

## 2020 Highlights

# Solid SiC Products to Support the Evolution of Semiconductors

Solid SiC Focus Rings, which are highly regarded by semiconductor device and equipment manufacturers around the world, are flourishing from the strong demand for high-performance semiconductors.

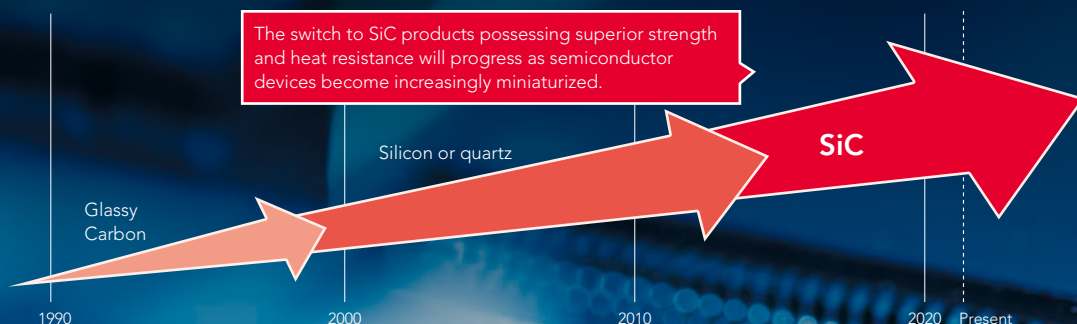
## 01 Solid SiC Focus Rings enter growth phase

High integration to enhance semiconductor performance is expanding from miniaturization in two dimensions to 3D (stacking) where circuits are stacked three-dimensionally. This development towards 3D accelerates larger demand for solid SiC Focus Rings.

A focus ring is a component used in the etching process, where a plasma-enhanced gas is used to dig grooves in semiconductor circuits. It is an important component placed

on the outside of a silicon wafer to concentrate the plasma on the wafer and ensure uniform processing. Traditionally, focus rings were mainly made of silicon metal or quartz glass. However, with the increase in the number of etchings and the boost in plasma power accompanying the transition to 3D semiconductors, there has been a shift to solid SiC, which has excellent plasma resistance.

Chronological Development of Materials for Focus Rings



### What is Solid SiC?

This product is a pure CVD-SiC, which features ultra-high purity SiC. This is achieved using the Group's proprietary CVD\* method to thicken the SiC coating, which is normally about 100 microns (0.1 mm).

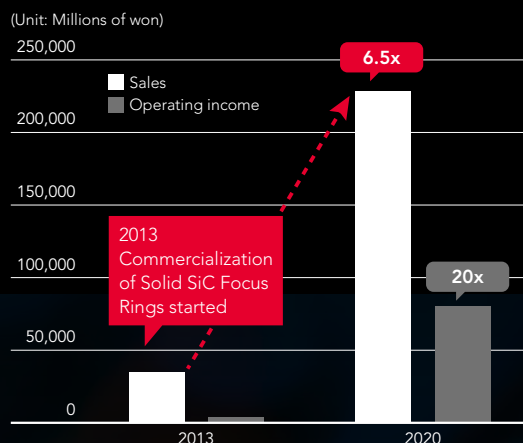
As a material with excellent strength and corrosion resistance, it is an ideal material for use in semiconductor manufacturing equipment.

\* CVD (Chemical Vapor Deposition): A method of depositing a film through a chemical reaction by supplying a raw material gas containing the components of the desired thin film to the surface of a base material heated in a reaction tube.

# 02 Becoming the leading supplier of solid SiC products

The Group installed a CVD furnace at Tokai Carbon Korea Co., Ltd. (TCK) in 2002 and began developing solid SiC Focus Rings in 2006, successfully commercializing them in 2013. Solid SiC Focus Rings have demonstrated their true value under severe conditions of use, and sales have been growing steadily as demand has increased. As a pioneer in the field of solid SiC Focus Rings, the Group is highly regarded by semiconductor device and equipment manufacturers for quality, and is currently the top supplier with an 80% share of the global market.

