

WITH MATERIALS

MITSUBISHI MATERIALS communication magazine

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SPECIAL FEATURE


SECURING THE FUTURE OF OUR LIMITED METAL RESOURCES



Metal resources may potentially face an imbalance between demand and supply in the future. In particular, the demand for copper is increasing as an essential material for society’s decarbonization efforts, while the supply from mines is predicted to decrease.

So, what can we do to ensure the future of our limited metal resources? The key lies in recycling, enabling us to utilize our existing metal resources over and over again.

For more information on Medium-Term Management Strategy 2031, please see our website.

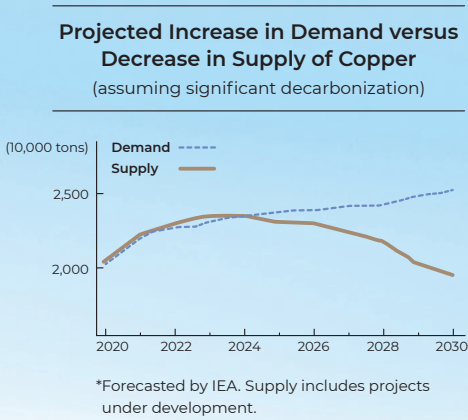


The demand for copper is anticipated to rise significantly due to the decarbonization of society. As an excellent electrical conductor, copper is an indispensable component in xEVs and equipment used for generating and transmitting renewable energy.

According to the International Energy Agency (IEA), a supply-demand imbalance is expected to emerge in the late 2020s, resulting in an estimated shortage of approximately 5.5 million tons by 2030. Even with the additional supply anticipated from mines in South America and other new mines under

construction, it is unlikely that the supply will be able to meet the future demand.

Recycling plays a pivotal role in securing the future of our limited metal resources. In our Medium-term Management Strategy FY2031 (“FY2031 Strategy”), we have set out our commitment of “For people, society and the earth, circulating resources for a sustainable future.” Mitsubishi Materials is committed to addressing this challenge using the resource recycling capabilities we have developed over many years.



SPECIAL FEATURE

SECURING THE FUTURE OF OUR LIMITED METAL RESOURCES

To deliver limited metal resources to society

Leveraging our strengths in smelting and home appliance recycling

Mitsubishi Materials will establish a metal resource recycling system by integrating its disassembling and sorting technologies from home appliance recycling with its expertise and experience in separating and recovering valuable metals acquired through smelting.

As part of the FY2031 Strategy, we will prioritize the recycling of metal resources.

By expanding both the scope and scale of recycling operations, as well as the regions where it is implemented, we aim to achieve growth across the entire value chain.

Mitsubishi Materials operates in two types of businesses: venous and arterial. Venous businesses involve collecting and recycling used products for reuse, while arterial businesses focus on product generation. The flow of goods within these businesses can be compared to the circulation of blood.

In venous businesses, where used and discarded products are fed into the recycling process and reused as raw materials or materials, Mitsubishi Materials’ strength lies in its technologies cultivated over many years of smelting and home appliance recycling.

Securing natural resources

Continuous investment in mines to secure 500,000 tons of copper concentrates

We secure metal resources from mines and deliver them to society. Mitsubishi Materials has invested in overseas copper mines to ensure stable procurement of clean copper concentrates.

Currently, Mitsubishi Materials holds interests in four operational mines: Copper Mountain Mine in Canada, and Mantoverde Mine, Los Pelambres Mine, and Escondida Mine in Chile, and we secure approximately 150,000 tons of copper concentrates annually from these mines. While mining development has a long history, many easily accessible mining locations have already been exploited, resulting in the challenge of increasing production costs for mines. Moreover, there is a shortage of supply for rare metals like cobalt, despite the growing demand for them.

To address these concerns, Mitsubishi Materials has set a target of increasing the volume of secured copper concentrate from the current 150,000 tons to over 500,000 tons by FY2030. This will be achieved through participation in new medium-scale copper mines and other measures. This

target represents approximately 30% of the copper concentrate volume processed at the Naoshima and Onahama Smelters and Refineries.

Recovering scarce resources with the power of technological development

We solve resource challenges through the power of technological development. In 2020, Mitsubishi Materials established the Mining & Metallurgy Laboratories, expanding its existing smelting technology development base to include resource technology development functions. We are strengthening technological development to ensure superior and stable procurement of clean copper concentrates.

One of the challenges faced by existing operational mines is the decrease in ore grade (metal content) due to deeper mining and the increasing impurities within copper concentrates. In response, Mitsubishi Materials has bolstered its resource technologies through developments such as impurity removal techniques. This has enabled the establishment of a comprehensive development framework that spans from metallic mineral analysis to metal recycling

technologies, allowing Mitsubishi Materials to swiftly tackle diverse technological challenges related to metallic minerals.



Securing resources through recycling

Strengthen recovery of metal resources through recycling technology

Mitsubishi Materials strives to become a leading and innovative player in the recycling of non-ferrous metal resources. By strengthening our processing capabilities for recyclable items, including non-ferrous metals beyond E-Scrap, and leveraging our world-class electrolytic copper supply capacity, we aim to become a core supplier within the resource recycling ecosystem.

One of our strengths is the Material Grid, which consists of copper, precious metals, lead, and tin smelters. Through enhanced collaboration along this value chain, focusing on non-ferrous metals, we will expand our presence in the realm of resource recycling. Additionally, by driving innovative process development, we aim to enhance the efficiency of resource recycling, thereby swiftly bolstering our competitiveness and expanding our business.

We are also focusing on discarded lithium-ion batteries (LIBs). With the increasing adoption of xEVs in society, the

quantity of LIBs used is expected to increase several tens-fold by 2030. Therefore, Mitsubishi Materials is working on the early development of an integrated recycling process from LIBs to battery materials, as well as the collection of black mass* by leveraging our E-Scrap network.

Within our FY2031 Strategy, the establishment of a domestic recycling center is positioned as a key initiative. This center will serve as a central hub for consolidating and processing dismantled components from home appliances and automobiles, ensuring appropriate recycling procedures. Through the expansion of processing capabilities for various recyclable items, we aim to accelerate the recycling of metal resources.

