

# WITH MATERIALS

MITSUBISHI MATERIALS communication magazine

WINTER  
2024  
vol.

08



SPECIAL FEATURE  
**BECOMING  
THE STRENGTH OF  
THE WORLD'S  
MANUFACTURING**



# BECOMING THE STRENGTH OF THE WORLD'S MANUFACTURING

Mitsubishi Materials has set out “Our Commitment” of “For people, society and the earth, circulating resources for a sustainable future” in its Medium-term Management Strategy (“FY2031 Strategy”).

In this issue, we will cover the tools used for machining and cutting objects at manufacturing sites in a wide range of industries, including automotive, aerospace, medical, die and mold, hygiene, and more.

You may not normally ever encounter these tools, but they are actually an indispensable part of manufacturing, which supports our lives.

For more information on the Medium-term Management Strategy FY2031, please see our website.



## Automotive

### Creating key components for automobiles

One automobile is made up of approximately 30,000 components. Engines and brakes are key automobile components that control “moving” and “stopping” while withstanding large amounts of force. Mitsubishi Materials’ tools play an active role at vehicle manufacturing sites that carry out precise metalworking.



## Aerospace

### Machining strong materials that withstand even difficult flights

Fly in the skies at an altitude of around 10,000 meters on wings equipped with jet engines that have approximately 100,000 horsepower. In order to endure even these kinds of harsh conditions, aircraft are built with lightweight but strong alloys and carbon fiber reinforced plastics. Mitsubishi Materials’ tools cut these out as well.



## Medical

### Processing prosthetic joints that restore the joy of movement

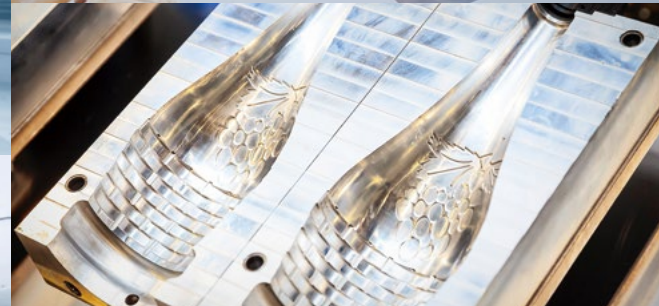
Restorative medical devices, such as dental bridges, joint replacements, and artificial bones, restore and support the functions of bones and joints that no longer operate as they once did due to injury, sickness, or aging. Mitsubishi Materials’ tools also play an active role in this field, which often uses alloys that are difficult to process.



## Die & Mold

### Necessary for smartphones as well as PET bottles

Dies and molds are used to shape various materials, such as metal, glass, and plastic. From smartphones to PET bottles, they are essential for shaping all types of objects. The quality of a mold will affect the quality of the product. Mitsubishi Materials’ tools are also used for the processing of these molds.



## Hygiene

### Precisely cut out even soft materials

Manufacturing sanitary products, such as disposable diapers and bandages, involves a processing step that cuts paper and non-woven fabrics into complex shapes. MMC RYOTEC, a group company of Mitsubishi Materials, supports efficient production by supplying tools known as rotary die cutters, which cut these materials out like a cookie cutter.







# Incredible features of Mitsubishi Materials' carbide tools

Among Mitsubishi Materials' tools, carbide tools have continued to be produced using technology accumulated over many years. These are extremely hard, strong tools that are indispensable for machining metal components. Here, we will explore the remarkable features of these tools using numbers and keywords.

## The precursor to carbide tools! 90 years of history in business

Mitsubishi Materials' history with carbide tools began with the product named "Tridia," which was developed by the predecessor to Mitsubishi Materials, Mitsubishi Mining, and trademarked in 1933. Not long before this, the manufacturing method for tungsten carbide was developed in Germany in the 1920s, and commercialized. As a global pioneer, Mitsubishi Materials has taken the path of Japan's leading carbide tool manufacturer, creating a number of innovations through many years of research and development.



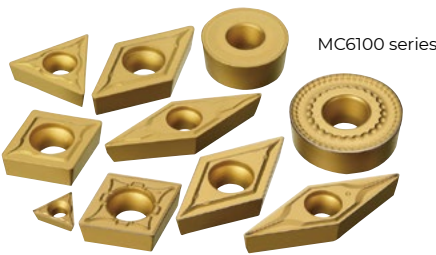
Working at the Tokyo Plant (predecessor to the Tsukuba Plant)



Extensive product lineup to meet every need

\*Number of standardized DIAEDGE cutting tool items

37,000 items



### Results of repeated challenges

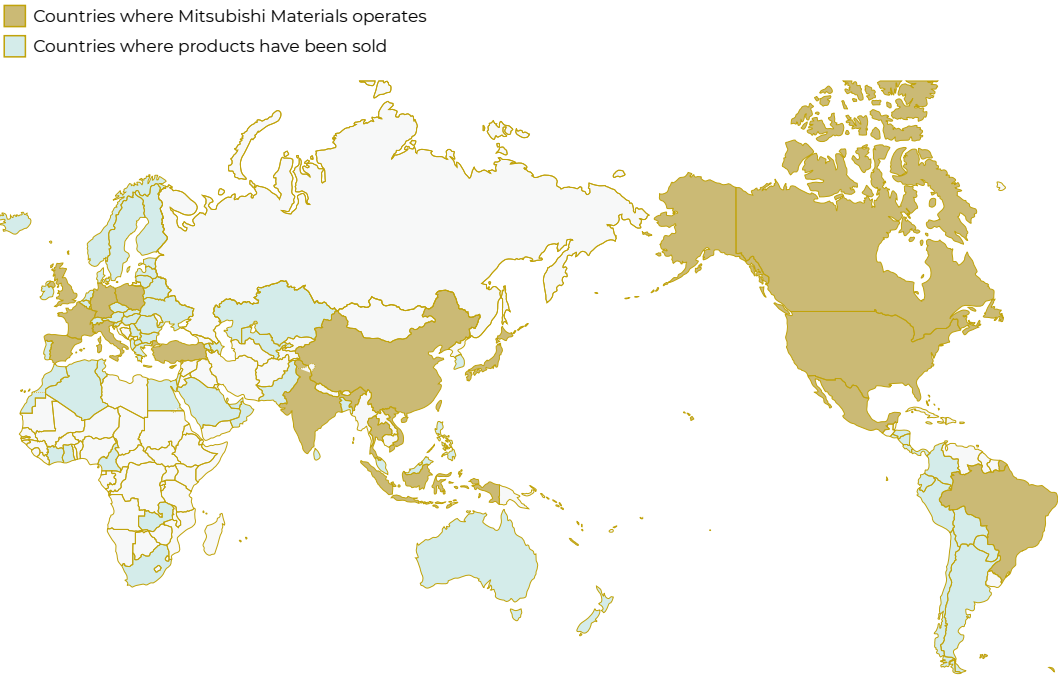
736 domestic patents

Mitsubishi Materials boasts 694 proprietary patents and 42 patents shared with other companies for a total of 736 patents (domestic patents only; as of January 1, 2024). Focusing efforts into many years of development has led to the acquisition of a number of patents. Engineers are always looking beyond the future and taking on the challenge of creating new technologies.