Business results of Tokai Carbon Korea Co., Ltd. (TCK)

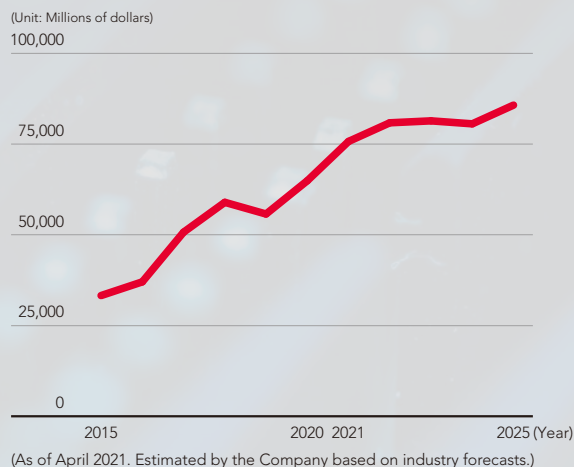
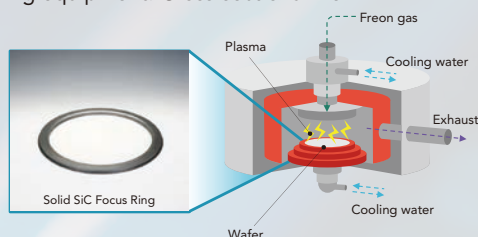


### Column

## Semiconductor manufacturing equipment market trends and forecast

The semiconductor market is expected to continue to grow briskly due to the rapid increase in the volume of data distribution, the establishment of big data analysis and cloud services, the spread of 5G communication networks, and the spread of CASE in the automotive industry. In order to meet the increasing demand for semiconductors, capital investment in a wide range of semiconductor manufacturing equipment, from high-performance to general-purpose products, is expected to continue, and the market is expected to grow at an annual rate of 5-7%.

Dry etching equipment: Cross-sectional view





**GRAPHITE  
ELECTRODES**

**Business Overview**

**Graphite Electrodes**

**Generating stable earnings backed by the greater demand for high-quality electrodes**

**2020 Summary**

Global crude steel production in 2020 remained at the same level as the previous year, driven by the Chinese market, which recovered quickly from the COVID-19 pandemic. Electric arc furnace steel production, which directly affects graphite electrodes demand, dropped by 5% YoY excluding the Chinese market. Graphite electrode sales dropped 58.5% YoY as the excessive inventory in the market took time to come down to a normal level. The division recorded a

5.77 billion yen operating loss in the same period with 3.66 billion yen inventory valuation losses (devaluation of book value) associated with the deteriorating market conditions.

	Net sales	Operating income	ROS
2019	91,317	39,388	43.1%
2020	37,879	-5,766	-15.2%
<b>2021 plan</b>	<b>40,900</b>	<b>1,300</b>	<b>3.2%</b>
Reference figures for 2023	82,400	23,330	2.8%

(Millions of yen)

