FANUC
NEWS

2018-I

A view of Mount Fuji from the New Research Center cafeteria
Photo taken on February 20, 2018

2017 International Robot Exhibition

The International Robot Exhibition was held for four days from November 29 (Wednesday) to December 2 (Saturday) at Tokyo Big Sight.

In addition to SCARA robots, collaborative robots, super heavy payload robots, and the Genkotsu robot, we also showcased many systems that apply robotics to various applications, such as welding. For IoT technologies, we showcased the FIELD system and ZDT (Zero Down Time), among others. We also showcased our factory automation (FA) and ROBOMACHINE, and introduced the "one FANUC" and "Service First" initiatives.

The system that gave away free "FIELD-onbei" cup noodles using a compact collaborative robot that was installed next to the reception desk was very popular and attracted many visitors.

The FANUC booth was kept busy with many visitors throughout the four-day exhibition period.

Collaborative robot giving away "FIELD-onbei" cup noodles

SCARA robots

Four new SCARA robots (SR-3iA and SR-6iA, two robots for each model) were displayed along the main passage as featured products.
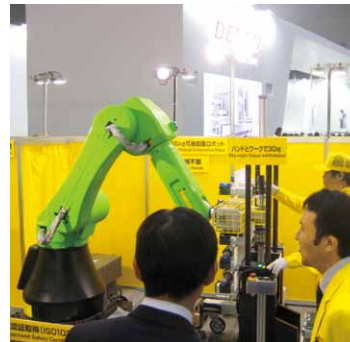
Collaborative robot

Displayed the CR-15iA, a new model with a payload of 15kg, for the first time.

Many visitors were impressed with the ease of use achieved with a compact handguidance and iHMI.

Demonstrated assembly using a collaborative robot with a payload of 35kg.

Genkotsu robot

Its speed and dexterity gathered a lot of attention.

Super heavy payload robot

Many people were impressed with the powerful motion that can lift a vehicle up to 6.2m high.

3D vision sensor

Displayed the new 3D vision sensor that can be mounted on a hand for the first time.

Washing robot

Demonstrated high-pressure washing using small and large washing robots.

Painting robot

Many people were impressed by the compactness that was achieved by integrating a 7-axis painting robot and a door opener.

FANUC IoT and AI zone

Many people were impressed with the FIELD system as an open platform that can be connected to anything.

In the ZDT area, robots in the booth were connected to the network to monitor the operation status.

Regarding deep learning, the method to automatically extract the characteristics of scars and to learn the assessment criteria to perform pass/fail evaluation was displayed.
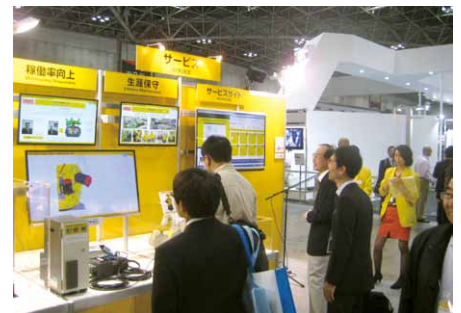
one FANUC zone

Operation management using MT-LINK*i* and the display of integrations between the CNC and robots.

Green QSSP allows users who are not familiar with robots to easily connect with a robomachine.

Introduced the downtime reduction tool and service website accessible from mobile devices.

FANUC Robot Global Partner Reception 2017

The FANUC Robot Global Partner Reception 2017 was held on the night of November 30 (Thursday).

We invited 123 global partners who are selling FANUC robots to participate in the reception from Japan and other countries.

Trophies were awarded to 28 companies as a token of our gratitude for their daily sales activities. The Grand Award was awarded to DAIDO Corporation, and Special Awards went to US-based ACIETA, Germany-based LEWA, and China-based JIANGSU CENGLARY ENGINEERING & TRADING.

The wonderful reception provided us with a sense of unity with our global partners, and gave the partner companies the opportunity to deepen the bond among themselves.

Introduction of New Products and New Functions (FA)
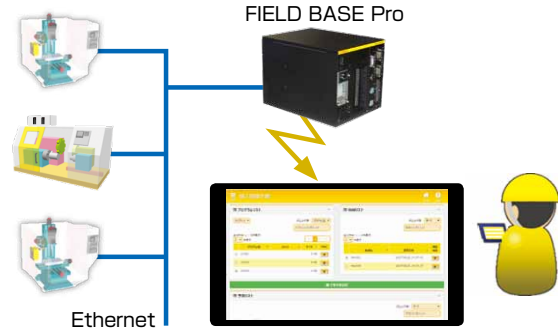
■ Cycle Time Estimate Function

FANUC has developed a new function to accurately predict the processing time when operating a processing program in the machine tool.
Represented by complicated and time consuming mold processing, this function can be used to schedule various processing.