As a general tool manufacturer, Mitsubishi Materials boasts a product lineup of over 30,000 items. These tools are supplied widely to customers around the world through global logistics bases. The automotive and aerospace industries have diverse needs related to cutting-edge materials and technologies, and Mitsubishi Materials has a lineup of carbide tools that can meet such diverse machining needs.

## Global business expansion Operating 27 companies in 19 countries Sales in 88 countries

Mitsubishi Materials manufactures its broad lineup of tools in Japan and overseas and conducts sales in the global market. It has also established technical centers in various regions of the world and provides solution services, such as trial machining, various types of training, and technical consultations, to customers around the world. Mitsubishi Materials utilizes its world-class technological capabilities cultivated through this abundant experience and knowledge and plays an active role globally.



According to the 2022 sales results of DIAEDGE<sup>\*1</sup> cutting tool, its overseas sales ratio was approximately 80%. Mitsubishi Materials expects demand for carbide cutting tools to continue to increase and sales to exceed 2 trillion yen globally by 2030. To respond to this demand, we will further bolster overseas sales and continue to expand business in North America, Europe, and China as our focus areas.

\*1 DIAEDGE: Product brand developed by the carbide tools business of Mitsubishi Materials

80% overseas sales ratio for cutting tools

## Make the electricity used for manufacturing 100% carbon neutral by 2030

Ahead of the other businesses, the Metalworking Solutions business of Mitsubishi Materials has formulated a plan to make the electricity used for manufacturing 100% carbon neutral by FY2031. Through this, it will contribute to the reduction of greenhouse gas (GHG) emissions. From FY2023, the Metalworking Solutions business began using electric power companies' renewable energy plans<sup>\*2</sup> and purchasing renewable energy for domestic manufacturing bases. It has also started procuring non-fossil fuel energy certificates<sup>\*3</sup> for renewable energy generated in-house. Furthermore, as one specific form of capital investment, the Metalworking Solutions business has introduced solar power generation at the Akashi Plant, Gifu Plant, and MMC Tools (Thailand) Co., Ltd. It will continue to actively contribute to the realization of a decarbonized society through self-sufficient electricity and other initiatives at sites in Japan and overseas.



Solar power generation facility at MMC Tools (Thailand) Co., Ltd.

\*2 Renewable energy plan: Electricity plans that provide consumers with electricity with net-zero CO<sub>2</sub> emissions by utilizing power from renewable energy sources, procured by electric power companies and non-fossil fuel energy certificates

\*3 Non-fossil fuel energy certificates: Certification of the "environmental value" of electricity generated using non-fossil fuel energy sources, such as renewable energy

# Solving Difficulties in Machining through the Power of Technology

In the FY2031 Strategy, Mitsubishi Materials aims to leverage its longstanding technology and experience to focus on the development of products in the areas of “difficult-to-cut materials” and “difficult machining.”

One of these challenges was the successful development of DVAS, a TRISTAR drill series that uses advanced technology to drill tiny, deep holes in difficult-to-cut materials.

(Left)

**Akira Sato**  
Assistant to the Manager, Tool Development Section  
Drill, CBN & PCD Products Development Dept.  
Gifu Plant  
Metalworking Solutions Company

(Right)

**Koji Enami**  
Small Parts Machining Expert,  
Assistant General Manager, Technical Sales Dept.  
Sales Div.  
Metalworking Solutions Company

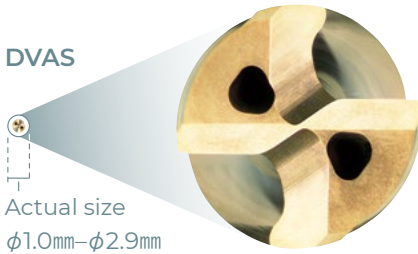


The development of DVAS, a TRISTAR drill that challenges conventions in small-hole making

Creating next-generation tools that solve machining issues with our precise technology and challenging spirit

Machining refers to using tools to cut or drill holes in metal and other materials. Among these processes, drilling holes is very common. In particular, it plays a key role in creating holes for screws and bolts in the production of precision components used in industries like automotive and medical devices. In addition, these precision components often require special metal materials that are solid or difficult to machine. These materials require careful machining, leading to a need for higher-performance tools.

To enable careful drilling of holes, Mr. Sato and Mr. Enami took on the challenge of developing a next-generation tool called DVAS. DVAS is a long, slim drill used not only for machining parts in automobiles and medical devices but also for drilling holes in everyday fixtures like water heaters and bathroom fittings like bidet seats.



In general, when drilling holes in metals, cutting fluid is used to prevent tool wear and damage due to frictional heat and to keep the tool cool. DVAS incorporates tiny triangle-shaped holes that spiral through the drill, allowing the cutting fluid to flow through. Consequently, in the design and manufacturing process, the team faced a new challenge that had not existed before—to improve tool rigidity without breaking these holes. Mitsubishi Materials achieved a unique design that ensures the tiny spiral holes remain intact, successfully balancing

## What are “difficult-to-cut materials” and “difficult machining”?

Difficult-to-cut materials refers to materials that are inherently challenging to machine. Examples include stainless steel, titanium alloys, and heat-resistant alloys. These materials play an important role in the automotive and aircraft industries, where strength and heat resistance are crucial. Difficult machining, on the other hand, refers to fields where machining becomes challenging due to the shape of the workpiece or the complexity introduced by new machining processes. It includes processes such as machining small holes, deep holes, dense, complex, microscopic shapes, and precision machining that requires high accuracy.

## What is LFV technology?



LFV technology is a proprietary control technology developed by Citizen Machinery Co., Ltd. It involves vibrating the tool in the cutting direction and synchronizing this vibration with the rotation of the spindle while cutting. Its distinctive feature lies in the ability to forcibly separate the material being cut and the cutting tool with fine vibrations, resulting in the fragmentation and discharge of previously connected scrap chips. This prevents issues caused by scrap chips and a rise in the temperature of the tool's cutting edge.

LFV is a registered trademark of Citizen Watch Co., Ltd.

the enhancement of tool rigidity with the ease of removing scrap chips. This development resulted in the creation of a tool that improves our customers' manufacturing efficiency.

