

EFFICIENCY AND UTILISATION

Drive returns. Lower TCO.



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New technologies can be expensive and take years to deliver – so where can manufacturers make efficiency gains fast? **Fleur Doidge** reports.

Essentra Components has announced it will slash energy consumption a third by electrifying its 180 hydraulic injection moulding machines and equipment. Which sounds great – until you read it will cost many millions and take until 2031.

It's fair to say that while impressive efficiency gains can certainly be made by deploying new technologies, solutions and systems, these may be currently out of reach for many manufacturers.

Emile Naus, partner at consultancy BearingPoint, confirms that lower-hanging fruit may reduce total cost of ownership (TCO) and deliver a return on investment (ROI) in less than a year, moving firms into a better position to drive future gains.

Start from the customer, and work back, he says. "Put yourself in their shoes, and then work back to what you're making. Then think of the best way to produce it. It's a really powerful way to look at the problem; find the useful differentiator. Sometimes an absolute focus on lowering costs makes you really inflexible."

Ideally, the focus should be the end customer – this might entail anything from ringing customers up for a chat, carrying out online research or setting up a study. With insights and improved customer understanding, manufacturers can move on to accurately assessing their position and flexibility relative to changing customer needs and demands.

Focus on customer needs to understand key objectives

Once customer requirements are analysed, look at the organisation in relation to those needs. What do you actually have, and how does it all work together? "Then ask what you actually spend, and on what. Some things matter, everything else is waste," Emile says.

Most manufacturers will have data on resources, systems

and processes; those that don't should consider improving their monitoring and management to better understand their organisation and even the supply chain, although major software implementations too can take years to deliver ROI, he agrees.

2021 research by Bilal Gokpinar, Professor of Operations and Technology, Marketing and Analytics at UCL School of Management, with co-researchers Philipp Cornelius and Fabian Sting, suggests the value of frontline staff in this journey is often untapped.

Up to 75% of all productivity gains can be from bottom-up employee ideas, according to the research team, and fostering creative thinking among staff – engineers, technicians, managers and assembly workers – can reap efficiencies that drive ROI within months.

This isn't about plonking a suggestions box in the office but systematically implementing changes that drive ideation.

The large German manufacturer they studied found that transferring shop floor staff around locations to work shoulder-to-shoulder within other teams for weeks at a time helped pinpoint issues and improvements. Contributions were fed into a database, systematically evaluated and implemented if net value could be shown.

"You can start seeing actual ROI pretty much right away, within a month or so. Ideas need not be ground breaking to effect change," Bilal says, adding that it's key that workers know ideas will be taken seriously. "Improvements can come not by introducing some sophisticated AI, machine learning or industrial automation. Simply let your frontline workers think a bit more."

Bilal says efficiency gains are often about the basics: understanding customers then looking at your costs, systems and processes case by case while tapping the power of human resources in-house.



Instead of walking around the edge of a playing field, why not go straight across the middle?

Mark Hughes UK and Ireland Vice President, Epicor



Mark Hughes, UK and Ireland Vice President at enterprise resource planning (ERP) software vendor Epicor, says also ask how components, goods and equipment flow around the factory space. Do people, equipment or vehicles get in each other's way? This can be a big issue when it comes ventilation and energy costs as well.

"Lower-volume, higher-value type UK manufacturers often grew out of a particular need in one area or a past supply chain," Mark says. "A linear flow is ideal, but when I'm allowed on site, the layouts aren't optimal. Instead of walking around the edge of a playing field, why not go straight across the middle?"

Review and revise processes, then tackle systems

Harness data and insights garnered from your people and systems to better understand and realign processes with key customer objectives, enhancing staff contribution wherever possible, suggests Paul Crutcher, Operations Director at office furniture maker Bisley.

