

WHY CONNECTIVITY IS VITAL TO HIGH-TECH MANUFACTURERS

[...] 83% of survey respondents believe that smart manufacturing is the key to their organization's success.

Despite the unstoppable rise of Industry 4.0, most shop floors still use some form of ad-hoc or custom industrial connectivity. Adoption of newer solutions, such as edge networks and private 5G mobile networks is still far from universal, but this presents a huge opportunity for forward-thinking manufacturing firms looking to join the race for modernisation.

Building a smarter shop floor

According to the latest Annual State of Smart Manufacturing report by Rockwell Automation, 83% of survey respondents believe that smart manufacturing is the key to their organization's success.¹ The secret to that success is starting with

In the world of high-tech manufacturing, staying competitive means adopting more sustainable business models and making informed decisions based on facts rather than emotions. That in turn requires the ability to collect, process, and act upon data from various sources rapidly and at massive scale.

Because of this, connectivity has become the backbone of modern manufacturing operations across Europe and beyond. Given the rapid acceleration of digital innovation in manufacturing, organizations that prioritise connectivity in their operations are well ahead of the game, both in terms of streamlining their processes and reducing waste.



5G

the right foundation which, in this case is a secure and dependable network architecture that can grow with the business and work seamlessly with both new and legacy technologies.

Smart manufacturing is the defining characteristic of the fourth industrial revolution. High-tech manufacturers are now integrating industrial internet of things (IIoT) devices, such as sensors and actuators, into their production workflows. At the same time, cloud computing, machine learning, and analytics are becoming critical enablers of enhanced efficiency. Moreover, many factories are now investing in additive manufacturing techniques like material extrusion, sheet lamination and photopolymerisation. What all of these

systems have in common is that they generate data. That data must be timely and accessible for it to deliver maximum value.

For that to happen, factories need exceptionally reliable connectivity that offers the bandwidth to accommodate increasingly massive data sets. Redundancy is also essential, especially in the case of devices used to monitor and maintain recommended operating conditions, detect environmental hazards, or carry out predictive maintenance. Today, these technologies are helping manufacturers solve some of their biggest challenges, but they can only do so when connectivity is guaranteed.

Improving supply chain visibility

Manufacturing supply chains are complex and multifaceted, not to mention prone to disruption due to global instabilities in the availability and pricing of raw materials and components. As such, the supply chain has long been notoriously hard to track and optimise, to the point they end up being many single points of failure. Without complete visibility into the supply chain, it is only a matter of time before serious problems arise. For example, if a manufacturer cannot predict, with a reasonable degree of accuracy, when certain supplies will arrive, they cannot be confident about fulfilling orders, meeting production quotas, and keeping customers happy.



Rather than resorting to stockpiling resources or changing suppliers, manufacturers should prioritise proactive supply chain planning to mitigate risk and accurately anticipate demand. Once again, data is the key to delivering on those goals. Connectivity both within and outside the shop floor is vital for enabling the seamless flow of data, thus allowing the back office to track inventory and assets on the move. For example, manufacturers can track the location of assets like shipping containers using GPS tracking devices that keep manufacturers informed of the exact location of their supplies in real time. However, the timeliness and accuracy of the information depends on the quality of the network transmitting it.

Enhancing communications

When we talk about Industry 4.0, we usually focus on the role of automation and AI in modern manufacturing. However, we must also not forget the vital human element which, for too long has been stunted by communication and collaboration challenges. These have been further exacerbated by the increasing complexity of production

lines and supply chains which, in turn, have led to operational siloes where different departments are inadequately prepared to share information. With hybrid work now being the new norm for knowledge workers, the challenges are often even greater.

Rapid innovation requires close collaboration between research and development, sales and marketing, customer service, supply chain management, and personnel on the shop floor. If team members cannot communicate efficiently, excess waste and mistakes are inevitable. Fortunately, connectivity enables unified communications, where departments can collaborate using any internet-connected device, whether that means hopping on a quick call, joining a video conference, or simply sharing

production plans or instructions. With a truly connected environment, manufacturers can also share essential insights to make profitable decisions in near real time.

The rise of intelligent networking

To reap the rewards of Industry 4.0, manufacturers need to implement a network architecture that can support these new business models and processes. Bandwidth needs to be scalable, connectivity reliable, and latency as low as possible. Conventional local area networks are no longer enough, even when they do offer exceptionally high bandwidth. In fact, there is no one single physical solution that can provide all the connectivity today's high-tech manufacturers need.

