



FANUC

NEWS

2015-Ⅲ

Mt. Fuji and autumn clouds
Photo taken on September 2, 2015

EMO Milano 2015

EMO Milano 2015 was held at Fiera Milano in Italy over a six-day period from October 5 (Monday) through 10 (Saturday). The exhibition was very successful, drawing 155,362 visitors from around the world.



In our booth, located near the entrance of the exhibition hall with a huge yellow balloon floating above it, readily usable solutions combining FA, ROBOT, and ROBOMACHINE products were presented with the keywords "one FANUC" and "Service First."

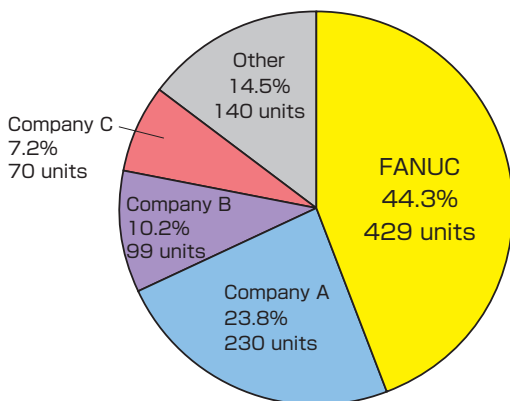


The FA section featured a special stage on which an extra-large panel was put up to present our New HMI for the first time in Europe. A live machining demo using a fiber laser, which was also shown for the first time in this region, and the enhanced line of 400V servo products received a lot of attention as well.

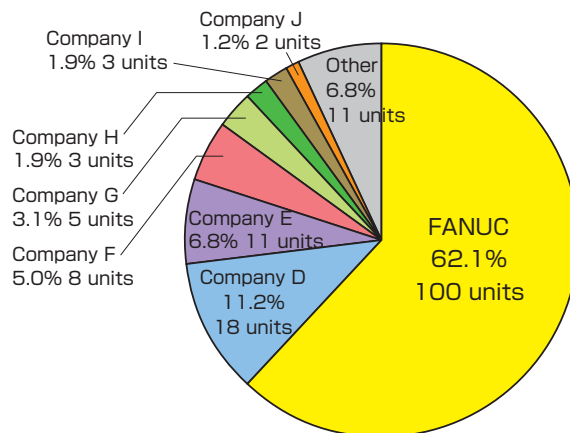
The ROBOT section, where three units of the green Collaborative Robot were exhibited, was crowded all day long with visitors hoping to gain firsthand experience with the robot. In front of a huge robot lifting a finished automobile body (manufactured by Fiat), there was also a constant crowd of visitors trying to take pictures of the robot. In the ROBOMACHINE section where robot-integrated systems were displayed, the high-speed, high-precision and high-quality machining and molding, and also accurate and nimble robot's movements, got great reputations.

Also, European watch manufacturers were deeply interested in the new ROBONANO model combining a machining precision of 0.1 nanometers with ease of use and high reliability.

The Services section had a world map showing our network of more than 240 service locations spanning 46 countries across the globe. Examples of the "lifetime maintenance" service offered by FANUC were presented using actual products to stress that our products can be used without worry anywhere in the world.



CNC share Total number of units: 968



Robot share (excluding those shown in its own booth) Total number of units: 161

Shares of FANUC in the CNCs and robots exhibited at EMO [researched by FANUC]

On the night of October 5 (Monday), FANUC hosted a customer event, which was attended by customers not only from Japan and European nations but also from the U.S. and Asia. Enjoying wine and Japanese and Italian cuisines, they all spent an excellent time having pleasant conversations.



Origin of the Company Name "FANUC"

It seems that there are a number of stories circulating in society about the origin of the company name FANUC. Here is an official explanation of where the name comes from.

F Fuji
A Automatic
N NUmerical
U
C Control

FANUC started out in 1958 as the numerical control (NC) division of Fuji Telecommunications Equipment Manufacturing (now Fujitsu). The brand name used at the time was FANUC (Fuji Automatic NUmerical Control). In 1972, when it spun off from Fujitsu, the company adopted the name of Fujitsu FANUC Ltd. Later, in 1982, it changed its company name to FANUC Corporation.



