

CYBER WORLD

New Era of Digital Manufacturing

Feature

Evolution of the Mazak iSMART Factory™

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Evolution of the Mazak iSMART Factory™

Wider utilization of the IoT and digitization in the manufacturing industry

The Internet of Things (IoT) connects everything to the Internet. Efforts to use the IoT to create new value have been expanding on a global scale the past few years. The number of things that can be connected to the Internet is increasing rapidly, and it is estimated that the market of IoT-related products and services will be equivalent to roughly \$1.4 trillion in 2021 (report from IDC). The utilization of the IoT, as well as digitization, is also becoming wide spread in the manufacturing industry and companies have started to actively use the IoT to win in today's intensifying competition. In addition to the efforts of individual companies, digitization in the manufacturing industry is promoted as a national project under the initiative of the central government in various countries. Germany promotes "Industry 4.0," which aims to achieve an alignment of the production field with digital data to realize a flexible and efficient production system, through collaboration between industry, academia and government. In China, the central government has launched "Made in China 2025," which is also called the Chinese version of Industry 4.0, and digitization of the manufacturing industry is positioned as a priority area in their industrial policy. The Japanese government has also released a new industrial vision "Connected Industries" to accelerate the utilization of the IoT by manufacturing and other industries as well as digitization.

Activities for the digitization of the manufacturing industry in various countries

	Germany: Industry 4.0
	China : Made in China 2025
	Japan : Connected Industries
	US : Industrial Internet
	UK : High Value Manufacturing Catapult
	France : Industry of the Future

White Paper on Manufacturing Industries 2017

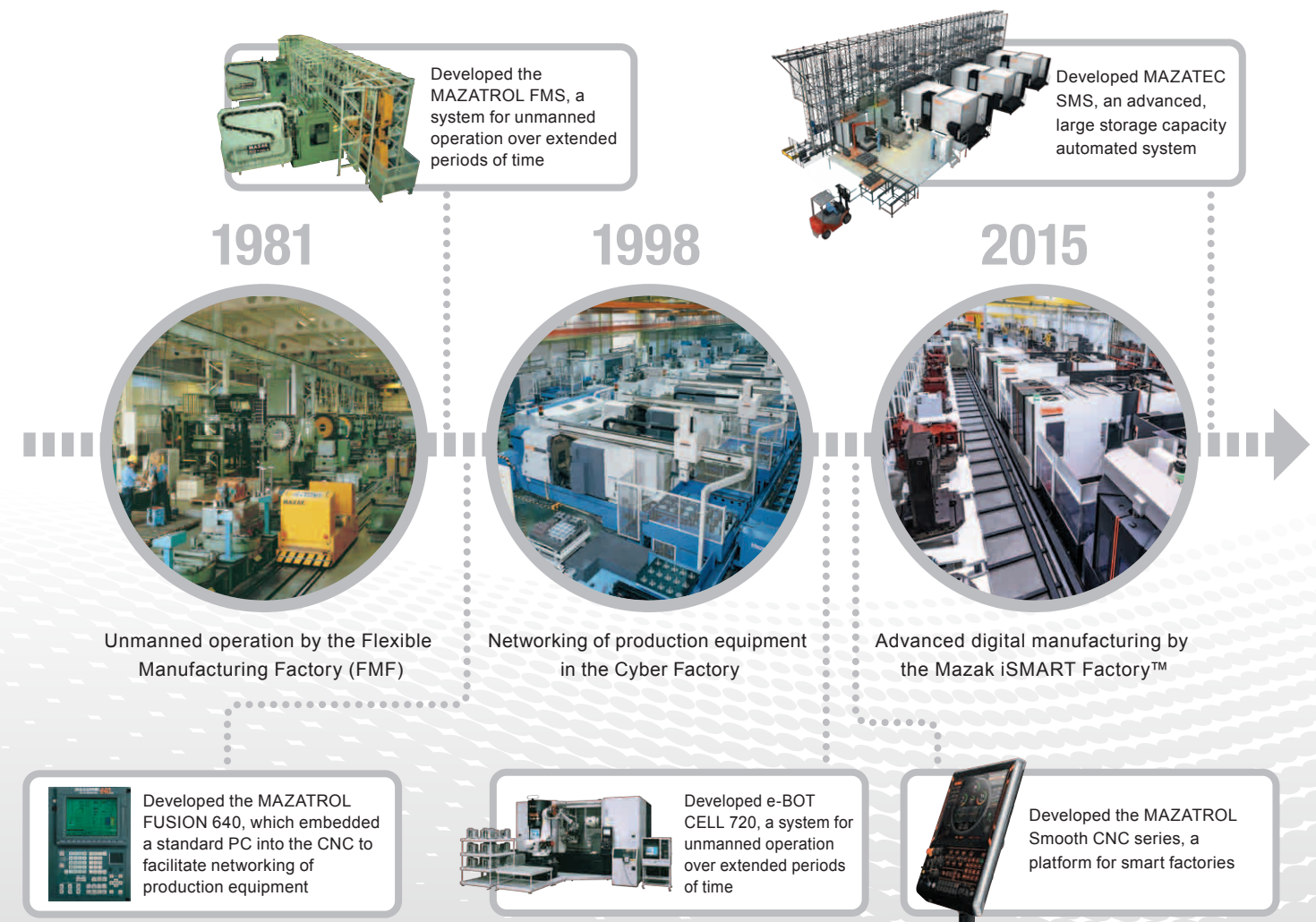


IoT collaboration between countries is also active (The leaders of Japan and Germany (in the center of the photo) confirmed collaboration between the two countries at CeBIT 2017.)



The machine tool industry is also making active efforts for utilization of the IoT, which is drawing increasing attention. (IoT corner in Mazak's booth at JIMTOF 2016)

History of automation and networking in Mazak



History of the commitment of Mazak to automation and networking — From the Cyber Factory to the Mazak iSMART Factory™ —

While the manufacturing industry must decide how to best utilize the IoT on a global scale, Mazak is committed to the establishment of its version of a smart factory – the Mazak iSMART Factory™. In a plant that has been transformed into Mazak iSMART Factory™, all production activities are converted into digital data to visualize and analyze the processes for making improvements and to coordinate the data with the main computer system. With such a plant, Mazak is striving to realize "advanced digital manufacturing," in which production activities are optimized in an autonomous manner.

