

Support railway transportation that connects people and cities with safety and trust, through manufacturing that merges electronics technologies and mechanical technologies in a highly advanced manner

Results for fiscal 2020

● Orders Received

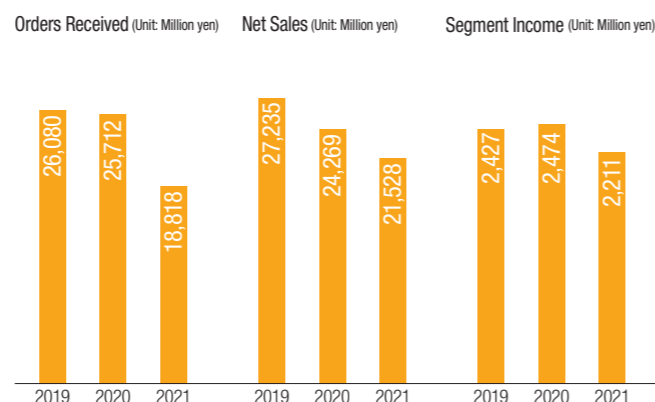
**18,818** million yen (Down 26.8% year on year)

● Net Sales

**21,528** million yen (Down 11.3% year on year)

● Segment Income

**2,211** million yen (Down 10.6% year on year)



Orders received decreased 26.8% compared with the previous fiscal year to 18,818 million yen, due to a decrease in orders from private railways, Chinese customers, and overseas customers (excluding those in China), despite an increase in orders from the JR Group. Net sales totaled 21,528 million yen, an 11.3% decrease from the previous fiscal year, due to a decrease in sales for private railways, Chinese customers, and overseas customers (excluding those in China), offsetting an increase in sales for the JR Group. Segment income decreased 10.6% from the previous fiscal year to 2,211 million yen as a result of lower net sales and profits at subsidiaries, despite the efforts to step up cost and process control.

VOICE

**We will introduce new environmentally friendly products to the market and expand the overseas maintenance business.**

The Transportation Systems segment will naturally continue pursuing safety and reliability of electrical equipment for railway vehicles, which have to meet strict usage conditions, and at the same time pour our efforts on reducing environmental impact in the form of energy saving, maintenance saving, and noise reduction to provide new environmentally friendly products and services.

In the domestic business, there has been a growing number of customers who have chosen our new products, including driving inverters and auxiliary power supply units that realized smaller size and lighter weight as well as noise-reduced motor and driving gear units. Going forward, we anticipate more customers will choose our new products, together with pantographs and other highly reliable electrical equipment.

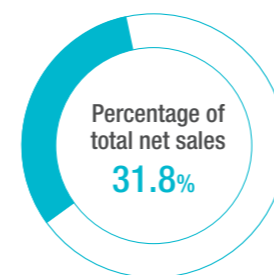
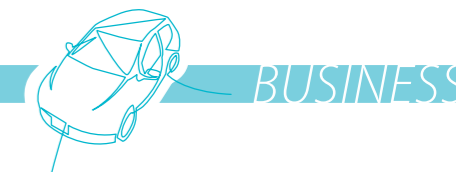
As for the overseas business, the maintenance business of electrical equipment for subway trains has been launched in China, and we will strive to expand the business and provide stable services to meet surging demand.

In North America, we reorganized our local subsidiaries in response to changes in the business environment and set up a new maintenance business, which has started operations.

We will also continue to work towards improving profitability of the production line at the Yokohama Plant, one of our production bases, by enhancing production capacity and efficiency.



**Naoki Okuyama**  
General Manager of Transportation Business Unit



Deliver technologies and gratitude to customers with highly precise, highly responding and highly efficient power electronics, for realization of an environment-friendly society

Results for fiscal 2020

● Orders Received

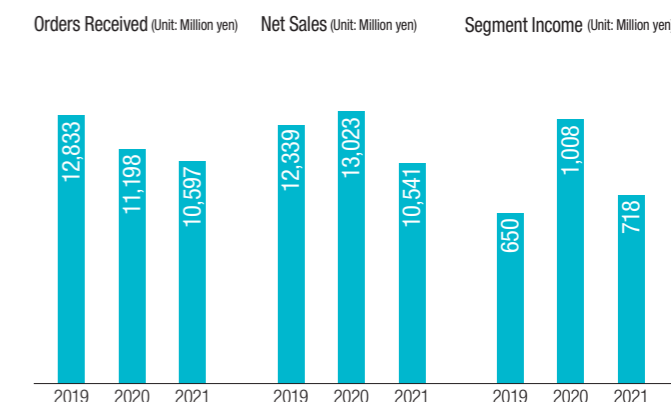
**10,597** million yen (Down 5.4% year on year)

