



FactoryEye

Whitepaper

Smart Manufacturing Trends in 2023

OEE

IoT

IIoT

START

AI



Manufacturing has traditionally been a slow-moving industry. However, with the needs to reduce costs, improve customer satisfaction, increase profitability and remain relevant in a supercompetitive market, manufacturers are quickly accelerating their transformation into the digital-age. The COVID-19 pandemic triggered disruptions further reinforced the need to engage innovation and to digitalize.

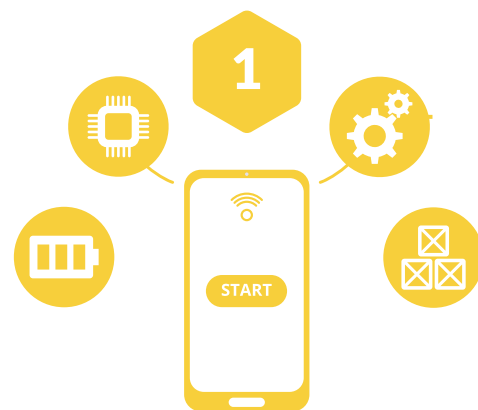
Recent surveys show a sharp trend of aggressive digital technology adoption. According to [Manufacturing.net](#), manufacturers are investing heavily in adopting IIoT, big data, and analytics to improve efficiencies, reduce human error, and increase revenues.

What are the impacts on the manufacturing industry? What should companies be aware of in this 'new normal' and take into consideration in their competitive plans?

This paper discusses seven main trends that we believe will affect the manufacturing industry in 2023 and beyond:



Greater adoption of digital technologies and innovation



“Relatively few organizations have yet turned the potential of smart manufacturing into sustained action. ... Smart manufacturing combines technology, data, processes and human interactions to disrupt and transform production’s role in a digital business, making it the foundation for reliable output from smart factories.”

According to Gartner

How can manufacturers, including SMBs, realize the potential of smart factories? How do they successfully adopt Industry 4.0 and IIoT technologies and methodologies?

At its core, Industry 4.0 is about harvesting data collected from the physical equipment in the manufacturing plant to drive better processes, automation, optimization, and decision making. It includes enabling full integration of data from IT systems (CRM, ERP, PLM and others) with the data collected from the production floor to allow advanced analytics of all data layers. This ‘marrying’ of the physical and the digital provides greater productivity, real-time insights, better decision making and operational excellence.

The integration between systems, data and people helps manufacturers in multiple ways. For example:

- **Integrating systems and processes results** in orders flowing seamlessly between the CRM and ERP, orders and specifications are sent more quickly from the ERP to the production floor, and production and inventory reports flow back to the ERP system transparently. Decision makers in every department have a 360-degree view of the processes in real time, reducing waste and improving operations.
- **Better connectivity within the organization** facilitates remote visibility from mobile applications, and internal messaging improves communications for reduced response time.

- **These integration, connectivity, and data management tasks** can be best achieved by migrating current applications, data, and systems to the cloud. Most companies find that this is best achieved in steps; in other words operating in a hybrid environment for a time. The benefits are well worth the effort: Users are able to access cloud services and data from anywhere.
- **Performance is improved** by delivering a better end-user experience.
- **Operations can be scaled** to support more users and larger workloads than with an on-premise infrastructure.
- **Performance is improved** by delivering a better end-user experience.
- **Costs will be reduced** as it is no longer necessary to purchase and setup physical servers, software licenses, storage and network equipment.
- **Fewer IT resources should be required** as cloud providers take over maintenance and upgrades.

While many manufacturers are well on their way to adopting Industry 4.0, many more are just taking their first steps. Understanding that a new digital business model is key to shorter order-fulfilment cycles, more sustainable production processes, better quality and higher revenues will help them make the transition smoother.

Improving data management



Another area that will continue gaining momentum in the traditional manufacturing industry is the adoption of analytical requirements for big data. This requires not only the interconnection of equipment and systems but also standardizing all data, applications and systems using a centralized integration platform best delivered with a cloud platform.

Analytics dissects the huge amounts of data available in the plant and makes sense of it all. Managers can review and analyze information from all systems and processes and make informed decisions. This is where machine learning, predictive engines, KPIs and dashboards come into play to provide actionable insights into the plant's operations and how to optimize them.

