Columbus
Once you know how...
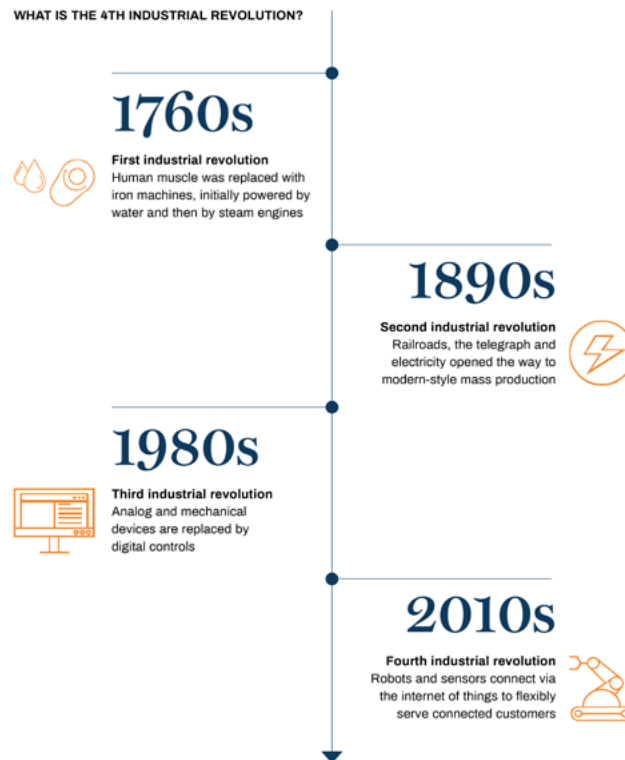
Five technology trends for
smart manufacturers

"Revolutions never go backward." -Wendell Phillips

Revolutions never go backward. When Wendell Phillips spoke these words in the 1800s, he was referring to seismic moments in American history. But the notion that new ideas and developments can only move the dial in one direction—forward—is timeless and universal.

This has rung true in the manufacturing industry since we moved from human muscle to steam-powered machines. And it's still true today amid the Industry 4.0 phase of the Fourth Industrial Revolution, where robots, data, connected devices and artificial intelligence are becoming standard.

There's no going backward. Manufacturing companies can only adapt and innovate. These are the digital manufacturing features headlining the revolution. Is your industrial equipment manufacturing company on the front lines?

WHAT IS THE 4TH INDUSTRIAL REVOLUTION?

1760s
First industrial revolution
Human muscle was replaced with iron machines, initially powered by water and then by steam engines

1890s
Second industrial revolution
Railroads, the telegraph and electricity opened the way to modern-style mass production

1980s
Third industrial revolution
Analog and mechanical devices are replaced by digital controls

2010s
Fourth industrial revolution
Robots and sensors connect via the internet of things to flexibly serve connected customers

Artificial Intelligence

Artificial intelligence (AI) is wide-ranging in its usefulness to industrial equipment manufactures because it supports many signature advancements of the era including automation, cybersecurity and robotics. AI-based systems that have dramatically changed the digital landscape include computer vision, which uses images and deep learning to accurately interpret what it "sees," creating a level of understanding about the world. In manufacturing, its birds-eye view can consistently find and correct issues the naked-eye can't detect.

Predictive maintenance, also supported by AI, offers an up-to-the-minute analysis of machine conditions that eliminate the broad uncertainty of preventive maintenance. Digital twins is a process that uses simulations and data to prevent problems before they occur. Generative design helps engineers and designers to see various iterations of their work that can be more exact and effective than the original. From design to execution AI can support operations.

The driver's seat of this powerhouse feature—and most other assets—is behind the wheel of an overarching control system created with industrial machinery manufacturers in mind. These intelligent business applications include ERP, CRM, PLM and SCM software.

Data & Analytics

The power of big-data and real-time analytics isn't hard to surmise. Big data refers to the extraction and analysis of data sources that are too large and complex for humans or simple software to calculate. The "real-time" element is exactly what it sounds like—an up-to-the-minute snapshot of your operations in any sector of your business. A well-armed intelligent business application can compute various data sets that didn't previously "speak the same language," translating it and computing comparisons, combinations and insights. It can also discard duplicate data and support data integrity.

