Business Strategy

Carbon Black

Business Overview

Carbon black is a carbon particulate material measured in nanometers (one billionth of a meter). Its diverse grades, defined by difference in particle size, structure (how particles connect), and surface properties, exhibit varied performance. Carbon black is primarily used as a rubber reinforcing agent. Accounting for nearly 20-30% of the weight of tires, it gives tires their black color and is indispensable to maintaining tire strength. It is also used for various applications including reinforcing agents for other rubber products, colorants for plastics, electric wire sheathing, and pigments for inkjet printers.

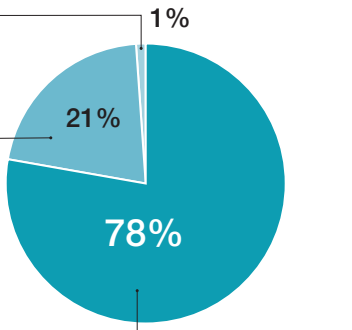
Application Breakdown (2024)

Pigments for inkjet printers and other applications

Commercialized Aqua Black, a carbon black developed for inkjet printers.

Industrial rubber products

Carbon black is also utilized as reinforcing agent in rubber components around automotive engines and other industrial rubber products.



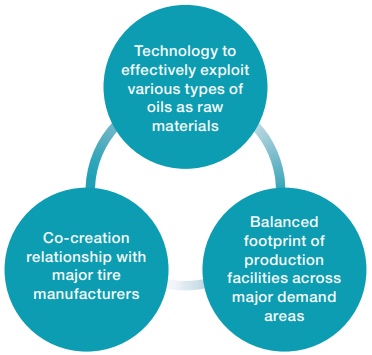
Tires

Carbon black mixed into rubber enhances tire strength.

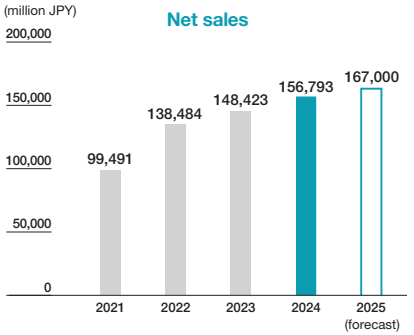
Our strengths

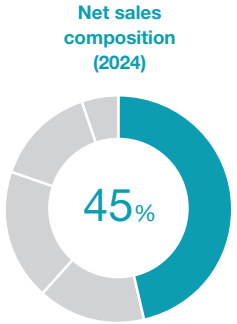
A key challenge for us was to effectively utilize pitch oil, a byproduct of our in-house pitch coke production, which is a raw material for our foundational product; graphite electrodes. As a solution, we undertook Japan's first industrial production of carbon black using the oil furnace method, the mainstream production method used today. Over time, we've accumulated technology to skillfully utilize various types of oil and precisely control properties, laying the foundation of our current competitive advantage. Our strengths also include contribution to local tire production for local consumption through strategically located production sites in the U.S., Japan, and Thailand, where many tire manufacturers are present. We also enjoy an advantage in our ability to supply specialty carbon black made from natural gas at our Canadian site.

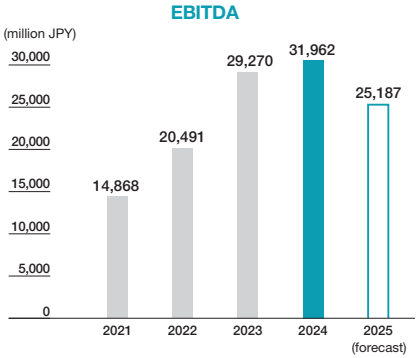
Three Key Strengths

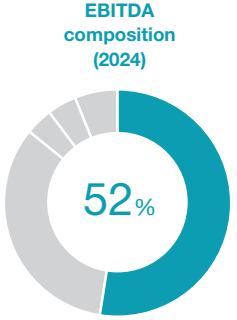


Earnings summary









	2023	2024	2025f
Net sales	1,484	1,568	1,670
Operating profit	213	217	132
ROS	14%	13.8%	7.9%
ROIC (adjusted)	12%	9.5%	5.4%
EBITDA	293	320	252

(100 million JPY)

Looking back on 2024

Our Carbon Black business has significantly expanded in scale, notably due to the 2018 M&A of production and sales bases in the U.S.. It has now developed to become our largest core business in terms of sales volume.

In FY2024, this business accounted for 45% of our Group's total sales. However, the primary U.S. market faced increased imports of inexpensive tires from Asia, forcing our major tire manufacturing clients to adjust its production of aftermarket (replacement) tires. However, we have proactively expanded sales of high-performance carbon black for premium tires that sees less competition from low-cost tires. In the Japanese market, automobile production decreased YoY, and sales of tires for export remained sluggish. The Thai market was impacted by a significant YoY decline in automobile production, compounded by the imposition of anti-dumping duties on Thai-made truck and bus tires destined for the U.S. market. Conversely, our Canadian site saw a substantial increase in its demand for specialty carbon black, driven by a competitor's withdrawal from production.

