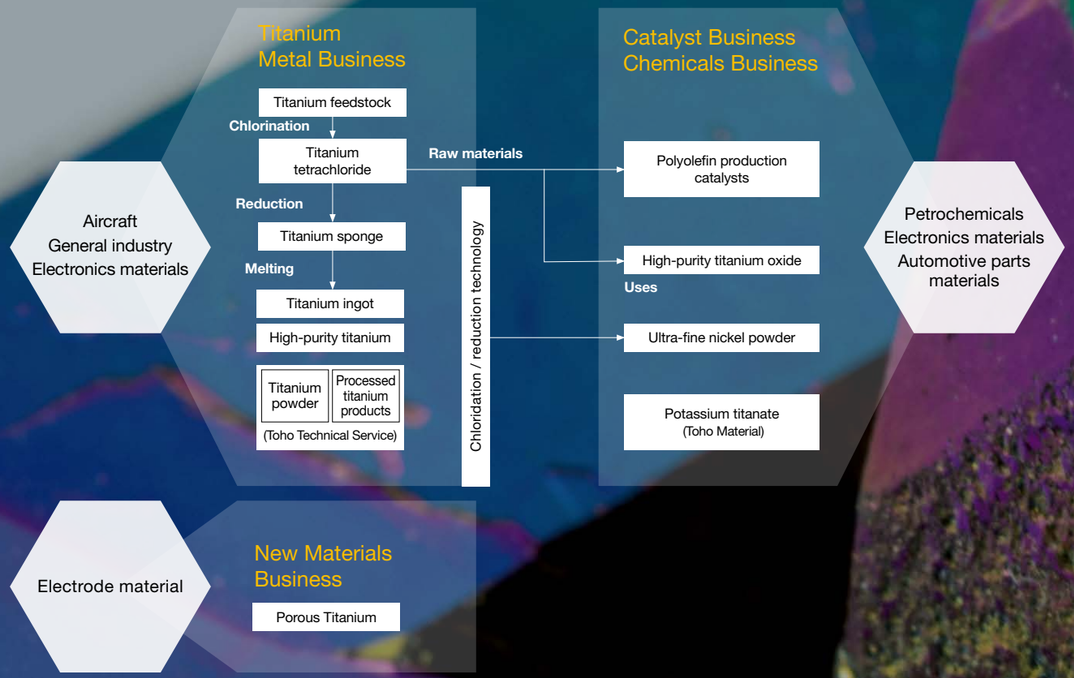
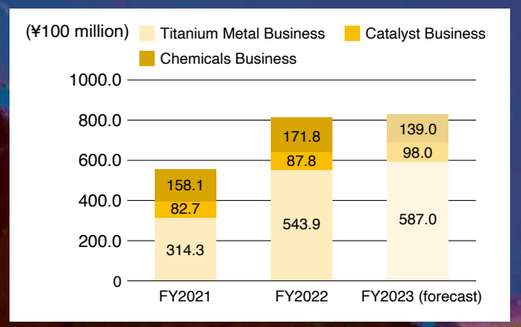
Titanium-related Technologies

Business overview

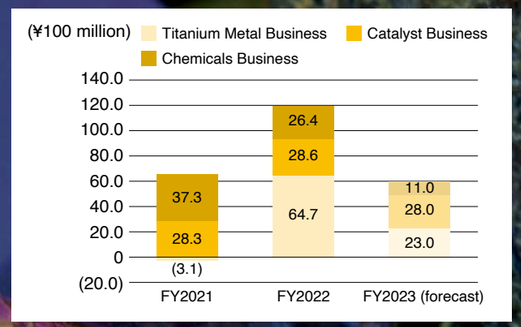
As one of the world's leading titanium manufacturers, the Toho Titanium Group operates 4 businesses: the Titanium Metal Business that manufactures and sells titanium metal; the Catalyst Business and the Chemicals Business based on the Titanium Metal Business; and the New Materials Business which opens up new possibilities for titanium. By accurately identifying market needs and pursuing the unlimited potential of titanium products and related technologies, we will contribute to our customers' product and business development, thereby achieving sustainable growth for our Group.



