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The Manufacturers' Organisation

MANUFACTURING AND AUTOMATION:
OPENING THE GATES FOR PRODUCTIVE AND EFFICIENT GROWTH

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CONTENTS

INTRODUCTION

Automation technologies today far exceed our expectations as manufacturers across the globe can mass produce products at speed and have them delivered to people wherever they may be. The impact of just-in-time (JIT) processes could not be possible without automation already embedded within supply chains, and while their impact may appear invisible to the average person, automation technologies were used to keep products on our supermarket shelves even during the Covid-19 period.

But what does automation even mean today? Whether in industry or in our own homes, automation is the act of replacing human-led tasks with tools and technologies that speed up processes and improve efficiency. Its purpose is to reduce or remove the need for people and it can enable workers to avoid doing work that might be typically seen as dangerous or hazardous, redeploying their efforts to more-productive activities. We see more and more of these technologies, including AI, now embedding themselves into our lives.

Automation as a concept is not so new, and the term itself was introduced in the 1940s by Ford Motors. The idea to use technology to minimise human intervention dates as far back as ancient Egypt, whose civilisation used water clocks to measure the passage of time automatically. Even the ancient Greeks and Romans played with automation concepts by designing waterwheels and windmills to produce grains and saw wood. While the technology we use today is far more advanced, humanity's aspirations to improve and be more productive are as insatiable as they were in those times.

Society has made significant strides since then as automation technology influences almost all aspects of our lives, from manufacturing processes to healthcare and education. Manufacturers are making use of these technologies in many areas of their businesses, improving their outputs and simultaneously resolving skills gaps. These businesses are not only automating the manufacturing process but also implementing automation, machine learning techniques and AI wherever possible, such as in IT, human resources, finance and marketing.

However, we do not see manufacturers automating for its own sake. These investments require considerable time and research to understand the return on investment, and most companies have only automated a small proportion of their business. This is particularly the case for smaller manufacturers, who are less able to adopt the most-advanced technologies owing to a lack of skills, finance and information regarding what the best technology would be for them.

The findings of this study show that while many manufacturers accept automation as a tried and tested method of improving productivity and reducing costs, most have only automated some processes. Therefore, if we are to truly solve the productivity puzzle, the Government can and should aim to accelerate growth in this area by incentivising the adoption of automation technologies. Manufacturers say they want support delivered through the tax system, not more short-term incentives that have been common with policymakers. In addition, these businesses want access to information on what types of automation exist, what their return on investment will be and how to implement them. Though this is more difficult for the Government to deliver directly, regional programmes such as Made Smarter can support these businesses on their automation journey and should be expanded nationally.

Indeed, our findings show manufacturers do not need to be convinced of the benefits of automation, and they need access to skills, finance and information. If we can close these gaps, then we can expect to see more manufacturers benefiting from automation as well as the overall employment base moving further towards higher-skilled work.

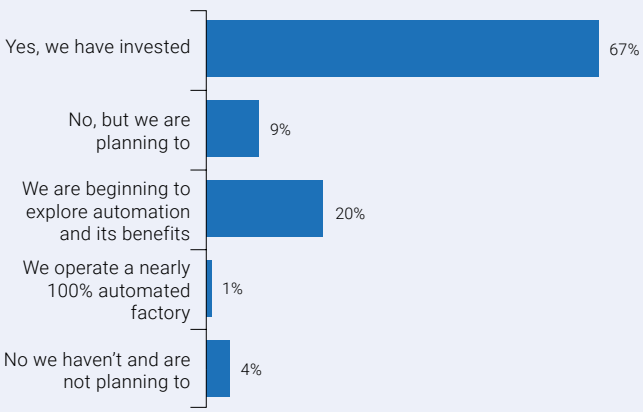
When describing automation, this research is primarily referring to machine-based solutions such as robotics, machine learning, computer numerical control and similar, rather than new digital technologies such as augmented reality/virtual reality, Internet of Things or artificial intelligence. However, the survey also explores these technologies, given how quickly they are emerging in industry.

PART 1:
INVESTING IN THE AUTOMATION JOURNEY

Manufacturers are embracing automation to solve the productivity challenges that have hindered growth in the industry for decades. Today, approximately two in every three manufacturers have invested in some type of automation to expand output and improve efficiencies. In addition, 20% of businesses are beginning to explore automation and its benefits, indicating that more companies will adopt automation technologies for its benefits rather than avoid it for its costs. Today, only 9% have not yet taken that step but are planning to, while 4% of businesses have no intention of investing in automation technologies.

These results show that manufacturers are highly motivated to adopt automation technologies, likely owing to the many benefits of improving labour efficiency, increasing the quality of goods and services and reducing costs. Automation can come in different forms, such as fixed automation where machines perform repeated tasks as part of a larger production process, or programmable automation which enables machines to perform tasks based on the developed program (these include computer numerical control (CNC) and programmable logic controllers (PLC)). Combining both and incorporating the use of data and system integration can allow businesses to achieve process automation whereby many manual labour tasks are automated through the coordination of machines and people.

Chart 1: Many manufacturers have invested in automation

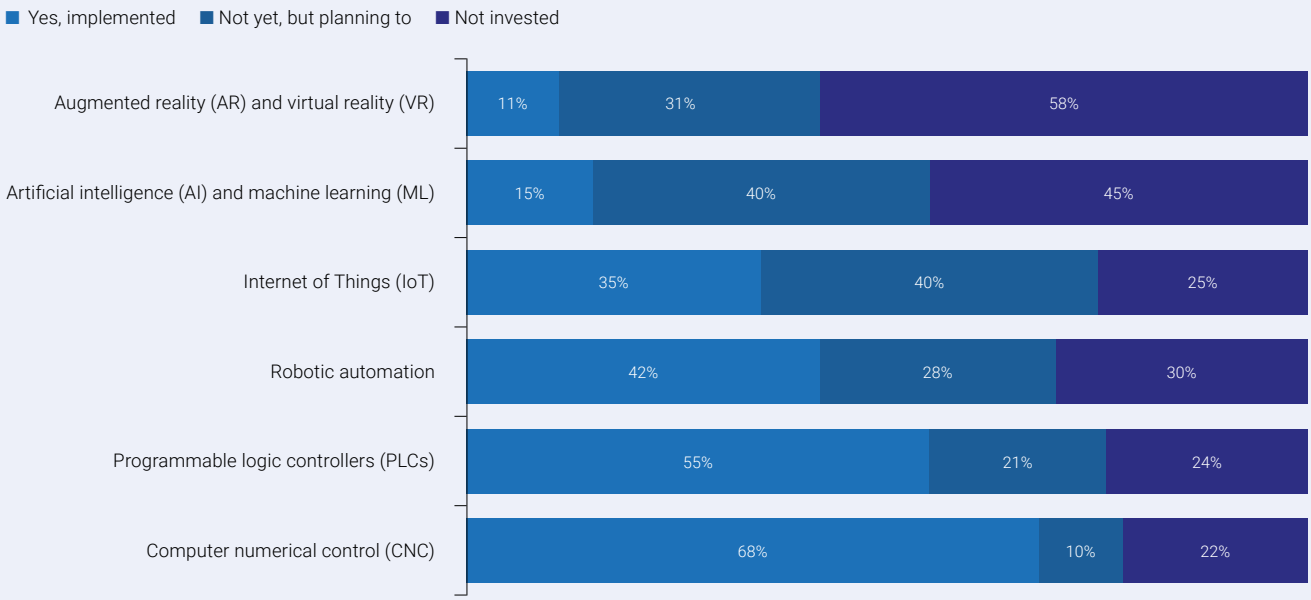


Source: Make UK/Infor Automation survey 2023

Automation is a catch-all term for technologies that can perform tasks previously done by humans. As a result, their type and function can vary widely in today's settings. For example, certain types of automation are more common in manufacturing, and so the survey finds greater rates of implementation for technologies such as CNC, PLC and robotics automation. Just over one-third have also implemented the Internet of Things (IoT), while artificial intelligence (AI), machine learning (ML), augmented reality (AR) and virtual reality (VR) have a much smaller proportion of manufacturers implementing these technologies.

Nevertheless, even for these technologies, between 30% and 40% of businesses are planning to invest more in the future.

Chart 2: Manufacturers have primarily invested in CNCs and PLCs



Source: Make UK/Infor Automation survey 2023

WHAT ARE THE DIFFERENCES BETWEEN CNC, PLC AND ROBOTICS?

Computer numerical control (CNC): These machines can be incorporated into manufacturing processes that involve cutting, carving or forming different parts based on programmable code. The technology is seen in almost every industry as it can work on metal, wood, plastic and even composites. Examples of such technologies include milling machines, laser cutters and water-jet cutters. In some cases, advanced 3D printers can be regarded as CNC.

Programmable logic controllers (PLC): These are specialised computers used within industrial automation to control and monitor manufacturing processes. They use programmable logic to execute specific tasks and operate based on input signals from sensors and other devices. PLC are essential to modern automation techniques.

Robotics: Robots are a form of automation often designed to perform specific tasks (generally repetitive) and can differ greatly depending on the situation or needs of a business. This can include anything from assembly line automation to packaging and palletisation, or even robots specialised in welding and cutting materials. Robotics can play a significant role in helping manufacturers improve productivity and business efficiencies.

THE WILLINGNESS TO SPEND ON AUTOMATION

Many manufacturers spent a sizable portion of their annual turnover on automation technologies last year. However, relatively speaking, automation does not come close to the amount a company would spend on other areas, such as labour costs and marketing. In fact, most manufacturers (72%) spent 6% or less of their turnover on automation in the last 12 months.

Across the sample, this comes to an average expenditure of 4.1% of annual turnover for a typical manufacturer. A level of expenditure around 4.1% for the average business is unsurprising, given that many businesses have only automated some processes. This compares to general plant and machinery investment, where manufacturers typically spend around 7% of their annual turnover.[1] Broken down by business size (employment bands), the data indicates that this average percentage of expenditure is largely consistent between SMEs and large firms. However, as expected, a larger business spending 4.1% of its turnover on automation is substantially outspending any SME in the sector whose turnover is less in comparison.

