does not happen in silos, on the production line or in the warehouse; these are but points in the chain. “There is a spectrum, right from the bare-bones basics, with factory managers and shop-floor supervisors [using analytics] to manage their teams and operations, and to benchmark performance and identify exceptions and anomalies, and correct and adapt [the production line] accordingly,” says Chawda.

“It goes right through the supply chain. The balance [for manufacturers] is between forecasting production in advance, to minimise expenditure and inventory, and at the same time making sure they can fulfil customer orders.”

Complex mathematical algorithms, giving rise to predictive analytics, connect and control all the points in the supply chain, from click-throughs on social media posts to robots on the production line. Japanese car maker Subaru has done well to reverse its data insights backwards in this way.

The company trawls data from up to 1,500 connected sales and marketing touchpoints, in store and online, as well as from social media and marketing campaigns, to personalise its promotions and engagements with customers. Chip-design company Arm provides systems integration to Subaru via its Pelion IoT platform.

“The information it is getting from the internet goes into predicting how people buy cars – when, and what models. It can see patterns in the data, and start to predict orders and volumes,” comments Rob Shah, a senior product manager within the company’s IoT services group.

“Subaru has really clever algorithms to be able to predict what will happen in six months in terms of order preferences and order volumes, and regional demand, and they can switch their production accordingly. The accuracy of it is astonishing. It is not just saving money, but making money. It can decide where [deliveries] should go – to the point it already knows when someone walks into a dealership how likely they are to purchase.”

This string of data goes perpendicular to
the supply chain too, dissecting it inside the factory as a ‘digital thread’ that describes the design, manufacture, and utilisation of the product across its life – in product lifecycle management (PLM). The digital thread of manufacturing operations is being brought to life in digital twins, including in VR/AR as interfaces for design engineers and factory workers to ‘experience’ their products before machines are set to work on them.

Spatial modelling shows the live interplay between physical environments and mechanical and digital systems, even as they change. This allows the product line to shift in response to changes in the product design, according to feedback about a product’s usability and reliability. A cycle of continuous improvement is set in motion, where iterative development is virtualised in software.

“This ability to create an entire production line in a virtual environment, with hundreds and thousands of scenarios working through it, was not possible before. You can rent 10,000 computers, or whatever, for a day or for an hour, and run through hundreds of thousands of design scenarios to come up with that optimal design for the client,” says Chawda at KPMG.

The vision of intelligent production seems tangible, suddenly, and is driving interest in industrial LTE and 5G networks as springboards for loaded real-time IoT systems. What of this interplay between 5G and AI? Chawda has just got off the phone to ‘the head of manufacturing at a large global manufacturer,’ he says.

The gist of the conversation, as he retells it, was that cloud-based analytics running in far-away data centres is too slow for some fast-paced production environments. The high-end examples presented above make clear edge-based, rather than cloud-based, compute infrastructure gets around this, in certain cases. But Chawda’s contact wants 5G to make factory connectivity both faster and wireless.

Massed ranks of automated guided vehicles (AGVs) and industrial AR/VR applications, serving modular factory setups, will not work (reliably) without the throughput and latency 5G brings. Modular production, which somehow transmogrifies to fulfil singular orders, requires an ultra-reliable low-latency (URLLC) manifestation of the technology.

The demand is real, already, he says. “There isn’t the time to send this data to and from the cloud. But you can run it at the edge, connected by a localised private 5G network around the factory. Then the whole concept works – the latencies for this kind
of AI decision-making on the production line will function.”

But URLLC will only be formalised in Release 16, appearing in late 2020 and gaining ground after 2023. We are future-gazing to an extent. The demand may be real – and rarefied instances of production-line analytics and supply-chain integration are out there – but progress is slow and challenges remain. “It’s not mainstream; some manufacturers even at the high end are only just experimenting,” says Chawda.