So how does this help manufacturers? It can cut cycle time for one, by ensuring exact data is fueling decisions both by the machine and personnel. Data also supports predictive maintenance which runs on analysis of operational data derived from machine patterns. This has the benefit of limiting machine downtime and optimizing a machine's lifespan. The most efficient process possible combined with less downtime only means one thing—more revenue.
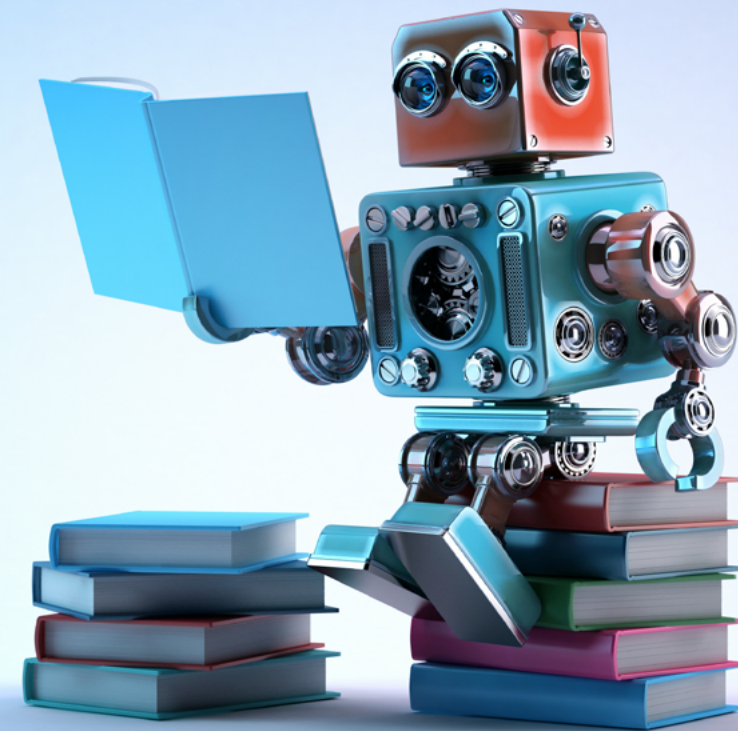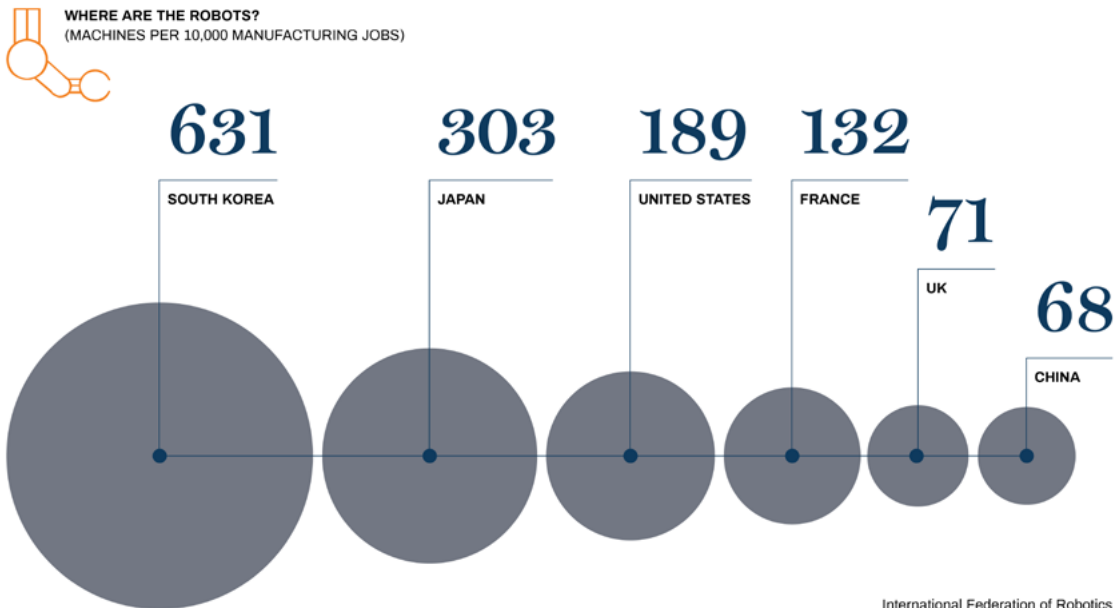
Autonomous Production

