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From sustainability to safety

What's driving Smart Manufacturing?

The driving force behind Smart Manufacturing

Industrial manufacturing organisations are used to driving innovation, at scale. They are often at the forefront of new technology adoption in the continual effort to improve their processes and output. Now, the rapid advancement of smart technologies, and the connected devices and data they offer, provides the opportunity to improve productivity, agility and speed on a scale that has previously been out of reach.

Smart Manufacturing, the process of optimising manufacturing procedures, uses automation, Big Data analytics and computerised controls to minimise costs and maximise productivity. The combination of IT and operational system data is enabling manufacturers to respond to changes quickly and effectively on the factory floor and across their value chain. This is driving real-time business benefits from continuous operational improvement (predictive maintenance), to increased productivity (new or mass-customised products) and reduced costs (reduced downtime).

The aerospace industry, as just one example, has been quick to react, leading the way in implementing Smart Manufacturing systems to optimise operations. Tools such as automation, robotics and AI are being utilised to drive value in efficiencies, cost savings and quality.

In this report, we look at all the factors that are driving Smart Manufacturing technologies within industrial manufacturing and the opportunities and challenges that organisations feel are ahead of them. Our research shows that beyond the expected benefits of improved efficiency, increased productivity, better asset management and greater cost controls, senior executives are prioritising the importance of sustainability and employee welfare, plus the need to invest in complementary technologies that can rapidly advance Smart Manufacturing processes and increase customer satisfaction.

Executive SUMMARY

From mechanisation to mass production, manufacturing processes have always evolved. Now smart technologies are catapulting industrial manufacturing organisations into a bold new era.

With the greater connectivity and data that Smart Manufacturing brings, organisations can improve quality and safety, optimise processes, minimise downtime and boost productivity. There are endless possibilities, so we wanted to see how organisations plan to embrace these opportunities while avoiding the potential pitfalls.

We surveyed senior decision makers at 150 manufacturing organisations in both the UK and Ireland. 93% said they have a clear Smart Manufacturing strategy in place, making it clear that this is a top priority for organisations.

ABOUT OUR RESEARCH

150 manufacturing organisations in both the UK and Ireland.

Four key trends emerged from our research:

Employee safety comes first: Manufacturers see the correlation between employee safety and productivity. Automation and robotics can reduce the risk of injury to workers, whilst increasing their productivity, and provide real-time monitoring to allow quick responses to potential safety issues. It's therefore no surprise that the most expected outcome of using smart technologies is to enhance employee safety.

Sustainability is a major driver: In a world with limited resources, manufacturers understand the need to prioritise sustainability. Regulators, shareholders and customers are all putting pressure on delivering these outcomes without increasing costs or reducing profit and productivity. This has forced manufacturers to explore the further benefits of sustainability and is expediting the push towards Smart Manufacturing for most respondents.

The cloud is essential: As anticipated, cloud is the foundation for Smart Manufacturing, enabling greater use of data and digitally connected technologies that are essential to achieve their sustainability, optimisation and safety goals.

Skill shortages risk progress: Without the expertise to design, develop and maintain Smart Manufacturing systems and processes, manufacturers are being held back from implementing their plans and realising productivity and agility benefits.

Putting employee SAFETY FIRST

Safety has always been of paramount concern for industrial manufacturers, and our research shows that it is now increasing in importance.

88% of industrial manufacturing Executives reported that safety has become a larger priority for their organisation in the last five years.

