

# CYBER WORLD

2023  
No.67

## Aiming for environmentally friendly manufacturing



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# New Year's greeting 2023



New Year's greeting  
President Takashi Yamazaki

I wish you a Happy New Year.

The machine tool industry continued to perform well worldwide last year, with the Japan Machine Tool Builders' Association (JMTBA) revising upward its forecast for orders at the beginning of the year. As economic activities normalized in various places, large-scale exhibitions such as IMTS in the United States and Japan International Machine Tool Fair (JIMTOF) in Japan were held in the latter half of last year. JIMTOF2022, which was held for the first time in four years, attracted many visitors from Japan as well as from Asia. We are looking forward to seeing even more customers this year as travel restrictions due to the coronavirus are easing.

Last year was a year in which significant progress has been made in the conversion of automobiles to Electric Vehicles (EVs), due to the acceleration of the global move towards decarbonization and soaring energy prices. Especially in Asia, Europe, and the United States, EV-related capital investment has progressed actively, and we have received many orders for machine tools. Under these circumstances, we launched a new product, the FSW-460V, which contributes to the mass production of parts for EVs. This new model achieves high-speed, high-quality friction stir welding, and contributes to the highly efficient production of motor cases, and inverter cooling equipment. We will focus on product development looking ahead to the next generation and contribute to the development of environment-related industries such as EVs.

In order to contribute to the decarbonization of society as a machine tool manufacturer, we believe it is important to reduce power consumption when using machines in our customers' factories. Last year, we expanded the "NEO series" with enhanced energy-saving performance. The FG-400 NEO, a 3D laser processing machine with a fiber laser resonator, and the HCN-5000 NEO, a horizontal machining center equipped with a coolant control function, and many other new products with significantly reduced power consumption were presented. These products reduce power consumption and simultaneously

increase machining performance. We will continue to develop products that achieve both reductions of environmental impact and improvement of productivity.

In addition to decarbonization, the manufacturing industry is facing issues such as a shrinking workforce and a shortage of skilled workers. Efforts to improve efficiency and save labor at manufacturing sites are required so that people can concentrate on higher value-added work. In this context, we have developed the Mazatrol DX software to transform the manufacturing process on the production site. Using 3D model, AI and digital twin technology, Mazatrol DX enables "automatic estimation", "automatic program generation", "issuing digital instructions to the machining site" and "automatic measurement support" all through one system. We will continue to further advance digital technology and work towards the development of the programless CNC, which does not require setup on site.

In addition to product development, we are also strengthening our support system to help our customers improve their productivity. Last year, we have newly established and renewed our support locations in Europe and the United States. In Italy, we have expanded our laser support base, and in Eastern Europe, where the manufacturing industry is developing remarkably, we have opened a technical center in Romania. In the United States as well, we have expanded our laser support bases and have further enhanced our support system. We will continue to provide before and after-sales service at a location close to our customers.

The environment surrounding the manufacturing industry is becoming more severe, with rapid inflation, exchange rate fluctuations and fragmentation of global supply chains. In this situation, we will continue to work together to provide solutions that support further development of the manufacturing industry.

I hope for your continued good health and success and renewed support in this New Year.

# Digital manufacturing solutions for carbon neutrality

## MAZATROL realizes high productivity and environmental impact reduction

With the background of growing global environmental risks and energy supply problems, Mazak has set a goal of "50% reduction in carbon footprint by 2030" and will reduce CO<sub>2</sub> emissions throughout the product life cycle. The majority of CO<sub>2</sub> emitted during the product life cycle is "power consumption during product use". For this reason, we utilize the production facilities of our Mazak iSMART Factory™, to develop new products and new functions that reduce power consumption during product use.

A Mazak machine tool with MAZATROL CNC system at its core, achieves both high productivity and the reduction of environmental impact. The next-generation model HCN NEO series has an "energy saver" function that enables visualization of the power consumption of the machine, power saving during standby state, and energy saving control of coolant equipment. It can be equipped with an optional

"smooth coolant system" that reduces running costs and environmental impact during sludge disposal. In addition, the "Ai Thermal Shield" function, which stabilizes machining accuracy, from the accumulated machining data, has been advanced to shorten the warm-up time. It maintains machining accuracy even more than before.