LIGHTS-OUT
Shah at Arm resets the vision of future production, separately of the rest of the supply chain. “The end goal is to have a fully automated factory. This idea of a ‘dark factory’, where things are running on their own, and there’s nobody manning the robots – to move from having collaborative robots to having fully automated systems that are churning things out 24/7,” he says.

This notion of lights-out manufacturing, which makes workers redundant (or, makes new skills vital) is controversial, and wrong-headed, reckons Sandvik. “Manufacturing doesn’t need muscle; it needs brains,” says Nord. But robots will forever be required to collaborate, he adds. “Your people are your most important asset – along with your data... The next revolution is about collaboration with machines.”

Sandvik Cormorant, the company’s industrial tooling division, based out of the village of Gimo, north of Stockholm, has been rated as a ‘lighthouse’ smart factory by McKinsey & Company, in an assessment for the World Economic Forum. It is the only factory in Sweden to gain the recognition, and one of just nine facilities in Europe and 16 globally.

Sandvik has 500 CNC (computer numerical control) machines and 400 robots in Gimo, developing 2,500 new products every year, and six new drill inserts every day. It collects 400 million data points each day, says Nord. “We collect just because we can.” It is saving up for a rainy day, when it finds reason to re-run the maths with new discoveries in mind.

Even as it stands, it processes 1,200 analyses per second, it says. “It’s also a lot about resources. We only have 8,760 hours per year – that’s 24/7/365. You need to utilise people and machines as well as possible.”

We are getting away from the detail of core production, perhaps. But the big takeaway from Gimo, in the context of the working relationship between humans and machines, is how it has changed its shift structure to accommodate increased automation, whilst also retaining human domain expertise at the heart of the operations.

Its plants have always run two shifts, explains Nord: from 5:30am to 2pm and from 2pm to 10:30pm. Its analytics has become sophisticated enough for robots to take over at night, independently, for eight hours. “Thanks to the data, that process is now stable,” says Nord.

But it begs the question: if the factory can run for eight hours without human intervention, why can’t it run for 16 hours, or even 24? Quite so, says Nord. Humans are required to keep charge, and manage certain inputs and processes, but a 16-hour run is feasible – on the grounds the automation/collaboration routine runs on an 8/4 hourly cycle, twice daily (“four hours, man and machine; eight hours, just the machines”, and repeat).

The machines were fine with the proposal, but the staff were not, says Nord: no one wanted to work a split shift, four hours in the early morning and four hours in the late afternoon. “The trick is flexibility,” he says. The company has trained its staff across production-line functions, and shifted them between in four-hour stints.

“Staff need to be able to do everything... Manufacturing doesn’t need muscle; it needs brains... Your people are your most important asset – along with your data... The next revolution is about collaboration with machines.”

Claes Nord, experience specialist, Sandvik Coromant
Embedded Connectivity Simplifies Manufacturing and Delivers Competitive Insights

 Produce devices with seamless global connectivity delivered by Pelion Connectivity Management and eSIM technology

- **Flexibility**: Choice of network providers and wireless technologies for any device

- **Simplicity**: Ease of deploying devices anywhere in the world

- **Cost-efficiency**: Low total cost of ownership with single vendor approach

To learn more about Arm Pelion Connectivity Management for manufacturing, visit [www.learn.arm.com/connected-industry](http://www.learn.arm.com/connected-industry) or email us at PelionCM@arm.com
– to make drills for four hours, and then milling counters for four hours; to make turning tools for four hours and then holding tools for four hours.” But Sandvik is a lighthouse factory; most others are struggling with the fundamental logistics of digital change.

For Arm, and platform providers like it, the point is how to manage the inter-relationship of data, devices, and connectivity. “We want to take the pain away,” says Shah. “Everyone has an idea of how it’s supposed to work, but people are still dipping their toes in. And, actually, they have had their fingers burned by jumping into a technology that is really just a buzzword.”

He is in the connectivity team within Arm’s IoT services group, and describes the need to manage expectations and capabilities. “Connectivity is usually an afterthought – something that gets talked about at the end. ‘We have these devices; how do we get the information out?’ And nine times out of 10, it’s too late, and the solution is just bodged together.”

