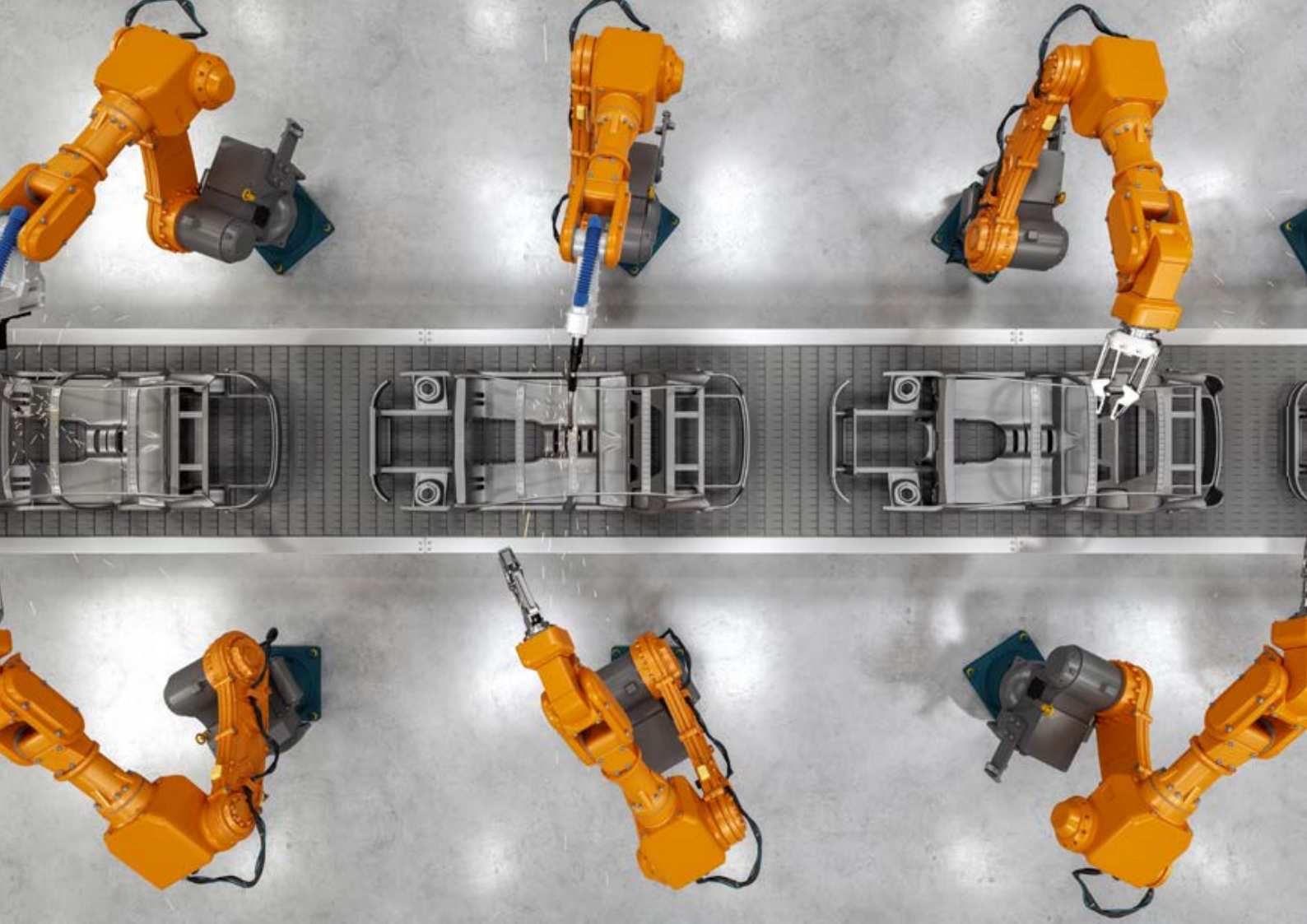# Effective technical applications
in connected
manufacturing

verizon
business

Smart manufacturing unleashed
Effective tech applications in the industry

Driven by reinvestment and shifting priorities from both investors and governments, manufacturing is experiencing a resurgence. Reshoring and creating resilient production networks are now the central focus and as a result manufacturers are increasingly embracing smart manufacturing technologies like artificial intelligence (AI), machine learning (ML) and the industrial Internet of Things (IIoT).