Regarding equipment manufacturers, [Surplus Record](#) states that:

“With sensors being installed in every part of the machine, manufacturers can pick up on trends across all their customers and detect new machinery trends before they go mainstream. They can use that data to better target customers and improve their machines.”

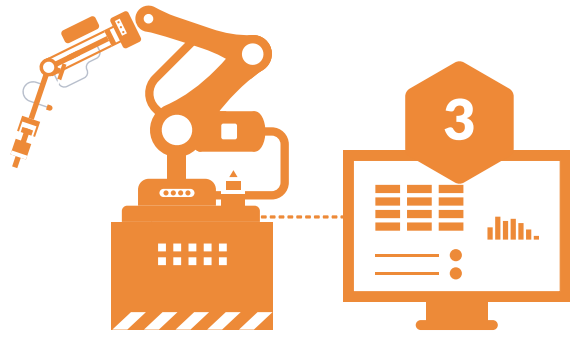
Industry 4.0 platforms enables manufacturers of all sizes to better analyze the large volumes of data at their disposal. With greater visibility into their operations, they are able to forecast demand, make adjustments to their processes, optimize vendor selection, reduce inventory costs and align delivery schedules leading to increased profits.

Acting on insights from available data can improve operations in several ways, including:

- **Eliminating bottlenecks** – big-data analytics identifies parameters that affect performance and slow processes down, helping factories identify and resolve problems quickly.
- **Predicting fluctuations in demand** – visualization of past and current activity, customer order patterns, and market trends, and other business patterns, allows predicting demand enabling companies to adapt their portfolio and manufacturing processes accordingly.
- **Improving warehouse and factory floor processes** – IIoT connected devices such as sensors and portable units allow identifying human error, poorly performing departments or lines and quality issues. By analyzing these IIoT feedback, factories can react quickly and resolve issues as they arise.
- **Predictive maintenance** – sensors identify machine failure patterns and data analysis correlates this with pre-failure physical parameters such as vibration and temperature. This allows predicting failures ahead of time and adopting predictive maintenance instead of fixed, periodic maintenance which is often not cost effective nor able to predict random failures in most machines.

As data collected from interconnected systems and IIoT devices continues to increase, correctly designed big-data analytics tools can create actionable insights for continuous improvement. The data can also be monetized with visibility of new revenue stream opportunities and improved operations.

Reshoring



Reshoring (i.e. moving production back to manufacturers' own countries) increases production resiliency, allows for a shorter and more effective supply chain within geographically closer locations, ensures a more streamlined distribution of goods and reduces risks.

To protect themselves from potential disruptions in the supply chain, manufacturers in both North America and in Europe are reviewing their policy towards remote production - and there is a growing move towards replacing nearshoring and offshoring with local production. USA giant Adidas, for example, decided a few years ago to replace production in Asia with local robotic-powered production lines.

Legislation in various countries is reinforcing the need for reshoring. Earlier this year, for example,

"The Biden administration issued an executive order commencing a resiliency review of four supply chains by different department secretaries."

[Gartner](#)

Similarly, the European Parliament published a study that

"discusses economic and political justifications for reshoring with respect to security of supply concerns and the debate on the EU's strategic autonomy."

[Europarl](#)

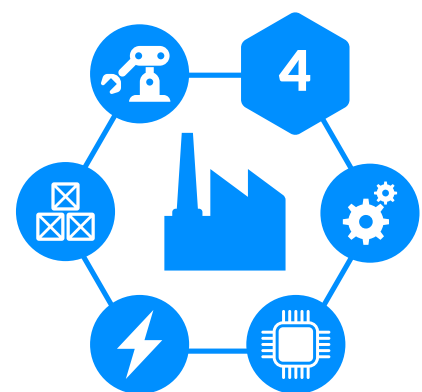
Another factor driving reshoring is the growing importance of environmental protection shared by individuals and companies alike. For example, German toymaker Margarete Steiff GmbH began nearshoring and insourcing its production as a way of cutting the costs associated with having to audit Chinese suppliers and ensuring they adhere to environmental practices.

