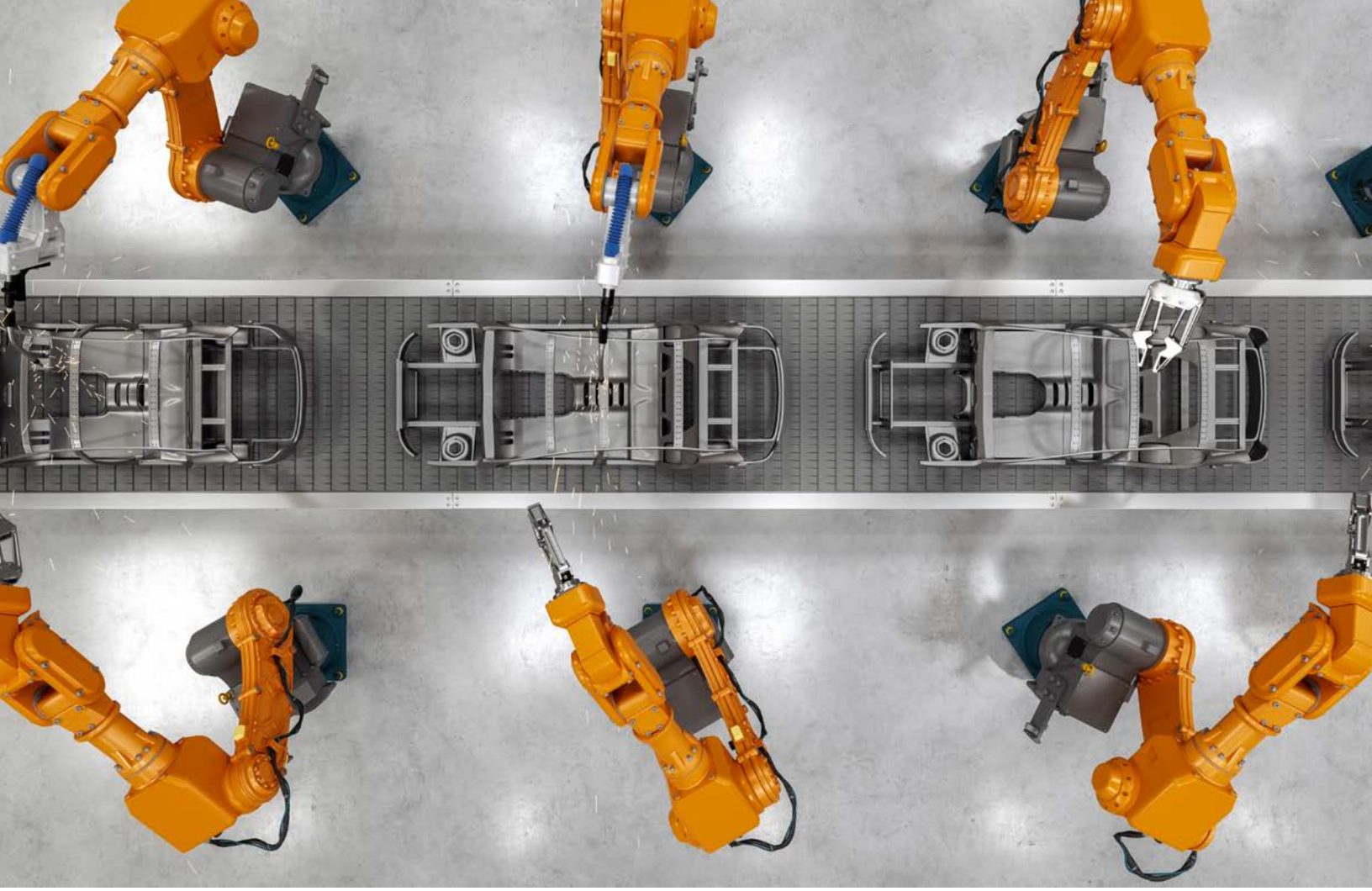
Effective technical applications in connected manufacturing

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 such as artificial intelligence (AI), machine learning (ML) and the Industrial Internet of Things (IIoT).

We spoke to key thought leaders in the industry who shared best practices and real-world experience, providing valuable insights into the 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 its production lines, providing precision and helping reduce manual labor costs. Sundeep Samra, Verizon Business's Manufacturing Client Partner, highlighted 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 U.K. where they manufacture and build these ships today. When they won the new contract, they recognized 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."

