Executive Summary World Robotics 2019 Industrial Robots

Robot Installations 2018: Now beyond 400,000 units per year

In 2018, global robot installations increased by 6% to 422,271 units, worth USD 16.5 billion (without software and peripherals). The operational stock of robots was computed at 2,439,543 units (+15%). This result came as a surprise because the main customer industries, automotive and electrical/electronics, had a difficult year and two of the main destinations, China and North America, have been starring in a trade conflict, imposing uncertainty to the global economy. Nevertheless, the automotive industry remains the largest customer industry with 30% of total installations, ahead of electrical/electronics (25%), metal and machinery (10%), plastics and chemical products (5%) and food and beverages (3%). Note that for almost 20% of the robots there is no information on the customer industry. This is five percentage points more than the year before.

Since 2010, the demand for industrial robots has accelerated considerably due to the ongoing trend toward automation and continued innovative technical improvements in industrial robots. From 2013 to 2018, annual installations increased by 19% on average per year (CAGR). The number of robot installations had never increased so strongly before. Between 2005 and 2008, the average annual number of robots sold was about 115,000 units, before the global economic and financial crisis caused an exceptional plunge in robot installations in 2009 at just 60,000 units with lots of investments being postponed. In 2010, investments made leeway and drove robot installations to 120,000 units. Until 2015, annual installations more than doubled to almost 254,000 units. In 2016, the mark of 300,000 installations per year was crossed and in 2017, installations surged to almost 400,000 units.

Europe and America growing strongly as Asia stagnates

Asia[2] is the world's largest industrial robot market, albeit growths slowed down substantially in 2018. A total of 283,080 units was installed in 2018. This is just 1% more than the year before but still a new peak level for the sixth year in a row. Two out of three robots (67%) newly deployed in 2018 were installed in Asia. From 2013 to 2018, annual robot installations rose by 23% on average per year. In 2018, there is a differentiated picture for the three largest Asian markets: Installations in China (154,032 units; -1%) and the Republic of Korea (37,807 units; -5%) declined, while installations in Japan (55,240 units; +21%) increased considerably. Robot installations in the second largest market, **Europe**, increased by 14% to 75,560 units. This is a new peak for the sixth year in a row. The annual average growth rate from 2013 to 2018 is 12%. The growth rate was even higher in **the Americas**: About 55,212 robots were installed in 2018. This is 20% more than the year before and -like in Asia and Europe- a new peak level for the sixth year in a row. The average annual growth rate since 2013 is 13%.

[2] including Australia and New Zealand

74% of global robot installations in five countries

There are five major markets for industrial robots: **China, Japan, the United States, the Republic of Korea, and Germany**. These countries account for 74% of global robot installations.

Since 2013, **China** is the world's largest industrial robot market with a share of 36% of total installations in 2017 and 2018. In 2018, 154,032 units were installed. This is 1% less than in 2017 (156,176 units) but still more than twice the number of robots installed in Europe and the Americas together (130,772 units). For more details see chapter 3.3.1.

In 2018, robot installations in **Japan** increased by 21% to 55,240 units (new peak value). The average annual growth rate of 17% since 2013 is remarkable for a country with an already highly automated industrial production. For more details see chapter 3.3.4.

Robot installations in the **United States** continued to increase to a new peak in 2018 – for the eighth year in row. 40,373 units is 22% more than in 2017. Since 2010, automation of production processes in all U.S.-manufacturing industries has been the ongoing trend. Regarding annual installations, the country has taken third position from the Republic of Korea in 2018. For more details see chapter 3.2.2.

In the **Republic of Korea** annual robot installations have been declining since they reached a peak level of 41,373 units in 2016. In 2018, 37,807 units (-5%) were installed. Installation figures for this country strongly depend on the electronics industry that had a tough year 2018. Nevertheless, installations increased by 12% on average per year since 2013. For more details see chapter 3.3.5.

Germany is the fifth largest robot market in the world. In 2018, the number of robots installed surged by 26% to a new peak value of 26,723 units. Installation figures in this country are mainly driven by the automotive industry. For more details see chapter 3.4.11.

