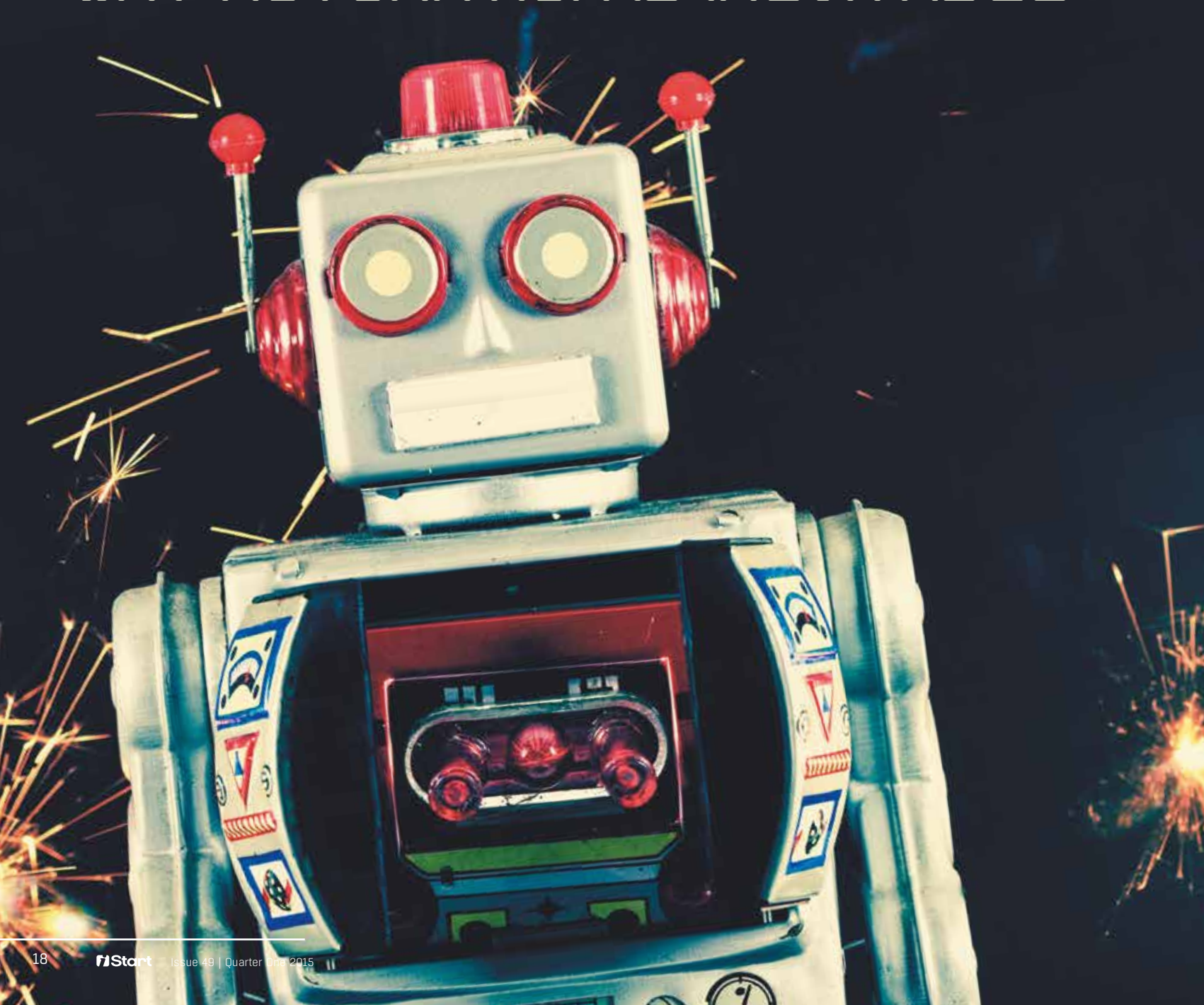
INDUSTRIAL STRENGTH IT

WHY AUTOMATION IS INEVITABLE



Farming, manufacturing, fast moving consumer goods, office work and even the information technology industry – what do all these activities have in common? Among many other potential things, a relentless drive towards automation of business processes is a common thread, because when machines can perform tasks the result is greater efficiency, more consistent outcomes and lower costs of production. **DONOVAN JACKSON** *pointedly avoids automating his own role* to find out how companies in Australia and New Zealand are integrating machines and IT systems to maintain their competitive advantage...*

Mechanisation is nothing new; after all, it was 1811 when the Luddites got busy smashing stocking frames, spinning frames and power looms in a futile effort to halt the march of mechanisation in the textile industry. However, the pace and capability of automation has taken massive leaps and bounds thanks to developments in both the hardware which is found on production lines, and the software which controls and manages it at a factory floor level, and further up the chain into enterprise management systems.