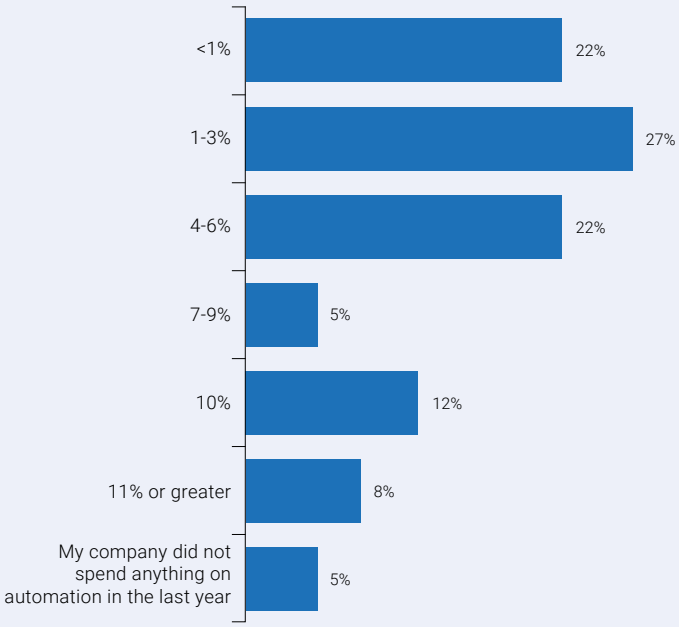
Looking forward, many businesses intend to increase their level of expenditure on automation over the next 12 months. A total of 59% of manufacturers have indicated they plan to increase their expenditure on automation in comparison to the previous 12 months, in addition to 36% who intend to spend the same (i.e., an average of 4.1% of their annual turnover). This commitment to investing in automation technologies is highly positive and shows that manufacturers are becoming more willing and able to make these sorts of investments. Of course, for some manufacturers, barriers to adoption remain a problem.

[1]Make UK, Investment Health report. (2022)

MANUFACTURERS ON AVERAGE SPENT 4.1% OF THEIR TURNOVER ON AUTOMATION TECHNOLOGIES LAST YEAR

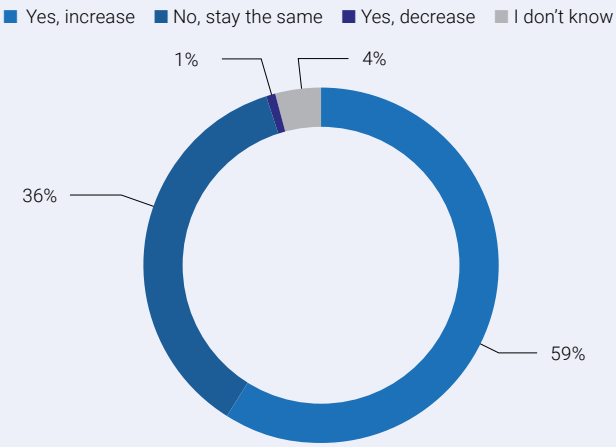
Chart 3: Most manufacturers spend less than 6% of their turnover on automation

% of turnover invested in automation in the last 12 months



Source: Make UK/Infor Automation survey 2023

Chart 4: Businesses plan to increase their spending on automation



Source: Make UK/Infor Automation survey 2023

THE PAYBACK PERIOD

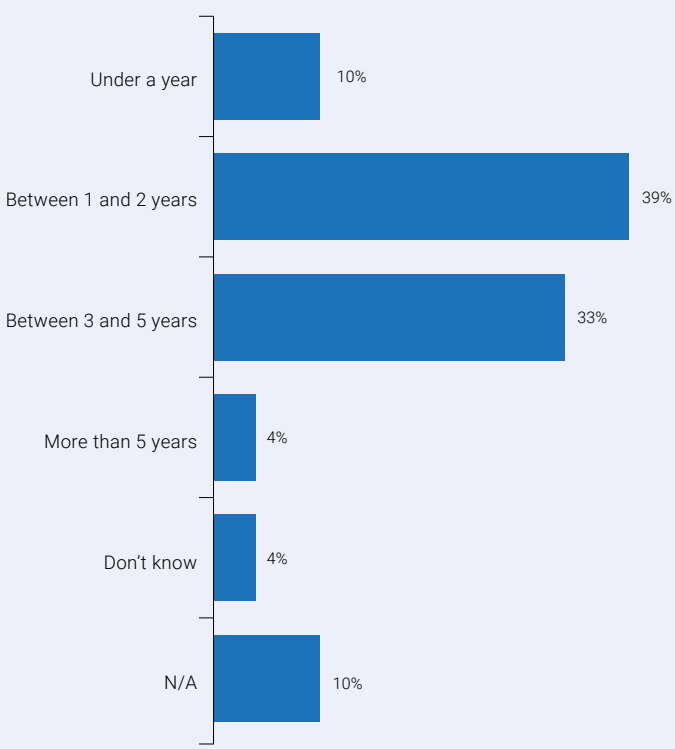
The impact of automation and the motivations that lead to greater investment in automation can be closely associated with expected returns on investment (ROI) – in other words, whether the future gains are worth the cost of investment. This means the impact a particular investment will have on output, whether that be measured by productivity or changes to turnover and profits.

The time periods for returns can vary greatly depending on the type of investment and the cost, from projects intended for long-term growth to quick incremental improvements in business processes. Understanding how ROI impacts investment decision making is critical to impacting how the Government can help incentivise manufacturers to invest.

Our survey data on automation investments shows that many manufacturers (39%) expect a positive ROI between one and two years after the investment was made. A similar share (33%) have slightly longer expectations of three to five years before achieving positive returns. More generally, eight in ten manufacturers expect up to five years for their investments to yield a positive ROI. This means that businesses who are considering how to expend their annual budgets must always consider very carefully whether an investment is worth the costs. Although the benefits to automation can be great, investments with longer time horizons for positive ROIs can make it more difficult for businesses with less cash or those who face difficulties in accessing finance to invest in worthwhile investments that could result in significant growth.

This in partciular should resonate with policymakers when designing incentive tools to promote investment, such as generous schemes like super-deduction that only last for two years. While businesses appreciate these gestures, they don't align with how businesses are run or how investment decisions are made. A long-term view is necessary to promote the right types of investment.

Chart 5: Manufacturers can expect up to five years to see the benefits of automation



Source: Make UK/Infor Automation survey 2023

In comparison to automation, manufacturers have remarkably similar levels of expectation with regard to the anticipated payback periods of investments in digital technologies. In a previous survey, about 75% of manufacturers indicated they expect up to five years for positive ROIs[2]. Not only are information and evidence of returns crucial to incentivising investment in new technologies, whether that be in automation (or digitalisation generally) or even decarbonising, but it is

[2]Digital Adoption: The Missing Link in Productivity Growth, 2022.

also highly important if businesses are to access external finance from banks or attract investors to help scale up their businesses more quickly.

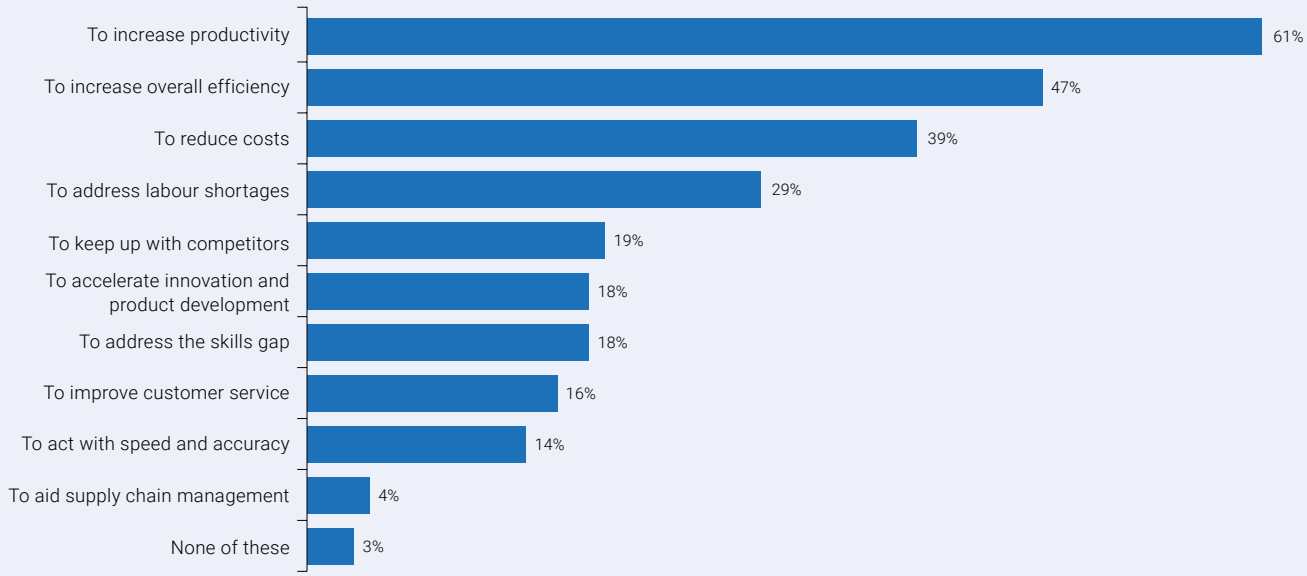
In terms of Government support, the timelines of ROIs should be considered when designing policy tools that could help support businesses on their automation journey, particularly SMEs who are more likely to lack the capacity to understand ROIs and how to implement automation. In fact, as the survey data will show later, a substantial share of manufacturers indicated that more evidence on ROIs would incentivise them to invest more in automation.

