

Transforming factories into fully connected enterprises



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How do we go from automated factories to **smart, connected, end-to-end** industries?

The manufacturing world is undergoing a significant shift. We're moving from basic automation to a more integrated approach, connecting entire enterprises.

While the buzz about smart manufacturing is prevalent, the true benefits come from applying these technologies across whole businesses. Extending digital factories or production lines into fully connected enterprises allows companies to fully realize the benefits of smart manufacturing.

The benefits of smart manufacturing

Smart manufacturing and Industry 4.0 technologies can help increase overall equipment effectiveness, enhance flexibility across the enterprise and reduce costs. To capture the potential of these advancements, smart manufacturing practices should be adopted across entire business networks, not just individual factories.

Digital manufacturing combines tools such as simulation, 3D visualization and analytics, creating a digital thread of the end-to-end process. These technologies help engineers and designers collaborate more effectively, avoiding costly mistakes, speeding up the design-to-market process and help reduce production costs.

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Efficiency, safety, compliance and cost saving are benefits seen across all sectors.”

Rob Nicol

Director of Sales at Verizon Business

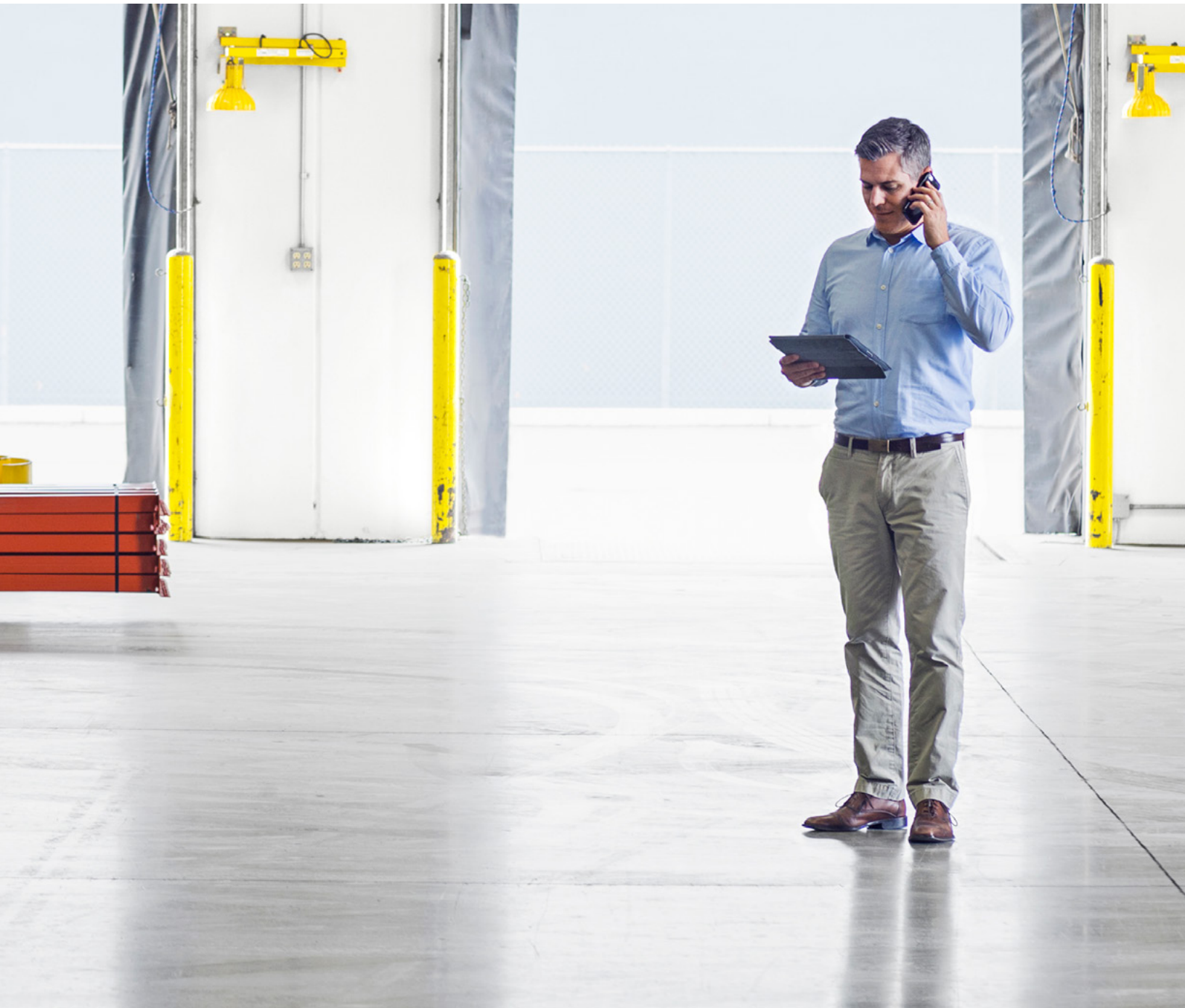
This practice, evolved from design for manufacturability and lean manufacturing, promotes a smooth flow of information between design and production, providing an end-to-end digital thread of the process.



