

World

Robotics

Industrial Robots

2024



Statistics, Market Analysis, Forecasts and Case Studies

World Robotics Industrial Robots 2024

World Robotics 2024 – Industrial Robots

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The robot statistics are based on consolidated world data reported by robot suppliers as well as on the statistics and support of the national robotics associations of North America (A3), Spain (AER), UK (BARA), People's Republic of China (CRIA), Denmark (DIRA), Japan (JARA), Republic of Korea (KAR), Italy (SIRI), and Sweden (SWIRA).

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We express our most sincere gratitude to all partners!

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Executive summary World Robotics 2024 Industrial Robots

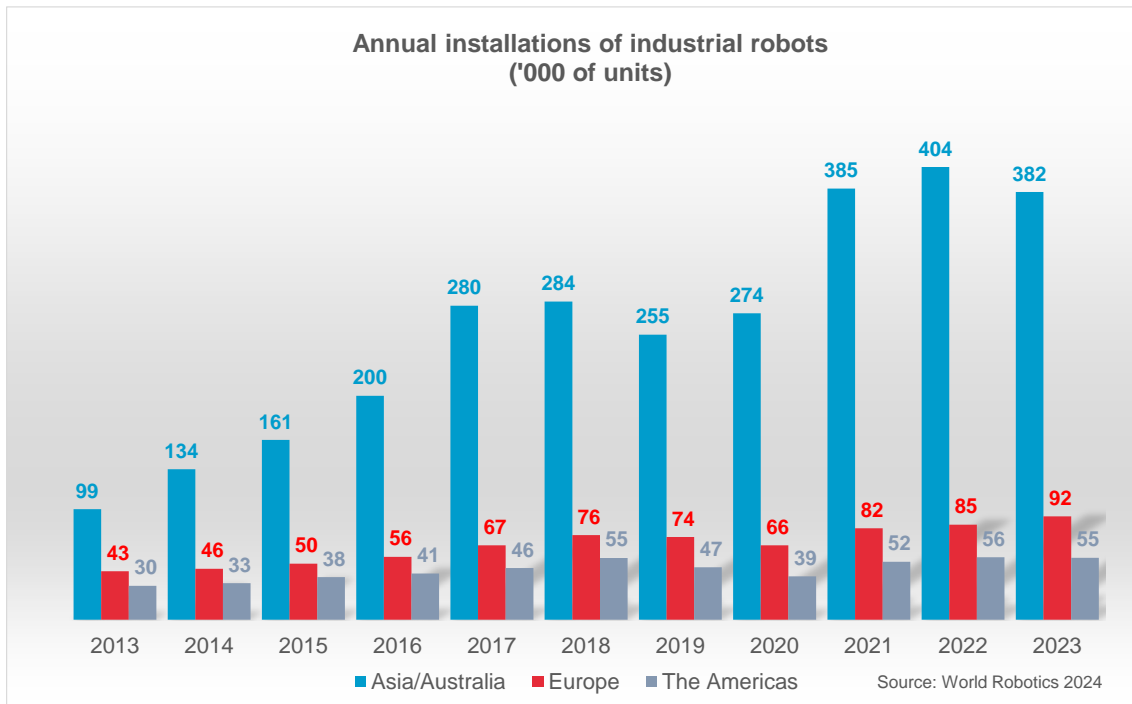
Robot installations 2023: Second highest installation count in history

541,302 robots installed in 2023. Robot installations down 2% from record level.

For the third year in a row, annual installations exceeded the 500,000-unit mark. Despite challenging macroeconomic conditions, installation counts were just 2% lower than the record-setting 552,946 units achieved in 2022 and exceeded the 2021 result by 3%. Demand from the major customer industries did not provide impetus for growth: Despite the sideways movement of installation counts, the automotive industry reclaimed its position as the largest customer of industrial robots, since robot demand in the electronics industry experienced a major contraction. The automotive industry installed 25% of the robots in 2023 (+0 percentage points) and the electronics industry accounted for 23% (-5 pp). The metal and machinery industry retained its third place and increased its share to 14% (+2 pp), followed by the plastic and chemical products industry (4%) and the food and beverage industry (3%). Note that for 17% of the robot installations (-0 pp), there is no information on the customer industry.

In 2023, the operational stock of industrial robots exceeded the four-million-unit mark and was computed at 4,281,585 units (+10%). Since 2018, the operational stock of industrial robots had been increasing by 12% on average each year.

China's operational stock of industrial robots, which had been growing impressively by 22% on average each year since 2018, exceeded the one-million-unit mark in 2021 and the 1.5-million-unit mark in 2022. In 2023, it grew by 17% to 1.76 million units. This represented 41% of the global stock. The Japanese operational stock was 435,299 units in 2023, representing 10% of the global stock. The European operational stock of robots was computed at 777,596 units and the Americas held a stock of 520,524 units.