Mazak has promoted the automation and networking of plants as a pioneer in the industry since the establishment of unmanned factories in the 1980s. In 1998, for example, we completed the Cyber Factory designed for networking production equipment based on IT. The Mazak iSMART Factory™ is a plant that

realizes even more efficient manufacturing by making use of the automation technologies and expertise on plant control we have accumulated over many years of operation.

Mazak's efforts to create iSMART Factories in its production bases started with a pilot project launched at the Mazak US Plant in Kentucky in 2015. A project to upgrade all Mazak production facilities worldwide to iSMART Factories is underway. The transformation of the Oguchi Plant at Mazak's headquarters into an iSMART Factory was completed in May this year. The knowledge and expertise acquired from the project in the Kentucky Plant, as well as the introduction of cutting-edge IoT technologies, were applied to the Oguchi Plant, which has initiated its operation as the most digitized production base at present.

Mazak iSMART Factory™ ~ Oguchi Plant ~

Located at the company headquarters, the Oguchi Plant, which has completed the transformation into an iSMART Factory, all of the production activities from parts manufacturing to final inspection processes are now converted into digital data. The information obtained from the analysis of the data is fed back into production to help improve productivity and quality and to work together with the ERP system to realize advanced tracking of errors and optimization of the entire plant operation.



Machining area in the Oguchi Plant

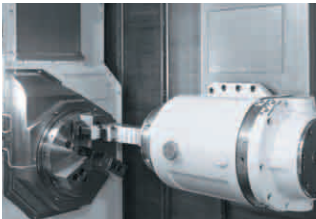
Various types of production equipment are networked in the machining and sheet metal processing areas

The machining area in the Oguchi Plant is composed of the INTEGREX series of multi-tasking machines and other state-of-the-art machines to produce a wide variety of components in small quantities according to the production schedule. Continuous unmanned operation over extended periods of time is enabled with various automated systems including automatic high-rise warehouses and sorting robots as well as tool transport systems, which automatically supply tools to multiple machines, and auto jaw changers, which automatically replace chuck jaws. All of these processing machines, along with peripheral equipment such as integrated chip conveying systems and automatic guided vehicles, are networked to collect more than 10 million pieces of plant operation data per day and monitor and analyze the operation status. Data are collected from all equipment to improve the efficiency of the entire machining area.

The networking of different equipment and the collection and integrated control of the data are realized with MTConnect®, an open communications protocol for manufacturing equipment, and the MAZAK SMARTBOX™, a network connection unit. The MAZAK SMARTBOX™ does not only ensure cybersecurity of the network but also functions as a fog computing device for distributed data processing to reduce server load from data collection and substantially improve the processing speed of data analysis. For older machines and other equipment that are not compatible with MTConnect®, the MAZAK SENSOR BOX is deployed to convert machine status data into MTConnect® format for data collection.



Tools are automatically supplied to multiple machines



Chuck jaws automatically changed by attachment mounted in milling spindle



All data of machines are collected using the MAZAK SMARTBOX™ deployed in different locations of the machining area



Information for older machines is collected by the MAZAK SENSOR BOX



SMOOTH MONITOR AX is used for visualization and analysis



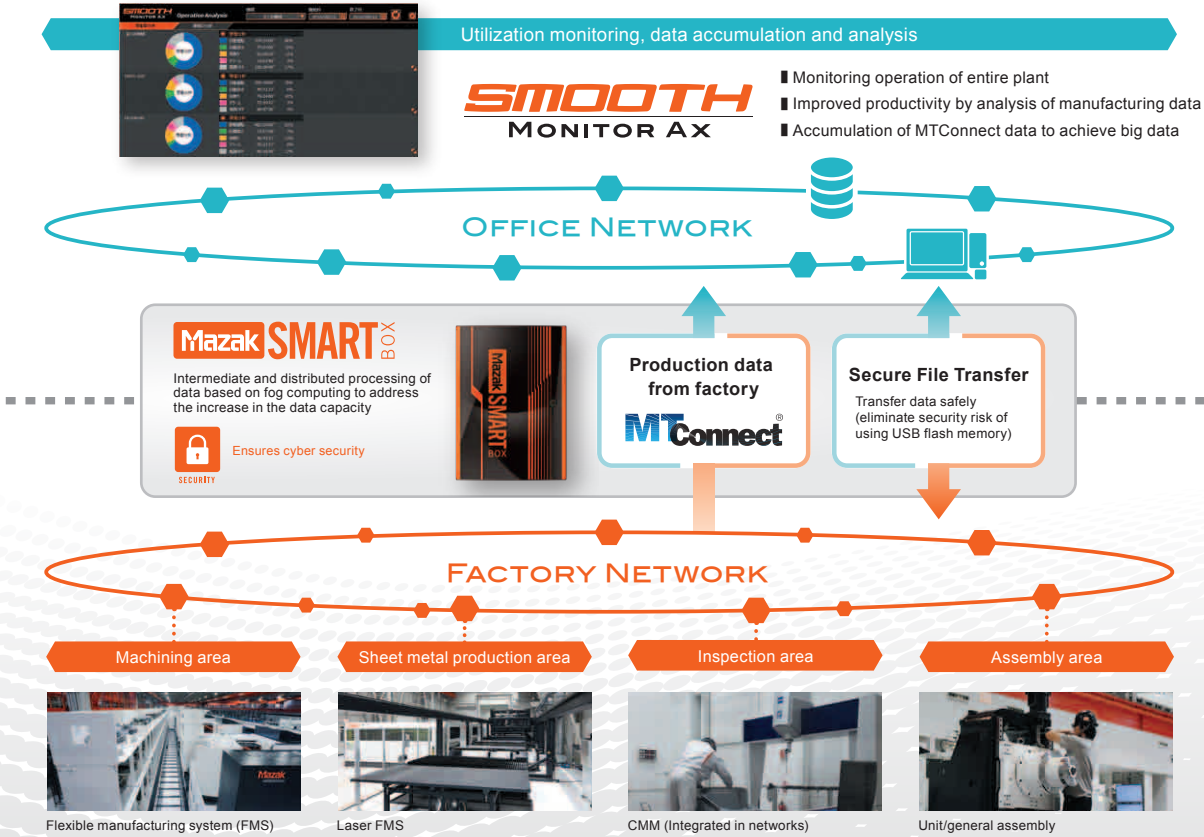
In the event of equipment problems, an alarm notification is sent to the staff by smartwatch, etc.