“Conventional cutting tools tend to have reduced uptime due to breakage and damage,” explains Mr. Sato, who was involved in the development. “Preventing breakage contributes to enhancing productivity and stabilizing quality. We tried to create a tool that can support not only conventional machining techniques but also new ones such as LFV (Low Frequency Vibration Cutting) technology to contribute to our customers' manufacturing.”

DVAS is compatible with machines equipped with LFV technology. LFV technology is the latest advancement

designed to address issues related to scrap chip troubles that arise during metalworking. Scrap chips have long been an obstacle in metalworking due to getting caught in tools and damaging machined materials. However, DVAS combined with LFV technology solves these problems.

Behind the success of this challenging development was the on-site expertise and continuous trial and error of the professionals who carried out advanced technical development and produced a drill that incorporates unique, industry-first technology.

“Our mission is to identify our customers' on-site problems and provide solutions,” says Mr. Enami, who is in charge of technical sales. “To achieve this, we initiated collaborative seminars

with machine tool builders and peripheral equipment manufacturers to make the capabilities of our products, including TRISTAR drills, more widely known among customers. With unparalleled product capabilities and solution offerings that other companies cannot replicate, we will work toward the realization of the FY2031 Strategy.”

Mr. Sato adds: “We aim to be a manufacturer capable of swiftly delivering the tools our customers expect. We will expand our tool lineup to meet various demands, including small-hole, large-hole, and deep-hole drilling, and offer them to the market without any delays. Additionally, through our proprietary technical support, we intend to expand the tools market and contribute to the realization of the FY2031 Strategy.”



Mr. Enami checking a machining tool capable of supporting the LFV technology



DVAS attached to a machine tool allows for the drilling of tiny, deep holes.



# Innovating Manufacturing Sites with Digital Technology

In Mitsubishi Materials' FY2031 Strategy, the Metalworking Solutions business has set the target of becoming “a leading company in tungsten products recognized by customers globally.” To achieve this and address diverse needs across manufacturing sites, we aim to develop cutting tools with innovative functions and provide an extensive range of machining solution services leveraging the digital technology accumulated at our technical centers worldwide. As examples of these initiatives, we will introduce the development of sensor tools and the global expansion of our technical centers.

## Development of sensor tools

Quality, cost, and productivity.  
Aiming to create a tool that can solve various problems our customers face.

**Wataru Takahashi**  
Technology Development & Tools Data Section  
Machining Technology Center  
Research & Development Div.  
Metalworking Solutions Company

As a leading company of the carbide tools industry, Mitsubishi Materials is working on digitalizing machining. The sensor tools we are developing play an integral role in this digitalization process.

Our sensor tools feature two types of sensors, a displacement sensor and an image sensor. The conventional process of measuring workpieces involves replacing the cutting tool on the machining equipment with a dedicated measurement sensor, or removing the workpiece to set it on a separate measuring device. However, with a displacement sensor, measurements can be conducted on the machine immedi-

ately after machining, leading to improved productivity. Additionally, unlike conventional tools that are typically replaced once a certain production volume is reached, sensor tools can be utilized until the limits of their tool life, enabling cost reduction. Furthermore, we can assess and quantify the deterioration in the quality of the machined surface—previously evaluated through human eyes—directly on the machining equipment. This allows us to pass on engineers' know-how more easily.

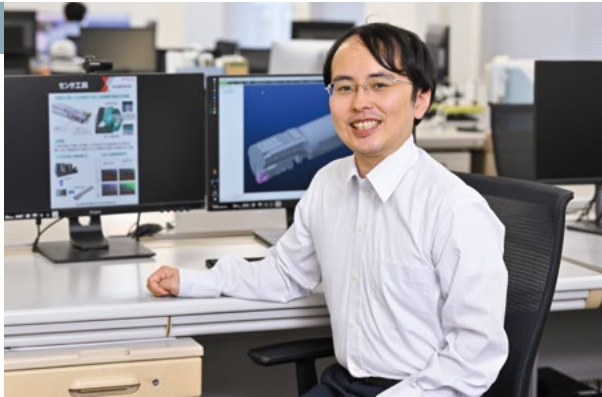
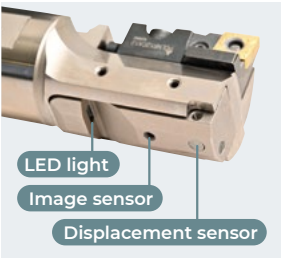
During the development process of these sensor tools, we faced numerous challenges. For example, the image sensor needed to be compact but

support high resolutions and fit into a small space. Similarly, the displacement sensor needed to be compact and highly precise. Therefore, we collaborated with the Innovation Center, which has abundant knowledge in this field, to select components and develop electronic circuits, leading to our current specifications.

In the future, we will develop sensor tools with various specifications to meet diverse customer needs. In line with this goal, we hope that our customers at manufacturing sites adopt our sensor tools at the earliest opportunity to address their on-site issues through our machining solutions.

### What is a sensor tool?

A sensor tool is a type of cutting tool equipped with two types of sensors: a displacement sensor, which measures the dimensions of the material being cut, and an image sensor, which photographs the machined surface. These sensors allow for immediate measurement and automatic adjustment of workpiece dimensions, as well as capturing images of the machined surface, immediately after machining. Furthermore, analyzing the surface images allows for automatic assessment of tool life.



## Global expansion of technical centers

Continuously improving issues faced by manufacturing sites through the provision of customized solutions

**Shpend Arifi**  
Assistant Manager  
MTEC Stuttgart

In recent years, the metalworking industry has faced various challenges, including labor shortages, and customers are expecting suppliers to provide value-added services. Among these requirements, reducing costs and increasing productivity is not just about improving the production process, but also necessitates a review of the planning phase.

This is why Mitsubishi Materials has established technical centers around the world to provide support to customers. The overseas technical centers focus on providing customized solu-

tions for local customers. Established in 2019, the MTEC Stuttgart in Germany aims to provide solution services to address issues for customers across Europe. By introducing a European standard of tools and solutions, MTEC Stuttgart offers customers an even broader product portfolio to better meet their needs.