Sales by business segment



Operating profit by business segment



Messages from the Division Managers

Titanium Division

Accelerating transformation for future leaps

Takeshi Shiraki

Our advanced titanium sponge smelting technology and ingot melting technology have been highly praised by our many customers. However, given the steady growth in demand in the aviation industry and tight global supply due to the impact of the conflict in Ukraine, we recognize that stably providing the quantities required by our customers is presently an important issue. Against this backdrop, the Titanium Division has set its "Vision for 2030" for the company to "capture the top position in global sales share of titanium sponge for aircrafts" and "obtain an ordinary profit to net sales ratio of 10%". We are focusing on expanding production capacity and improving productivity.

In this period of major change, we believe that the progress made in our Medium-term Management Plan up to FY2025 will have a major impact on future development. We will work with a sense of speed to solidify our footing at our manufacturing sites, increase production capacity, and improve our profit structure. Also, by taking advantage of titanium's excellent properties and further expanding its use in fields such as aircraft, general industry, and semiconductors, we will contribute to the realization of a sustainable society.

Catalyst Division

Building a strong business with even higher added value

Hideo Funabashi

The strength of our catalysts is that they can be applied not only to a specific polypropylene (PP) manufacturing process, but also to several different processes. We also have a PP rating technology that other catalyst manufacturers do not have. Our ability to discuss technology from the same perspective as our customers also gives us a market advantage.

In 2022, we have established "strengthening cost competitiveness", "product differentiation," and "new business acquisition" as the pillars of our business strategy. We have already established a method that significantly reduces manufacturing costs, and have successfully produced prototypes using commercial equipment. Going forward, in addition to accelerating the development of higher-performance PP catalysts through joint research with PP manufacturers and universities, we will promote our three pillars by strengthening our sales capabilities.

The PP market is growing at an annual rate of 4%, but price competition is intensifying, especially in the Asian market. In order to lead our current research to success and establish a strong business with high added value and high profits, we would like to first ensure that we achieve our Medium-term Management Plan by FY2025.

Chemicals Division

Business, research, and engineering are unified to demonstrate competitiveness

Takashi Fujii

In FY2022, we were largely able to carry out our main tasks of increasing the operating rate of the fourth nickel powder plant, making investment decisions for a fifth nickel powder plant, and promoting new development, as planned. Although sales were sluggish due to the effects of China's economic slump, we believe that we were able to strengthen initiatives that will lead to medium- to long-term business growth.

Going forward, we recognize that the market will continue to grow over the medium to long term, with demand for electronic components, such as Multilayer Ceramic Capacitors (MLCC), expected to increase. We believe it is important to steadily capture new demand while taking into account the trends of emerging competitors such as Chinese manufacturers.

All of our products are based on our proprietary technology, and the high appraisal we receive from our customers is the source of our competitiveness. We will continue to improve our R&D capabilities for newly developed products and maintain and expand our supply capacity to reliably meet increasing demand. Sales, research, and manufacturing will come together to accelerate problem-solving toward "Vision for 2030".

New Materials Division

Aiming to establish the "Fourth Pillar" by accelerating commercialization

Kenichi Yamaguchi

The New Materials Division was launched in April 2023. The mission of this division is to develop into a business, items that have reached the commercialization stage through development projects carried out by the Technology Strategy Headquarters (formerly the Technical Development Center). Through the promotion of this commercialization, it is also an important mission to contribute to achieving an annual sales of 10 billion yen for new businesses envisioned in "Vision for 2030".

The first product that our division will work on commercializing is porous titanium material (WEBTi), which is primarily used as a component for PEM water electrolysis generators for hydrogen production. The water electrolysis generator market is expected to expand significantly as we move toward the realization of a carbon-neutral society. We will establish communication channels with customers and expand the sales base by developing and improving products that meet market needs. At the same time, we will expand our production scale by establishing a stable mass production process and improving productivity. We will also work to improve the functions of our business management, such as building quality control systems and risk management systems. We will expand our human resources through active recruitment of new graduates and mid-career employees, as well as enhance our business promotion capabilities.

Titanium Division

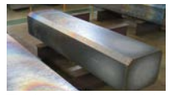
Expanding domains of application with stable quality metallic titanium

In our Titanium Division, in addition to titanium sponges and titanium ingots made by melting and casting the sponges, we have a wide range of products such as DC Slab and titanium powder, each with high added value, and their own superior features as a raw material.

With high quality and reliable supply, we provide titanium products that satisfy our customers.

