The Fourth Industrial Revolution
Industry 4.0

1
Mechanization, water power, steam power

2
Mass production, assembly line, electricity

3
Computer and automation

4
Cyber physical systems

The Fourth Industrial Revolution, big data in manufacturing and the Internet of Things (IoT) are happening now. A study done by Cisco Systems indicates that 50 billion machines will be connected to the internet by 2020[1]. Companies across industrial sectors are rapidly moving into the era of big data, smart machines and IoT. From innovations in additive manufacturing to horizontal and vertical system integration, Industry 4.0 is transforming the world around us.

INDUSTRY 4.0 BACKGROUND:

In 1784, the first industrial revolution, the first steam engines along with the use of hydro-power revolutionized manufacturing and introduced the era of mechanized production. The second industrial revolution begin in 1870 and was dominated by mass production, electricity, the automobile, the telephone and fossil fuels. The third industrial revolution, also known as the age of digital, started in the late the 1940s with the advent of the transistor and ENAIC (Electronic Numerical Integrator and Computer)-known as first computer ever made.

We are now in the fourth industrial revolution or Industry 4.0, a concept first introduced in Germany in 2011. The term is used to describe the computerization and connections within the manufacturing industry. Industry 4.0 uses smart technology and real-time data via internet connections, to increase productivity and reduce costs through automation. IoT closely integrates business systems, production and factory equipment.

Reshoring Institute

University of San Diego
SCHOOL OF BUSINESS
Supply Chain Management Institute

THE INTERNET OF THINGS AND RESHORING

Within Industry 4.0 is the concept known as *The Internet of Things* or IoT, which has to do with all things connected via the internet. Connectivity involves how technology and people interact with the world around them and the internet to optimize production line capabilities. A survey conducted by PwC regarding U.S. manufacturing and IoT found the following:

- 35% of U.S. manufacturers are currently collecting and using data generated by smart sensors to enhance manufacturing/operating processes

- 34% believe it is "extremely critical" that U.S. manufacturers adopt an IoT strategy in their operations

- 38% currently embed sensors in products that enable end-users/customers to collect sensor-generated data

IoT, robotics and innovation in machine automation are key factors in bringing manufacturing back to the U.S., also known as "reshoring." Increased labor rates in low-cost countries such as China and India, along with the rising costs of supply chains, and energy costs in different parts of the world, have led many companies to consider the potential of bringing manufacturing back to America and Western Europe. But to reshore production, manufacturing has to become more advanced and efficient. Automation and IoT are ways to achieve improved efficiency and reduce cost in manufacturing and make reshoring more economically attractive.

A study conducted by Supply Chain Management World[2] and a complementary survey by the Reshoring Institute[3] reveal that more than half of respondents plan to reshore a portion of their production capacity.

Much of the manufacturing and production work being reshored is returning to the U.S. and Western Europe. In an effort to help streamline the reshoring process, many companies are integrating IoT applications that will improve operational efficiency, information transparency and product design.

DELL EMC
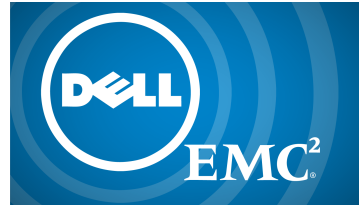
Dell EMC is working hard to be a go-to provider of IT storage solutions using IoT as a key differentiator. Dell EMC now produces a wide variety of computer and networked storage data platforms. In 2015, Dell Inc. acquired EMC, and EMC had previously acquired Data Domain.

Data Domain Products

Since its inception in 2001, the Data Domain line of products has been on the forefront of IoT. Data Domain products are known for their "call home data" and service logs, where products self-report problems. Data Domain products recognize drive failure and capacity constraints by looking at overall data information and predicting the likelihood of hard drive failure. This allows products to simultaneously alert customer when the device may be reaching data capacity and more storage needs be purchased, and improve overall operational efficiency, capabilities and customer service.

According to Hugh Walker, Vice President of Operations, removing the manual processes from checking hard-disk appliances and raid arrays was essential for improving their customers' global operations. Data Domain software was developed to signal failures, validate residual capacity and determine required repairs over internet communications. This allows for significantly enhanced customer service response time and improved performance on service-level agreements (SLAs).