FANUC Global Service Conference

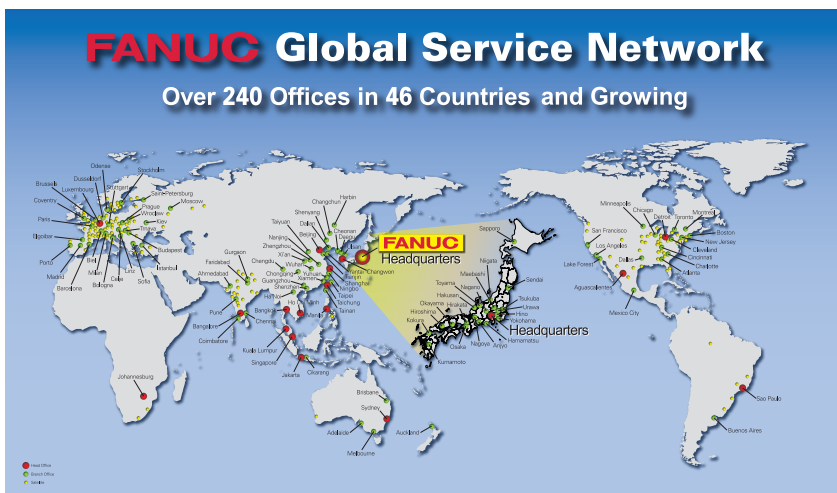
The second FANUC Global Service Conference was held at the FANUC headquarters over the three-day period from July 13 (Monday) through 15 (Wednesday). More than 250 people, including 97 participants from 32 foreign countries, gathered and had spirited discussions on ways to deliver high-level services anywhere in the world.



In order to make improvements in three basic elements of service - "service parts," "technology and skill", and "information" - a subcommittee meeting was held on each of the themes to analyze the current situation of service of the FA Business Division, ROBOT Business Division, and ROBOMACHINE Business Division as well as to explore ways to improve the situation and lay out a roadmap for achieving the improvements. Also, tools designed to help in maintenance work were exhibited for the service personnel from around the world to share information. After the conference was over, a party hosted by the president was held, bringing all the participants closer together.



We intend to continue to push forward our initiative based on the keywords of FANUC - "Service First" and "one FANUC." By doing so, we will make our customers across the world even more satisfied with our products and services.



Service First

In the spirit of "Service First," FANUC provides lifetime maintenance to its products through more than 240 service locations in 46 countries around the world for as long as they are used by customers.

one innovation  **fa • robot • robomachine**

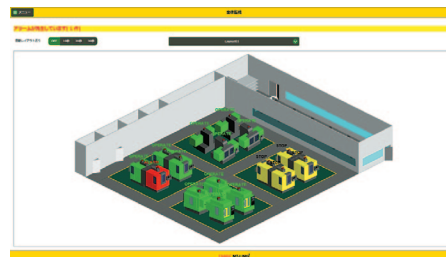
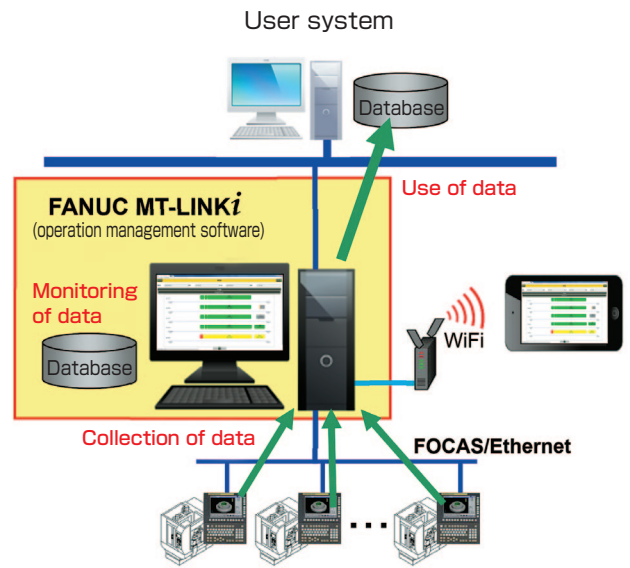
The three FANUC business divisions of FA, ROBOT, and ROBOMACHINE are unified with the Service Division as "one FANUC" to provide innovation and reassurance to manufacturing sites across the globe.