One of our objectives is to continuously improve our customers' issues. To this end, we must continue to offer added value to our customers through optimized technical support, utilizing next generation cutting tools and digi-

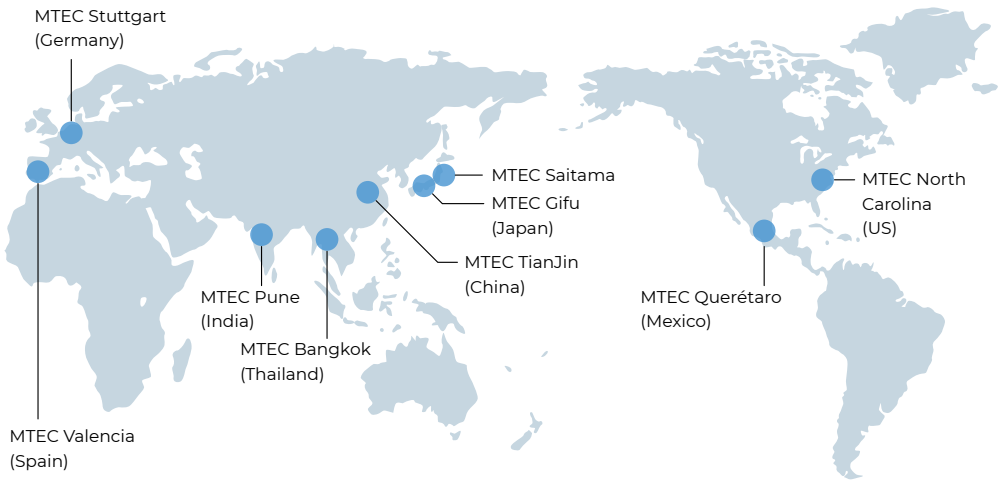
tal analysis, as well as technical training and process optimization.

In order to continuously offer advanced services, we are combining MTEC Stuttgart's expertise with the technological know-how of our colleagues in Japan, and also exploring the potential of open innovation by strategically collaborating with external experts and research institutions. By leveraging Mitsubishi Materials' latest digital tools, we will aim to rapidly deliver solutions that are better tailored to each customer than ever before.



## Technical centers supporting customers worldwide

We have technical centers around the world to provide technical support to our customers. We established MTEC Stuttgart in Stuttgart, Germany in June 2019, and MTEC Pune, our ninth technical center, in India in March 2020. Through the close collaboration of technical centers worldwide, we will swiftly deliver customer-oriented solutions.

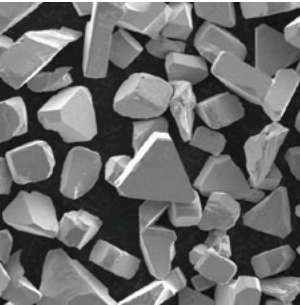


# Making Tungsten Procurement Sustainable

Tungsten is a primary raw material for carbide tools. It has also seen increased demand in recent years, particularly as a material for rechargeable batteries used in products such as electric vehicles (EVs). With the aim of sustainable tungsten procurement, Mitsubishi Materials Group is striving to expand the collection of tungsten carbide scrap globally and strengthen its recycling processing capacity.

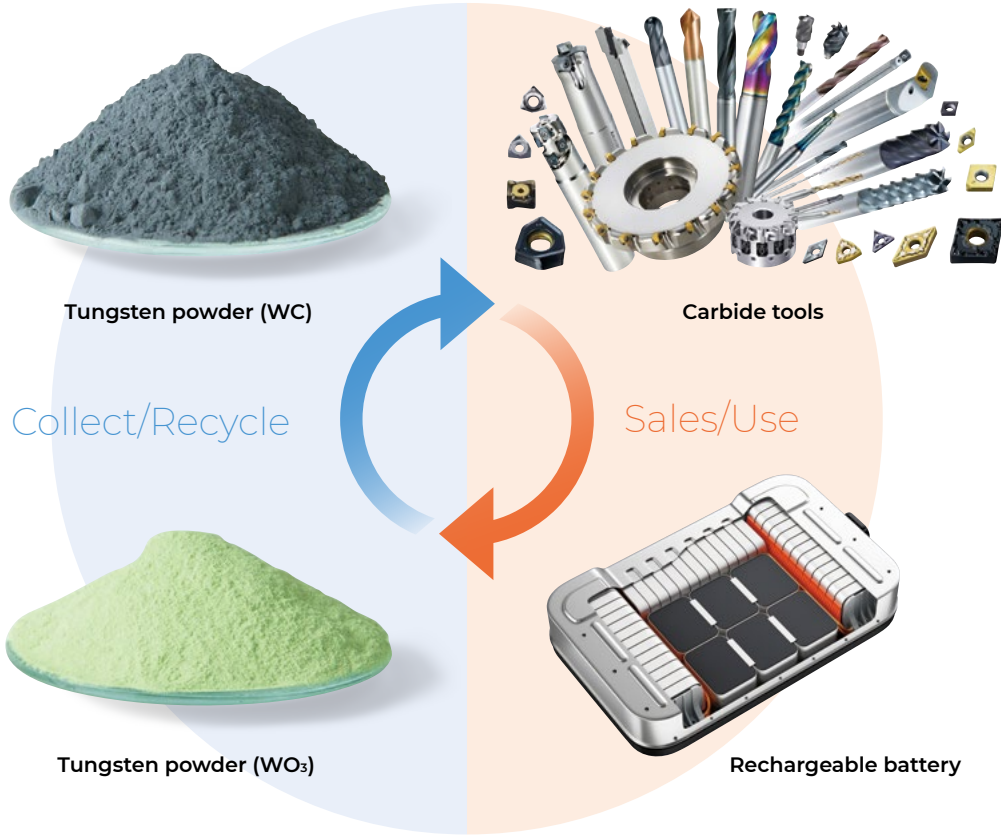
### What is tungsten?

Tungsten is an extremely hard and heavy rare metal. When combined with carbon, it forms an even harder material. It is this hardness that makes it an ideal primary raw material for carbide tools. Additionally, tungsten powder is also used as a material for rechargeable batteries, and with the increasing electrification of vehicles, the demand for tungsten is expected to rapidly expand in the future.



Tungsten carbide (WC) crystals

Used carbide tool scrap



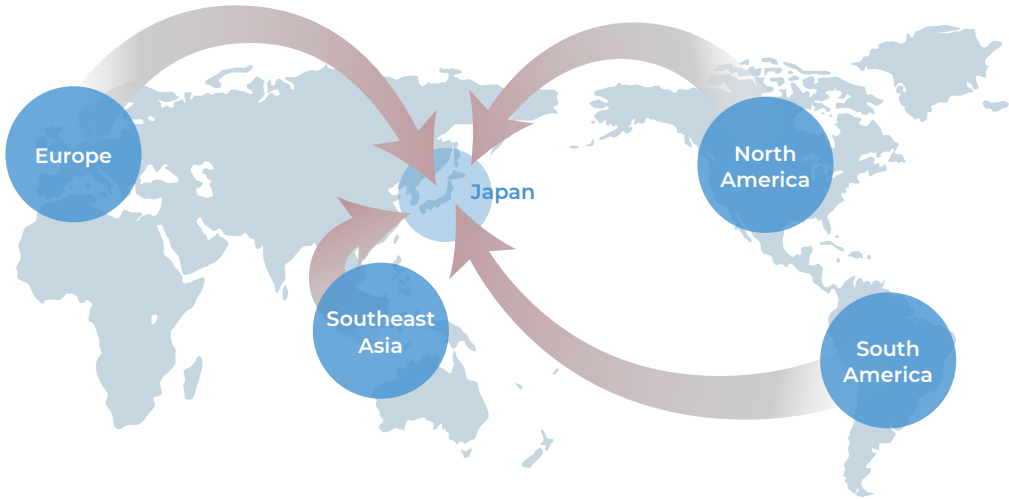
### Aiming for a recycled raw material ratio of 80% or more