These "call-home" features were early applications of IoT technology before the term IoT was coined. Data Domain products remain in the technology forefront today.

BIG ASS FANS

Big Ass Fans manufactures fans, lights and controls for industrial, agricultural, commercial and residential use, including Big Ass Fans, Big Ass Light, and Haiku brands. Big Ass is ahead of the curve in IoT. Initially known as HVLS Fan Co., the

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[1] http://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf.
[2] https://www.scmworld.com/research/reports/manufacturing-footprints--getting-to-plant-x/
[3] www.REshoringInstitute.org/research

company officially changed its name after customers kept calling and asking if the company made "those big-ass fans."

Haiku Products

IoT is not only a way to bring improvements to the manufacturing floor, but it also contributes to how customers use the products. Big Ass product line Haiku with SenseMe fan has been pegged as the world's first smart fan and only ceiling fan to boast the "Made in the USA" label. The fan operates by allowing the user to control air movement and light dimming with either a smartphone application or a remote. It can also be programmed to work in conjunction with a NEST thermostat, and incorporates timed schedules in addition to being able to respond to movement within close proximity of the sensor. The product has won several awards including CES Best of Innovation Award and 2015 ENERGY STAR Most Efficient.

In recent years, Big Ass Fans has shifted from using an all-Asian supply chain for residential products to the majority of its residential fan lines being manufactured in Lexington, KY. Founder Carey Smith, credits the move back to the U.S. to a variety of factors including increasing Asian labor costs, quality control and proximity of production. The company reshored over 125 jobs to its main facility in Lexington and plans to add 15 additional jobs in preparation for expansion.

WHAT'S NEXT?

To rebuild a manufacturing base in America, it is essential to move towards advanced manufacturing in robotics, automation, IoT and other computerization on the shop floor. Incorporating automation equipment that can effectively communicate is important for gaining efficiency resulting in lower production costs. Reducing production costs is key to competing with manufacturing in low-cost countries.

In addition, IoT opens up a host of possibilities with the way that machines are connected to each other and to service centers. With an eye toward reducing labor in manufacturing processes and in re-training skilled labor, the road to recovery in American manufacturing becomes clearer. Workers will need additional training and skills development in technology to fill the new kinds of manufacturing jobs. New training and new skills will lead to higher-paid, more sophisticated jobs. The quest for more automation and internet connections is on a supportive path to reshoring.

The Fourth Industrial Revolution will cause manufacturing in America to evolve into something new, attracting significant investment in automation and requiring a different skilled workforce.

SOURCES:

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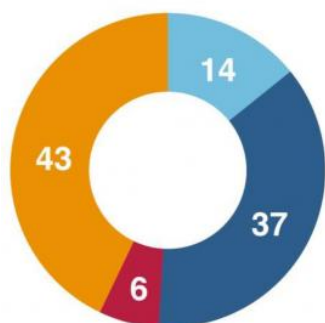https://www.scmworld.com/research/reports/manufacturing-footprints--getting-to-plant-x/

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Expectations about reshoring

- We are looking to reshore most or all of our manufacturing for some combination of cost, risk and market responsiveness improvements
- We are looking to reshore some of our production as part of a dual or multi-sourcing strategy
- We are probably going to reshore some manufacturing for symbolic or experimental purposes
- We are not expecting to reshore any of our manufacturing

Source: SCM World report, Manufacturing Footprints: Getting to Plant X   % of respondents, n=324

AUTHOR

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ABOUT THE RESHORING INSTITUTE

Our Vision

In collaboration with USD's Supply Chain Management Institute, we are recognized as the premier research and support organization for companies considering reshoring their global sourcing and manufacturing. We do this through rigorous research, publishing, and the development of analytical tools.

Our Mission

The Reshoring Institute has a dual mission:

1. Provides research and support for companies bringing manufacturing back to America
2. Provide experiential education and opportunities for USD students to learn about global sourcing and manufacturing

https://www.ReshoringInstitute.org

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