Contraction in Asia, stagnation in the Americas, belated growth in Europe

Asia is the world's largest industrial robot market. This region, in particular, suffered from the low demand of the electronics industry and the automotive industry. In 2023, 382,073 units were installed, down 6% from 404,391 units in 2022. 70% of all newly deployed robots were installed in Asia (2022: 73%). From 2018 to 2023, annual robot installations grew by 6% on average each year. Three of the top five markets for industrial robots are in Asia: China is by far the largest market. Every other robot installed worldwide in 2023 ended up in China: Installations were down 5% to 276,288 units. Installations in Japan were down 9% to 46,106 units. The Korean market continued the sideways trend (31,444; -1%) that it had been experiencing since 2019.

Robot installations in the second largest market, **Europe**, were up 9% to 92,393 units. Delayed projects were completed, and the backlog cleared in 2023. Robot demand in this region also benefited from the nearshoring trend. The annual average growth rate from 2018 to 2023 was +4%. In 2023, growth was driven rather by many smaller markets than by the top three. Installation counts in Germany, the largest European market and the only European one in the global top five, were up 7% to 28,355 units. Installations in the second largest European market, Italy, declined by 9% to 10,412 units. The third largest European market, France, was down 13%, installing 6,386 units. 80% of all European robot installations in 2023 took place in the European Union (73,534 units; +2%), and 67% took place in the Euro Area (62,009 units; +2%). Installations in Central and Eastern Europe were up 7% to 12,716 units.

In the **Americas**, installations trended sideways at a very high level, as 55,389 units were installed in 2023 (-1%). The peak level of 55,880 units was achieved in 2022. The United States is the largest American market and accounted for 68% of the installations

in the Americas (37,587 units; -5%) in 2023. The two other major markets are also in North America: Mexico had 5,832 units (-3%) installed and Canada 4,311 units (+37%).

78% of global robot installations in five countries

The five major markets for industrial robots are **China, Japan, the United States, the Republic of Korea, and Germany**. These countries accounted for 78% of global robot installations (419,780 units).

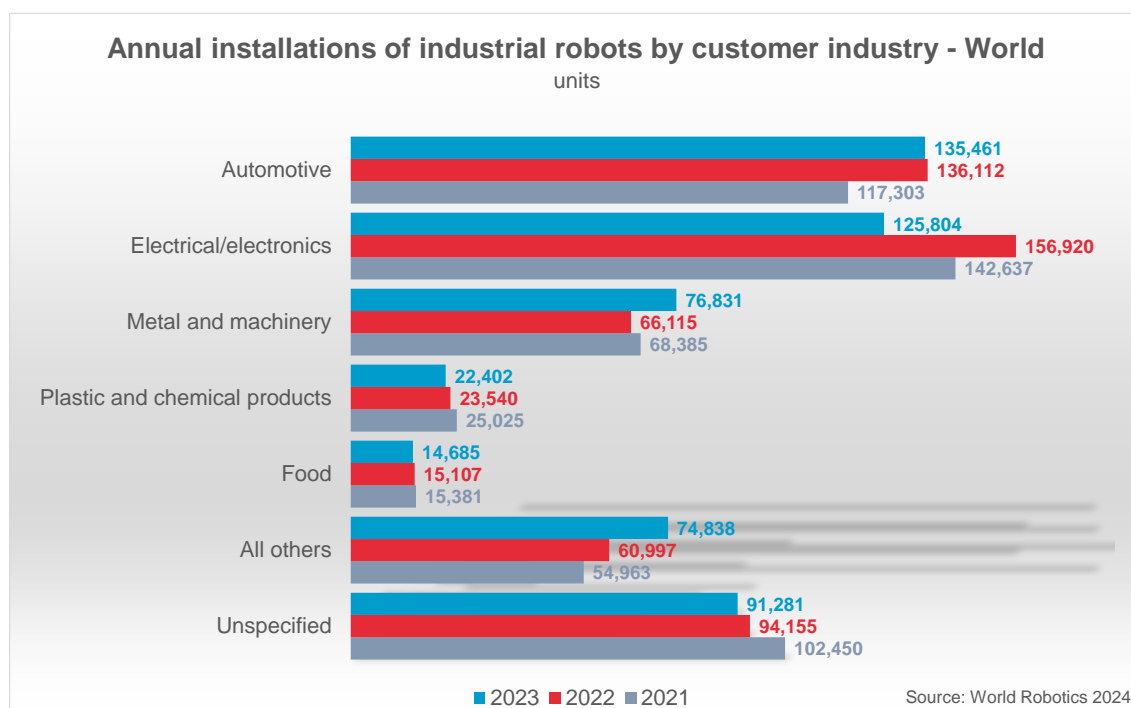
China has been the world's largest industrial robot market since 2013 and accounted for 51% of total installations in 2023. For more details, see chapter 3.3.1.

Robot installations in **Japan** returned to their 2021 level. The country accounted for 9% of global robot installations in 2023. For more details, see chapter 3.3.4.

The **United States** accounted for 7% of robot installations in 2023 and remained in third place. For more details, see chapter 3.2.1.