EIGHT IN TEN MANUFACTURERS EXPECT IT CAN TAKE UP TO FIVE YEARS TO REAP THE BENEFITS OF AUTOMATION

BALANCING MOTIVATIONS WITH THE RIGHT INCENTIVES

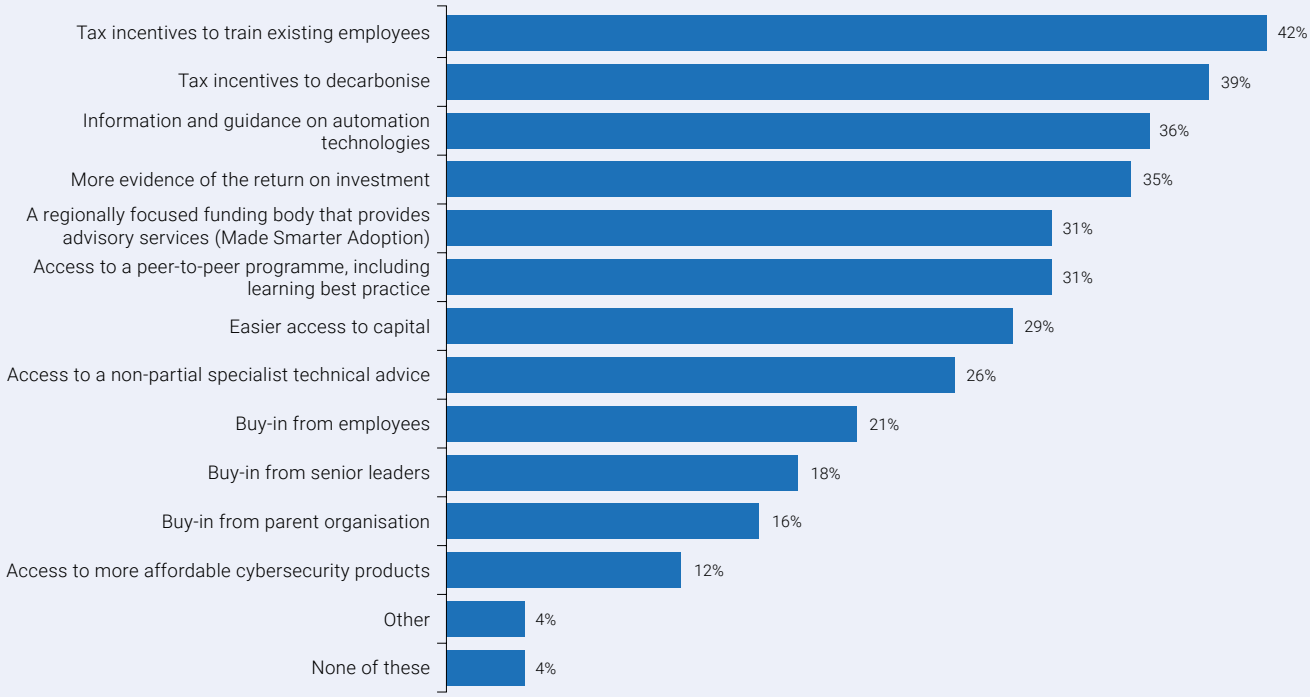
Why invest in automation? Different manufacturers can have different reasons for automation, from solving the skills challenges that have persisted for decades to finding new ways of developing products. Regardless, businesses have consensus on some of the key reasons for investment. The top five include increasing productivity (61%), increasing efficiency (47%), reducing costs (39%), addressing labour shortages (29%) and keeping up with competitors (19%). However, it is interesting that solving challenges in supply chain management or customer service are reported as a relatively weaker motivating factors. It is possible that automation in these areas does not yield such great benefits, or that businesses have less awareness of how automation can be used. For example, many businesses in the UK are beginning to embrace more automation and AI in areas such as customer service and marketing.

Chart 6: Manufacturers automate because they want to increase productivity and reduce costs



Source: Make UK/Infor Automation survey 2023

Chart 7: Incentives delivered through the tax system are most favoured by manufacturers



Source: Make UK/Infor Automation survey 2023

But these motivations do not tell us much about what the Government or solution providers could do to incentivise businesses to invest more in automation. Behind the scenes, all the top benefits have some relation to improving the ROI. Asking manufacturers what they believe would incentivise them produced interesting results.

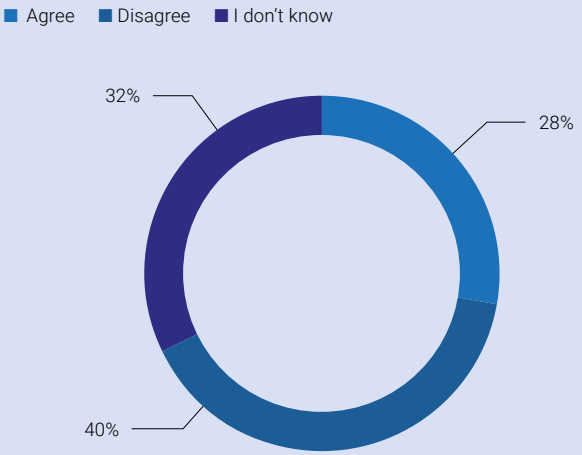
Manufacturers say specifically tax incentives to train employees (42%) and to decarbonise (39%) would be the most popular ways to incentivise investment in automation. While there exist many solutions and funding institutions that can help businesses access the finance they need to grow, often manufacturers prefer simpler solutions that can be delivered at scale without the need for significant paperwork. For example, manufacturers are some of the heaviest users of capital allowances and R&D tax credits to incentivise investment in plant and machinery and innovation. While businesses are not looking for tax incentives directly for the adoption of automation capital, they have a clear interest in solving the skills challenge by upskilling/reskilling the workforce to be able to work with new automation technologies.

It is critical to understand businesses' thinking processes and how best they want to be reached out to for support. This should, in principle, guide Government decision making when designing or redesigning policy tools to be as efficient as possible.

Following on from tax-related benefits, businesses seem to lack knowledge too. A total of 36% of manufacturers say they need information and guidance on automation technologies, while a similar 35% believe more information on ROI would incentivise them to invest in automation. While the Government can play a role in signposting businesses to relevant experts in the field, such as Catapults, Innovation Hubs or Innovate UK project grants, case studies of how other manufacturers have adopted automation and benefited from it could help close the knowledge gap. In an ideal scenario, manufacturers would be able to access one-to-one support to guide them on their automation journey. This is something we have observed being applied successfully in the Made Smarter adoption programme which is only available in selected regions but should be expanded to the rest of the UK.

DO MANUFACTURERS THINK THE UK IS IN A LEADING POSITION IN TERMS OF AUTOMATION?

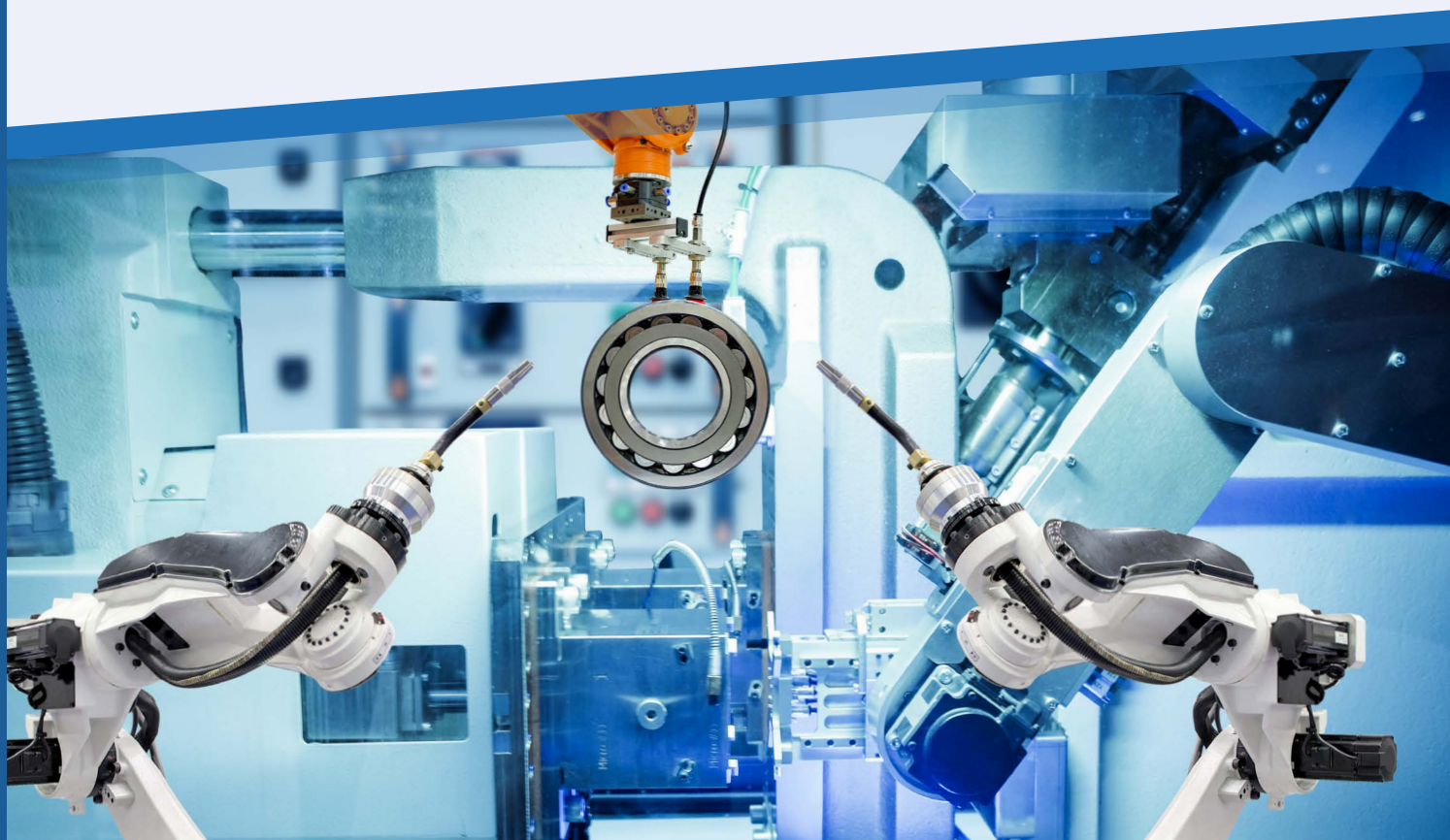
Chart 8: 40% of manufacturers disagree with the statement that the UK is a leader in automation



Source: Make UK/Infor Automation survey 2023

There is no clear consensus on whether most manufacturers believe the UK is a leading nation for automation or not. The largest group (40%) would disagree with the notion that the UK is a leader in this area, while only 28% would agree. On balance, the perception is weighted slightly more to the negative, which itself will affect investment decisions, particularly from Foreign Direct Investment as potential investors' beliefs about the UK as a place to do business will influence their choices.

