

CORNING



The Future Runs on Fibre

Building Industrial Infrastructure for Tomorrow's Demands

Manufacturing is Undergoing its Most Significant Transformation in Decades

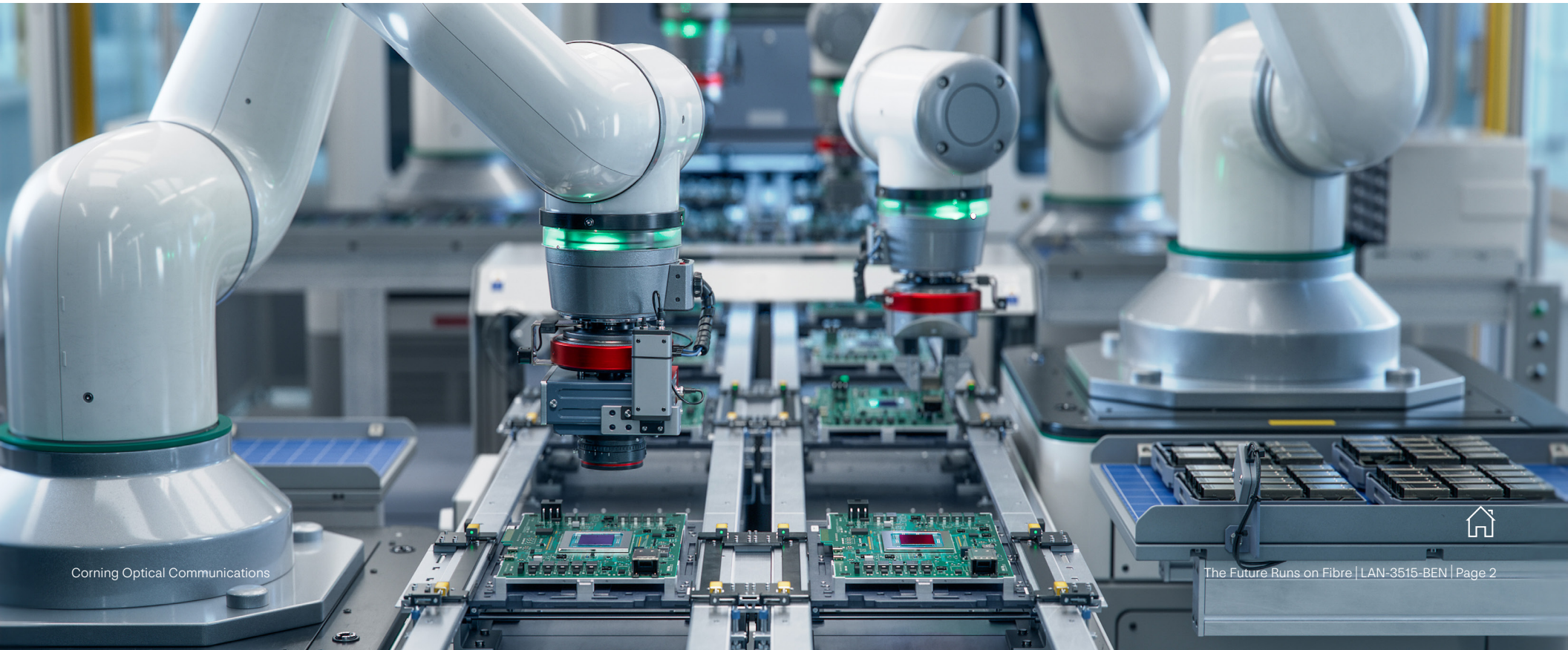
As industries embrace another digital revolution, billions are being invested¹ in artificial intelligence (AI), machine learning (ML), and cloud computing to optimise production and drive smarter decision-making.

But there's a fundamental challenge: **today's physical infrastructure wasn't built for tomorrow's digital future.**

From semiconductor and EV battery manufacturing to pharmaceutical and oil & gas plants, AI-enhanced processes have shifted from a competitive advantage to a competitive necessity.

Modern smart manufacturing requires seamless connectivity between machines and humans, allowing for real-time data collection and analysis. Legacy infrastructure simply wasn't designed for this scale.

¹The Zayo Bandwidth Report: Key Trends Driving the Bandwidth Boom (2024)



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The Smart Manufacturing Revolution

A State-of-the-Industry

Manufacturing infrastructure demands have reached a critical inflection point where legacy systems can no longer support the scale and speed modern operations require.