## Medium-Term Management Plan and Earnings Forecast

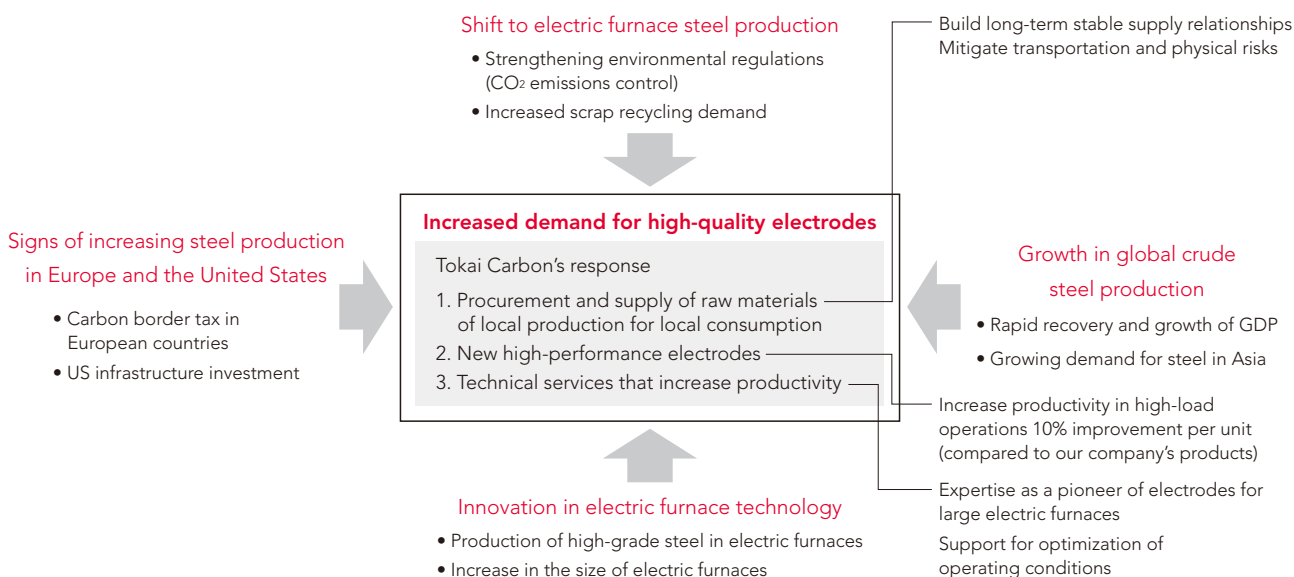
In 2021, both crude steel production and electric arc furnace steel production are expected to return to 2019 levels backed by the fiscal stimulus measures taken in major countries. Graphite electrode demand will significantly improve from the previous year following the reduction of graphite electrode inventory in the market. The Graphite Electrodes business is expected to return to profitability in 2021, and furthermore we will aim for a fair profit that will let us reinvest for stable production and supply.

Looking ahead to the next three years of our medium-term management plan, T-2023, the business environment is expected to improve further. One reason is the shift in the steel making process from blast furnaces to electric arc furnaces to achieve the lower CO<sub>2</sub> emissions. In fact, plans for the construction of several new large-scale electric arc furnaces have been announced, and in China, the shift from blast furnaces to electric arc furnaces is expected to proceed rapidly. As a result, demand for graphite electrodes, which are essential for electric arc furnace operation, is expected to increase significantly. Based on this forecast of an upturn in demand, we will strengthen our long-term relationship of trust with our customers by providing a stable supply of high-quality electrodes, taking advantage of our strength in covering the global market with our production plants in Europe, Asia, and North America.



**Kenji Enokidani**  
Executive Officer  
General Manager of the Graphite Electrodes Division

Although the performance of the graphite electrodes business in 2020 was significantly downwardly affected by the COVID-19 pandemic, graphite electrodes will grow in importance as the environment problem comes to be recognized as a shared global issue. In view of how the tide is changing, the Company is committed to fulfilling its supply responsibilities, thereby contributing positively to solving the global environmental issues. Under T-2023, we intend to take advantage of this opportunity to expand the electrode market in order to strengthen our business foundation to generate stable earnings over the next three years.



## Carbon Black

# Align production with market growth at a fair margin

### 2020 Summary

Net sales declined 30.5% YoY due to the US-China trade friction and the COVID-19 pandemic, which caused a significant stagnation in production by tire manufacturers, who are our main customers, in the first half of the year. In addition, operating income declined by 62.5% as lower sales prices and lower capacity utilization drove an increase in costs as a percentage of sales. On the other hand, sales volume in the second half of the year increased by 30% compared to the first half thanks to the rapid recovery of automobile production, reflecting the unpredictable impact of the COVID-19 pandemic on market conditions in 2020.

