How the Digitalization of Manufacturing Creates Opportunities

intel®

6 WAYS digital transformation increases competitiveness[1]

Automation
Increase level of digitalization and improve connected worker skills

TCO reduction
Lower operations costs with predictive maintenance and quality control

New service models
Pursue new opportunities

Mass personalization
Give customers what they want with 3D printing and more

Agile supply chain
Keep critical suppliers informed at all times

Sustainable production
Practice social responsibility

As a manufacturer in the global economy, you face increasing customer demands and intense competition, driving the need for higher quality and lower-cost production. Standing still is not an option, so you're constantly looking for new ways to innovate, increase product quality, maximize your output, and optimize your operations, assets, processes, facilities, and workforce. But innovation requires investment.

Intense competition is sparking a new industrial revolution, and it's starting with the digitalization of manufacturing. Digitalization is the foundation of the factory of the future. Whether you call it Industry 4.0, Industrial Internet of Things (IIoT), Smart Factory, Made in China 2025, or something else, it all boils down to the same imperative:

Increase efficiency by upgrading manufacturing and operational processes through the use of digital technologies such as the Internet of Things (IoT), cloud computing, and data analytics.

Go digital

Are you ready to create the factory of the future by using manufacturing equipment that is smarter, data aware, and connected to the enterprise? At Hannover Messe 2017, we'll show you industrial IoT solutions that optimize processes and operations, and collect and process data with built-in security, so you can turn your ideas into a competitive advantage and be prepared for the promise of artificial intelligence and 5G connectivity.

Trusted partner

We understand the opportunities and hurdles of the digital industrial age. Having deployed IoT solutions in our own manufacturing facilities, we've seen how they produce operational efficiencies and cost savings. Now we want to show what data can do for you.

IOT SOLUTION REDUCES MANUFACTURING COSTS

Intel manufacturing uses big-data analytics to improve product yields, increase throughput, and reduce spares, among other things. Read more[2] about an Intel product assembly and test implementation and its benefits.

Yields losses reduced by
25%

Automated classification of defects completed
10x faster than manual inspection

Spare parts cost cut by
20%

Digitalization is transforming how manufacturers think about asset and human capital management.

MAKING BETTER USE OF DATA: 5 TRENDS

At this year's Hannover Messe, see how Intel®-based solutions are driving new trends and opportunities in manufacturing.

1. Predictive maintenance lowers operations cost.

Unplanned downtime can bring production to a grinding halt, which is why situation operations managers do a lot of preventive maintenance (PM) to avoid equipment breakdowns. At regular intervals, service engineers run diagnostics, grease parts, and swap out components, whether they need to be replaced or not. But is all this costly PM necessary, and does it really catch imminent failures?

Growing in popularity, predictive maintenance is a potentially lower-cost alternative that continuously monitors equipment health using IoT sensors to measure temperature, vibration, throughput, etc. Machine-learning algorithms differentiate normal wear from problematic behavior for individual pieces of equipment. Learn how this approach is applied to motors by National Instruments and truck fleets by Amazon Web Services.

2. IT/OT convergence improves company processes.

Many industrial companies use different computing and networking technologies for their industrial and data center environments, which can limit overall performance, efficiency, and flexibility. What's needed is a bridge between information and operational technology (IT/OT) to create a single factory view, making it easier to improve manufacturing and business processes.

Bridging this divide, Hilscher, NEXCOM, SAP, Microsoft, and IBM show how to connect the factory floor to the cloud. Various types of sensors, actuators, and controllers communicate with the cloud via gateways, enabling the visualization of cloud applications used to optimize manufacturing processes.

3. Connected workers increase efficiency and safety.

Every manufacturer strives to make workers more productive and safer. Now with connected wearable technology, you can provide them with the right data at the right time to improve efficiency and avoid safety hazards.

Want warehouse workers to pick faster and with fewer errors? See how Intel's IoT-enabled Recon Jet* Pro smart glasses allow workers to access an inventory list, locate items, validate picks, and track progress, entirely hands-free. Want to speed up troubleshooting and repairs in the field? Improve collaboration between the hotline and field service engineers with a KNAPP KiSoft WebEye*-enabled headset to show product experts in the factory exactly what's going on.

4. Automation boosts factory throughput and precision.

Like other manufacturing scenarios, factory automation has helped Intel increase throughput and the precision of its factory processes. In the future, increasing levels of automation are expected to enable autonomous manufacturing, which will eliminate nearly all manual steps needed to operate and reconfigure production lines.

Moving in this direction, Altera developed a highly automated environment based on FPGA and IoT technologies. The solution helps smart-factory developers who must contend with networking protocol standards that are not yet fixed. It also addresses such connectivity/integration issues using reconfigurable FPGAs that are integrated on system-on-module (SOM) boards and can adapt to changing protocol standards (e.g., time-sensitive networking (TSN)), enabling industrial solutions that are quick to assemble, robust, complete, and flexible.
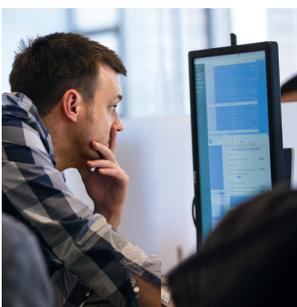
5. Data analytics leads to better business decision making.

Data analytics plays a big part in many factories, with manufacturers processing huge volumes of data looking to find ways to better control processes and increase efficiency. In the not-too-distant future, data analytics and machine learning will evolve into artificial intelligence (AI) and intelligent decision making that previously required a human.

