



TOK Medium-Term Plan: Review of the Past Two Medium-Term Plans

TOK Medium-Term Plan 2015 (FY2014/3–FY2016/3)

In 2012, TOK established customer-oriented sites that use an integration of “the trinity” platform covering development, manufacturing, and sales in South Korea where the semiconductor industry was displaying remarkable growth, and accelerated its strategy of building close relationships with customers overseas, especially in the U.S., South Korea, and Taiwan, under the TOK Medium-Term Plan 2015.

Management Objectives/Features

- ◻ Deepen and expand existing business domains
- ◻ Swiftly launch new business domains
 - ◆ Surpass record-high profits
 - ◆ Carry out large-scale investment to enhance business foundations that support sustainable growth
 - ◆ Expand business domains to include the renewable energy field



Results

- ◻ Achieved record-high profits
FY2015/3 Operating income: ¥13.2 billion
- ◻ Strategy of building close relationships with customers made significant progress



TOK Advanced Materials Co., Ltd. (South Korea) TOK TAIWAN CO., LTD. (Taiwan)

Diversified earnings drivers

- ArF excimer laser photoresists:** Growth in North America
- KrF excimer laser photoresists:** Double-digit annual growth rates for Asia
- g-Line and i-Line photoresists:** Secured positive growth
- High-density integration materials:** Expanded to major OSAT manufacturers, made progress in developing new customers
- High-purity chemicals:** Succeeded in development and sales expansion of high-grade products

Strategy

Company-Wide Strategies

- Build close relationships with regional users
- Reform business portfolios
- Develop global personnel

Important Strategies

[Earnings drivers]

- Continue growth of semiconductor photoresists
- Capture business for advanced packaging materials
- Expand LCD materials by capturing demand related to high-resolution LCD panels for tablet devices and smartphones
- Continue multifaceted development of existing technologies that will contribute to sales
- Recover earnings in the Equipment Business, fully commercialize TSV equipment

[Strengthen business potential]

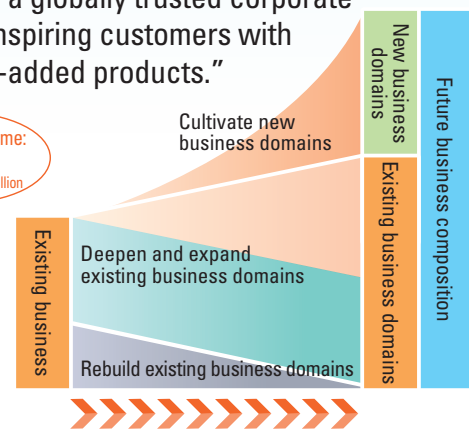
- Strengthen development of ArF excimer laser photoresists (for the 10nm level) to secure market share
- Develop next-generation clean solutions
- Develop new materials in the renewable energy field
- Enter the optoelectronics field

Long-Term Management Vision (formulated in 2010)

Overarching aspiration for 2020

“Aim to be a globally trusted corporate group by inspiring customers with high value-added products.”

Operating income:
¥20.0 billion



Major Indicators

	2014/3	2015/3	2016/3
Net sales	75,269	88,086	89,969
Material Business	72,866	84,611	87,280
Equipment Business	2,484	3,581	2,748
Operating income	10,025	13,253	12,438
Profit attributable to owners of the parent	7,549	8,818	7,716
Free cash flow	(2,610)	3,380	7,517
Capital investments	14,577	7,276	5,919
Depreciation and amortization	2,672	4,276	5,631
R&D costs	6,389	6,903	7,015
Cash dividends applicable to the year per share (Yen)	52.00	60.00	64.00
ROE (%)	5.8	6.2	5.3
Equity ratio (%)	87.5	84.3	85.1
Payout ratio (%)	30.9	30.5	36.1
Worldwide semiconductor market (Millions of U.S. dollars)*1	335,843	335,168	338,931
Exchange rate (¥/\$)*2	103	120	112

*1 Source: World Semiconductor Trade Statistics (calendar year) *2 As of the end of each fiscal year

TOK Medium-Term Plan 2018 (FY2017/3-FY2018/12)

Achieving record-high profits under the TOK Medium-Term Plan 2015 provided us with momentum for the overarching aspiration for 2020 (operating income of ¥20 billion), and TOK began proactive investments to focus on strengthening the management foundation and reforming business portfolios.

Positioning/Management Objectives/Features

- Key three years for achieving the overarching aspiration
- Continue striving to deepen existing business domains and swiftly launch new business
 - Continue proactive investments for the overarching aspiration
 - Aim for record-high profits in the final year
 - Aim for ROE of over 7% and enhance returns to shareholders



Results/Issues

- Strengthened R&D and production bases
Conducted capital investments of ¥21.7 billion



TOK TAIWAN CO., LTD.



New R&D Building at the Sagami Operation Center

- Leveraged strengths in the cutting-edge semiconductor field

EUV photoresists: Highly evaluated by major customers
KrF excimer laser photoresists: Adoption for 3D-NAND (Japan, Asia)/ Increasing demand accompanying expansion of 3D-NAND mass production (Japan, Asia)
High-density integration materials: Adoption for FOWLP (semiconductor field) by a major customer/Adoption by customers in Japan and overseas resulting in expanded adoption and application (electronic components field)
High-purity chemicals: Expanded adoption for next-generation process by a major customer (Asia)/Adoption of and increased demand for new clean solution (Asia, the U.S.)

- Midway through reforming business portfolios

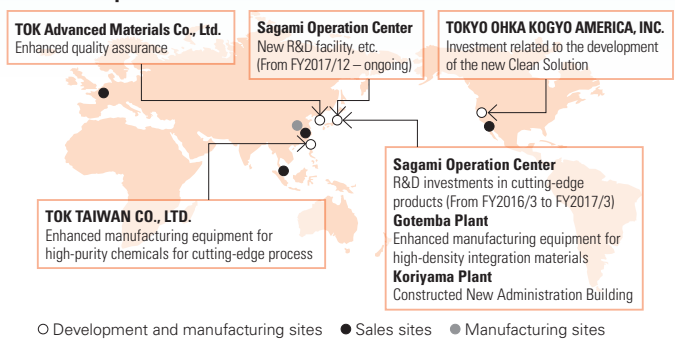
ArF excimer laser photoresists: A major customer did not adopt (Asia), and major customers' production plans delayed (Asia, the U.S.)
Equipment Business: Delayed expansion of 3D packaging process market
New business: Delay in commercializing focused themes (high-functional films, nanoimprint, etc.)