These functions are graphically visualized on the screen of the MAZATROL CNC system and can be operated easily and interactively. MAZATROL DX software realizes digital transformation (DX) at the manufacturing site. It shortens the process that was conventionally performed at the site, such as estimation and program generation, increases the machine operation rate, and reduces losses and errors due to hand work. In addition, it enables long-term automatic operation by combining with an automation system.



## MAZATROL DX\*

Digitize the machining site with the advanced MAZATROL

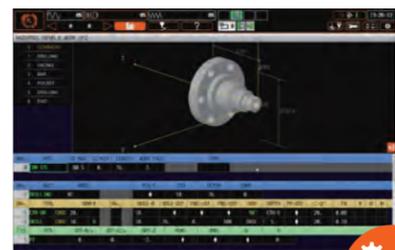
Replaces work performed on the machine with office work using a virtual machine tool. Automation of on-machine operations using digital information minimizes operator work and enables the start-up of processing in a short period of time.

\*The release day of the Mazatrol DX varies by market.



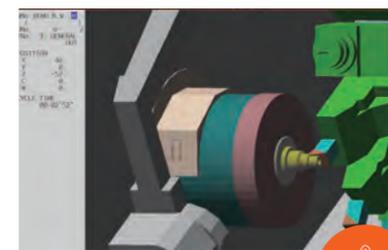
**Digital quotation**  
QUICK QUOTE

Automatic calculation of machining times (production costs) from 3D CAD models. Anyone can estimate easily and quickly.



**Automatic / conversational programming**  
SOLID MAZATROL

Mazatrol programs can be automatically generated from 3D CAD models in a short time.



**Simulation**  
VIRTUAL MACHINING

The latest data on the machines registered in the network is acquired, and accurate simulations are performed.



**Machining analysis**  
CUTTING ADVISER

Cutting adviser optimizes machining conditions by machining simulation and visualization of the machining process from accumulated machining results.



**Automated on-machine setup**  
SETUP GUIDE

The completed manufacturing data is sent to the machine as setup instructions. Additional setup instructions are not required.

## NEO series with high productivity and environmental performance

Next generation high performance horizontal machining centers with environmental performance

### HCN NEO SERIES

Spindle specifications to meet a wide variety of machining requirements. Optimal control of coolant discharge amount by energy saver and smooth coolant system (option).



Next generation high performance 5-axis vertical machining center with environmental performance

### VARIAXIS NEO SERIES

Simultaneous 5-axis vertical machining center with a wide variety of spindles. The tilting/rotary table and high-rigidity machine construction ensures sustained machining accuracy.

The Mazak NEO series is an environmentally friendly model range for a carbon-neutral society. The MAZATROL CNC system equipped with a high-performance machine and the latest functions ensure high accuracy and high productivity. This evolves into a 'Next Generation' machine, with enhanced spindles, tables, hydraulic fixtures and automation equipments, equipped even more 'Excellent' specifications, capable of providing 'Optimal' solutions to meet customer needs.



### Fiber laser processing machines reduce power consumption



2D fiber laser processing machine for high-speed and high-quality cutting in a wide range of material

### OPTIPLEX 3015 NEO

Available with 3.0 kW, 4.0 kW, 6.0 kW, 10.0 kW and high-output 15.0 kW fiber laser power. High-speed and high-accuracy cutting is ensured with beam shaping. Power consumption is reduced by 60% compared to a conventional machine.

3D fiber laser processing machine for large and long pipes and structural materials

### FG-400 NEO

The 3D laser head improves accuracy for joining pipes and structural materials. Automatic and continuous 3D laser cutting of long pipes and structural materials. Complete all cutting processes in one machine. High-speed, high-quality cutting is ensured with beam diameter control. Power consumption is reduced by 40% compared to a conventional machine.



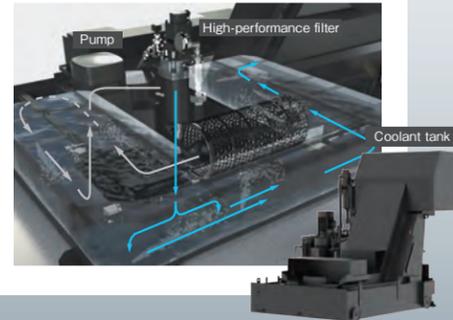
### Energy saver

Energy consumption and the regenerative power produced through the energy saving equipment can be viewed visually on the CNC system - control/management of coolant and other equipment.



