AUTOMATION AND ROBOTICS

2014 SUPPLEMENT
**Introduction**

Welcome to The Manufacturer’s special supplement on automation. If Prime Minister David Cameron is right and the world is in ‘fast forward mode’, then the pressure is on for UK manufacturing to raise its investment in technology and equipment to take us to the next level. It looks like we have been lagging behind, so the need is pressing.

As NatWest’s Richard Hill highlights, the UK – the world’s seventh-largest economy – lies in 19th place when it comes to robot density (the number of robots per 100,000 employees); Germany is far ahead. The UK engineering sector – the automotive industry in particular – has done very well at adopting and implementing lean manufacturing principles.

We have a flexible and adaptable labour force and it is undoubtedly competitive. Augmenting our people’s skills and abilities with appropriate automation will enable a big step forward.

What to automate? Ah – there’s the rub. In short, anything that lends itself to it, from tasks that are already acknowledged to be better undertaken by robots – the dirty, difficult, repetitive and dangerous jobs – and further, to more complex component production.

But the real opportunity is in Industry 4.0 – the fourth phase of the industrial revolution. This is about networking, on a grand scale. As consultancy firm Forcam says, modern equipment is “bristling with intelligent technology”. The key is to link them together, to use networking to create a Smart Factory – an idea the Germans are already solidly behind.

Where is the money to come from? Richard Hill and his colleagues make clear that the banks are already on the case and have created packages aimed at enabling investment in automation. The opportunity is here; it is for UK business to seize it.

Happy reading!

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Ruari McCallion
Contributing editor
The automotive industry continues to remain strong after its peak in 2012 with an enviable appetite for industrial robot orders. Other sectors such as pharmaceuticals, plastics, aerospace and engineering are also on the rise, but again not at a pace that matches other European and Far Eastern competitor nations. One of the benefits of being a member of the British Automation and Robot Association (BaRa) is to gain access to detailed quarterly statistics on industrial robot sales and trends.

Michael Portillo will conduct the official opening of the PPMA show with his great support for British manufacturing. The exhibition showcases hundreds of working solutions to automation and robotics across the manufacturing sector and takes place from September 30 - October 2 2014 at the NEC.

Hear Christine Tacon live at the PPMA Show 2014, 11am, Tuesday 30 September 2014, NEC, Birmingham.

The adjudicator and former boss of the Co-operative Group’s farming business will explain why she is so keen to resolve issues affecting the entire supply chain, thereby encouraging greater investment in automation within the food sector. Underlying her commitment to improving conditions, Christine Tacon is keen to hear indirectly as well as directly from suppliers, either personally, anonymously or through a trade association – and this doesn’t just mean front-line organisations such as the Food & Drink Federation or the National Farmers Union; it also includes the Processing and Packaging Machinery Association (PPMA).

According to Grant Collier, PPMA Group’s head of marketing, Christine’s appointment has significant implications for PPMA members: “This is good news as far as automating the food industry is concerned, and also for our members, most of whom supply machinery to the sector. After surveying 367 manufacturers that took part in the government’s Automating Manufacturing Programme, there is clear evidence that the reluctance to adopt automation is in part driven by on-going narrowing of supplier margins and lack of contracts from multiple retailers. The adjudicator’s actions will hopefully change this culture and enable much-needed automation of the UK’s largest industry if it is to remain competitive. The adjudicator is willing to answer questions and may meet with anyone in private too”.

As asked with ensuring that supermarkets treat suppliers fairly and lawfully, the role of the Groceries Code Adjudicator (GCA) will undoubtedly have a positive effect on confidence in much needed automation for the food sector.

Christine Tacon is a chartered engineer with 12 years’ experience in sales and marketing of fast moving consumer goods (Mars, Anchor and Vodafone). She also ran the Co-operative Group’s farming business, the largest in the UK, for 11 years until 2012. She was awarded a CBE for services to agriculture in 2004. Christine has created much interest up and down the supply chain, not afraid to name and shame some of the larger multiple retailers throughout the press. She also has the ability to levy substantial fines. The Groceries Code Adjudicator will join Michael Portillo in addressing the supply chain issues at PPMA show on September 30th. In addition Tesco, Marks and Spencer and Coca Cola will also be there to speak.