He picks up on the earlier point about the practicable schedule for new-fangled IoT technologies. “People make assumptions because they’ve watched talks on Industry 4.0. But 5G is not coming to IoT, in terms of [real] experience, for some time yet… And there are only a couple of towns in England and a couple of cities in Europe where [NB-IoT] is readily available. It’s not a globally-ready commercial technology yet.”

At the same time, cellular is the right choice, he says, advising on a couple of rules-of-thumb: involve connectivity and hardware providers from the start, and cellular, even if incoming IoT variants remain drawing-board items. “The thing that’s been consistent the whole way through is cellular. If you’re using a cellular gateway, you’re not getting locked into these silos of experimental technologies.”

ROUGH DATA

Most significantly, the market between industrialists and technologists is struggling under the weight of data coming off the factory floor, as the promise of sensing, of attaching sensors to machines, outruns the practicalities of sense-making, of drawing insights from them. It is a mess, says KPMG; too often, forward-thinking organisations find they are drowning, not waging.

“The real challenge is the data itself is rough, and often broken. More than half the time, it can’t be used at all because it doesn’t have any context. Bringing context to the data is very expensive. It takes several iterations or experiments to figure out where the value is. And extracting that value with high-end AI is a challenge, because right now the context is not there,” comments Chawda.

“Data capture has to evolve. At the moment, the data generated from two sensors in the same location in the same factory, under the same conditions, is often quite different. To extract meaning, at least in my experience, is still a challenge. Any attempt to gain insight from a whole bunch of numbers like that, especially if the sensors become distorted, is pretty much useless.”

Faulty sensors are one thing, but trouble tends to come because operational technology (OT) staff, who retain the essential ‘domain’ knowledge, are not accustomed to the discipline of ‘big data’ analysis, and
analytics is not made easy by data scientists. Google-backed Canvass Analytics is trying to change that.

Founded in 2016, and with a dozen customers in process manufacturing on its books, plus twin partnerships with the two “largest” industrial automation companies, the company is focused on AI for optimising assets, processes, and energy usage. Its pitch is that it makes these functions usable and scalable for OT staff on the ‘shop floor’, and not just for IT experts in remote hubs.

“We are not focused on how to build more data scientists, but how to transform the industrial users themselves. We’ve taken the science out of the data science, and built engineering around it,” says Humera Malik, the company’s chief executive and founder, speaking with press and analysts at PI World 2019 in Gothenburg in September.

The industrial sector has been blocked in its pursuit of new operational intelligence by the heavy-handedness of entrenched tech conglomerates, the argument goes, with little knowledge of plant operations and little sense of how to deploy industrial AI flexibly, in a way that encourages industrialists to marry-in their knowledge in a process of continuous development.

“I used to run a company that was doing a lot of instrumentation in these industrial plants, and it bothered me that hundreds and millions would go on contracts [with large tech providers], and 18 months later they were still going through data discovery. I just went to solve a problem.”

The bad blood between IT and OT is such that one manufacturing customer even ushered Malik’s team in through the back door, she says, to stay out of sight of the IT crowd to devise the algorithmic magic on its own terms. “They said: ‘Shhh, don’t tell IT; take this laptop, plug it in, and let’s do this.’” The story reinforces the idea of industrial innovation as a cloak-and-dagger affair.

But the picture is tangled by the types of work, and by the stakeholders involved. Malik’s team refuses to discuss upfront returns (ROI) from industrial analytics solutions, she says. “It’s hard enough to go through procurement. If you get into ROI, you’re never getting paid. We ask what’s important for them – optimisation, automation, cost reduction, and so on – and we look to educate them.”

Its analytics modules can be stretched, so far as possible, to meet the customers’ ambitions for efficiency and productivity gains, but industrial analytics only comes off when all business functions – from board table to shop floor – are invested in the work. In the end, the IT crowd must learn to relinquish control, and the OT crowd must collaborate around its know-how, she says.