● This function is applied to the lathe, machining center, laser, and punch press, so it can be applied to a variety of machines.

● This function simulates the CNC motion and quickly estimate the cycle time with high precision.
(About 1/20 of the actual processing time with an error margin of about ±5%.)

● Prediction is easier and more accurate because the execution time of the auxiliary function, which was manually set in the past, is now automatically measured by the CNC.
(The FIELD system version is scheduled to support this function in September 2018.)

● This function is also useful for preparing tools to be used, adjusting the processing path or for other purposes because you can predict the time and distance per feed rate or rapid traverse rate and the information on the execution time of the auxiliary function, in addition to the total processing time and total travel distance.

*i*HMI Cycle Time Estimate Function

FIELD BASE Pro

Ethernet

Operation screen
FIELD Cycle Time Estimate Function

You can choose one of the following three types for your application:

1. PC version : This version can be used as the PC version processing time prediction function that operates on the PC in combination with the NC guide.
As this version can also be embedded as a library, the processing time prediction function can be used in the customer's application.

2. PANEL *i*H Pro version : This version can predict the processing time on the machine as the *i*HMI Cycle Time Estimation in the FANUC *i*HMI application.

3. FIELD system version : This version can predict the processing time of the machine connected to the FIELD system as the FIELD Cycle Time Estimation in the FIELD system application.

■ Fiber laser system that supports the multi-functional machine

FANUC has developed a fiber laser system that is equipped with laser processing functions, such as fine processing or quenching, which turn the lathe or machining center into a multi-functional laser machine.
This system contributes to an increase in productivity through combined processing.

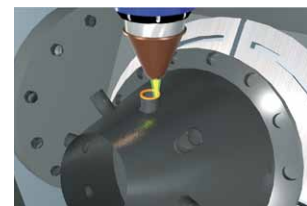### (1) Series 30*i*/31*i*/32*i*-B laser control function option

The laser control function option is a software option that adds laser processing functions to the lathe or machining center to make them a multi-functional laser machine.
This option can be added to the Series 30*i*/31*i*/32*i*-B.

● Diverse laser processing functions with proven results for sheet metal or other processing can be added.
—Laser output command
—Processing condition setting function
—Gap control for laser processing and other features

● High-speed laser control synchronized with axis control can be easily added to the machine tool to support fine processing, additive manufacturing and other processing.

Fine processing

Additive manufacturing

(2) FIBER LASER FF500*i*/FF1000*i*-A

The FANUC FIBER LASER series is a high-output fiber laser oscillator that supports a variety of fields including metal processing and welding.
New FIBER LASER FF500*i* and FF1000*i*-A models with a laser output of 500 W and 1000 W respectively have been added to models with a laser output of 2 kW to 6 kW in the lineup.
This series supports many different applications, including fine processing, additive manufacturing, welding, and quenching.

FIBER LASER FF1000*i*-A

● With a compact housing that can be mounted in a 19" rack, this series can be easily added to a lathe or machining center using the laser control function option in the Series 30*i*/31*i*/32*i*-B.

● Laser beam suitable for the processing allows deep penetration, displaying excellent cutting performance even with medium-thick mild steel plate.

Introduction of New Products and New Features (ROBOT)

■ FANUC Robot SR-3*i*A, SR-6*i*A

FANUC has developed and launched SCARA robots, FANUC Robot SR-3*i*A and SR-6*i*A, which are optimal for assembling electronics and high-speed transfer.
With high motion and usability, these robots contribute to an increase in productivity in the manufacturing field.

● The SR-3*i*A and SR-6iA are 4-axis, horizontal, articulated-type robots with a payload of 3 kg (SR-3*i*A) or 6 kg (SR-6*i*A).
With a light body and high-speed and high-precision motion built with the latest control technology, these robots can be used in a variety of applications, such as mounting components on the PC board and aligning parts.
These robots also support a dense system layout because their slim arm can avoid interference with the peripheral equipment.
● Wiring around the hand is easy because the solenoid valve is mounted in the mechanical unit and a hollow shaft is adopted.
● FANUC has developed a new compact controller, the R-30*i*B Compact plus, in line with the development of these SCARA robots.
Although the size is compact, this controller provides the latest intelligent functions from FANUC including *i*RVision.
● Since the teaching operation can be performed from a PC or tablet without having to use a dedicated teach pendant, even users who are not familiar with robots can easily perform the teaching operation.

