

Creation of Innovation

Basic Policy on R&D

Developing New Products and Technologies to Anticipate Changes in the World around Us

Our basic policy when it comes to development is to precisely identify customers' needs and future technology trends, and to develop and provide products and technologies that anticipate changes in the world around us. With this policy in mind, we aim to provide the Earth with new materials that make the most of the Group's unique technologies. This means creating distinctive products and technologies that will be competitive in the global market, and upholding our strategy of becoming a world's leading company.

We also engage in a development strategy with the aim of creating timely new products and technologies that will help us to become the number one, and "only one", in each of our lines of business in the short term. Over the medium term, we intend to focus on developing new core businesses that will underpin the sustainable growth of the entire Group, in areas such as next-generation vehicles, IoT and AI and areas where we can contribute to a realization of fulfilling sustainable society. On a longer-term basis, we intend to boldly take on the challenge of creating inspirational new technologies for the future. Combining technology, human resources and passion, our aim is to continually achieve innovation, with an emphasis on the customer's perspective and speed.

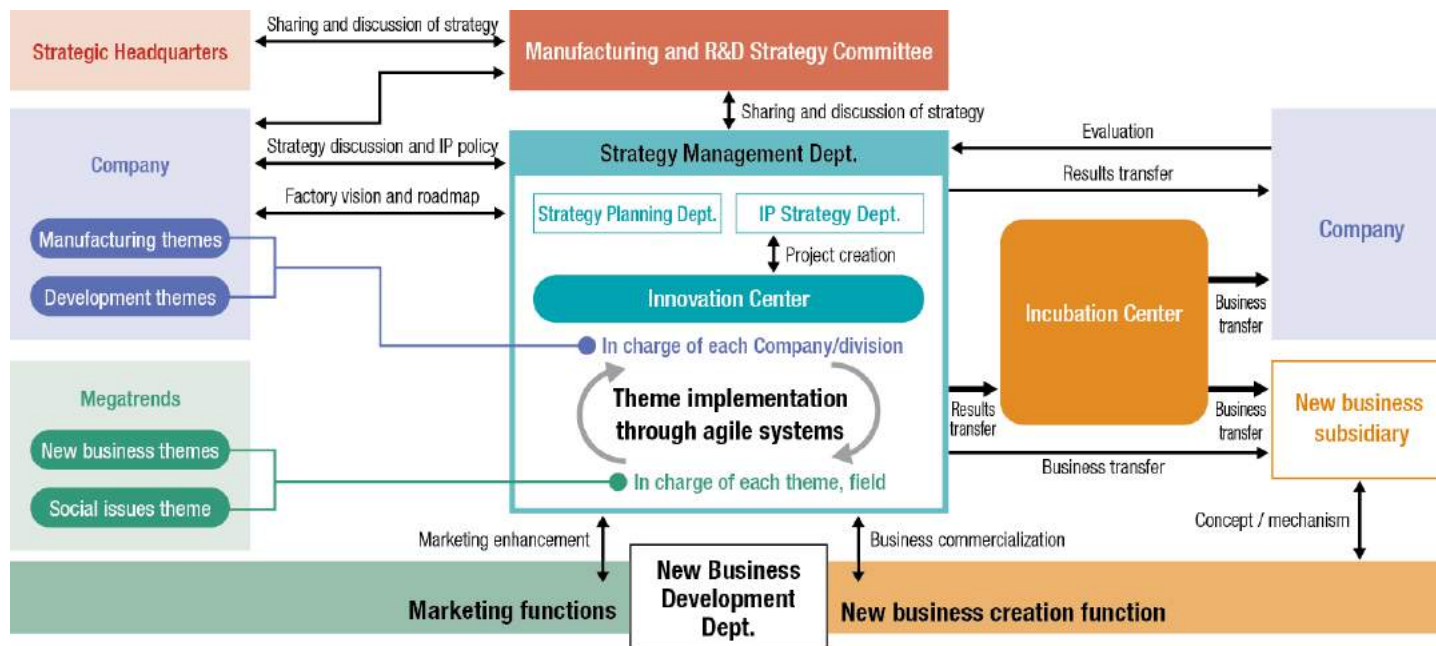
Meanwhile, by taking a broad view when gathering information about megatrends and technology trends and pursuing marketing activities based on dialogue with customers, we will create new value that reflects the needs and wants of customers. By combining our technical development capabilities based on our core technologies with our manufacturing abilities we will work to give shape to this value as we strive to create new products, services and businesses and establish new intellectual properties.