This investment also includes enhancing network connectivity to support the automated systems and quality control by machine learning.

> "... the integration of these robots has not only improved efficiency but also enhanced safety on the shop floor."
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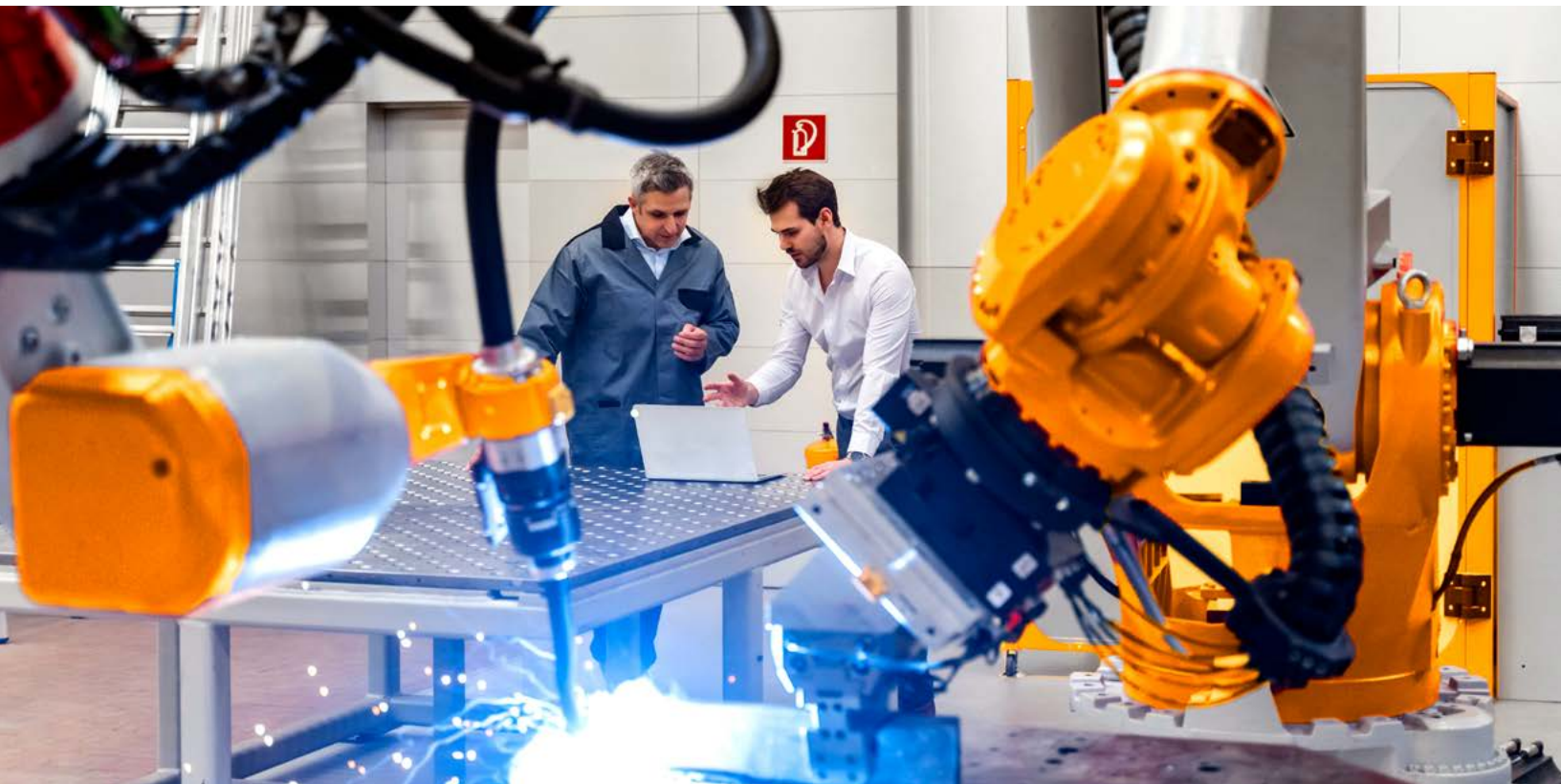
> **Sundeep Samra**
> Verizon Business's Manufacturing Client Partner

1. "Rapid rise in robotics adoption: Global average robot density doubles in just six years, IFR finds," Manufacturing Automation, Jan 19, 2024. https://www.automationmag.com/ifr-robotics-adoption-density-global
2. "9th Annual State of Smart Manufacturing," Rockwell Automation, accessed May 22, 2025. https://www.rockwellautomation.com/en-gb/capabilities/digital-transformation/state-of-smart-manufacturing.html



Similarly, a consumer goods company in the U.K. employs AMRs in its facility to transport goods from production lines to packaging areas, replacing manual labor with efficient robotic processes. Sundeep went on, “The integration of these robots has not only improved efficiency but also enhanced safety on the shop floor.”