“People like us have to bridge the gap, but we can only do so much. There has to be a cultural shift within the organisation. IT has to let go of the idea it needs to own everything. And OT has to work together with IT. The goals are the same. Who doesn’t want to reduce costs, improve quality, and improve on the labour side?”

### DATA INTEGRATION

The point is digital transformation, set in motion by industrial IoT, is an abstract exercise. It is not an off-the-shelf kind of a sale. It requires all parties to collaborate to affect change and reinvention, capturing business culture and business practice. Importantly,
it also needs to consider the algorithmic minutiae of multiple enterprise functions, and as they impact the forwards/backwards supply chain.

“Yeah right. It’s not an off-the-shelf exercise. You may get a spot solution from one of the IoT cloud providers. But it’s only for one particular part of the equipment, and that’s not how any manufacturing line works. To get a meaningful outcome, you have to join it across multiple different systems – to make any sort of business decisions. And that’s not available as a pre-packaged solution,” comments Chawda.

Is that a symptom of the fact that the market is still in its infancy, or that every customer is different? Chawda think it is the latter, as if the multiplicity of industrial process will make digital systems integration and digital solution design new every time.

“It’s not just that every customer is different. But every sub-process is different. There are multiple vendors making up the manufacturing line. You could have 10 different pieces of equipment manufactured by 10 different companies, with 10 different cloud providers capturing the data from them. That won’t change. It’s the same old ERP-bingo vendor analogy.”

At the same time, transforming production is not that hard. It just takes planning and patience. The first step, just to gain visibility of production data, can bring considerable rewards.

Swiss biotechnology firm Lonza – with 112 and 15,000 staff in Europe, North America and South Asia – is just discovering this. Since 2017, its Lonza Speciality Ingredients (LSI) division, which makes everything from anti-dandruff shampoos to corrosive coatings, has sought to make production data from its factories available in its central data science hub in Visp, in Switzerland.

LSI reviewed its manufacturing facilities at the time, evaluating each on a traffic-light system for its handling of data: most sites were red-lit for using paper; a handful had turned amber for recording process data in ‘historian’ time-series databases; just two were using formal data engines and dashboards. None were making advanced data analytics.

The LSI network is equipped with 150,000 sensors, providing control of its production processes. The first step was just to get the data from its myriad range of sensors and systems into a single system, says Tobias Merz, global operational technology manager at Lonza.

“We have a huge variety of systems at local level. The first stage is to connect to the system, and the second is to visualise the data in there. It’s hardly complex analytics.”

It has deployed a unified data management system based OSIsoft’s PI infrastructure. PI is well established among industrialists as a repository for operational data, and a base-line platform to unite multiple data sources. (Merz is speaking at the European leg of OSIsoft’s annual PI World get-together in Gothenburg, in Sweden.)

The company has also engaged Microsoft for cloud storage and IoT tools, and Seattle-based industrial IoT and AI provider Seeq (alongside, at the PI World address),
Check out the library of in-depth editorial reports from *Enterprise IoT Insights* online. All of them are free to download. See the back page for the latest on the *Enterprise IoT Insights* editorial calendar.

[enterpriseiotinsights.com/channels/reports]
which targets ‘data-rich information-poor’ enterprises in process manufacturing, to provide the dashboard skin on top, and the AI tools that go with it. It will only move to modelling and executing analytics for process control after completing these initial tasks, says Merz.

“We want to concentrate our activities and resources only on these first stages, to provide the infrastructure to enable operational staff to make more sense of the data. We are building individual solutions for single plants.”

The work will not be rushed, and production staff will be engaged at every step. “It’s a vision, for now,” he says of the company’s master-plan, to go to more ambitious AI-enabled production. But its first move to unite its global production data has been “overwhelming,” says Merz. So far, LSI has 400 users in 10 facilities on the Seeq system, drawing on the PI engine. Around 150 processes are being monitored and optimised (he mentions “cooling channels” and “PH conductivity”) through the Seeq dashboard.