More could be done to demonstrate the sheer amount of investment that the industry has already made in automation technologies and the benefits that are being gained from it. However, it is still possible the UK is falling behind its Western competitors.



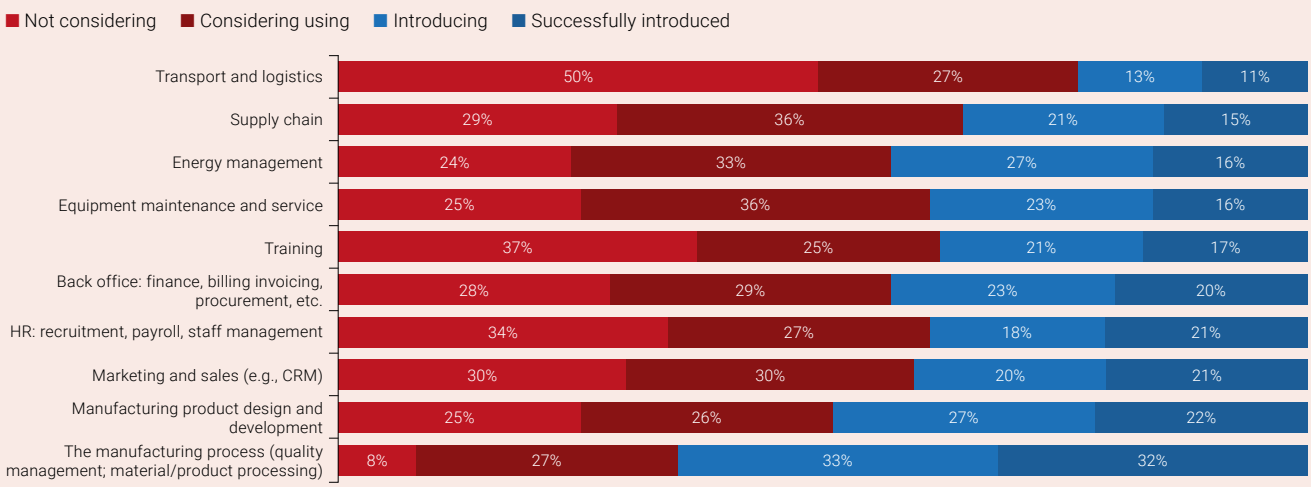
PART 2:
THE BENEFITS AND USE CASES OF AUTOMATION

The meaning of automation can be wide ranging, depending on how it is applied and used in different situations. Historically, the idea of automation is most associated with applications in factories and warehouses, but as technology evolves, the adoption of automotive technology among businesses and households is increasing too. From the Roomba vacuum cleaner to AI tools such as Alexa, automation technologies are a part of our lives.

However, each individual and business may use automation technology for different applications and reap different types of benefits from it. For example, 32% of manufacturers have successfully introduced automation into the manufacturing process, while a further 33% are in the process of introducing more automation in this area. Following this, the second most common part of the business to experience automation is manufacturing products and development (22% successfully introduced and 27% in the process of introducing).

Excluding the manufacturing process, all departments in a typical manufacturing company have experienced some level of automation, including human resources, finance, training, supply chain and even logistics. There may be several reasons why these parts of a manufacturing business are less likely to be automated. It can be that there are fewer technologies available that can be applied to back-office processes, or that manufacturers lack knowledge of the right tools to implement in these areas. Alternatively, it may be that the benefits do not outweigh the costs for manufacturers in terms of cost reductions and productivity gains, so we are more likely to see greater automation in those areas where the benefits-to-cost ratios are most favourable.

Chart 9: One in three have successfully automated the manufacturing process



Source: Make UK/Infor Automation survey 2023

EXAMPLES OF HOW MANUFACTURERS ARE MAKING USE OF AUTOMATION AND MACHINE LEARNING

Within a manufacturing process, automation can have many uses, from parts assembly to quality checks and defect detection. Manufacturers make use of automation for a wide range of processes to maximise efficiency and productivity. Many of these solutions include examples of using machine learning techniques which combine with purpose-built algorithms, while some are advancing quickly with the development of AI.

Machinery maintenance

A total of 33% of manufacturers say they primarily use automation for machinery maintenance, which helps reduce the costs of repairs and decreases the likelihood of breakdowns occurring. An example of this includes predictive maintenance, where technology uses data to monitor the performance of machines and can actively report to engineers by detecting various cues that could lead to future breakdowns.

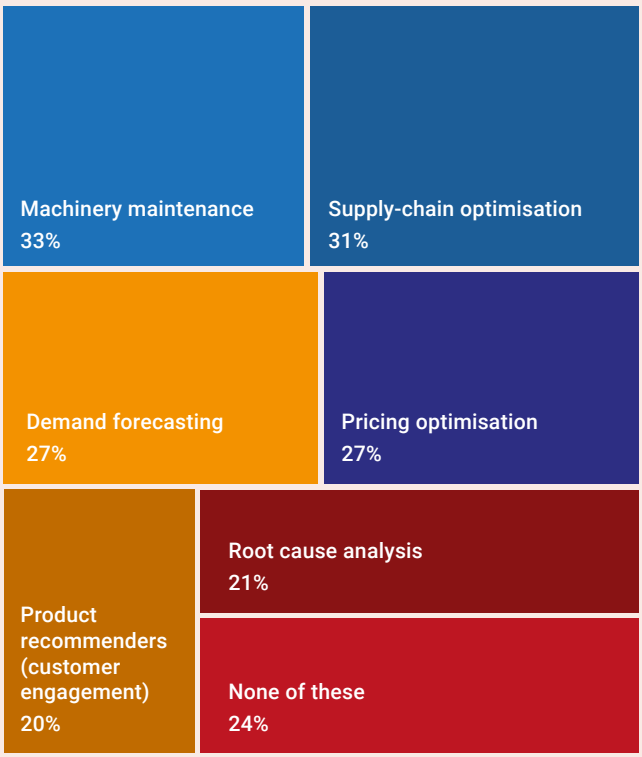
Supply-chain optimisation

Although supply chains reported a lower implementation of automation technology, 31% of manufacturers have been applying machine learning techniques to supply-chain optimisation. Though this is a good share of manufacturers investing in supply-chain resilience, more needs to be done, especially given how vulnerable supply chains can be when disrupted. While eight in ten manufacturers agree that monitoring supply chains can add success to their business, one in five say that they lack timely data on changes to demand or supply, which can hinder progress[3]. However, digital technologies are more common in supply chains than automation technologies, such as digital dashboards and analytics, used by 46% of manufacturers. Only 7% apply automation and robotics, according to a survey conducted in 2022[4]. Therefore, the adoption of automation for supply chains has grown significantly in the last twelve months.

Demand forecasting

Forecasting demand is about making use of data to estimate future performance and customer needs, which allows a business to optimise the use of its inputs, labour and capital. While this is less associated with robotics and machinery, it can still be automated with the use of machine learning tools with algorithms that are able to adjust based on business activity, as long as that business is able to collect the relevant data. The impact of demand forecasting is only expected to grow with the introduction of AI-based tools, with global corporations such as IKEA (demand sensing) making use of it to manage output. Demand forecasting has enabled IKEA to lower costs, reduce waste and even decrease emissions, with the ultimate benefit going to the consumer by keeping prices low. Manufacturers that face more dynamic conditions for their productions often make use of similar technologies, but at only 27% of businesses, more needs to be done to incentivise these techniques.

Chart 10: Machine learning and automation go hand in hand



Source: Innovation Monitor (2022), Make UK/Infor

Pricing optimisation

Following the end of the pandemic, manufacturers

[3]No Weak Links: Building Supply Chain Resilience, 2022.
[4]Ibid

reported increased demand for goods at unprecedented rates coupled with global supply-chain disruptions which impacted their abilities to deliver on orders. This sparked cost inflation rising dangerously, resulting in the cost-of-living crisis we face today. For manufacturers, it became increasingly difficult to price their goods effectively as the cost of inputs (such as metals and plastics) was changing almost hourly at its worst. Many businesses now seek ways to optimise their pricing strategies so that they can strike the right balance between margins and demand. Like demand forecasting, these tools use machine learning techniques which require effective gathering and use of data.

Root cause analysis

This method of problem solving is exactly as it sounds: to find the cause of problems. In manufacturing, this can relate to production processes such as finding out what exactly is causing defects in products or delays to delivery. Manufacturers can automate root cause analysis, enabling specific tools to collect data continuously and make decision makers aware of potential problems even before they arise. The system is particularly useful for businesses with multiple locations, where the findings of the analysis in one facility can help decision makers in another facility if they are using similar machines and tools.

THE RISE OF ADDITIVE MANUFACTURING/3D PRINTING IN THE UK

An area of automation not yet discussed but heavily influential in the manufacturing industry is additive manufacturing (3D printing). The UK is a leading user of 3D printing technology and, according to Additive Manufacturing UK (AMUK), could increase UK output by £3.5bn and contribute to more than 60,000 jobs by 2025.[5]

This technology enables manufacturers to improve their productivity by allowing for better use of resources and greater experimentation with product development. There remain significant opportunities for manufacturing to adopt these types of technologies, which have been proven to be highly successful for processes dealing with low-volume, high-complexity goods. There is no doubt that wider applications for 3D printing exist, and many more manufacturers could benefit from it with the right support and information to overcome barriers to adoption.