	(Millions of yen)		
	Net sales	Operating income	ROS
2019	101,751	8,512	8.4%
2020	70,754	3,192	4.5%
<b>2021 plan</b>	<b>78,000</b>	<b>5,400</b>	<b>6.9%</b>
Reference figures for 2023	100,600	9,900	9.3%



**Hirofumi Masuda**

Member of the Board

Executive Officer

General Manager of the Carbon Black Division

### Medium-Term Management Plan and Earnings Forecast

With the recovery of automobile production, sales volume in 2021 is forecast to exceed that of the previous year. On the other hand, the significant increase in costs due to the rise in raw material oil prices has reached a level that cannot be absorbed by means of the Company's efforts alone. We therefore intend to improve our profitability by raising prices.

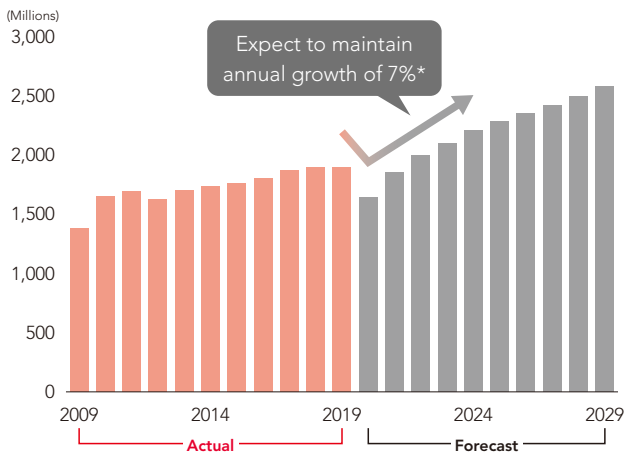
Tire production, which is said to be proportional to the growth rate of the world economy, is expected to grow at an annual rate of 7% during the period of the medium-term management plan, T-2023, with its rebound from the previous decline. Given that 80% of our carbon black is used for tires, we expect to maintain a high rate of capacity utilization by aligning production with market growth. With respect to increasing our sales prices, our intention is to secure an appropriate margin by allowing not only rising raw material prices to be passed on, but also costs for investments, including environmental investments. Meanwhile, we aim to increase the ratio of next-generation products that extend tire life, as well as high-value-added non-tire products that take advantage of special raw material characteristics. We will also continue to create synergies through measures to reduce raw material costs and the sharing of production technologies and know-how in our global 5-country production structure, including Tokai Carbon CB Ltd., which we acquired as a subsidiary in 2018.

We will also focus on environmental contributions. In addition to promoting efforts to recycle used tires to produce carbon black, the Company is also researching the production of carbon black from vegetable oil instead of fossil fuels such as petroleum and coal. We also plan to develop advanced technologies to recover and reuse CO<sub>2</sub> generated in the production process.



**CARBON  
BLACK**

Global Tire Production



Our estimate based on automobile market forecasts and research company reports  
 \* Annual growth forecast: 7% during T-2023, 3-5% after 2024

Initiatives during the T-2023 period

1. Align production with market growth and maintain high capacity utilization
2. Ensure an appropriate margin
  - Incorporate fluctuations in raw material prices and costs for investment into the sales price
3. Increase the ratio of high-value-added products (ongoing effort)
  - Promote certification of developed products and increase the sales ratio of high-value-added products
4. Sustainability initiatives
  - Recycling of used tires
  - Production of carbon black from vegetable oil
  - Research on technology for CO<sub>2</sub> recovery and reuse

## Fine Carbon

# Boosting our production capacity of CVD-SiC products to meet the strong growth of the semiconductor market

### 2020 Summary

The COVID-19 pandemic negatively affected sales for general industrial applications. On the other hand, product shipments for semiconductor devices continued to perform well throughout the year with the expansion of markets such as 5G, IoT, and DX (digital transformation). We experienced robust sales in the photovoltaic application market as well. As a result, net sales in this business increased by 4.6% YoY and operating income increased by 8.8% YoY, exceeding the forecast at the beginning of the year. In particular, there was a significant increase in sales of Solid SiC Focus Rings, which are used in the etching process of semiconductor

manufacturing. Tokai Carbon enjoys a global market share of about 80% for this product. In addition to the growing demand for semiconductors, the company is also benefiting from the semiconductor industry's switch of ring material from conventional silicon or quartz focus rings to more durable SiC focus rings as the devices become increasingly miniaturized and multilayered.