Addressing supply chain vulnerabilities

Global supply chains and offshore manufacturing have faced significant challenges recently, and events such as the COVID-19 pandemic exposed weaknesses in these chains. Henry Anson, Publisher of The Manufacturer, noted that global tensions have also highlighted the fragility of extended supply chains. “The situations in Ukraine and the Middle East have exposed how fragile these extended supply chains are. It has become a critical issue for discussion.”

Because of these challenges, there's a growing emphasis on building resilient supply chains that can adapt to disruptions. This shift involves nearshoring, investing in domestic production and developing smarter supply chain strategies, requiring a new way of managing business with connectivity as a key enabler.





Integrating automation across industries

Industries such as automotive have long used robotics and automation. Now other sectors, such as food and beverage, are catching up, in part because cheap labor is now more difficult to come by. But here's the catch: Companies need their digital systems to talk to each other effectively. Moving from a single automated line in a factory to a connected industry requires serious investment in new technology and infrastructure.

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The food and beverage sector is quickly advancing in automation due to the increasing cost of labor.”

Henry Anson

Publisher of The Manufacturer

To stay ahead, companies must help employees learn to use advanced machinery and data analytics. Those who don't adapt might end up like the horse-drawn carriage industry when cars came along.



The strategic role of digital twins

Digital twins are virtual replicas of physical assets, processes or systems. They provide a dynamic, real-time representation of their physical counterparts. IBM uses the example of a wind turbine outfitted with various sensors related to its performance. These sensors collect data on energy output, temperature, weather conditions and more.¹ All this data feeds into the digital twin, creating a constantly updated virtual model that gives a big picture view.

Rolls-Royce uses digital twins for its plane engines, continually updating virtual models with sensor data.² These models can run simulations, analyze performance issues and suggest improvements, leveraging real-time data for deeper insights.

This predictive maintenance helps spot issues quickly and adjust accordingly. This micro picture helps businesses see the macro as well, making it easier to optimize processes, reduce downtime and improve overall efficiency, which in turn reduces overhead.

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Digital twins allow us to simulate and refine new business models with precision.”

Philip Horn

Verizon Business's Head of Digital Transformation and Innovation

1. "What is a digital twin?" IBM, accessed Apr 22, 2025. <https://www.ibm.com/topics/what-is-a-digital-twin>

2. "What are digital twins?" Rolls-Royce, accessed Apr 22, 2025. Available at: <https://www.rolls-royce.com/innovation/digital/digital-twin.aspx>

Smart manufacturing in action

BMW's digital thread

BMW's engine manufacturing plant in the West Midlands showcases the power of connected technology. By creating a digital thread of the entire process, the company can pull data from various legacy systems into a central repository. This allows real-time monitoring of production, identification of common faults and addressing issues at specific stations. This integration means BMW can plan future production more efficiently, enabling operational excellence and reducing waste. This information was presented at the Smart Manufacturing Summit 2024.

Procter & Gamble's smart diaper production

P&G's use of digital twins in its diaper production lines exemplifies a connected industry. The technology helps detect potential issues early and make adjustments before they become costly problems. Continuous monitoring improves cycle time, reduces network losses and promotes quality while improving operator productivity.³

3. "P&G enlists IoT, predictive analytics to perfect Pampers diapers," CIO, Aug 23, 2023. <https://www.cio.com/article/650197/pg-enlists-iot-predictive-analytics-to-perfect-pampers-diapers.html>



Constructing robust infrastructure

Becoming a fully connected business isn't easy. It requires strong, scalable infrastructure; hardened cybersecurity; and smart data management.

Having the right connectivity will also be essential for any connected industry, mainly because it will need to support the heavy data demands of modern manufacturing. Technologies such as private 5G networks and multi-access edge computing will be important for providing the speed and reliability required for real-time data processing and automation.

