



From steam power to smart machines

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Idea in brief: Industry 4.0



Rise of the machines

Interconnectivity, automation and machine learning are at the core of Industry 4.0, which combines physical operations with smart digital technologies.



Working smart, not hard

Artificial intelligence and connectivity are projected to reduce manufacturing costs by up to 20%. This is expected to save some \$400 billion in global costs each year for companies that successfully implement Industry 4.0.^{1,2}



Growth in Industry 4.0 spend

The market for Industry 4.0 is expected to top \$300 billion by 2023, growing at a compound annual growth rate (CAGR) of 37% (2017-2023).³

The fourth industrial revolution – Industry 4.0 – is set to change the global economy in profound ways, as the three before have done. Starting in the 18th century, the first industrial revolution involved the transition from agrarian to manufacturing processes.

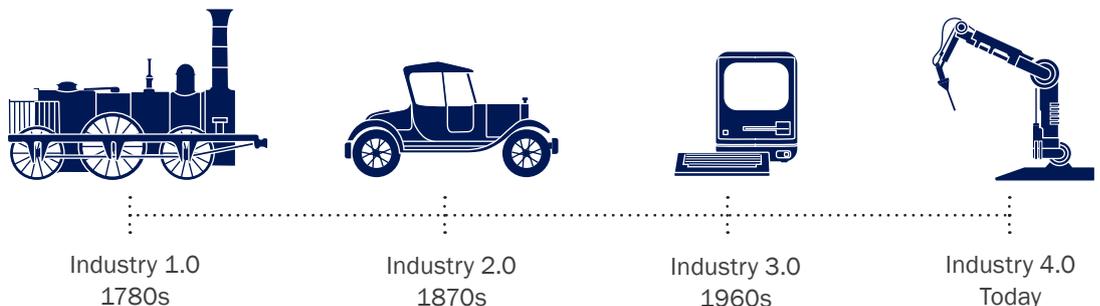
The second industrial revolution was a phase of rapid standardization involving mass production. A notable example is Henry Ford's factory at Highland Park Michigan, which in 1913 became the first in history to assemble cars on a moving assembly line.

The third industrial revolution saw the rise of electronics, computers and automation.

Industry 4.0 refers to a new generation of automated machinery, enhanced by wireless connectivity and digital technology. These machines are connected to systems (the Internet of Things) that can visualise the production line and take intelligent, independent decisions (figure 1).²

Figure 1: The four industrial revolutions

New technologies have been driving rapid change across the global economy over the past two centuries.



¹ The factory of the future, BCG, December 2016

² Industry 4.0: Building the digital enterprise, PwC, 2016

³ IoT Analytics, Market Report: Industry 4.0 & Smart Manufacturing 2018 - 2023; 2018

Source: Rothschild & Co

At the heart of Industry 4.0

Industry 4.0 offers new technologies that affect a wide range of functions. First, machines are enabled to take decisions independently through design processes, simulation, big data and the cloud. Second, smart collaborative robots and sensors increase manufacturing efficiency and accuracy. A third area – in-factory logistics – is improved by the use of automated guided vehicles, which allow for more flexible production and reduced labour costs.⁴

Industry 4.0 meets artificial intelligence

One way to think about Industry 4.0 is in terms of fundamental human functions. Looking at the production line, automation and robotics are the muscles. Augmented, virtual reality and cameras are the senses, while data and connectivity are its central nerve system. The brain, however, is artificial intelligence (AI), which can enhance processes through a collaboration between human and machine.

One of the most common applications of AI (see our [Instant Insights – AI](#)) within manufacturing is machine learning – the science of computers learning, adapting and acting without any human involvement. Most predictive maintenance systems rely on these techniques. Two of the advantages are lower costs and reduced downtime.

Industry 4.0 spend

Another important pillar of Industry 4.0 is automation, which firms across many industries are set to benefit from. Smart factories with a large degree of automation are expected to

dominate within sectors such as automobiles, electronics and machinery.²

In achieving the transition to Industry 4.0, the benefits for these companies are projected to be:

- higher value-added products;
- more flexible productions; and
- improved margins.

The impact can be seen in return on capital employed (ROCE), which is expected to increase from 15% to 40% in the next 15 years – derived from plant utilization and more efficient machine distribution along with human capital investments.⁵

In light of the demand for automation and smart factories, the total spend on product and services driving Industry 4.0 is forecast to grow at a CAGR of 37% (2017-2023) (figure 2).²

A future dominated by robots?

A recent International Federation of Robotics report show a record of 2.7 million industrial robots deployed in factories across the globe, expected to reach almost 4 million by 2022.⁶ Many companies are likely reviewing their dependency on more conventional labour given disruptions to global supply chains seen during the pandemic as factories were forced to temporarily close their doors to contain the spread.

At the same time and reflecting a growing adoption of robots in factories: new opportunities will arise for skilled workers. That said, differences in education level, industrial developments and the composition of economies have contributed to a divergence in estimated automation levels across countries and industries.⁷

We believe that the factories of the future will be more intelligent, effective and cost efficient. Companies are investing in Industry 4.0 in order to achieve these gains.

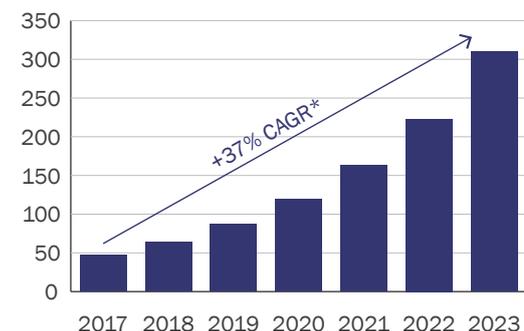
How to invest in Industry 4.0

There are a number of ways to invest in companies that provide products and services associated with Industry 4.0.

With our **Investment & Portfolio Advisory** team at Rothschild & Co Wealth Management, we can advise on the most appropriate ways of gaining access to Industry 4.0.

Figure 2: Global Industry 4.0 projected market size

2017-2023, in USD bn



Source: IoT Analytics, Market Report: Industry 4.0 & Smart Manufacturing 2018 - 2023; 2018, Rothschild & Co

² Industry 4.0: Building the digital enterprise, PwC, 2016

³ IoT Analytics, Market Report: Industry 4.0 & Smart Manufacturing 2018 - 2023; 2018

⁴ Factory of the future; beyond the assembly line, Goldman Sachs, April 2016

⁵ The Industries 4.0, transition quantified, Roland Berger, April 2016

⁶ High demand for "Robotics skills" in post-Corona recovery, The International Federation of Robotics, 2019

⁷ Will robots really steal our jobs? An international analysis of the potential long term impact of automation, PwC, 2018

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