

CYBER WORLD

Feature

The future of the manufacturing industry changed by robots

Customer Report

07 Jiangsu Pacific Precision Forging Co., Ltd.

09 The Yamazaki Mazak Museum of Art

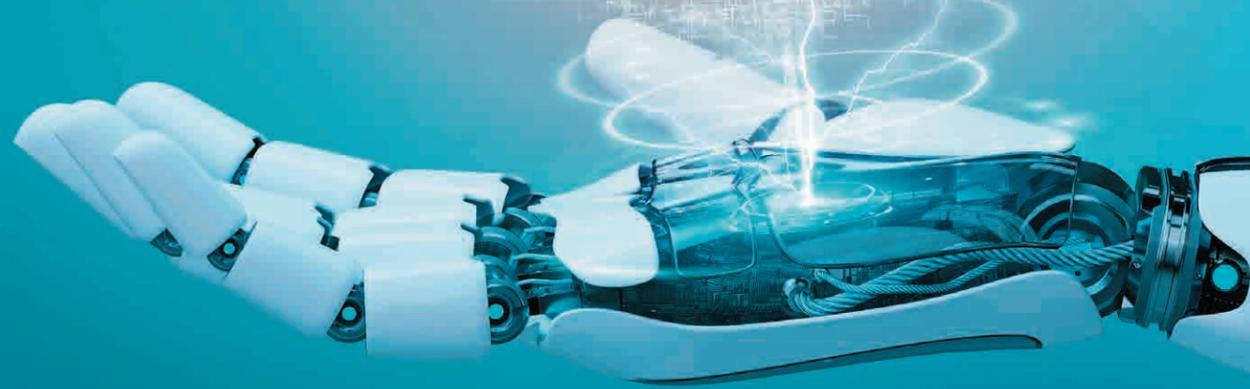


2022
No. 65

Ⓔ

ROBOTIC INNOVATION

The future of the manufacturing industry changed by robots



01

02



- 01. Home communication robot that heals people's hearts
- 02. Humanoid robots that have become familiar
- 03. Industrial robots are installed extensively

Robots that support our lives

Today various robots are active around us. For example, humanoid robots that we see in stores and household cleaning robots have become familiar to us, and in recent years, home communication robots have attracted much attention. These were developed with the purpose of healing people's hearts and supporting their lives, and feature cute looks and designs that make you want to touch them.

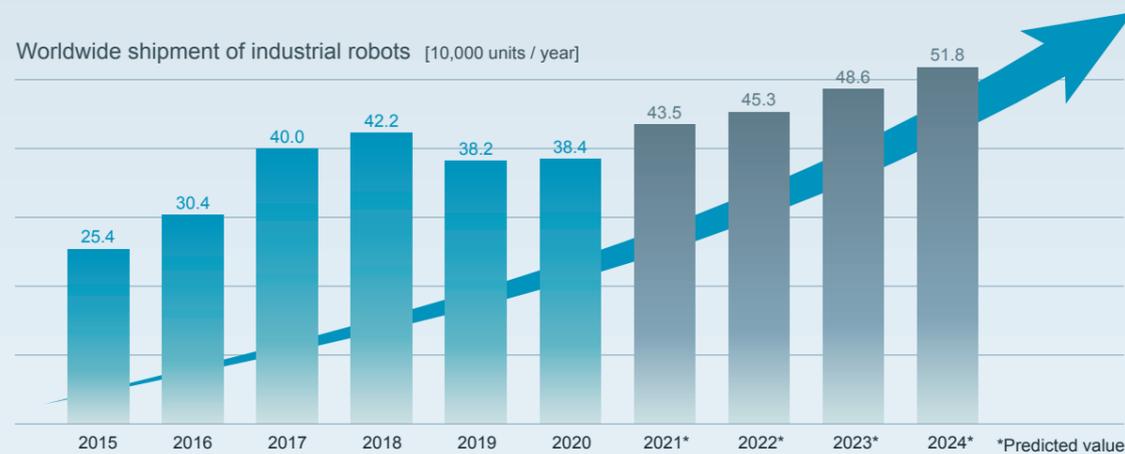
In addition, industrial robots are now indispensable for production at manufacturing sites. An industrial robot is a mechanical device that performs welding, painting, assembly, transportation, etc., at a factory on behalf of humans. First introduced in the automobile industry, they expanded into various industries, and are now active in all fields, such as the production of electronic and electrical equipment and the food industry.