Areas for Improvement from Fiscal 2024 and Beyond

We will undertake the following initiatives under our new Medium-term Management Strategy, with fiscal 2024 as its first year. First, we will work on achieving differentiation in our manufacturing capabilities, developing more sophisticated production processes, driving the development of smart factories, and advancing the creation of new businesses. We will also engage in research and development, focusing on areas that reflect emerging megatrends including next-generation automobiles, IoT and AI, urban mines, clean energy and decarbonization.

On the organizational front, we have newly established the Monozukuri and R&D Strategy Div., consolidating departments related to manufacturing (production technology), development, marketing and new business to fully integrate everything from the creation of ideas and R&D through to mass production and commercialization. In the division's Innovation Center, we have set up a structure to efficiently utilize human resources along the lines of each R&D / manufacturing challenge or new business theme, enabling us to create new products and businesses, pursue development focused on solutions, and acquire new technologies. We have also established an Incubation Center, where we cultivate and strengthen businesses created in the Innovation Center, as well as businesses deemed difficult for an in-house company to expand on its own. To promote coordination inside and outside the Group, reinforce business foundations and advance the creation of new businesses, we have also established a Strategy Planning Dept., IP Strategy Dept. and New Business Development Dept. inside the division. Through these efforts, we will strengthen efforts to deal with the challenges we currently face, namely coordination across multiple strategies, the flexible allocation of management resources, and the development of human resources specializing in general project management, mass production and commercialization.

■ Implementation Structure



MMC Innovation Fund

In March 2019, we worked with JMTC Capital G.K. to establish the “MMC Innovation Investment Limited Partnership,” a corporate venture fund with the objective of investment in venture companies with material technologies. We support technology start-ups that have synergies with us. In this, we accelerate collaboration with a focus on next-generation batteries, metal processing, IoT and AI, material technologies related to life and healthcare, and process technologies related to decarbonization and urban mines.

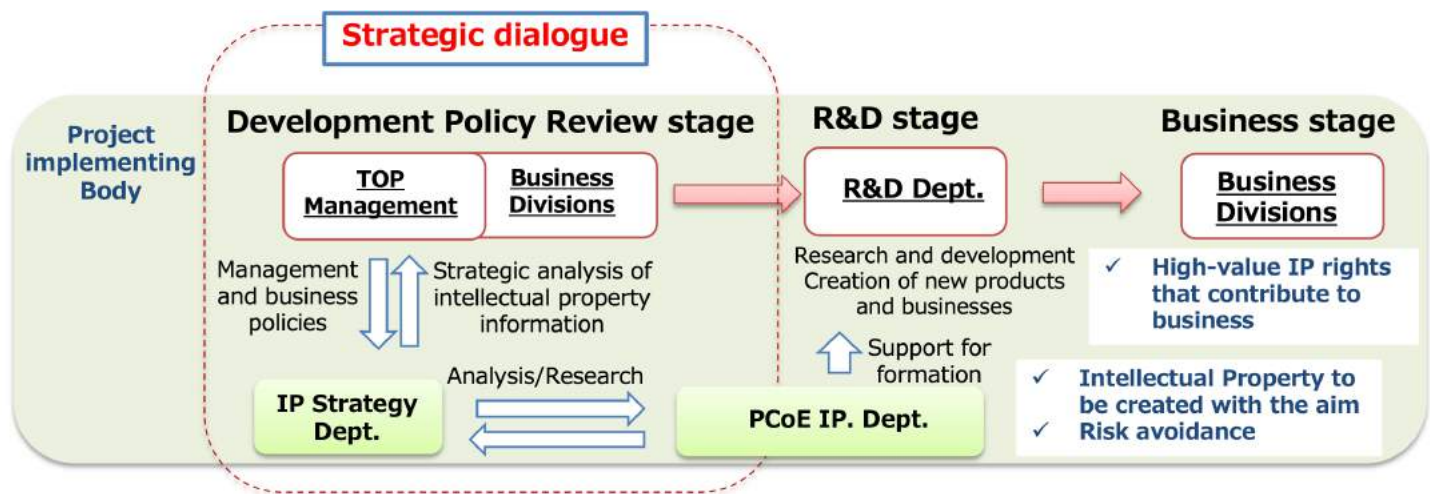
Time	Company name	Company’s technologies/products	MMC’s aim
October 2019	Elephantech Inc.	Elephantech has manufacturing technology for electronic circuit boards by additive manufacturing using inkjet printing of metal nano inks and electroless copper plating.	MMC has started development of “copper nano ink” with Elephantech as an evaluation partner. MMC will aim to develop new copper products for circuit boards and get opportunities of its supply.
May 2020	EneCoat Technologies Co., Ltd.	EneCoat Technologies is developing Perovskite Solar Cells characterized by high power generation efficiency, light weight, and flexibility compared to conventional silicon-based solar cells.	In collaborate with EneCoat Technologies, MMC will develop technologies that contribute to improving the performance of Perovskite Solar Cells and the peripheral materials etc. necessary for making them lead-free, aiming to get opportunities to supply materials when perovskite solar cells become widespread.
June 2020	CONNEXX SYSTEMS Corporation	CONNEXX SYSTEMS has development and manufacturing technologies for new storage battery, high-power in-vehicle Lithium-ion battery (LIB), and next-generation battery that combine LIB and lead-acid battery.	MMC is developing technology for reusing and recycling used in-vehicle LIB. In collaboration with CONNEXX SYSTEMS, MMC will promote the reuse business that is the reuse of collected used in-vehicle LIB for stationary storage battery.
September 2020	Nature Architects inc.	Nature Architects has unique structure design technologies such as giving strength only to the necessary parts and adding the function of absorbing vibration to hard parts.	By combining MMC’s knowledge of non-ferrous metals and other material properties with Nature Architects’ design technology, MMC will promote development of unique products with new added value by additive manufacturing using our materials.
June 2021	Immunosens Co., Ltd.	Immunosens Co., Ltd. develops and provides unique immunosensors for POCT (Point of Care Testing: real-time testing at medical sites) that are both highly sensitive and small in size through its patented GLEIA (Gold Linked Electrochemical Immuno Assay) technology.	Through collaboration with the company, MMC aims to find synergies between MMC’s knowledge of materials, including nonferrous metals, and the company’s life/healthcare-related technologies and expertise, and apply them to the life/healthcare field.