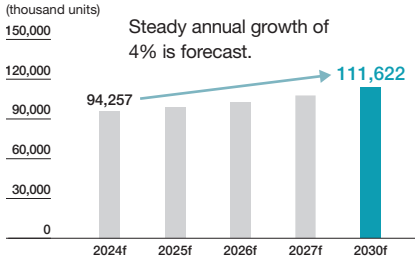
Outlook and strategy

The carbon black business environment is significantly influenced by the trends in production of tires, which account for approximately 70% of our carbon black demand. Tire demand is broadly categorized into replacement tires and original equipment tires. Global tire production volume is expected to grow approximately 3% per year.

In 2025, we're focused on ensuring stable sales volume in the U.S. market through strategic contracts with key customers, while also strengthening the sales expansion of new product grades. Plant relocation project in Thailand is progressing smoothly, with the new plant scheduled to begin operating in mid-2025. The new plant and existing plant will be operated in parallel for some time, aiming to fully transfer production to the new plant by mid-2026. Our goal is to quickly securing higher productivity and improved quality.

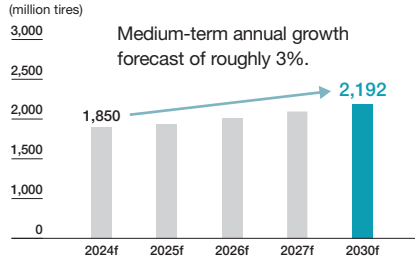
Looking ahead, we will continue to focus on the development of high-performance carbon black for premium tires. We will also engage in industry-government-academia collaboration on the development of technology to recover carbon black from used tires (rCB) and imbue it through secondary processing to achieve rubber reinforcement properties equivalent to virgin carbon black, thereby contributing to the realization of a circular economy. Furthermore, we will actively invest in environmental improvements and equipment modernization to reduce environmental footprint, boost productivity, and ensure stable operation.

Global automobile production



Source: Notch Consulting, Inc. *f = forecast (outlook)

Global tire production

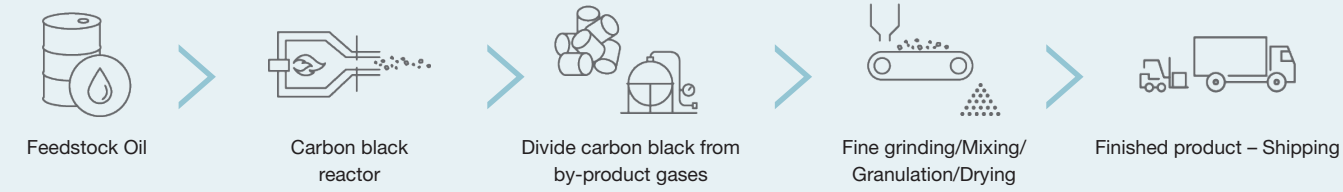


Source: Notch Consulting, Inc. *f = forecast (outlook)

	Business risks and opportunities	Medium-term action
RISK	Global tire production annual growth rate of 3%	Equipment renewal investment to ensure stable production and supply
Chance	Increasing concerns over tightening feedstock oil supply	Securing necessary volume of feedstock oil and transferring cost increases to sales prices
Chance	Expansion and acceleration of environmental initiatives	Technology development for realizing circular economy

Manufacturing process

Carbon black is made with the incomplete combustion of oil residue from petroleum refining and coal dry distillation in a reactor. The collected carbon black goes through granulation and other processes before being packed in bags or loaded into exclusive carbon black transport vehicles for shipment.



Fine Carbon

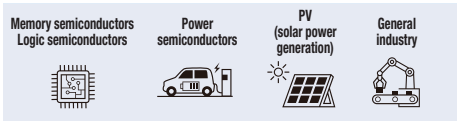
Business Overview

Fine carbon refers to specialty carbon, graphite materials, along with their processed products, developed through the pursuit of optimal raw material compositions to meet the intricate needs of semiconductor manufacturing and other fields. It also includes processed graphite products coated with ultra-high-purity silicon carbide (SiC) and standalone SiC products (Solid SiC). While these fine carbon materials and products are not widely known, they play essential roles in the manufacturing processes of silicon and SiC, which are core materials for memory and power semiconductors used in smartphones, personal computers, data centers, EVs, and many other applications. Over 70% of the sales of our Fine Carbon business is attributed to semiconductor applications. Specifically, our products are used as components in semiconductor manufacturing equipment, silicon single crystal ingot pullers, SiC single crystal ingot manufacturing equipment, etc. Beyond semiconductors, they are also used in general industrial applications such as electrodes for electrical discharge machining and dies for continuous casting, as well as in solar cell applications such as components for solar-grade silicon single crystal pullers.