QR codes* are scribed by a laser processing machine
*QR code is a registered trademark of DENSO WAVE INCORPORATED



The operator calls the bending processing program by scanning the QR codes scribed on workpieces



The collected data are visualized and analyzed by the SMOOTH MONITOR AX and the results of the analysis are fed back to production to improve productivity. As a specific example, the Oguchi Plant has analyzed alarm stops of equipment to identify the causes and frequency of the alarms. These data are used to perform preventive maintenance, which has reduced downtime by half and improved the operation rates. In addition, the operation status of equipment during the automatic operation was analyzed to identify inefficient processing cycles. The data analysis has resulted in improved productivity such as significant reduction of non-cutting time with optimization of cutting tools and the machining program.

The improvement of productivity through advanced data coordination has also been achieved in sheet metal processing. In the sheet metal processing area, a QR code is scribed on each material sheet by a Mazak laser processing machine to use for

calling processing programs in the subsequent bending process as well as for the registration and management of progress of the painting process. This has reduced the time required for part identification and calling up the appropriate program to improve productivity by 30% in comparison with the previous method.



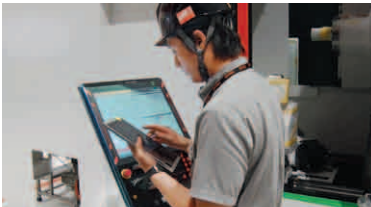
State-of-the-art fiber laser processing machines in the sheet metal processing area



Assembly area in the Oguchi Plant

Information on operations performed by employees is also digitized in the assembly area

Conversion of production activities into digital data is also performed in the assembly and inspection processes. The results of operation in the assembly area are entered on tablets and other smart devices, not on paper documents as was previously done, to convert them into digital data. Large screens installed in the plant display the results of operation for each machine order number which are used by management to check the progress of assembly constantly. With visualization of the progress, any holdup between processes or problem can be identified instantly to help reduce the assembly time. All manufacturing records including tool and measurement data at the time of manufacturing are also converted into digital data to enhance tracking of information on machines that have been delivered, as well as to improve quality. A detailed history of the use of tools and measuring instruments is converted into data to ensure that in the event of detection of any abnormality, the manufacturing processes and item numbers for which the tool have been used can be searched quickly to take proper action.



Operation results are entered into tablet



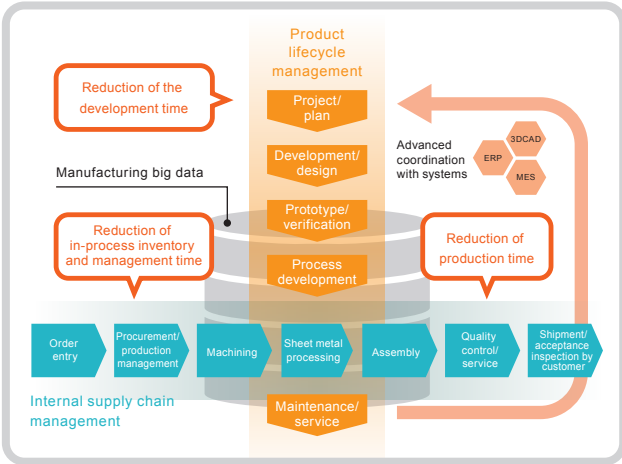
Production records are converted into digital data in the unit assembly area as well as in the general assembly area



Large screens installed in the assembly area display the progress of processes on a real-time basis

Use of manufacturing big data

With the complete transformation into Mazak iSMART Factory™, all production activities in the Oguchi Plant, from order entry to shipment, are now converted into digital data to successfully enhance the efficiency of internal supply chain management and reduce the in-process inventory, management time and manufacturing time. In the future, in addition to internal supply chain management, we will also convert information on the management of product lifecycles, which ranges from the planning of products to maintenance service, into digital data to promote the use of manufacturing big data developed through advanced coordination with 3D CAD, ERP, MES and other systems. Through these efforts, we are striving to reduce the development time, along with the manufacturing time, and meet widely diversified market requirements.



Manufacturing big data will be used to further reduce the production time

Mazak iSMART Factory™ provides solutions

Through the transformation of production facilities into Mazak iSMART Factories™, Mazak does not only realize advanced digital manufacturing internally but also creates and supplies new value to customers. The effectiveness of cutting-edge technologies and new manufacturing concepts utilizing the IoT is demonstrated in our plants. Using the products, services and solutions, we help customers to transform their plants into smart factories. The Mazak iSMART Factory™ has generated various IoT solutions including the MAZAK SMARTBOX™ and the SMOOTH MONITOR AX, which are used for the improvement of production sites through networking and the visualization of equipment operation data as well as through data analysis.

Solutions generated by the Mazak iSMART Factory™

■ Networking of equipment



Mazak SMARTBOX [MAZAK SMARTBOX™]
Any device that uses the MTConnect® communications protocol can perform data communications via the MAZAK SMARTBOX™ regardless of manufacturer and whether the model is old or new. The fog computing function enables intermediate and distributed processing of manufacturing data to identify and discard any unnecessary data automatically and improve the processing speed of data analysis.



Mazak SENSOR BOX [MAZAK SENSOR BOX]
The MAZAK SENSOR BOX is used for older machines that are not compatible with MTConnect®. It converts the machine status, as well as coolant amount, temperature, power consumption and other information, into an MTConnect® format to enable visualization and analysis of operation data.