Strategy

Company-Wide Strategies

- [Reform business portfolios]
 - Renew mainstay products
 - Create new business/new materials
 - Recover earnings in the Equipment Business and develop versatile applications of TSV technology
- [Evolve strategy of building close relationships with customers]
 - Strengthen development of ArF excimer laser photoresists (10nm or less)
 - Further increase market share of KrF excimer laser photoresists (Thick-film photoresists for 3D-NAND)
 - Strengthen customer support structure in Chinese market
- [Develop global personnel]
 - Promote development of core human resources with a Group-wide perspective, as well as recruitment and promotion of diverse personnel appropriate for global business
- [Strengthen management foundation]
 - Build a governance system aiming to reduce risks accompanying globalization and to raise corporate value

Main Capital Investments under the TOK Medium-Term Plan 2018



Major Indicators

	2017/3	2017/12*1	2018/12
Net sales	88,764	92,411	105,277
Material Business	86,558	90,532	102,626
Equipment Business	2,252	1,921	2,697
Operating income	9,954	9,194	10,505
Profit attributable to owners of the parent	6,343	6,007	6,875
Free cash flow	(926)	4,169	6,298
Capital investments	9,378	6,731	5,636
Depreciation and amortization	6,118	6,035	7,063
R&D costs	8,207	6,921	8,526
Cash dividends applicable to the year per share (Yen)	64.00	64.00	96.00
ROE (%)	4.4	4.1	4.7
Equity ratio (%)	84.6	82.2	78.0
Payout ratio (%)	43.8	46.3	58.2
Worldwide semiconductor market (Millions of U.S. dollars)*2	412,221	468,778	412,086*4
Exchange rate (¥/\$)*3	112	113	111

*1 The fiscal year ended December 31, 2017 was an irregular nine-month period due to a change in fiscal year-end. *2 Source: World Semiconductor Trade Statistics (calendar year)
 *3 As of the end of each fiscal year *4 Forecast-based amount for 2019

Our Value Creation

Our Focus

Our Foundation

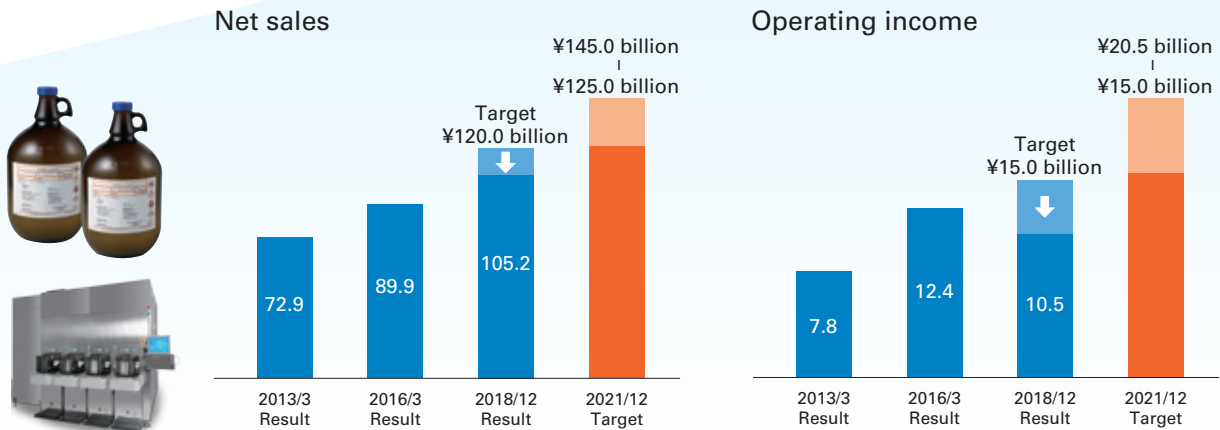
Data Section

Overview of the TOK Medium-Term Plan 2021

Management Vision

Aim to be a globally trusted corporate group by inspiring customers with high value-added products that have satisfying features, low cost and superior quality.

Performance/Targets



(Billions of yen)	2018/12 Result	2019/12 Forecast	2020/12 Target	2021/12 Target
Net sales	105.2	111.6*	120.0–130.0	125.0–145.0
Operating income	10.5	10.5*	13.5–15.0	15.0–20.5
ROE (%)	4.7%	—	—	Over 8.0%
Exchange rate (Yen/US\$)	111	105	105	105

* Figures announced on February 14, 2019

Features of the TOK Medium-Term Plan 2021

Point
1

Strengthen business portfolio reforms

⇒ Ambitiously develop the technologies required by 5G, IoT & Innovation

Point
2

Return to a growth trajectory

⇒ Operating income target: ¥15.0 billion to ¥20.5 billion (Fiscal year ending December 31, 2021)