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 labor, is rapidly adopting automation due to increasing labor costs and shortages. The use of robots in these industries is not just limited to production lines but also extends to warehousing and logistics, which enables a seamless flow of goods and materials.

Live application:

AMRs in action

Many manufacturers have integrated AMRs into their factories to streamline material handling between production stages. These robots can navigate factory floors only when there is a reliable wireless connection. In a factory setting, Wi-Fi can often have coverage issues caused by interference from machinery or other obstructions. This often causes issues with AMRs, making them inoperable. With a cellular connection, there is coverage throughout the factory floor, resulting in better functioning AMRs.

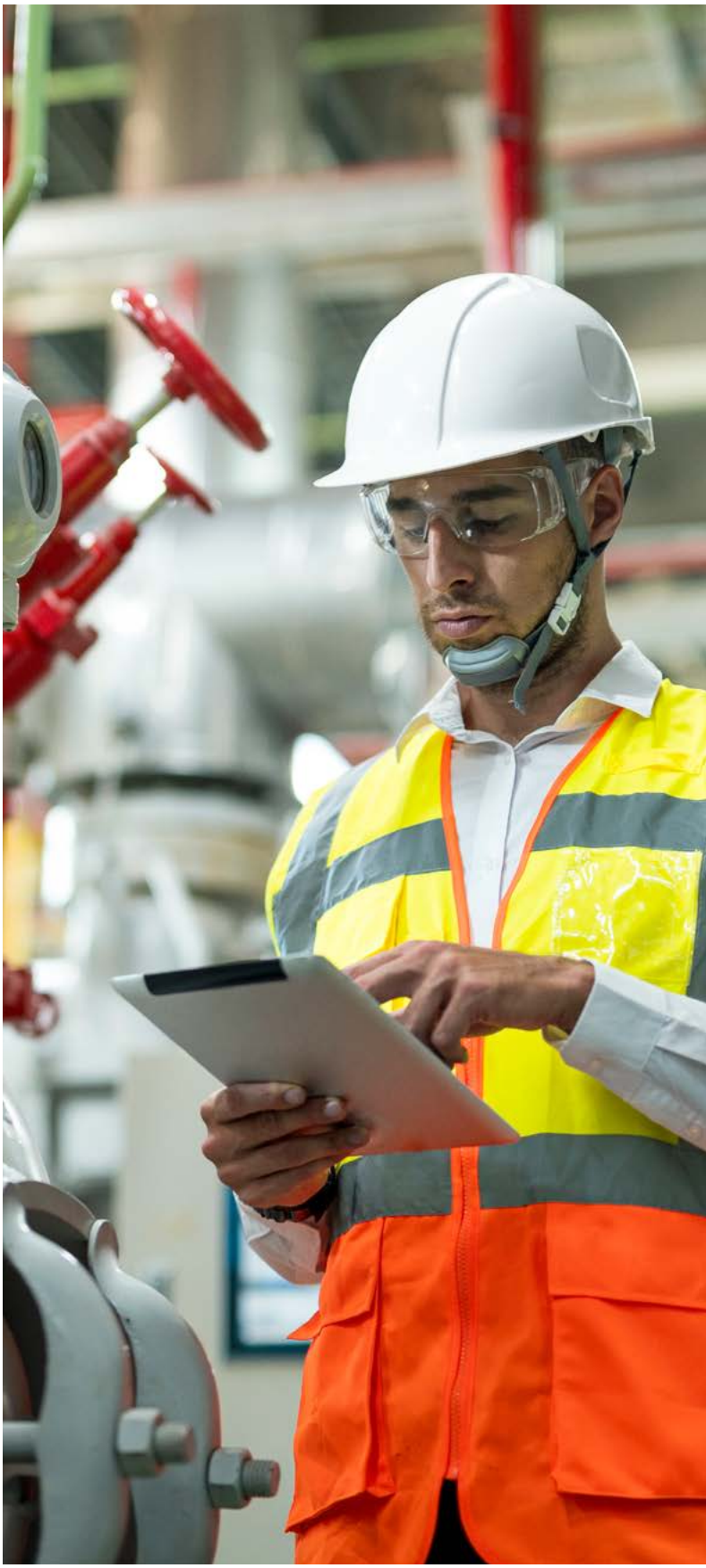
AI and machine learning

AI and ML 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 its painting process. Cameras and AI compare each newly painted car body against an ideal model, significantly improving the efficiency and accuracy of quality checks.[3]