Merz has a fag-packet calculation that staff are saving 15,000 hours per year with Seeq’s data visualisation dashboards, compared with the time they would spend each morning “to discover the same information”, principally about their factory’s night-time operations. More than this, the system has changed the way the business pulls together.

“It’s not just production; it’s really going into different departments… It’s a decision making tool, a finding-together solution. Because [production staff] open the Seeq display in the morning, and discuss directly [about] the data. They don’t have to go back to the original distributed control system, and then make copies. Everyone is talking the same language… The system is changing the way we look at the data, and how we discuss problems [in production].”

LESSONS LEARNED
Where does this leave us? Well, the industrial set is using AI to fantastic effect on the production line. But such examples remain outliers, and they tend to function – however well – in isolation. More transformative gains can be achieved by implementing simpler – often, non-AI – analytics solutions on a grander scale.”

Seeq’s data visualisation dashboards, compared with the time they would spend each morning “to discover the same information”, principally about their factory’s night-time operations. More than this, the system has changed the way the business pulls together.

“The narrative tells it: the lesson from the auto-plant is the digital magic works; the lesson from Lonza is industrial change should not be rushed. Be deliberate; organise your data. The lesson from Sandvik is people will write the future, and order the AI. Importantly, the lesson from everyone is that innovation must be collaborative, and combine digital and domain expertise – it cannot happen behind curtains. Which is a story for another day.
Arm technology is at the heart of a computing and connectivity revolution that is transforming the way people live and businesses operate.

Improving business performance, turning risk and compliance into opportunities, developing strategies and enhancing value are at the core of what we do for leading organizations. KPMG’s Advisory practice delivers services and creates comprehensive strategies that reflect our deep knowledge of the industries and functional priorities of our clients. With our groups organized by both industry (Financial Services, Government, Health Care & Life Sciences and Products) and service (Management Consulting, Risk Consulting, Deal Advisory and Strategy) we facilitate collaboration across the entire firm. This enables us to meet our clients’ unique needs and help them gain a competitive advantage — from revised strategies and reconsidered business models, to new products and expanded markets.
Need guaranteed leads? Thought leadership? Incremental content marketing opportunities?

Sponsor an RCR Wireless / Enterprise IoT Insights multi-platform, editorial program and receive the following benefits:

EDITORIAL WEBINAR – sponsorship includes 250 guaranteed leads, participation as sponsored guest, and recognition as sponsor in all promotional materials. Sponsors will receive webinar registration and attendee list, responses to pre/post surveys, responses to polls gathered during webinar.

EDITORIAL REPORT – in addition to recognition as sponsor in program promotion, sponsorship includes 250 guaranteed leads, distinct from webinar leads, one-page ad spread or advertorial in feature report, and responses to lead capture survey questions.

25% discount when you sponsor two or more programs.

For information contact: sales@rcrwireless.com

Fast facts about RCR Wireless:
- 382,000 monthly page views
- 170,000 unique monthly visitors to websites
- 81,000+ opt-in newsletter subscribers
- 220,526 monthly video minutes
- 45,000 leads generated annually
- Industry leading demand generation programs and results

UPCOMING 2019 EDITORIAL PROGRAMS INCLUDE:

SEPTEMBER 2019

RCR Wireless |
In-Building FirstNet Challenges
Challenges for deploying FirstNet compliant in-building wireless systems

OCTOBER 2019

RCR Wireless |
Assuring The RAN:
Mobile access / radio access networks

Enterprise IoT Insights |
Making Industry Smarter #5 (report series): Metals & Mining

NOVEMBER 2019

RCR Wireless |
Spectrum sharing beyond CBRS

DECEMBER 2019

Enterprise IoT Insights |
Digital Factory Solutions #3 (report series): AI/lef Innovation

Each program is limited to three (3) sponsors