Mitsubishi Materials Group is strengthening its recycling processing capacity for collected carbide tools. At the Akita Plant of our Group company, Japan New Metals, tungsten recycling facilities were expanded in 2017, resulting in a substantial increase in processing capacity. Our aim is to increase the ratio of recycled raw materials used in the production of carbide tools to over 80% by FY2031. To this end, we are actively engaged in the development of recycling technology and the expansion of recycling capacity.

### Collecting used carbide tools from around the world and utilizing them without waste

Tungsten is concentrated in specific resource-rich countries, with China being the main source. Due to its high rarity and the risk of unavailability due to changes in global conditions, it is imperative to work on establishing a recycling system to ensure a stable supply of this raw material.

Mitsubishi Materials is establishing a resource recycling system to collect used carbide tools and other carbide scrap from around the world and transform them into new tungsten powder. We are currently expanding our collection efforts in North and South America, with plans to further extend scrap collection in Europe in the future.



### Establishment of a resource recycling system

### Aiming to provide a stable supply of tungsten powder to meet the growing demand in society

#### Yuta Umeta

Deputy Manager of Manufacturing Group  
Akita Plant  
Japan New Metals Co., Ltd.



At our Akita Plant, we recycle tungsten concentrates and tungsten-containing scrap to produce tungsten powder through an integrated production process. Currently, I am leveraging my experience in technical development to manage the integrated production line.

Towards the achievement of the FY2031 Strategy, our company is dedicated to strengthening recycling capabilities. The completion of our new tungsten recycling plant in 2017 allowed us to double our recycling capacity for carbide scraps. Currently, the annual recycling capacity for carbide scrap stands at approximately 1,000 tons.

To expand recycling efforts, it is necessary to increase the procurement of carbide scrap. We are currently working with domestic and overseas Group companies to establish a scrap collection system. In order to ensure stable procurement routes, we are coordinating with multiple procurement sources.

Furthermore, our company provides tungsten powder not only for tungsten carbide alloys but also for various other applications. In particular, we can feel the future potential of tungsten through the demand for electronic components and rechargeable batteries. Growth in these sectors will contribute to the achievement of the

FY2031 Strategy. To that end, I feel that it is important to keep up with the latest cutting-edge technologies in society through information and technical exchanges with customers in new fields.

We will continue to improve our refining technologies to meet the growing demand in society, striving for improved quality and cost reduction of high-purity and high-value-added products. As a trusted powder raw material manufacturer, we are committed to providing a stable supply of tungsten powder to customers in the processing fields that support manufacturing.





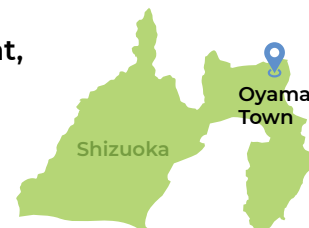
## Visiting a Town with MM

Ms. Stride, a woman traveling around the world, visits a town where a Mitsubishi Materials Group hub is located.

### Fuji-Oyama Plant edition



Navigator  
**Ms. Stride**  
A woman in her late twenties who enjoys factory tours and strolls around town.



In this edition, we will introduce the town in which Fuji-Oyama Plant, Mitsubishi Materials Corporation, resides.

The plant produces insulated heat dissipation substrate, an essential for electric vehicles, solar power generation, and more.

Oyama Town, located in the most northeastern part of Shizuoka Prefecture, is known as a "Mt. Fuji town," situated at the foothills of the mountain. Here, you can see not only the bountiful nature nurtured by Mt. Fuji but also a variety of attractions.

### Homon Park

A park where local history comes alive



The park was built by the old Fuji Spinning Co., Ltd., who laid the foundation of Oyama Town's modernization, and has been maintained in cooperation with the town and townspeople. Within the park is a registered tangible cultural property that was once the residence of Fuji Spinning's first president—the Homon Kaikan. One can enjoy strolling through the park filled with flowers and trees.

### The birthplace of Kintaro

The pride of Oyama Townspeople

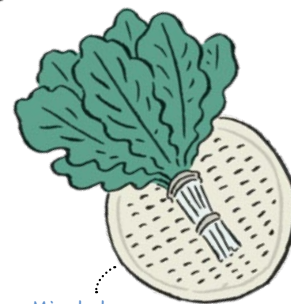
Oyama Town is the birthplace of the famous folktale hero Kintaro. The town has numerous places associated with Kintaro, including parks and shrines, attracting lots of attention as a tourist spot. There are also statues of Kintaro throughout the town.



### Clean natural water is the town's treasure

Many blessings from nature

Oyama Town's local specialty is mizukakena, a leafy vegetable grown using natural water from Mt. Fuji. The town's natural water is a popular drinking water. It is also home to many fireflies, which enjoy clean water.



Mizukakena



Oyama Town's natural water



We need to continue to protect clean water and nature.

Guide

### Tomomi Tsuchiya

General Affairs Group,  
Administration Dept.

Joined the company in 2020. Is in charge of general affairs and accounting. Her favorite local dish is the mikuriya soba at Inaka Ryori-Miya. She enjoys going to see the lights at Gotemba Kogen Tokinosumika.



Mt. Fuji is visible from the plant!

### About Fuji-Oyama Plant

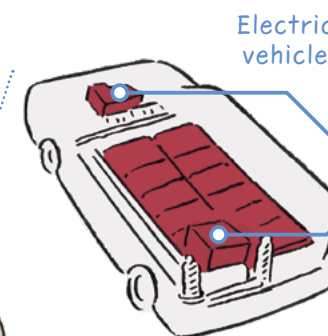
The plant produces insulated heat dissipation substrate for automobiles, and its predecessor, Sanda Plant's Shizuoka DBA Center, was established in 2004. In 2022, there was a change in jurisdiction and the center became the Fuji-Oyama Plant. Currently, the main product is insulated heat dissipation substrate, which plays a key role in the heat management of next-generation automobiles and other equipment. The plant is an all-in-one base with all functions necessary to business operations that handles not only manufacturing and sales but also the design of new products and strategy development.