The Scale of This Revolution is Staggering

Bandwidth demands in manufacturing have reached unprecedented levels. Manufacturers aren't just coping with increased challenges; they are rapidly scaling their network capacity to meet them. According to the Zayo Bandwidth Report², the manufacturing sector saw a 364% increase in wavelength capacity purchased between

2020 and 2024. Dozens of new facilities are under construction, AI is shifting from advantage to necessity, and infrastructure demands are surging while installation capacity remains limited.

Two Factors are Creating This Gap

1 Market Forces Driving Change

Manufacturing reshoring is creating unprecedented infrastructure demands. Government programs and private investment are driving massive industrial buildout, spurring the construction of new high-tech facilities designed for precision production.

AI is transforming manufacturing operations. Through predictive analytics and real-time decision-making, AI allows equipment parameters to be adjusted automatically, enabling smarter, faster production with fewer interruptions.

2 Operational Impacts Requiring New Solutions

The skilled labour shortage is acute. There simply aren't enough qualified technicians to build and maintain the infrastructure these facilities require, particularly for fibre-intensive environments.

Automation is no longer optional. Manufacturing facilities are implementing enhanced automation to optimise production efficiency and worker safety, but this drives demand for high-performance network infrastructure that can support these capabilities.



Building Future-Ready Manufacturing Networks

The path to smart manufacturing isn't theoretical, it's being built right now. Manufacturing leaders face infrastructure realities that traditional network approaches weren't designed to solve. These realities break down into three categories: technical demands, implementation barriers, and environmental factors.

Technical Demands

Modern manufacturing often requires converging IT (information technology) and OT (operational technology) into a single backbone. This means connecting thousands of sensors and automated systems across facilities that can span hundreds of thousands of square feet, all while transmitting data with minimal latency.

Copper networks, reach their limits after 90 or 100 meters (channel) and require far more equipment closets which means that they cannot deliver the reach or bandwidth required. In smart manufacturing, network failures cascade through interconnected systems and downtime costs are exponentially higher than in traditional manufacturing.

Implementation Barriers

Challenge	What It Means
IT/OT Integration	Teams with different objectives and systems need infrastructure that supports convergence
Edge vs. Cloud Flexibility	Networks must support both on-premise edge computing and cloud connectivity as strategies evolve
Skilled labour shortage	Demand for skilled network installers is high, making deployment speed and simplicity increasingly important
Advanced Automation	Enhanced manufacturing processes require high-performance network infrastructure as a foundation



Environmental Factors

The physical challenges of industrial environments compound these demands and implementation barriers, and they vary significantly by sector.



Identifying a solution that meets all these requirements simultaneously requires infrastructure built for a new and different era of manufacturing.
That solution is fibre optic technology.



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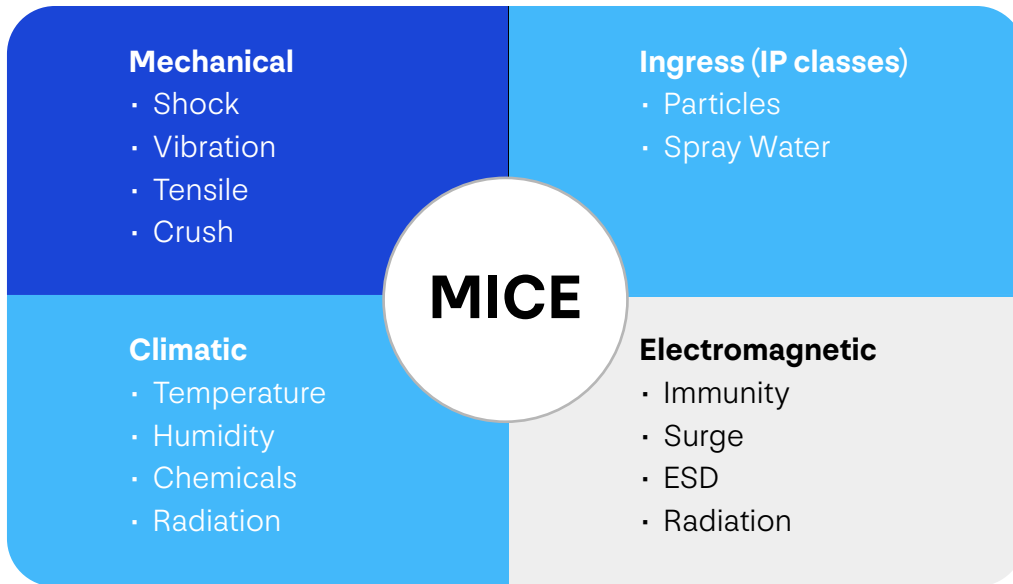


Fast Forward

Leveraging Fibre to Meet the Demands of
Today and Tomorrow

Four characteristics make fibre uniquely suited
for smart manufacturing's demands.