(Millions of yen)

	Net sales	Operating income	ROS
2019	30,369	6,107	20.1%
2020	31,775	6,647	20.9%
<b>2021 plan</b>	<b>33,700</b>	<b>5,700</b>	<b>16.9%</b>
Reference figures for 2023	41,900	8,700	20.8%

FINE  
CARBON



## Medium-Term Management Plan and Earnings Forecast

The Tanoura Plant, which produces graphite materials for fine carbon, was damaged by the torrential rains of July 2020, but thanks to measures such as utilizing the heat treatment facilities at other group sites, the plant has now been restored to full production. We are also in the process of redoubling our preparedness for anticipated natural disasters in the future. In 2021, the expansion in production capacity is underway for further growth.

Under our medium-term management plan, T-2023, we expect the semiconductor production equipment market to grow by 5-7% per year, and demand for solar power generation to grow by around 10% per year in line with the global shift to renewable energy. Given these conditions, in our fine carbon business, we plan to increase production capacity of isotropic graphite materials in 2021. Similarly, we plan to increase production capacity of solid SiC Focus Rings in Korea by 50% compared to 2019. We are also building new high-purity processing furnaces in China and state-of-the-art CVD-SiC furnaces in Japan, aiming to increase the ratio of high-value-added products to achieve sales growth above and beyond the boost from the increase in scale.

At the same time, we will improve cost competitiveness and production efficiency through cross-divisional



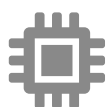
### Hideo Shin

#### General Manager of the Fine Carbon Division

reorganization, such as consolidating the production of extruded graphite materials at Tokai COBEX Savoie in France, which joined the Group in 2020. In addition, while striving to control CO<sub>2</sub> emissions in the supply chain, we will contribute to reducing the environmental burden by producing and supplying high-quality fine carbon products that are essential for the production of energy efficient power semiconductors and photovoltaic power generation equipment.

#### Business Environment

The semiconductor and photovoltaic markets are booming and expecting further growth



Semiconductors

With the semiconductor supply shortage, continued growth is expected in the manufacturing equipment market (5-7% per year)



Photovoltaic generation (PV)

Demand is expected to grow in line with the global shift to renewable energy (10% per year)

Source: Semiconductors: Our estimate based on WSTS, Gartner, and others;  
PV: Our estimate based on RTS Corporation and others.

#### Strategy

1. Expand scale in line with market growth
  - Increase production capacity of isotropic graphite materials
2. Focus on the high-value-added product market
  - Increase SiC ring production capacity (Korea: 2nd half of 2021)
  - Introduce state-of-the-art CVD-SiC furnaces (Japan: 1st half of 2021)
  - Install new high-purity furnaces (China: 1st half of 2021)
3. Overall optimization
  - Consolidate extruded material production to France (Tokai COBEX)
  - Make effective use of heat treatment facilities within the Group
  - Reduce costs by reorganizing processing sites in Europe



## Smelting and Lining

# Integration of TCX and TCS will significantly enhance sales and productivity

### 2020 Summary

Tokai COBEX (TCX), which became a subsidiary in July 2019, contributed to the Group's consolidated financial results throughout the year, and in July 2020, Tokai COBEX Savoie (TCS) in France was added, further expanding the scale of our business in cathodes used in aluminum smelters. The aluminum market was sluggish in the first half of the year due to the global economic slowdown caused by the COVID-19 pandemic. In the second half of the year, however, the situation improved due to the recovery in automobile productions. Shipments of blast furnace blocks, which are materials used to line the inner part of blast furnaces, were also at a high shipment level due to strong replacement (upgrade) demand in China. Despite some logistical delays caused by COVID-19, net sales from the Smelting and Lining business increased almost 1.5 times over

(Millions of yen)

	Net sales	Operating income	ROS
2019	14,662	-1,600	-10.9%
2020	36,421	1,161	3.2%
<b>2021 plan</b>	<b>45,600</b>	<b>2,200</b>	<b>4.8%</b>
Reference figures for 2023	61,200	10,100	16.5%



**Takashi Masaki**

Executive Officer  
General Manager of the Smelting and Lining Division

the previous year. In addition, we were able to secure operating income of 1.16 billion yen despite recording 9.69 billion yen in amortization expenses associated with M&A.