Introduction of New Products and Functions (FA)

■ New product FANUC MT-LINKⁱ for managing the operation status and results of machine tools in a factory

The FANUC MT-LINKⁱ is PC software designed to manage the operation status of machine tools with FANUC-made CNCs in a factory. The software collects the internal data of individual machine tools and the high-level user system can read and use the collected data, making it possible to build a production management system that supports Industry 4.0 and IoT (Internet of Things).

- The data concerning the operation status of machine tools can be collected and monitored in real time. This allows the operation status of all machine tools in a factory to be checked at a glance.
- The operation and machining results of machine tools can be displayed as graphs. Checking the past operation status records of machine tools helps improve the operation rate. By analyzing the alarm history and other relevant data, you can grasp the trend of alarms, possibly contributing to preventive maintenance.
- Since the software uses browser-based windows, the operation status can be checked on tablets as well.



Overlook screen



Operation results screen

■ New product Smart rigid tapping function that enables high-speed rigid tapping with no tuning

Smart rigid tapping is a function that enables the fastest tapping with no tuning of the time constant.

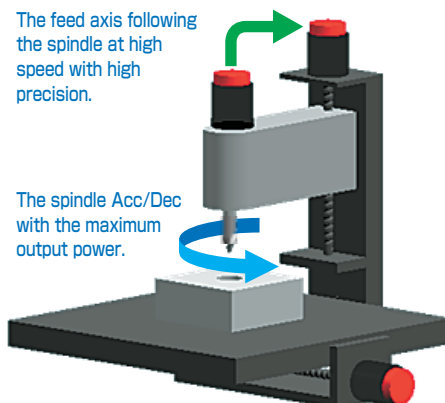
With the existing rigid tapping function, it is difficult to make full use of the torque of the spindle motor in all speed range and the motor cannot use its full performance.

When Smart rigid tapping is used, the spindle motor accelerates with the maximum output power all the time from the low speed range to high speed range and the feed axis follows the movement of the spindle at high speed with high precision. This allows the synchronization precision to be maintained while enabling the fastest acceleration and deceleration. The acceleration performance of the spindle motor is detected while performing the maximum acceleration, and the detected acceleration is also used when the motor decelerates as the spindle moves to the bottom of the hole, thereby making it unnecessary to tune the time constant.

This function allows the cycle time of tapping to be reduced easily.

The feed axis following the spindle at high speed with high precision.

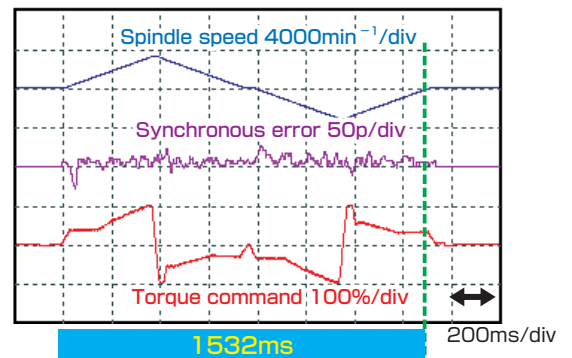
The spindle Acc/Dec with the maximum output power.



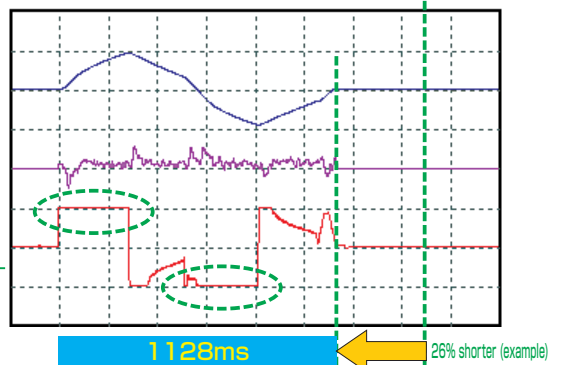
Maximum output power used

Example: M6 25 rev. S5000

■ Existing rigid tapping



■ Smart rigid tapping



Introduction of New Products and Functions (ROBOT)

■ New product FANUC Robot M-2000iA/2300 and M-2000iA/1700L

As new additions to the M-2000iA series, the large robot machine with the world's highest payload capacity, we have developed and brought to market two new models: the M-2000iA/2300 supporting twice the payload capacity and the M-2000iA/1700L featuring a long arm. The introduction of these models has expanded the application scope of robots further to those applications that involve the handling of very heavy objects that have formerly been possible only with cranes.

