

Robot End-Effector - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

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Abstracts

The Robot End-Effector Market size is estimated at USD 4.87 billion in 2024, and is expected to reach USD 9.29 billion by 2029, growing at a CAGR of 13.80% during the forecast period (2024-2029).

Key Highlights

The integration of various technologies, including artificial intelligence, automation, the Internet of Things, computing power, and robotics, facilitates the building of a new generation of smart factories. Robotics and automation have changed significantly over the past few years. In the continuously growing range of industries such as electronics, automotive, food and metalworking, and material handling, increasing investment in advanced automation creates ample opportunities for robots, thus driving end-effector demand.

Robots work even more closely with humans, so they must respond to the users and adapt their behaviors. Over the next few years, researchers are expected to recognize basic human behaviors and adapt these robots' actions to respond to them. Over the next few years, this will develop into much more advanced programs adapting to complex tasks' needs. From the intelligent lift assist devices built to lift weight safely without motion power of their own to the emergence of the first cobots that came with vision-integrated systems for obstacle avoidance, the market is expected to grow even further.

Collaborative robots are becoming increasingly affordable, less complex, and more accessible to use. This will provide multiple options to the organizations, augmenting the demand for collaborative robots in the market. Collaborative robots enable

enterprises of all scales and sizes to stay competitive as these robots utilize plug-and-play technologies, advanced sensors, and automatic robot programming from CAD data. Players in the market are also expanding their operations through strategic mergers & acquisitions. Thus, the rapid adoption of collaborative robots results in the rapid growth of end-effectors.

The main limitations of robot end-effectors have been observed in terms of their slow speed relative to human pickers, the inability of the vision system and gripper to deal with unusual items, and the reliability of being fully autonomous. The companies in the market studied have demonstrated some degree of success in picking individual items out of totes. However, the remaining half of the companies face various challenges when it comes to implementing these systems on a larger scale.

The COVID-19 pandemic significantly impacted the robot end-effector market due to the workforce shortage, the shutdown of manufacturing facilities to restrict the spread of the virus, and nationwide lockdowns, leading to a downturn in robot manufacturing. According to IFR, Around 283,000 industrial robots were shipped worldwide in 2018 and it decreased to 250,000 in 2021. Asia/Australia had the highest number of units installed, with an estimated 266,000 units fitted in 2020 alone. By 2024, industrial robot installations in Asia/Australia are projected to reach 370,000 units.

Robot End Effector Market Trends

Automotive End-User Segment is Expected to Hold Significant Market Share

The automotive industry is one of the major adopters of robotics and automation. Prominent automotive manufacturers use robotics to assist in critical activities such as welding, painting, milling bits, cutters, machine tending, and parts transfer. Using robotics helps improve the product's quality while reducing the complexity of industrial operations.

In automotive manufacturing, robot end-effectors play an important role in welding, painting, assembly, and material handling tasks. These end-effectors are designed to be versatile and precise, aiding production processes' efficiency and quality. End-effectors equipped with welding torches are used for welding components such as body panels, frames, and exhaust systems. These end-effectors ensure precise and consistent welds, improving the structure integrity of automotive parts.

The automotive industry has the largest number of robots in factories worldwide. The

International Federation of Robotics stated that the operational stock hit a record of about one million units, representing about one-third of the total number installed across all industries. According to IFR, global industrial robot shipments amounted to about 0.59 million in 2023, just a slight increase compared to 2022. Industrial robot shipments are projected to increase significantly in the coming years, and in 2026, they are expected to amount to about 0.71 million.

Like many other industries, the auto industry wants to make the most of Industry 4.0, where "connected" machines communicate with one another and human operators to deliver workplace safety and productivity benefits. As a result, the rising need for automation in the vehicle industry affects automakers' attitudes about worker safety, resulting in a spike in the studied market.

The automotive industry is also adopting Cobots or Collaborative robots to smoothen the manufacturing process. The increase of Cobots in regions like North America and Europe is expected to create a robust demand for end effectors. The trend of Industry 4.0 pushing the automation of traditional assembly lines in the automotive industry is also expected to increase the demand for collaborative robots and end-effectors.

Asia Pacific is Expected to Hold Significant Market Share

The Asia-Pacific region is experiencing swift modernization and industrialization, leading to a shift toward automated processes in production industries and a decrease in the need for manual labor, which is impacting the growth of the market. Collaborative robots are increasingly utilized in the electronics and automotive sectors to improve efficiency and productivity.

The latest industrial revolution, called Industry 4.0, has led to the advancement of new technologies, such as collaborative robots. These AI-powered robots have allowed industries to enhance efficiency, minimize mistakes, and streamline various processes. The improved safety in the workplace and increased production capabilities have encouraged industries in the area to invest in robotic systems.

Countries with significant investments and advancements in technological automation have contributed to the widespread adoption of robots in the region. Japan is considered a hub for utilizing robotics and automation in manufacturing due to its advanced robotic industry and technology.

The Chinese government initiated the 'Made in China 2025' policy. This policy has become a significant priority for the manufacturing industry in the country to maintain its position as the largest manufacturing sector. Chinese manufacturers are implementing smart manufacturing strategies such as Industry 4.0 and Industrial IoT to enhance global competitiveness and ensure future survival. As a result, it is anticipated that the end-effector market in China will experience growth.

According to IFR, in 2022, the number of industrial robots installed in China reached a record high of 290,258, marking a 5% increase from the previous year. According to the Washington Information Technology and Innovation Foundation (ITIF), China's workforce has significantly more robots than predicted, with a ratio of 12.5 times higher than initially anticipated.

The area has a solid presence in the field of robotics, which is beneficial for the overall expansion of the market. A few of the companies in this sector include OMRON Corporation, Kawasaki Heavy Industries Ltd, Fanuc Corporation, and Siasun Robot & Automation Co. Ltd.

Robot End Effector Industry Overview

The robot end-effector market is highly fragmented due to the presence of both global players and small and medium-sized enterprises. Some of the major players in the market are ABB Group, DESTACO Europe GmbH, Zimmer Group, Schunk GmbH, and J. Schmalz GmbH. Players in the market are adopting strategies such as partnerships and acquisitions to enhance their product offerings and gain sustainable competitive advantage.

March 2024 - SCHUNK presented automated solutions at the Hannover Messe, unveiling two novel electric gripper series, namely EGU and EGK. These grippers can customize parameters and provide various gripping modes, ensuring secure handling operations in diverse production settings. SCHUNK is actively involved in developing tailored automation solutions for emerging industries like e-mobility and electronics, thereby adapting to the evolving manufacturing landscape.

October 2023 - Schmalz launched a vacuum surface gripping system, the FXP-60 and FMP-60. In contrast to the established 130-millimeter-wide version, the FXP-60 and

FMP-60 measure just 60 millimeters and are ideal for use in tight spaces, with disruptive contours, or for handling individual beams. The new surface gripper is particularly light with its modular structure made of an aluminum profile with sealing foam as a gripping surface. This enables a high level of dynamics in the handling process.

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