● Net Sales

**10,541** million yen (Down 19.1% year on year)

● Segment Income

**718** million yen (Down 28.8% year on year)



Orders received decreased 5.4% compared with the previous fiscal year to 10,597 million yen, due to a decrease in orders for processing equipment, despite orders for testing equipment maintaining the previous year's level. Net sales decreased 19.1% compared with the previous fiscal year to 10,541 million yen mainly as a result of lower sales for testing equipment and power supply. Segment income totaled 718 million yen, a 28.8% decrease compared with the previous fiscal year, mainly due to lower net sales, offsetting efforts to step up cost control.

VOICE

**We will accelerate our business expansion both in Japan and overseas to achieve dramatic development in the new era.**

While sales activities, local adjustment, and other aspects of the Industrial Systems segment have been affected by the COVID-19 pandemic that has been devastating the world from the beginning of 2020, efforts for a new era are producing steady results.

At the Shiga Ryuo Plant, we have been embedding thorough cost and process control and improving the quality control level, raising its maturity as our main plant in three years after it was newly built. In addition, the R&D center attached to the plant has been accumulating data for the practical application of in-wheel-well dynamo, and local adjustment of overseas test equipment now gets remotely completed, which confirm the increasing sophistication of the plant.

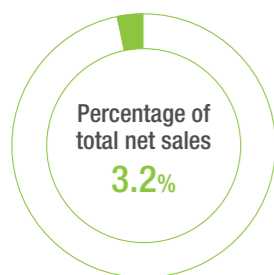
Overseas, the two local subsidiaries set up in 2019 are steadily developing their businesses for the future, despite harsh environments. SIAM TOYO DENKI, a Thai subsidiary, is producing results in expanding its customer base, while Chalco-Toyo Permanent Magnet Motor Co., Ltd., a Chinese motor production subsidiary, started operations in the fall of 2020 and is in full swing to capture the growing demand for high-efficiency motors in China.

In Japan, inquiries for our electrical equipment are growing as corporate capital investment recovers, and demand of products for small hydroelectric power generation, in which the Company has a strength, is also expanding sharply, as the world shifts towards carbon-neutrality.

We will continue to strive for dramatic development of the Industrial Systems segment, keeping pace with new trends in a new era.



**Yoshifumi Otsubo**  
General Manager of Industry Business Unit



Provision of products that make the execution of operations on station premises and trains smooth and convenient and M2M solutions based on mobile phone networks and cloud servers using remote monitoring system

Results for fiscal 2020

Orders Received

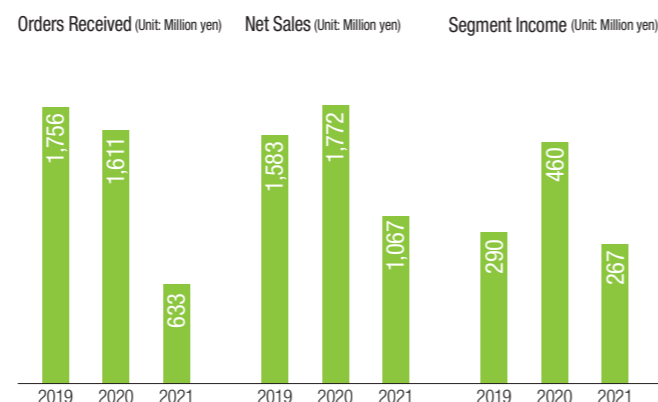
**633** million yen (Down 60.7% year on year)

Net Sales

**1,067** million yen (Down 39.8% year on year)

Segment Income

**267** million yen (Down 41.9% year on year)



Orders received decreased 60.7% compared with the previous fiscal year to 633 million yen, due to the impact of COVID-19 as well as a negative rebound from demand for software improvement projects associated with the consumption tax amendment seen in the previous fiscal year. Net sales decreased 39.8% from the previous fiscal year to 1,067 million yen for the same reason as orders received. Segment income totaled 267 million yen, a 41.9% decrease from the previous fiscal year, as a result of lower net sales.