### Insulated heat dissipation substrate

An essential for automobiles

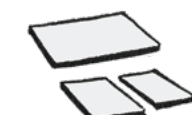
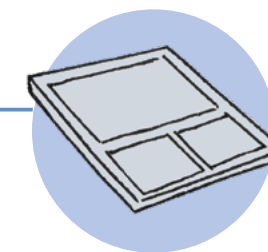
Electric vehicles use more than 10 times the amount of electricity of the average household. This means that the semiconductor in a vehicle's power module releases a large amount of heat. Insulated heat dissipation substrate is necessary to allow heat to escape quickly because the automobile will malfunction if too much heat accumulates. The substrate is produced by directly bonding high purity aluminum to both sides of a ceramic substrate.

I see! Lots of electricity is being used, so it is important to allow the heat to escape.



Electric vehicle

Insulated heat dissipation substrate



Aluminum plate



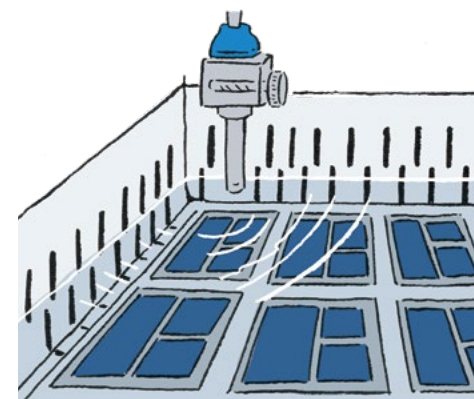
Ceramic plate



Aluminum plate

### Ensuring reliable quality through visual inspections

Employees perform visual inspections in addition to all the checks done by machine. It is due to this ensured quality and strong trust that this substrate is used as a part of many automobiles and industrial machines worldwide.



### Ultrasonic inspection to check the condition of the adhesive layer

After the aluminum and ceramic plates are assembled and bonded, we check the adhesive layer. Using ultrasonic waves, we inspect whether there are any spots that are insufficiently bonded.



Guide

### Tsubasa Fujimagari

Manufacturing Group,  
Business Promotion Dept.

Joined the company in 2014, currently in charge of the manufacturing department. Born and raised in Oyama Town, his favorite place to visit since early childhood is Fuji International Speedway. His recommended local dish is soba from Fujimagari-ya.







“Keep polishing my skills and supporting stable operations”

**Miku Kanno**

Assay Section  
Onahama Smelting and Refining Co., Ltd.

## Analytical work handling quality assurance and stable operations is a major responsibility

Onahama Smelting and Refining Co., Ltd. puts effort into both the copper smelting business and the recycling business. For example, the company, committed to resource recycling, utilizes the copper smelting process to collect valuable metals such as gold, silver, copper, and palladium from discarded circuit boards of electronic equipment and other parts. I originally wanted to contribute to a recycling-oriented society through my work, which is why I was drawn to this company and decided to join.

As an analyst in the Assay Section, my role encompasses a wide range of analytical work, including the component analysis of raw materials used by our company and the analyses of manufactured and shipped products. Every day, I am made aware that my work is directly tied to the company's quality assurance and stable operations and it is a major responsibility.

In the copper smelting business, the sulfur content of copper concentrate is used as a raw material in the manufacturing of sulfuric acid and gypsum, which are important products of our company. I am currently in charge of conducting the product and process analyses of sulfuric acid and gypsum. This role involves using various tools and equipment to summarize analysis results and accurately present them before the due date. Analysis results are crucial information, not only for quality assurance, but also for determining whether manufacturing processes are

operating normally.

As a second-year employee, my current work scope is not yet extensive, but the results of my analyses have predicted trouble in the manufacturing process and led to the identification of the cause of malfunctions. My senior once said to me, “We were able to prevent the issue before it arose. Thank you,” leaving me feeling pleased and rewarded from fulfilling my work duties.

## “Protecting your own equipment yourself” by polishing autonomous maintenance skills, too

I want to contribute to the protection of the quality of Onahama Smelting and Refining. It is with this thought that I took the Autonomous Maintenance Engineer Level 2 exam in October. Autonomous maintenance involves preventing deterioration in advance through facility inspections and maintenance, quantitatively measuring the deterioration of facilities without relying on senses, standardizing maintenance and management based on the characteristics of facilities and equipment, and more. It could be said that these activities are the essence of “protecting your own equipment yourself.” The autonomous maintenance engineer certification covers knowledge and skills that are necessary to those who work in manufacturing.

I became interested in the exam through the recommendation of a senior at work and decided to take on the challenge after looking into the test and thinking I could maybe make use of it at work. To be honest, balancing studying with my daily work was exhausting. Whenever I was unsure of what and

how to study, a senior at work gave me advice based on his practical experience. When my efforts paid off and led to my passing the exam and additionally receiving the “High Achiever” award for outstanding performance, I was very happy. By learning the knowledge and skills of autonomous maintenance, I have become able to, with a sense of responsibility for protecting our own equipment by ourselves, keep a sharper eye on abnormalities in the equipment.

## Keep supporting a stable copper supply as a full-fledged analyst

Copper is highly conductive to heat and electricity and is an essential material in all electronics. Its demand is particularly growing in recent years, and so is the demand for the electrolytic copper we produce. In this context, I see my mission in my work as the swift and accurate reporting of analysis results to continue to protect quality assurance and stable operations. While I may not be directly involved in the manufacturing of copper, I believe my work supports the trust of our company's products, ultimately contributing to society.

As a relatively new member, there are still many pieces of equipment I haven't used and operations I have yet to gain experience with. Thus, my current goal is to become a full-fledged analyst like my seniors by first mastering the tasks at hand firstly and polishing my analytical skills in my daily work. Then, in the future, I want to become an indispensable member of the company, supporting the stable supply of copper, which is a globally in-demand resource, and contributing to our Corporate Philosophy of “For People, Society and the Earth.”

Ms. Kanno uses a wide variety of tools and equipment in her analytical work, in which accuracy is strongly required. She learns from watching her seniors work and describes the workplace as follows: “Everyone is detailed in their instructions, and there is a very good atmosphere.”







# The Power of Materials Builds Society

## Automobiles

### **Solar heat-ray shielding paint that prevents a rise in the interior temperature of automobiles and improves energy saving**

The interior temperature of automobiles occasionally exceeds 50°C on extremely hot days, creating the risks of heatstroke and unexpected accidents. Mitsubishi Materials' solar heat-ray shielding paint actively serves as a countermeasure to these risks. Applying the paint to automobile glass doesn't only absorb and block near-ultraviolet rays to prevent a rise in the interior temperature of automobiles but also lowers the load on air conditioners to reduce electricity consumption.