To understand their impact, we spoke to industry experts, who shared their best practice advice and whose real-world reports and key statistics provide valuable social proof and credibility about these transformative investments.

Robotics and automation

Automation is significantly reshaping manufacturing by enhancing efficiency and productivity. The widespread use of robots, including collaborative robots (cobots) and autonomous mobile robots (AMRs), demonstrates this shift. Robotic density has doubled in the past six years,[1] with investment in these technologies up 30% in the past year.[2] These technologies are now mobile within factories, increasing operational flexibility and are often driven by new strategies in production.

One key player in shipbuilding has integrated automated welding systems into their production lines, providing precision, and helping to reduce manual labour costs. Sundeep Samra, Verizon's Manufacturing Client Partner, highlights the company's long-term investment in shipbuilding: "We're talking about a contract that they secured for building the next generation of frigates. They have multiple sites across the UK where they manufacture and build these ships today. When they won the new contract, they recognised that they needed to make a massive investment in those facilities to deliver the quality and the speed that the new contracts required.

They took a pragmatic approach site by site, laying foundational infrastructure in place."[3] This investment also includes enhancing network connectivity to support the automated systems and quality control by machine learning.

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...the integration of these robots has not only improved efficiency but also enhanced safety on the shop floor.

Sundeep Samra
Verizon's Manufacturing Client Partner

1. Rapid rise in robotics adoption: Global average robot density doubles in just six years, IFR finds. (2024, January 19). Manufacturing Automation. Retrieved July 20, 2024, from https://www.automationmag.com/ifr-robotics-adoption-density-global/
2. State of Smart Manufacturing Report | Rockwell Automation | UK. (n.d.). Rockwell Automation. https://www.rockwellautomation.com/en-gb/capabilities/digital-transformation/state-of-smart-manufacturing.html
3. Interview with Sundeep Samra, Client Partner at Verizon Business.

Similarly, a consumer goods company in the UK employs AMRs in their facility to transport goods from production lines to packaging areas, replacing manual labour with efficient robotic processes. Samra goes on, "the integration of these robots has not only improved efficiency but also enhanced safety on the shop floor." [4]

In addition to these examples, many smaller companies are also leveraging automation to remain competitive. For instance, the food and beverage sector, traditionally reliant on cheaper labour, is rapidly adopting automation due to increasing labour costs and shortages. The use of robots in these industries is not just limited to production lines but extends to warehousing and logistics, which enables a seamless flow of goods and materials.

Live application:
Siemens' AMRs

Siemens has integrated Autonomous Mobile Robots (AMRs) in their manufacturing processes to streamline material handling. These robots navigate the factory floor, transporting materials between different production stages. The AMRs are equipped with sensors and AI to avoid obstacles and enable smooth operations. They also depend on high-quality connectivity to negotiate the space efficiently. [5]

4. Interview with Sundeep Samra, Client Partner at Verizon Business.
5. Siemens. "Autonomous Mobile Robots in Manufacturing." From Siemens.

AI and machine learning

AI and machine learning are becoming pivotal investments in manufacturing, with robotics being significantly enhanced by these technologies. AI allows for this near real-time data processing and decision-making on the factory floor, which leads to improved operational efficiency.

An example of this is BMW's implementation of AI-driven quality control in their painting process. Cameras and AI compare each newly painted car body against an ideal model, significantly improving the efficiency and accuracy of quality checks. [6]

Bosch, the German engineering specialists, integrates AI into their robotics systems, allowing robots to learn and adapt over time, which enhances their performance and flexibility. [7]

"The potential for AI in manufacturing is enormous, not just in improving efficiency but also in addressing the skills crisis," says Henry Anson, Publisher of The Manufacturer. "The skill shortage exists in virtually every manufacturing country, around the world." [8]

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The potential for AI in manufacturing is enormous, not just in improving efficiency but also in addressing the skills crisis

Henry Anson,
Publisher of The Manufacturer.