Main Products


Titanium sponge


Titanium ingot (rectangular)


Titanium ingot (DC Slab)

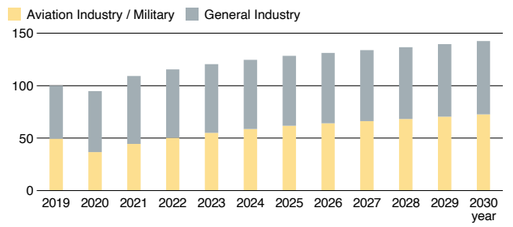

High-purity titanium ingot (round)


Titanium powder

Market Environment and Overview of the Current Fiscal Year

The demand for aircraft and general industrial applications has continued to be strong since FY2022. In addition to increased demand for new aircraft due to recovery in passenger demand from the COVID-19 pandemic, supply and demand became tight, especially for titanium sponge, a major raw material, due to the demand for substitutes caused by the avoidance of Russian-made wrought products due to the invasion of Ukraine. Our domestic Chigasaki and Wakamatsu plants continue to operate at full capacity, and our plant in Saudi Arabia has also prepared for full operation. The tight situation for titanium is expected to continue for several years, so we are increasing production capacity through facility and process improvements, as well as considering the construction of a new plant that can ensure profitability.

Titanium sponge demand forecast (our estimate) *2019 is set to 100

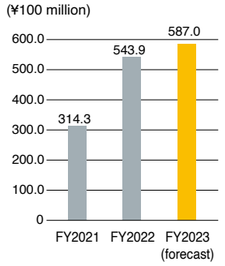


Outlook on the business environment

Short term FY2023	■Demand for aircraft remains strong due to recovery from the COVID-19 pandemic and avoidance of procurement from Russia ■General industrial demand also recovers, mainly for high-end products ■For titanium ore, demand for titanium oxide is currently on the decline, but is expected to recover by the end of the year, and prices are expected to rise from the second half of the year.
Medium term to 2025	■The demand and supply gap in the aviation industry is expected to continue to exist ■Customers place importance on securing quantity ■Titanium ore prices continue to rise
Long term to 2030	■The aircraft industry is growing at an annual rate of about 4% ■Continued avoidance of procurement from Russia is expected

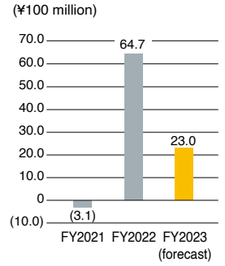
Net sales

(¥100 million)



Operating profit

(¥100 million)



Plant in Saudi Arabia operating towards full production

Growth Strategy

1 Apply a price formula linked to cost fluctuations

Aim to optimize prices by linking sales prices to fluctuations in energy costs such as raw materials, secondary materials, and electricity related to products.

2 Increase titanium sponge production capacity at Wakamatsu/ Chigasaki (3 kt/year)

Aim to increase capacity by 3 kt/year at the two domestic plants combined by increasing capacity through facility improvements at each plant.

3 Full operation of the Saudi Arabia Sponge Plant

Start full operation within 2023 in order to respond to the strong increase in demand.

4 Improve titanium ingot production efficiency

Aim to improve productivity by improving operations and optimizing personnel allocation.

Catalyst Division

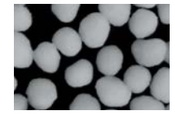
Contributing to Value-added Polyolefins

Taking advantage of our ability to internally procure titanium tetrachloride and magnesium chloride, which are raw materials for catalysts from the titanium manufacturing process, we develop, manufacture (including outsourced manufacturing), and sell catalysts for the production of polyolefins (PO) such as polypropylene (PP), a plastic product, and polyethylene (PE). We also process and sell magnesium chloride for applications such as catalyst raw material and raw material for pharmaceutical intermediates.

Main Products

Polyolefin catalysts

- For PP manufacturing
- For PE manufacturing
- For other olefin polymerization


THC catalyst

Raw materials for catalyst supports and pharmaceutical intermediates

- Magnesium chloride powder
- Magnesium chloride lump
- Magnesium chloride powder/titanium trichloride mixture

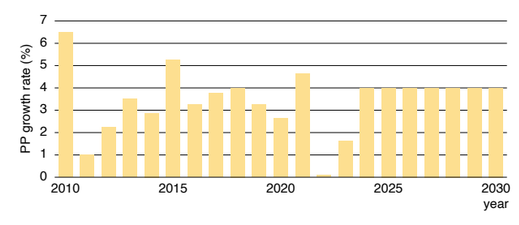

Catalyst raw materials

External donor for PP production

Market Environment and Overview of the Current Fiscal Year

Demand for polyolefin catalysts in Asia continues to weaken, mainly due to the economic downturn in China. Due to weak demand in the first half of FY2023, sales volume is below the level of the same period in FY2022, but we expect it to gradually recover from the second half of FY2023 and return to a growth trajectory. Due in part to the effects of a weaker yen, tight supply and demand is expected to continue. Global demand for PP is expected to grow at an annual rate of 4%. In response to this growth, we are working on further product improvements, providing catalysts with reduced environmental impact, and developing new products.