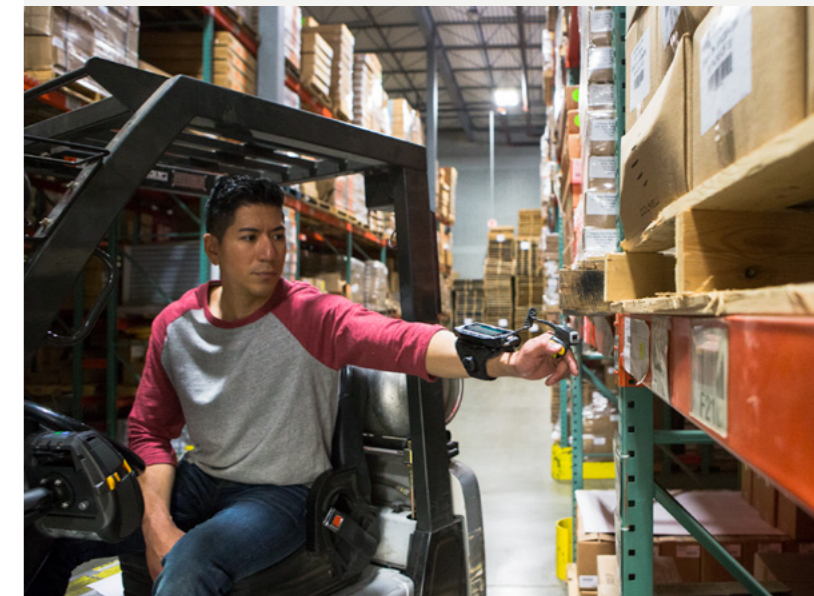


EXAMPLE

Efficient systems for the warehouse

Manufacturers with warehouses might look at modernisation via print-scan and data-capture alongside mobile computing via handheld and AR devices, such as scanners and smartglasses, that help workers or cobots pick and manage stock. They can communicate location-based information and data back to base in real time.

Daniel Dombach, EMEA head of industrial solutions at Zebra, says: "There's a pressing need for additional staff to cope with all the e-commerce shipments and so on. It's a lot easier to train people on these devices because it's more intuitive. And faster and more efficient than before."





ABOVE: Home office multidesk solutions IMAGE: BISLEY

"If you do enough of the right stuff there's a positive feedback loop," he adds. "Your benefits and your wins become compounded and you end up getting an exponential growth or improvement - a cascade of favourable outcomes."

Examine all processes end to end for inefficiency and waste, from packaging to transport, inventory management, over-processing, over-production, defects and recalls, energy use and staff productivity. Prioritise changes that are cost-effective and benefit the customer.

Can ordering be rationalised - perhaps ordering the same volumes monthly, instead of ad hoc, for example?

Process heating, drive power, cogeneration and boiler use can be ripe for waste reduction according to US consultancy ESource's Business Energy Advisor, these typically consume the most energy in manufacturing facilities regardless of sub-sector.

Paul agrees scrutiny of value streams, Kanban and inventory, and enabling Kaizen rapid-improvement events remain important but also emphasises an investment in people to drive gains.

Don't waste human resources and cognition by an overreliance on formulaic thinking in a quest for ROI; give staff headroom and bandwidth as the subject-matter experts of their working environments, he says.

"Too much can be focused on output metrics," Paul explains. "Sure, it allows you to get better at that, but sometimes it's detrimental because there's a trade-off in every walk of life. I don't mean that you go backwards necessarily, but movement can stall."

Bisley last year implemented Kata-inspired training with a focus on experiential learning in one small part of the



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factory. This was about developing learning opportunities via measuring process variability, including hourly variance, on the factory floor - in other words, what happens when things don't play out as intended.

Paul says this lifted productivity by 40% in about four months. "At the same time we also improved our quality and safety as well. Systematically squeezing the variability in the process creates the opportunity to improve."

Optimal processes ensure any business makes more of what it has today. Rob Rutherford, Chief Executive Officer at IT systems consultancy QuoStar, points out that manufacturers may not apply lean principles consistently beyond the shop floor to optimise process and systems



ABOVE: Paul Crutcher, Operations Director, Bisley IMAGE: BISLEY

analysis and automation. "Finance operations are often very bloated," he says. "In that case, IT can facilitate outsourcing or offshoring and not only reduce costs but also allow the process to become quickly automated to a good extent."