Bosch, the German engineering specialist, integrates AI into its robotics systems, allowing robots to learn and adapt over time, which enhances their performance and flexibility.[4]

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



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3. "Fast, efficient, reliable: Artificial intelligence in BMW Group Production," BMW Group, Jul 15, 2019. https://www.press.bmwgroup.com/global/article/detail/T0298650EN/fast-efficient-reliable:-artificial-intelligence-in-bmw-group-production?language=en
4. "Bosch Center for Artificial Intelligence," Bosch, accessed May 22, 2025. https://www.bosch-ai.com

Live application:

BMW's AI-driven quality control

BMW has deployed AI and machine vision systems to improve the quality control of its 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.[5]

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 optimize their supply chains, predicting demand and adjusting production schedules accordingly. This level of precision helps in reducing waste, allowing for supply to meet demand efficiently, and in reaching sustainability requirements.

5. "AI in Automotive Quality Control," BMW Group.

Digital twins and digital threads

Digital twins and digital threads are revolutionizing 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 continual optimization and proactive maintenance.

Siemens transformed its electric motor factory with digital threads, enabling continual monitoring and optimization of production processes. “Digital threads provide insights into factory operations, aiding better decision-making and improving overall efficiency,” explained Philip Horn, Verizon Business’s Head of Digital Transformation and Innovation.

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 origins and address them promptly. For instance, a car manufacturer’s engine plant in the U.K. uses a digital thread to monitor production processes in real time, enabling quick identification and resolution of faults.

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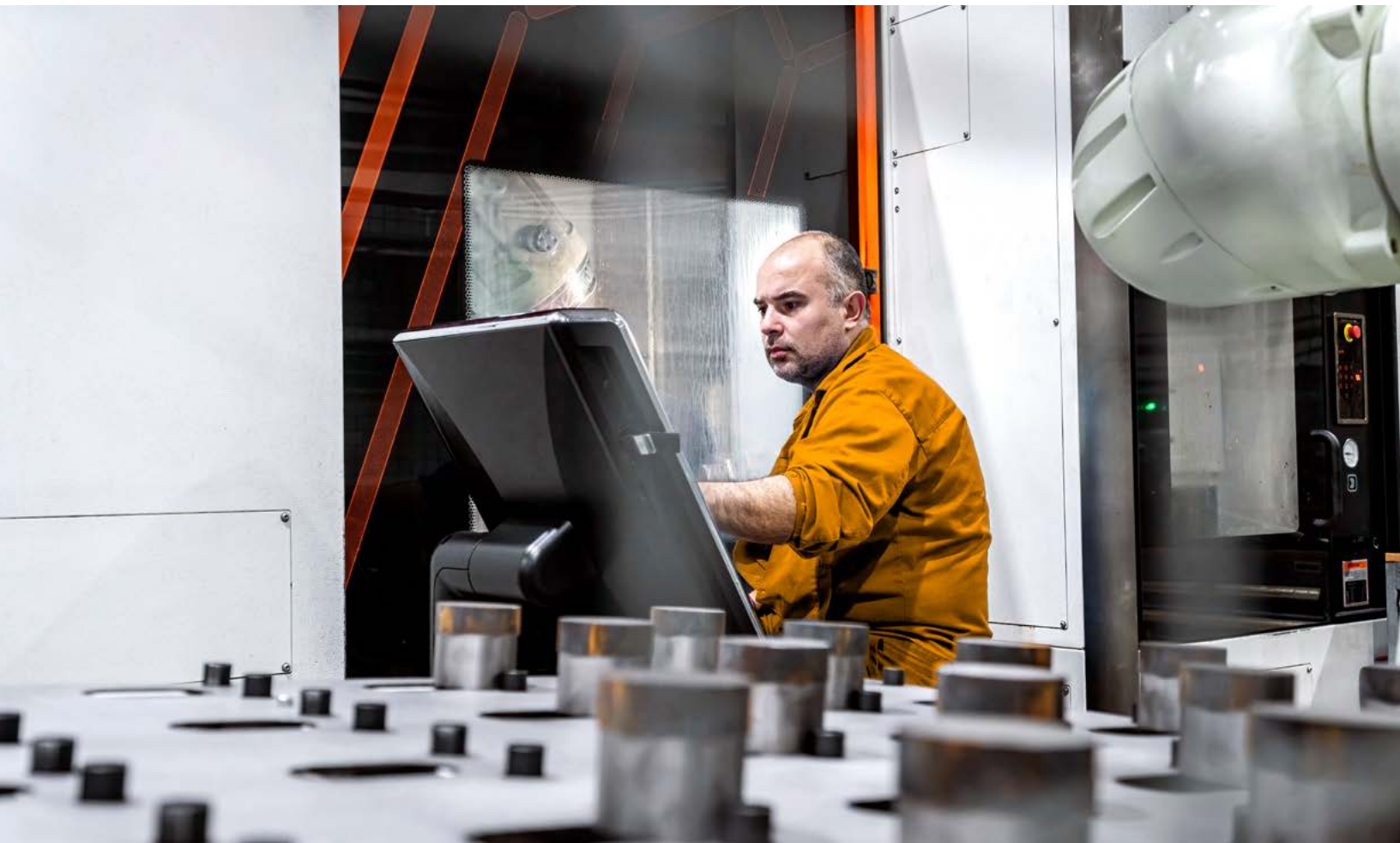