*Concentrated lithium, nickel, and cobalt slag obtained by discharging, drying, crushing, and sorting LIBs.



PICK UP What is the Material Grid that Mitsubishi Materials counts among its strengths?

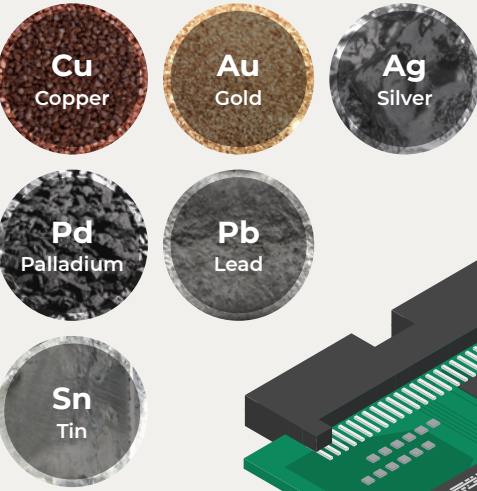
In recent years, with the expansion of recycled product processing, the types of raw materials that can be recycled into metal resources, such as E-Scrap and batteries, has increased. In addition to copper smelting, Mitsubishi Materials is involved in various smelting businesses in Japan and overseas, including precious metals smelting, lead smelting, and tin smelting, and the variety of metals handled at each smelting site is increasing.

To efficiently recover the desired materials, multiple smelting bases are interconnected like a grid, enabling the exchange of valuable metals between them. This interconnected network of smelting bases, known as the Material Grid, is one of Mitsubishi Materials' strengths.

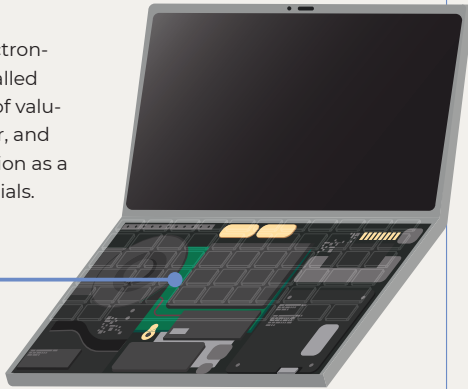
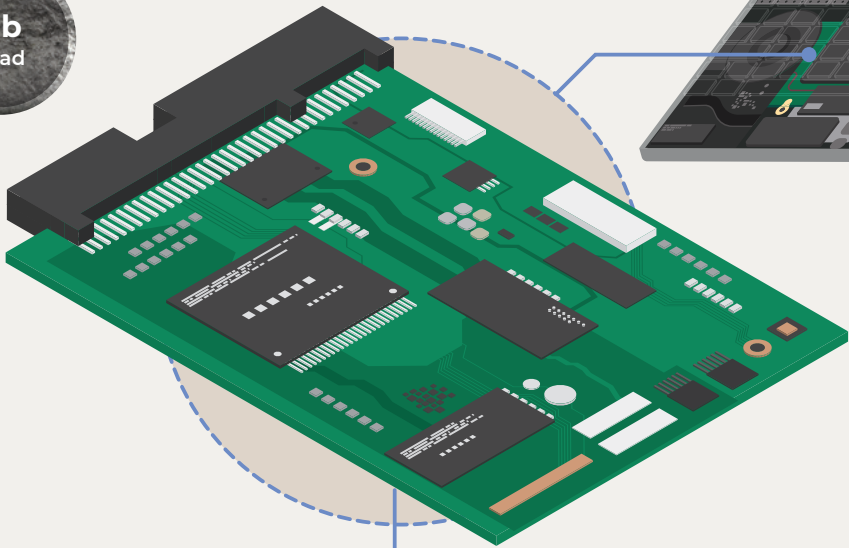
Recycling used products into metal resources

Many of the products around us contain a number of valuable metals. Rather than discarding these used products, we extract the metals and reuse them as resources. This process of metal resource recycling utilizes the technologies and experience of Mitsubishi Materials.

Examples of typical metal resources



The discarded circuit boards from electronic devices such as notebook PCs are called “E-Scrap” and contain large amounts of valuable metals such as copper, gold, silver, and palladium. E-Scrap is attracting attention as a valuable source of smelting raw materials.



E-Scrap

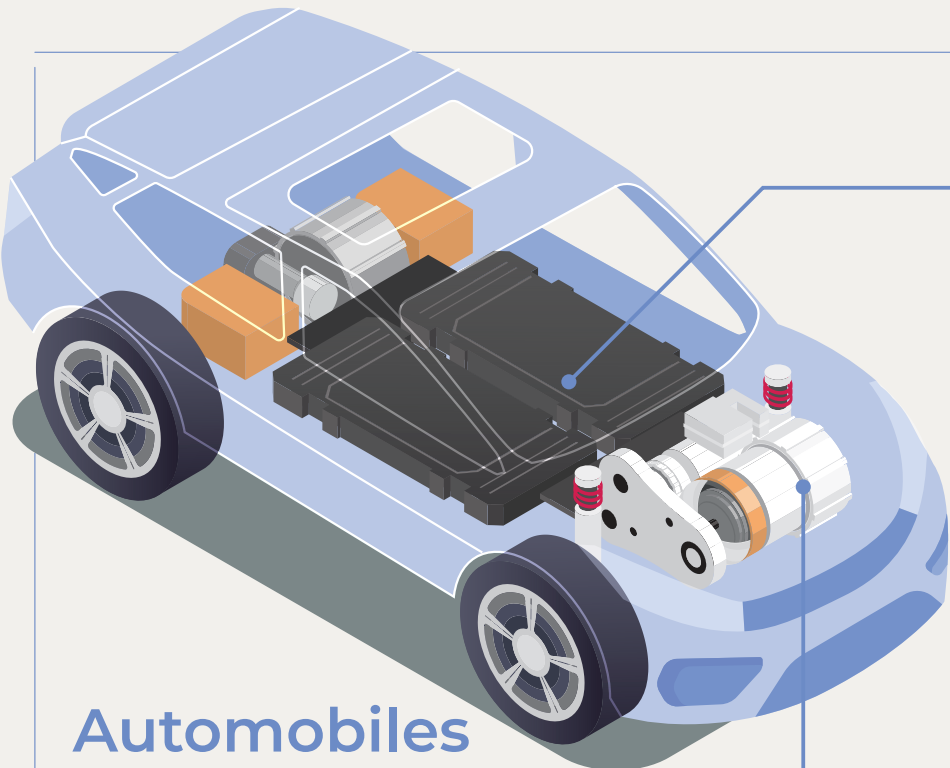
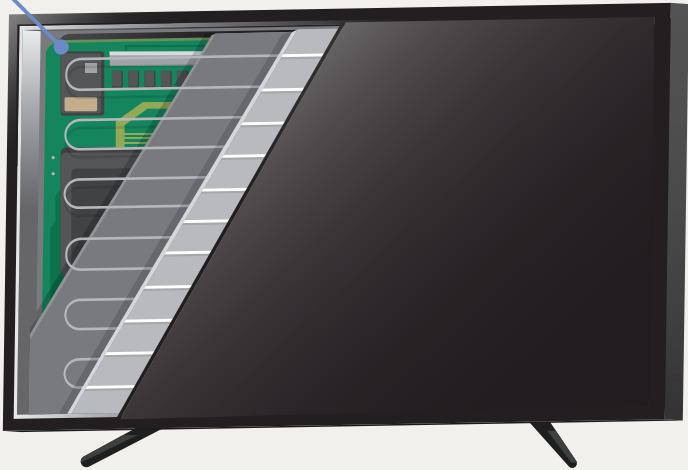
Home appliances