SR-3*i*A

SR-6*i*A

R-30*i*B Compact Plus Controller

■ PC and tablet teaching function, *i*RProgrammer

FANUC has developed the *i*RProgrammer function to create robot teaching programs from a PC or tablet device.

● Robot programs can be created easily using the table-format position editing function in the graphical operation environment.
● The jog operation of the actual robot and program execution can also be performed using soft keys on the screen.
● Initial robot setup or the setup of each function can be performed with menu operations in this function as well.
● This function runs on a web browser on the PC or tablet device connected to the robot controller via Ethernet.
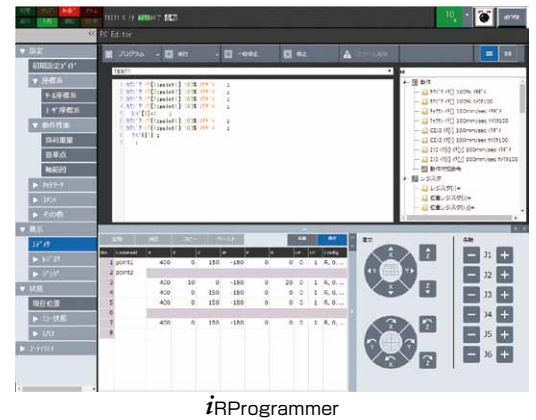
FANUC will continue contributing to the expansion of automation application fields by improving the usability of robots.

*i*RProgrammer

No.	Comment	X	Y	Z	W	P	R	UF	UT	Config
1	point1	400	0	150	-180	0	0	0	1	R, 0, …
2	point2									
3		400	10	0	-180	0	20	0	1	R, 0, …
4		400	0	150	-180	0	0	0	1	R, 0, …
5		400	0	150	-180	0	0	0	1	R, 0, …
6										
7		400	0	150	-180	0	0	0	1	R, 0, …

Table-format position editing function
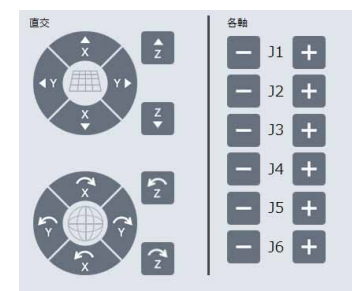
Jog operation panel

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Introduction of New Products and New Features (ROBOMACHINE)

■ AI functions for ROBOMACHINE

As the first AI functions for ROBOMACHINE, FANUC and Preferred Networks (PFN) have jointly developed the AI thermal displacement compensation function, which improves the performance of ROBODRILL and ROBOCUT, and the AI backflow monitor function, which improves the preventive maintainability of ROBOSHOT.

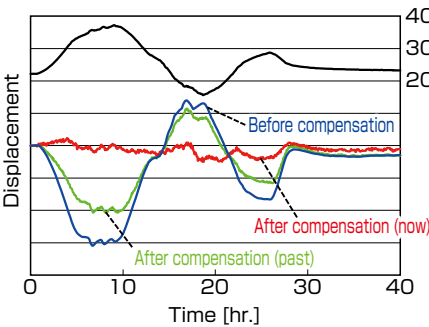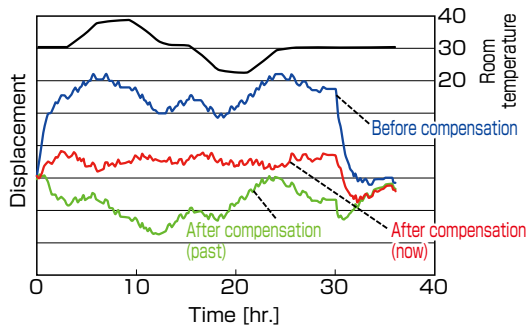### ● AI thermal displacement compensation function (ROBODRILL and ROBOCUT)

FANUC has developed and applied the AI thermal displacement compensation function to the ROBODRILL α -DiB series and the ROBOCUT α -CiB series.
The AI thermal displacement compensation function predicts the thermal displacement of the machine due to changes in the temperature or motion conditions by using AI (machine learning) technology and improves the compensation precision.
Multiple temperature sensors placed at different parts of the machine and machine learning have improved the compensation precision compared to conventional models.