THE PATH FORWARD IS GREATER AUTOMATION

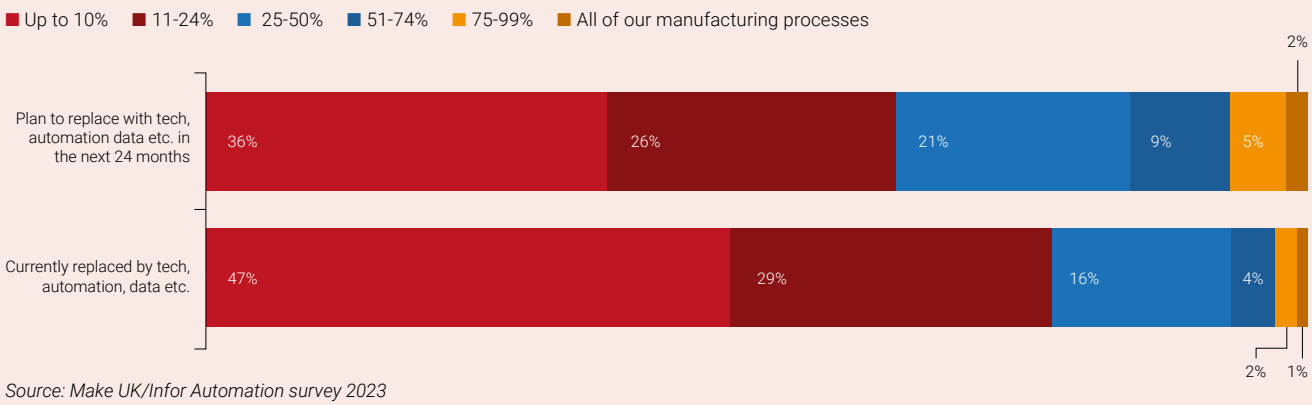
Manufacturers are investing more and more in automation to improve their businesses. Looking ahead, it is inevitable that companies will continue to adopt technologies, although some will do this faster than others. Over the next 24 months, manufacturers are planning to automate a greater proportion of their businesses, with most of the automation likely to take place within the manufacturing process (according to the findings of Chart 11).

Today, 47% of manufacturers only have up to 10% of their processes replaced by automation, while only 29% have replaced between one-quarter and one-half.

However, in the next two years, the proportion of manufacturers within the "below 50%" automation category is expected to decrease, while those within the "greater than 50%" automation category are expected to increase, from a cumulative 8% to 16% by 2025. This does not represent a significant proportion of businesses, but it shows a strong trend towards greater automation within manufacturing in the UK, which will have implications for both productivity and the labour force. On balance, it is a positive sign to see manufacturers planning to embrace automation a lot more in the next two years, with some even aspiring for 100% automation.

[5] AM-UK_Strategy_Publication_Amends_Novermber_Digital.pdf (additivemanufacturinguk.org.uk)

Chart 11: Manufacturers plan to automate more processes in the next two years



Source: Make UK/Infor Automation survey 2023

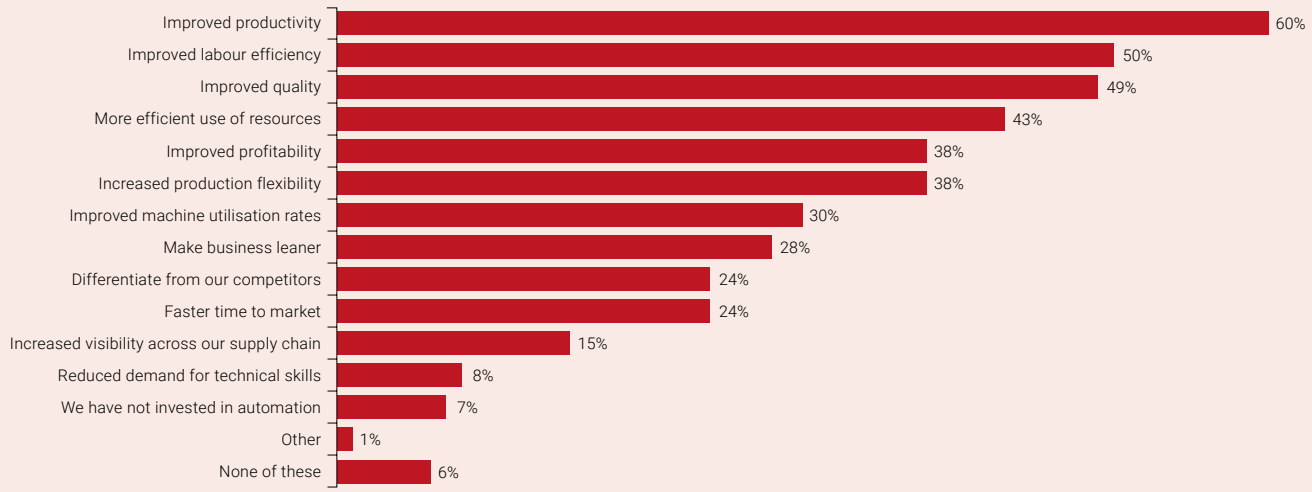
THE BENEFITS OF AUTOMATION

Automation can be costly for manufacturers, so the decision to take that step is not a simple one, especially for small businesses with limited capital.

The majority of manufacturers (60%) report that automation brings improved productivity to the business. This is followed by improved labour efficiency (50%) and improved quality (49%) to complete the top three. This is similar to the experience of manufacturers adopting digital technologies more generally who report more production flexibility, labour efficiency and better use of resources.[6] Though digital technologies can make production facilities more flexible, these technologies coupled with automation can bring about real productivity gains.

Businesses also indicated that automation brings benefits to resource use efficiency, making business leaner, increasing profitability, higher utilisation rates, better supply-chain visibility and even reducing demand for labour.

Chart 12: Automation brings benefits to productivity, labour efficiency and quality



Source: Make UK/Infor Automation survey 2023

[6]Digital Adoption: The Missing Link in Productivity Growth, 2022.

There remain huge opportunities to take even further advantage of automation. Most manufacturers (63%) have only automated some of the processes in their business, a proportion of what could be realistically automated. This means that the benefits of automation could go even further by increasing productivity, labour efficiency and quality in the goods that manufacturers produce. In the next two years, an increasing number of businesses expect to have more than 50% of their business automated. However, at the current rate, it is not expected to have an impact on a large portion of the industry by 2025 (only 16%). If we are to accelerate our productivity growth, we must think first about how to close the gap between those who are quick to adopt new technologies and those who are not.

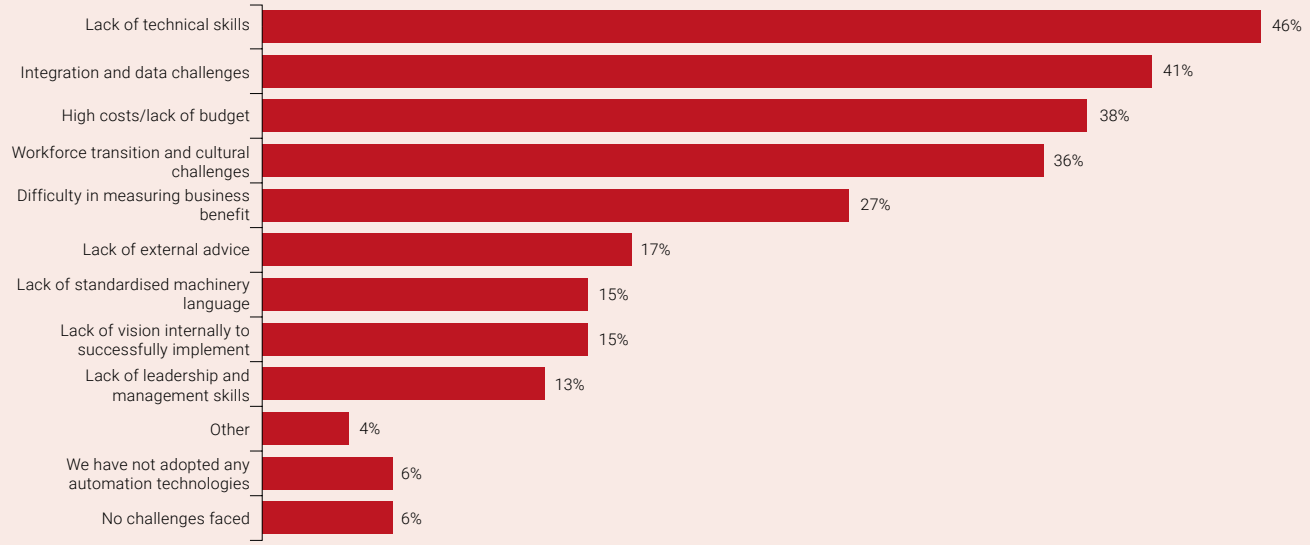
Manufacturers have already stated that benefits delivered through the tax system as well as more information on the benefits of automation and ROI would incentivise them to invest more. This is in addition to having access to services like Made Smarter, which has a proven track record of engaging with businesses to adopt new technologies.

BARRIERS TO ADOPTION CONTINUE TO HOLD MANUFACTURERS BACK

The benefits of automation make investments in these technologies a no-brainer for any manufacturer. Of course, every business is different, which means some may be able to automate certain processes while others have the capability to automate significantly more. Manufacturers report it is easier to include automation up front in the design phase compared with automating functions retrospectively, which is more challenging.

The largest share of manufacturers (46%) say a lack of technical skills creates challenges to adopting automation technologies. Indeed, automation technologies such as CNC and PLC regularly require human operators to manage the technologies, as well as people with the skills for maintenance in case there are issues with the machines. Specific automation technologies, such as cobots, are designed to function alongside people and so a lack of skills can slow down the adoption of automation technologies.