Global PP growth rate (our YoY estimate)

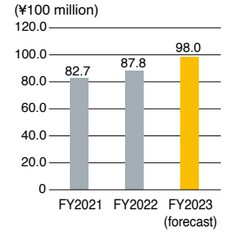


Outlook on the business environment

Short term FY2023	■The polypropylene market weakens due to soaring raw material prices and China's Zero-COVID policy, and catalyst usage declines among customers in Asia, Europe, America, and Japan. ■Demand bottoms out and gradually recovers in the second half of FY2023
Medium term to 2025	■Polypropylene demand returns to a growth trajectory from FY2024 onwards
Long term to 2030	■Polypropylene demand is expected to grow at an annual rate of around 4%

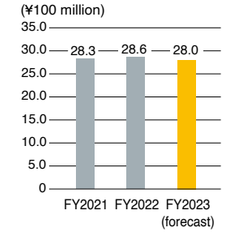
Net sales

(¥100 million)



Operating profit

(¥100 million)



High-performance catalyst development research is being conducted in our latest catalyst research facilities.

Our catalysts are widely used in plastic products that are essential for daily necessities, as well as automobile bumpers and interior PP.

Growth Strategy

1 Increase production capacity through improvements in production technology and other areas (approximately 60% increase compared to the current production capacity)

Aim to expand production capacity by fundamentally reviewing issues in the production process.

2 Formulate a plan to increase capacity by constructing a new plant

Start by considering the location of the new plant in anticipation of future demand.

Chemicals Division

Powder manufacturing technologies supporting the evolution of electronic component materials

In our Chemicals Division, we manufacture and sell high-purity titanium oxide, ultra-fine nickel powder, and other electronic component materials used in multilayer ceramic capacitors (MLCC), PTC thermistors (positive temperature coefficient thermistors), and dielectric resonators. In particular, ultra-fine nickel powder is used for the internal electrodes of MLCC, taking advantage of its ability to control particle size and surface condition. We will further refine our powder manufacturing technology with high levels of quality stability to meet growing demand in the markets for telecommunications equipment, in-vehicle electrical components, and electronic equipment.

Main Products

High-purity titanium oxide

Ultra-fine nickel powder

Market Environment and Overview of the Current Fiscal Year

In FY2022, while MLCC, the main application for our main product, ultra-fine nickel powder, was on the road to recovery from the decline in demand caused by the COVID-19 pandemic, we entered an adjustment phase once again due to the impact of China's economic stagnation, and demand recovery for both communication and automotive applications was delayed. The slump in demand continued into the first half of FY2023, and as a result, the liquidation of distribution inventories is also being protracted. Although a full-fledged recovery in demand is expected to occur in the second half of FY2023, sales volume and profits are expected to decline in FY2023.

In the long term, demand for electronic components is expected to further expand due to faster communications, higher functionality of electronic devices, and automobile electrification. In order to meet this growing demand, we have decided to build a new nickel powder plant to strengthen our supply system.

Applications

Internal electrode material (nickel powder)

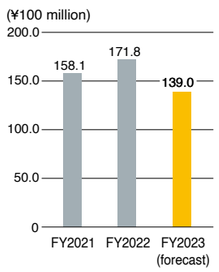
Electroceramics

Pharmaceuticals

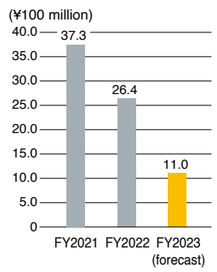
Optical materials

MLCC demand forecast (our estimate) *2020 is set at 100

Net sales



Operating profit



Outlook on the business environment

Short term FY2023	■Although there is an impression that the decline in MLCC demand has bottomed out, recovery in demand for both communication and automotive applications is delayed, mainly due to the prolonged economic slump in China. ■Considering the elimination of excess inventory in distribution, it is estimated that demand for MLCC materials will recover from the second half of FY2023 onwards.
Medium term to 2025	■Under the assumption that the Chinese economy will be stabilized, once MLCC demand recovers, both communication and automotive applications will return to a growth trajectory. ■In particular, automotive applications are expected to grow as the speed of automobile electrification accelerates.
Long term to 2030	■There will be no change in the trends in the improvement of communication functionality, automobile electrification, and driving automation. ■MLCC demand is expected to grow at an annual rate of approximately 7%

