GUIDE

How Smart Manufacturing Is Transforming Factories

Data and analytics are helping to increase efficiency and quality while lowering costs.

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What Is Smart Manufacturing?

The rise of smart factories, big data, the industrial internet of things (IIoT), and artificial intelligence (AI) is transforming manufacturing. These forces are restructuring the landscape with powerful technologies and solutions.

But how will smart manufacturing benefit customers? In this guide, we answer that question and explore how manufacturing will keep evolving.

Smart manufacturing is the intersection of digital technology and product development that places an emphasis on automation, machine learning, and real-time data. It's unlocking groundbreaking gains in both productivity and business value.

Powered by the IIoT, smart manufacturing taps into data and analytics to make every step of the process work more efficiently, from design to testing to production. As increasingly connected equipment systems create more data, manufacturers gain critical and actionable insights.

Smart manufacturing opens doors into every aspect of our products and processes, and creates significant benefits along the value chain.

The Role of Data in the Smart Manufacturing Ecosystem

Data powers smart manufacturing, providing manufacturers critical information they couldn't otherwise easily collect. Engineers, designers, shift supervisors, and operators can make better, more informed decisions using that data.

For example, consider the maintenance of the ovens used for baking, curing, and drying engineered plastic parts and components. In the past, manufacturers had a limited understanding of how, when, and why a part or process might fail. The options were to:

- Analyze how often it failed, and work to an appropriate preventive maintenance schedule, or
- Wait for it to fail and fix the problem

Today, sensors provide performance data about the ovens. Software analyzes that data, allowing manufacturers to pinpoint the precise maintenance requirement exactly where and when it's needed, drastically reducing downtime.

This is just one example of how data and analytics provide insight into the root cause of a specific manufacturing event or process. Understanding the root cause makes all the difference in increasing efficiency and quality while lowering costs.

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Artificial Intelligence and Machine Learning

Machine learning and artificial intelligence (AI) are the foundation of smart manufacturing. Machine learning is the idea that through the continuous collection of data, iteration, and refinement, machines become smarter. AI refers to machines using this ever-improving information to more intelligently perform tasks.

Think of machine learning as the brains of the operation, with AI providing a recommended action. The more that's learned about the data, the better the recommended actions.

How do AI and machine learning benefit manufacturing? AI increases uptime and ensures consistent quality, which makes for better forecasting. Plus, AI is the launchpad for predictive maintenance, which we'll talk about in more detail later.

Industrial IoT

Industrial IoT (IIoT) allows manufacturers to create a fully connected and flexible system that provides real-time situational awareness. A thread of digital information is embedded in every manufactured product. Manufacturers use networked sensors and intelligent devices on the manufacturing floor, collecting data to drive AI and predictive analytics.

Manufacturers are using IIoT assets to connect machines and systems, a shift that enables real-time asset monitoring. Data from these assets helps to monitor equipment for reliability, compliance, and safety.

> **"93% of companies believe AI will be a pivotal technology to drive growth and innovation in the manufacturing sector."**
>
> – Deloitte, Survey on AI Adoption in Manufacturing

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Four Key Benefits of Working With Smart Manufacturers

1. **Automated data:**

   Smart manufacturing provides managers with precise data to more efficiently measure key performance indicators (KPIs), resulting in improved product quality.

2. **Predictive maintenance:**

   Smart factory managers receive alerts and can resolve maintenance issues before they cause operational downtime.