Televisions / Air conditioners / Refrigerators and freezers / Washing machines and clothes dryers

Examples of typical metal resources



Discarded home appliances undergo manual or mechanical dismantling, crushing, and sorting processes. Valuable metals are recovered from television circuit boards, air conditioner heat exchangers, and other components, and then recycled.

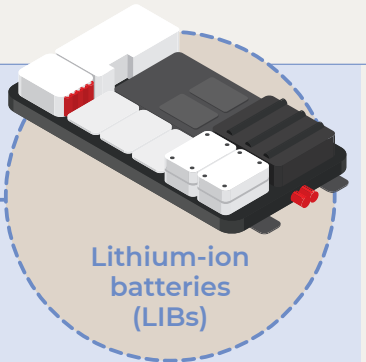
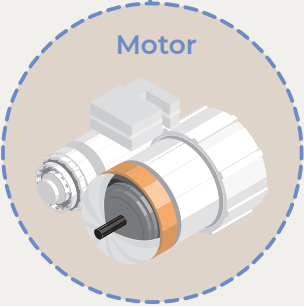


Automobiles

Typical metal resources that Mitsubishi Materials recycles



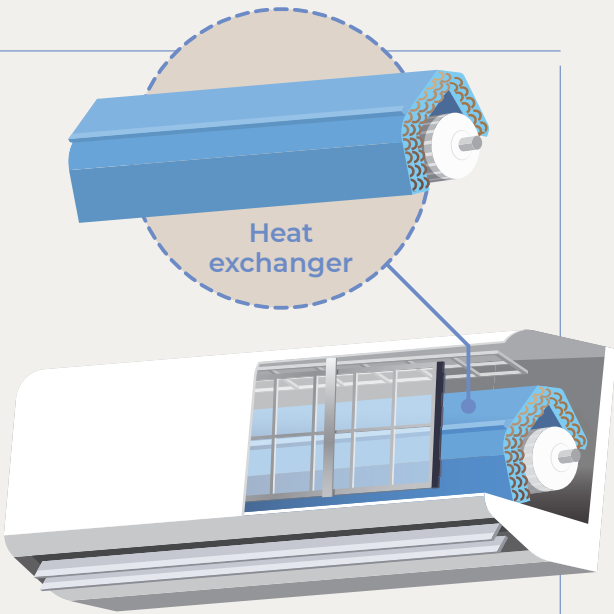
Rare earths and copper can be recovered from automobile motors. Rare earths are a type of rare metal that is produced in small quantities and is difficult to extract. They are essential materials in the manufacturing of smartphones and automobiles.



Planning of a LIB recycling business is underway

The growing adoption of EVs and hybrid vehicles in the automotive industry has led to an increased demand for LIBs. However, there are concerns about the future availability of rare metals like lithium, nickel, and cobalt, which are crucial components of LIBs.

Mitsubishi Materials is working on technology to recover and refine lithium, nickel, and cobalt from the black mass generated during the LIB recycling process.



Cutting tools

The cutting tools used in the machining of automobile and aircraft parts are made from ultra-hard materials primarily composed of tungsten carbide. Mitsubishi Materials is involved in the manufacturing and sale of these cutting tools. Additionally, we recover and recycle used cutting tools to produce new cutting tools from recycled materials.



To fulfill our commitment

The Challenges That Guide Our Resource Circulation

To fulfill our commitment, Mitsubishi Materials has already started taking on challenges. In this section, we would like to introduce employees who are actively striving to achieve their targets.

Latest Topics
concerning the
FY2031 Strategy

01

Securing a stable supply of natural resources Investment in the Canadian copper mine project

In April 2023, Mitsubishi Materials acquired 5% of the stocks of Western Copper and Gold Corporation (WRN), a company in Canada. WRN owns 100% of the Casino Mine Project involving a copper mine located in Yukon, a territory in northwestern Canada, and aims to start production in 2030.

The Casino Mine boasts abundant reserve amounts, and the copper concentrates it produces are expected to have few impurities, ensuring clean quality. The mine is projected

to stably provide copper resources in the long term until 2057. Additionally, the concentrates are profitable due to their high-grade (pure) gold content, in addition to copper.

This acquisition of stocks is part of our initiatives for securing a stable supply of copper concentrates, which are natural resources, through ongoing investments in copper mines. By steadily promoting this project, we will advance these initiatives.