The integration of digital twins and threads also supports sustainability efforts. By providing detailed insights into energy consumption and emissions, these technologies help manufacturers optimize their operations to reduce environmental impact. For example, Siemens uses digital twins to monitor and reduce energy usage in its factories, contributing to its sustainability goals. As Siemens representatives themselves pointed out, "Digital Twin technology ... 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."[6]

Live application:

Rolls-Royce's predictive maintenance

Rolls-Royce uses digital twins for predictive maintenance of its plane engines. These virtual replicas allow real-time monitoring and analysis to predict issues before they occur, helping reduce downtime and extend engine lifespan.[7]

6. "What do Siemens and NASA have in common?" Siemens, Jul 18, 2024. https://www.linkedin.com/pulse/what-do-siemens-nasa-have-common-siemens-cgfec
7. "Digital Twin Technology for Predictive Maintenance," Rolls-Royce.

Warehousing and supply chains

Smart manufacturing and machine learning open new horizons in distribution and supply chains and offer significant advantages. For starters, the integration of these technologies streamlines operations, helps reduce waste and enhances productivity.

Philip highlighted how a leading European metal recycler has improved its 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 realized it lacked control and digital means for asset and people tracking. Basic Wi-Fi was ineffective for tracking purposes. The company needed a reliable solution to provide good coverage for asset tracking and to manage forklift operations. By implementing digital asset tracking and automated forklifts, it achieved better control and efficiency in its warehousing operations.

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 optimizing storage space, managing stock levels and facilitating timely delivery of goods.

Moreover, AI and ML are being used to predict and manage supply chain disruptions. By analyzing 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 such as the COVID-19 pandemic.

Live application:
Ocado’s robotic warehousing

U.K. 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 fulfillment and improves accuracy. AI integration allows for continual optimization of warehouse operations, enabling high efficiency and customer satisfaction.

The real-world impact of advanced technologies

The adoption of advanced technologies in smart manufacturing is revolutionizing 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 such as Verizon Business, manufacturers can realize the potential of smart manufacturing and maintain a competitive edge in a rapidly changing industry.

Working with Verizon Business

Verizon Business is uniquely positioned to help manufacturers navigate these challenges. With expertise in digital infrastructure and smart manufacturing, Verizon Business 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 Business enables your organization to effectively address the cybersecurity, data management and cultural challenges of smart manufacturing.

As the manufacturing industry transforms to 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 cocreation,” emphasized Philip.

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

Verizon Business’s expertise in digital infrastructure, private 5G networks and the IIoT makes it an ideal partner for manufacturers looking to modernize their operations. Our 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 Business, manufacturers can overcome these challenges and achieve their goals of smarter, more efficient and more resilient operations.

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

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