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Industry 4.0

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Industry 4.0 signifies the promise of a new Industrial Revolution – one that marries advanced production and operations techniques with smart digital technologies to create a digital enterprise that would not only be interconnected and autonomous but could communicate, analyze, and use data to drive further intelligent action back in the physical world. It represents the ways in which smart, connected technology would become embedded within organizations, people, and assets, and is marked by the emergence of capabilities such as robotics, analytics, artificial intelligence and cognitive technologies, nanotechnology, quantum computing, wearables, the Internet of Things, additive manufacturing, and advanced materials.

While its roots are in manufacturing, Industry 4.0 is about more than simply production. Smart, connected technologies can transform how parts and products are designed, made, used, and maintained. They can also transform organizations themselves: how they make sense of information and act upon it to achieve operational excellence and continually improve the consumer/partner experience.

In short, Industry 4.0 is ushering in a digital reality that may alter the rules of production, operations, workforce – even society.

It’s now possible to create a smart factory where the Internet, wireless sensors, software and other advanced technologies work together to optimize the production process

and improve customer satisfaction. These tools allow a business to react more rapidly to market changes, offer more personalized products and increase operational efficiency in a cycle of continuous improvement.

Industrial Revolutions over the ages

c. 1780 Industry 1.0 – Mechanization

Industrial production based on machines powered by water and steam

c. 1870 Industry 2.0 – Electrification

Mass production based on the assembly line

c. 1970 Industry 3.0 – Automation

Automation based on electronics and computers

c.1980 Industry 3.5– Globalization

Offshoring of production to low‑cost economies based on lower communication and containerization costs

Today Industry 4.0 – Digitization

Introduction of digital technologies

Industry 4.0 uses digital technologies to react more rapidly to market changes, offer more personalized products and increase operational efficiency.

Industry 4.0 touches everything in our daily lives. The Fourth Industrial Revolution is important to understand because it doesn't just touch *manufacturers* – it can touch all of us. While Industry 4.0 has grown to encompass business operations, the workforce, and society itself, its roots in the supply chain and manufacturing constitute the backbone of the world as we know it. What things are made of, how they are made, where they are made and how they get to us, and where they go when we need them fixed or we're done using them: All of these things are part of the production life cycle. Industry 4.0 will likely change how we make things, but it could also affect how those things are moved (through autonomous logistics and distribution), how customers interact with them, and the experiences they expect to have as they

interact with companies. Beyond that, it could drive changes in the workforce, requiring new skills and roles.

Industry 4.0 integrates the digital and physical worlds. The digitization of operations, manufacturing, supply networks, and products enables companies to combine learnings from humans, machines, analytics, and predictive insights to hopefully make better, more holistic decisions. Fully connected processes present huge opportunities: Rather than monitoring processes in a linear fashion, as has always been done, and operating reactively, companies can take learnings along the way and feed them back into the process, learn from what they are seeing, and adjust accordingly in real or near real time. This should lead to smarter decisions, better-designed products, service and systems, potentially more efficient use of resources, and a greater ability to predict future needs. The digital thread represents one such end-to-end Industry 4.0 solution, linking the entire design and production process with a seamless strand of data that stretches from the initial design concept to the finished part. Beyond the digital thread, the use of the digital twin can enable organizations to gain insight into the inner workings of systems or facilities, simulate possible scenarios, and understand the impacts of changes in one node on the rest of the network.

The benefits of introducing digital technologies. The benefits to manufacturers of adopting digital technologies are real.

>**60%** of adopters say digital technologies helped boost their productivity. The main driver of productivity growth in a smart factory is the capacity to predict and prevent downtime, and to optimize equipment effectiveness and maintenance.

> **Almost 50%** say they save operating costs. Savings may come from the following processes: real-time production monitoring and quality control to reduce waste and rework – predictive maintenance to prevent costly repairs and unplanned

downtime – higher automation to save labour costs and improve throughput – the use of 3-D printers to achieve faster prototyping, reducing the cost of engineering and accelerating time to market

> **42%** say they have improved overall product quality. For instance, real-time quality controls allow you to reduce, or even eliminate, customer returns that occur when products do not meet specifications.

> **13%** identified greater capacity to innovate as a benefit. While this is a low score, we believe greater innovation may unlock the most value for your business. New business models made possible by smart products and new advanced technologies, such as 3-D printing, are only beginning to emerge. They promise to spark innovation on a monumental scale over the next five to 10 years. We are already seeing inspiring examples of how small businesses are using connected products and customization to reinvent themselves in the digital context.

It's time to get started!

The digital age has arrived. New digital technologies are changing the way products are developed, manufactured and delivered to customers.

In fact, there's never been a better time to get involved – technologies have matured and become more affordable and user-friendly. The time is right to join the Industry 4.0 revolution.