### Medium-Term Management Plan and Earnings Forecast

Due to the need for lighter materials in EVs and other products and the increasing demand for urban housing in emerging countries, global aluminum demand is increasing. On top of that, the demand for high-end graphite cathodes for efficient smelting is increasing mainly in emerging countries. We therefore forecast a 25% increase in sales in 2021 with Tokai COBEX Savoie acquired in July 2020 giving a full year contribution to financial results for 2021. We are currently in the process of integrating the sales, production, engineering, human resources, and other organizational units of the sites in Poland and France, and will continue to improve profitability going forward.

The first action item in the medium-term management plan, T-2023, is to integrate operations in Poland and France in order to significantly enhance sales and productivity. Specifically, we will consolidate high-strength graphitized cathodes in Germany and consolidate pastes and sidewalls in France. Furthermore, as part of our efforts to create synergies across the entire Group, in addition to the production of extruded specialty graphite materials for the Fine Carbon business at our French operation, we are considering transferring the battery anode materials produced in Japan to our French site, where the EV market is expected to grow rapidly.

Secondly, we will accelerate market development with our innovative product, RuC (Ready-to-Use Cathode). Aluminum smelting furnaces, which consume large amounts of electricity, are increasingly switching to graphitized cathodes that can withstand high currents in the pursuit of production efficiency. We developed the RuC, which features a copper bar attached to the cathode, as a way to further reduce the environmental burden. In addition, as part of our goal of achieving a decarbonized society, the French plant will use hydroelectric power generation and the Polish plant will be powered by renewable energy.

Proposal of an innovative cathode



**RuC®**  
Ready to Use Cathode

- Reduces CO<sub>2</sub> emissions by reducing energy per unit (approx. 5%)
- Extends cathode life by 1-3 years
- No need for rodding of conducting bars by customer

Two plants in France (formerly Carbone Savoie)

France Venissieux plant      France Notre Dame de Briançon plant



Two plants in Poland (formerly COBEX)