- The M-2000iA/2300 is a super heavy payload large robot with a payload capacity of 2300 kg. Its outstanding wrist capability makes this robot suitable for loading and unloading large castings to the machine tool and carrying building materials.
- The M-2000iA/1700L is a long-armed large robot with a payload capacity of 1700 kg as well as with a horizontal reach of 4.7 meters and a vertical reach of 6.2 meters. With a wide motion range and an outstanding wrist capability, this robot can be used to carry very long objects, such as building materials and large glass panels, and finished automobile bodies that former robots are unable to carry.
- The M-2000iA is a six-axis articulated robot, which can freely tilt and turn over the workpiece using the three degrees of freedom of the wrist, thus allowing it to flexibly adapt to various tasks and factory layouts.
- To maximize its heavy payload capacity, the M-2000iA has two motors for the J2 and J3 axes each that are subject to the action of gravity. Exerting optimal control over these two motors allows the robot to move smoothly without any vibration and achieve highly precise positioning even when it carries a large heavy object.
- Since the wrist part of the M-2000iA has environmental resistance (dust and drip proofness) comparable to that of the IP67, the robot can be used without worry even in a harsh environment.



Large M-2000iA/1700L robot carrying a finished automobile body

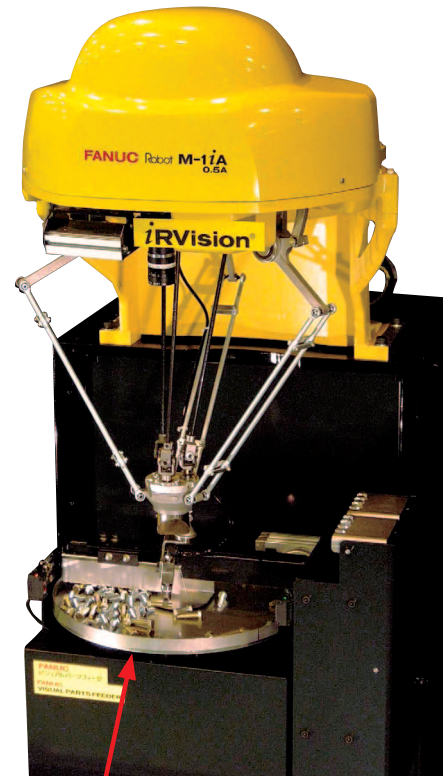
■ New product iRPickTool visual arc tracking

We have added a new visual arc tracking function to iRPickTool, the popular intelligent software dedicated to picking applications. The visual arc tracking function tracks and picks workpieces that are randomly carried on an arc conveyor, by using the built-in iRVision sensor.

When compared to the existing visual tracking function for linear conveyors or a system that has no tracking function, this function has the following benefits:

- The system can be made more compact than one with a linear conveyor of the same length. Particularly, a compact robot having a circular motion range, such as the Genkotsu robot (see the photo at the right), can be used more effectively.
- Unlike in conventional systems, when the workpieces are supplied, the robot does not need to wait for the conveyor or table to start or stop rotating, leading to high picking efficiency.

We intend to keep enhancing the functionality of the iRPickTool and promote the use of robots particularly in production lines in the food, pharmaceutical, and cosmetic industries.



Visual arc tracking function

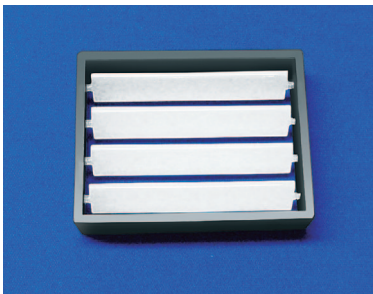
Since the table keeps rotating with no interruption in the flow of workpieces, the robot does not need to stop and can pick workpieces anytime.