Start from analysis - rinse and repeat for optimal innovation

Essentially, everything on the shop floor can over time be optimised by being better integrated and connected. Data from all parts of an operation can also then be turned into usable information and actionable insights that in turn promote greater improvements and eventual innovation.



At some point further efficiency gains will mean investing in new systems and technologies, ideally without deconstructing best practices already created across the operation. Examples include radio-frequency identification (RFID) tags and sensors in an interconnected web of smart devices to collect, process or analyse data in real time, helping predict issues and fulfil demand.

However, achieving this in practice is rarely straightforward, which is why systems should come last on the to-do list.

As Bernhard Eschermann, Chief Technology Officer at ABB Process Automation, explains: "If you've got things connected by piping and tubing, it's not that easy to say tomorrow you'll do something completely different. Hardware is typically not the easy way to get quick wins."

Additionally, operational data in the control system might require preparation and cleaning before a machine learning package, for example, can use it (garbage in equals garbage out, as techies say).

Process automation is often cited as a must-have. But again, making the right choice and enjoying fast ROI depends on knowing what you need to do better in relation to customer requirements, Bernhard says.

Start small with a system that works with other vendors' products and can be scaled up by applying it to other equipment, other parts of your factory or in other factories because to deliver the ROI you either need more return or be able to apply it across multiple cases, with minimal investment.

BELOW: Wind manufacturing at the Nordex USA manufacturing facility in Arkansas IMAGE: SCIENCE IN HD ON UNSPLASH



Many manufacturers still adopt very dated procedures - clipboards, checklists, whiteboards and the like

Rob Tanner
Commercial Manager,
Solweb

"For the future, it will help to specify interoperable systems using standards, that avoid tying you into proprietary storage of data," Bernhard warns. An example is the OPC-UA communication standard which enables internet-connected industrial devices to 'talk' to each other.

Even though it's become simpler and more cost-effective to retrofit all kinds of measurement devices, success still relies on whether the data will help the operation deliver customer benefits. "You could want to increase the yield, the uptime, or energy efficiency. That already starts to become difficult in some cases," Bernhard confirms.

"Many times the benefit that you want to get, for example if you look at overall equipment effectiveness, doesn't come from only one system. You need data from the operational system but might have to relate it to data from the ERP system, or from the combined heat-and-power (CHP) system or whatever."

Of course, sometimes systems improvements can deliver fast. Rob Tanner, Commercial Manager at software consultancy Solweb, says ROI on average for its custom-software projects is three to six months - perhaps customer relationship management (CRM) systems, web shops or configurators that automate or link systems together permit data sharing.

"Duplication of data entry by different staff is commonplace. The software we write allows partial or complete reduction in manual input, negating staff errors, saving time and increasing efficiency," he explains. "Many manufacturers still adopt very dated procedures - clipboards, checklists, whiteboards and the like."

BearingPoint's Emile notes, too, that if the tolerances aren't relevant or a proposed improvement makes no difference to the end customer and a process works fine, there might be no need to invest. It still comes down to how to meet customer need.

"Don't worry initially about advanced things that will take two years to put in, or you need the people to operate or you need to train them, where it's not a case of creating a system and switching it on," Emile says. "Ten small steps that instantly deliver benefit are as good as one very big leap."

Being smarter about efficiencies today is a building block to future innovation, whether that's full electrification, automation or robotics, greater IoT enablement or a digital twin.

EXAMPLE

Decreasing floor-to-floor time

Ross Milne, Director at machine tooling specialist RAM Engineering and Tooling, notes that less floor-to-floor time (reducing set-up and idle costs) can boost efficiencies. Additive manufacturing is one potential route, although implementations can be expensive. If making components requires multiple set-ups in various platforms, including long milling cycle, then hybrid laser metal deposition (LMD) combined with existing systems might generate a faster ROI. Functionality aiming simply to extend component life by improving wear characteristics will likely be a longer term play.

Ross explains: "Hybrid manufacturing innovations over the last five years have transformed hard-face welding of moulds. Directed energy deposition (DED) with machining can strengthen key properties of a mould with all steps achieved in the same setup, saving time, effort and resource."