The adjudicator continues to remain strong after its peak in 2012 with an enviable appetite for industrial robot orders. Other sectors such as pharmaceuticals, plastics, aerospace and engineering are also on the rise, but again not at a pace that matches other European and Far Eastern competitor nations. One of the benefits of being a member of the British Automation and Robot Association (BaRa) is to gain access to detailed quarterly statistics on industrial robot sales and trends.
Ambica has long been promoting the benefits of automation as a way for UK manufacturers to enhance their competitive position and increasing numbers have been reaping the rewards for such investment.

As the UK trade association for the instrumentation, control and automation industry, we are active in many fields, such as the writing of international standards, the formation of European regulation and reporting on market data trends in the industry. We also have a role in education and communication, through guidance publications, seminars, exhibitions and media articles.

It is in this context that we have sought to spread best practice and independent advice on the many benefits of automation to UK industry.

Automation can provide the answer to all these questions and many more...

How can you deal with the skills shortage?
How can you improve quality?
How can you grow your business?
How can you increase your company's competitiveness?
How can you give your staff greater job satisfaction?
How can you decrease wastage in production?

The global automation market is growing at a faster rate than industrial production in general and is prevalent in economies where growth is strongest, in some of the fastest developing and forward-looking industries. It is not too much of a stretch to say that automation is behind the success of the businesses it is implemented in.

As economies such as China move ever faster to automate the manufacture of products with increasing functionality and quality, the UK has the opportunity to compete on a level playing field.

As automated and intelligent processes become the norm, low-cost labour will be much less a factor in global manufacturing strategy. Consideration to transport and energy costs, labour skills and competences, political and economic stability, tax incentives and infrastructure will feature highly.

Gambica is seeking to bring government and industry together to put the UK in a position of strength for these factors.

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Is the UK’s historically lower investment in automation about to present British manufacturers with the opportunity to jump the productivity gap? Ruari McCallion finds that it might, if the opportunity is seized.

The next phase in automation offers the possibility of a leap forward as fundamental as Henry Ford’s application of mass production to the auto industry. Forcam UK describes as ‘the next paradigm shift’ the emergence of the “Smart Factory”, or “Industry 4.0” – which is happening now.

This “Fourth phase” of the industrial revolution is about networking shop-floor processes so that digital intelligence is applied to the real world, according to Forcam. In traditional manufacturing, product design, production planning, order scheduling and production monitoring are separate sequential processes. Various issues including machine outages, material delays and so on can lead to interruptions in production. But the basic technology, including CAD/CAM, ERP and MRP, is already in place.

Modern equipment is bristling with intelligent technology to monitor performance and warn of potential problems – but this digital intelligence has been working in isolation, or only narrowly linked.

The catapults and other initiatives enable smaller businesses providing the catalyst for the shift to what we do,” he said.

**BRIDGE THE GAP**

“The UK is definitely lagging behind – our own company data shows that, as does information from independent sources, such as British Automation and Robotics Association (BARA),” said Brian Holliday, divisional director at Siemens Industry, which manufactures and supplies automation infrastructure. “The 10:1 difference between Germany and the UK can partly be explained by the higher proportion of GDP represented by the automotive sector and by the fact that Germany has a larger economy than ours – but it is only 1.5 times as big.” While Germany has embraced automation with enthusiasm, the UK has focused more on lean principles – or is that an illusion? Is it just another case of failure to invest?

“Generally in the UK, we are pretty flexible when it comes to labour,” said Holliday. He acknowledges that many British factories have very lean setups but rejects the idea that it is a case of either/or. “A really efficient factory has the right balance of lean processes, flexible people and technology. On balance, Germany has a higher proportion of technology; the sense is that we in the UK are underdeploying the technology part and it is probably holding us back.”

**FIRM SUPPORT WHERE IT MATTERS**

Networking is the core technology. It scales from connected machinery in the workshop to the broader enterprise and on to the entire supply chain. The German government has given official backing to the project behind the Smart Factory project, where real life production data and machine information is processed and analysed in a virtual cyber-physical system (CPS). It means that production monitoring can move from being a historic process to the collection, assessment and use of genuine real-time information, allowing closer co-ordination and collaboration across the value chain.

Automation has been proven to enable high labour cost countries (such as the UK and Germany) to compete with emerging economies in manufacturing. Paradoxically, Britain’s lower level of investment over the past 20–30 years could actually help us to leapfrog competitors, if the opportunity is seized.