Introduction of New Products and Functions (ROBOMACHINE)

■ New product FANUC ROBOSHOT SI-20A (second injection unit)

We have developed a high-precision and compact second injection unit enabling various plastic moldings: FANUC ROBOSHOT SI-20A.

- SI-20A is an all electric second injection unit equipped with FANUC's latest CNC and it provides "high molding performance", "high sustainability", and "ease of use".
- By mounting the unit on ROBOSHOT, it allows to mold parts with two different materials or colors simultaneously.



Example of molding
Automotive parts
Plastic: ABS + PC

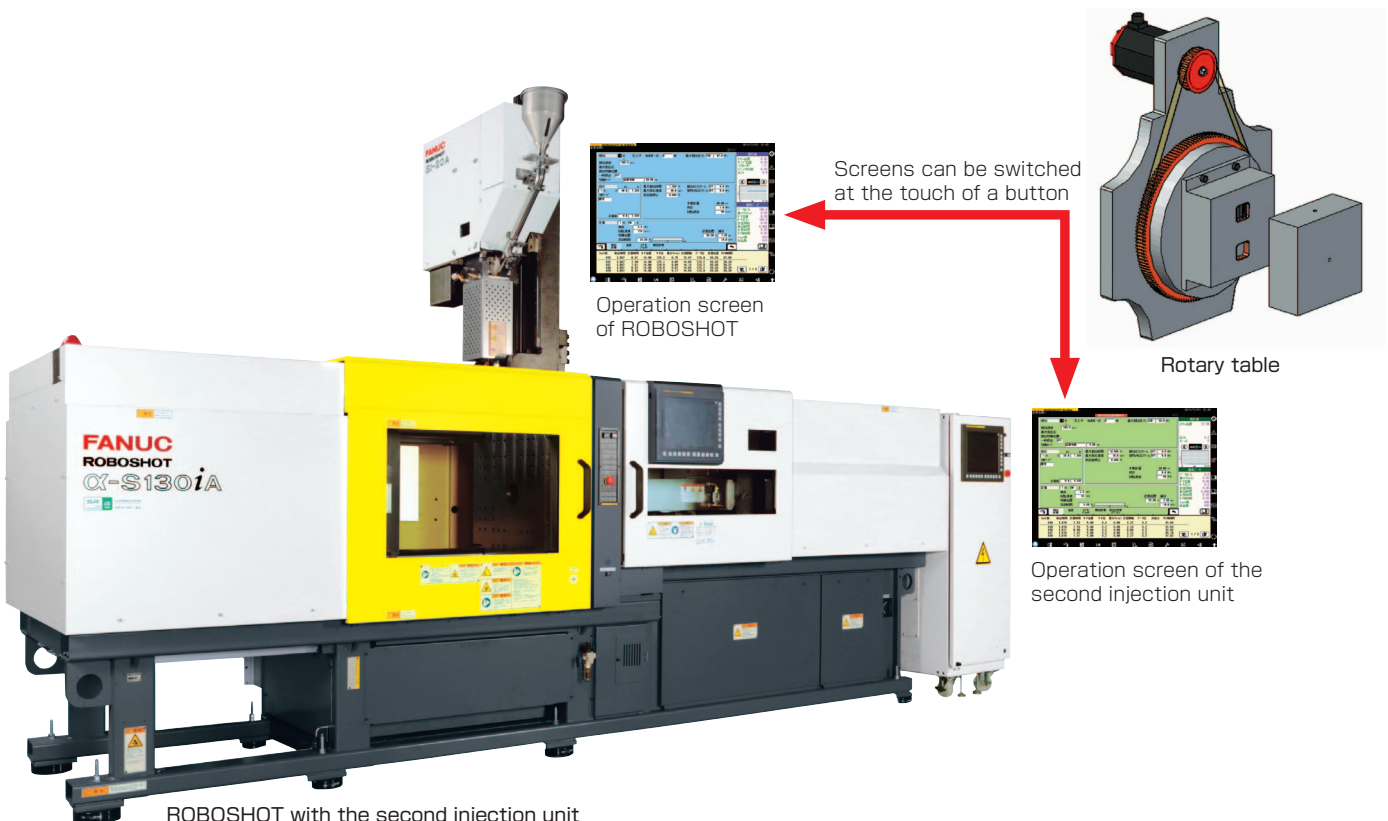


Mechanical part of
ROBOSHOT SI-20A



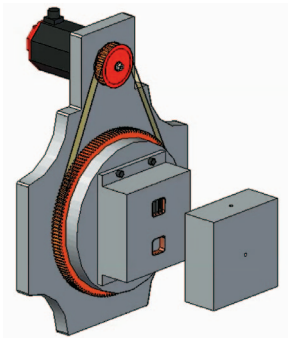
Electric part of
ROBOSHOT SI-20A

- SI-20A can be operated from the operation screen of ROBOSHOT as well as its operation screen. The rotary table that rotates mold half can also be controlled at the same time by using servo auxiliary axis control.
- The second injection unit features high levels of precision and stability equivalent to ROBOSHOT, providing the most advanced functionality and highest added value ever offered for molding.
- SI-20A can be linked to ROBOSHOT-LINK², the production and quality data management system for molding factories. It supports the globalization and automation of molding factories.



Operation screen
of ROBOSHOT

Screens can be switched
at the touch of a button



Rotary table



Operation screen of the
second injection unit

ROBOSHOT with the second injection unit

Groundbreaking Ceremony for the Mibu Factory



From left to right: Mayor Kosuge of Mibu Town, President Inaba, Governor Fukuda of Tochigi Prefecture, and University President Inaba



Planned appearance of the completed factory (bird's eye view)

On August 4, a groundbreaking ceremony for the Mibu Factory was held at the Mibu-hanyuda Industrial Park in Mibu Town, Tochigi Prefecture. The ceremony was attended by about 80 invited guests and people concerned with the project, including Tomikazu Fukuda, Governor of Tochigi Prefecture. Following the opening speech by President Inaba and the congratulatory speech by Governor Fukuda, a groundbreaking ritual took place to wish for the safety of the construction work.

Gist of the opening speech by President Inaba

.... (Omitted)