Setting up the proper infrastructure involves installing high-speed networks such as 5G, using edge computing for faster data processing and developing scalable cloud architectures for data storage and analysis.

Verizon Business's expertise in these areas makes us an ideal partner for those looking to build the foundation for their connected industry vision.

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Robust digital records and advanced sensor technologies are crucial for adhering to new sustainability and energy use regulations.”

Philip Horn

Verizon Business's Head of Digital Transformation and Innovation





Eliminating operational silos

For connected industries to thrive, they need to break down traditional silos between IT and operational technology (OT) departments. And this is more than just putting aside departmental differences. As Sundeep Samra, Verizon Business's Manufacturing Client Partner, pointed out, "The lack of integration across departments often hampers full-scale digital transformation."

Collaboration between IT and OT enables shared data and resources, boosting productivity and innovation. This teamwork is essential for unleashing the full potential of smart manufacturing.



Sustainability and resilience

Connected industries are more efficient, sustainable and resilient. By interlinking supply chains and production processes, manufacturers can reduce waste, improve resource use and enhance sustainability.

Sustainability involves making better use of resources, minimizing waste and optimizing energy use. Connected businesses can use data to optimize production processes and supply chains.

Digital twins can identify inefficiencies, driving better plant utilization and lowering carbon intensity. Improved supply chain visibility helps suppliers adhere to sustainable practices.

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The drive for resilience and efficiency should be the basis of any sustainable program.”

Henry Anson

Publisher of The Manufacturer



The importance of cybersecurity

As manufacturing processes become more digital, the cybersecurity risks increase with them. With more machines and systems linked through the internet, there's a larger surface area of attack.

Philip Horn, Verizon Business's Head of Digital Transformation and Innovation, pointed out, "Some machines have a digital twin running in the cloud, which requires constant data exchange. This creates multiple points of vulnerability." Aggressive cybersecurity protections will be almost sacrosanct to protect systems and ensure the smooth operation of connected businesses. However, for the vast majority of customer scenarios, there are even more basic challenges to address: Many machines are infrequently patched or provided with security updates for their firmware yet still have a strong requirement to be remotely connected.

This includes implementing advanced firewalls, regular security audits, employee training and adopting a zero-trust architecture approach.

Cybersecurity is a shared responsibility. IT and OT teams must align with business requirements and be aware of the additional risks of connecting OT infrastructure to the network. Full visibility of all OT equipment and understanding normal operating behavior are crucial for identifying potential attacks. Regular updates, patches and employee training are essential. Together, IT and OT can create a secure environment for smart manufacturing, ensuring smooth and safe operations.

Achieving a connected industry

As manufacturers integrate technology to make their operations smarter and more connected, they must embrace new technologies, shift mindsets and commit to continual improvement.

Philip advised, “Designing for greenfield sites should be the blueprint for existing ones, aiming for fully autonomous factories.” This means looking at every aspect of the business and finding ways to integrate and optimize processes.

All companies need to develop a clear vision of what they want to achieve and create a road map to get there. This involves setting goals, identifying key performance indicators and regularly reviewing progress. It also means being open to change and being willing to invest in new technologies as well as training and upskilling existing and future employees.

To move from isolated smart factories to a connected enterprise, companies should follow a structured approach, such as this:

- ① Check how digitally advanced all sites and processes are.
- ② Assess the systems on the shop floor (if applicable).
- ③ Create a clear plan for connecting the entire business.
- ④ Start with small projects to test and improve solutions.
- ⑤ Expand successful projects to other sites and partners.
- ⑥ Segment elements to minimize damage and downtime in case of intrusion.
- ⑦ Regularly review, learn and update the strategy.





Verizon Business: Your partner in smart manufacturing

Verizon Business is uniquely positioned to help manufacturers navigate the transition from automated factories to fully connected enterprises. With our expertise in digital infrastructure, private 5G networks and Industrial Internet of Things solutions, we provide the robust connectivity backbone essential for smart manufacturing. Our team of industry experts works closely with businesses to design, implement and support end-to-end solutions that help to boost productivity, reduce waste and increase profitability across the entire manufacturing ecosystem.

As you plan your next steps toward a connected operation, consider partnering with Verizon Business. Our expertise in digital infrastructure and smart manufacturing can help you overcome challenges and realize the full potential of your digital transformation.

Learn more about how Verizon Business can help you explore and adopt the technology that's making manufacturing smarter at [verizon.com/manufacturing](https://www.verizon.com/manufacturing).