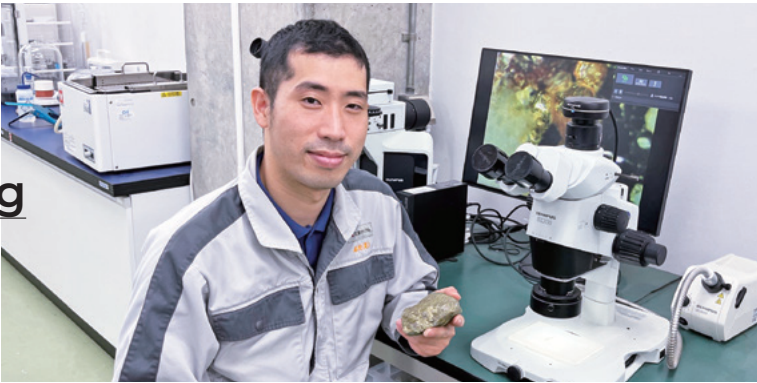


My Challenge

Creating synergies by applying techniques developed through mining

Koichiro Takatsugi

Assistant General Manager
Mining & Metallurgy Laboratories
Technology Development Dept.
Metals Company



At the Mining & Metallurgy Laboratories I belong to, we provide technical support to maintain stable operations at smelter/refinery and mine sites, offer solutions for technical issues in operations, and also develop processes to create new business.

As a leader on the mining and mineral processing team, I lead young researchers and work closely with frontline teams to analyze the root causes of existing issues and to develop

solutions in order to secure necessary quantities of copper concentrates with stable quality.

Furthermore, we are committed to developing unique technical synergies within Mitsubishi Materials by applying mineral processing techniques, cultivated through mining over the years, to each smelting location.

To achieve the FY2031 Strategy, we will focus on developing technologies to enhance the productivity of our invest-

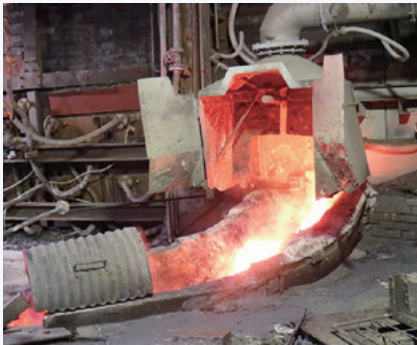
ed operating mines and strive to secure a supply of copper concentrates from these mines. Specifically, we aim to develop efficient processes for extracting necessary metals from ore. In new mine investment projects, we also need to identify technical risks that cannot be discerned solely from the disclosed information.

We will add more value to our mineral resources business by solving these issues.

Latest Topics
concerning the
FY2031 Strategy

02

Strengthening the Material Grid across locations Fully acquiring Onahama Smelting and Refining Co., Ltd.



In April 2023, Mitsubishi Materials fully acquired Onahama Smelting and Refining Co., Ltd. Its Onahama Smelter and Refinery is the only copper smelter and refinery in East Japan. It plays a vital role as a resource recycling hub for non-ferrous metals, ensuring a stable supply of copper materials and alloy metals as well as processing automobile shredder residue (ASR) and E-Scrap.

Mitsubishi Materials is enhancing its Material Grid to facilitate the recovery of various metal elements across its

metallurgy business locations. As we now fully own Onahama Smelting and Refining Co., Ltd., we are promoting the project to establish a new pre-processing facility for recycled materials at the Onahama Smelter and Refinery, which will strengthen our Material Grid.

By leveraging Mitsubishi Materials' technology to fortify the Onahama Smelter and Refinery's recycling business, we will accelerate the metal resource recycling mentioned in the FY2031 Strategy.

My Challenge

I want to contribute to the growth and strengthening of the Onahama Smelter and Refinery

Kazuyuki Akasaka

Assistant General Manager
Metallurgy Dept.
Metallurgy Div.
Metals Company



Our department is involved in the planning and management of metallurgy technology and production within our metallurgy business. Specifically, I provide support to the Onahama Smelter and Refinery in its operation, the addressing of technical challenges, and the development of the capital investment plan.

As shown in the FY2031 Strategy, we are committed to increasing the processing capacity for E-Scrap to 240,000 t/year. Our department is aiming to

achieve this target by supporting each smelter and refinery in developing the capital investment plan.

The Onahama Smelter and Refinery has long worked on processing waste, including ASR, and has promoted continuous capital investment and technological improvement, enhancing processing capacity. To further enhance the capacity, we are moving forward with plans to increase the processing capacity of E-Scrap and will implement new processing facilities,

thereby achieving a processing capacity twice as large as the current capacity by 2030.

Currently, all members involved are working as one to conduct constructions and are planning new businesses toward the realization of the FY2031 Strategy. I would like to contribute to the growth of Onahama Smelter and Refinery, which is becoming more competitive and stronger.

To fulfill our commitment

The Challenges That Guide Our Resource Circulation

Latest Topics
concerning the
FY2031 Strategy

03

Expanding the E-Scrap business

Building a partnership with the U.K.-based company Exurban



In March 2023, Mitsubishi Materials acquired some of the stocks of Exurban in the U.K., became its major shareholder, and established a strategic partnership with the company. Exurban is currently developing the world's first zero waste recycling facility specifically designed for E-Scrap and other recycled metals.

Mitsubishi Materials will participate in the Exurban Group's project to construct a new recycling facility in Indi-

ana, U.S.A., contributing as a partner in the areas of construction, operating, and financing.

Through this partnership, we aim to solve environmental and industrial issues related to metal recycling. We also strive to expand our E-Scrap business globally, including in Europe, to become a leader in resource recycling of nonferrous metals and achieve the target set forth in the FY2031 Strategy.

My Challenge

Aiming to become a leader that connects global resource circulation efforts

Satoshi Kikuchi

Assistant General Manager
Business Development Dept.
Resource Circulation Div.
Metals Company



I am currently engaged in activities promoting the Exurban and LIB-recycling projects. I am also involved in planning, conducting surveys, and engaging with stakeholders to strengthen and expand our existing recycling businesses and to create new resource recycling opportunities.