Industrial robots can be broadly classified into two types: transfer robots and articulated robots. A transfer robot is a robot that transports products and parts in distribution warehouses and manufacturing plants. Heavy load

and large quantities of products can be transported faster and more safely than by human power. An articulated robot moves like a human arm by moving multiple joints. These robots can perform more delicate movements than conventional robots as they can be finely adjusted. In addition to simple work, robots that can work and collaborate at the same site as humans have also been developed, and are expected to reduce employment cost, substitute for heavy labor and reduce human error.

Currently, about 3 million industrial robots are in operation at factories around the world. Demand for robots is increasing year by year to solve the labor shortage. In addition, robots not only play an active role in the manufacturing industry but are also entering new market. As robots become easier to install and their work becomes diversified, the number of installations will continue to increase. The market is expected to continue to grow steadily, and worldwide shipments in 2024 are expected to reach 500,000 units.*1

Worldwide shipment of industrial robots [10,000 units / year]



Source : International Federation of Robotics (IFR) World Robotics 2021 Report

*1: International Federation of Robotics (IFR) World Robotics 2021 Report



SMOOTH PMC

- Easy and prompt optimization of system operation schedule
- Smooth system operation by a simulation function
- Early detection and restoration of defects

Convenient visual display in easy to understand manner

System and production status are displayed visually. Monitoring of system operation is extremely convenient.



Smooth PMC system monitoring screen

Simulation optimizes system operation

Simulation based on accumulated machine data optimizes the system operation schedule in advance.



Smooth PMC simulation screen

Mazak iSMART Factory™ (Oguchi plant)

Evolution of industrial robots in the manufacturing industry

Robots have been evolving along with the development of the manufacturing industry, and rapidly expanding their role since the middle of 20th century. Various types of robots, such as transfer robots, articulated robots, and collaborative robots have been incorporated into manufacturing sites today and have become indispensable for realizing labor-saving and automation at current manufacturing sites.

Mazak developed its own FMS (Flexible Manufacturing System) in 1985, and has been developing automation systems ever since. To date, we have more than 3100 sets of FMS installed by customers all over the world.

Among them, the PALLETECH series can perform efficient automatic operation over extended periods of time as it automatically transfers pallets with fixtures and workpieces

based on production schedule. Since it adopts a modular design, the system can be expanded flexibly even after installation.

We have also developed the multiple pallet stocker system, MPP (Multiple Pallet Pool) for high-mix, low-volume production. With its compact design, the MPP can be the best solution especially for customers who require an automation system on limited floor space. In addition to storing materials and finished workpieces, the MPP can support complex production schedules for high-mix, low volume production and automatically determines production schedules based on accumulated machine data, such as machining time and tools used for each workpiece.

Mazak also provides automated systems with articulated robots to meet a wide variety of automation needs. Mazak AUTO FLEX CELL is a self-propelled articulated robot that not only loads/unloads workpieces, but also mounts tools on machines, measures outside the machine, and exchanges fixtures and chuck jaws.

Thanks to these features, the works that previously required manpower can be replaced by robots now.

As described, industrial robots are now being used in more complex and advanced production systems. Now that industrial robots have evolved and become more advanced, the importance of software that controls them has dramatically increased.

The importance of software to increase productivity

As a trend of modern automation systems, there is a demand for systems that can handle mass production as well as high-mix low-volume production. The software also plays an important role in flexibly responding to ever-changing production schedules and safely and easily controls the complex movements of robots that differ for each workpiece.