■ Visualization and analysis of operation status



[SMOOTH MONITOR AX]



■ Dashboard
The operation of equipment can be monitored to check the status on a real-time basis via any terminal in any location that has network access, including large screens installed in a plant, smartphones and tablets.



■ Alarm analyzer
By indicating the frequency of alarm occurrences, recovery time and other information, this can be used to determine the cause of the alarms so that preventive measures can be taken to increase machine operation rates.



■ Energy Dashboard Plus
Electrical power consumption is displayed on a real-time basis and the history can also be shown. The correlation of power consumption with processing programs, operation status and tool data is displayed to help control and reduce power consumption.

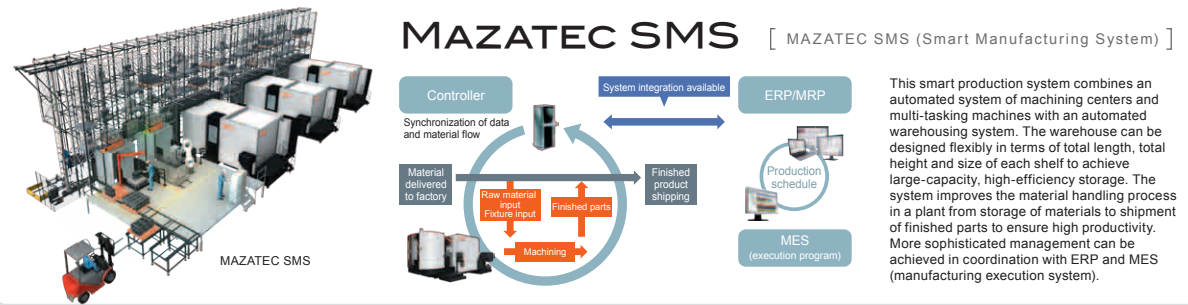


■ Operation analysis
Operation time is analyzed with the time classified into five categories: automatic operation time, automatic power off, setup time, alarm time and power shutdown time. It facilitates the understanding and improvement of problems in processing programs.



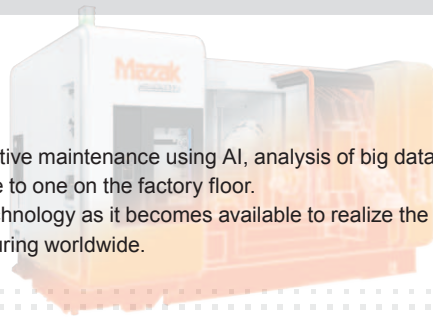
■ Analysis of tool use
(only for machines equipped with the MAZATROL CNC)
The usage rate, usage time and average cutting load of tools are analyzed to determine the optimum cutting conditions for reduced processing time.

■ Advanced automation with system integration



Evolution of Mazak iSMART Factory™

Mazak is currently working on improving productivity by comprehensive monitoring, predictive maintenance using AI, analysis of big data, and the development of a "Digital Twin", which compares the operation of a digital machine to one on the factory floor. Under the concept of "Constant factory evolution", we will continuously utilize the latest technology as it becomes available to realize the evolution of the Mazak iSMART Factory™ and contribute to the development of manufacturing worldwide.





01

Customer Report 01

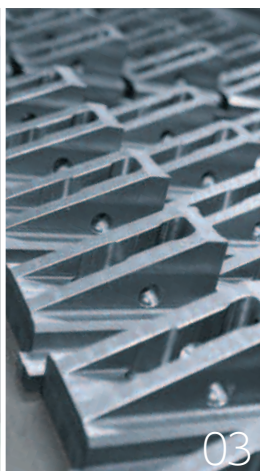
Leading the world with tire building drums

Japan Mori Ironworks Co., Ltd.

Tires on a vehicle have four main functions: weight support, transmission of driving force and braking force to the road surface, absorption of shock from the road surface and change and maintenance of direction. A key to the production of high-performance and high-quality tires is the process to laminate the number of rubber sheets, plies and the tread to create a semi-finished tire. A device that plays a pivotal role in this process is a tire building drum. Mori Ironworks Co., Ltd. located in Kurume, Fukuoka, is a world-class manufacturer of tire drums, and is engaged in their development, design, manufacturing and sales.



02



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- 01. Tire building drum produced by Mori Ironworks
- 02. VARIAXIS i-700T PALLETECH system installed at the end of last year
- 03. Hinges that allow the drum to expand and contract smoothly
- 04. Mr. Mori, President (center, first row) and employees

COMPANY PROFILE //////////////////////////////////////



Mori Ironworks Co., Ltd.

President (CEO) : Haruki Mori
Address : 18 Oishi-machi, Kurume, Fukuoka, Japan
Number of employees : 45
www.moridrum.co.jp

MORI IRONWORKS CO., LTD.

The tires produced with the tire building drums manufactured by Mori Ironworks cover a wide range - they are used for automobiles, aircraft and construction machinery, and many other applications. The company supplies products to all the tire manufacturers in Japan as well as major international tire manufacturers and are exported to 46 countries. Mori Ironworks was established by Mr. Touichi Mori in 1905. The company had a great opportunity to make a breakthrough as a manufacturer dedicated to building drums when it produced tire building drums at the request of Mr. Shojiro Ishibashi, the founder of Bridgestone and a friend of Mr. Mori from the same hometown. The business was passed on to and further developed by Mr. Katsumi Mori, the former president. He had a creed "To be honest with technology," which has been handed down as its unchanging philosophy in the company.



Mr. Haruki Mori, president, talking about the unique strategy of the company

"Tires affect people's lives. So in the event that any problem is pointed out in our tire building drums, we would stop all lines to identify the cause and use all possible technologies to address it with the utmost efforts. This attitude is a source of the trust our customers have in our company," said Mr. Haruki Mori, the current president, adding an explanation about the policy of the former president.