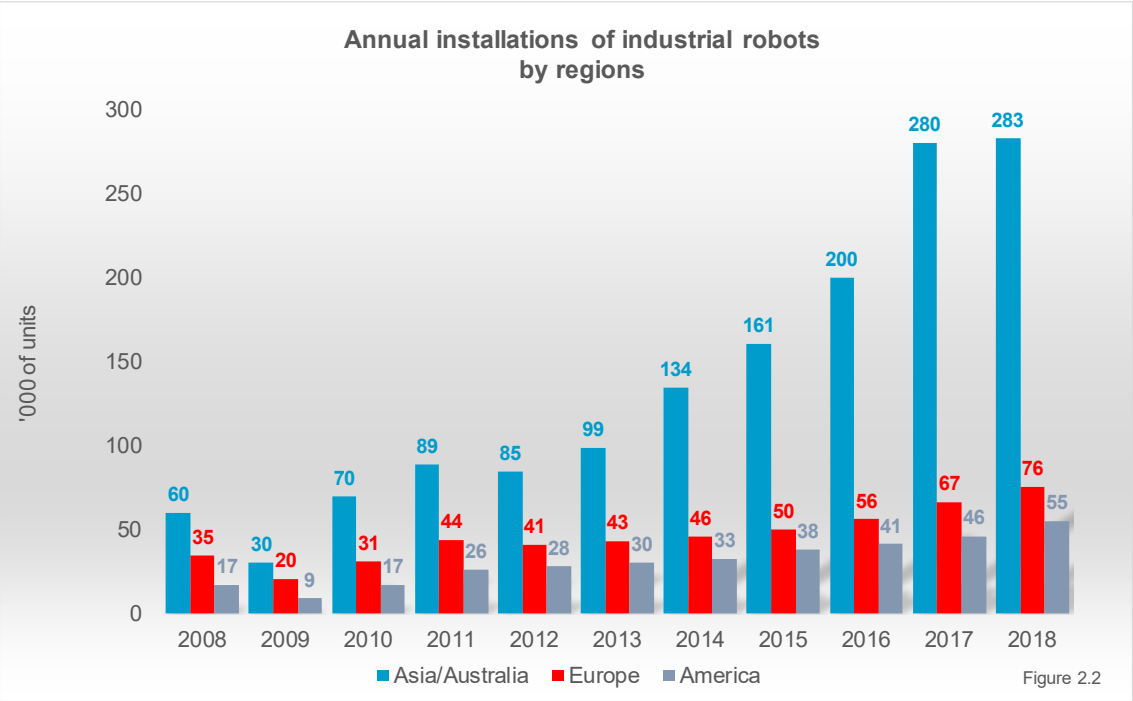

Figure 2.2

Steady robot installations in the automotive industry

The **automotive industry** is the most important customer of industrial robots. Almost 30% of all industrial robot installations take place in this industry. After a very strong year 2017 that saw a 21% increase of installations to 123,439 units, this level could be maintained in 2018. In fact, a slight increase of 2% set a new peak level of 125,581 robot installations. From 2013 to 2018, annual installations in the automotive industry increased by 13% on average per year (CAGR). After the economic crisis in 2008/2009, car manufacturers started to restructure their businesses. Since 2010, investments in new production capacities in emerging markets and investments in production modernization in major car producing countries have driven the demand for robot. Using new materials, developing energy efficient drive systems and high competition in all major car markets pushed for investments despite the existing overcapacities. Automotive parts suppliers were heavily affected by the restructuring of the car industry after the economic crisis in 2009. They needed to follow after the motor vehicle suppliers started to carry out their investment plans. Therefore, the supply of robots to the automotive parts suppliers gained momentum only in 2011. Note that due to improvements in reporting, as of 2018, most of the units previously assigned to IFR industry class 299 – "automotive unspecified" could be either assigned to a more specific industry class or at least to class 2999 – "parts and accessories unspecified".