“We have recently been working with a major robot manufacturer on a project in the aerospace sector. We are looking at some very innovative techniques that will, if proven, lead to significant uplift in productivity,” said Simon Allsop, director of Delmia in Europe North. Delmia is part of Dassault Systèmes, which is very much involved in the automotive and aerospace sectors and also owns SolidWorks. Although he has no doubt about the potential for automation to boost British manufacturing competitiveness, Allsop does not entirely agree that the UK is lagging a long way behind – or, at least he sees catching up fast.

**THE SQUEEZED MIDDLE?**

“Jaguar Land Rover (JLR) is investing heavily in roboticised assembly lines, as is Nissan. GKN has invested in automation of some component subassemblies,” he says. He observed that the ‘Mittelstand’ – essentially, companies with turnovers of £100–400m – have been making substantial investments in robotic lines, to undertake cleaning, fettling and other activities that are less suitable for humans.

“We also work closely with the high-value ‘catapults’, and we see them helping mid-sized organisations. They are providing the catalyst for the shift to what we do,” he said. The catapults and other initiatives enable smaller businesses to work with high value manufacturers and to access expert knowledge that may not otherwise be available. That knowledge can be crucial in the assessment of the likely value and ROI of investment under consideration.

“Sharing technology brings costs down; it was recently reported that the components in today’s iPhone would have cost over $1bn at the time of the Apollo project.”

Cost is not the issue it once was and, as reported elsewhere in this supplement, the banks are eager to fund this kind of investment. What is in the commitment to seize the time and the next leap forward will be under way.
Design consultancy uses ABB industrial robots to produce customised metal designs for designers and architects.

London-based design consultancy RoboFold is quite literally demonstrating the art of robotic technology. The company is using two ABB IRB6400 industrial robots to help architects and designers to explore new ways of bending and forming metal, opening up new possibilities for architectural and furniture design.

More usually employed for cast cleaning and pre-machining in metal industry applications, the two IRB6400 robots are used by RoboFold to produce single-piece metal objects customised to a customer’s specific requirements. Both six-axis robots are fitted with vacuum cups, which hold pre-scored metal sheets, ranging from 60-80cm² up to 1.5m²; they are curved and folded according to instructions supplied by RoboFold’s own robotic CAD system. The CAD programme dictates the movement of the robots, which move simultaneously according to the pre-determined trajectories needed to fold the metal into the desired shape or shapes. As all of the information for the folding process is contained in the data from the CAD system, there is no need for any hard tooling.

The use of the robots is the culmination of a quest started by RoboFold proprietor, Gregory Epps, in 1997. “I firmly believe that there are no limitations in design or in the possibilities of turning a design into a real-life object,” explains Epps. “My interest in finding new ways to create single-piece curved surfaces first started about 17 years ago. In particular, I became very interested in how to develop a system for producing curved folded metal panels. My search for ways to do this is what eventually led me to the ABB robots.”

A key benefit of using the robots is their inherent flexibility, which enables them to handle any design programmed into the CAD system.

“Before I bought the robots I had made previous attempts at developing my own machines that could bend metal along a curve. However, none of them could be readily adapted to handle different jobs,” says Epps.

By using the robots, this problem has been overcome. All information about the shape and form for the metal is contained in the CAD instructions, which direct the movement of the robot to produce the object required. Furthermore, RoboFold also has the ability to simulate the process before it has been carried out, enabling any areas for fine-tuning to be identified and rehearsed before the physical production process begins.

The ability of the robot to work directly from the CAD file has also helped to overcome another problem typically encountered in metals fabrication processes, specifically the need to produce a mould.

“As almost all of the work we do is bespoke and non-standard, it would be both impractical and uneconomical to produce a mould for every object we make,” explains Epps. “With our robotic system, the CAD file is effectively the mould, but, unlike a traditional mould, it can be readily changed and adapted whenever necessary.”

Another benefit of the robotic system is its speed. Typically, metal sheets can be formed and shaped within just two minutes. This, combined with the elimination of the need for a mould, makes it both much faster and less costly for RoboFold’s customers to see their concepts turned into reality.