Pursuing "high accuracy, high durability and assured interchangeability"

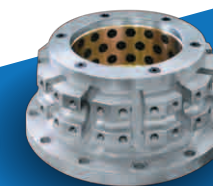
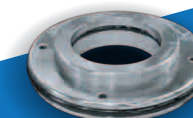
Mr. Haruki Mori, who has experienced working for a general trading firm, has created a stream of overseas customers by attending top-level negotiations in person. While the percentage of overseas sales was 10% 35 years ago when he started to work for Mori Ironworks, it has increased to more than 80%. The key was the unique design of products under the policy of providing "high accuracy, high durability and assured interchangeability." For example, the company seeks the accuracy of a hundredth of a millimeter (0.0004 in), manufactures durable components that will be used for approximately 300,000 tire production cycles without requiring any maintenance. When replacement parts are required for this sophisticated system, they can be ordered from Mori and easily and quickly replaced by the customer.



PALLETECH system installed to further reduce production time

To achieve high accuracy component manufacturing, Mori Ironworks installed a VARIAXIS i-700T PALLETECH system with 12 pallets in November 2016. The company is committed to the improvement of accuracy in the processing of parts that are required to meet especially strict quality standards, such as those of drums to shape tires for airplanes, as well as to the reduction of the

► Components produced by Mazak machines (left and center) and a finished tire building drum (right)



Customer Report 01

Japan Mori Ironworks Co., Ltd.

manufacturing time with unmanned processing lines. "As our products are used around the world, stable quality is our top priority. In this context, we place much confidence in the processing accuracy of Mazak machines."

Aiming to be the company called first

To further stabilize the activities to manufacture high-quality products based on the orientation to technology pursued since its establishment, Mori Ironworks now focuses on active fostering of young staff. "We place emphasis on their character when hiring employees. When there is a difficult task, we have them take on the challenge and learn from it. Only their skills matter and their age is not our concern. In fact, the operation of Mazak machines is now left to a technical leader who is 22 years old."



An environment that allows young employees to take on challenges and improve their skills

When visiting an overseas user, Mr. Mori is accompanied by experienced service staff to demonstrate the maintenance operation. Customers sometimes exclaim at the extremely high ease of maintenance of Mori Ironworks' tire building drums. "This exactly indicates the evaluation of our company. Our goal is to be the company on which Japanese and international users depend first. We would like to keep growing faster than our peer companies with an indomitable spirit without relying on anyone." The vision of Mr. Mori is thus clear.



01

Customer Report 02

Contributing to society by Cutting, Connecting and the Environmental Considerations

🇯🇵 Japan REX Industries Co., Ltd.

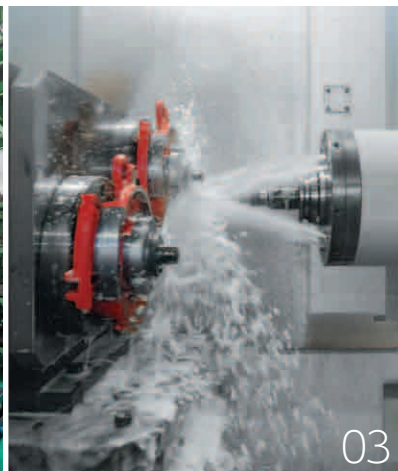
Pipe threading machines with a domestic market share of 65%, roll threading machines with a share of 100% and equipment to join polyethylene pipe with a share of 70 to 80% — the main products of REX Industries Co., Ltd., a comprehensive manufacturer of piping equipment located in Osaka, has a high market share. The company is well-known in the industry and it is said that a business operator is not mature enough if it does not know REX. How has the company, whose name means the king in Latin, become so prominent in industry?



Osaka, Japan



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- 01. Conveyor line for the assembly of small, light pipe threading machines that are extremely portable
- 02. Mazak horizontal machining center HCN-6000 improved production efficiency 15%
- 03. High-speed machining by the HCN-6000
- 04. Mr. Kazuhiko Miyagawa (center), Executive Director, and staff of Machining Group, Manufacturing Division

COMPANY PROFILE



REX Industries Co., Ltd.

President : Junichi Miyagawa
Address of Head Office : 1-4-5 Nishi Shinsaibashi, Chuo-ku, Osaka, Japan
Address of Main Factory : 1-9-3 Hishiya-Higashi, Higashi-Osaka Japan
Number of employees : 300 (group total)
www.rexind.co.jp



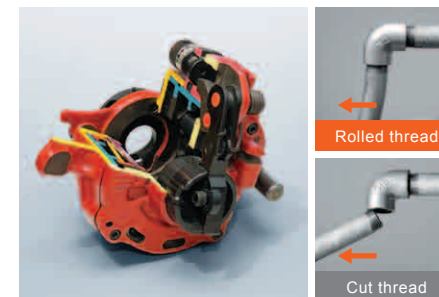
Mazak machines show performance one grade higher

The main products of REX Industries have a large share in their respective markets as a result of the consistent commitment to suggestions and solutions to problems for piping equipment. In fact, it sets the corporate philosophy of "Three Benefits," which is aimed at benefiting its customers, its employees and society as a whole, and works for social contribution through the three business fields of cutting, connecting and the environment. For the sales breakdown by business field in the company, pipe machines in the "connecting" field and band saws and other products in the "cutting" field account for 55% and 20%, respectively, and the "environment" field such as internal pipe inspection equipment represents 15% while others accounts for 10%.



Mazak's horizontal machining center HCN-6000 with a 6-pallet changer performs unmanned operation over extended periods of time

Mazak machines are used to process main components of the products for infrastructure, which is a job closely related to society. The machines recently installed by REX Industries include the HCN-6000 series (with 6-pallet changer) horizontal machining centers, which were installed in 2015 and 2016. "The small footprint and high performance with a reasonable price were attractive. Despite the table size of 500 mm (20 in), the X-axis stroke is equivalent to that of machines of other manufacturers with a table size of one grade higher. In addition, the machine we installed last year is equipped with the latest MAZATROL SmoothG CNC system to improve the processing speed, and our production efficiency



Rolled thread head that can be easily changed on a building site (left)
Rolled thread (upper right) and cut thread (lower right) show durability test results indicating that the pipe with the cut thread can be easily broken when the pipe is bent

Customer Report 02

🇯🇵 Japan REX Industries Co., Ltd.