VOICE

We will work towards expanding the Information Equipment Systems segment through product development and solutions that meet customer needs, with a focus on railway station operating equipment.

Capitalizing on the strengths in fare calculation and IC card processing technologies, the Information Equipment Systems segment provides products ranging from railway station operating equipment such as commuter pass issuing machines to portable terminal devices for conductors. In response to the spring timetable revision in March 2021, we modified the equipment we had already delivered and were able to complete the work without any major problems. In addition, more railway lines and zones started using on-board IC ticket checking machines that enable the processing of IC card entry and exit on trains. These machines are smoothly operating without disruption.

The prolonged COVID-19 pandemic has caused a slew of postponements and scalebacks in railway operators' plans for new and renewal projects as well as functional refurbishments, dragging out an extremely difficult situation. However, we will engage in product development with an eye on changes in the times and the post-COVID world and continue to provide products that satisfy our customers, with the keywords of non-contact, cashless, thin client, and competitive price.



Toshiaki Asakura  
General Manager of IT Business Unit

# TOPICS

## Development of electrical equipment for rail vehicles with green credentials such as energy saving

The Company delivered VWF inverter, totally enclosed motor, and other products for Keikyu Corporation's new 1000 series 20th-batch rolling stock. VWF inverter uses SiC elements to achieve smaller size and lighter weight in comparison to the previous product (for Keikyu Corporation's 2100 series), with a mass reduction of approximately 37% and a volume reduction of approximately 44%. In addition, totally enclosed motor realizes maintenance saving, high efficiency, and noise reduction thanks to the totally enclosed structure. The Company will continue to develop products with green credentials such as energy saving with an aim to realize a sustainable society.



## Promotion of the development of test equipment that contributes to the electrification of automobiles and autonomous driving

The Company is developing in-wheel-well dynamo, a new type of test equipment for automobile development, for the purposes of evaluating self-driving vehicles, which are predicted to become widespread in the future, and replacing chassis dynamos. This equipment can be attached to the tires of an actual vehicle to simulate an actual driving test. The Company has received the first order for test equipment using in-wheel-well dynamo.



Actual vehicle test with in-wheel-well dynamo

Going forward, development efforts will be carried out with a view to the applicability to self-driving vehicle tests inside a testing room. The Company will continue to contribute to the realization of a sustainable society, including decarbonization, by supporting automobile development.

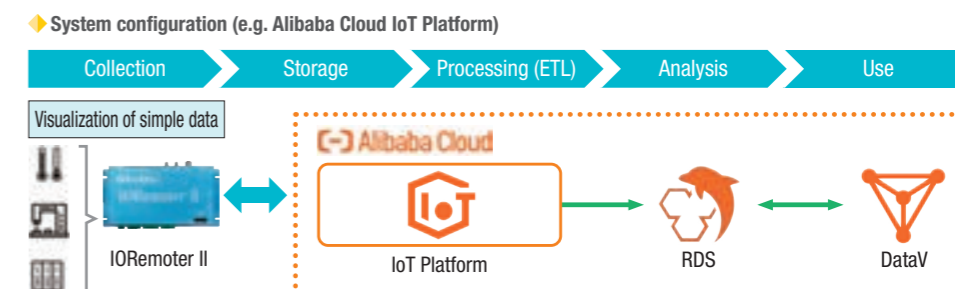
## IORemoter II, IoT terminal for remote monitoring and control systems, enables connection with major clouds

IORemoter II is a high-speed IoT terminal with a built-in 4G/LTE module. IoT remote monitoring and control of various facilities, controllers, devices, and mobile entities can be conducted faster and at a larger capacity.

IORemoter II is compatible with multi-carrier and dual SIM operation, enabling proposals for communication lines that are suitable for each customer's applications.

Our new initiative is to develop IORemoter II's connectivity with major cloud computing services. It now connects with Microsoft Azure, AWS, and Alibaba Cloud IoT Platform. We are also developing connectivity with Google Cloud Platform.

Enabling connection with each cloud computing service reduces the time required for connection verification and makes system provision quicker. In addition, more secure and high-quality systems can be built. The Company will respond to diverse needs of our customers and contribute to accelerating digital transformation.