“With the robotic system, we’ve really achieved the best of both worlds, coupling the accuracy, speed and capabilities of automation with the human appreciation of form and function,” says Epps. “Using the robots has opened up a world of new possibilities for the way in which metal can be shaped, with an end result that looks much better than other products formed using alternative processes.”

Started in 2008, Robofold specialises primarily in the design and architectural markets. The company has attracted attention for its work produced by the robots, which has include custom-built furniture, façades for buildings, structures for renowned architect Zaha Hadid, and, in 2012, a custom-made metal egg used as part of the world’s biggest Easter egg hunt.

“I firmly believe that robots are for working with people, not replacing them,” concludes Epps. “The future of manufacturing, especially here in the UK, cannot just be about efficiency. It should be about making useful, aesthetically pleasing things, using the best tools available.”

Find out all you need to know about making the switch to robots at our seminar this November. Being held at our Milton Keynes training centre, the event will cover what to consider when automating with robots and how to design a strategy to suit your individual business needs. You’ll also see examples of the latest robotic technology for SMEs and how it is delivering benefits for other UK businesses.

To reserve your place, email robotics@gb.abb.com or call 01908 350300 ref. ‘Seminar’. Alternatively, scan the QR code below.
WORKING TOGETHER TO UNBURDEN AND FREE YOUR potential

WORKING TOGETHER TO UNBURDEN AND FREE YOUR potential

Working together, Pacepacker and Festo offer manufacturers the widest range of robot solutions on the market. From super fast delta style robots, to highly dexterous articulated arms and low investment Cartesian options, with 80+ robots and 20+ end effectors to choose from we will develop the BEST solution for your application.

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Robot solutions including IP69K food grade systems easily transfer wrapped and unwrapped goods between conveyors to orientate products before the packing process. Robots, often handling delicate products at high speeds, offer repeatable accuracy to minimise waste. Low investment Cartesian robots are the ideal solution for simple handling and entry level automation tasks.

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PALLETTISING

Cartesian or articulated arm robots can handle multiple items including boxes, crates, pallets and slip sheets with a single multi-tasking end effector. The latest palletising robots are stronger, faster and smaller enabling them to work in space restricted production environments. Pacepacker uses Festo’s ‘off the shelf’ modules to create simple, bespoke palletising solutions, reducing your initial outlay and removing your risk whilst improving the productivity as all the systems are pre-tested and guaranteed.

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Ever since Jethro Tull introduced his seed drill, automation has been boosting productivity – but the UK, once the home of automation, seems to be lagging behind its competitors, in Europe and beyond, when it comes to investment in robotics and systems. Richard Hill, head of automotive and manufacturing at NatWest and RBS explains the importance of automation and how the bank and their partners can help.

According to World Robotics 2013, the UK is 19th in robot density (the number of robots per 10,000 employees); that position is lower than it was the previous year, when the country stood 17th. It is estimated that Germany currently has around 190,000 robots in operation; the UK has around 16,000 – less than one-tenth. Despite this, the UK has become an investment destination for OEMs and has attracted about £1bn of investment recently, due to factors such as a stable and supportive economic environment; a flexible and productive labour force; and strong R&D capabilities including a commitment to low carbon technologies. Jaguar Land Rover is investing heavily, with product development and capital expenditure reaching to £5bn over the next five years to fund expansion.

The issue spans the entire supply chain and is therefore also a key challenge for SME’s. They are the ones who really must actively consider investing in automation – and they are also the companies for which the perceived, understood or feared cost is likely to be the most daunting. The first thing is to overcome that fear. Most readers will be well aware that programmable logic boards are now so cheap they are used in domestic central heating systems, in white goods and the like – but robots have come down in price as well. It is possible to buy one for as little as £8000.

There is no doubt that industry has significant scope to expand the level of automation. It isn’t just about consistency and raising output of the ‘same thing, day after day’ – the days of mass production are falling further into the past. The need now is for agility, for bespoke production and to adapt to niches. NatWest in particular and RBS as a whole has been working closely with industry specialists on the ground, with interested parties and, crucially, with their customers, to develop packages, structures and the right approach to enable British industry to take the necessary steps up.