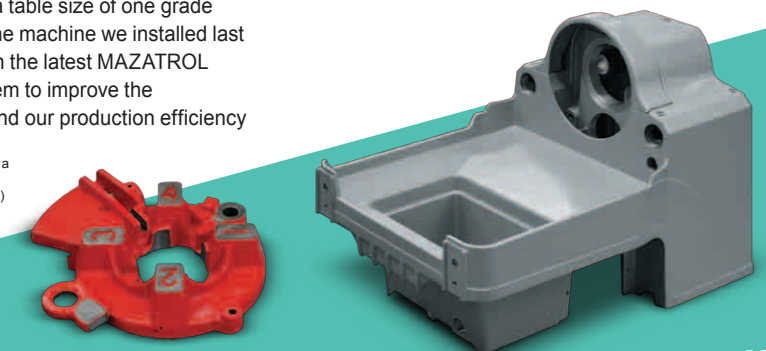
grew by 15%. We are also satisfied with the quick support system." Mr. Kazuhiko Miyagawa, Executive Director in charge of the Manufacturing Dept., mentioned the reasons for the selection of Mazak machines and their benefits.



Mr. Kazuhiko Miyagawa, Executive Director, Mr. Shigeo Yokota, General Manager of the Manufacturing Dept., and Mr. Tsutomu Terao, Manager of the Manufacturing Department (from right)

Became strongly aware of connection with society after two earthquakes

REX Industries offers equipment to connect polyethylene pipes, which are more earthquake resistant than steel pipes, and also has a share of nearly 80% in the domestic market. The two major earthquakes, the Kobe Earthquake (1995) and the Tohoku Earthquake (2011) encouraged the company to promote the development of products that meet the demand for improvement of earthquake resistance. When the Tohoku Earthquake caused a nuclear power plant accident, the company made concerted efforts to cooperate in the reconstruction of the infrastructure. Mr. Kazuhiko Miyagawa stated, "The experience made us strongly aware of the connection of our business with society." REX Industries is now promoting a global strategy based on the technologies and experience accumulated since its foundation. In addition to production sites in the United States and China, the company has established sales bases in Thailand and India, in which the development of infrastructure is in progress. It plans to increase the ratio of overseas sales from the current level of 15% to 50% in the future. Underlying these activities, the philosophy of "The Three Benefits" seems to be instilled in the company.





01

Customer Report 03

Building Blocks for the Future

U.K. Katron Engineering Precision Ltd.

There are many factories using Mazak machines in the United Kingdom. However, there can only be one company that was the first to do so. Katron Engineering Precision Ltd. is the company which purchased the first Mazak CNC machine tool in the UK – the QUICK TURN 10- which was put on the market in 1981 with the industry's first conversational CNC system, the MAZATROL T-1. Katron Engineering then bought many other Mazak machine tools – vertical machining centers, 5-axis multi-tasking machines one after another. And the great performance of the Mazak machine tools made it possible for the company to be involved in several prominent projects.

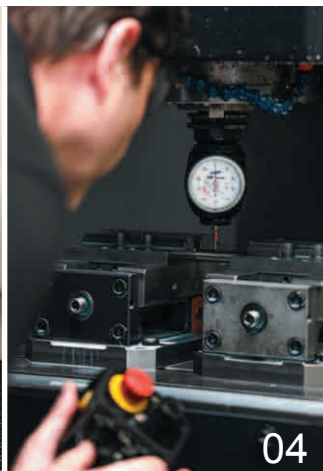
United Kingdom



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- 01. Katron Engineering currently manufactures parts for a wide range of industries, including aerospace, oil and gas, pharmaceutical and general manufacturing
- 02. (l-r) Denman Groves, Adrian Groves and Sam Groves
- 03. One of the company's earliest Mazaks, a QUICK TURN 8SP, is still in use by the company to this day
- 04. Katron machine tool operator checking a workpiece setup

COMPANY PROFILE //////////////////////////////////////

Katron Engineering Precision Ltd.

CEO : Denman Groves
 Managing Director : Adrian Groves
 Director : Maureen Groves
 Founder : Ronald Groves
 The head office : Battledown Industrial Estate, Saxon Way,
 Cheltenham Gloucestershire GL52 6QX United Kingdom
 Number of employees : 16
 www.katron.co.uk



Katron Engineering has supplied components to a number of notable projects over the years, including the 1.6 km (1 mi.) Severn Bridge between England and Wales, for which the company manufactured all the construction bolts. Another well-known project is the Cassini-Huygens spacecraft, for which Katron produced a number of parts for the gas analyzer motor on the Huygens probe, which has explored Saturn's largest moon, Titan. Components for both of these projects were produced on Mazak machine tools. "Denman, my father, used to dream about a machine that could move all axes together-but during the 70's there wasn't anything like it on the market. Everything we made back then was machined on manual lathes and mills. It was in 1980 when he stumbled across an article in a magazine about the MAZATROL CNC mounted on the Yamazaki Mazak turning center – the QUICK TURN 10. He bought it immediately and added a second machine a year later. That's where our love of Mazaks began. As we were going from manual machines to CNC machines, what really stood out about the Mazak machine was the simplicity of the MAZATROL control system and the accuracy of the machine tools. And since we have stayed loyal to them, we have been rewarded with their loyalty with excellent machine tools and service." Adrian Groves, managing director and son of CEO, Denman Groves, looks back on Katron's long history on their relationship with Mazak.

Reduction of programming and set-up times and cost

In spite of having only 16 employees, Katron has been involved in prominent national projects thanks to everyone being a highly skilled engineer. Founded in 1942 by Denman's father, Ronald Groves, the company has remained in the family ever since during its 75-year history. The company has branched out from its aerospace roots and now serves a wide range of industries,

including oil and gas, pharmaceutical and general manufacturing and is recognized as a leading hi-tech company in high-precision machining.