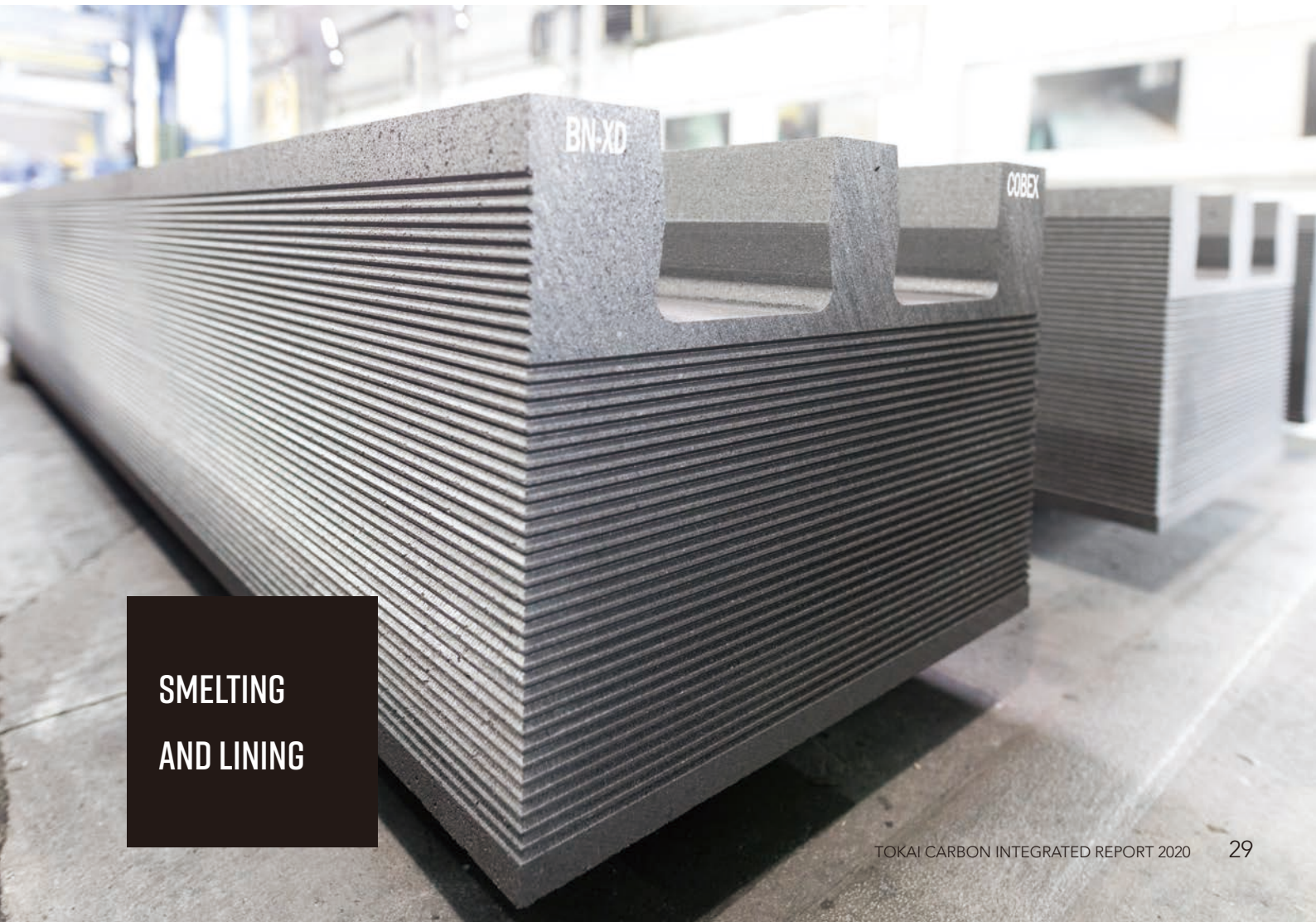
Poland Nowy Sacz plant      Poland Racibórz plant



**Integrated both in name and reality starting in 2021**

**Integrated as TOKAI COBEX**

Sales benefits	Production technology benefits	Management benefits
<ul style="list-style-type: none"> <li>• Unify sales brand names</li> <li>• Improve ability to propose solutions to problems</li> <li>• Centralize customer database</li> </ul>	<ul style="list-style-type: none"> <li>• Consolidate 100 years of technical expertise</li> <li>• Six Sigma approach to cost reduction</li> </ul>	<ul style="list-style-type: none"> <li>• Production, sales, and accounting management on unified databases through ERP system integration (January 2023)</li> </ul>



**SMELTING AND LINING**

**INDUSTRIAL  
FURNACE AND  
RELATED  
PRODUCTS**

**Business Overview**

# Industrial Furnaces and Related Products

## Aim for continuous high profits focusing on the development of next-generation furnaces

### 2020 Summary

The growth in 5G base stations and the transition to EV lead to robust capital investment in the MLCC (monolithic ceramic capacitor) industry, which drove the sales increase in the industrial furnace business. EREMA (silicon carbide) heating elements and other products sales declined as a result of the COVID-19 pandemic, although the overall business sales were up 9.8% YoY and operating income increased 16.6% YoY to a record high level.