Paving the way, see how Siemens uses data-driven insights from manufacturing data analyzed on Intel® architecture to optimize their factory, reduce operational expenditures, and avoid costly mistakes. This is demonstrated with an easy-to-understand model that simulates two manufacturing lines with integrated sensors connected to an intelligent gateway. The solution detects bottlenecks and visualizes them over a web-based human machine interface (HMI). Data from the two manufacturing lines is analyzed to find areas to optimize the process.

Factory floor machines will become increasingly intelligent and able to work side by side with people, offering manufacturers higher levels of efficiency and productivity.

Digital transformation pays off

All around the world, manufacturers are deploying end-to-end solutions that bring a new level of automation and computerization to manufacturing. Advanced technologies are becoming a competitive differentiator for industry, increasing the pressure to modernize, standardize, and automate. Of those companies transforming their businesses through the adoption of Industry 4.0, 35 percent expect revenue gains of 20 percent over the next five years, according to Forbes.[3]

Make the transition

Do you need help digitizing and transforming your manufacturing processes? This year at Hannover Messe, Intel and its solution partners are demonstrating how IoT technologies can be used to create end-to-end solutions that drive cost savings, increase agility, and open the door to new opportunities. These demos span the collection, processing, analysis, and sharing of data, as shown in Figure 1.
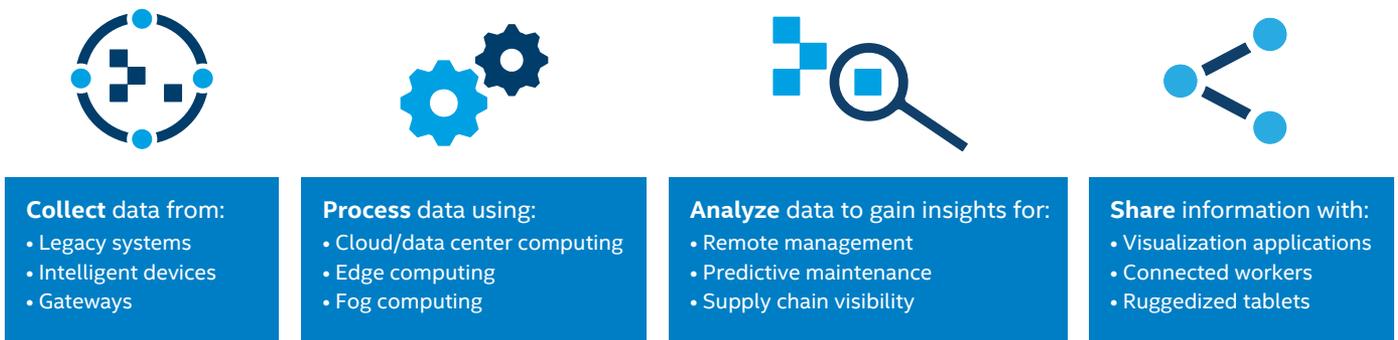

Collect data from:	**Process** data using:	**Analyze** data to gain insights for:	**Share** information with:
• Legacy systems • Intelligent devices • Gateways	• Cloud/data center computing • Edge computing • Fog computing	• Remote management • Predictive maintenance • Supply chain visibility	• Visualization applications • Connected workers • Ruggedized tablets

Figure 1. Getting data to work for you

High cost of proprietary systems

Manufacturers seeking to lower operational costs are often held back by aging assets and infrastructure that stifle the pace of innovation in ways shown in Figure 2. That's because these assets are typically custom and proprietary, so it can take a long time for a vendor to add new features and services to equipment that wasn't designed to support them. OEM proprietary controls systems that lock manufacturers into a single vendor's solutions can also limit choice for manufacturers.

High CapEx/OpEx	**Inflexibility**	**Security Deficiencies**	**Innovation Constraints**
Multiple proprietary boxes increase costs	Lack of interoperability limits choices	Bolt-on security solutions leave gaps	Advances are tied to a single vendor's capabilities

Figure 2. Proprietary solution drawbacks

Cognitive computing and analytic techniques will enable production environments to self-configure, self-adjust, and self-optimize, leading to greater agility, flexibility, and cost-effectiveness.

Increase agility

With IoT technologies as a baseline, Intel is working with OEMs, ODMs, and SIs to develop solutions that are open, secure, interoperable, and agile, giving manufacturing companies the flexibility to choose best-in-breed hardware and software components.

The Intel approach creates controls systems and platforms using general-purpose computing platforms that can run almost any type of application or service in near-real time with deterministic performance and functional safety mechanisms. These standards-based platforms implement virtualization technology to make application deployment and scaling as easy as a software download. To attain the factory of the future, manufacturers need to move away from purpose-built hardware and single-sourced solutions to more flexible open solutions.

Improve communications

5G promises to be a key enabler for factories of the future. It will deliver an evolution of mobile broadband networks as well as provide the unified communication platform required to disrupt the status quo with new business models and to overcome the shortcomings of current communication technologies. As such, 5G technologies have the potential to amplify and accelerate the ongoing transformation and unlock a next level of efficiency gains in manufacturing even for the vast community of European manufacturing.

Read more[4] ›

Visit us at the Intel booth: Hall 7, D12

We have a lot to show you about the digitalization of manufacturing, especially around collecting, processing, analyzing, and sharing data across your supply chain. Come talk to us and our solution partners, and hear about solutions that can help you lower cost and prepare for the next industrial revolution. We look forward to seeing you.

For more information about Intel® solutions for industrial applications, visit intel.com/industrial.
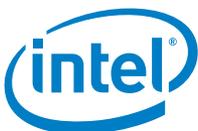
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