Mazak has developed its own software for the automatic operation and management of automated systems. PALLETECH series, MPP and Mazak AUTO FLEX CELL incorporate

management software Smooth PMC / Smooth MPP / Smooth RCC to perform automatic operation. Production schedules can be displayed and flexibly changed in response to when machine down time is caused. In addition, the resource check confirms that required tools for machining are in the magazine and the tool life is sufficient for scheduled machining.

The automated system TA (Turn Assist) / MA (Mill Assist), which is comprised of an articulated robot and stocker, eliminates complicated robot teaching by selecting and editing prepared robot movement patterns. Furthermore, the original operation program is easily created to meet your production requirement. With this software, an automated system can be operated efficiently and safety over the long term, from the time of installation.

Comprehensive support from system proposal to installation

FA* Solution Division *FA: Factory Automation



TA (Turn Assist) / MA (Mill Assist)

Robot system for turning centers/machining centers. It performs automatic operations from loading raw materials to unloading finished workpieces. The conversational programming eliminates complicated robot teaching and can be easily introduced without specialist knowledge.



CNC turning center with the Ez LOADER



Vertical machining center with the Ez LOADER

Ez LOADER series

The Ez LOADER series consists of a collaborative robot, a vision sensor and dedicated software for Mazak machines. By adopting a collaborative robot, it is possible to build a safe and compact automation system. The connection with the machine tool is completed simply by connecting the cable, and the robot position is automatically adjusted to the right position by the vision sensor, so it can be installed in just 15 minutes.

* Available models vary by market for above

Demand for automation system with industrial robots is increasing year by year. However, some customers have challenges such as limited floor space or lack of operator knowledge when introducing robots. When considering the introduction of robots, the first issue is the "difficulty of introduction". Conventional robot systems require a lot of time from installation to operation because the installation takes several weeks. Another challenge is that operating the robots requires specialized knowledge, making it difficult to ensure stable operation at sites where human resource is in short supply. Mazak launched the Ez LOADER 10 last year to

solve these problems. The Ez LOADER series can operate a robot easily in a small space by software dedicated to Mazak machines. With this software, even operators who do not have knowledge of robot operation can intuitively create operation programs and can flexibly respond to machining workpiece and floor layout changes. By combining these functions, additional functions such as work conveyors can be added, and even more advanced operations are performed. In addition, in order to support the production of more customers, we have adopted a compact design to allow it to be installed in limited factory space.

Some customers who are considering the introduction of an automation system are not sure which automation system is the best for their requirements. At Mazak, we provide comprehensive support from system proposal to installation and after-sales support. Please feel free to contact us when you consider introducing an automation system.

Speaker : FA Solution Division Project Engineering Group



Intuitive robot programming by simply selecting command icons



Creating the future with robots

Robots have evolved since their invention. In recent years, robots not only carry out simple tasks but also have been developed with communication functions such as guidance and interpretation. With the invention of these robots, the image of conventional mechanical robots is changing. Image recognition and AI (artificial intelligence) technology are being developed for a society where robots and humans live together. Diversifying robots will continue to evolve to meet the needs of the times.



01

COMPANY PROFILE

Customer Report 01



Jiangsu Pacific Precision Forging Co., Ltd.

Chairman : Hanguan Xia
 Head office : No. 198, Shuangdeng Avenue, Jiangyan District, Taizhou City, Jiangsu Province, China
 Number of employees : 1800

www.ppforging.com



China Jiangsu Pacific Precision Forging Co., Ltd.

Customer Report 01

Development into an industry-leading company with sustainable innovation

China Jiangsu Pacific Precision Forging Co., Ltd.

With the rapid development of the automobile industry, there are increasing demands for the processing and manufacturing of gears, which play an important role as transmission components. Headquartered in Taizhou, Jiangsu Province, China, Jiangsu Pacific Precision Forging Co., Ltd. is a world-class supplier of precision forging gears, supplying products to countries around the world such as Europe, the United States, Japan, and Southeast Asia. As a result of many years of research and development, technological innovation, and market development, the company's products have been highly evaluated by the world's major automobile manufacturers and suppliers, and are installed in various vehicle models of domestic and foreign automobile manufacturers.