Robot sales to the **electrical/electronics industry** (including computers and equipment, radio, TV and communication devices, medical equipment, precision and optical instruments) have been increasing by 24% on average per year since 2013. In 2017, they accounted for 31% of total installations and were about to replace the automotive industry as the most important customer. However, in 2018, global demand for electronic devices and components substantially decreased. This customer industry is probably the

most affected by the China-US trade crisis as Asian countries are leading in manufacturing electronic products and components. Robot installations in this industry declined by 14% from their peak level of 121,955 units in 2017 to 105,153 units in 2018.

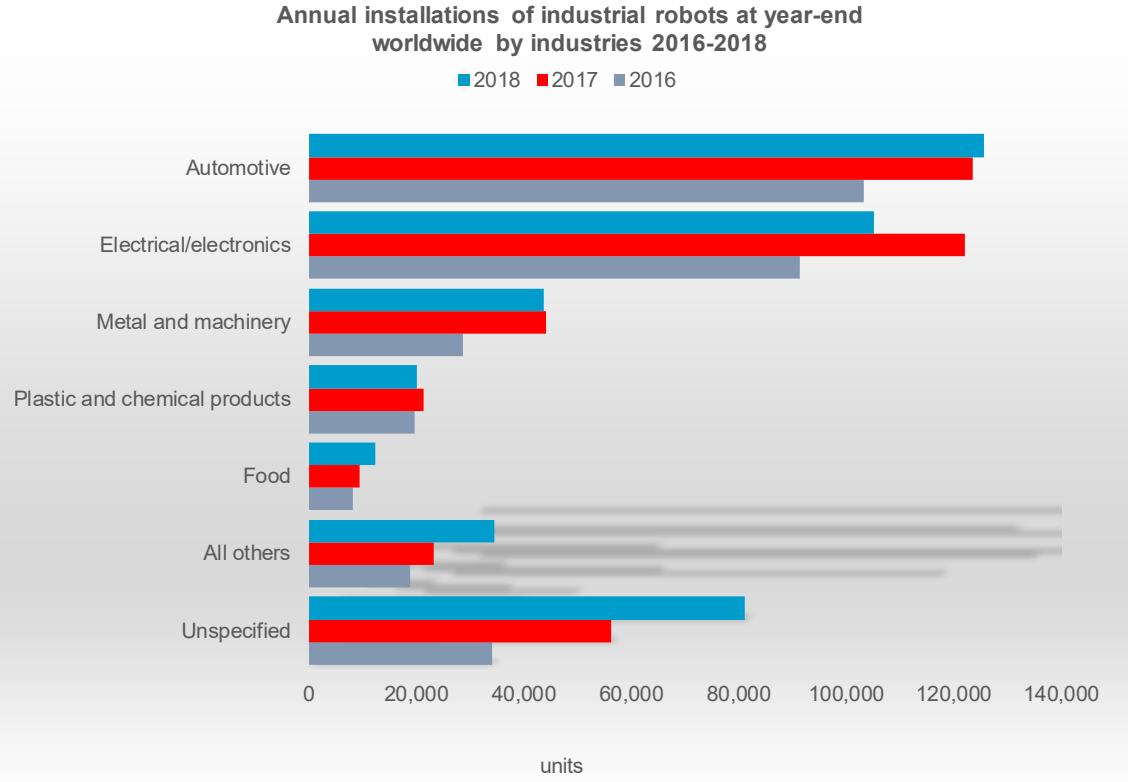

Figure 2.16

Automation of production further increasing

In 2018, the average robot density in the manufacturing industry was 99 robots per 10,000 employees. Note that this global average only includes those countries that have a relevant operational stock. It is therefore overestimated as countries with low robot density are systematically excluded. The same hold for the following figures: Europe is the region with the highest robot density with an average value of 114 units. In the Americas, the value is 99 units and in Asia/Australia it is 91 units. Driven by the high volume of robot installations in recent years, Asia has the highest growth robot density growth rate and is about to catch up with the Americas. Between 2013 and 2018, the average annual growth rate of the robot density in Asia was 16%, in the Americas it was 9%, and in Europe it was 6%.

Forecast: 2019 - 2022

Worldwide annual sales of industrial robots:

- **2019: 420,870 units, 0% compared to 2018**
- **2022: 583,520 units, + 12% per year on average from 2020 to 2022**