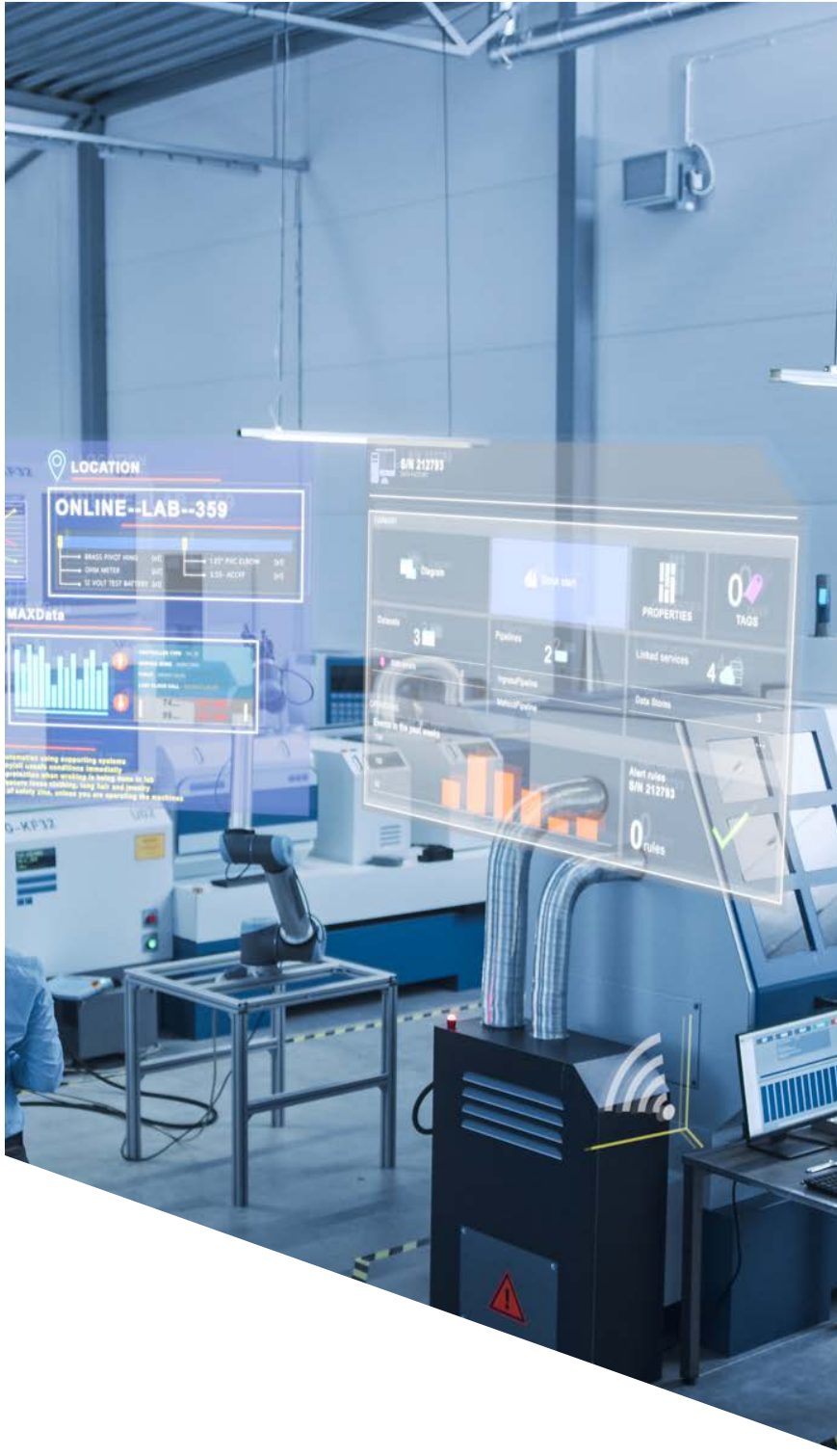
3. **Cost reductions:**

   Better forecast accuracy helps reduce waste and lower costs.

4. **Enhanced productivity:**

   Seamless data on machine maintenance, potential bottlenecks, and other inefficiencies helps improve productivity.

> **“Whether it is improving quality, reducing downtime, or optimizing efficiency, AI-driven predictive analytics is the perfect technique to solve many complex manufacturing problems.”**
>
> – Ryohei Fujimaki, CEO and co-founder of dotData



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Three Emerging Technologies That Will Shape the Future of Manufacturing

Smart manufacturing offers endless possibilities. In addition to improving factory operations and processes, expect to see developments like these:

1. Digital Twin Technology

A digital twin is a virtual representation of a real-world product. Using IIoT data, digital twin technology creates a virtual copy that not only interacts with its “twin” (or digital counterpart) but can test how that part or process responds under different circumstances. Product engineers are already leveraging digital twins for virtual field testing to better understand how part properties might change during each phase of production — before the parts are ever made.

This technology helps engineers understand how products are performing and how they’ll perform in the future. Using a digital twin, organizations can learn more about product innovation, complex life cycles, and value creation faster than ever before.

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2. Predictive Analytics

Few industries benefit from predictive analytics more than manufacturing, which generates enormous amounts of data, involves repetitive manual tasks, and presents multi-dimensional problems beyond the scope of many conventional tools.

AI-powered predictive technology identifies potential downtime and accidents by analyzing sensor data. AI systems also help manufacturers forecast when or if functional equipment will fail, enabling maintenance and repair to be scheduled beforehand. These AI-powered insights improve efficiency while reducing the cost of machine failure.

Manufacturers will continue to use predictive analytics to gain greater agility, deeper insights, and faster, more accurate decision-making.

3. The Rise of Cobots

Collaborative robots, or cobots, are designed to interact and collaborate safely with humans in a shared workspace. They handle tasks that are either too tiring or dangerous for people.

Cobots have sensors and smart systems that link up to the IIoT and task-specific systems, such as warehouse management, freeing up people for more sophisticated, productive roles.

> **“Beyond the latest technological innovations today, the collaborative robots of the future will take collaboration and productivity to entirely new levels.”**
>
> – Robotic Industries Association

The Advantages of Partnering With a Smart Manufacturer

Technology has transformed manufacturing over the past decade — and more changes are on the horizon. Manufacturers with a head start are tapping into new ways to deliver higher quality products.

From order processing and control of raw materials to more efficient plant production that minimizes waste, energy, and downtime, partnering with a tech-driven smart manufacturer means you'll get greater value.

Together We're Capable of Almost Anything

Find out how big data and automation can benefit your next project.

Get Started →

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About CDI Products

CDI Products is a Michelin Group Company headquartered in Humble, Texas with locations serving North America, Europe, and the Asia Pacific. We are a global leader in high-performance polymer products to the energy industry and beyond.

We service the oil and gas, liquid natural gas (LNG), cryogenics, wind and renewable energy, water management, fluid handling, automotive, aerospace and defense, medical and biomedical, refining and petrochemical, industrial processing, power generation, and semiconductor markets.

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