(Millions of yen)

	Net sales	Operating income	ROS
2019	12,641	3,227	25.5%
2020	13,873	3,765	27.1%
<b>2021 plan</b>	<b>18,300</b>	<b>4,400</b>	<b>24.0%</b>
Reference figures for 2023	19,800	5,100	25.8%

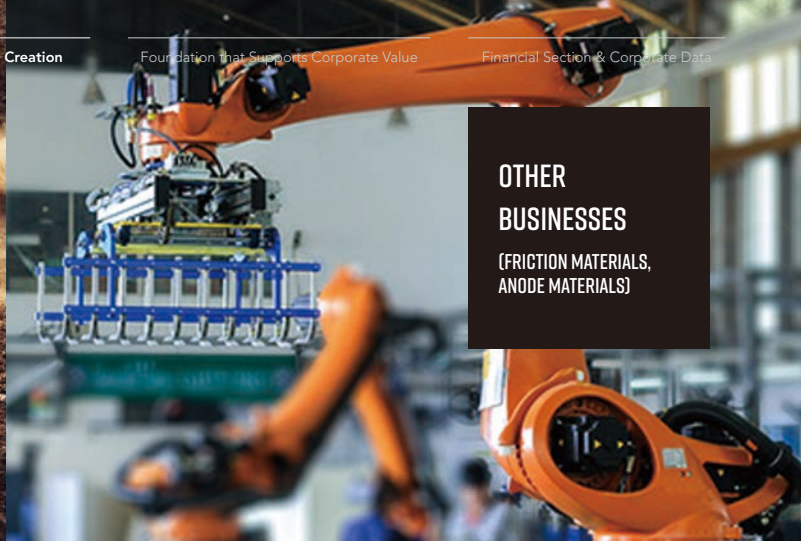
### Medium-Term Management Plan and Earnings Forecast

We are experiencing steady orders intake for industrial furnaces, which should support an increase in sales and profit in 2021. Our end user markets in MLCCs and lithium-ion batteries are growing in the range of 5-10% and 20-30% respectively on an annual basis. Under our medium-term management plan, T-2023, we will concentrate on these

growth markets and focus on winning new orders by leveraging our track record, know-how, and development capabilities. In particular, we will strive to respond quickly to our customers' next-generation products and promote the development of industrial furnaces with energy-saving and waste-heat recovery systems. We will also differentiate our consumables, such as our EREMA heating elements, by developing and launching environment-friendly products, and gradually increase our production capacity in anticipation of a recovery in demand. Meanwhile, looking ahead to the future, securing technical personnel is another priority task.



**Akihiko Sato**  
Tokai Konetsu Kogyo Co., Ltd.  
President



**OTHER  
BUSINESSES**  
(FRICTION MATERIALS,  
ANODE MATERIALS)

## Business Overview

# Other Businesses (Friction Materials, Anode Materials)

## Aiming to improve profitability by promoting automation

### 2020 Summary

Net sales of friction materials declined by 13.0% YoY due to the impact of our exit from the four-wheel automotive market and the sluggish market for construction machinery, agricultural machinery, and motorcycles caused by the COVID-19 pandemic. Net sales of anode materials rose by 14.3% as sales volumes for EVs increased, mainly in Europe. Revenue from real estate rentals and other items decreased 2.6%. As a result, overall net sales in these businesses declined by 4.0% from the previous year, but operating income returned to the black.

(Millions of yen)

	Net sales	Operating income	ROS
2019	11,286	-21	-0.2%
2020	10,837	298	2.8%
<b>2021 plan</b>	<b>11,400</b>	<b>500</b>	<b>4.4%</b>
Reference figures for 2023	14,100	1,400	9.9%

### Medium-Term Management Plan and Earnings Forecast

At present, sales of friction materials for construction machinery, agricultural machinery, and industrial robots are picking up in China, and sales of touring and sports motorcycles are growing in Europe, so we expect sales and

profits in the Other Businesses category to increase in 2021. The friction materials business has become fierce due to harsh price competition among the emerging new players. Under our medium-term management plan, T-2023, which prioritizes improving profitability, we plan to thoroughly reduce inventory and gradually automate our labor-intensive production systems. At the same time, we will focus on improving quality and developing next-generation products by leveraging our strength in materials technology.



**Yoshiharu Tachibana**  
General Manager of the Friction Materials Division