Growth Strategy

1 Increase production capacity by operating the fifth nickel powder plant (scheduled for FY2025) (approximately 20% increase compared to the current production capacity)

In line with the growth in MLCC demand, the company will build a new plant to increase the supply capacity for ultra-fine nickel powder, which is a raw material for components.

TOPIC

Start of construction of the Nickel Powder Plant No. 5 within the Wakamatsu Plant (September 2023)

Ultrafine nickel powder, the main product of the Chemicals Division, is used as the internal electrode in MLCC. MLCC is an electronic component with functions such as assisting and stabilizing power supply, and suppressing noise. It is installed in most electronic devices such as mobile and home appliances, automobiles, IT, and infrastructure equipment. The market is expected to continue to grow significantly in the future as communication equipment becomes more sophisticated and 6G (6th generation mobile communication systems) become more practical.

In the past, we constructed a nickel powder plant in the Wakamatsu Plant to enhance our production capacity, and now we decided to construct a new plant in order to strengthen the supply system of nickel powder that can respond to compact MLCC with large capacities. Moving forward, we will continue to invest in expansion in line with the growth of the MLCC market.

New Materials Division

Full-scale start towards mass production of WEBTi as need increases

In recent years, hydrogen has been attracting attention as a next-generation energy source. That is why the porous titanium material (WEBTi) we developed is expected to be used in solid polymer electrolyte membrane (PEM) water electrolysis generators, a type of hydrogen generator. Our division will work towards early commercialization of WEBTi, including establishing a supply system. We will also move forward with initiatives to commercialize other new business projects as well.

FOCUS Achieving a Carbon-neutral Society with the Power of WEBTi Materials → p.23

Main Products

WEBTi-K (development product)

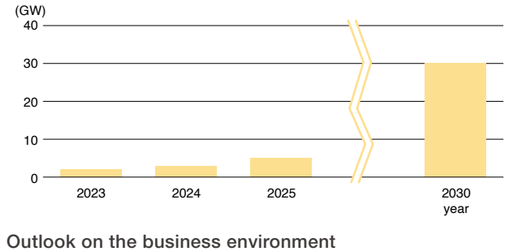
Market Environment and Overview of the Current Fiscal Year

WEBTi, which has been under development since the early 2000s, has grown into a developed product that receives many inquiries as a material for PEM water electrolysis generators.

We will establish an initial mass production system in FY2023-2024, and aim to fully commercialize it in FY2025.

We are also progressing with planning and development projects other than WEBTi, and will continue their commercialization as well.

PEM electrolytic tank installation capacity forecast (our estimate)



"Vision for 2030"

New Business	Ordinary profit
Sales of 10 billion yen/year	Achievement of 3 billion yen/year (target)

Outlook on the business environment

Short term FY2023	■Requests for samples of porous titanium material WEBTi for PEM water electrolysis generators are increasing.
Medium term to 2025	■We aim to start mass production of WEBTi in 2024 ■Proceed with new planning and development projects simultaneously
Long term to 2030	■The porous titanium material market for PEM water electrolysis generators has the potential to become a megamarket. ■Commercializing new projects other than WEBTi

Growth Strategy

1 Commercialization of WEBTi via the New Materials Division

Solve issues in the production process and establish a mass production system.

2 Increased capacity in line with business expansion

The porous titanium material market for PEM water electrolysis generators has the potential to become a megamarket. Continue to increase capacity while paying close attention to market trends.

3 Plan and develop new business themes at the Technology Strategy Department and Technology Development Center

Simultaneously plan new planning and development projects that come after WEBTi.

FOCUS

Start of the New Materials Division and a new structure

We started with a total of 51 people, mainly development project members, but also new personnel. In order to make this the Fourth Pillar of our business, we will work diligently to resolve issues and expand our organization and personnel.