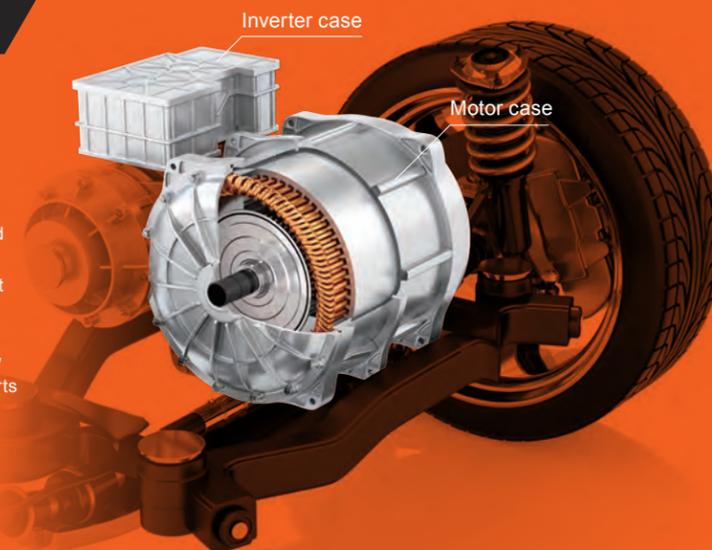
### Smooth coolant system

The coolant tank has a coolant jet that makes a vortex in the center so that small machined chips will not settle in the tank. Thanks to this feature, the coolant tank stays clean and the service life of the coolant is extended. Ease of maintenance is also ensured.



## FSW total solution for EV manufacturing

As part of the worldwide environmental efforts, the EV shift in vehicles is rapidly expanding, with the goal of zero emissions. In the EV market, there is increasing demand for the processing of modular components for motor and battery. In order to meet such demand, Mazak developed the FSW-460V equipped with Friction Stir Welding (FSW) technology for stirring and joining materials softened by friction heat. The newly developed high-speed, high-rigidity spindle and our original tool that supports high-speed feed, enables high-speed and stable joining. Furthermore, a tool holder with built-in IoT sensor make it possible to control the thrust force during joining at a constant level, preventing defects from insufficient pressure and burrs due to excessive pressing. It is a dedicated machine with the machining performance and high rigid structure required for machining module components. Mazak's FSW total solution, with FSW-460V as the core, provides high-speed and stable joining, low equipment costs, support for machining process development, etc., from prototyping EV parts used for motor and battery cases to establishing mass production machining methods.



### High speed and high accuracy FSW machine FSW-460V

Based on a general-purpose vertical machining center, FSW machine achieves high-speed, high-accuracy friction stir welding.





## Customer Report

# TOPPO GEORGE'S MACHINE TECH

Using the latest technology to make old motorcycles look better than when they were new

TOPPO GEORGE'S MACHINE TECH is regarded as a "last resort for repairing old Harley-Davidsons" by people in the same business and fans. They have a variety of machine tools that general motorcycle maintenance shops do not have, doing everything in-house from disassembly to inspection, machining, assembly and adjustment.

#5-axismachine #On-machinemeasurement #Customizedmotorcycle #Japan



All processes are performed on the machine by VARIAXIS j-500/5X



A variety of parts lined up on the counter



Mr. Shizuka, President (left) and his son

### Started a business specializing in remanufacturing Harley's internal combustion engines

The company's predecessor was TOPPO GEORGE'S MOTOR CYCLES, which was founded in 2007 by Mr. Shizuka, President, after training at Harley shops in Kyoto and Tokyo, he said, "I want to live doing what I like." They specialize in the maintenance, sales, and customization of Harley-Davidson. The refurbished vehicles they handle are old vehicles mostly from the 1930s to the 1990s.

"Our specialty is regenerating the internal combustion engine. Using cutting-edge technology, we can polish old cars to a level better than when they first came out," said Mr. Shizuka, President. "We had tools, a hydraulic press machine, a TIG welding machine, an old general-purpose lathe, a drilling machine, etc. Still, I felt the limitations on analog operation in accuracy and time as most of the regeneration of old internal combustion engines requires index machining."