In the **Republic of Korea**, annual robot installations continued their sideways trend. In 2023, installations in Korea accounted for 6% of the overall total. For more details, see chapter 3.3.5.

Germany is the fifth largest robot market in the world, accounting for 5% of global robot installations in 2023. For more details, see chapter 3.4.12.



The **automotive industry** reclaimed its position as the largest customer of industrial robots in 2023. Demand was stagnant at a very high level of 135,461 units in 2023, just

651 shy of the peak level of 136,112 units in 2022. The automotive industry invested in the transition from combustion engines to alternative drives, but decreasing demand for battery electric vehicles currently limits the need for capacity expansion. From 2018 to 2023, annual installations in the automotive industry increased by 2% on average each year (CAGR). After several years of continuous decline down to 21% in 2020, the share of the automotive industry in total installations was 25% in 2022 and 2023.

The **electrical/electronics industry** dropped to second place in 2023, as robot installations declined by 20% to 125,804 units. The share in total installations was down 5 percentage points to 23%. In 2022, a peak level of 156,936 robots were installed in the production of household appliances, electrical machinery, semiconductors, solar panels, computers, telecommunication devices, and video and electronic entertainment goods. In 2023, supply chain bottlenecks mostly vanished and many companies reduced their inventory back to a normal level, causing a temporary contraction of sales in the electronics industry.

The **metal and machinery industry** established itself as the third largest customer industry and accounted for 14% of all installations in 2023. Both producers of metal products and producers of industrial machinery have installed substantial amounts of robots in recent years. Installations in the metal and machinery industry had increased by 12% on average each year since 2018. In 2023, installations were up 16% to a new peak level of 76,831 units.

In 2023, the average **robot density** in the manufacturing industry was 162 robots per 10,000 employees. Driven by the high volume of robot installations in recent years, Asia's average robot density grew by 13% CAGR from 2018 to 2023 and was 182 units per 10,000 employees in 2023. During the same period, the European robot density grew by 7% CAGR to 142 units. In the Americas, it was 127 robots per 10,000 employees (+6% CAGR since 2018).

Many governments support industry modernization by direct and indirect subsidies. Enormous funding programs, like the European Union's recovery plan "NextGenerationEU" and the Inflation Reduction Act in the United States, offer multi-billion euro and dollar support for digitalization. Indirect subsidies like preferred tax deduction schemes had also proven to be successful investment incentives, e.g. in Italy and the United Kingdom. But these programs address only those companies that are already aware of robotic automation as a solution to their problems. The share of companies that use robots is still rather small, especially among SMEs. Additional effort is needed to spread knowledge especially among SMEs to avoid inefficient technology being used in large parts of the industry. The IFR's new campaign Go4Robotics (<https://go4robotics.com/>) offers vendor-neutral first orientation help for companies new to robotic automation. But there is more to it than that. Without sufficient knowledge, expertise, and resources, it is hardly possible to reap the benefits of robotic automation to their full extent. The wide range of engineering capabilities needed also in peripherals, such as vision or process design, often prevent the adoption of robots, especially in SMEs. A developed ecosystem of system integrators that provide these capabilities is

key – and also often the bottleneck. Government programs should focus on supporting this type of robotics infrastructure.

Outlook 2023 – 2026

The macroeconomic conditions are improving, but the situation is diverging in different markets. Generally, inflation drivers like energy prices and supply chain disruptions are softening. But wages and thus labor costs are currently rising in many countries as a time-lagged consequence of inflation. Geopolitical headwinds are still perceived as a major risk and factor of uncertainty. Geopolitical headwinds are still perceived as a major risk and factor of uncertainty. The robotics industry is not immune to global macroeconomic conditions but might be affected differently than other industries. To reduce risk from geopolitical tensions, supply chains are regionalized and diversified.

In the ongoing year 2024, the global economic downswing is bottoming out. Global robot installations are expected to trend sideways at 541,000 units. Growth is expected to accelerate in 2025 and continue in 2026 and 2027. There is no indication that the overall long-term growth trend will come to an end any time soon.

Robot installations will exceed the 50,000-unit mark in North America in 2024. Nearshoring of supply chains, supported by the Inflation Reduction Act and others, will create demand for automation technology in the years to come.

Robot demand in Asia is expected to grow just slightly to 389,000 units, as the three major Asian markets are expected to trend sideways in 2024. Robot demand in China is expected to remain at 276,000 units, Japan at 46,000 units, and the Republic of Korea at 31,000 units.

Robot installations in Europe are expected to decline substantially in 2024. The war in Ukraine and the trade embargo on Russia, tight monetary policies, and the relative weakness of the European automotive industry compared to the Chinese one are dampening the propensity to invest. But there is also a base effect from 2023: A high order backlog due to supply chain restrictions in 2021 and 2022 was cleared in 2023. A double-digit contraction, resulting in around 82,000 robot installations in 2024 is expected. A 10% contraction of demand is forecast in Western Europe.