There is an increasing demand for recycling metal resources, driven by the need to ensure economic security and minimize environmental impacts.

However, the recycling industry is becoming more competitive as resources become more restricted and competitors expand their presence or enter the market.

Under such circumstances, the Business Development Dept. is working to realize the project that Exurban is planning in Indiana, U.S.A.

Since Mitsubishi Materials began investing in Exurban, we have received a number of inquiries from various

stakeholders, which shows high expectations for us.

The future of resource circulation is uncertain, partly influenced by the policies of individual countries and regions. That is why we are committed to actively collaborating with internal and external stakeholders and developing a resource circulation system that fully leverages our technological capabilities.

An expert
discusses
the future
of metal
resources

Fostering of People and Technology Builds the Future of Metal Resource Recycling



Tetsuya Uda

Materials Engineering
Professor
Faculty of Engineering,
Graduate School of
Engineering,
Kyoto University

Specializes in thermodynamics of materials, fuel cells, smelting and refining titanium and non-ferrous metals, etc. Also teaches Kyoto University's Laboratory of Non-ferrous Extractive Metallurgy, a course sponsored by Mitsubishi Materials, educating and enlightening adults and college students.

The prices of non-ferrous metals, such as copper, have been rising in recent years. The predictions of a "non-ferrous metal shortage" we hear about in the news and other media, are strictly stating there is a possibility of an imbalance of supply and demand. It is precisely because we foresee further growth in demand that the securing of metal resources through the recycling of used metal from urban mines, or E-Scrap, is important.

Japan once produced lots of metal resources. However, as you can see from the fact that all of Japan's copper mines are closed, our metal resources are currently dependent on imports from specific countries. Therefore, we need to be prepared for a situation where our imports are cut off due to possible future political risks. That is why establishing a cycle of metal resource recycling through urban mining in Japan will help to maintain the stability of the industry.

Expansion of metal resource recycling will lead to the effective use of resources. Compared to mineral resources, urban mines are superior in terms of having a high concentration of not only copper but also precious metals, such as gold and silver, as well as rare metals, including palladium.

On the other hand, an issue with urban mines is the difficulty of predicting the amount of resources that can be secured in the future. For this reason, the compe-

titition for metal resources has been regarded as a problem in recent years, and it is also essential to create a system for a stable supply of resources, taking into account the perspectives of the government and administration. I have a wide range

of expectations for Mitsubishi Materials, which is a key company for metal resource recycling. Mitsubishi Materials, using the "Mitsubishi Process" for continuous copper smelting, its proprietary technology, has continued to take on the challenge of technological development and established a smelting process. Now, in this era in which urban mining is the key, I would like the company to treasure the challenger's spirit, researching and developing a smelting and refining process optimized for urban mining and releasing newly evolved technologies to the world.

Mitsubishi Materials is sponsoring an endowed course at Kyoto University as part of non-ferrous metal smelting related education. At the time the course began, the then vice-president of Mitsubishi Materials, Osamu Iida, encouraged me, saying: "During this course, please deliver a lecture that will benefit the entire non-ferrous metal smelting industry." In response to his thoughts, I aim to educate and train human resources who will shape the future of non-ferrous metal smelting, the basis of social development, through this course.

For the expansion of metal resource recycling, passing on smelting and refining technology to the future generation is vital. Communicate not only the technology but also the mindset of proactive thinking and action. Create an environment in which engineers can take on more challenges without fear of failure. These things should evolve smelting and refining technology and connect it to the future.

Continuous learning strengthens the muscle supporting technology. Going forward, let's continue to promote collaboration between business and academia to develop people who will create the future.





Visiting a Town with MM

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

Ikuno 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 where Mitsubishi Materials' Ikuno Plant is located. Ikuno Plant has long been responsible for tin smelting and the management and maintenance of closed mines.

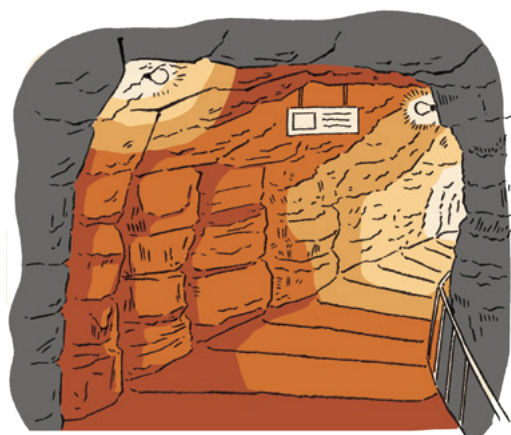
Asago, situated in the north-central part of Hyogo Prefecture, is one of Japan's most prominent mining towns. There are numerous spots in the area where you can feel the historical significance, such as the remains of Ikuno Silver Mine and the buildings of Ikuno Plant.



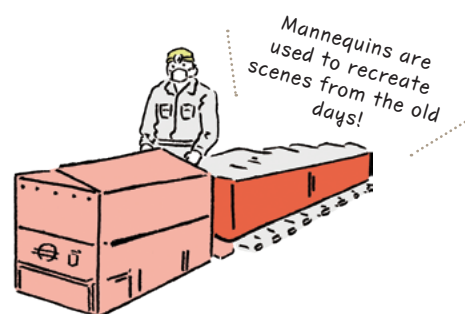
Ikuno Silver Mine

One of Japan's largest mines with over 1,000 years of history

It is said that silver was produced at Ikuno Silver Mine as far back as 1,200 years ago. It flourished as a shogunate-controlled mine and supported the modernization of industries for many years. The mine was closed in 1973 and is now a popular tourist attraction.



As the mine formerly belonged to the Meiji government and the imperial family, the gate posts bear the chrysanthemum crest.



Matsuba Crab, Tajima Beef

Popular ingredients from Hyogo Prefecture!

Matsuba crab is a specialty of the Tajima region in Hyogo Prefecture, which faces the Sea of Japan. It is characterized by its sweetness, even when served cold. Tajima beef is renowned for its delicious balance of lean meat and fat, and it is known as the origin of domestic brand beef.