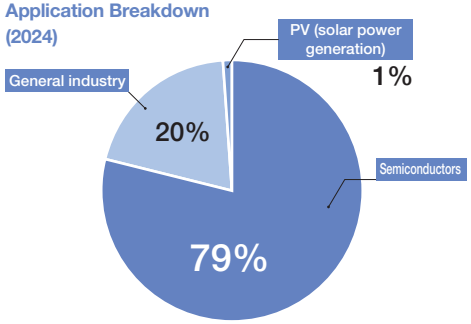
Our strengths

While only a limited number of manufacturers globally can produce high-quality specialty carbon and graphite products, Tokai Carbon stands among the industry leaders in both quality and production capacity. Notably, we possess the world's largest production capacity for SiC coated products and Solid SiC products, underpinned by our technological prowess. Graphite materials produced at our plant in Kumamoto Prefecture, Japan are processed to optimal specifications for customer applications at our domestic and international sites before shipment. Our manufacturing and sales network for fine carbon materials and products extends globally, meeting customers' needs through a diverse product lineup. Through our process of co-creation and developing new products in cooperation with customers, we have built strong trusting relationships and expanded our business domains. The synergies from these relationships of trust and technological expertise forms our competitive advantage.

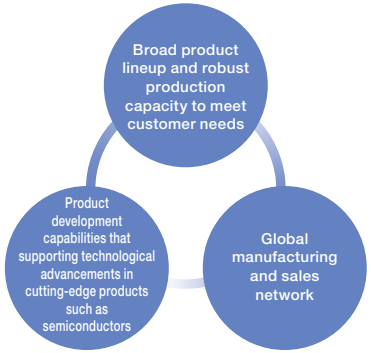
Target markets



Application Breakdown (2024)

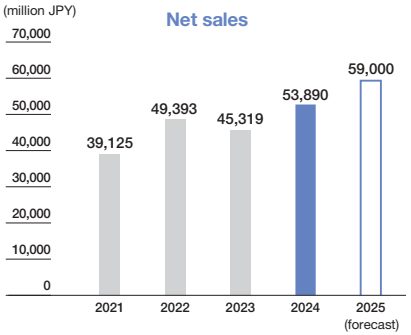


Three Key Strengths

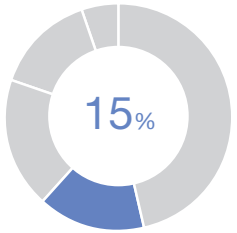


Earnings summary

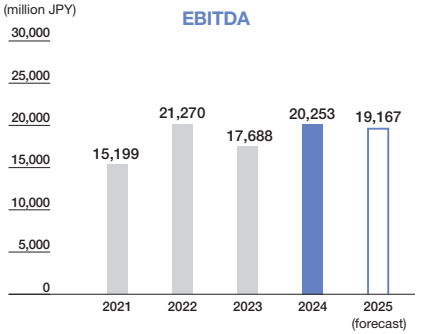
Net sales



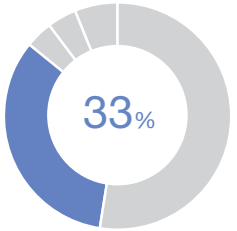
Net sales composition (2024)



EBITDA



EBITDA composition (2024)



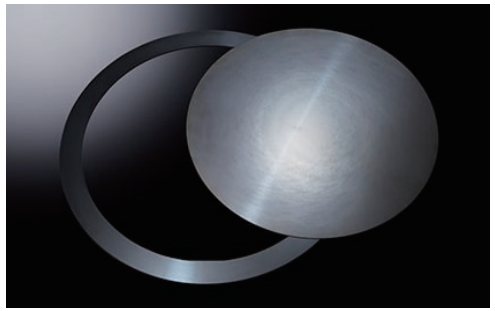
	2023	2024	2025f
Net sales	453	539	590
Operating profit	106	124	82
ROS	23%	23%	13.9%
ROIC (adjusted)	21%	18.8%	14.5%
EBITDA	177	203	192

(100 million JPY)

Looking back on 2024

The memory semiconductor market, which was sluggish in 2023 due to a decreased demand for PCs and smartphones, showed a gradual recovery in 2024. As a result, sales volume of Solid SiC focus rings, used in the upstream plasma etching process for memory semiconductor manufacturing, increased.

Conversely, the sluggish growth in EV demand led to successive inventory adjustments and CAPEX postponements among power semiconductor manufacturers. This caused a slowdown in the SiC power semiconductor business from the second half of 2024.