Industry 4.0 technologies help enable reshoring by increasing automation and enabling newly digitalized companies to manage their supply chains and production facilities more effectively. This is facilitated by key processes and technologies:

- **Data connectivity**, IoT, cloud technology and blockchain
- **Data analytics** – intelligence, advanced analytics, machine learning and artificial intelligence
- **Human-machine interaction (HMI)** with robotics, automation and augmented reality

Digitalization and faster reconfiguration of production systems enable further benefits from reshoring by enabling strategies like make-to-order (MTO) which are quickly gaining momentum. Manufacturing only after a confirmed order is received enables a high degree of customization and greater variety, which in turn provide customers with exactly what they want, when they want it. It also reduces the need to maintain high levels of unnecessary stock and associated wastage. Industry 4.0 facilitates the necessary increased flexibility and production efficiency needed for individualized products.

Climate-neutral & Carbon-free production



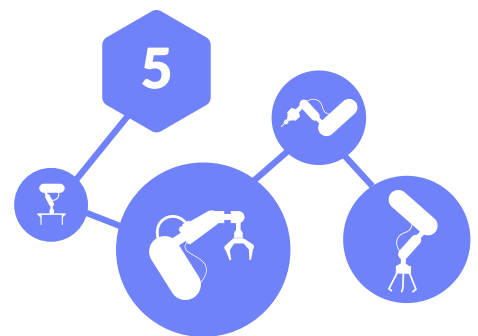
Another topic that ranks high among manufacturers' concerns, especially in Europe, is sustainability throughout the value chain. Energy-intensive industries are facing major challenges, and in light of global climate changes, the pressure to reduce emissions that are environmentally harmful is growing. As a result, companies are planning and beginning to implement appropriate measures to reduce carbon footprint and cut CO2 emissions.

Giants like [Daimler and Allianz](#) are spearheading investments in climate-neutral production. Mercedes-Benz Cars is committed to becoming CO2 neutral by 2022, whereas giant insurer Allianz has announced [its intention to invest billions in a climate change strategy](#).

Industry 4.0 helps migrate to climate-neutral and carbon-free production as a more efficient production and maintenance process results in lower energy consumption. By collecting data from sensors and other devices, manufacturers can leverage analytics systems and predictive models to identify inefficient processes, optimize production, improve schedules and anticipate maintenance work. As such, Industry 4.0 allows

- **Predictive maintenance** to prevent machine malfunction and pollution
- **Data analytics** to reduce waste, high energy consumption and overproduction
- **Closed-loops** of interconnected machines, IT systems, products and people that ensure improved quality and optimum working environments

Digital networking, robotics and human-robot collaboration



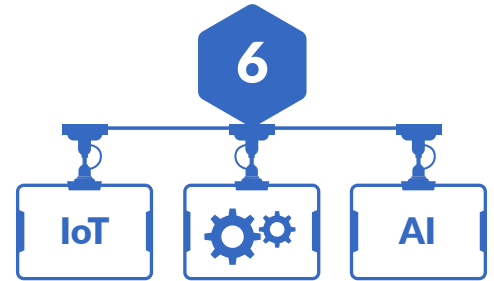
Artificial intelligence and use of IIoT devices have created a new Industry 4.0 paradigm of collaboration between people and robotic systems which is increasingly popular in mechanical engineering and will become even more mainstream in years to come.

The digitally networked systems, robots and AI technologies are transforming the way the manufacturing floor functions. For example, machine-learning-based sensors help guided vehicles identify physical obstacles in their surroundings, and IoT sensors help workers understand their performance and how to improve it.

Aimed at increasing flexibility and efficiency in the manufacturing processes, human-robot collaboration is becoming key in achieving increased flexibility while improving production output and quality. Fueled by AI, robots can increase productivity by taking on repetitive tasks and working 24/7. This can be particularly beneficial to small and mid-sized producers who usually cannot sustain a massive workforce.

Over time, digital technologies are quickly paving the way for more smarter factories, where machines and people work collaborative to ensure top efficiency and lower costs with humans being freed to do more important and less dangerous tasks.

Platform economy in manufacturing



Empowered by IoT, AI, machine learning and big data, the manufacturing industry is increasingly shifting towards digital systems offered by manufacturers of robotics and manufacturing equipment in addition to the hardware they sell. These digital platforms centrally monitor, control and analyze the machine and device-generated data to enable functions like predictive maintenance, energy management, and resource optimization. They also facilitate an industrial platform economy.