Therefore, President Shizuka looked for a machine tool that performs the entire process on-machine, from the current measurement of the workpiece to the inspection after machining.

"We were convinced that not only would production lead time be shortened, but accuracy would also be improved." In this way, they decided to introduce VARIAXIS j-500/5X in April 2021. The deciding factor was that the entire process could be done in one chucking, and that it could be linked with the NC gage.

### 0.0008 mm (0.00003 inch) bore tolerance realized by NC gage

The machine comes in handy for various machining, such as jig boring for the crankcase, plane cutting for the lifter block, line boring for the camshaft bearing bushing, and oil pump surface cutting. "We use it not only for parts machining, but also for manufacturing jigs for our own machines that are not available from manufacturers," said President Shizuka.

"The most important thing is that we can avoid the

precision misalignment that occurred with the conventional method, in which machines were changed according to the process and set up one by one."

President Shizuka evaluates the advantages of introducing this machine. "The feature of being able to incorporate NC gage on the machine was a particularly significant point of selection that other company's products did not have. We always believed that measurement was the key to machining."

President Shizuka praises the high accuracy achieved by the NC gage linkage: "We were able to achieve a bore tolerance of 0.0008 mm (0.00003 inch) after boring, which was barely 5 microns (0.005 mm/0.0002 inch) before, even with best efforts." Compared to a general-purpose machine, the required time has been reduced to about one-third.

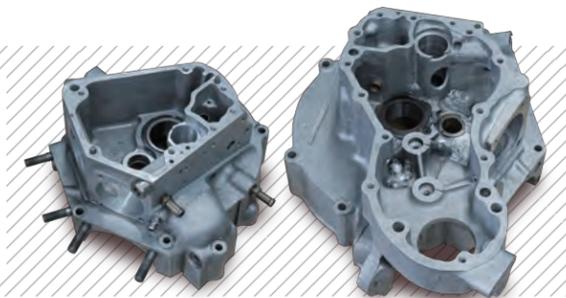
"Estimated from the time reduction effect, the cost can be reduced to about one-third," he said, looking satisfied with the results after the introduction.

### Expanding business towards Harley fans around the world

"Actually, there are quite a few dealer shops that cannot repair old vehicles like the ones we handle. It seems that the number of shops that can repair them is decreasing because the veteran mechanics who know the vehicles of the time have already retired. That is the reason customers rely on us." President Shizuka sees the position and significance of the company in that way. Reflecting on this situation, the storefront is lined with old cars waiting for repair, and parts for repair requests are delivered day after day from tradesmen all over the country. "The engine's durability is outstanding, assembled with each part machined precisely and accurately line machined. It is transformed into a great engine with increased power." Delivery time for parts gathered from all over the country is about one month. The VARIAXIS j-500/5X contributed to shortening the period. "I want to be able to respond to orders from overseas in the future." President Shizuka's dream seems to be expanding.

Workpieces processed by Mazak machine

Internal combustion engine regenerated by President Shizuka



Please check our website for more information about on-machine measurement.



#### TOPPO GEORGE'S MACHINE TECH

President : George Shizuka  
 Head office : 1F, 1-28-16, Take, Yokosuka, Kanagawa, Japan  
 Number of employees : 2  
 toppogeorge-mc.blog.jp



Old Harleys lined up in stores



Mr. Shizuka, President, talks about the machining accuracy of the internal combustion engine



Internal combustion engine machined with VARIAXIS j-500/5X

# Mazak News & Topics

News & Topics

01

## "Machine Tool Utilization Lecture" Held by the Factory Scientist Association



For four days from September 27, 2022, "Factory Scientist Machine Tool utilization lecture" was held at the Yamazaki Mazak, Minokamo Plant 1. Three participants attended the four-day course consisting of classroom lectures, verification using a machine, and presentations. The participants experienced a series of hands-on processes using the latest machine tools at Mazak's facility. The concept is to create a machining program on the actual machine, experience machining, obtain operation data, and present everyone's work on the final day. The course was well received, with comments such as, "It was a practical and meaningful course that also applies to our company's machine tools." Mazak will continue to aim to develop factory scientists who will contribute to improving the productivity of machine tools, along with the increase of machine tool utilization lecture of the Factory Scientist Association.



