SANDVIK Coromant

Manufacturing intelligence

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WHITE PAPER

We're living in a time of rapid digitization, where computers and robots are capable of performing science fiction tasks.

Today, there are automated concept cars out there that can drive safer than you and I. Utilizing advanced sensing technologies, smart algorithms and powerful microprocessors make robots performing advanced logistic assignments and draw intelligent conclusions. You can verbally ask your smartphone a question and get a reliable answer back. The same smartphone probably has more computing power than Apollo 11 when it landed the first men on the moon.

Your smart phone may not yet answer all of your questions, nor will your present car take you anywhere without your involvement, but the technologies are developing rapidly and are gradually ready to be implemented in different consumer and industrial devices.

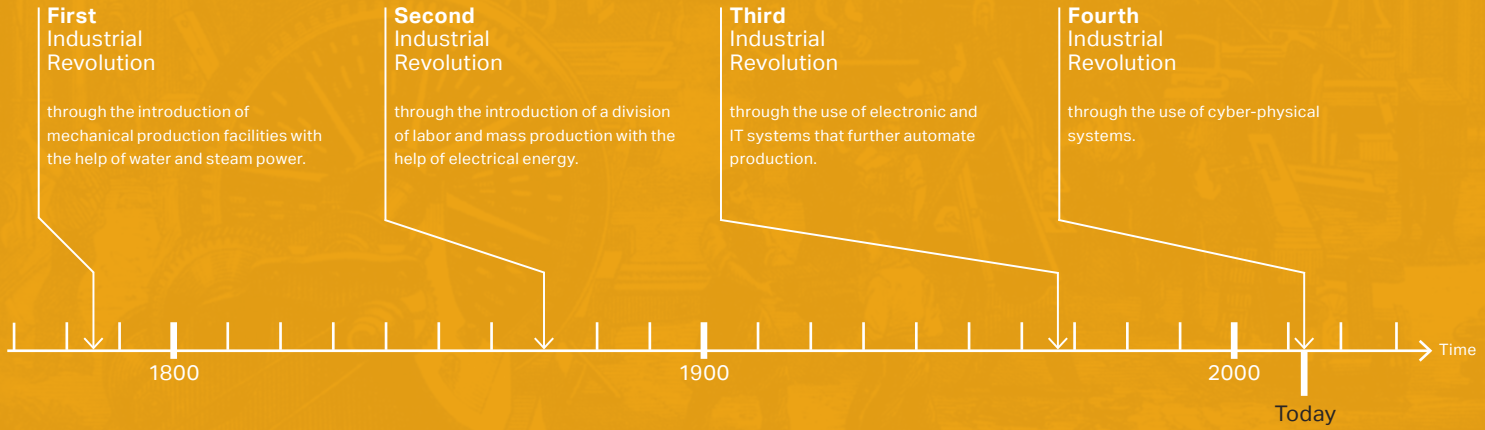
The technology shifts that we are experiencing are an embryo of an industrial revolution, and even though we are still in the very beginning of it, the capabilities are improving quickly.

DRIVING FORCES FOR CHANGE

When the steam engine first appeared in the British cotton industry, many naysayers argued that it was foolish and expensive to invest in it, as the hydropower they were using at that time, was basically free of charge. The sceptics had to surrender however, as flexibility and productivity were stronger motivators than the investment cost alone. Use of waterpower restricted the factories to the riverbanks, while the steam engine opened up for a more flexible location and higher output.

While the steam engine is usually considered being the first industrial revolution, it was followed by the introduction of mass production through electricity in the second half of the 19th century and by computerization in the late twentieth century.

Common to all three is that they opened up for higher productivity and that enterprises that failed to join the revolution had a hard time catching up. We are now on the verge of a fourth industrial revolution, in Germany called Industry 4.0, that of intelligent technology.



FOURTH INDUSTRIAL REVOLUTION

Today's growing world population and consumption pattern mercilessly put pressure on the environment. In addition, food supply isn't enough for everyone and we are running out of fossil energy resources. The fourth industrial revolution might be part of the answer to some of these challenges. In order to survive the reality we've created, we need to develop sustainable solutions that are economically beneficial and environmentally friendly. We need to act smarter; increase efficiency in everything we do, and optimize every step.

So, what is the fourth industrial revolution? As the Wall Street Journal explained in June 2013: "The new industrial revolution is a wave of technologies and ideas that are creating a computer-driven manufacturing environment that bears little resemblance to the gritty and grimy shop floors of the past." The explanation doesn't solely imply that machines and robots are taking over the heavy and dirty tasks that humans don't particularly want anyway. There is a lot more to it. The vision is of smart factories where every product control how it is produced, resulting in a decentralized manufacturing system.

CONNECTING THE PHYSICAL WORLD WITH CYBER-PHYSICAL SYSTEMS

We are quickly moving from information technology to intelligent technology. Sensors embedded in objects are connected to networks, enabling a future refrigerator to tell you to avoid the soft drink you crave for, because it knows that your body needs a carrot and two eggs. Products in a factory will find their way independently through a production process, and a worn cutting tool insert will know when it's time to be replaced by a fresh and ask an available robot to get a new one and make the change.