Takeda Castle Ruins "The Castle in the Sky"

Takeda Castle is a mountain castle known as the "Castle in the Sky" because it appears to be floating on a sea of clouds. It stands at an elevation of 353.7 meters. Although none of the buildings from the Muromachi period remain, the stone walls are said to date back to that period.



Kanaya Festival

An event where you can enjoy the atmosphere of the Showa Era

A local festival where you can enjoy strolling through the historic streets around Ikuno Silver Mine. In recent years, due to the COVID-19 pandemic, the festival has become an event focused on walking around the town. Some people even dress up in old-fashioned clothing!



Welcome to Ikuno Plant!

Certified as a Heritage of Industrial Modernization site!

A former mercury mixing facility

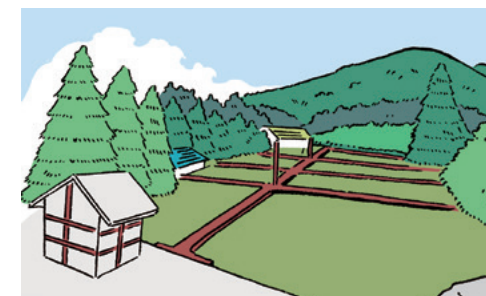
About Ikuno Plant

Ikuno Mine, which was sold to Mitsubishi Goshi Kaisha by the Meiji government, is the origin of Ikuno Plant. The former mercury mixing facility, which now serves as the office for Ikuno Plant, was originally constructed in the early Meiji period to extract silver from ore. The historical brick structure has been certified as a Heritage of Industrial Modernization site by the Ministry of Economy, Trade and Industry. In 2017, it became one of the cultural assets that make up The Bantan Silver Mine Carriage Road / Ore Mining Road.

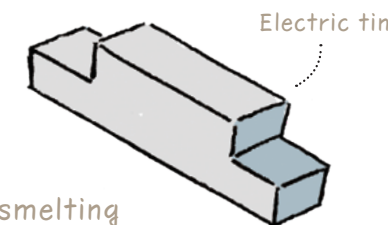


Management and maintenance of closed mines

The wastewater from the mine contains heavy metals, and Ikuno Plant is responsible for treating this water to clean it. We will continue to protect the natural environment around the mine.



So you've been working with the local mines for many years.



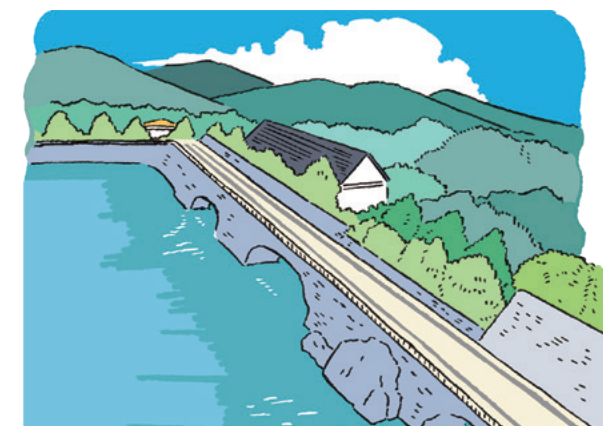
Tin smelting

Crude tin is produced by dry smelting tin scraps generated in the industrial sector. Subsequently, it is refined through processes such as electrolytic refining to achieve high-purity tin. Currently, the tin smelting business is managed by our group company, Materials Eco-Refining Co., Ltd.

There are a variety of other industrial heritage sites nearby.

Trolley Track Remains

These trolley tracks were used from the Taisho era (1912-1926). At the time, they played an important role in the local industry by connecting the mine to the station.



Former Ikuno Mine Staff Dormitory

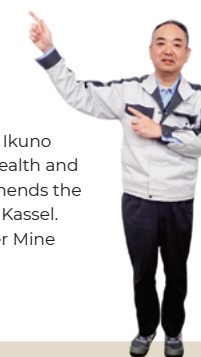
The housing for mine employees, which had long been affectionately known as "Kou Company Housing," was renovated in 2010 as the Former Ikuno Mine Staff Dormitory in Asago.

Guide

Kazuaki Sugitani

Manager, Administrative Section

Joined the company in 2011. Began working at Ikuno Plant in 2014. Responsible for general affairs, health and safety, and environmental matters. He recommends the Tajima beef dishes at Ikuno Kogen Restaurant Kassel. His favorite local events include the Ikuno Silver Mine Heikuro Festival and the Kanaya Festival.





“Establishing a sustainable future from the frontlines of R&D”

Yoshiko Yamaguchi

Separation and Purification Field
Innovation Center

Development of new methods to manufacture and mass produce tungsten, the lifeblood of technological development

Cemented carbide tools are indispensable for cutting and processing metal parts for aircraft and automobiles. The demand for tungsten, the raw material required to make these tools, is increasing along with the growth of the aerospace and EV markets. However, tungsten reserves are limited, and extracting it from ore is not easy. Japan New Metals Co., Ltd., a member of the Mitsubishi Materials Group, contributes to the stable supply of tungsten through its business of recycling used cemented carbide tools.

We are currently pooling the group's resources to develop a new manufacturing method for recycled tungsten and its subsequent mass production.

Since 2021, I have been involved in R&D to implement this new method at our manufacturing sites. We have achieved success in controlling the rate of chemical reactions that occur during the manufacturing process, which was previously considered challenging. This made it possible to manufacture tungsten more efficiently, paving the way for mass production. This manufacturing method also allows for the production of a variety of products with a single process, enabling us to optimally meet the different needs of each customer.

R&D isn't always guaranteed to pro-

duce the desired results, but when we approach phenomena with our company's R&D principle of valuing principles and fundamentals, it presents an opportunity to understand unknown principles and fundamentals. While it can be challenging to go back to basic testing each time, there is a great sense of achievement when we find the optimal solution.