ROBODRILL
α-DiB series

ROBOCUT
α-CiB series

● Application of machine learning
Optimal compensation is realized by collecting a large amount of thermal displacement data under many different environmental and motion conditions and by processing the data with the machine learning technology.
With built-in learned models, this function can be deployed immediately.

● Improvement of compensation stability
The placement of temperature sensors and the use of temperature data are devised to continue compensation even if temperature sensors fail.

ROBODRILL
Compensation result of the Z axis (example)

ROBOCUT
Compensation result of the upper guide section (example)

During data collection

● AI backflow monitor function (ROBOSHOT)
FANUC has developed the AI backflow monitor function to estimate the wear amount of the screw tip for the ROBOSHOT α -SiA series.
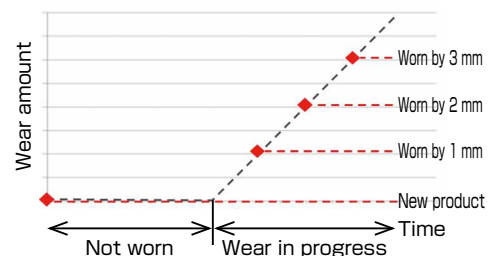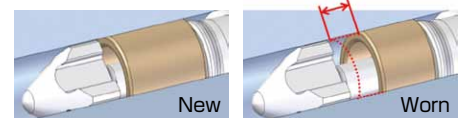
● Application of machine learning
The ROBOSHOT is equipped with a backflow monitor to monitor resin behavior (backflow) during injection by using the servo technology.
The AI backflow monitor is a function to estimate the wear amount of the screw tip from the backflow during molding.
Built-in learned models are created by applying machine learning to a large amount of data collected under many different conditions and associating the backflow with the wear amount of the screw tip.

● Realization of preventive maintenance
Maintenance becomes more efficient because you can check the wear status of the screw tip on the ROBOSHOT screen without additional sensors.
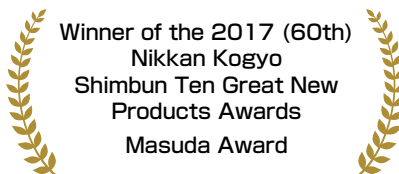
ROBOSHOT α-SiA series

New   Worn

Worn by 3 mm
Worn by 2 mm
Worn by 1 mm
New product

Not worn | Wear in progress

FIELD system

Winner of the 2017 (60th) Nikkan Kogyo Shimbun Ten Great New Products Awards Masuda Award

The Ten Great New Products Awards are awarded by Nikkan Kogyo Shimbun Ltd. to products developed or commercialized by participating companies during the award year that support the development of manufacturing industries and improve the international competitiveness of Japan.
The award ceremony was held on January 29 (Monday) at Keidanren Kaikan, where President Imizu of Nikkan Kogyo Shimbun Ltd. presented an award certificate and a plaque to Chairman Inaba of FANUC.

Winner of the 2017 Nikkei Outstanding Product and Service Awards Highest Award

The Nikkei Outstanding Product and Service Awards are awarded by Nikkei Inc. once a year to outstanding new products and services.
The award ceremony was held on February 7 (Wednesday) at the Imperial Hotel Tokyo, where President Okada of Nikkei Inc. presented a certificate and a bronze statue to Chairman Inaba of FANUC.

Award winner: FIELD system

The FIELD system is an open platform specialized for the manufacturing industry and developed for edge heavy computing, in which large amounts of data go through high-level processing near edge devices.
This system can be connected to various devices within the factory floor, making it possible to visualize the manufacturing process, conduct preventive maintenance, perform advanced analysis using AI, and control devices in accordance with analysis results.
By registering as a FIELD system partner, companies can freely develop and sell applications and converters.
By downloading applications and converters as necessary, companies can build systems that are suitable for different types of manufacturing sites.

The Mibu laser factory manufactures fiber laser and carbon dioxide gas laser.

20,000 units have been produced from 1987, when production started at the factory, to November 2017.

Currently, 500W to 6KW fiber laser and 1KW to 6KW carbon dioxide gas laser are manufactured in the factory.

In October 2017, FANUC built a new three-story factory building with total floor area of 32,000 m^2 at the premises of Mibu factory in Tochigi Prefecture and moved laser factory to this area from the headquarters.

The current monthly production capacity of 100 units can be increased to up to 400 units in the future.