Point
3

Strengthen balance sheet management and introduce a new dividend policy

⇒ A new dividend policy targeting a DOE of 3.5%

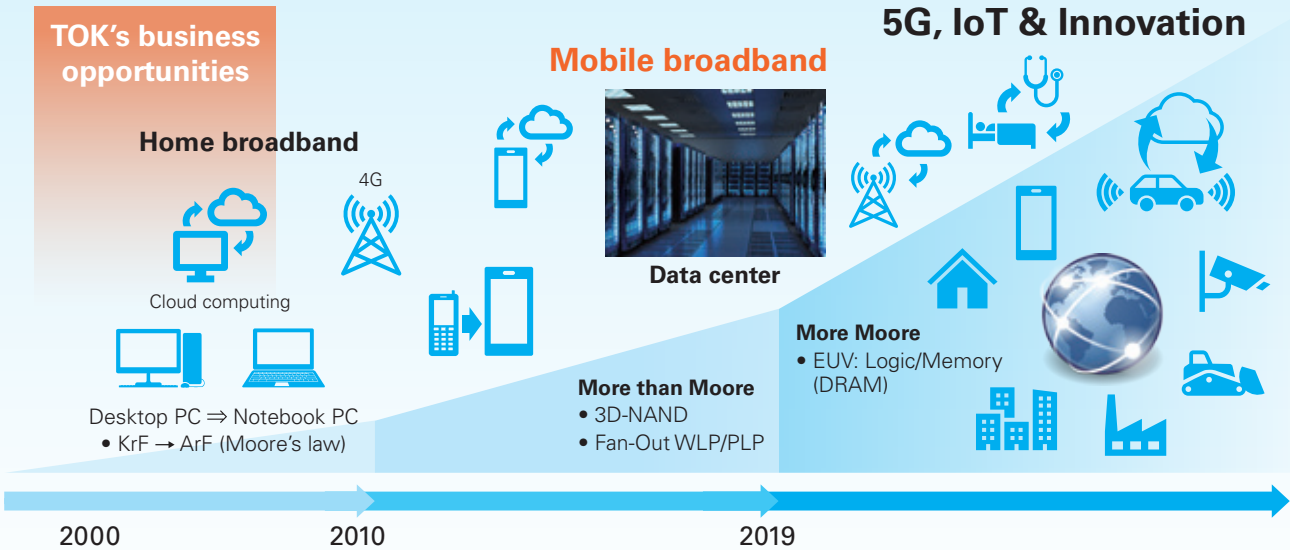
Dividends applicable to the year per share forecast = ¥120

(Fiscal year ending December 31, 2019)

⇒ Flexibly conduct share buyback as a means of returning profits to shareholders



Background and Aims behind Formulation



Business Strategy 1: EUV/ArF Photoresists

EUV photoresists to drive sales growth of cutting-edge photoresists
Expand sales of ArF excimer laser photoresists for the Chinese market

Business Strategy 2: KrF Excimer Laser Photoresists

Sales growth to be driven by growing demand arising from increased production of 3D-NAND, etc.

Business Strategy 3: High-Density Integration Materials

Strive to increase sales through advances in cutting-edge packaging technology

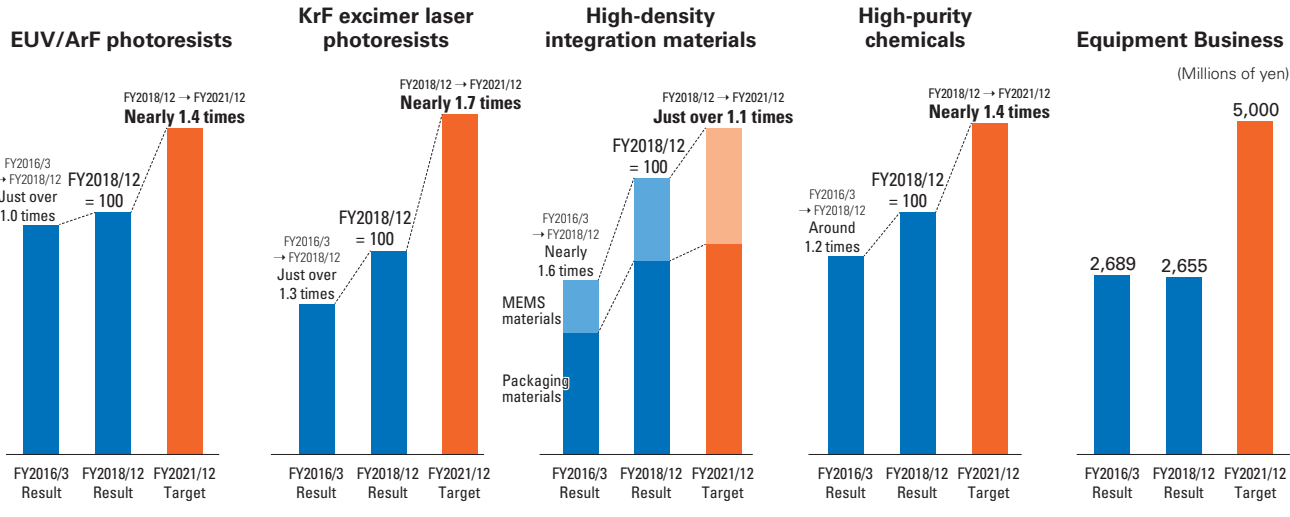
Business Strategy 4: High-Purity Chemicals

The U.S. and Asia are projected to contribute to increased sales

Business Strategy 5: Equipment Business

3D packaging and power devices are expected to grow/Increase orders based on TOK's track record
Development and manufacture of manufacturing equipment for next-generation displays

Sales Results and Target of Each Growth Driver



Our Value Creation

Our Focus

Our Foundation

Data Section



Company-Wide Goal

“Cultivate niche markets that the TOK Group should develop”

Company-Wide Strategies

(1) “Accurately identify and rapidly address the customers’ voice to build an even larger and stronger pipeline to customers”

Rapidly and steadily work to develop a support structure rigorously focused on customer satisfaction along with R&D

(2) “Strengthen marketing, increase understanding of the customers’ value creation processes and translate these efforts into new value creation”

Through rigorous marketing, TOK will carefully identify solutions that lead to the creation of new value for customers as it makes intensive and proactive efforts to address those solutions.