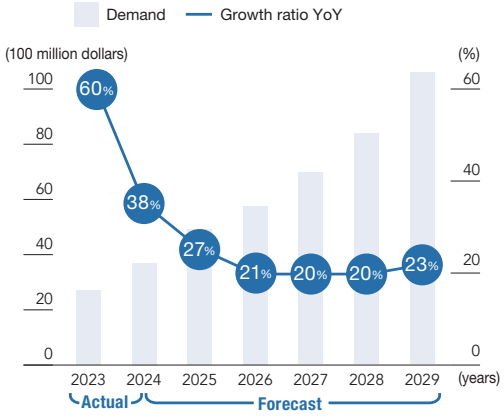
▲Solid SiC (SiC) focus ring (left) and dummy wafer (right)

Outlook and strategy

The memory semiconductor market is expected to experience short term fluctuations but is projected to continue growing in the medium to long term, amid the proliferation of 5G and advancements in AI. With higher vertical stacking of 3D-NAND requiring higher plasma output in etching equipments, demand for Solid SiC focus rings that feature high plasma resistance is growing. Looking ahead, as DRAM is also expected to attain a 3D structure similar to NAND, further expansion in demand is expected.

The SiC power semiconductor market is stagnant at present under slowing EV demand, but is expected to grow again from 2026. Looking toward mid—to-long-term market growth, we've increased our domestic graphite material production capacity and launched a production line for the polycrystalline SiC wafers, which serve as support substrates for bonded SiC wafers. Furthermore, by consolidation of U.S. machining/processing companies, we've strengthened our processing and sales structure in the U.S. market, where growth in the semiconductor and aerospace sectors is expected. Through these measures, we aim to lessen our dependence on Solid SiC focus rings and expand the manufacture and sales of high value-added products while capturing demand associated with market growth.

SiC power semiconductor market



Source: "Power SiC/GaN Compound Semiconductor Market Monitor Q1 2024", Yole intelligence, with editorial adjustments by Tokai Carbon

RISK / Chance

Business risks and opportunities

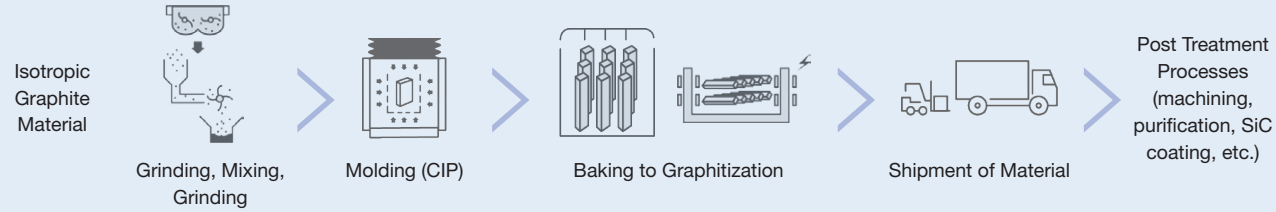
- Inventory adjustments in the SiC power semiconductor market
- Continued recovery in the memory semiconductor market
- Medium to long term growth outlook for overall semiconductor market

Medium-term action

- **Lessening our dependence on Solid SiC focus rings for memory semiconductors**
- **Investment to expand production capacity of our products for the SiC semiconductor manufacturing equipment, in anticipation of the SiC semiconductor market's resurgence.**
- **Renewal of graphite material manufacturing equipment**

Manufacturing process

Isotropic graphite material, the base material of fine carbon products, is made by crushing coke, filling it into rubber molds, and hydraulically applying isotropic pressure. This is followed by baking and graphitization. Depending on the application, isotropic graphite material then undergoes post-processing steps such as machining and SiC coating to become a final product.



Smelting and Lining

Business Overview

The Smelting and Lining business consists of three main products. Our flagship cathode blocks are laid at the bottom of electrolytic furnaces for producing aluminum. Furnace lining plays an important role as a refractory lining material in blast furnaces that melt iron ore to produce pig iron. Carbon electrodes are used as conductors in submerged arc furnaces (SAFs) that smelt silicon metal, ferroalloys, lead, and other metals. These three products are supplied globally from our four production sites in Europe.

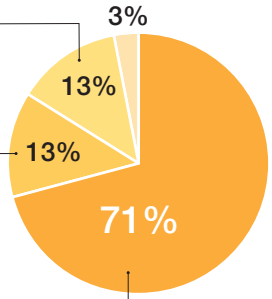
Product Breakdown (2024)

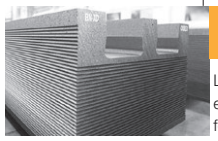
Carbon Electrodes

Carbon electrodes are used as electrical current conductors in submerged arc furnaces (SAFs) that smelt silicon, ferroalloys, copper, and lead.

Furnace Lining

Blast furnaces use these blocks as a refractory material in the lining. Used in sections of blast furnaces where temperature load is high.





Cathode Block

Laid in the bottom of electrolytic furnaces for primary aluminum production.

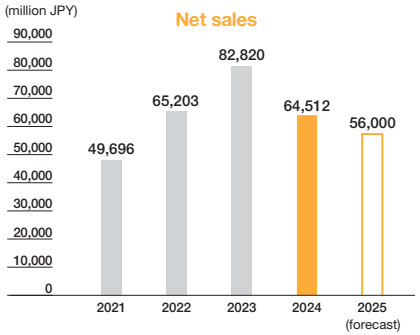
Our strengths

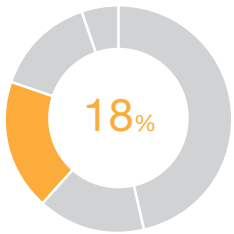
We hold the top market share for graphitized cathodes and carbon electrodes in all markets excluding China. In furnace lining, we have established the top share in the global market including China, placing us in an industry-leading position.