A & B Tooling, which is based in Leicester, manufactures and services cutting tools for engineering and woodworking. It recently decided to invest in a Walter Helitronic GVC Cnc grinding machine, complete with a fully automated robot arm. A&S secured a £220,000 hire purchase facility with Lombard, which was combined with a government initiative to complete the funding. Tools have traditionally been bought overseas and imported; this investment has given A&S Tooling the capacity to move into a new market, while maintaining its cash flow. Automated production means that the company’s overheads are lower, which will enable it to offer competitive prices.

GBV Engineering, a family-run business established in 1985 near Leeds, makes neckrings that are used to produce the tops of bottles. It is the only UK-based company in its market but supplies only 10% of it. GBV found that it was unable to replace staff who were retiring and it decided to invest in a fully-automated production line, consisting of four robots loading components into a Cnc machine, with quality control by robotic checking. Automation enables 24/7 operation, has cut cycle time by 50%, and doubled output. The investment was funded by hire purchase finance from Lombard.

“Capital investment is key to ensuring manufacturers are able to compete with foreign and home-grown competitors,” Richard explains. “Typically Lombard will look for what added value the automation will bring to the business in obvious means such as overdrafts, revolving credits and similar propositions.

“We recognised the need for additional support and have now launched a tooling finance product specifically aimed at the SME space. We have allocated an initial capital fund of £25 million to it,” added Richard. “If all goes well, we will look to expand it further.”

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KUKA Palletising Robots have enabled dramatically increased production levels at one of Britain’s oldest Cheesemakers.

A J and RG Barber is a farmhouse cheese producer based in Somerset in the UK. The Barber family have been farmers and cheese producers in the area since the 1800s and now produce a specialist range of cheeses including West Country Farmhouse Cheddar, Red Leicester and Double Gloucester.

THE ISSUE

Within the manufacturing plant at Maryland Farm, the cheeses are packed into boxes and loaded onto pallets, before being moved to the stores where they are matured for anything from three months to three years.

Production had been restricted to 35 tonnes per day due to the physical limitations imposed by manual handling of the boxes. Barbers were looking for a way to increase capacity without incurring any health and safety issues or losing staff as Julian Ing, Barbers head of engineering explains:

We had quite a task ahead of us as there were several physical factors working against us: firstly, the location for the cell offers a very small footprint. Add to that the challenges of a low sloping roof and a busy fork-lift truck access area and we knew we had our work cut out.

Production was restricted due to the limited space in the manufacturing plant.

AND THE SOLUTION

The KUKA name is synonymous with robots, so we were confident that with KUKA we would be able to concentrate on robots and not let extraneous ideas interfere with the central aim of the project.

The first system was installed by Gudel before SCM were KUKA partners. In addition, SCM Material Handling Ltd, a KUKA System Partner was also conveniently local so it made sense to approach them for the second robot cell.

Two KUKA KR100-2 PA models are being used at Barbers Maryland Farm in Somerset in separate areas of the plant. The installation of the first robot in 2010 enabled the plant to go from producing 35 to 65 tonnes per day, an increase of 93%.

Julian Ing, Barber’s head of engineering, said at the time, “It is a real success story, and everyone is very pleased with the way the system is running. We spent quite a lot of time on developing the right solution given the physical limitation of the space. As well as helping to address health and safety concerns by reducing the amount of manual handling, the switch to automation has also achieved a more efficient strapping process, an important part of the operation that had previously been problematic.”

A second KUKA KR100-2 PA robot has now been installed in the packaging plant with the cooperation of local KUKAs System Partners SCM Material Handling Ltd. In this area, the matured cheeses are de-stacked and fed into the cutting and packing lines. There are extra cleanliness regulations here compared with the box packing line, and the introduction of a robot reduces the risk of contamination. Similar benefits have been seen in potentially increased production levels.

Mr Ing says: “We have installed the second cell with no problems. Barbers is a major employer in the local area, and it is important to our company that no jobs have been lost as a result of introducing robots into this plant. We have been able to redeploy all the workers formerly employed in physical tasks to more rewarding jobs so there are winners all round.”

The success of Barbers in introducing KUKA robots to their line means that KUKA and their System Partners, SCM Material Handling Ltd, are well placed to advise on any future automation requirements.

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Kuka has supplied robots to be used at Barbers Maryland Farm in Somerset.

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ROBOT ROUND-UP

Fast facts on the UK and international market for industrial robots.

WORLDWIDE AUTOMATION STATS

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