"Mazak has always supported us as a family business really well, and we think it resonates well with their character. The quality, reliability and service from Mazak has been second to none. We fully intend to build on and extend our partnership with Mazak."(Adrian Groves).



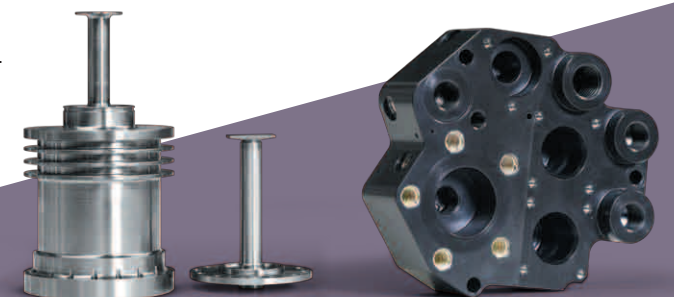
Katron machine tool operator programming the company's VERTICAL CENTER NEXUS

The company has realized large reductions of machining time by the introduction of Mazak machine tools. "Machining times have been drastically cut, we've also been able to reduce programming and setup costs, as well as reducing the production cost of fixtures by 10%." Adrian emphasizes the introduction benefits of Mazak machines. "We have plans in place for future installations of some of the more advanced Mazak machines. We see a lot of potential there."

Mazak partnership passed from one generation to the other

At just 13 years old, Sam Groves who is Adrian's eldest son, is the fourth generation to be involved with the family business. He is already immersed in metal-cutting. "We joke that he was christened with suds (machine tool coolant)!" laughs Denman, his Grandfather.

► Satellite and aerospace components



Customer Report 03

 U.K. Katron Engineering Precision Ltd.

Sam's really taken a fancy to Mazak machines. Having always been fascinated by Lego, at the age of six, he made his first Mazak from Lego.



Sam Groves, aged 13, whose family runs Katron Engineering in Cheltenham, UK, with his own Lego factory full of Mazaks

He set about creating his own machine shop... out of Lego bricks. Sam's collection of Lego Mazak machines has evolved over the years and, in parallel with his family's business, he's now on his third 'factory' with 22 Mazaks. The model factory itself is a sight to behold. Complete with a reception, offices and even a safe, the crowning glory however is the machine shop. You'd be forgiven for mistaking it for an official scale model.



Sam's third factory, which now features 22 Lego Mazaks

"His ultimate goal is to build a full-size Mazak out of Lego," finishes Adrian. "One for the foyer of the factory in Japan, and one for the UK." "That's a lot of bricks!" adds Denman.

MAZAK PEOPLE

YAMAZAKI MAZAK Deutschland GmbH Niederlassung Düsseldorf

 **Mr. Yuma Takahashi**

Striving to further enhance the service and support activities of Mazak Germany

Yamazaki Mazak operates many bases in Japan and other countries for various functions such as production, sales and before and after-sales service and support. MAZAK PEOPLE introduces employees who are active in the forefront of the Group companies. This issue features Mr. Yuma Takahashi, who works as a service engineer in the German subsidiary of Yamazaki Mazak Corporation. He is reminded of the importance of communication through his job every day.

PROFILE >> Mr. Yuma Takahashi

Mr. Takahashi joined Yamazaki Mazak in April 2008 and engaged in positions to improve the quality of products in the headquarters as well as installation and maintenance of delivered machines in Japan. In May 2015, he was assigned to Germany.

— What is your current job?

I engage in the installation of delivered machines and provide maintenance services. Giving top priority to the quick solution of machine problems of customers to resume production, I am making daily efforts to ensure that high-quality service and support are provided promptly in Germany.

— What do you keep in mind for working overseas?

When employees who speak different languages and have different customs work together, it is crucial to respect each other's opinions and try to incorporate good parts of them instead of sticking to a familiar way. While bridging the differences between the ways of working in a careful manner may seem a roundabout approach, I believe that it is actually a shortcut to the best way for the job.



Acquisition of in-depth machine knowledge is the first step to the improvement of service quality

— When do you feel happy during your daily work?

I feel happy when I am told that "we would like you to come again next time" after I solve a problem of the customer, and feel even happier when a local service engineer who has received my advice does a good job and says thank you to me. It is because I can feel that I have moved one step closer to a professional goal of "providing support to local employees and further improving the quality of service and support activities provided to customers."



Continuously solving problems deepens trust between team members

— As a service engineer, what do you find as a preference of German people in manufacturing?

When designing a product, even if it is a commodity, they assume that it will be used for a long time. German products are almost always designed to make them easily repairable and wide-ranging replacement parts are also readily available. The custom of repairing a broken item instead of buying a new one seems to be common among German people. I guess that such an environment helps German children naturally become interested in manufacturing.

— What have you learned as something typical to Germany through your job?

In Germany, people are strongly required to work as specialists. Educational courses in the country seem to specialize in cultivating professionals and jobs in the real world are also divided into surprisingly fine categories. While a service engineer in Japan is generally required to work as an all-around player who can address any types of problems independently, the German approach requires service specialists from various fields, such as machinery, electronics and software, to work together to address problems. This difference seems to stem from the idea in Germany that "you should have the utmost respect for the work of other specialists." I feel that German employees are better than Japanese at making maximum use of skills in their respective areas of expertise to work together to solve problems.

— What is your future career goal?

It is to further activate the service team in Germany with the ideas I have proposed and achieve results from our efforts for work restructuring. While I feel rushed by the fact that there are still many things to do, I will do my best. After returning from Germany, I would like to use the experience I gained during my assignment to improve service operations in Japan.