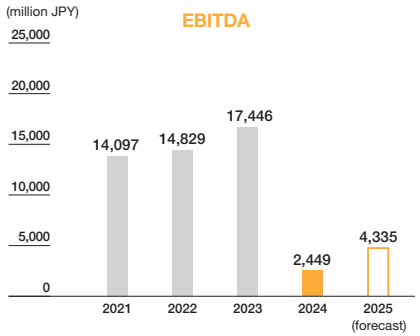
Cathodes and furnace lining are not consumables that depend on production volumes of aluminum or steel. Instead, they are used long-term as critical furnace components. Once installed, cathodes typically remain in place for 5 to 6 years, and furnace lining for 15 to 20 years, without replacement. Boasting an extensive supply record and reliable quality, our products will continue to support global aluminum and steel production.

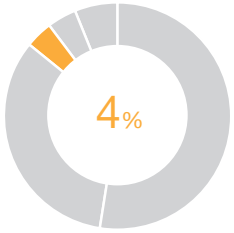
Three Key Strengths

Earnings summary









	2023	2024	2025f
Net sales	828	645	560
Operating profit	23	(137)	0
ROS	3%	(21.2)%	-
ROIC (adjusted)	14%	(1.2)%	0.0%
EBITDA	174	24	43

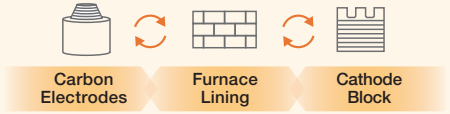
(100 million JPY)

Looking back on 2024

Since the outbreak of the war in Ukraine in 2022, Europe, where the production bases of the Smelting and Lining business are located, has experienced surging energy and raw material costs, along with severe inflation. While we managed to secured profits through 2023 by transferring rising production costs to prices, 2024 proved more challenging. With production costs remaining high, our main product, cathodes, faced declining demand and aggressive competition, forcing us to reduce production and sales. Sluggish sales of furnace lining and a decline in carbon electrode demand have also had an impact, leading to a significant deterioration in profitability. As a result, we carried out an impairment of goodwill, customer-related assets, and other intangible fixed assets in FY2024.

Utilization of swing capacity

Optimizes production according to demand by diverting and adjusting production facilities for the production of other products.

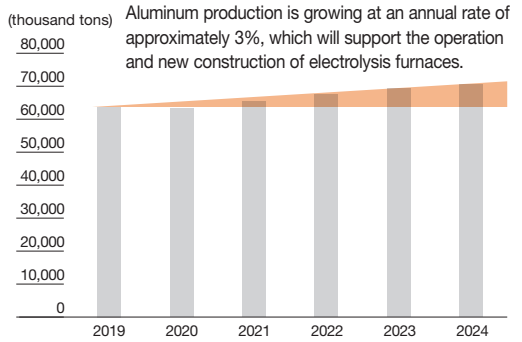


Outlook and strategy

Demand for cathode blocks is expected to remain weak in 2025, as in 2024. However, global aluminum production is projected to continue expanding, leading to an increase in the relining and new construction of aluminum electrolysis furnaces, thereby driving higher cathode block demand. Stable demand for furnace lining is anticipated, particularly from China and India. Carbon electrode demand is forecasted to gradually recover from the second half of 2025, as customers work through their excess inventory of both silicon metal and carbon electrodes.

We are actively pursuing structural reforms to fundamentally restore the competitiveness of this business, with direction to be set within 2025 and execution planned from 2026 onwards. We will also continue our efforts to promote RuC® (Ready-to-use Cathode), which contributes to reducing the environmental impact of aluminum production by lowering power consumption and extending cathode block life, thereby reducing replacement frequency.

Global primary aluminum production volume



Source: International Aluminium Institute and our company estimate

RISK / Chance

Business risks and opportunities

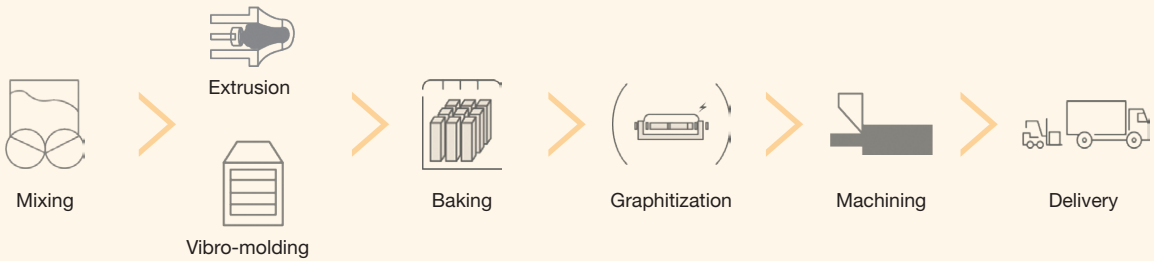
- Sluggish demand for cathode block relining
- Prolonged inventory adjustments at carbon electrode customers
- Decline in energy costs
- Realization of new aluminum electrolysis furnace projects