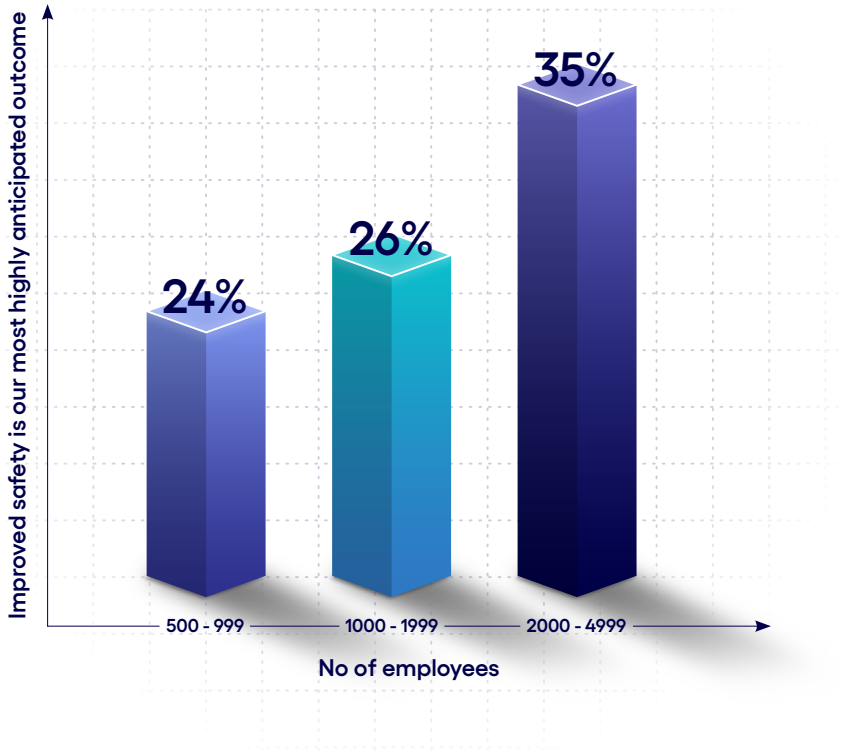
Embedding robotics into manufacturing processes has already reduced the need for employees to manually take on certain tasks. This will continue to evolve as Smart Manufacturing enables new, safer ways of working.

Huge improvements can be made by introducing connected, **wearable devices** to help monitor employees while they are working with hazardous materials to ensure safety protocols are followed. Employees can also benefit from **3D visualisation** that gives a realistic, virtual training environment to increase familiarity with the production floor and the actions needed to mitigate risks.

The greater connectivity and data that Smart Manufacturing brings will also allow manufacturers to improve safety. Equipment malfunctions present a risk to employee safety that can be mitigated with data-driven predictive maintenance. Almost a third (32%) of industrial manufacturing respondents stated that improved safety was their most highly anticipated outcome from introducing smart initiatives. This increases to 35% for the largest organisations.

Smart Manufacturing is a powerful ally for organisations striving to transform safety and create better conditions and processes to safeguard their workers and achieve their objectives.

Larger companies are positive about improving safety



Delivering the promises of COP28 with a smart approach to SUSTAINABILITY

In a demonstration of global solidarity, the 28th UN Climate Change Conference – COP28 – closed in December 2023 with agreement to 'transition' from a reliance on fossil fuels[1]. The summit also set a resolution to triple renewable energy and double energy efficiency by 2030. To achieve these goals, every sector will need to find cost-effective solutions from suppliers and innovative technologies.

Fortunately, our research shows that manufacturers aren't shying away from their responsibilities. 87% of respondents say that sustainability is business critical for their organisation, 88% are acting upon their sustainability goals.

91% say they are working on sustainability in their professional partnerships and suppliers.

1. unfccc.int/cop28/blogs

How Smart Manufacturing can help

Smart Manufacturing has made what would have been unthinkable a decade ago, possible.

Intelligent products, and the data they generate, can help manufacturers understand how each phase of their manufacturing process affects their carbon footprint and then take action to reduce it.

The use of **digital twins** can also remove the need for physical testing by enabling scenarios, such as process or design variations, to be played out virtually without needing to switch-on the original machine. This can significantly reduce, if not eradicate, energy consumption.

Increasingly, industrial manufacturers are considering the environment and promoting **circularity** in their product development; from the materials that are used through to how the product will be recycled at the end of its life.