Chart 13: The adoption of automation technologies can be slowed owing to a lack of skills and integration barriers



Source: Make UK/Infor Automation survey 2023

The top barrier of lack of technical skills is followed by integration and data challenges for 41% of manufacturers. The IT systems used by manufacturers are critical to enabling automation technologies to thrive. Unfortunately, if a business is using outdated software or even other branded software that may not easily communicate with modern technologies, then the business may struggle to adopt modern technologies. In such cases, a business may even need to consider changing its systems, which adds to the total cost of adopting automation technologies.

In addition, the extra value of automation technologies comes from the ability to collect and use data to improve processes. However, without the right tools and people with the skills to collect, analyse and apply the insights generated by automation technologies, a manufacturer's ability to maximise its automation investments even after adopting them is reduced. The adoption of digital technologies, such as dashboards and analytics software, can help resolve these challenges, but overcoming the challenge of ensuring these technologies can communicate with each other can be more difficult.

The barriers continue with high costs/lack of budget, cultural challenges and even lack of advice and evidence. While cost barriers can be alleviated with better information on return on investment as well as improving access to finance, overcoming cultural barriers is best done through sharing stories and case studies of businesses that have been successful in using automation.

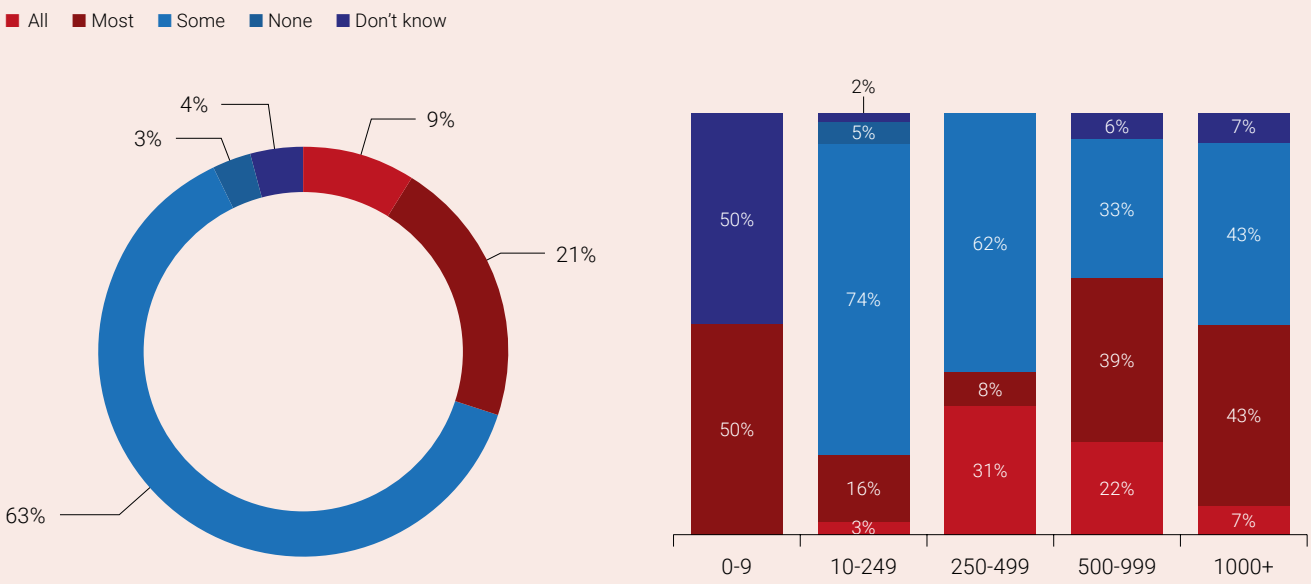
THE DIFFERENCE BETWEEN LARGE AND SMALL

Reducing the barriers could yield significant benefits to productivity and process efficiency. More than 60% of manufacturers have only automated "some" of their processes, of all that could possibly be automated. This is primarily because automating retrospectively is challenging for older businesses, and most manufacturers are likely adopting these automation technologies at a slower pace to ensure the ROIs are justified.

However, one in five manufacturers has automated most of its processes, which is a large share of businesses that have progressed significantly on their automation journey. This is positive for the industry and also demonstrates that there is still a long way to go before more manufacturers have automated most of their processes.

Chart 14: Of all the processes a manufacturer could automate, how much have they automated?

All manufacturers left, broken down by business size right



Source: Make UK/Infor Automation survey 2023

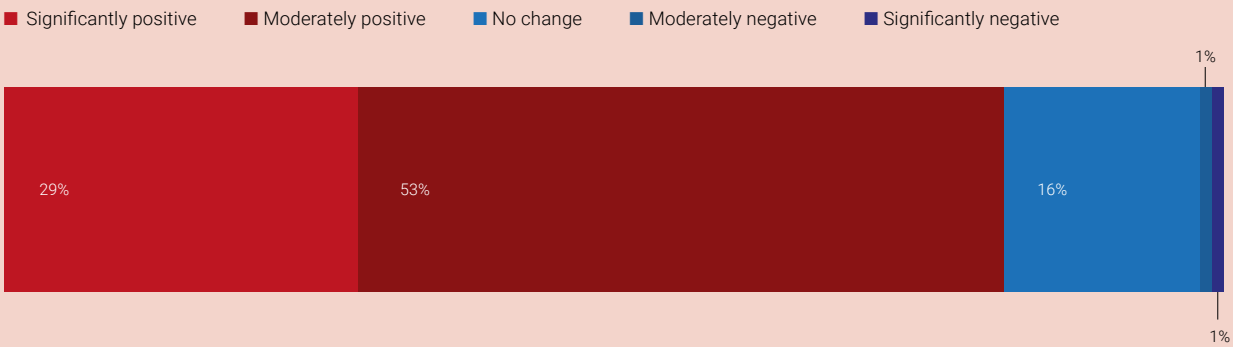
This data reviewed by business size does find notable differences between smaller manufacturers and larger ones. According to the survey, 74% of the SMEs sampled (10-249 employees) had "some" of their processes automated, with only 16% saying "most" were automated and 3% saying "all" for their processes. In comparison, larger manufacturers (500-999 employees) had only 33% of businesses with "some" automation, but 39% with "most" and 22% with "all". It is somewhat similar for businesses with 1,000+ employees, who had a larger share of businesses with "most" or "all" automation when compared to SMEs.

The breakdown of this data by business size reveals how different manufacturers are when it comes to automation. It is unsurprising that larger businesses have automated more of their processes than smaller ones, as they have greater access to resources (capital, labour and expertise), enabling them to automate more easily. These figures could also indicate that as manufacturers grow, they naturally automate more, while also increasing headcount.

THE FINAL VERDICT ON AUTOMATION

More than eight in ten manufacturers believe that the impact of automation is either significantly or moderately positive on their business. This represents an overwhelmingly positive review by manufacturers who have historically shied away from adopting modern technologies. As most businesses believe in the power of automation, investment in such technologies should be a no-brainer, and yet manufacturers continue to face barriers to adoption.

Chart 15: Most businesses feel very positive about the benefits of automation



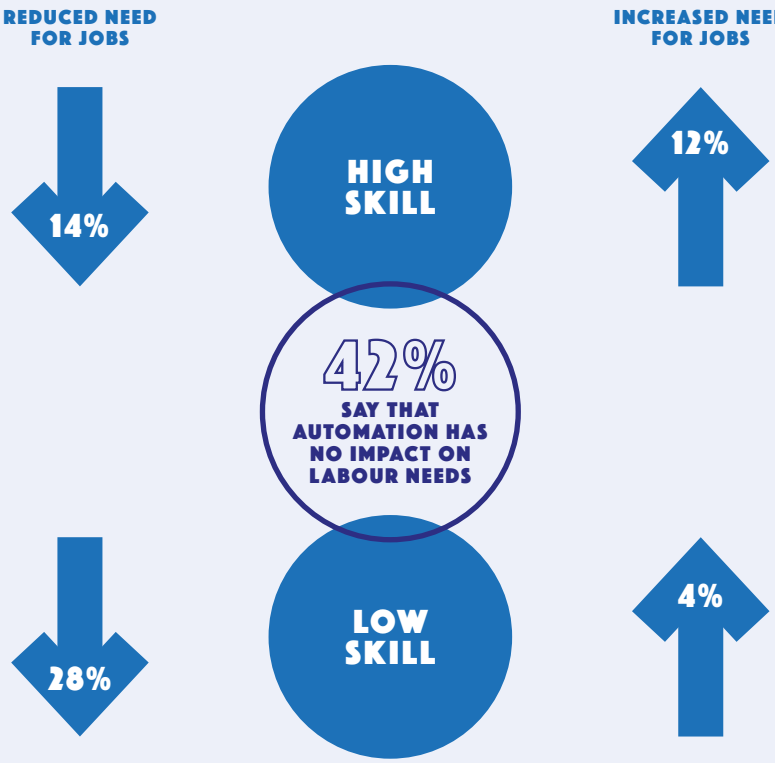
Source: Make UK/Infor Automation survey 2023

PART 3: AUTOMATION AND JOBS

The debates concerning the impact of automation on employment remain a key concern for industry and the Government. While it is great news that manufacturers are accepting automation with open arms and gaining benefits to productivity, the impact on jobs is real, although not altogether negative. Automation can improve efficiency in roles that were traditionally deemed dangerous and high risk to people, and could potentially make those roles obsolete which would increase unemployment. However, as the business grows, demand for labour in other roles can increase.

This results in a tricky situation for policymakers who may wish to incentivise the adoption of automation in manufacturing but risk a rise in unemployment through worker displacement. Indeed, according to manufacturers, it is low-skilled workers that are more at risk of being replaced by automation in comparison to highly skilled workers, who are likely to see an increase in demand for their skills.

For the largest single group of manufacturers (42%), automation has no impact on their labour needs. This also could be viewed as positive, meaning productivity benefits can be obtained without affecting the labour force.