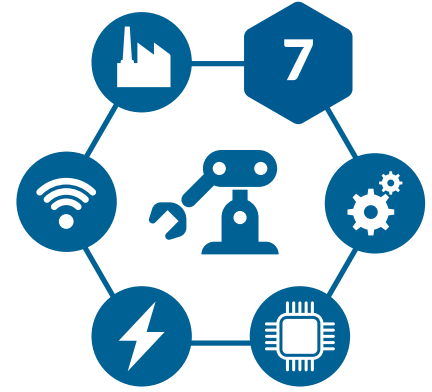
Platform economics will provide the manufacturing industry several benefits, including:

- **Increased revenues facilitated** by IT platforms that scale to provide smart services.
- **New products and services** for deployed products such as remote diagnostics and maintenance assistants.
- **Customer focus** – digital platforms collect data and analytics provide insights into customers' needs, thus enabling service improvement and products better suited for the market.

As a result of this trend, many manufacturers are now asking serious questions: "How will my market change due to the platform economy?" "Should we develop a platform ourselves or work with a partner? If so, which partner?"

These and other questions emphasize the need to actively assess how the platform economy will affect your business. Just like the industrial revolution in the late 1700s enabled the transition to new manufacturing processes, Industry 4.0 digital platforms and data will increase business value exponentially.

Building more resilient supply chains



“Companies must build in sufficient flexibility to protect against future disruptions. They should also consider developing a robust framework that includes a responsive and resilient risk management operations capability. That capability should be technology-led, leveraging platforms that support applied analytics, artificial intelligence and machine learning.”

According to [Accenture](#)

The pandemic caught many manufacturers flat footed. While this major disruption caused some businesses to shrink overnight, others grew at unprecedented pace, and an ‘enlightened’ few were able to respond to this crisis by rapidly changing their business models, product mix, and production processes to meet market demand. Whether it was producing much needed PPE, hand sanitizer, or plastic pellets required for safety panels, companies that were already responsive, agile, and transparent were able to meet consumer and industry demand when it was needed the most.

As they look to the future, companies should expect continued uncertainty in any number of areas such as the dynamic global supply chain, restrictions in the movement of goods for any number of reasons, and higher labor costs in the production and transportation of goods. By implementing Industry 4.0 connectivity and digital innovations and adopting some of the trends mentioned in this paper, manufacturers can better cope with the challenges of supply-chain disruptions. Production lines and warehouses can be fully automated, inventory levels reduced to a minimum, autonomous robotic vehicles can be used for short-distance deliveries, and IoT devices and sensors can collect data from interconnected machines that can be analyzed to improve processes. Insights into the supply chain enable decision makers to make real-world simulations to better forecast production and become more agile in resolving issues that may arise.

Conclusion

The extremely competitive environment is forcing many businesses to reinvent themselves. Industry 4.0 is now on the fast track, enabling the manufacturing industry to become more flexible and agile, more efficient, and reduce workforce risks. Looking ahead, it is clear that Industry 4.0, with big data, IoT, AI and machine learning, allows deeper and broader insights into business processes, and provides complete control over factories and supply chains. The adoption of digital tools allows the industry to maximize efficiency, reduce costs, and increase revenues.

When planning, manufacturers of all sizes must consider trends like reshoring, improved data management and investment in more resilient supply chains. Manufacturers should bear in mind that interconnected production-floor systems, advanced analytics that anticipate machine failures, predictive maintenance, better inventory management, and disruption-less raw material supplies will help to more quickly improve their competitiveness.

Are you looking for digital solutions to make visible your mission-critical and siloed data, enabling you to make more informed business decisions? Are you considering adopting Industry 4.0 innovations and technologies to increase productivity and profitability? Need guidance in how to get to smart manufacturing? Contact us for our expert opinion on the most suitable path to upgrade your business to Industry 4.0, smoothly and effectively to maximize the benefits afforded by our digital age.



If you're in the process of evaluating or rethinking your operational strategies, give us a call. Our experts can help you pave your way to Industry 4.0 and digital adoption.
www.factoryeye.co