# R&D to support the development of social infrastructure and supporting frameworks

## Research and Development

The Group's R&D activities are based on seeking to create products that fully satisfy our customers and challenging the creation and expansion of these products, and we actively promote development of technologies of our existing businesses and basic technology developments that support this development as well as development of new products that expand our businesses.

### Results and topics from fiscal 2020

Segment	Project	Description
Transportation Systems	Development of anti-slip re-adhesion control considering three-dimensional bogie motions	To explain the effect of bogie dynamics on the adhesion and wheel slip phenomena of railway vehicles, by building a three-dimensional model, we recreated the phenomena of false detection of slip due to torque reduction during slip and re-adhesion as well as re-adhesion failure due to repeated slips caused by insufficient torque reduction.
	Development of VVVF inverter for vehicles with high-functioning control unit	We increased the performance of control unit to almost triple the processing speed compared to before and installed a large-capacity memory. The improvements enabled high-speed re-adhesion control during slipping and sliding, high-precision monitoring data recording, and long-term dynamic recording.
	Development of current collector with ADD for overseas markets	Building on pantographs for the Japanese market, we developed air-operated type pantograph fitted with ADD (Automatic Dropping Device).
Industrial Systems	Development of in-wheel-well dynamo	We are studying the application of in-wheel-well dynamo, which can fit inside the automobile's wheel well, to chassis dynamo. We conducted in-house production of parts and a review to improve the potential of assembly operation, with mass production in mind.
	Development of slender-type high-speed motor for EV/HEV system tests	We are developing a motor for testing the multi-axle drive systems of EV/HEV. Using the developed motor for dynamos with a 20,000 rpm speed, the development process involves reducing the diameter of the frame and changing a part of the frame to cutout construction. Once developed, the motor will enable tests to create the same layout as if it is installed in an actual vehicle.
	Development of 690V large capacity motor / inverter	We are developing motor and inverter for 690V power supply that can accommodate larger capacities of processing machine systems. A motor for 690V was developed based on the existing induction motor for 400V power supply. Inverter and converter are undergoing evaluation tests on prototypes.
Information Equipment Systems	Development of standardized data and programs for railway station operating equipment	Standardized data and programs, which unified fare data (stations, fare, etc.) and fare calculation programs necessary for fare calculation to be processed by various railway station operating equipment, were completed. Standardization is expected to reduce renewal costs associated with fare revision and to improve the processing quality.
Expansion of New Businesses	Development of IoT terminal and expansion of functions	In addition to the Company's own existing cloud, it is now possible to connect to major cloud services such as Amazon Web Service, Microsoft Azure, and Alibaba Cloud. We started developing a next-generation IoT terminal that supports 5G, evolving IORemoter II to a next-generation terminal.
	Distributed power source	In collaboration with the Industrial Systems segment, we developed software for grid interconnection inverter VF66G that has already been commercialized, to comply with the grid interconnection regulations for distributed power sources.
	Support for overseas EDM production	With the research laboratory and the Industrial Systems segment, we are assisting production to develop a range of permanent-magnet synchronous motors CTEDM that are mass-produced by Chalco-Toyo Permanent Magnet Motor Co., Ltd., a joint venture set up in China. Three models with IP55 protection and 1,500 rpm specifications, which meet Chinese standards, were released ahead of others.
Research Laboratory	Development of automatic deburring system for cast gear boxes	Cast gear boxes that house gear devices for railway vehicles come in a variety of types, each of which is produced in small quantity, so deburring is performed manually. This development project involved deploying a 3D sensor that acts as a human eye and automating deburring with a robotic arm.
	Development of synchronous operation system with high-speed Ethernet communication	In a system that operates multiple motors in synchronization without mechanically connecting them, communication between each inverter that drives motors was realized by a high-speed open network using Ethernet. Conventional optical fiber and other types of wiring can be replaced with one LAN cable, which is expected to save wiring, reduce man-hours, and lower costs.

## Intellectual Property

Our intellectual property is placed as a key corporate resource. Our intellectual property department is responsible for the management of intellectual property and our research laboratory and the development divisions in each business unit actively apply for patents and utility models.

In the overseas markets which we expect to further expand our businesses, we have started to actively engage in activities concerning our intellectual property in order to protect our technologies and brand.

### Patent applications granted