(3) “Strengthen human resources who can perform research, make decisions, and take actions on their own initiative”

Bolster human resources that will pursue the possibilities of business with a variety of customers and continue to tackle challenges until they succeed

(4) “Strengthen TOK management foundation”

Focus on further sophisticating Group management, improving corporate governance, and promoting balance sheet management to utilize management resources more efficiently

Strategy for New Business

High-functional films

Secure new technological seeds as TOK’s core technologies and deploy them to multiple applications

Optical materials

Expand new materials fields such as nanoimprint materials and high refractive index materials

Life science-related materials

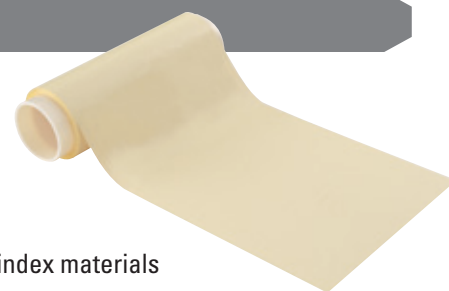
Commercialize photolithography-related technologies in the life sciences field

Collaboration/support

Drive new innovation through TOK’s core technologies and the outstanding technological capabilities of partner companies

Sagami Operation Center

Establish new technological seeds as core technologies



pixelligent
THE CLEAR SOLUTION™

Financial Capital Strategy: Balance Sheet Management

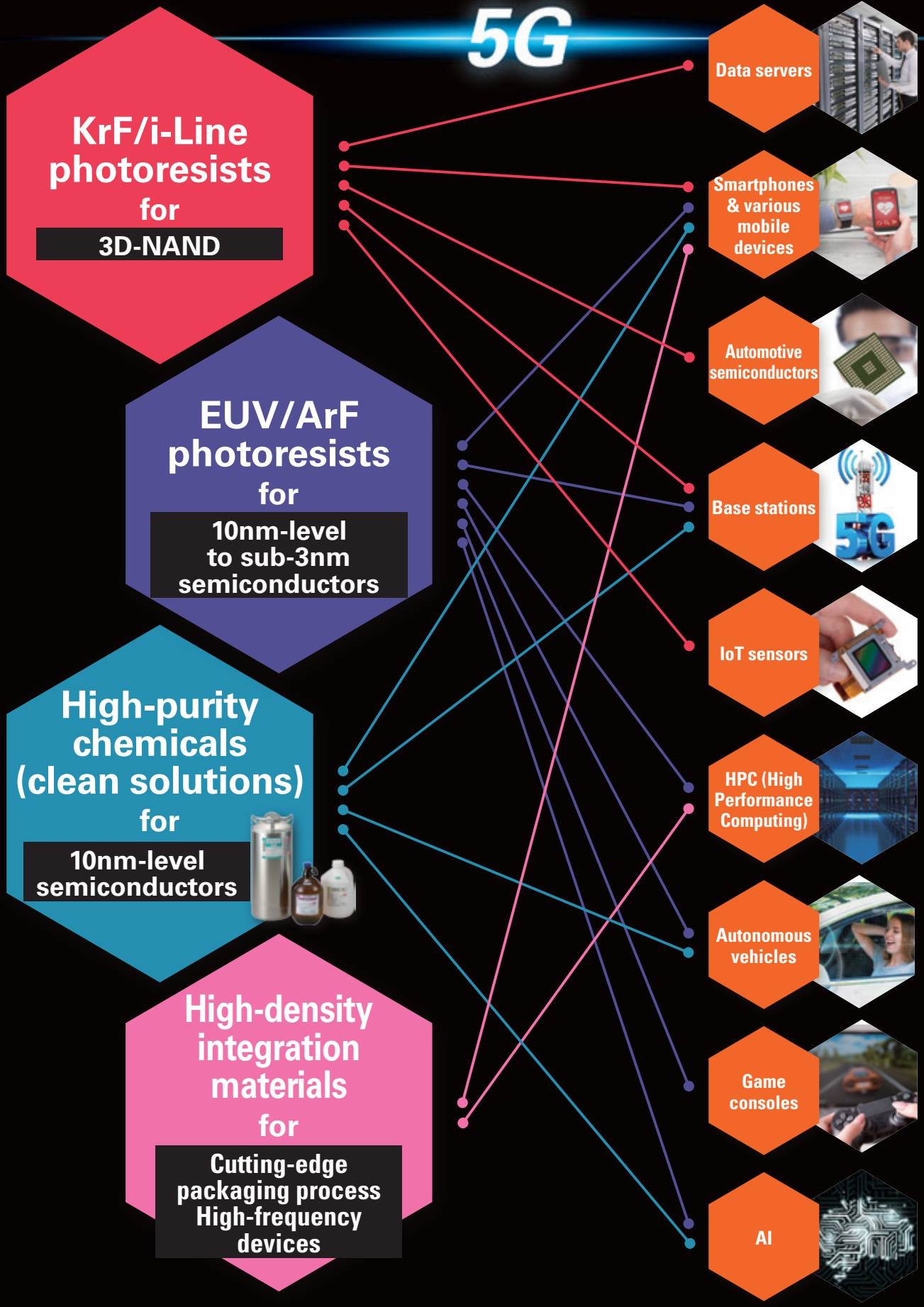
As a long-run R&D-driven company, TOK will pursue the optimal balance between investment, cash reserves, and shareholder returns.

(1) Pursuit of asset efficiency (2) Cash reserves (3) Shareholder return policy and dividend policy

5G and TOK's Products



5G



Our Value Creation

Our Focus

Our Foundation

Data Section

Message from the Director in Charge of Marketing

We are advancing our sales and marketing activities, motivated by the desire to meet the expectations of customers and society.



Keiichi Yamada

Director, Officer, Department Manager, Marketing Dept.

Megatrends

■ 5G Communications as New Social Infrastructure

The key traits of 5G communications, namely high-speed, high capacity, low latency, and multiple simultaneous connections, are likely to greatly benefit not only smartphones and other mobile devices, but also IoT that connects things to the internet. 5G's low latency, which is one-tenth that of 4G, and multiple simultaneous connections, which are 10 times that of 4G, will make it possible to solve a variety of social issues, such as remotely operating machinery to deal with labor shortages in medical, construction, and distribution settings, in addition to improving the safety of autonomous vehicles and remote medicine. Big data generated by countless sensors will lead to the realization of smart cities that efficiently consume energy and intelligent transport systems (ITS) with fewer traffic jams and accidents. 5G is expected to play a vital role as new social infrastructure.