Transforming the manufacturing floor through R&D with a worksite-centric perspective

During my on-site training as a new employee, I often heard the question, “Can that manufacturing method be implemented on-site?” These words have significantly influenced my mindset as a researcher. When I was conducting basic research at university, the emphasis was on clarifying unknown phenomena and laws rather than whether the results could be practically applied in society. So, it was only when I started hearing this question that I realized I needed to produce not only advanced research results but also ways of solving problems on the manufacturing floor. In other words, regardless of how socially significant our research results may be, they hold no meaning unless our colleagues in the manufacturing department can utilize them.

Even now, I sometimes find myself troubled by the gap between the pursuit of principles and fundamentals and the demands of the manufactur-

ing floor. During such moments, I ask myself questions like, “Would this be easy to operate on-site?” and “Doesn't this violate any basic principles?” By considering the implementation on the manufacturing floor and working backwards, I confirm the necessary principles along the way. By achieving a balance between a worksite perspective and principles, I aim to continuously generate research outcomes that drive Mitsubishi Materials' technological capabilities forward.

We must not give up on the global environment for the sake of human prosperity

During my university days, I was researching ways to reduce the impact on people and the environment in the synthesis of organic compounds, so I wanted to work for an environmentally conscious company. However, back in 2019, such companies were still in the minority. That's why Mitsubishi Materials' corporate philosophy seemed so fresh to me.

The research I am currently conducting on new tungsten manufacturing methods and their mass production has the potential to promote the growth of various markets and enrich people's lives. However, it's not enough for people to be prosperous. As I continue my R&D at Mitsubishi Materials, I always ask myself, “What can I do to help realize a sustainable global environment?”

(Left) The tungsten mass production research is a large-scale project involving 44 members. As the members are working at different locations, it is crucial to exchange opinions through web conferencing.

(Right) Members' opinions often differ, even when looking at the same test results. However, each and every opinion holds the key to advancing research and development.





The Power of Materials Builds Society

Photovoltaic power generation

The surge absorbers that protect electronic devices from lightning

Photovoltaic power generation currently accounts for about 10% of energy consumed in Japan. When lightning strikes, it occasionally causes abnormally high voltages (surges) in the surrounding transmission lines. These surges can sometimes penetrate the electronic circuits of solar panels, causing them to malfunction. To prevent this, a component called a surge absorber plays a role in absorbing surges and protecting electronic devices.

Surge absorbers don't operate at normal voltage. Rather, they are active in response to surges that penetrate the electronic device. For this reason, quicker responsiveness to surges enhances the protective performance. Mitsubishi Materials provides society with highly responsive, high-performance surge absorbers by using the Micro-gap method, our proprietary design technology.

The demand for surge absorbers is steadily increasing due to various factors, including the rising frequency of lightning strikes caused by abnormal weather conditions and the need to accommodate smaller electronic devices. Our company will strive to develop smaller, more durable surge absorbers.

PICK UP

LITOL / LTP series Surge absorber for distribution boards and control boards

The LITOL / LTP series is a product developed to protect all types of electronic devices from abnormal voltages, such as lightning-induced electrical surges (lightning damage), and noises. The product is easy to handle and install, durable against repeated surges, and has a longer product life.

The Secrets of Materials



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

SOZAI FILE NO.6

What type of technology is

“Al-Rich coating”?

Automobiles and airplanes are essential for daily transportation. Cutting tools, which are required to process metal and produce components of these products, must be harder than the metal they cut. To realize harder tools, Mitsubishi Materials has been working on the technological development of a material that applies special metal coatings to the surfaces of cutting tools.



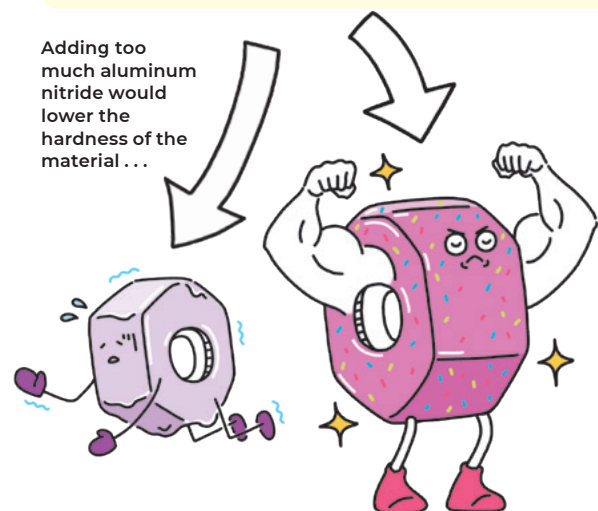
an expert on materials
Dr. Materials
A doctor who loves materials devoted to research at a Mitsubishi Materials lab.



The timing of blending coating materials changes the hardness of coatings?

When high-hardness titanium nitride is blended with a high amount of heat-resistant aluminum nitride, it produces a hard, high heat-resistant material. This material is called aluminum titanium nitride, and it is used in the coating for cutting tools. The key is the right balance between the two materials. If an excessive amount of aluminum nitride is added in order to create an aluminum titanium nitride material with a higher heat resistance, it will cause an issue that lowers the hardness. The solution to this issue is to adjust the timing of adding aluminum nitride.

Adding too much aluminum nitride would lower the hardness of the material...



Realized a high-performance material using our “ultimate recipe”!

The performance of the material for coating tools is something like the “taste” of food. In fact, Mitsubishi Materials has its own “ultimate recipe.” By adjusting the timing of adding aluminum nitride, we can produce aluminum titanium nitride materials without lowering their hardness despite adding high amounts of aluminum nitride. This proprietary material is called “Al-Rich coating” and plays an active role at component processing sites.

Example of applications



To process automobile and airplane components

Al-Rich coating has dramatically improved the abrasion resistance and thermal shock resistance of cutting tools and contributed to the evolution of automobiles and airplanes. We will continue to realize high-performance cutting in order to improve the processing technology of automobile and airplane components.

Mitsubishi Materials' Al-Rich coating actually extended the service life of cutting tools by over four times (compared to existing coatings).