On the first floor, FF Laser, a joint company of FANUC and Furukawa Electric, manufactures LD modules, which are the core part of the fiber laser. Fiber laser is manufactured on the second floor while carbon dioxide gas laser is manufactured on the third floor.

External appearance of the Mibu laser factory

Automatic manufacturing line of LD modules by FF Laser Corporation (1st floor)

The unique LD module manufacturing line on the first floor integrates the LD module manufacturing technology of Furukawa Electric, which includes a 1/1000mm high precision core adjustment process, with the automation system that utilizes FANUC robots.

In addition, the ultraprecision nano machine tool, ROBONANO α -0iB, is used for the ultraprecise processing of mirror holder for carbon dioxide gas laser.

On the second floor, high-precision assembly and fiber laser tests are performed in the clean room, which is strictly managed by monitoring the temperature, humidity, and particle amount.

On the third floor, the automatic test system using the FANUC CNC efficiently tests the carbon dioxide gas laser. FANUC is working to further improve its quality using an inspection system that measures the curvature and reflectivity of optical parts.
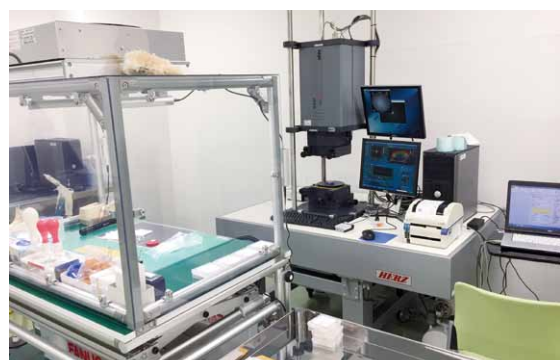

Mirror holder processing using the ROBONANO α -0iB (1st floor)

Assembly of fiber laser (2nd floor)

Automatic carbon dioxide gas laser test using the CNC (3rd floor)

Inspection of curvature and reflectivity of optical parts (3rd floor)

Exhibition Information

● Smart Factory EXPO

Overview · Period: January 17 (Wednesday) – January 19 (Friday), 2018
· Venue: Tokyo Big Sight

Key exhibit · FIELD system
(Explanation of concepts, introduction of various application software, exhibition of small-scale and large-scale system hardware, introduction of "Connect Everything" for various edge devices, explanation of service and support structures, introduction of the FIELD system store, and introduction of FIELD system partners)

● The 17th International Nanotechnology Exhibition (nanotech 2018)

Overview · Period: February 14 (Wednesday) – February 16 (Friday), 2018
· Venue: Tokyo Big Sight

Key exhibit · Demonstration of Head Up Display mold machining using ultra precision machine tool
· Smart measurement package (SMP) that integrates the peripheral equipment of nanomachines
· FANUC's precision molding technology
· FANUC's latest CNC and nano control servo
· FANUC's IoT technology and AI control technology
· Services

● The 4th Interphex Osaka

Overview · Period: February 21 (Wednesday) – February 23 (Friday), 2018
· Venue: Intex Osaka

Key exhibit · High-speed transfer systems for cosmetics
· Compact collaborative robots and iHMI
· High-speed alignment system for cosmetic samples
· High-speed alignment system for medical products
· Alignment system for containers
· FIELD system
· Application consultation corner

FA Foundation Research Paper Award Ceremony

President Matsuno

President Yamaguchi

On December 8 (Friday), the 2017 FA Foundation Research Paper Award Ceremony was held at the Kazan Kaikan Conference Center.

This foundation aims to improve automation technologies for engineering and industrial machines, and to contribute to Japan's industrial and economic development by recognizing outstanding research achievements on FA and industrial robot technologies.

For this year's award ceremony, seven research papers were chosen in total for the award from bodies of work recommended by the Japan Society for Precision Engineering, the Japan Society of Mechanical Engineers, the Robotics Society of Japan, and others based on an objective and thorough review.

Visiting Users

Hitachi Automotive Systems, Ltd.

Hitachi Automotive Systems, Ltd. is a world-class total supplier of automotive equipment. With their corporate vision of "contributing to a prosperous society by creating new value for people, cars, and society," Hitachi Automotive Systems is driving the growth of the automotive society forward.
We visited their facility in Kori, Fukushima, and spoke to Mr. Murakami, who is the manager of the Industrial Science Section, Suspension Division, Driving Control Department.