That's confirmed by Bob Stokes, managing director of Hamilton-based automation firm CTEK Combined Technologies. "The sophistication of the software in the PLCs [Programmable Logic Controller] means they are much more intelligent; predictive aspects are now standard, so, for example, if there is a temperature variation, the software will look at that and make changes to ensure that the outputs of an industrial process are consistent. From a hardware perspective, too, we're seeing more memory and componentry which is smaller, cheaper and more powerful; as the two advance in tandem, it means you can automate much more, and a lot more cost effectively."

A PERSPECTIVE ON MATURITY BURGER N CHIPS PLEASE

Providing a rather stark perspective on how automation has matured, let's consider the possibility of a machine-made burger. A delicious bit of science fiction you might think. Not quite. A hamburger-making robot is already a reality and has demonstrated its ability to produce 360 of the things in an hour. It's called Alpha, it's made in America (where the appetite for burgers surely exceeds even our own) and it's made by a company named Momentum Machines.

Amazed? Don't be, because over 50 years ago, AMF – a company today better known for its tenpin bowling alleys – invented a fully automated fast food service system, including a burger-making machine. The AMF system didn't take off because it was incredibly expensive to purchase, install, run, maintain and clean. In those days it was just far more cost effective to employ people to perform those tasks.

Today, the advances which CTEK's Stokes outlines, mean even relatively small operations can and do look for every opportunity to automate processes. For example, says Simon Craig, orchard manager at Punchbowl Kiwifruit Services in Ramarama, near Pukekohe, there is something of a meeting of cutting edge technology on one end of the company packhouse, and the oldest techniques in the business on the other.

"We've automated sorting of kiwifruit as they come into the packhouse with a system that uses cameras to take photos of the fruit and grade them. That was once done manually – or, if you prefer, visually – with people inspecting each fruit and deciding whether or not it makes the grade," says Craig.

At the other end of the packing process, it is good old manual labour, where trays are packed into boxes by hand.

WHY AUTOMATION IS A COMPETITIVE NECESSITY

Shane Bebe, business development manager at Australian industrial automation company Mobile Automation, says automation is a competitive necessity, particularly for companies in the developed world. "The biggest cost for companies is people, and that drives the necessity for implementing automated solutions," he points out. "If they are not automating as soon as they can, the simple reality is that they face going out of business."

That's because there are two conflicting forces at work, metaphorically tugging at opposite ends of a piece of string. On one hand, people want quality goods cheaply. On the other, workers want high wages, even for relatively menial work. Both can't win – but in a globalised environment, those who can produce inexpensively will make the sales. "There's a stark example playing out right now in the Australian automotive business. If those factories were allowed to automate years ago, the industry would still have a future," Bebe points out.

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Craig notes that companies which employ manual labour actively seek opportunities for further automation for the simple reason that machines don't require management (they also don't drink alcohol, take drugs or get sick). "It does take significant investment to automate even what looks like a fairly simple process; the sorting machines cost several hundred thousand dollars, but it is the return which is the important factor. In this instance, those machines will pay for themselves within two to three years."

Stokes provides further perspective on why automation is indispensable in businesses at scale. "Our largest customer is Fonterra; automating its plants is vital to get consistency of product in large volumes. Complex automation processes are applied in these big plants for longer runs and offer the ability to accommodate variability in incoming raw materials to ensure the end products meet applicable grading and standards."

Human operators, he points out, simply cannot manage these processes to the same degree of granularity and accuracy required to achieve predictable outcomes. "In other plants, such as baking, there are complex recipes to produce huge volumes of bread and other finished products, which must be the same on every day of the year, despite variability in conditions and materials. There is less operator input required today to get it right – and the advantages extend to health and safety, too. For example, packing lines can be physically dangerous, something that automation can and does reduce."

The demand for consumer products today is also such that plants operate around the clock. "Instead of three shifts and the inherent dangers of working with moving machinery late in the night, automation means the ability to produce high volumes with lower margins," says Stokes – and he adds that many of the jobs which are taken over by machines are those that humans really wouldn't want to do anyway. "The reality is that with automation, jobs don't disappear, they change."

FROM FACTORY FLOOR INTO ERP

Of course, automation and process control sit at the front end of the considerably sophisticated software systems which manage (particularly) today's large corporations. Fundamentally,

> "SUCKING UP INFORMATION CREATED ON THE SHOP FLOOR COLLATING COMBINING AND REFINING IT."

enterprise resource planning (ERP) solutions are about information exchange and management; they can be seen as a large funnel, sucking up information created on the shop floor, collating, combining and refining it to provide managers and directors with the ability to operate large, complex businesses.

"ERP systems support thousands of functions and every level of an organisation, from operational, managerial and strategic levels. It empowers people, down to every individual within an organisation, as appropriate, with information at their fingertips rather than requiring it to be explicitly sent, and provides a mechanism to collaborate in a structured manner with workflow systems and other mechanisms," says David Sundaram, associate professor of information systems and operations management at the University of Auckland.