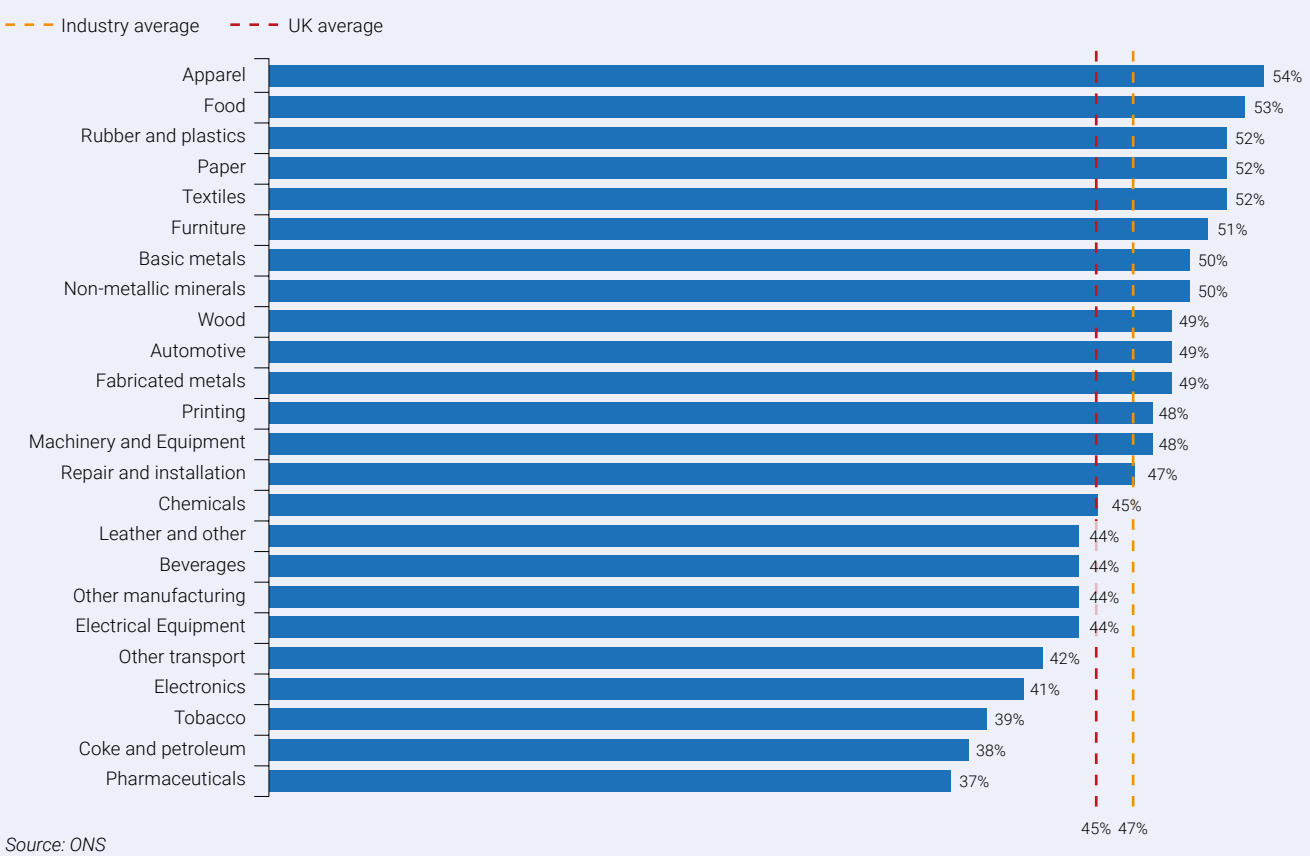
Source: Make UK/Infor Automation survey 2023

There are often concerns about the impact of automation, despite the benefits to productivity which come at the expense of employment. While to an extent this is a valid concern and is further exacerbated by the influx of new AI technologies, these technologies can create more jobs than they destroy. According to the Office of National Statistics (ONS), certain subsectors in manufacturing are more exposed to automation than others, with the industry facing an average probability of automation of 47% for jobs in the sector, compared to the national average of 44% when including all other industries.

This research by the ONS was completed in 2017, and since then the advancement of technologies could indicate that the probability of automation in jobs will be higher. However, alongside this, the probability of greater job creation may also be higher. The data below (Chart 16) illustrates only to what extent some industries face automation but does not highlight anything related to job creation. According to the World Economic Forum (WEF), automation could lead to a net gain of between 3.3million and 6million jobs by 2030 across the globe, which includes job types that do not yet exist.[7]

Though automation will result in some worker displacement, it will be up to both firms and the Government how they use the additional labour and to ensure they can contribute to the jobs of tomorrow. Though jobs can be displaced, workers can be redeployed to other roles through retraining and reskilling programmes. However, this can be more difficult to implement for older workers, who dominate the manufacturing industry. The Government's recently announced "returnships" could help solve this issue, but more solutions would be required to support the manufacturing sector appropriately.

Chart 16: Probability of Automation (by subsector)



Source: ONS

[7]Here's how automation and job creation can go hand in hand | World Economic Forum (weforum.org), 2022.

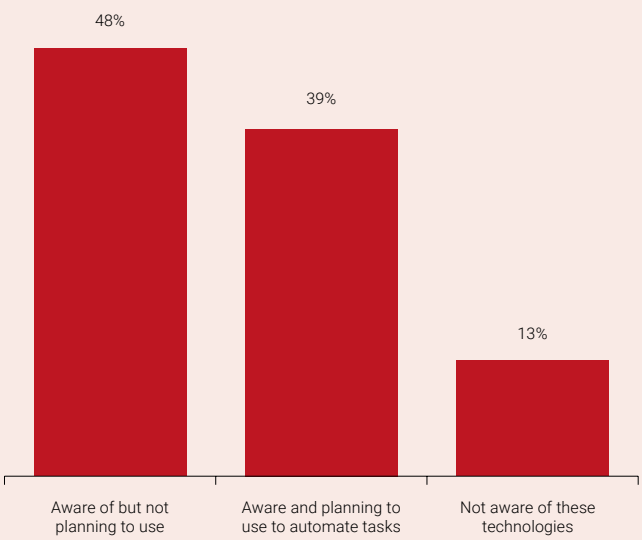
PART 4:
A NEW GENERATION OF ARTIFICIAL INTELLIGENCE

In recent months, there has been an explosion of new AI tools that have become accessible to businesses and consumers. Examples such as Google Bard and ChatGPT (Chat Generative Pre-Trained Transformer) are model-based language processors able to produce humanlike conversations that can respond to written questions and be used for a number of business purposes, such as content creation and software programming. While AI technologies like this are not new, these chatbots have advanced significantly in recent times, which has raised both excitement and curiosity regarding the long-term impacts of such technology.

This new type of technology creates significant opportunities for manufacturing. Both the access to these technologies and the rate of adoption have been incredible, given the short space of time they have been available. This may be partly owing to the network effects generated by journalists and social media which have generated a buzz around it, coupled with the basic versions of these technologies often being free at the point of use.

According to the survey, as the technology is so new, manufacturers are not yet making use of it in the production process, although it is advanced enough to have an impact. Our findings show the technology, commonly known as generative AI, could have a major positive impact on manufacturing businesses, not just on production processes but also by affecting other major functions that are important to these businesses, from marketing to human resources and finance. The technology is already able to apply advanced programming which could be applied to PLC or be used to support service engineers and maintenance operatives.

Chart 17: Two in five manufacturers are planning to use new generative AI tools, such as ChatGPT



Source: Make UK/Infor Automation survey 2023

The rate of awareness and intended adoption has been nothing short of remarkable. Though the largest group (48%) of manufacturers have stated that they are not planning to make use of generative AI in their business, nearly two in five are already planning to automate tasks in the business with these tools that are nearly costless to adopt.

What is more interesting is the parts of their businesses where these manufacturers are already making use of the technologies. The survey explored how

manufacturers intend to apply generative AI tools and, while many are still exploring its potential, most are making use of it in marketing and sales. This includes using the tools for content creation, writing blogs, campaigning, customer service, code generation and others. One manufacturer is even using generative AI to help draft job descriptions. Businesses are evidently experimenting with this AI's potential, and its applications could be limitless and will certainly expand into the entire manufacturing process if the rate of adoption continues at that being observed today.

The importance of generative AI is growing and will no doubt become inherent in every part of the manufacturing process over time. The latest survey findings show that the technology is already affecting other departments of manufacturing businesses directly, from marketing to human resources and finance. This itself could increase productivity and reduce costs, particularly as many of these AI tools are highly accessible, which will reduce barriers to adoption for small manufacturers as well as reduce the limitations these businesses face when it comes to accessing skills in those departments.

CONCLUSION

The findings of this research make clear that the adoption of automation technologies in manufacturing is growing promisingly across all sizes of businesses. While several barriers to adoption remain a problem, manufacturers do not fear making use of the various types of automation technologies, from CNC to robotics or AI, to improve productivity.

The usage cases for automation are wide and many. The extent to which manufacturers can realistically automate different functions and processes will differ from business to business. Manufacturers who produce one or a few types of products may find achieving high automation rates easier than those who produce multiple products or bespoke goods made to order. The potential to automate will continue to expand as the technology itself evolves over time, but for industry to progress and help the UK close the productivity gap, significant opportunities remain. Many manufacturers are yet to take complete advantage of automation to increase productivity and efficiencies across the business, with most having only automated some processes. With the right support from the Government and with improvement in the quality of information available on the benefits of automation, more businesses will be able to take that step forward.

Even with all the concerns surrounding the impact of automation on jobs, manufacturers see growth in recruiting for highly skilled workers when they increase their investment in automation. However, as automation is often used to replace repetitive tasks, demand for low-skilled workers is likely to fall, which could lead to higher unemployment rates for these workers, even if the net change in jobs is positive. This should not deter policymakers from incentivising the adoption of automation technologies, as to reach the heights of a highly skilled, high-value economy we must embrace automation and see it for its benefits, not its costs. With the right incentives, automation will lead to greater job creation than job destruction.

The same can be said for generative AI, which is having a tremendous impact on the manufacturing community as businesses, including their workers, are exploring the capabilities of such technologies. Whether the balance of the impact will settle on the side of positivity or negativity in the long term remains to be seen, but it is good to see so many businesses engaging with the technology at speed.