One of our management principles is to "contribute to society." Having identified the "development and provision of high value-added products that will contribute to innovation" as a material issue, TOK will continue to refine its world-leading microprocessing technology and high purification technology with the aim of contributing to the development of 5G communications as social infrastructure along with its customers.

Risks and Opportunities

■ Steadily Tapping into Numerous Business Opportunities

We anticipate numerous business opportunities in the 5G semiconductor device market. First, the Company will provide high value-added materials for 5G base stations that have begun to be installed in communications infrastructure. Since 5G signals travel along more linear paths and have shorter wavelengths than 4G signals, a much larger number of base stations will need to be deployed for 5G services. As these base stations use many semiconductors, TOK expects steady growth in earnings from the provision of advanced photoresists for 3D-NAND and 10–5nm semiconductors, and clean solutions for 10–5nm semiconductors. In addition to KrF excimer laser photoresists and i-Line photoresists for ubiquitous sensors, TOK is keen to steadily tap into demand for other types of photoresists for high-performance computing (HPC) applications that will quickly process the massive volume of data generated by sensors.

■ Focusing on 5G-related Trends in the U.S. and China

Competition in 5G has heated up between the U.S. and China recently. Therefore, there is a risk that 5G-related supply chains will be divided along lines drawn by the U.S. and China in the global semiconductor industry, semiconductor materials industry, and semiconductor manufacturing equipment industry, resulting in a slower-than-expected proliferation of 5G and growth in related markets. In response to this potential risk, the TOK Group takes the approach of dispersing risk through business development in the five regions of Japan, the U.S., China, South Korea, and Taiwan. Moreover, the TOK Group intends to minimize the impact of risks if they materialize by accelerating the reform of its business portfolios that began under the "TOK Medium-Term Plan 2015."

Marketing Strategy in the 5G and IoT Markets

■ "Unknown Domains" Not Currently Visible Are Keys

Currently, there is decent visibility on growth in demand related to base stations and HPC. In reality, technological innovation that exceeds expectations will be necessary for a new world to emerge from the proliferation of 5G. We believe successful marketing in the 5G and IoT market will hinge on discovering business opportunities in the "unknown domains" of technological innovation. In line with company-wide strategy (2) "Strengthen marketing, increase understanding of the customers' value creation processes and translate these efforts into new value creation" in the "TOK Medium-Term Plan 2021," the Company is concentrating its efforts on strengthening sales and marketing in these "unknown domains" of the 5G and IoT markets.

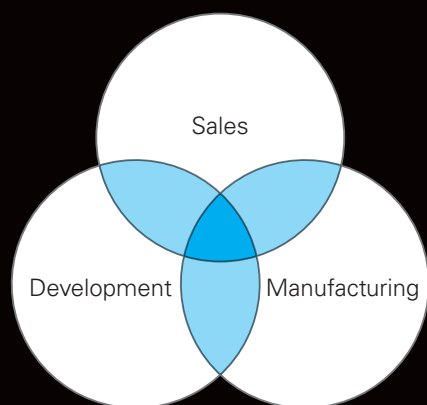
For example, one "unknown domain" of 5G communications is the faster speed of outgoing data transmissions, in addition to faster incoming data transmissions. This functionality is likely to be groundbreaking for sensor devices that transmit large volumes of data, and should present a major business opportunity in related materials. In April 2019, the Company merged together the Marketing Div., which was responsible for sales and marketing photoresists used to make IoT sensors, and the Panel Material Marketing Div., which oversaw the sales and marketing of materials for panel production, into the newly established Imaging Material Marketing Div. This brings together the Company's resources in the sensor and display fields, positioning it to


target growth in the sensor device market that is expected to expand strongly in the 5G and IoT era.

■ Marketing Strategy Based on “the Trinity” of Sales, Development, and Manufacturing

One more point to note in our initiative to strengthen sales and marketing is to evolve our strategy of building close relationships with customers that has been in motion since the “TOK Medium-Term Plan 2015.” This strategy of building close relationships with customers, which is based on “the trinity” of sales, manufacturing, and development, has gained momentum over the previous two medium-term plans, becoming an integral part of our front-line operations and a new aspect of our DNA, equivalent in stature to our aim to “create a frank and open-minded business culture.” Under the “TOK Medium-Term Plan 2021,” TOK will evolve this strategy of building close relationships with customers into a marketing strategy based on “the trinity” of sales, manufacturing, and development. Instead of having the marketing divisions do all of the marketing on their own, operations in sales, development, and manufacturing will monitor the latest trends in technologies and constantly propose methods that differ from before, while at the same time focusing on the creation of new niche top products by coalescing around new business models and measures to reduce costs.

Marketing strategy based on “the trinity” of sales, manufacturing, and development



 Driving force: Desire to meet the expectations of customers and society

Leveraging Strengths in Sales and Marketing

■ Driven by the Desire to Meet the Expectations of Customers and Society

Since its founding, TOK has created value by working closely with its customers. Our desire to meet and surpass the technological requirements of our customers while staying one step ahead of the times is embedded in our corporate culture, and it is also the driving force behind sales and marketing activities. For example, KrF excimer laser photoresists for 3D-NAND are products we have developed with the desire to meet customer requirements. We have increased

our market share in these photoresists lately, even though the market had almost matured and they had no longer played roles as cutting-edge materials in miniaturization, by tapping into new demands for thick-film formation, where the staircase structures unique to 3D-NAND are formed. Furthermore, our photoresists for IoT sensors, which have received high marks from our customers, are products we developed with the desire to meet customer requirements at a time when the growth potential of the markets was uncertain, allowing us to obtain a slice of the market.

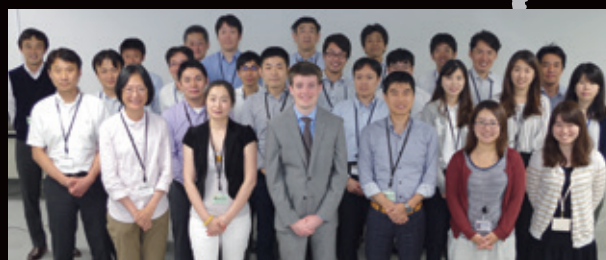
In non-photosensitive materials, our high-functional films have begun to be used as separators in lithium-ion batteries for special B-to-B applications. These high-functional films are high value-added products that are beneficial to society within the context of reducing the risk of lithium-ion batteries catching fire, a social problem that we proudly took action to solve from a desire to meet society’s expectations, even though this choice entailed many hardships because creating materials with strong heat resistance requires a very large number of processes.