▶ MMC Innovation Fund

* This data is only available in Japanese on the website.

Intellectual property sector initiatives

The Strategic dialogue is promoted as an intellectual property activity in line with management, business and development strategies and new business strategies. In the strategic dialogue, we hold dialogues with the Companies and new business creation divisions based on the results of analyses of intellectual property information, and strategically formulate the intellectual property needed for business development. We support new value creation initiatives through various intellectual property activities, including strategic dialogue.



► Intellectual Property

■ Major Achievements in Fiscal 2023

Field	Item	Details
Decarbonized society	Participation in Japan Science and Technology Agency (JST) JST-Mirai Program – Utilizing magnetism to develop high performance thermoelectric materials and devices	We are participating in the JST-Mirai Program together with universities engaged in joint research. Through the program we will develop materials and modules to improve performance and facilitate the widespread adoption of thermoelectric technologies.

TOPICS

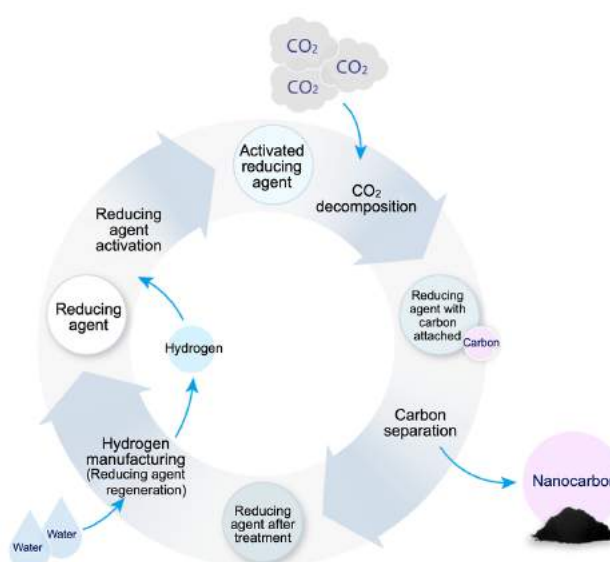
Development of Carbon Recycling Technology Adopted as an R&D Project Commissioned by NEDO

For the creation of a new business for carbon neutrality, we set about research and development starting in 2017 for a technology to decompose carbon dioxide (CO₂) for recycling as a carbon material. In October 2021, this initiative was adopted as a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO) with the title of "Development of Carbon Material Manufacturing Technology by Chemical Decomposition of Carbon Dioxide" in the field of "Development of Technologies for Carbon Recycling and Next-Generation Thermal Power Generation / Development of Technologies for CO₂ Reduction and Utilization".