This Mibu Factory will be a huge investment that we are going to make for the third time in relation to manufacturing site.

Specifically, the factory will have manufacturing equipment to produce 10,000 CNCs and 60,000 servo motors, both of which are our core products.

The existing plants at our headquarters in Oshino Village, Yamanashi Prefecture, are capable of 25,000 CNCs and 150,000 servo motors. When we look at the building area alone, however, this factory will be almost twice as large. So it will be an enormous investment for us.

I believe that the Mibu Factory will contribute to the future growth of FANUC, just as the massive equipment investments that we made in the past for manufacturing sites paid off five or 10 years later. And I also believe that the factory will help the further development of Tochigi Prefecture and Mibu Town both directly and indirectly.

.... (Omitted)

AC Meeting



On August 24, the 58th AC Meeting was held at the cafeteria of the laboratories of the headquarters. The AC Meeting originated from a convivial gathering organized by the Automatic Control Department established in 1958. This year, it marks the 58th anniversary. A total of 918 people attended the meeting, including President Yoshiharu Inaba, Advisor Ryoichiro Nozawa, and FA Technical Advisor Mitsuto Miyata, and 89 new members. At the beginning of the meeting, President Inaba delivered a speech about FANUC's future research and development activities, giving all the participating researchers a shared view on which direction to go.

During the meal, all the attendees took part in a quiz game to get better acquainted with one another. They renewed their determination to contribute to the further growth of the company.



Introduction to FANUC's Factory Press & Die Cast Factory

Robot-automated press die casting factory

The Press & Die Cast Factory mainly deals with press and die casting of the parts of servo motors and spindle motors. The servo motor core punched by the press machine is carried from the press machine onto the conveyor, and the robot picks it from the conveyor using the visual tracking function. Then, after an automatic appearance inspection by the FANUC *iRVision*, the robot stores the core in a pallet. Highly reliable production is achieved without human intervention.