It is important to study closely the lessons that can be learned from the fast introduction and adoption of generative AI and whether this could change our understanding of how to accelerate the adoption of other technologies too. As the data already indicates, these technologies will bring more benefits than costs to businesses, and it is a positive sign to see so many manufacturers embracing these technologies rather than shying away from them.

RECOMMENDATIONS

FOR POLICYMAKERS

Roll out Made Smarter across all regions: The Government should commit to the full roll-out of Made Smarter adoption. There remains untapped potential to digitalise factories across the country, which could help stimulate economic growth. Made Smarter is a proven concept that has brought great benefits to companies that have engaged in the progress. It should also extend the remit of Made Smarter to include industrial decarbonisation to help support manufacturers to become more energy efficient and transition to net zero.

Make full expensing capital allowances permanent: The Government should make permanent the generous capital allowance scheme for plant and machinery to ensure businesses are able to plan their investment over long leads.

Expand the R&D tax credit to include capital expenditure: The R&D tax credit should be expanded to include capital equipment within qualifying expenditure to spur further digitalised R&D.

Improve SME engagement and collaboration with the Catapult Centres: The UK's Catapult Centre system is truly world leading, providing invaluable support for innovation in manufacturing. Yet, despite its offering an unparalleled asset to industry, many smaller firms fail to engage with Catapult Centres and the consequential benefits from the potential of collaboration, expertise and fantastic facilities. The landscape of Catapults had to be reconsidered to be more effective in order to have a greater reach within their regions, particularly in terms of where the Catapults were geographically based. Better distribution would enhance engagement with relevant businesses. The Government should work with industry bodies, including Make UK, and subsector-specific groups to help encourage increased engagement from smaller firms.

FOR MANUFACTURERS

Share best practice: Manufacturers must be willing to share information on the benefits of automation, even if anonymously. Make UK is committed to supporting best practice where possible, to enable SMEs to learn from the best in the industry.

Be more proactive: Manufacturers cannot wait for the right support to take the next step and improve their productivity. Automation can be for any business, small or large or in any subsector. This can be done by identifying your objectives in what you want to achieve from automation, investing in the right people and skills, asking for help from experts and celebrating the successes so that your peers in the manufacturing sector can learn from you. Manufacturing is a competitive industry as well as a complementary one, with the success of one business benefiting the rest of the supply chain.

VIEWPOINT

ENHANCING BUSINESS AGILITY THROUGH AUTOMATION IN THE UK MANUFACTURING SECTOR

In today's ever-evolving business landscape characterized by Volatility, Uncertainty, Complexity, and Ambiguity (VUCA), manufacturers are increasingly recognizing the need to adapt to change at speed – a concept commonly referred to as 'business agility.' One of the most potent tools at their disposal to achieve this is automation – both physical and digital. This survey shows that automation yields significant benefits in terms of productivity, efficiency, and ultimately, profitability.

Assessing the State of UK Manufacturers

Automation Hesitation: While a substantial portion of respondents (two-thirds) have made investments in automation, it accounts for only 4.1% of the typical manufacturer's turnover, with the majority (60%) falling below 6%. Is this level of investment sufficient? Without a comparable statistic from other EU manufacturers, direct comparisons are challenging. However, the survey's finding that 40% believe the UK is not a leader in this area suggests room for improvement. This sentiment is further supported by the fact that three-quarters of respondents have automated only up to 25% of potentially automatable processes.

Encouragingly, the majority (59%) express intentions to increase their expenditure on automation compared to the preceding 12 months, while over 80% express optimism about the benefits automation can bring.

Digital automation advantage

It's important to note that not all automation initiatives need substantial capital investments in new machinery or robotics. Manufacturers are gaining the benefits of digital automation, which offers rapid Return on Investment (ROI) across various business processes, including machinery maintenance (33%), supply chain optimization (31%), forecasting (29%), and root cause analysis (21%). These digitalisation efforts leverage existing equipment and data from Manufacturing Execution Systems (MES) and Enterprise Resource Planning (ERP) systems, employing machine learning (ML) and artificial intelligence (AI) to extract fresh insights and drive actions at speed. These automation initiatives can be implemented and deliver value in under 90 days, with leading manufacturers aiming for a 'flywheel' effect of value creation, where the benefits from one initiative fund the next

Interestingly, the survey reveals the rapid ascent of generative AI, with 39% indicating they are '*aware and planning to use*' this technology – a remarkable and encouraging level of awareness for a concept that entered mainstream language less than a year ago (although AI itself traces its origins back to the 1950s).

Urgency in Action

Barriers to faster automation adoption, such as skills shortages, workplace culture, and budget constraints, are identified as key inhibitors.

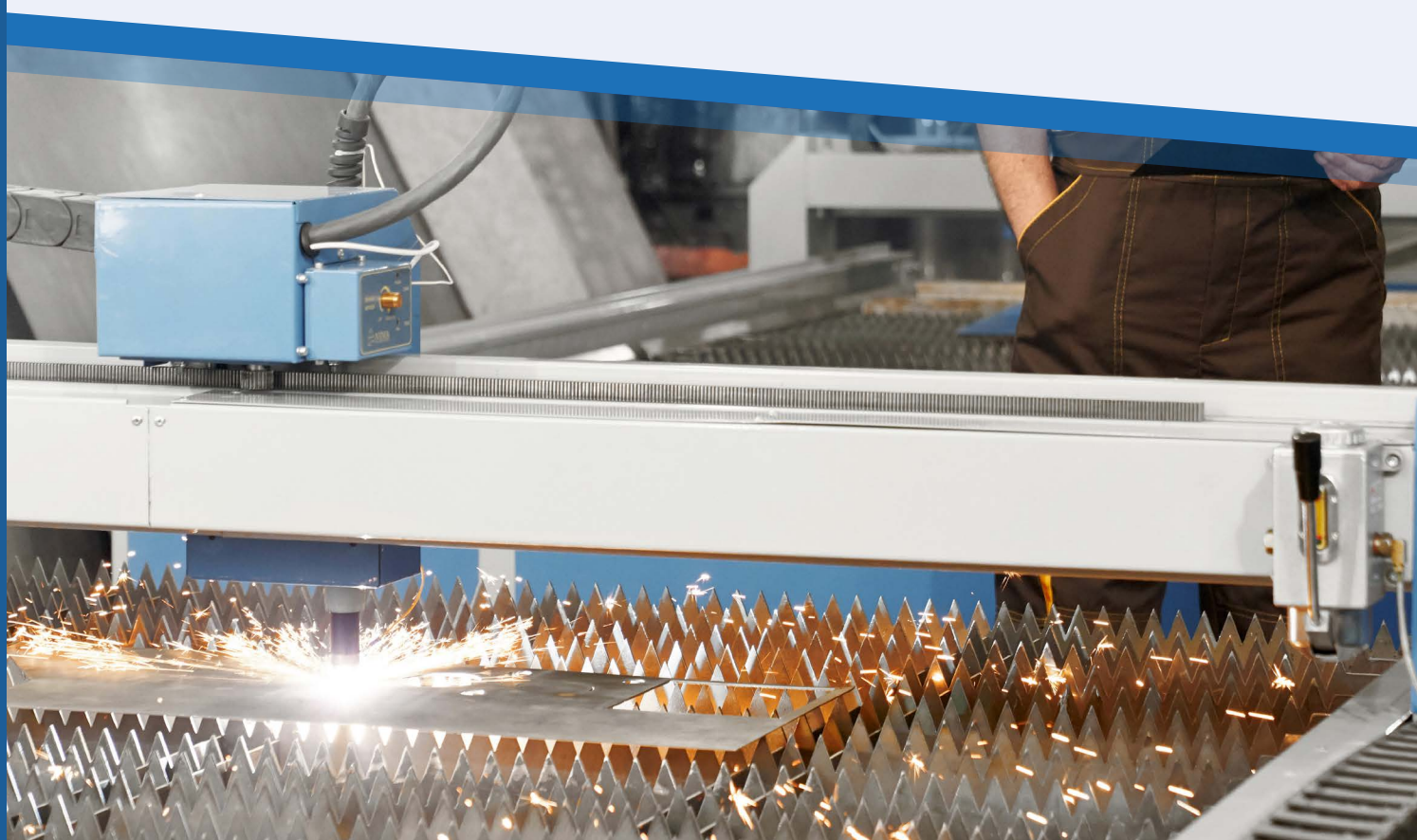
To address these challenges, Infor supports Make UK's recommendations for wider adoption of the Made Smarter initiative and government incentives to educate and expedite investments. However, Infor also urges manufacturers not to wait for government action. While the government clearly has a role to play in supporting

AI adoption, manufacturers currently have an opportunity to take control themselves to bridge the gap between intent and value in creating business advantage. The technologies are now widely available, affordable and a come with a typically fast ROI, which all helps manufacturers compete in a challenging environment”

Survey results highlight existing disparities between larger and smaller businesses and across industry sectors. Irrespective of size or sector, all manufacturers can benefit from increased automation, which do not need to be prohibitively expensive or time-consuming to implement.

The path to success in a VUCA environment for UK manufacturers hinges on their ability to embrace automation as a catalyst for agility, seize the opportunities presented by physical and digital automation, and overcome skills barriers through tapping into the Catapult and Made Smarter facilities. The time for action is now, as the benefits of automation are clear, compelling, and within reach.

Andrew Kinder
SVP Industry Strategy, Infor



Make UK, The Manufacturers' Organisation, is the representative voice of UK manufacturing, with offices in London, Brussels, every English region and Wales.

Collectively we represent 20,000 companies of all sizes, from start-ups to multinationals, across engineering, manufacturing, technology and the wider industrial sector. Everything we do – from providing essential business support and training to championing manufacturing industry in the UK and the EU – is designed to help British manufacturers compete, innovate and grow.

From HR and employment law, health and safety to environmental and productivity improvement, our advice, expertise and influence enables businesses to remain safe, compliant and future-focused.

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