That information is also increasingly drawn from the shop floor, Sundaram notes. "Information is varied and comes from a variety of sensors; it can be temperature, pressure, goods counts, whatever, increasingly automatically generated but also from people keying it in from terminals. The information flows into operational systems, before being passed at a higher level into data warehousing and business intelligence systems, providing people at the managerial and strategic levels with the ability to take decisions based on accurate, real-world data."

> "EMPOWERMENT MEANS PROVIDING VISIBILITY AND CONTROL, ALLOWING THE CEO TO DRILL DOWN."

CTEK's Stokes agrees that the shop floor is more integrated with enterprise software systems than ever before. "That's reflected in the type of people we employ and there are two aspects to that: those who specialise in automation and have an engineering [specifically mechatronics] background, and those with experience and training in manufacturing execution systems [MES]."

MES is something of an intermediate step between ERP systems and SCADA (supervisory control and data acquisition) systems, commonplace on factory floors. "These two skills sets have to be well integrated; we need people competent in both camps, so that things like reporting on downtime, operational efficiency and packing line performance can be designed and built to go straight into the MES layer."

What that means in practice, says Stokes, is that a manager can instantly pinpoint issues with shifts, downtime, production and any one of hundreds of other salient metrics, directly drawn from the coal face. "Today, it is very much more tightly coupled and it is a lot smarter."

That's confirmed by Bebe, who says he has over the course of many years observed the interface between factory automation and business management software develop considerably. "Today there is greater interaction between automation and management systems; managers in the office are in control of processes to the extent of handling throughput and dealing with exceptions as they crop up. And whereas the average electrification person wouldn't touch the 'black boxes' [PLC] in the past, today we see people walking around the shop floor, plugging in with monitors and looking at the coding in the PLCs. It has become an integral component of this type of work, reflective of how managers have a direct link into how automation equipment is running."

OFFICE WORKERS, YOU'RE NOT SAFE EITHER

Automation isn't limited to industrial and manufacturing processes, but extends into the white collar environment, too. That goes beyond the traditional 'office automation' which is the standard equipment of business (computers, printers, and other devices) and, more significantly, extends to 'high touch' business processes.

Sundaram notes that automation is a big part of ERP solutions, pointing out that major business processes and functions can be taken care of within the system. "Offloading tasks such as compliance with regulations – Sarbanes-Oxley, or Basel Capital Adequacy and many others – means businesses have the ability to meet their obligations rapidly with low human overheads."

It goes further; for example, a major insurer is introducing a new way of doing business by automating to a large extent the manual tasks involved in producing policy documents for its customers. The system centres on a new platform which is used by internal staff and the company's brokers to handle quotes and get service. The Belgium-based project manager of the system implementation, who asked not to be named as the system is still commercially sensitive, says it represents an investment of some US$5-million. "The purpose is to achieve a new 'target operating model' which will make us a disruptive force in the short-term market for small to medium business," he says.

"By automating many of the tasks and production of paperwork for business insurance, our brokers become more efficient and can spend more time with their customers, rather than shuffling paper."

Notably, the system is divided into two components: an automated service centre and a centre of expertise. Business insurance isn't as standardised as home and car insurance, so when the inevitable exceptions crop up which cannot be handled by the finely defined business processes which underpin automation, the system 'kicks' the transaction into the centre of expertise where real people handle it. Even so, the project manager says the split between the centres is 80 percent for automation and 20 percent to human handling.

WHY AUTOMATION IN BUSINESS IS IMPERATIVE

Just as automation is necessary to maintain the global competitiveness of manufacturers and those in the agricultural fields, so too is the automation which comes with ERP systems a major driver for their implementation, notes Sundaram.

It is a particular necessity for those businesses operating in multiple countries which have differing currencies, rules and regulations, practices and languages. "In this environment, it is necessary to achieve lean manufacturing, optimise cost and stock holdings and so on, and provide intelligence across the business. Empowerment means providing visibility and control, allowing the CEO to drill down and look at the company performance in detail from the top, while also at the bottom level providing people with the ability to see across their job functions to, for example, gear production schedules and control operations better."

But Sundaram has a warning for growing companies considering the implementation of an ERP system. "This is not a no.8 wire quick fix; it requires serious investment of time and money. It requires taking a medium- to long-term view of your ability to remain competitive. There are substantial risks in getting that done properly, and companies have gone bust attempting to deploy ERP. Big systems mean big risk."

* WHAT NEXT – AUTOMATED JOURNALISTS?

Automated production of written texts doesn't fall into the realm of science fiction. In the United States, clever software is capable of producing written weather reports for publication on news websites. Commenting on one such a programme (called StatsMonkey) *The Guardian* notes that, "Automated journalism can basically be understood as search algorithms programmed to look out for certain key findings. then to put them into a certain structure. For a report on a football game for example, the StatsMonkey calculates the narrative based on the numerical data." [sic].

Given the errors in that quote, taken directly from *The Guardian's* website, it is questionable whether or not the report itself was written by a machine. Furthermore, it is arguable that the software engineers, in calling their program 'StatsMonkey', have great insight into the calibre of people who take work as journalists or writers.