With autonomous production—in the Utopian sense—machines would be fully automatic, self-optimized, communicative with other machines and capable of decision making based purely on data and AI learning. You've probably heard this scenario dubbed "lights out" manufacturing, where the whole operation can run on its own with the lights out. Very few operations have the capacity to run this way exclusively, but it's a common goal of Industry 4.0.

In Microsoft's 2019 Manufacturing Trends Report, it was reported that only 9% of manufacturers currently use semi-autonomous or fully autonomous robotic devices within their operations, with an additional 11% expected to do so in the next three years. Unsurprisingly, cost is the biggest speed bump.

Higher productivity, lower costs, workplace safety, quality, reliability, expertise and reduced waste are all pros of embracing automation.

WHERE ARE THE ROBOTS?
(MACHINES PER 10,000 MANUFACTURING JOBS)

631	303	189	132	71	68
SOUTH KOREA	JAPAN	UNITED STATES	FRANCE	UK	CHINA

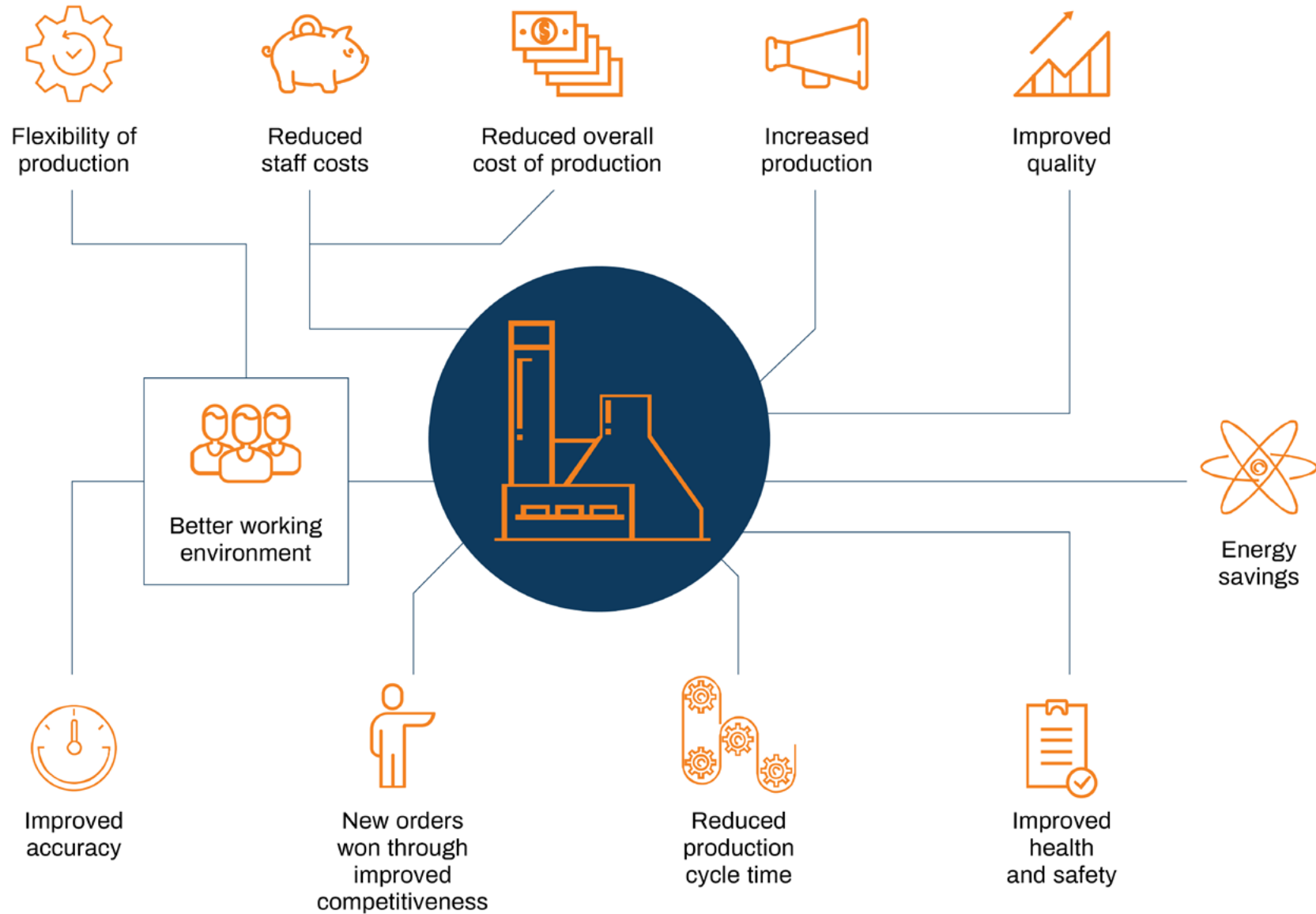International Federation of Robotics

Internet of Things (IoT)

We've covered machines "talking to each other" to optimize production and derive critical data insights throughout your operations. But how exactly do these machines communicate and learn? What's the line of communication both within and to other machines?

The Internet of Things (IoT) is a branch of connected devices that refers to the computer networking and communication of everyday objects that were not previously connected to the internet. The Industrial Internet of Things (IIoT) is just that, but it refers to the sensors, machinery and other devices connected to industrial applications.

The Digital Twins example we used in the artificial intelligence section is also rooted in IoT. Though it requires skills of machine learning and AI, a digital twin replicates the details of how a "IoT-enabled device or system works and operates," says ReadWrite.

Digital Twins isn't the only example of a feature overlap. Predicative maintenance and data mining also require the agility and connectivity of IoT, as do most augmented reality, virtual reality and machine learning devices.