The solar heat-ray shielding paint was originally created for building window glass, but while taking advantage of the product's strength in high transparency, we have improved it since its launch. As a result, the product was adopted for automobiles in 2002. We have secured a leading market share for over 20 years by proposing appropriate materials from a diverse line-up that are in line with various applications.

In the present day, the electrification of automobiles is accelerating. Reducing electricity consumption leads to an increase in travel distance, so there is a growing need for a higher performing solar heat-ray shielding paint. Going forward, we will continue to use our technology in order to create a next-generation solar heat-ray shielding paint that satisfies our customers' requests and social needs.

#### PICK UP

### **Solar Heat-ray Shielding ITO Paint**

Applying Solar Heat-ray Shielding ITO Paint creates a transparent, heat-resistant membrane that blocks near-infrared rays, which easily turn into heat. At the same time, this paint does not block electromagnetic waves emitted from mobile phones, ETC (Electronic Toll Collection System) equipment, or other devices. It also excels in durability.



## The Secrets of Materials



Exploring the “secrets” of materials and technologies Mitsubishi Materials has developed!

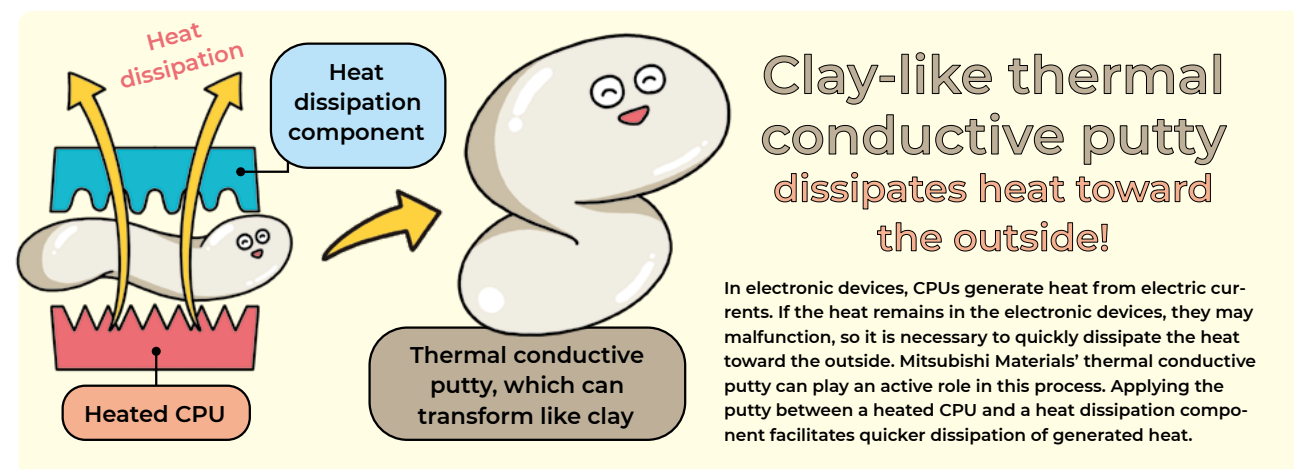
SOZAI FILE NO.8

## What type of material is “thermal conductive putty”?

Mitsubishi Materials' technology is applied not only to hard materials like metal but also to soft materials. An example of the latter is a thermal conductive material called “thermal conductive putty,” which facilitates the dissipation of heat generated in automobiles and electronic devices. In this issue, we will introduce the outstanding characteristics of this putty, which is soft like clay and flexibly formable.

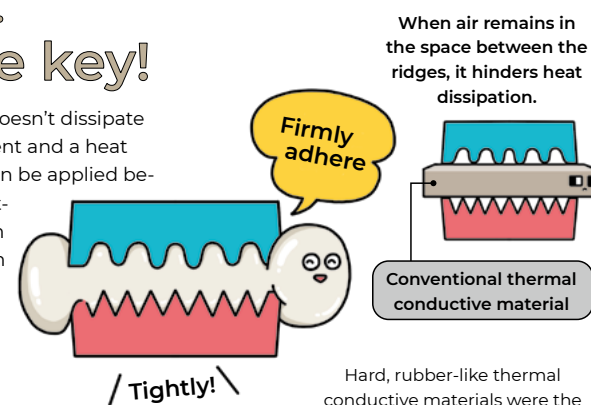


an expert on materials  
**Dr. Materials**  
A doctor who loves materials devoted to research at a Mitsubishi Materials lab.



## Air doesn't transfer much heat... so close adhesion is the key!

Air hinders heat dissipation. Because air doesn't transfer much heat, heat doesn't dissipate smoothly when air remains between a heated, high-temperature component and a heat dissipation component. To solve this issue, our thermal conductive putty can be applied between them. As it is flexibly formable like clay when force is applied, the putty adheres the two components closely together when it is stuffed between their small ridges. In other words, it makes it difficult for air to pass between the components, resulting in more efficient heat dissipation. Mitsubishi Materials Group has created such new clay-like materials by combining its accumulated organic and inorganic material compounding technology.



Hard, rubber-like thermal conductive materials were the previous trend. Compared to conventional materials, our clay-like thermal conductive material can easily adhere to components, resulting in efficient heat dissipation.



## Areas of applications



### Electric vehicles

Our thermal conductive putty is expected to serve as a thermal conductive material supporting the operations of secondary lithium-ion batteries, semiconductors, and other products. In particular, electric vehicles face challenges in managing heat generation for secondary batteries due to the substantial electricity requirements. The thermal conductive putty can contribute to the further advancement of electric vehicles as it can withstand large amounts of electricity and high loads while effectively controlling the generated heat.

# TOPICS

Here are some of the main topics involving Mitsubishi Materials from October to November 2023.

Please take part in the WITH MATERIALS survey /

We would love to hear your honest thoughts and opinions about this issue of “WITH MATERIALS” and what you would like to see covered in the future.

<https://forms.office.com/r/s8rmbRJtZx>



## October

### “Teine Forest, one of the Materials' Forests” Certified as a “Natural Symbiosis Site” by the Ministry of the Environment

“Teine Forest, one of the Materials' Forests” (“Teine Forest”) owned by our company, has been certified as a “Natural Symbiosis Site” by the Ministry of the Environment. Natural Symbiosis Sites are areas where biodiversity is being conserved and are certified by the national government. Teine Forest is a suburban forest adjacent to the urban area of Sapporo City, although it is home to a wide variety of flora and fauna. Teine Forest has been highly evaluated for its adoption of a work system with low environmental impact on forest management to conserve its biodiversity and for its monitoring activities using digital tools. We will continue to work on the conservation of biodiversity and sustainable forest management by appropriately maintaining and managing company-owned forests.