Asset health is also a contributing factor to sustainability efforts. Machinery operating at its optimised peak performance will be more energy efficient, meaning that the advances to preventative maintenance driven by Smart Manufacturing will see overall carbon emissions reduce.

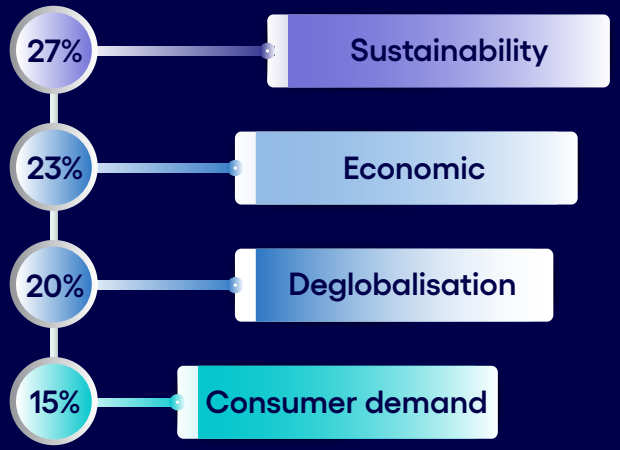
The World Economic Forum has stated that global manufacturers are responsible for one-fifth of carbon emissions and consuming 54% of the world's energy sources[2]. In the UK, according to Statista[3], the manufacturing sector was responsible for 80 million tonnes of carbon emissions in 2021 and accounts for nearly 10% of all greenhouse gas emissions.

Sustainability goes beyond clean, green initiatives in the manufacturing sector. Manufacturers also recognise the potential for a sustainable business to reduce costs whilst increasing profits and productivity; delivering against their wider business objectives.

27% of Industrial Manufacturers told us that sustainability was their main reason for pursuing Smart Manufacturing projects. This comes above economic desire and even consumer demand, showing that industrial manufacturers are willing to lead the way.

2. weforum.org/impact/carbon-footprint-manufacturing-industry/
3. statista.com/statistics/486100/co2-emission-from-manufacturing-uk/
4. ghgprotocol.org/

Sustainability was most likely to be named as the top driver of Smart Manufacturing



To deliver on the promises of COP28 and comply with The Greenhouse Gas Protocol[4] international framework, organisations must understand their own carbon emissions and those of their suppliers. Industrial manufacturers are well on the way to doing this with 88% stating that they are working to improve sustainability in their professional partnerships and with their suppliers.

It's clear to see why sustainability requires immediate action. Industrial manufacturers are already showing that they are willing to adopt smart technologies to change how they operate and minimise their impact on the planet.

Complementary technologies are critical to SMART PROCESSES

Smart Manufacturing brings together digitally connected technologies that generate huge reams of data. It is this data that informs decisions and optimises processes.

35% of industrial manufacturers stated that improved access to data was their first or second most anticipated outcome from Smart Manufacturing.

84% have used cloud computing to augment their manufacturing processes.

Smart Manufacturing is being powered by cloud

Industrial manufacturers were quick to adopt a 'cloud-first' strategy, which has helped to lay a solid foundation for future change. To realise the benefits of improved sustainability and safety, while also maximising return on investment, organisations are now focusing on using the cloud to enable more smart technologies.

The cloud has made it possible for manufacturers to store their data without relying on on-premises solutions (and the high costs that they entail). This has allowed organisations to leverage the **Internet of Things** and implement more digitally connected technologies that give insights into areas such as sustainability, process optimisation and safety. By using **real-time data** from their production processes, organisations can make better-informed decisions and reduce energy use, optimise machine uptime and boost productivity.

This is why it's perhaps unsurprising that 60% of Executives said that cloud computing was an important part of their Smart Manufacturing strategy. However, our research shows that there is scope to do more. While 84% of respondents have used cloud computing to augment their manufacturing processes only 28% say they have reached the limit of the technology.