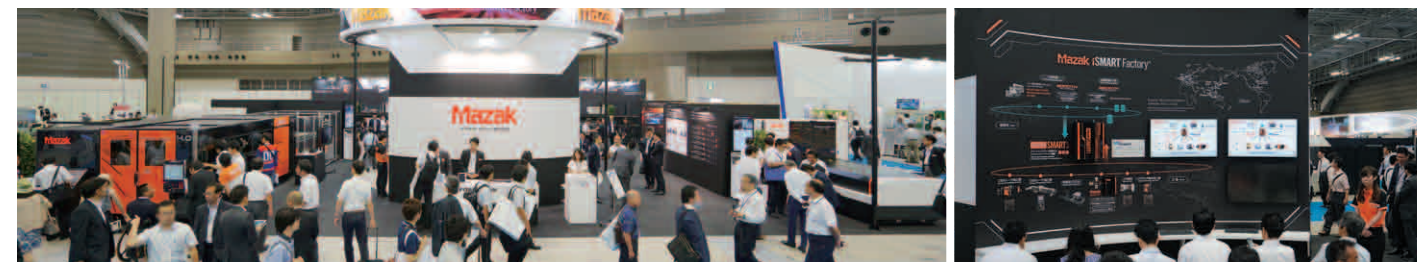
"No job is more rewarding than a service engineer, who can receive requests, opinions and voices of delight, or sometimes complaints, directly from customers," Mr. Takahashi said confidently. He will continue to play an active role as a representative of Mazak that ensures high-quality services.

How he spends his days off

I went to Disneyland in France with my family. While I have never been to Disneyland in Japan due to the notion that it is a place for children, the visit made me realize that adults can also enjoy Disneyland and I actually had much fun. It was also interesting to drive there across the national border, which was a unique experience in Europe.



News & Topics



Mazak introduced the latest laser processing machines and IoT solutions at Metal Forming & Fabricating Fair

Metal Forming & Fabricating Fair, one of the largest trade fairs in Japan, was held in Tokyo in July and received approximately 32,000 visitors in total, which was a record high. Recently in the Japanese sheet metal industry, demand for fiber laser processing machines, which replace CO₂ laser processing machines, has been increasing and there has been growing interest in the improvement of productivity utilizing the IoT. To meet such requirements, we displayed the latest laser processing machines and IoT solutions at the event.

Exhibited the first Mazak laser processing machine equipped with a DDL resonator

In our booth, visitors showed a great deal of interest in the OPTIPLEX 3015 DDL equipped with a cutting-edge direct diode laser (DDL) resonator, which we released in March this year. The machine provides cutting performance exceeding that of the fiber laser, and the quality of the cut surface of intermediate to thick plates is equivalent to that of CO₂ laser machines while the energy conversion rate is four to five times higher than that of CO₂ laser machines to save energy. These features led to the high evaluation of the machine. In the presentation corner, we introduced our support activities for the introduction of the IoT. The SMOOTH MONITOR AX, software that visualizes and analyzes the operation status of laser processing machines to help improve productivity, along with a well-prepared network security measure based on the MAZAK SMARTBOX™, which was jointly developed with Cisco Systems, Inc. in the US,

attracted considerable attention.

Innovative machine for the processing of long pipe and structural material

Visitors were similarly interested in the 3D FABRI GEAR 400 III, a 3D laser processing machine dedicated to cutting long pipes and structural material. The machine received the Ministry of Economy, Trade and Industry Award at the 47th Machine Design Awards sponsored by the Nikkan Kogyo Shimbun (newspaper) in July of this year. Once long materials are mounted on the loading station, the subsequent processes from loading of materials to 3D laser processing and unloading of finished parts are fully automated. When an optional tapping unit is installed, processes from laser processing to thread tapping can be completed in a single workpiece setup.



Mazak will continuously contribute to the improvement of productivity in sheet metal processing through its cutting-edge laser processing machines.

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.



GALLÉ, Émile [1846-1904]
"La Libellule," applied and engraved cup with bronze mount
c.1904

GALLÉ, Émile "La Libellule," applied and engraved cup with bronze mount

THE YAMAZAKI MAZAK MUSEUM OF ART
Collection Showcase 1

This cup is decorated with images of two dragonflies, flying with outspread wings. The eyes and body of the dragonfly in front are created with appliqué containing metal foil and carved in high relief. The tail is carved in low relief out of the glass ground. The eyes are different colors, an effect often seen in Gallé's work. The right eye has pink glass inside it, producing a slightly reddish cast which contrasts with the silvery gray of the left eye. The rounded body is made of drops of transparent glass fused to green and opal glass. The second dragonfly is carved into the surface and shown flying alongside and behind the first one. The entire inside surface of the cup is shallowly etched in a vortex pattern, expressing the flow of water. This is a reference to the environment of the dragonfly, which spends its larval stage in water. It is not known whether Gallé designed the bronze base or not, but it is decorated with plant forms in the Art Nouveau style. This footed cup with a dragonfly motif is representative of Gallé's late period. According to one theory, Gallé manufactured it as a gift for a close friend.

THE YAMAZAKI MAZAK MUSEUM OF ART
Collection Showcase 2

INGRES, Jean-Auguste-Dominique "Louis XIV and Molière"

Ingres was a major Neo-Classical painter. After his acceptance to the Académie in 1825, he became the director of the École des Beaux Arts and the French School in Rome. He painted this picture at the age of 80, depicting a historical anecdote. In this picture, the great 17th century French actor and playwright Molière (1622-73) is shown seated at the same table as Louis XIV in the king's private chamber. The story of Louis XIV eating with Molière was told in Madame Campan's *Memoirs of Marie-Antoinette*, written in 1822. Madame Campan (1752-1822) was the queen's first lady in waiting. She related how Louis XIV invited Molière to breakfast and sat at the same table with him in order to force his courtiers to show respect for the playwright. Ingres depicts the king showing his regard for Molière by relaxing in front of a simple table with him. The courtiers watch with expressions of bewilderment and irritation, frustrated at having to respect the king's wishes in spite of their scorn for the commoner playwright. In 1857, Ingres donated *Louis XIV and Molière* to the Comédie Française, the state theater, as a gesture of appreciation for receiving a lifetime certificate of admission to the theater. This work is a variant on a similar painting on the same theme made for Eugénie, wife of Napoleon III, which became part of the collection of Napoleon III in 1861.



INGRES, Jean-Auguste-Dominique [1780-1867]
"Louis XIV and Molière"
1860
Oil on canvas