At an award ceremony

## October

### MOU Signed with Anglo American to Build a Sustainable and Responsible Supply Chain

Mitsubishi Materials Corporation (“MMC”) and Anglo American plc (“Anglo American”), a UK-listed multinational mining company headquartered in London, UK, have signed a Memorandum of Understanding (MOU) to promote collaboration for providing sustainable and responsible products throughout the copper-related products supply chain. MMC and Anglo American will collaborate to advance efforts to ensure transparency and provide sustainable and responsible products throughout the copper-related products supply chain. Under this MOU, we will share information on various decarbonization technologies and strive to calculate and reduce the carbon footprint (CFP) of our copper-related products.



MOU signing ceremony held at Anglo American London office

## November

### Launched Acceleration Program for Rapid New Business Creation

We launched the MMC Acceleration Program “Wild Wind” 2023 to address research and development (R&D) themes that might pose challenges for solo commercialization. In line with our R&D strategy of “Providing sustainable materials designed for resource circulation and continuously enhancing corporate value through the creation of new products, technologies, and businesses,” this program aims to accelerate business co-creation with startup companies and other organizations that possess assets we lack. We are publicly soliciting startup companies interested in collaborating on six themes related to the environment and materials, which were selected through an open call. By promoting technological development and actively incorporating cutting-edge technology from domestic and global sources, we will contribute to the realization of Our Commitment.



Acceleration Program



## October

### Certified as a Healthy Company Declaration Gold Certification

Mitsubishi Materials Corporation has obtained a Healthy Company Declaration Gold Certification(†) from the Health Company Declaration Tokyo Promotion Meeting. We regard the health management of our employees as a management issue and have been promoting health management in a strategic manner, such as by establishing the Mitsubishi Materials Health and Productivity Management Declaration. Against this backdrop and in line with the idea that “we are committed to providing a safe and healthy environment for all our stakeholders,” we have worked in cooperation with Mitsubishi Materials Health Insurance Society on addressing high-risk factors for physical health and conducting mental health and other initiatives. We will continue to implement the creation of vibrant workplaces and promote the mental and physical health of our employees and their families with the aim of becoming a more health-conscious organization.



\*Certified on September 20

## October

### Received Environment Award from JTA for Second Consecutive Year

Our Metalworking Solutions Company received the Environment Award from the Japan Cutting & Wear-resistant Tool Association (JTA) for the second consecutive year. This award is bestowed on the most outstanding member company that has demonstrated notable and exemplary achievements based on an evaluation encompassing over 30 criteria, including global warming mitigation and resource conservation initiatives. We received this award in recognition of our efforts in promoting an environment management system involving business partners, as well as contributing to global warming mitigation, including reductions in electricity consumption and CO<sub>2</sub> emissions.



\*Japan Cutting & Wear-resistant Tool Association: Japan's largest machine and tool manufacturer organization consisting of companies that manufacture cutting tools, deformation processing machines, wear resistant tools, and their materials.

## November

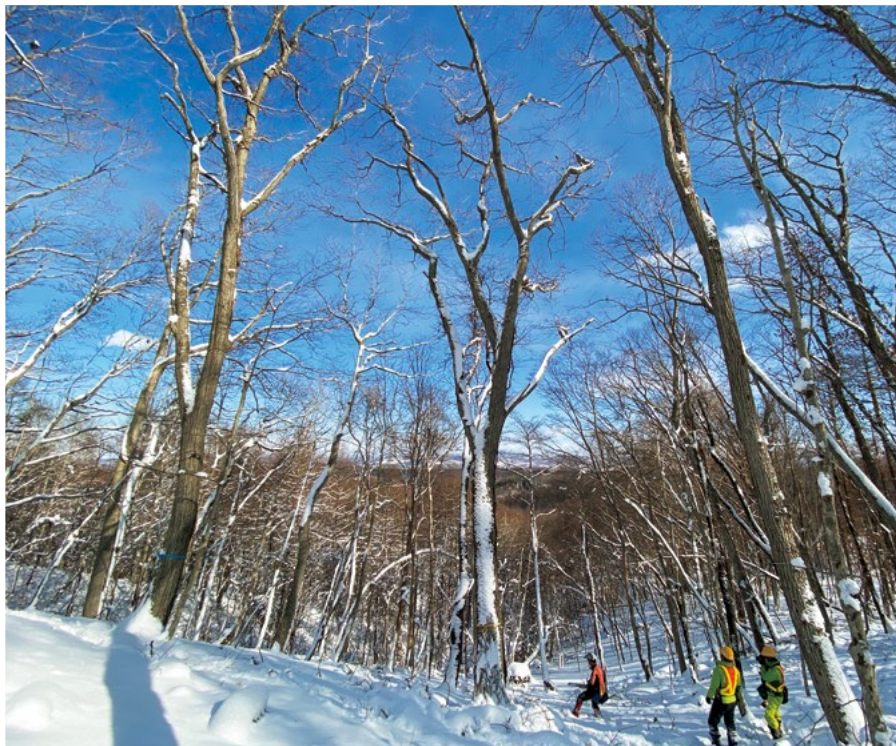
### Newly Launched Material Career to Boost Employees' Career Development

With the aim of supporting employees' autonomous career development and encouraging them to take ownership of Our Commitment, we held our first career event this year. Throughout the month of November, we conducted various initiatives aimed at exploring career paths, including lectures by experts, online Career Café meetings featuring employees with experience in overseas assignments, side work, or childcare leave, and the promotion of 1-on-1 meetings using career sheets. To fulfill Our Commitment, we will continue to advance initiatives that maximize the strengths of each employee.



At a Career Café meeting





Thinning in Hayakita Forest, one of the Materials' Forests (Abira Town, Hokkaido)

## To pass on rich forests to future generations

Thinning is carried out throughout the year in our Materials' Forests. It is the process of adjusting forest density by cutting some trees. Without thinning, the spacing between planted trees will become smaller as they grow, preventing sufficient sunlight from reaching the ground. Appropriate thinning ensures adequate sunlight exposure, which is essential for tree growth, and leads to the development of strong trees.

As forest guardians, we start the selection of trees to be removed more than six months prior to thinning, looking at species, trunk thickness, number of trees in the forest, and more. It is up to us to decide which trees to cut down and which to leave standing. It is both an act of taking life from the trees and an act of shaping the forest's future. That is why we try to maintain an attitude of humility and respect for the forest when selecting trees.

The more trees are cut down, the more profit is made. However, the pursuit of short-term profits risks the loss of rich forests for future generations. That is why we are committed to creating sustainable forests that respect the diversity of flora and fauna. This commitment is based on a comprehensive understanding of forest ecosystems, ensuring that we can pass on rich forests to future generations.