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Producing more with less - the age of automation

Resource scarcity has long been seen as one of the fundamental principles of economics. Throughout history, shortages of vital resources have driven the need for people to innovate, whether that be through discovering new materials or developing new technologies. Many companies are using human ingenuity to address resource scarcity.

Structural changes shake up traditional industry categories

As business models change, product life cycles become shorter, and materials become increasingly complex, the boundaries between industries such as materials, industrials and technology are becoming blurred. This has resulted in what we view as a new universe of companies that are an amalgamation of these industries.

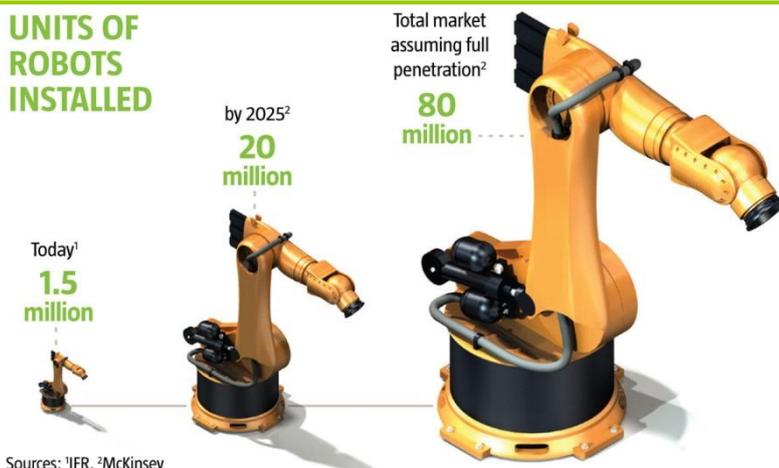
Moore’s law, a decades-long observation in technology whereby the efficiency of semiconductors increases over time, is impacting adjacent industries. As computing capabilities become more powerful and cheaper, automation is becoming increasingly pervasive, to the point where it determines the choice of materials in some of the largest consumers of basic materials, such as in aviation and automotive markets, changing the demand dynamics for individual materials. Below we outline some of the most attractive investment opportunities in factory automation and robotics, software and 3D printing.

Factory automation and robotics boost productivity

The industrial robotics market is estimated to be USD 10 billion, based on approximately 230,000 robots sold in 2014. Growth is expected to accelerate from 11% average annual growth since 2002, to 25–30% over the next 10 years, and could result in an installed base of 15-25 million robots by 2025¹. But even then, less than 25% of manufacturing would be automated.

New generations of robots are cheaper and more agile than ever before. They can also work safely and effectively alongside humans, giving rise to the era of “collaborative robots”. These robots can be used in new applications, further driving growth in demand, on top of cost- and performance- driven penetration of existing markets.

The robotics market offers huge growth potential



According to robotics company KUKA, production costs have fallen by an average of 5% per year since 1980 – or by 80% in total – as a result of faster assembly and improvements in robot performance.



Collaborative robot
 Source: KUKA AG

¹ McKinsey

Software and the Internet of Things

Software is playing an increasingly important role in manufacturing processes, which are growing in complexity and using an increasing variety of materials. The total addressable market for comprehensive design software is estimated to be USD 32 billion². These tools enable engineers, designers and architects to visualize, simulate and test a virtual product during the design process without the need for physical prototypes, leading to reduced production costs, collaborative prototyping and greater flexibility.

The next step in automation and robotics will be connecting the hundreds of billions of devices, machines and people, resulting in the so-called Internet of Things. This interconnectedness will require immense quantities of sensors, robotics and related software, driving strong (over 20%³) growth in demand for companies involved, over the next 5-10 years.

3D printing: optimized design and manufacturing

The 3D printing market was valued at USD 4.1 billion in 2014⁴, and could achieve revenues of USD 50 billion per year over the coming decade, which would still only represent penetration of 0.5% of total global manufacturing. 3D printing, also known as additive manufacturing, has disruptive potential across several industries: by enabling the optimization of production, it is reshaping global supply chains and business models. For example, according to Airbus, an aircraft produced entirely by additive manufacturing would be 30% lighter and 60% more cost-efficient than current models.

One benefit of additive manufacturing (AM): Weight reduction

Traditional Design



A conventional steel buckle weighs 155 g

AM Optimized Design (3d printed)



Titanium buckle designed with AM weighs 70 g
– weight reduction of 55%

For an Airbus 380 with all economy seating (853 seats), this would mean a reduction of 72.5 kg. Over the airplane's lifetime, 3.3 million liters of fuel or approximately EUR 2 million could be saved, assuming a saving of 45,000 liters per kg and airplane lifetime.

Source: Courtesy of 3T RPD Ltd in conjunction with the SAVING Project

“New generations of robots are cheaper and more agile than ever before, driving growth in demand beyond established markets.”



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² Dassault

³ IDC

⁴ Wohlers