Yangzhou Pacific Precision Forging Co., Ltd., the predecessor of Jiangsu Pacific Precision Forging Co., Ltd., was established in 1992 by Tai County Powder Metallurgy Factory and Hawaiian Island Enterprise Co., Ltd. The company turned a profit in 2002, and after that achieved rapid growth and developed to become the first listed company in the Chinese precision forging gear industry. Currently, the sales volume of precision forging gears for automobiles is No. 1 in the Chinese market and one of the top in the world. Looking back on the company's history, Mr. Hanguan Xia Chairman said, "We have recovered from a deficit for 10 years and grown to the current scale, eventually gained the top position in the industry. The reason for our success is that we have been riding the wave of open innovation in China for new era with transformation and upgrades." In addition, Chairman Xia emphasized the company's strengths as a strategy of "focusing on human resources, sincere management, quality first, and original research and development." "In market competition, quality is a prerequisite for all orders. Only when quality is valued, prices and other things are discussed. Continuous innovation is the driving force for the development of the company."

"Love at first sight" for Mazak machines that can process with high precision. Hundreds of Mazak machines are now introduced

The company's first Mazak machine was the QUICK TURN 200, which was introduced in 2004. Chairman Xia reveals the background behind the introduction of the first Mazak machine. "Originally, we used grinding machines for manufacturing, but the low machining rate and high failure rate hindered the development of our business. We needed a reliable machine tool with high machining accuracy. When I first saw a Mazak machine, I was received an impact by its ability to achieve high-speed machining with high precision."



The first Mazak machine "QUICK TURN 200" introduced in the company

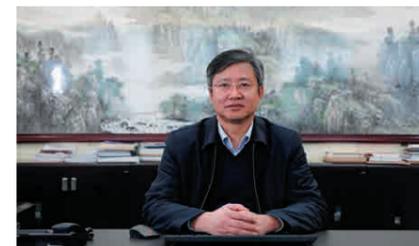
He also states "As we continued to use the Mazak machine, the machining accuracy of gears became more stable than before, the machining process was optimized and efficiency improved significantly." Since then, the company has introduced Mazak machines one after another, and finally realized the complete replacement from the grinding machine to the CNC turning center. Hundreds of Mazak machines, such as the CNC turning center QUICK TURN series and the vertical machining center VCN series are now in operation. "Everyone wants to be in charge of the Mazak machine when working on site. It is everyone's favorite because it simplifies complicated processing procedures and is easy to operate" states Chairman Xia.

Make a strategy actively to respond to the new energy industrial revolution

Chairman Xia talks about trends in the automotive industry. "Now, there is a strong demand for environmental consideration in the world and new energy vehicles, such as electric vehicles are expanding their market share at an unimaginable speed which has a great impact on the entire automobile industry. Car makers and automotive parts makers must take this change seriously," He also said, "as an automobile parts manufacturer, we must have a keen sense of the market." The company was one of the first to focus on new energy vehicles, and has made strategic plans for high-end gears for passenger cars and lightweight parts for new energy vehicles since 2008. In future, the company will continue to expand and invest in high-end precision gear and electronic control components and assemblies to enhance its overall production and market development capabilities. In 2022, the company will celebrate its 30th anniversary. The company has continued to grow by tackling challenges with its own R & D, driving innovative change, and steadily strengthening its production capacity. As the electric vehicle business expands, the company plans to purchase more than 100 Mazak machines within a year. With this, the company will own more than 650 Mazak machines. Mazak will continue to support the growth of the company, which leads the automobile industry.