Machine tool utilization lecture

## What is the Factory Scientist Association?

Factory Scientist Association is a general incorporated association for the purpose of cultivating "factory scientists". It is working to develop human resources who can acquire, analyze, visualize, and utilize data by combining IoT devices and sensors. About 99.7% of all businesses in Japan are small and medium-sized businesses. While it is difficult to introduce a system that requires large-scale investment these days, there are examples of businesses that create similar functions by combining convenient web services and devices. They believe that they need people who have this kind of ability, who can communicate with the workers on site and managers, and who can propose the next move for the company, so we provide a curriculum to cultivate such people.



### The role of the factory scientist



News & Topics

02

## Introducing carbon-neutral initiatives to visitors

### JIMTOF2022 Nov.8 >> 13

Japan International Machine Tool Fair (JIMTOF) was held for the first time in four years, with the theme of "manufacturing solutions for carbon neutrality." We exhibited 19 machine tools and laser processing machine, including seven new models. Among them, the NEO series, a new product that has achieved energy saving, efficiency, and high accuracy, attracted attention. At the venue, we showed energy saver that display power consumption and smooth coolant systems that enable energy-saving control of coolant. As efforts toward a decarbonized society due to rising environmental awareness are accelerating, many visitors were able to experience this. In addition, digital setup was introduced as a manufacturing solution that utilizes digital technology. The CNC system, MAZATROL, makes it possible to create estimates easily and quickly, automatically calculate processing times, and shorten production lead times. On the stage at the entrance of the booth, special lectures by five famous persons and popular YouTubers were held on a daily basis. Every lecture on Japanese manufacturing using digital technology was a great success, attracting many visitors. On the first day, Mr. Taro Monozukuri, a YouTuber who specializes in manufacturing; on the second day, Mr. Kiyoyuki Okuyama, a notable



industrial designer and representative of KEN OKUYAMA DESIGN; on the third day, Mr. Masato Otsubo, a representative director of the Factory Scientist Association, and on the fourth day Mr. Mitsunobu Yoshida, Managing Executive Officer of MISUMI Group Headquarters and President of ID Company. Mr. Tonkotsu of Nantoka Zyukou, a YouTuber specializing in manufacturing, took the stage on the fifth day. The metal processing technologies exhibited at the machine tool trade fair is attracting attention both at home and abroad as the foundation of the manufacturing industry. Minister of Economy, Trade and Industry, Yasutoshi Nishimura, who visited the JIMTOF and METALEX held in Thailand, also stopped by the Mazak booth.

**Mazak** VR BOOTH  
JIMTOF2022 Mazak VR booth



**Mazak YouTube Channel**

The latest machine tools and machining technologies are available!



### METALEX 2022 Nov.16 >> 19

The metal machining exhibition METALEX was held in Bangkok, Thailand for the first time in two years. Mazak exhibited four new products and technologies, including the FSW-460V, which was exhibited for the first time in Thailand. In the current Thai market, the demand for parts related to automobiles, aircraft, and semiconductors is rising and predicted to grow. Mazak has developed a machine equipped with high-speed and stable friction stir welding (FSW) technology for these markets, and proposed FSW solutions that differ from conventional welding. The machining efficiency and quality advantages of FSW have received a lot of attention and interest from visitors in the automotive industry, where the EV shift is accelerating.



LÉGER, Jules Fernand Henri [1881-1955], "Cenpa", 1953, Oil on canvas

THE YAMAZAKI MAZAK MUSEUM OF ART  
Collection Showcase

## Cenpa

LÉGER, Jules Fernand Henri

The oil painting Cenpa is an unusual work because it was made as a study for an advertisement for the paper mill. In Léger's times, there were many people who issued warnings and criticisms against modern industrial society and machine civilization. With his active mind, he was aware of these criticisms, but in spite of them he attempted to find the beauty in machinery and maintained a stance of deliberately defending machine civilization. As early as the beginning of the twentieth century, he used automobile engines and construction sites as images in his painting.



**M** THE YAMAZAKI MAZAK  
MUSEUM OF ART

<https://www.mazak-art.com>

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.