Mr. Murakami

Please tell us about your company's history and business domain.

Murakami: Our company was started in 1930, when our parent company, Hitachi, began the manufacture of automotive equipment. After that, Hitachi merged with Unisia JECS and Tokico in 2004.
Five years later in 2009, we separated from Hitachi and became Hitachi Automotive Systems.
We have over 10 facilities in Japan, including the Atsugi Works, Sawa Works, and Yamanashi Works.
Here at Fukushima Works, we began manufacturing shock absorbers in 1980. Today, we not only build mechanical shock absorbers, but also electronically controlled shock absorbers.
We have many facilities overseas in places like China, North America, and Europe. In recent years, we have been focusing on expanding our facilities in China and Mexico.

Please tell us what makes your company unique.

Murakami: We are what you would call an independent total supplier, so we do not limit ourselves to certain brands and we provide automotive equipment to customers all over the world.
We also leverage the strength of the Hitachi Group to conduct technological development and product

development together with Hitachi and Clarion.
Today, there is a growing demand for digitized technology, such as for safety improvement and self-driving technology. We focus on proactively pursuing the development of digitized products, such as electronic control units and hybrid systems.
Furthermore, we also handle a wide range of automotive parts, such as stereo cameras, ECU, VTC, hybrid motors, and inverters. We provide our customers with these products as an entire system, which has been highly evaluated.

Your company has been using many FANUC robots. Could you tell us why you began using our products, and your thoughts on it?

Murakami: At Fukushima Works, we manufacture semi-active suspensions.
In the beginning, manufacturing took place in manual production lines, but when we decided to expand manufacturing of semi-active suspensions, we considered automating our production lines.
That was when we began using FANUC robots. Today, we are using many FANUC robots not only to transfer parts, but also for assembly and welding.

View of Fukushima Works

Installation of a FANUC Robot in the suspension welding line (Fukushima Works)

You have been using many of our FANUC ROBODRILLs.
Please tell us your thoughts after using them.

Murakami: When I was posted at our factory in the Czech Republic, we installed a system that combined the FANUC ROBODRILL and the FANUC robot.

The compatibility between the two was seamless; we never once had a breakdown or failure.

How would you evaluate FANUC?

Murakami: We have many facilities not only in Japan, but all over the world.

FANUC has many service sites around the world, so if we use FANUC products, we have access to the same services provided in Japan at our overseas facilities.

I think this is one of the greatest strengths of FANUC, and it has helped us a great deal.

We are still using old machines at our Japanese facilities, but FANUC provides repair services and maintenance for outdated machine parts, which we are grateful for.

Please tell us if you have any requests that you would like to make to FANUC.

Murakami: At our company, we use many units of ROBODRILL, and we rarely have any problems with them. However—and this perhaps cannot be helped due to the structural design of the machines—when we try to perform complex machining, we often do not have enough tools.

When we need to perform machining for a wide variety of parts, we have to change the tools every time, so it would be great if we had Robodrills with more ATCs.
(Interviewer: Shingo Numoto, Public Relations Department)

Installation of a system that combines the FANUC ROBODRILL and the FANUC robot (facility in the Czech Republic)

Hitachi Automotive Systems, Ltd. (http://www.hitachi-automotive.co.jp/index.html)
▶ Representative Director and CEO: Hideaki Seki ▶ Capital: 15 billion JPY (wholly owned by Hitachi) ▶ Revenue: 992.2 billion JPY (March 31, 2017, consolidated) ▶ Number of employees: 40,100
Headquarters ▶ Address: Shin-Otemachi Building, 2-1, Otemachi 2-chome, Chiyoda-ku, Tokyo, 100-0004 Japan
Fukushima Works ▶ Address: 3-2 Narita Nakamaru, Kori-machi, Date-gun, Fukushima Prefecture, 969-1652 Japan

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Four Seasons of FANUC

On a cold February morning, a green pheasant stopped by the forest of FANUC for a visit.
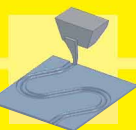Its brilliant colors and dignified look stood out against the bright, snowy white landscape.

ROBONANO α-NMiA

Ultra Precision Machine with Enhanced Ease of Use and Sustainability
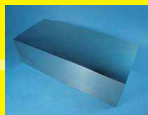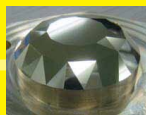
Milling processing (curved surface)   Cutting processing   Milling processing (groove)

HUD mold processing   Clock parts   Hologram