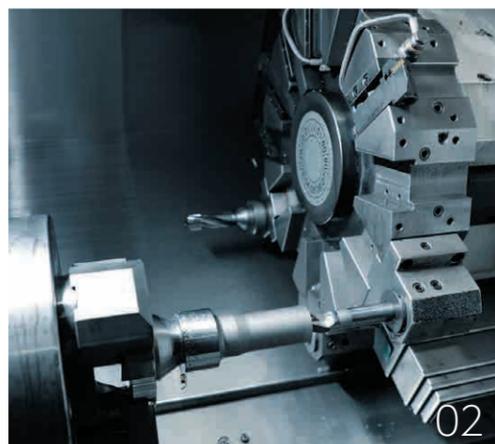


The MAZATROL conversational CNC system is highly valued for its ease of operation



Chairman Hanguan Xia, who leads the company

The company's precision forging gears are installed in automobiles around the world



02



03



04

- 01. High precision and high efficiency machining by CNC turning center QUICK TURN series
- 02. High accuracy machining of the output shaft of an automobile engine with QUICK TURN 250 L
- 03. Chairman of the Board of Directors, Mr.Xia, Chairman (far left), and employees of the company
- 04. The company's factory where hundreds of Mazak machines are installed

The Yamazaki Mazak Museum of Art was opened in April 2010 in Aoi Higashi-ku, the heart of Nagoya in order to contribute to the creation of a rich regional community through art appreciation and, consequently, to the beauty and culture of Japan and the world. The museum possesses and exhibits paintings showing the course of 300 years of French art spanning from the 18th to the 20th centuries collected by museum founder and first museum director Teruyuki Yamazaki (1928 - 2011), as well as Art Nouveau glasswork, furniture, and more. We look forward to seeing you at the museum.

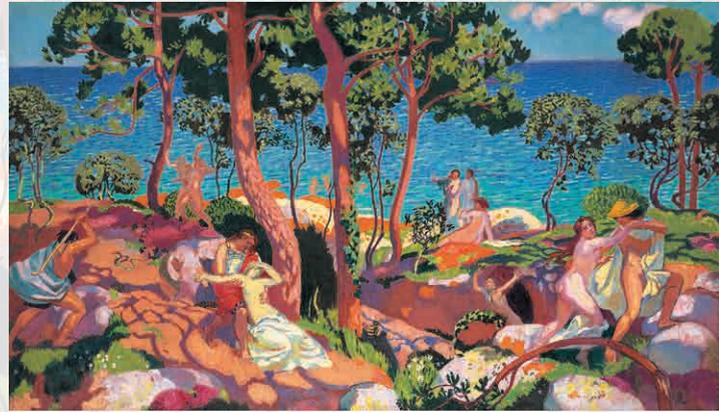


Collection Showcase 1

THE YAMAZAKI MAZAK MUSEUM OF ART

DENIS, Maurice "Eurydice"

The subject of this work is Eurydice, the wife of Orpheus, the Thracian poet of the Greek myths. Fleeing from a man's advances, Eurydice was bitten by a poisonous snake and died. Orpheus was inconsolable. Here, however, he is shown in a bright, pastoral Mediterranean setting. Light and shadow are boldly expressed by the contrast between flat planes of color without using classical chiaroscuro. This is an example of the painting theory for a new age advocated by the Nabis.



DENIS, Maurice [1870-1943]
"Eurydice"
1906
Oil on canvas

GRUBER, Jacques "Screen"

Collection Showcase 2

THE YAMAZAKI MAZAK MUSEUM OF ART



The veneer attached to the walnut frames of this screen appears to be a type of cedar with an extremely elaborate grain. It was peeled off the log in a thin slice with a rotary lathe. Images of clematis and cyclamen are created on these panels with marquetry, using a variety of woods such as tulip wood, white sycamore, rosewood, and silky oak. Burl is used in the cyclamen leaves. Large angelica plants of the family Apiaceae are carved in relief on pieces of walnut glued to the surface of the veneer. The white flowers of this plant are called umbels, small flowers on short stalks emerging from a single point like the ribs of an umbrella. They are found from the Caucasus Mountains to Lorraine, and even today can be seen in the gardens at Nancy, growing higher than three meters.

GRUBER, Jacques [1870-1936]
"Screen"
1900-03