Medium-term action

- **Restoring competitiveness through structural reform**
- **Maintaining and enhancing market presence**
- **Promoting RuC®, next-generation environmentally friendly cathode**

Manufacturing process

In this business, materials are manufactured by mixing coke, anthracite, etc., extruding or molding them, followed by baking. These materials are then either machined directly into finished products or further graphitized before final machining.



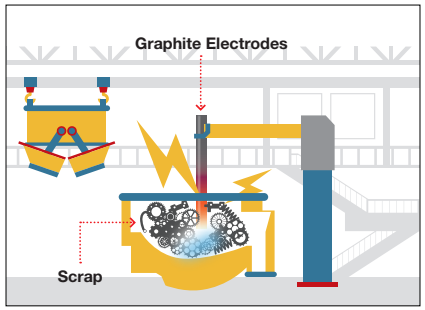
Graphite Electrodes

Business Overview

Graphite electrodes leverage their properties of electrical conductivity and superior heat resistance, and serve as conductors in EAF(electric arc furnace)s for melting steel scrap for recycling into rebar and other products. This demanding environment, with furnace temperatures reaching approximately 1,600°C and electrode tip temperatures exceeding 3,000°C, necessitates exceptionally high-quality electrodes that can deliver stable performance. As they are used, the tips of graphite electrodes gradually wear down; it's estimated that about 1.7 kg of graphite electrode is consumed to produce one ton of steel. For over a century, we've continuously supplied high-quality, low-consumption electrodes to EAFs in various countries and regions. The EAF method is gaining significant attention as an environmentally friendly steelmaking process in recent carbon neutrality efforts, as it can reduce CO_2 emissions by approximately one-quarter compared to the blast furnace method.

Graphite electrodes melt scrap with arc discharge in EAFs

Approximately 1.7kg of graphite electrode is consumed to produce one ton of steel

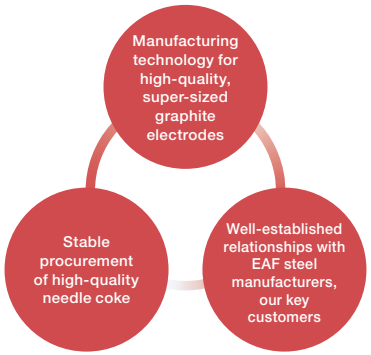


Electrode manufacturing process and usage (movie):
https://www.tokaicarbon.co.jp/en/products/graphite/

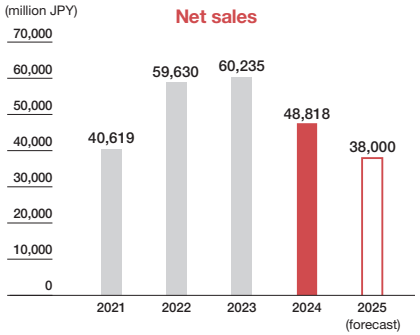
Our strengths

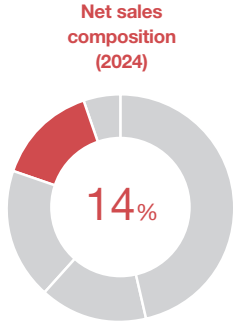
As a pioneer in graphite electrodes, Tokai Carbon established Japan's first manufacturing technology for 24-inch electrodes and subsequently achieved early commercial production of the world's largest 32-inch super-size electrodes. Through this technological prowess, we reliably supply high-quality electrodes that feature low breakage and consumption during operation. Grounded in long-term relationships with suppliers, we have built strong relationships of trust with EAF steelmaker customers by stably procuring high-quality needle coke and continuously meeting their needs. Furthermore, we've enhanced our technical prowess by sharing the expertise cultivated over many years with our U.S. and European subsidiaries. These initiatives are the strengths that underpin our competitive advantage.