6. BMW Group. "Fast, Efficient, Reliable: Artificial Intelligence in BMW Group Production." From BMW Group
7. Bosch. "Bosch Center for Artificial Intelligence."
8. Anson, H., 2024. The Manufacturer. Interview by Verizon

Live application:
BMW's AI-Driven Quality Control

BMW has deployed AI and machine vision systems to improve the quality control of their painting process. Cameras and AI compare each newly painted car body against an ideal model, significantly improving the efficiency and accuracy of quality checks. This technology identifies defects early, reducing rework and promoting high-quality standards. Additionally, it accesses cloud computing to support the factory-level systems, providing the necessary computational power and data storage to enhance performance and scalability. [9]

However, quality control is just a small snippet of the possibilities of AI. Predictive maintenance, powered by AI, helps manufacturers anticipate equipment failures before they happen, reducing downtime and maintenance costs. For example, in the automotive industry, AI is used to monitor and predict wear and tear on factory machinery, facilitating timely maintenance and replacement of parts. This proactive approach not only extends the lifespan of equipment but also enables uninterrupted production.

AI is also enhancing supply chain management by providing real-time insights into logistics and inventory. Large multinational companies use AI to optimise their supply chains, predicting demand and adjusting production schedules accordingly. This level of precision helps in reducing waste and allowing for supply to meet demand efficiently as well as helping reach sustainability requirements.

9. BMW Group. "AI in Automotive Quality Control." From BMW Group.

Digital twins and digital threads

Digital twins and digital threads are revolutionising manufacturing by providing real-time monitoring and analysis, predicting potential issues before they even occur. These technologies create virtual replicas of physical assets, allowing for continuous optimisation and proactive maintenance.

Siemens transformed its electric motor factory with digital threads, enabling continuous monitoring and optimisation of production processes. "Digital threads provide insights into factory operations, aiding better decision-making and improving overall efficiency," explains Philip Horn, Verizon's Head of Digital Transformation and Innovation EMEA. [10]

Digital threads integrate data from various stages of production, creating a comprehensive view of the manufacturing process. This integration helps manufacturers trace issues back to their origin and address them promptly. For instance, a car manufacturer's engine plant in the UK uses a digital thread to monitor production processes in real-time, enabling quick identification and resolution of faults.

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Digital threads provide insights into factory operations, aiding better decision-making and improving overall efficiency

Philip Horn
Verizon's Head of Digital Transformation and Innovation EMEA

10. Interview with Philip Horn, Head of Digital Transformation and Innovation EMEA at Verizon Business.

The integration of digital twins and threads also supports sustainability efforts. By providing detailed insights into energy consumption and emissions, these technologies help manufacturers optimise their operations to reduce environmental impact. For example, Siemens uses digital twins to monitor and reduce energy usage in their factories, contributing to their sustainability goals. As Siemens themselves point out, "Digital Twin technology that is not only relevant during ongoing operations, but from the very first minute an idea or business model is created. Today, a smart factory is first created as a digital twin and only much later in the real world. Precise simulations not only make it possible to avoid roadblocks and foresee dangers, but also to design all processes as efficiently as possible so that the factory of the future is not only productive, but above all highly sustainable." [11]

Live application:
Rolls-Royce's Predictive Maintenance

Rolls-Royce uses digital twins for predictive maintenance of their aero engines. These virtual replicas allow real-time monitoring and analysis to predict issues before they occur, helping reduce downtime and extending engine lifespan. From their Derby facility, Rolls-Royce monitors engines globally, providing connected aftercare. This has been happening for years. In fact, initially, it was done with floppy disks, but now uses real-time internet data to send parts to meet planes as needed. This ensures timely maintenance and consistent performance. [12]

11. Siemens. (2024, July 19). What do Siemens and NASA have in common? https://www.linkedin.com/pulse/what-do-siemens-nasa-have-common-siemens-cgfec/
12. Rolls-Royce. "Digital Twin Technology for Predictive Maintenance." From Rolls-Royce.