Cloud is the underpinning technology to Smart Manufacturing success. Unlocking the value of real-time insights, adaptability and efficiency, relies on the seamless collection, storage and analysis of real-time Smart Manufacturing data. This ability to make data-driven decisions, respond to changing demands, and augment factories with emerging tools and technologies depends on the effective implementation of Cloud to prevent excessive costs and poor outcomes.

The top four technologies that are critical for Smart Manufacturing success:

Cloud computing **91%**

AI / ML **80%**

Sensors **80%**

5G **82%**

Skills needed to implement SMART MANUFACTURING are in short supply

While our research shows that organisations are keen to implement Smart Manufacturing processes, finding skilled resource is a challenge,

44% told us that a lack of experienced talent is a major barrier to pushing ahead with their Smart Manufacturing plans.

Fortunately, this talent shortage may not last forever as according to recent statistics from UCAS, there are more STEM post-secondary students enrolled in UK universities than at any point in history, with a 400% increase in AI-related courses in the last decade.

The 2022 Census wide survey[5] of over 4,000 of the UK's workforce also showed a clear national appetite for skills development.

This shows that people can see the types of roles that will be needed for the long term, with IT and digital leading the way. And it's clear that industrial manufacturing organisations are ready to welcome them. Only 4% said that an unclear strategy for their Smart Manufacturing programs is a major challenge, decreasing to just 2% for the largest companies. If the talent shortage can be overcome, organisations have everything else they need in place to proceed quickly with their plans.

One way to overcome the short-term skills gap in Smart Manufacturing is to form partnerships with companies that have the necessary expertise. By collaborating with companies that have experience in implementing Smart Manufacturing processes, organisations can leverage their knowledge and skills to accelerate their own adoption of these technologies. This can help to bridge the skills gap in the short term while organisations work to develop their own internal capabilities. Additionally, partnerships can provide access to a wider pool of talent and resources, enabling organisations to address the challenges of implementing Smart Manufacturing more effectively.

The top areas workers said they were most keen to explore included;

IT and digital	20%
Finance	16%
Business	16%
Green industries	11%

5. themanufacturer.com/articles/80-of-employees-in-manufacturing-want-to-upskill-this-year/

Conclusion

Our research shows much optimism among industrial manufacturers, who are well on the way to implementing Smart Manufacturing processes that drive sustainability and improve safety. Ultimately this marks an exciting new era for manufacturers who, with the right foundations in place, can potentially drive innovation on a much greater scale.

Although organisations clearly see the benefits of Smart Manufacturing, implementation is complex. There is the reliance on the cloud and data management to consider, and the lack of experienced talent to overcome.

Yet organisations with clear strategies, and the right partners to support their plans, have a vital opportunity to leverage Smart Manufacturing technologies and optimise their operations, improve productivity, drive innovation, and open up new streams of valuable data. This will drive the growth, improve customer experience and put industrial manufacturers in a stronger position to adapt in a rapidly changing world.

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About Cognizant

Cognizant is a leading provider of information technology, consulting and business process services. With a strong focus on innovation and digital transformation, Cognizant is at the forefront of the Smart Manufacturing revolution. By utilising the latest technologies, including automation, Big Data analytics and computerised controls, Cognizant helps manufacturers optimise their procedures, minimise costs and maximise productivity. With a deep understanding of industry trends and pain points, Cognizant is well-positioned to deliver end-to-end services across the lifecycle of a manufacturing facility, from conception to operation.

www.cognizant.com

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Prasanth is a digital expert with over 20 years of experience in business and technology consulting, digital transformation, innovation management and consulting-led sales. He has worked across the US, Europe and Asia, delivering projects across a variety of industries. He is passionate about future-proofing digital and technology investments and helping organisations define and execute their digital roadmap.

About Microsoft

(Nasdaq "MSFT" @microsoft) enables digital transformation for the era of an intelligent cloud and an intelligent edge. Its mission is to empower every person and every organisation on the planet to achieve more.