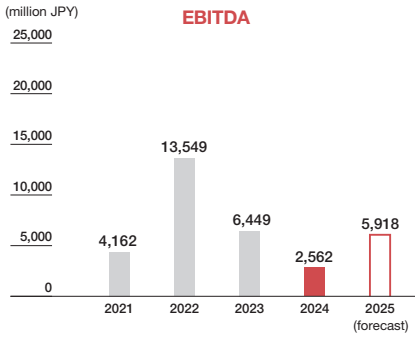
Three Key Strengths

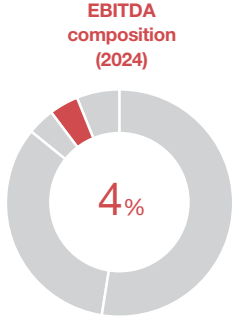


Earnings summary









	2023	2024	2025f
Net sales	602	488	380
Operating profit	8	(35)	11
ROS	1%	(7.2)%	2.9%
ROIC (adjusted)	2%	(2.7)%	2.7%
EBITDA	64	26	59

(100 million JPY)

Looking back on 2024

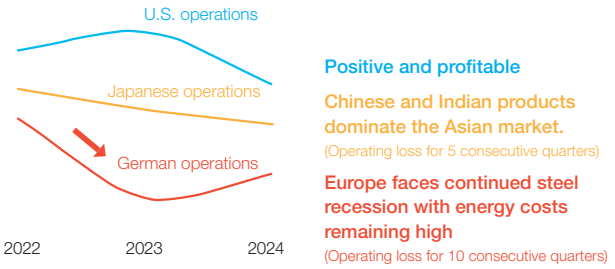
In 2024, the graphite electrode supply and demand remained soft in Japan and Europe due to several compounding factors. Japan experienced delays in construction projects, driven by soaring material costs and labor shortages, while Europe saw continued manufacturing stagnation. Adding to this, the sustained export of overproduced Chinese graphite electrodes and an aggressive influx of inexpensive Chinese steel products led to reduced EAF operating rates. In the United States, the demand for graphite electrodes remained firm amidst a relatively favorable economic environment. However, this period also saw an increased presence of low-priced Indian graphite electrodes. Given these conditions, we initiated a structural reform of this business in mid-2024. As part of this effort, we decided to consolidate our production system in Japan and reduce our European facility's production capacity by 30%.

Outlook and strategy

While the business environment is expected to remain challenging over the short term due to weak market conditions, the most pressing issue is implementing fundamental structural reforms that we initiated in mid-2024. The consolidation of our production capacity in Japan was largely completed by the second quarter of 2025, ahead of schedule. For our European site where we decided to reduce production capacity by 30% the previous year, we announced in May 2025 a further decisive step to transfer this operation to a German investment fund. Through these measures, we are aiming to restore profitability of the business and achieve a rapid return to profitability.

In the medium to long term, demand for graphite electrodes is expected to increase in line with the carbon neutrality-related shift from blast furnaces to EAFs. We will increase our production and sales ratio of high-quality super-size graphite electrodes, mainly at our site in the U.S., where EAFs account for a large proportion of crude steel production and investment in large EAFs continues. While EAFs typically use steel scrap as raw material, it is anticipated that various other raw materials, such as direct reduced iron (DRI), will be used in the future. We are committed to focusing on the development and production of high-quality graphite electrodes suitable for such evolving operating conditions.

EBITDA by our manufacturing sites (image)



RISK / Chance

Business risks and opportunities

- Ongoing structural recession, particularly due to overproduction in China, leading to a global market downturn.
- Growing market presence of Chinese and Indian graphite electrode manufacturers.
- Increased demand for high-quality and super-size electrodes driven by the shift from blast furnaces to EAFs

Medium-term action

- **Recovery of competitiveness through structural reform**
- **Focus on high-quality, super-size graphite electrodes**
- **Development of higher-quality electrodes suited to the shift from blast furnaces to EAFs**

Manufacturing process

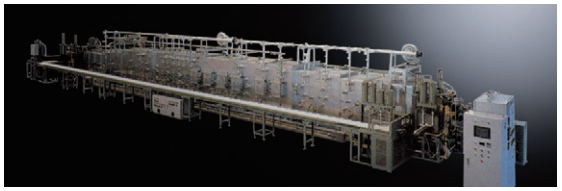
Graphite electrodes are manufactured by kneading needle coke, extruding it, and then subjecting the resulting material to baking, pitch impregnation, secondary baking, and graphitization processes, followed by final machining.

Industrial Furnaces and Related Products

Business Overview

TKK, our wholly owned subsidiary, designs, manufactures, and sells custom made pusher-type and roller hearth-type heat treatment furnaces. They are primarily used for treating lithium-ion battery materials and electronic components such as multi-layer ceramic capacitors (MLCCs), with particular strength in pusher furnaces. As a pioneer in the industry, TKK commands roughly 50% of the global market for heat treatment furnaces for MLCCs, as well as world-class quality and market shares in the silicon carbide (SiC) EREMA heating elements used in float glass manufacturing and heat treatment furnaces.

Industrial Furnaces



Industrial furnace processes (debindering, heating, sintering, etc.) ceramics, electronic components, secondary battery materials, glass, and powders at specified temperature and atmosphere.

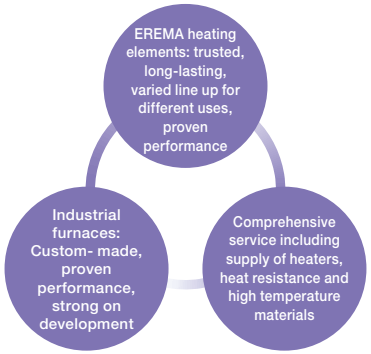
EREMA heating elements

This energy-saving, clean, high-temperature, quality ceramic heater is used for sintering, melting, and heat treatment in electric furnaces, etc.