Pressing cell



Automatic appearance inspection by the *iRVision*



Conveyance of the punched core from the press machine

In the die casting cell, all the processes, from entering the aluminum ingot into the melting furnace and drawing and injecting melted aluminum to picking the casting, applying a release agent, cleaning the gate, deburring, and storing the casting in a pallet, are performed without human intervention by making full use of robots, enabling 24/7 unmanned operation.

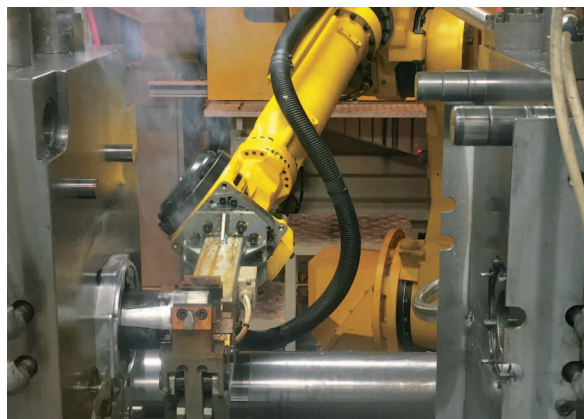
Also, minimizing the amount of the release agent to be applied provides a very clean factory environment, making this die casting factory environmentally friendly.



Die casting cell



Entering the aluminum ingot and drawing melted aluminum



Automatic pickup of the casting

TDF Corporation

TDF Corporation is a forging company with a history of roughly 100 years from its foundation. We visited TDF's headquarter factory in Murata-cho, Shibata-gun, Miyagi Prefecture and interviewed President Koike and Acting Factory Manager Ogawa. The company produces high-quality forged parts by exploiting its world-class forging technology.



From right to left: President Koike and Acting Factory Manager Ogawa

Could you tell us about the products that you manufacture at TDF?

President Koike: First of all, let me talk briefly about our company's history. TDF was founded in 1918, so it has been around for about 100 years. We were the first private forging company at the time and have undergone a number of changes since then. Now, in the era of motorization, we mainly deal with automotive parts. We did a lot of business with customers in the building equipment and shipping industries in the past. Nowadays, however, most of the products we manufacture here are automotive parts. Actually, we have been producing some parts for reducers used in FANUC's robots for the past two years. Our main products are I-beam front axels for two-ton and larger trucks. They are hot forged parts that weigh 10 to nearly 100 kilograms. We also process forged parts for steering equipment. Other items that we manufacture include crank shafts, propeller parts, transmission gears, and shafts.

How do you use FANUC robots at your company?

President Koike: For the production of large parts, we have a 35-ton counter blow hammer and a 10-ton drop hammer. The 35-ton counter blow hammer was introduced when the company moved from Kawasaki about 40 years ago. There was growing public concern about pollution at the time, as well as the issue of vibration, and that was why we relocated from Kawasaki to Miyagi. This means that, until recently, we have done manufacturing in almost the same way in

terms of techniques since long before that. We put a new production line in operation this summer, which is called the 12,800-ton screw press line, and we introduced a large press machine from the German company Schuler. We could no longer manufacture products in our traditional way, so we purchased five FANUC robots and rearranged our lines so that the robots would basically play the role of the brain with other machines surrounding those robots. I think this will cut the manufacturing cost significantly. It was a huge investment for us, but we somehow managed to gain the approval of our stakeholders to execute our plan. We have secured the factory site from a long-term perspective and are determined to continue to do manufacturing here in Japan. The equipment we have introduced reflects our determination.

Why did you decide to use FANUC robots, and how do you like them?

Acting Factory Manager Ogawa: FANUC does almost everything for us, including the installation of the system. Building the line that we put in operation this summer also went smoothly.

President Koike: FANUC is very keen to develop innovative products. Our factory is a noisy place with a lot of difficult conditions and is entirely different from clean ones. It's hard to work with us unless you are a tenacious, devoted company. I really appreciate the support that FANUC has given us. And I am proud to be doing business with a company that has such an excellent track record.



12,800-ton screw press line



Robot picking parts from a rotary furnace

Is there anything new about the five robot systems that you have introduced?

Acting Factory Manager Ogawa: That is the first production line we have ever put in operation where the handling of parts is entirely done by robots.