TOPICS

Here are some of the main topics involving Mitsubishi Materials from April to July 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/myFS4KFa6b>



Regulatory Approval for the Zafranal Copper Project in Peru

Mitsubishi Materials Corporation (MMC) and Teck Resources Limited (Teck) have jointly invested in Compañía Minera Zafranal S.A.C. (CMZ) and are promoting the Zafranal Copper Project. We are pleased to announce that the project has received regulatory approval from SENACE (Peru's National Service of Environmental Certification for Sustainable Investments). With this regulatory approval, CMZ will update and verify the project capital and operating cost estimates and will develop detailed engineering plans. The project could be positioned for a formal project sanction decision as early as H1 2024. One of the long-term strategies in the Medium-term Management Strategy of the Resources business from fiscal 2024 to 2031 is “Acquisition of copper mining interests and securing copper concentrates through continuous investment in mines.” By steadily advancing the Project, we will advance the initiatives to realize this goal.



In Preparation for Wide Expansions of GloBrass® in European and North American Markets

GloBrass®, MMC's next-generation lead-free, free-cutting brass, is an alloy that achieves strength and machinability similar to those of our conventionally developed products while achieving about twice the electrical conductivity and reducing metal costs, which was achieved by reviewing the composition of copper and zinc. Going forward, GloBrass® is expected to be used in faucets and a wider range of automotive and electronics components. In order to promote strategic product development and marketing of GloBrass® in the European and North American markets, MMC has signed an agreement with Luvata Oy, a wholly-owned subsidiary, granting Luvata Oy an exclusive license in those regions. Furthermore, Luvata Oy has signed a sublicense agreement with Wieland-Werke AG, one of the world's leading suppliers of semi-finished copper and copper-alloy products. We will strive to make GloBrass®, an environmentally friendly lead-free brass product, widely used in numerous regions, including Europe and North America.



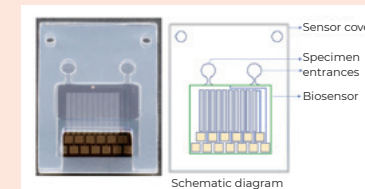
Renewal of Sustainability Management System

On July 1, MMC renewed its sustainability management system and further strengthened its sustainability response under the new system. MMC aims to pursue a more strategic perspective on sustainability issues that contribute to the environment and society, such as “promoting resource recycling,” “addressing global environmental issues,” and “strengthening human capital management.” In particular, regarding resource recycling, the newly established “Resource Circulation Strategy Meeting” will study the concept of resource circulation for our product lines from the perspective of long-term, company-wide optimization. MMC will continue to actively pursue sustainability initiatives to achieve sustainable growth and will enhance our corporate value.



Commenced Commercialization of a Biosensor That Uses a Solid-Electrolyte Thin-Film Transistor

MMC together with Professor Yuzuru Takamura and Assistant Professor Daisuke Hirose of the Bioscience, Biotechnology, and Biomedical Engineering Research Area at Japan Advanced Institute of Science and Technology have developed a biosensor that uses a novel solid-electrolyte thin-film transistor and have started on product development toward its practical use. Genetic testing in the medical field generally uses methods of testing that amplify nucleic acids, such as the polymerase chain reaction (PCR) method, but their application is limited by the high cost and large size of testing equipment. MMC has cultivated advanced technology over the years to develop thin films using wet deposition. We then applied this technology to develop a new biosensor that uses a proprietary solid-electrolyte thin-film transistor as the detector. With this biosensor, the simultaneous detection of multiple nucleic acids and pathogens can be done in parallel in a short amount of time. Additionally, the small size of the solid-electrolyte thin-film transistor itself enables the miniaturization of biosensors, which is expected to expand applications for biosensors in the future.



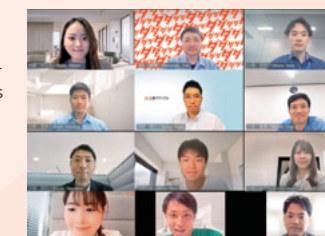
Selected as a “Noteworthy DX Companies 2023” for the First Time

MMC has been selected for the first time as a “Noteworthy Digital Transformation (DX) Companies 2023” in a program run by the Ministry of Economy, Trade and Industry (METI), etc. “Noteworthy DX Companies” are companies selected for their implementation of noteworthy initiatives that contribute to corporate value. MMC was recognized for our DX achievements, human resource development, and efforts to foster a corporate culture. We will continue to utilize DX to realize management reform and to implement a variety of initiatives to fulfill our commitment and evolve into a competitive corporate group.



Third-Year Ambassadors for Inner Branding Promotions Decided

The Mitsubishi Materials Group began inner branding initiatives in FY2022, and is expanding our various initiatives with the goal of encouraging employees to take ownership of “Our Commitment.” We appointed 11 of the applicants from within the Group as third-year ambassadors to promote this fiscal year's activities. The ambassadors will develop various activities, including hosting internal radio-style broadcasts as radio personalities, conducting interviews with external people involved in various fields, and creating videos introducing the appeal of departments from an ambassador's perspective, all aimed at leading to an understanding of and sympathy for “Our Commitment.”



Forests

and Materials



Vegetation survey through daily monitoring at Teine Forest, a Materials Forest
(Sapporo, Hokkaido)

Because We Want to Protect the Beautiful Forests for the Next 100 Years

A variety of plants and animals live in “Materials’ Forests.” The “guardians,” who watch over their growth, perform daily monitoring surveys to track the changes of the forests. The guardians are always paying attention so that none of the plants’ and animals’ habitats are lost when we cut down trees or receive the bounty of the forest.

When stepping into a forest, you may feel as if it has not changed since your previous visit; however, if you look closely, you will see the trees have grown taller and thicker, and you may even come upon rare plants and animals. The guardians also play an important role in determining how to best protect the plants and animals living on the land based on wisdom gathered from examining the changes of the forest.

Forests do not grow over night, but require 100 years or even more time. There are certainly times when things do not go as planned because we are dealing with nature; however, it is the mission and the pride of the guardians to pass on the bountiful nature to the next generation and protect beautiful forests for the next 100 years. That’s exactly why we will continue to challenge ourselves to create sustainable forests based on the knowledge we have gathered.