TOK will continue to evolve its sales and marketing activities, driven by the desire to meet the expectations of its customers and society.

■ Sharing Our Desire to “Meet Expectations” with Local Personnel Overseas

Since TOK began establishing local subsidiaries overseas in the 1980s, the Company has been deeply involved with not only local customers, but also local personnel in charge of sales and marketing at each overseas site. We have focused on sales and marketing from the unique standpoint of being driven by the desire to meet the expectations of customers and society, operating businesses in tune with local cultures. As a result, local personnel have come to deeply appreciate and put into practice this principle, becoming a new force in the Group for creating value.

New strength: Ability to create value through local personnel overseas



We are improving development efficiency while strengthening marketing in R&D.



Harutoshi Sato *Director, Senior Executive Officer, Department Manager, Research and Development Dept.*

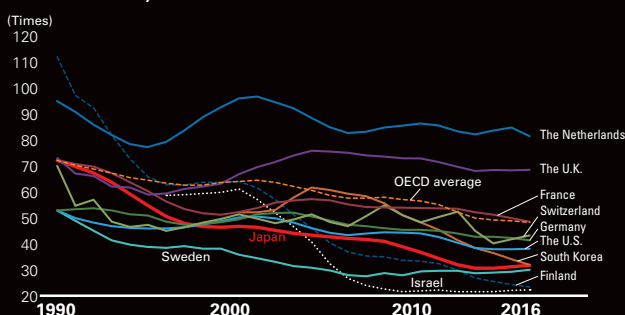
Megatrends

■ Rising Interest in R&D Efficiency

Around the world, interest in improving R&D efficiency has grown in various industries alongside advances in the globalization of the manufacturing industry, including the chemicals and electronics industries. According to research by the Organization for Economic Co-operation and Development (OECD), R&D efficiency at Japanese companies is lower compared with other advanced countries. Improving R&D efficiency has become a priority at TOK and other Japanese companies amid labor shortages caused by declining birthrates and an increasing elderly population, as well as greater demands for better capital efficiency.

TOK is strengthening marketing in the development divisions in addition to the marketing divisions, while continuing to focus on the development of higher value-added niche top products. At the same time, TOK is improving R&D efficiency by introducing elaborate methodologies for activities in each development project.

R&D efficiency in advanced countries



Source: Ministry of Economy, Trade and Industry, based on OECD Main Science and Technology Indicators (as of November 7, 2017)

* Corporate added value and R&D spending five years prior (purchase power parity conversion) is calculated using the ratios of trailing five-year moving averages.

Risks and Opportunities

■ Rapid Technological Innovation Presents Both Risks and Opportunities

In “unknown domains” not currently visible on the 5G and IoT markets, technological innovation is likely to proceed with a greater-than-imagined speed and disruptiveness.

Concentrating on the development of materials in cutting-edge semiconductor fields, TOK always engages in R&D amid competitive forces, and is well aware of the risk

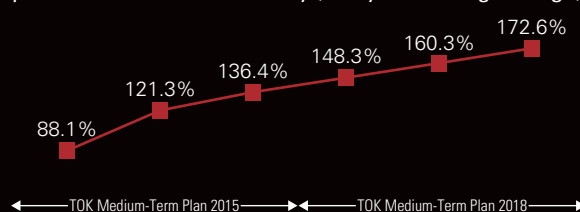
of losing customers to rivals in the competition to develop cutting-edge materials. When customers switch to new cutting-edge processes, we see this as a prime opportunity to propose and have new materials adopted by customers. The Company’s development divisions have been focusing on winning new business opportunities while working closely with the marketing divisions. Since its founding, TOK has developed business in niche markets, so sudden and volatile changes do not come as a surprise to the Company (change is normal). Change is viewed as an opportunity for the Company to leverage its strength in development capabilities.

R&D Strategy for 5G and IoT Markets

■ Capital Investment in R&D

TOK’s business model is based on the constant development of high value-added products for niche markets. As such, the Company spends roughly 8% of net sales on R&D, far higher than the averages of 2.7%*¹ for the chemical and petroleum industry and 4.0%*¹ for the electrical equipment and precision machinery industry. TOK will firmly maintain this policy in the future, and is keen to improve development efficiency to increase capital efficiency and corporate value with the outcomes of its development initiatives. The Company’s R&D efficiency*² has followed an uptrend over the previous two medium-term plans, the “TOK Medium-Term Plan 2015” (FY2014/3–FY2016/3) and the “TOK Medium-Term Plan 2018” (FY2017/3–FY2018/12), and we are turning our attention to the following initiatives to increase efficiency further under the “TOK Medium-Term Plan 2021.”

Uptrend in TOK’s R&D efficiency (five-year moving average)*²



2014/3 2015/3 2016/3 2017/3 2017/12 2018/12

*¹ Average of totals for FY2014/3 through FY2016/3. Source: Nikkei Smart Work Survey on April 20, 2018

*² R&D efficiency = Operating income in the most recent five years/R&D costs over the previous five years

■ Marketing Also Plays a Vital Role in R&D

Strengthening marketing is the highest priority in our aim to increase development efficiency. In the development divisions as well, the focus of our efforts is the company-wide strategy (2) “Strengthen marketing, increase understanding of the customers’ value creation processes and translate these efforts into new value creation” in the “TOK Medium-Term Plan 2021.”

More specifically, we will roll out development strategies with an eye on the future, scrutinizing target markets and communicating closely with the marketing divisions from the initial stage of project inquiries. After the start of each development project, due attention is paid to changes in customer requests and technological trends in the market, and functional definitions are refined for new high value-added products by both the marketing and manufacturing divisions.