Warehousing and supply chains

Smart manufacturing and machine learning open new horizons in distribution and supply chains, both of which offer significant advantages. For a start, the integration of these technologies streamlines operations, helps reduce waste, and enhances productivity. In many cases, these shifts have been as a result of a positive productivity problem.

Phillip Horn highlights how a leading European metal recycler has improved their warehousing operations with digital asset tracking and automated forklifts. The factory, with a vast area for raw materials and used metals arriving by truck or ship, faces challenges such as a shortage of personnel, limited space, and the constant need to locate materials. These issues lead to questions like, "Where is everything? Where have we left it? Where does it need to go?" The company realised they lacked control and digital means for asset and people tracking. Basic Wi-Fi was ineffective for tracking purposes. They needed a reliable solution to provide good coverage for asset tracking and to manage forklift operations. By implementing digital asset tracking and automated forklifts, they achieved better control and efficiency in their warehousing operations. [13]

In addition to these advancements, the implementation of digital twins in warehousing and supply chains has shown great promise.

Digital twins provide a virtual model of the warehouse, allowing for real-time tracking and management of inventory. This technology helps in optimising storage space, managing stock levels, and facilitating timely delivery of goods.

Moreover, AI and machine learning are being utilised to predict and manage supply chain disruptions. By analysing data from various sources, these technologies can identify potential risks and develop contingency plans. This capability is particularly valuable in the wake of global supply chain disruptions caused by events like the COVID-19 pandemic.

Live application:
Ocado's Robotic Warehousing

UK supermarket home delivery leader, Ocado, has developed a highly automated warehouse system using robotic pickers and automated guided vehicles (AGVs). This technology significantly speeds up order fulfilment and improves accuracy. AI integration allows for continuous optimisation of warehouse operations, enabling high efficiency and customer satisfaction.

13. Interview with Philip Horn, Head of Digital Transformation and Innovation EMEA at Verizon Business.

The real-world impact of advanced technologies

The adoption of advanced technologies in smart manufacturing is revolutionising production processes, quality control and supply chains. The practical applications of AI, ML, digital twins, and automation demonstrated in the above live applications highlight significant benefits and a giant leap forward. These innovations drive efficiency, reduce costs and enhance competitiveness and, as the industry evolves, manufacturers across all industries gain more flexibility and sustainability. The transformation underscores the importance of robust digital infrastructure and strategic partnerships. By collaborating with partners like Verizon, manufacturers can realise the potential of smart manufacturing and maintain a competitive edge in a rapidly changing industry.

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Working with
Verizon

Verizon is uniquely positioned to help manufacturers navigate these challenges. With expertise in digital infrastructure and smart manufacturing, Verizon offers end-to-end solutions that combine advanced data analytics and robust networking to boost productivity, reduce waste, and enhance profitability across the manufacturing ecosystem. Partnering with Verizon enables your business to effectively address the cybersecurity, data management, and cultural challenges of smart manufacturing.

As the manufacturing industry transforms towards a connected enterprise, building the right infrastructure and architecture is paramount. This requires collaboration and partnership. "If you want to have a true transformation, the best possible solution requires co-creation," emphasises Horn.[14]

Verizon supports this collaborative approach, enabling your smart manufacturing efforts to be successful and fully integrated. By partnering with Verizon, manufacturers can build robust digital infrastructures that support advanced manufacturing technologies, ensuring they stay competitive in a rapidly evolving industry.

Verizon's expertise in digital infrastructure, private 5G networks, and the Industrial Internet of Things (IIoT) makes it an ideal partner for manufacturers looking to modernise their operations. Their comprehensive solutions help manufacturers leverage the latest technologies and data to improve productivity, reduce waste, and enhance profitability across their production ecosystems. By working with Verizon, manufacturers can overcome these challenges and achieve their goals of smarter, more efficient, and more resilient operations.

Learn more about how Verizon can help you explore and adopt the technology that's making manufacturing smarter at **verizon.com/gb/manufacturing**

14. Interview with Philip Horn, Head of Digital Transformation and Innovation EMEA at Verizon Business.