Rating	Environmental Class		
	1	2	3
Mechanical	M ₁	M ₂	M ₃
Ingress	I ₁	I ₂	I ₃
Climate and chemical	C ₁	C ₂	C ₃
Electromagnetic	E ₁	E ₂	E ₃

Figure 1: An overview of ISO/IEC 11801/EN 50173/TIA-568 classification system for evaluating the environmental robustness of cabling systems and components in industrial settings. Source: Corning

1 Built for Industrial Reality

Fibre withstands the harsh conditions found in manufacturing facilities: extreme temperatures, chemical exposure, moisture, and vibration. Physical hazards like vibration can cause connectors to loosen, while moisture leads to corrosion. Electromagnetic interference can disrupt signal integrity. Unlike copper, fibre is immune to electromagnetic interference (EMI). Fibre optic solutions are engineered to meet or exceed MICE ratings, industrial standards that ensure cabling systems and components can withstand harsh environmental demands. Its rugged, dielectric design protects both network and personnel, eliminating risks from electrical shock, sparks, or fire. From clean rooms to industrial production floors, fibre performs reliably where traditional cabling struggles.

2 Performance That Scales

Fibre enables rapid, seamless data transfer crucial for real-time monitoring and control at smart factories. With virtually unlimited bandwidth and minimal latency, fibre networks support today's AI and machine learning demands while accommodating whatever new technology might be required down the line. Whether connecting thousands of sensors, running high-resolution cameras for quality control, or supporting AI-driven analytics, fibre delivers the performance modern manufacturing requires.



3 Sustainable & Cost Effective

Fibre is an important element of environmentally conscious design for the manufacturing sector. Unlike traditional copper cables that require frequent rip-and-replace upgrades as bandwidth demands grow, fibre backbone deployments are essentially “one and done”—allowing operations to scale without overhauling network infrastructure. Compared to copper, optical fibre delivers significant environmental advantages: up to 84% lower carbon footprint³ and 54% lower power consumption⁴ over the network’s lifespan. Because fibre doesn’t require equipment rooms throughout facilities, it eliminates the upgrade cycles and energy costs associated with cooling that equipment.

4 Deploy Faster, Maintain Less

Pre-terminated fibre assemblies are factory-sealed, tested, and ready to deploy out of the box. These ruggedized solutions enable faster, more reliable deployments with less specialized expertise—addressing harsh environments and labour shortages simultaneously. From a materials standpoint, facilities built with fibre backbones typically won’t need rewiring for decades, compared to the much more frequent rip-and-replace upgrades that copper-based networks require.

³ Sullivan et al. “A sustainable future with optical fibre.” White Paper, Corning Incorporated, March 2023.

⁴ Eurocable. (2022, Jul). Fibre: the most energy-efficient solution to Europe’s bandwidth needs.



Identifying a solution that meets all these requirements simultaneously requires infrastructure built for a new and different era of manufacturing. **That solution is fibre optic technology.**





These characteristics solve the infrastructure challenge. But solving it requires more than understanding fibre's advantages — **it requires knowing how to implement them effectively.**



3



Ready, Set, Scale

The Essentials of Designing with Fibre

With fibre's advantages established, the focus shifts to implementation: **how to deploy fibre infrastructure that maximizes operational benefits while simplifying deployment.**



Consider This Five Step Plan



- 1 Enhance Network Integration and Deploy IIoT* at Scale** Modern manufacturing benefits from improved connectivity between IT and OT systems, enabling better data sharing between machine control and analytics platforms. Embedded sensor arrays throughout facilities support process automation and operations optimisation, opening the door to more sophisticated manufacturing capabilities. At scale, this enables real-time visibility, eliminates unplanned downtime, and unlocks advanced capabilities like inventory control and digital twins—allowing manufacturers to test and refine operations without disrupting physical production.

*Industrial Internet of Things

- 2 Partner with Proven Fibre Optic Infrastructure Experts** Successful fibre deployment requires more than selecting the right technology, it demands partnering with manufacturers who have deep expertise in harsh environment applications, a comprehensive product portfolio, and the distribution network to support projects at scale. Look for partners with ruggedized solutions designed specifically for industrial settings and a track record of supporting manufacturing deployment.