■ Toward Long-Term Sustainable Growth with “Continuous Growth” and “Discontinuous Growth”

Marketing in the research and development divisions is approached from both “continuous growth” and “discontinuous growth” perspectives. We aim to maintain “continuous growth” by pulling ahead of the competition in the current market where development competition has already begun (i.e., red ocean strategy), while also attaining “discontinuous growth” by agilely addressing newly emerging needs (i.e., blue ocean strategy). We believe both strategies will lead the Company toward sustainable growth over the long term. On the 5G and IoT markets, TOK will firmly address recently emerging issues at customers and technological needs. In the “unknown domains” of IoT sensors, advanced packaging processes, and high-frequency devices, we will rapidly respond to emerging needs.

■ Combination of Agile Development*1 and Waterfall Development*2 Methodologies

We are focusing on agile development methods as a specific way of rapidly responding to needs. As a recent example, we used an agile development approach to develop EUV photoresists for the 7nm node for a Taiwanese customer. For the development of clean solutions for the 10nm node for a North American customer, we used a combination of agile and waterfall development methodologies to successfully realize high added value in this cutting-edge field. We will also apply these methodologies to “unknown domains” in the 5G and IoT fields.

*1 Agile development: Mainly used in short-term projects, this approach to development is a repeating process of immediately responding and adjusting to frequent changes in development requirements.

*2 Waterfall development: Mainly used in long-term projects, this approach to development defines final specifications at an early stage, and then follows carefully laid out plans.

■ Introducing AI to Enhance Efficiency of Discovering and Verifying New Materials

To further enhance development efficiency, we have been creating a structure for visualizing our knowledge and expertise accumulated over many years in semiconductor photoresists and high-purity chemicals, and then sharing

this data throughout the development divisions. Since April 2018, the Company has concentrated its efforts on Materials Informatics (MI), which uses AI and big data in material development to increase efficiency in the discovery and verification process for new materials, and has also been putting its legacy knowledge into databases. During the “TOK Medium-Term Plan 2021,” the Company aims to build databases in cutting-edge fields and produce results from the partial utilization of these databases.

Strengths in R&D

■ Human Resources with Deep Pools of Talent

TOK launched its photoresist business in 1968 as a pioneering manufacturer of photoresists in Japan. Since then, the Company has made numerous technological breakthroughs while painstakingly fulfilling customer needs in each generation of miniaturization, from novolac photoresists (g-Line and i-Line photoresists) to chemically amplified photoresists (KrF and ArF excimer laser photoresists, EUV photoresists), building strong relationships of trust with customers around the world. As a result, our human resources represent deep pools of talent earned from extensive experience and know-how accumulated over past generations of technology. By passing down and further honing this strength, we will lay a rock-solid foundation for sustainable value creation.

■ Measures to Develop Human Resources Specializing in Development

TOK has the Level-based Training Program and the TOK Global Practical Training for Selected Members as its education programs for all employees across the divisions. In the Research and Development Dept., we have our own unique human resource development curriculum, in addition to these other programs. In the “TOK Medium-Term Plan 2021,” the company-wide strategy (3) is to “Strengthen human resources who can perform research, make decisions, and take actions on their own initiative.” This has been the aim of the Research and Development Dept. before this new medium-term plan even began. In addition, we have identified the “10 qualities of successful development,” such as “Continue to take the initiative until successful without giving up.” From this perspective, we are committed to developing human resources who can continue to produce results on development projects in cutting-edge fields. We are currently working to further systemize and visualize these education systems, and tie them into employee evaluation systems.

Outline of Human Resource Development Measures in the Research and Development Dept.

“10 qualities of successful development”

1. Think, research, decide, and take action on your own initiative
2. Continue to take the initiative until successful without giving up (3. onward omitted)

[New employee training] Basic training program for 2 hours a week (includes tests)

[Section manager training] Training on how to guide and educate subordinates in development projects

[General manager training] Exclusively developed training based on MOT (Management of Technology)

Message from the Director in Charge of the Environment

TOK uses its world-leading high purification technology and diverse human resources in the pursuit of environmental value and occupational safety.



Nobuo Tokutake *Director, Officer, Department Manager, Manufacturing Dept.*

Megatrends

■ Globalization of Supply Chains and the Deepening Problem of Climate Change

As a fine chemicals manufacturer, TOK supplies high value-added products through the structure of close relationships with customers through its six plants in Japan and five plants overseas. TOK has identified the following megatrends in the external environment in both its upstream and downstream value chains.

First of all, upstream domains have seen greater risks that should be managed more closely amid the megatrend where supply chains are increasingly globalized. Overseas suppliers now account for a larger part of solvent and polymer suppliers, the main materials in photoresists, and these suppliers have a relatively higher risk of accidents than Japanese suppliers. Measures must be taken to address this risk, and also respond to environmental regulations in each country. In downstream domains, environmental and safety-related laws and regulations, as well as regulations concerning the management of chemical substances, have become tougher every year in the U.S., China, South Korea, and Taiwan, where the Company has its production sites, amid the megatrend of increasingly severe problems caused by climate change. The TOK Group will continue to rapidly address changes in the external environment and megatrends like this. At the same time, we are ready to advance measures under our Environmental Policy and Occupational Health and Safety Policy with an eye on changes in social issues and the further globalization of business activities.