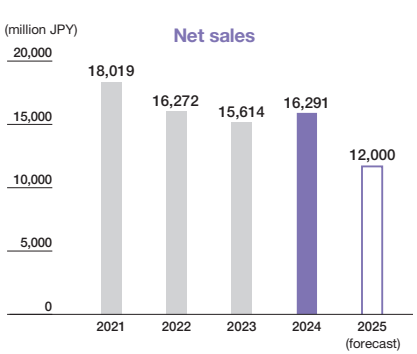
Our strengths

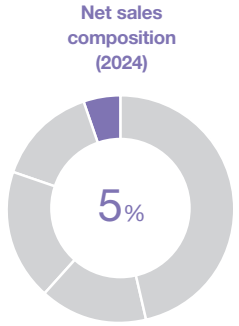
Industrial furnaces are custom-ordered to meet specific customer requirements, and then literally evolve as various functions are added and improved. Through a corporate culture that rigorously responds to customer customization demands, we've honed our products and cultivated technical capabilities recognized by leading manufacturers in the industry, accumulating a strong track record. Particularly in industrial furnaces for MLCCs and lithium-ion batteries, our design capabilities and production technology, tailored to customer needs, are a significant strength of TKK. Furthermore, our EREMA heating elements in the heating element business boast overwhelming quality superiority. These strengths also create synergy, enhancing our new industrial furnace design capabilities.

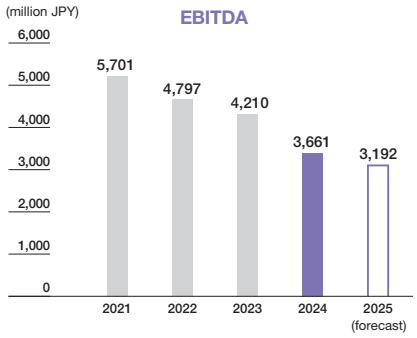
Three Key Strengths

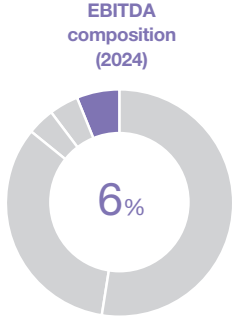


Earnings summary









	2023	2024	2025f
Net sales	156	163	120
Operating profit	39	33	26
ROS	25%	20.2%	21.7%
ROIC (adjusted)	28%	21.2%	15.2%
EBITDA	42	37	32

(100 million JPY)

Looking back on 2024

In 2024, the MLCC industry experienced inventory adjustments due to decreased demand for smartphones and other devices. While there was some recovery in demand for AI data centers, it did not lead to a full recovery. Additionally, the slowdown in EV market growth led to delays in some customers' lithium-ion battery material projects, resulting in postponed deliveries of industrial furnaces.

Pusher furnace ▲

Outlook and strategy

Recovery in MLCC and lithium-ion battery materials is anticipated to occur from 2026 onward, with new industrial furnace deliveries expected to decrease year-on-year in 2025.

Meanwhile, the MLCC industry is projected to grow at an annual rate of approximately 10% in the coming years, driven by the widespread adoption of 5G, EVs, autonomous driving, and AI data centers. Furthermore, despite the current slowdown in EV market growth, it is expected to re-accelerate eventually. Considering these market trends, TKK will continue to proactively invest in increased production capacity to align with market expansion. We anticipate new demand for industrial furnaces driven by increased capital expenditure, as well as greater demand for EREMA heating elements due to higher industrial furnace operating rates.

Expanding our industrial furnace business requires continuous development of next-generation furnaces. As MLCC-enabled products demand miniaturization and greater capacity, ceramic and electrode layers are becoming increasingly thinner. This presents a challenge in accelerating the heating rate during material heat treatment. To address this, TKK is developing "TK-SONiC," a roller hearth furnace designed to dramatically improve heating speeds. Furthermore, to meet the needs for mass production of lithium-ion battery materials, we have developed a pusher furnace that significantly enhances both productivity and running costs. TKK remains committed to proactively pursuing the development of next-generation industrial furnaces, always looking ahead, rather than resting on its laurels as an industry leader.

Roller hearth furnace ▶

	Business risks and opportunities	Medium-term action
RISK	Prolonged slowdown in EV growth	Expansion of production capacity to meet growing demand in target markets
Chance	Increasing MLCC demand driven by automobile electrification and proliferation of AI	Development of next-generation roller hearth furnaces
Chance	Continued EV growth expected to boost lithium-ion battery demand	Deployment of next-generation pusher furnaces

Manufacturing process

Industrial furnaces are designed and assembled to meet the individual requirements of customers, and then installed at customer plants.