President Koike: We have five robots and need to achieve systematization while monitoring the interference between the robots, which does not necessarily require coordinated control. Still, building this system was very difficult for us. Basically, we had worked with standalone machines, so we felt like we were in a very different world.

Acting Factory Manager Ogawa: Our plan was to convey front axels weighing 40 to 50 kilograms or even 100 kilograms. They were difficult to carry on a conveyor, and we had a hard time with our existing production lines as well.

President Koike: I think that maintaining robots in a forging or hot forging factory like ours is very uncommon. First, we have heat. There is a tremendous amount of heat around the large special furnace. We also have oxide films, oxide scales, and dust powder peeling from parts, which the robots have to fight against. We cannot use robots unless they operate reliably even in such a harsh environment. FANUC has a considerable amount of experience and know-how in this regard. I think that the robots have a number of ingenuities where we cannot see them.

Could you give us your frank opinion about FANUC robots?

President Koike: There have been no major problems so far. It's true, and I appreciate it.

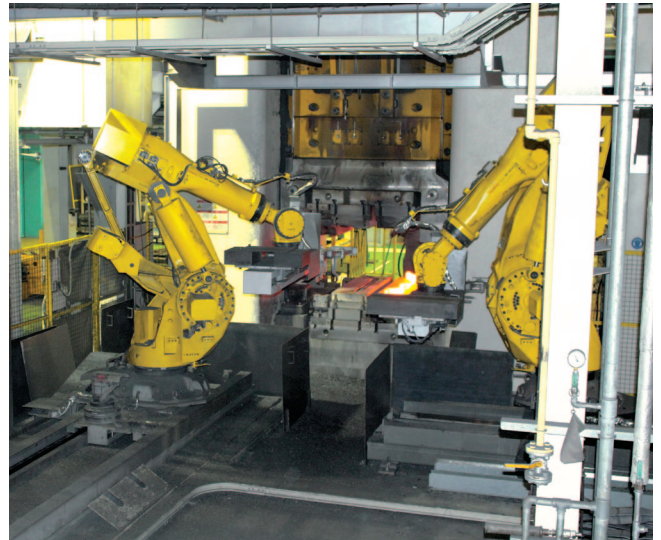
Acting Factory Manager Ogawa: FANUC is very quick in troubleshooting. Whether it is the supply of parts or anything, they get the work done by far the fastest. We also have robots from three other companies, and FANUC responds more quickly than any of them.

Do you have any requests for FANUC?

Acting Factory Manager Ogawa: I'm interested in the use of robots for picking. Currently, we have materials aligned



Conveyance of parts by a robot



Robots supplying parts to and picking parts from the press machine



Palletizing

mechanically. But, because materials vary in diameter, I feel that it is difficult to do this task mechanically. At a FANUC exhibition, I saw a bin picking robot using a magnet. Considering the speed with which it operates, I think that robot is good enough to replace the mechanical system that we currently use and can be used for many different purposes.

President Koike: A robot that uses a magnet becomes useless once the magnet is demagnetized. The best solution is a robot that is capable of grabbing parts. It would be great if we could use such a robot without a safety fence and, if possible, without the need to teach the robot.

(Interviewed by Naoki Yukisada, Vice Manager,
Public Relations Department)

TDF Corporation (<http://www.tdforge.co.jp>)

- ▶ Founded: 1930
- ▶ President: Seiya Koike
- ▶ Address: 39, Aza Hounosaku, Ooaza Numabe, Murata-cho, Shibata-gun, Miyagi Prefecture, 989-1321 Japan
- ▶ Phone: 0224-52-5411 ▶ Fax: 0224-52-5419 ▶ Number of employees: 370

Reliable
Predictable
Easy to Repair



FANUC strives to enhance operability in manufacturing sites throughout the world.

High reliability of the CNC system proven in the field.
MTBF of the 0i-D series system*: 52.9 years
* CNC system including a motor and amplifier

FA&ROBOT&ROBOMACHINE
FANUC

Dream of manufacturing sites
throughout the world:
A factory that never stops

FANUC is developing new technologies
to make this dream come true,
with a brighter future of the manufacturing industry in mind.



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