THE INTERNET OF THINGS, IOT

Among important enablers for this development is the radio frequency identification (RFID) that can be embedded in an object, such as a T-shirt. The RFID sensors collect useful information about your heart rate. Connect the devices to the Internet and the information can be processed and acted upon.

The technology can be used in basically all industries for increased sustainability, quality, safety, efficiency and profitability. One example is the oil and gas industry, where RFID can be used to collect information about the environment in the down hole to prevent uncontrolled releases of crude oil or natural gas from a well. Another example, where use of new technique is used for increased sustainability is electrical grids called Smart grids. By collecting information about consumer behavior, electricity can be produced and distributed according to the analysis to improve the efficiency, productivity and profitability.

Gartner, the world's leading information technology research and advisory company, predicts that there will be 26 billion IoT units in use by 2020, PCs, tablets and smartphones excluded. Objects and systems communicating with other systems, shape the core of the fourth industrial revolution.

The Internet of things is what will take your component through the entire production process and autonomously ensure that the manufacturing is performed flawlessly from start to end.

THE DIGITAL UNIVERSE GROWS EXPONENTIALLY

The digital universe, which is all the data produced in the world, doubles every two years, increasing from 4.4 trillion gigabytes in 2013, to ten-fold, 44 trillion gigabytes by 2020, according to a report by EMC and IDC. Thanks to the fast-growing online activity, such as social media and the Internet of things, the digital universe grows exponentially. Wal-Mart alone handles more than a million customer transactions each hour, and imports the data into databases that are used for smarter decision-making.

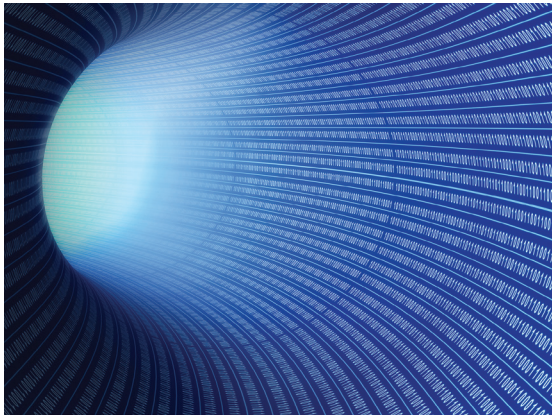
Companies that are good at collecting, analyzing and acting upon the analyses, will be able to improve everything from product development to customer offer. It becomes increasingly important to create sustainable strategies for how to collect and store– what to store, how, and in what format. Today, only a fraction of available data is analyzed to create business advantage, but as previously stated, this is just the beginning of a new era of Big Data analytics.

NEW POSITIONS, NEW CHALLENGES

New technique and communication makes it increasingly easy for small companies and start-ups with limited budget to get their innovations to market. As was the situation in Britain in the early nineteenth century, flexibility is the key word today. Increasing demand for easily accessible customized products calls for an agile innovation process and new flexible manufacturing processes, including 3D printing. Product life cycles become ever shorter and very few products will be exactly alike.

The industry needs smarter, leaner and agile factories, where faster and reliable decision making and intelligent data stream management are prerequisites. Additionally, a competence shift will be essential. To succeed, your staff will need to concentrate on innovative processes and smart product development rather than traditional tasks that are taken over by automation.

Your set of competitors will probably be different ten years from now. Small, agile start-ups have never in history had a better position to challenge large companies that are not as flexible and agile. How do you need to adjust?



SANDVIK COROMANT IS PREPARED

Research and development has been fundamental for Sandvik since the start in 1862, in the midst of the first industrial revolution. Sandvik Coromant spends more money on R&D than any other company in the metal cutting industry and a substantial part of the budget is spent on new technologies and sophisticated systems, because we strongly believe in the new industrial revolution.

We aim at helping our customers and partners to succeed with intelligent manufacturing. When machine tool makers, controller manufacturers and our common customers are ready for full-scale connectivity, we will have the required tools ready.

We want to help our customers free-up resources that can be used for innovations. A first step in this direction is the introduction of the Adveon™ software aiming at embedding product data, information and knowledge related to our cutting tools into the customer's processes through their CAM-system. Adveon is built on the cutting tool data standard ISO 13399, initiated by Sandvik Coromant. This means that the open source Adveon system allows you to work with tools from any supplier using the standard, guaranteeing the accuracy of all geometrical information.

The version introduced already makes it easier for the customer to prepare cutting tools from the latest updated information, in their CAM environment, which will increase the efficiency in their planning process through an advanced smart tool library combined with an assembly functionality.

Together with the experience and competence of the CAM-programmer, Adveon streamlines and optimizes the planning and preparation.

The released version of Adveon will save time and secure the information quality needed in CAM programming at our customers today, but it's just the beginning. Looking ahead, Adveon will be a vital part of the comprehensive smart manufacturing systems that integrate manufacturing intelligence across the entire production operation.

SOURCES

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