WHAT BENEFITS DO COMPANIES EXPERIENCE/EXPECT FROM FACTORY CONNECTIVITY?

Flexibility of production

Reduced staff costs

Reduced overall cost of production

Increased production

Improved quality

Better working environment

Energy savings

Improved accuracy

New orders won through improved competitiveness

Reduced production cycle time

Improved health and safety

Columbus/ *The Manufacturer* survey

Digitally Savvy People

No matter how advanced machines become, real-life human beings are the foundation of a company's success. But today's workforce looks very different than the industrial equipment manufacturing workforce of yesteryear.

There are two main reasons why. One is that digitally complex machines require a digitally-savvy team to run operations (lookin' at you digital-natives). The second is that the old-guard is getting to be of retirement age. Enter a skills-gap.

The remaining traditional workforce needs to be trained in the cutting-edge tech at their fingertips. Techy Millennials need to be inspired and passionate about manufacturing. According to our Columbus Manufacturing survey, 50% of respondents were concerned about implementing and using connected devices due to lack of expertise. An unskilled staff is no reason to lose momentum in Industry 4.0. It's never been more important to train, hire and nurture the beating heart of your business—living, breathing employees.

Next read...

6 [key takeaways from Microsoft's manufacturing trends report](#)

Let's talk about what digital transformation looks like for your business.

☎ 888 209 3342

🌐 in 🐦 f

About Columbus:

Columbus is a global IT services and consulting company with more than 2,000 employees serving 5,000+ customers worldwide. Columbus helps ambitious companies transform, maximize and future-proof their business digitally. We are specialized within the industries retail, distribution, food and manufacturing. We offer a comprehensive solution portfolio with deep industry knowledge, extensive technology expertise and profound customer insight. Columbus has offices and partners all over the world and we can deliver our solutions and services locally – on a global scale. www.columbusglobal.com