This technology uses the reaction of an activated reducing agent (powdered metal oxide) with CO₂ to break down and recover the CO₂ as a particulate carbon nanomaterial (a valuable resource). The recovered carbon nanomaterial is expected to be used in a variety of applications as a source of carbon. Many carbon recycling technologies require hydrogen. Features of this technology are that the amount of hydrogen the process requires is relatively small, hydrogen is even generated by the process, and it is a cyclical process in which the reducing agent and other materials can be reused.

Currently, the principle has been verified in the laboratory and elemental research has been completed. Going forward, we will use scaled up testing equipment to confirm equipment performance and optimize reaction conditions.

▶ Carbon Recycling Technology Adopted as an R&D Project Commissioned by NEDO



Exploration and Creation of Social Value

Exploring and Creating Social Value

To continue to develop materials in anticipation of the future, Mitsubishi Materials Corporation (MMC) has established a Basic Research and Development Policy which focuses on research and development that achieves the growth strategies of its in-house companies.

First, we have set "resource recycling", "decarbonization", "semiconductors" and "mobility" as areas of focus, and conduct research and development based on product and brand strategies that reflect the values demanded by society.

Additionally, looking to the future, we aim to directly link MMC's business activities with the exploration and creation of social value (solving issues), and we strategically set and work on research and development themes accordingly. By 2030, we aim to "provide society with sustainable materials that design circulation" by strengthening both the arterial and venous functions of materials, developing new products that help reduce greenhouse gases (GHGs), and implementing process innovations.



*Abbreviation of computer aided engineering, technology that utilizes computer simulations in the development of materials and processes.

*Abbreviation of electric axle, a single package comprising the main components required for an xEV to run (motor, inverter, reducer, etc.).

Strengthening of Manufacturing

Pursuing Manufacturing Capabilities

Mitsubishi Materials Corporation (MMC) aims to fully utilize Group support functions and achieve the MMC Group vision by having each operating division continually layout a vision for raising manufacturing capability to the next level. By swiftly resolving issues with the use of human and technological resources inside and outside the Group, we will succeed in creating manufacturing capabilities that set us apart from the competition.

Key Points to be Improved Upon in Fiscal 2024 and Beyond

Through initiatives aimed at raising manufacturing capability to the next level, we will achieve our vision for plants based on business strategies that lead to medium- to long-term business growth, improve our ability to identify issues by utilizing digital technologies that enable production process upgrade, and enhance our ability to make meaningful improvements by innovating the way we work.

We will also make proactive use of external knowledge in an effort to further enhance manufacturing capabilities.

In our plant vision, we will consider effective mechanisms to streamline vision development and the process of following up on the measures implemented. Under our manufacturing management framework, we have completed the initial assessment of Kaizen capabilities and factory management capabilities, and will check the progress of improvement plans. Meanwhile, we have completed the design of innovation power and organizational and human resource development capabilities, and will roll out an initial evaluation of these elements. In production process upgrade, we are working on multiple themes, and have already developed equipment related to the theme of AI-based inspection automation and installed the equipment at a plant. We plan to aggressively roll out these advancements so that the elemental technologies gained through these development activities can be used at other plants as well. We are also pursuing the development of smart factories, and have made progress in the selection of model businesses and factories, defining elemental technologies and initiating surveys and development. In fiscal 2024 we will continue to establish elemental technologies to improve quality, reduce labor and achieve reduced manufacturing lead times. MMC has also developed a practical manufacturing human resource training program for young employees. We will apply the program to each field of manufacturing, development, sales and management, and implements more effective initiatives that will help improve the profitability of our plants. We are also pursuing initiatives to develop DMAIC (quantitative process improvement) leaders among management at each plant. In fiscal 2024, we will continue to raise manufacturing issues and strengthen activities to establish improvement themes. Utilizing the expertise and technologies we have cultivated to date, we will work to solve issues under an efficient framework.