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Instead, manufacturers should look to newer network types like software-defined wide area networks (SD-WAN) and 5G. Both these technologies complement one another to create a seamless networking experience where everyone has access to the right data at the right time, no matter the device they are using. SD-WAN, for example, offers improved cloud connectivity, high availability with multiple redundancies, and simplified management via a centralised administration dashboard.

At the same time, 5G provides networking features that are essential for smart manufacturers, such as the ability to support IIoT and edge devices with very low latency and high bandwidth. Another unique benefit of 5G is how, unlike previous generations, it allows companies to set up their own private networks to extend connectivity far beyond what regular wireless or wired networks can achieve.

Digital transformation is now well underway in manufacturing. For those who have not done so already, now is high time to build a network infrastructure that can support the factory of the future.

[The Fraunhofer Innovation Platform at the University of Twente helps manufacturers turn their ambitions to build the factories of the future into reality. We offer industrial technical benchmarking, develop proof of concepts and process and production developments. Get in touch today to discover how we can support you. ■](#)

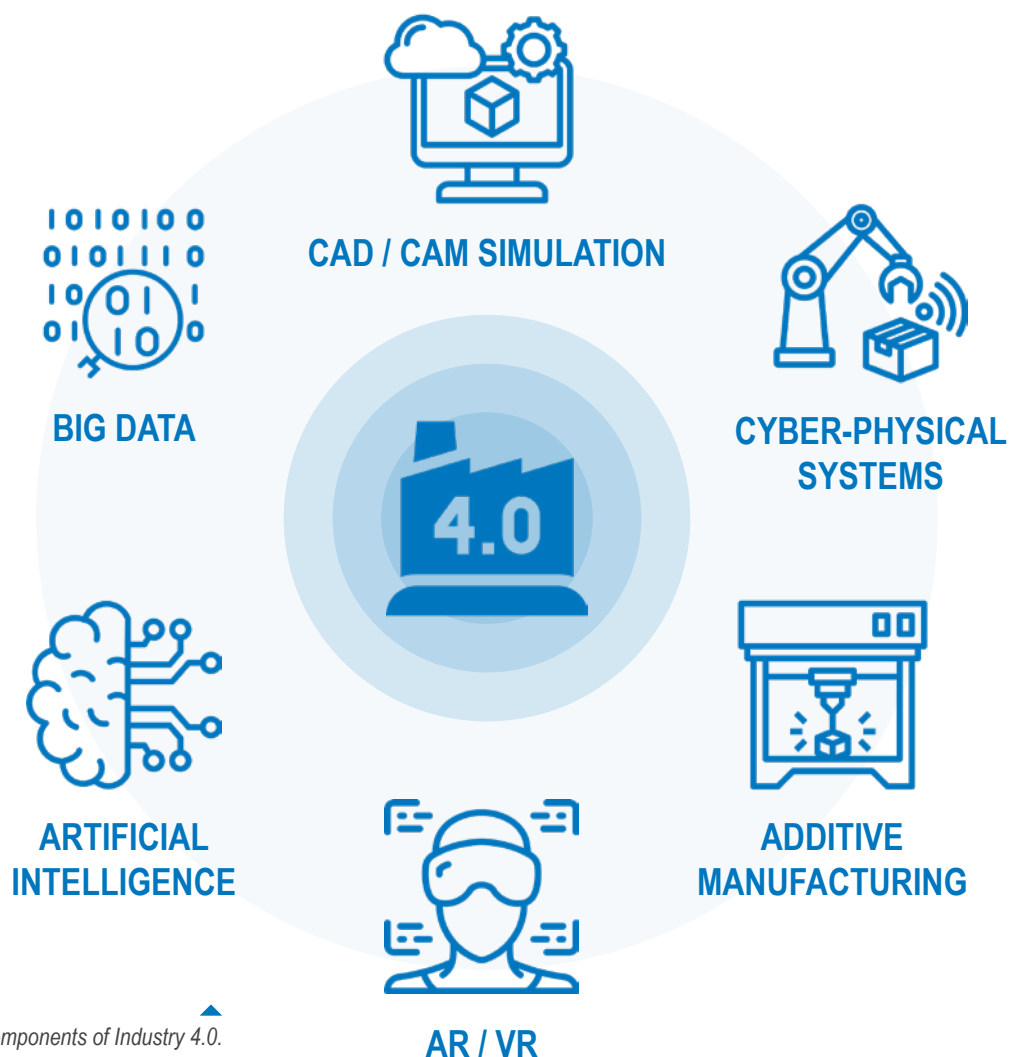
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The components of Industry 4.0.