Consider This Five Step Plan

3 Deploy Pre-terminated Solutions

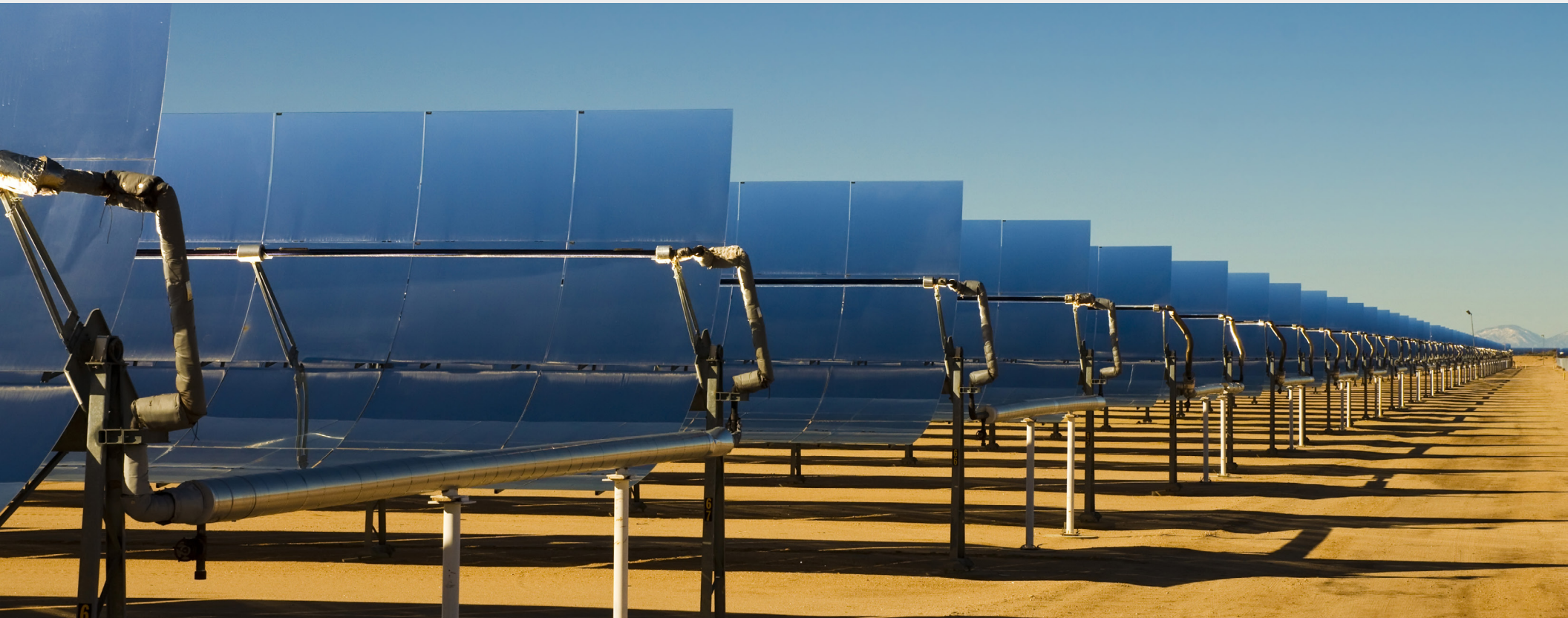
Pre-terminated fibre assemblies enable faster, more reliable deployments with less specialized expertise while addressing harsh environments and labour shortages. Ruggedized pre-terminated fibre solutions are factory-terminated, sealed, and tested cable assemblies ready to deploy out of the box. These systems are highly adaptable, offering a range of configurations from partial pre-terminated assemblies to fully plug-and-play solutions.

4 Consider Fibre-to-the-Edge (FTTE) Design

A long-reach network eliminates many of the pain points of conventional network design. Fibre allows for the long, uninterrupted wiring spans required by large buildings such as manufacturing facilities. The long-reach aspect of fibre also enables more far-flung devices.



Consider This Five Step Plan



5 Select Industrial-Grade LAN Components

Manufacturing environments demand cabling and hardware designed to withstand harsh conditions. Select solutions with appropriate MICE ratings that match your facility's environmental demands—from industrial-grade and ruggedized cables for factory floors to specialized solutions for mining, petrochemical, or outdoor applications. Selecting the right industrial components ensures your network can withstand environmental stressors while supporting smart manufacturing demands for decades.





For over 50 years, Corning has been
pioneering fibre optic solutions that
connect the world.




Today, we apply that expertise to **help you** build manufacturing infrastructure that is scalable, reliable, and cost-effective. We provide the tools, resources, and support you need to create a well-planned fibre optic backbone for your network.



Learn more about
Corning's Fibre Solutions





**The future of manufacturing runs on fibre.
And the time to build that future is now.**

 **Contact a Corning Expert**

CORNING

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