Risks and Opportunities

■ Unique Environmental Risks in Fine Chemicals

In capital markets, shareholders, investors, and ESG research institutions tend to view and analyze TOK shoulder to shoulder with other major chemical manufacturers in the chemicals sector. However, TOK specializes in fine chemical products, so its product portfolio and the size of its plants are quite different from those of major chemicals companies that produce bulk chemicals. Approximately 90% of the ingredients in photoresists, our leading product, are safer solvents* and the remaining 10% are polymers and photosensitizing agents, which are detoxicated in closed loop systems at semiconductor manufacturers. Accordingly, the environmental risk associated with the fine chemicals produced by TOK are relatively lower than bulk chemicals that are mainly made from naphtha and the like. As environment-related laws and regulations are tightened

Tighter environmental and safety-related laws and regulations around the world

- Japan: Revisions to the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (Chemical Substances Control Law) (June 2017)
- The U.S.: Revision to the Toxic Substances Control Act (TSCA) (June 2016)
- South Korea: Revisions to the Chemicals Control Act (proposed revisions published in January 2019)/Revisions to the Occupational Safety and Health Act (January 2019)
- Taiwan: Revisions to the New and Existing Chemical Substances Registration Act (March 2019)/Revisions to the Toxic Chemical Substances Control Act (January 2019)

Environmental Policy

Contributing to society in our aim to become a corporate group that is trusted around the world, is one of the most important themes in our management plans. Accordingly, we will track our impact on the environment in all phases, from product development to procurement, production, sale, and disposal. Reducing environmental impact from our corporate activities by complying with laws and regulations, as well as our internal regulations and social norms, and balancing production with environmental conservation while preventing of pollution. We will take steps to accelerate the development of businesses in the environment and energy fields in order to contribute to the creation of energy on a global scale.

1. Enhance handling and management with consideration for chemical safety and the environment.
2. Promote efficient use, reuse, and recycling of resources.
3. Promote activities to conserve energy and mitigate global warming.
4. Prevention of pollution.



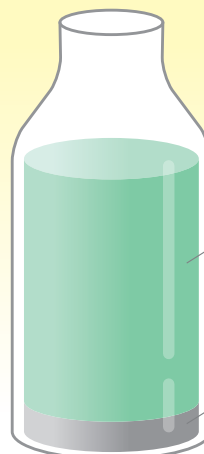
Occupational Health and Safety Policy

In consideration for the safety of the chemical agents to use as chemicals manufacturing industry, we carry out the reduction of the risk and exclusion and security work thoroughly and act for security of the security of an employee and the interested party and the prevention of the illness.

- ▶ Prevention of the work-related accident
- ▶ Continuous improvement of the system



Depiction of raw materials in TOK's photoresists



Approx. 90%
Safer solvent*

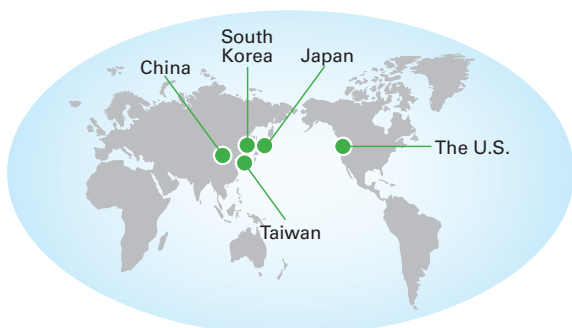
Approx. 10%
Polymers,
photosensitizing agents, etc.

* Safer solvent: Solvent that decomposes in vivo and is gentler on the human body, living organisms and the environment

around the world, however, TOK will continue to focus on creating and operating a robust chemical substance management system with the ultimate aim of creating shared value and sustaining improvement in its corporate value.

■ Environmental and Other Risks Dispersed with Five-region Production System

In line with its strategy since 2014 of building close relationships with customers, TOK has expanded production capacity in the U.S., China, South Korea, and Taiwan, putting into place a system able to disperse risks globally while enabling the rapid supply of cutting-edge products. Recently, TOK has been making capital investments to further expand production capacity at overseas sites. This measure also plays a role of fulfilling the TOK Group's responsibilities as a supplier by reducing environmental risks, as well as the risk of natural disasters and accidents.



■ World-leading High Purification Technology is an Opportunity to Create Environmental Value

Our world-leading high purification technology is one of our core competencies that has been honed since the Company's founding. This high purification technology contributes to the creation of environmental value, in addition to making semiconductors and electronic devices perform better, conserve electricity, and become smaller. For example, if materials delivered by a supplier unexpectedly contain prohibited substances or controlled/regulated substances, the Company's high purification technology can remove these impurities, thereby providing the best value to its customers while reducing environmental risks.

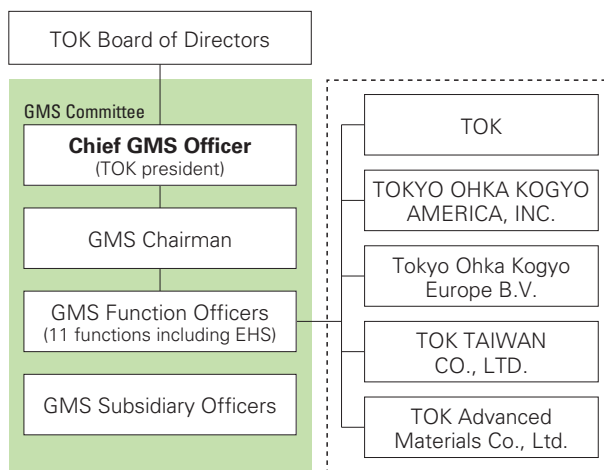
Key Measures in the TOK Medium-Term Plan 2021

■ Strengthening Environmental Risk Management Systems at Overseas Sites

Some of TOK's most important management issues are taking an integrated approach to managing chemical substances, reducing environmental impact, and ensuring the health and safety of employees. The Company engages in Responsible Care activities* and operates the Group Management System (GMS) to minimize the impact of potential risks inside and outside Japan and prevent them from materializing. In 2017, the Company created an EHS (environmental, health and safety) management policy with the aim of further enhancing the effectiveness of these systems. TOK has bolstered group-wide initiatives for the environment and safety through an integrated management structure based on GMS and the EHS Div. As a result, the reinforcement of structures at domestic sites has wound down, and under the "TOK Medium-Term Plan 2021," the Company aims to instill solid risk management at all sites, including overseas subsidiaries, from 2019, while improving chemical substance and environmental risk management at overseas sites through the strengthening of human resources and organizations.

* Activities in which companies handle chemical substances voluntarily take environmental, safety and health measures in every process from chemical substance development through manufacturing, logistics, use and final consumption to disposal and recycling, and announce the results of these activities while engaging in dialogue and communication with the public. (Defined by Japan Chemical Industry Association)

TOK Group's Responsible Care activity framework



Strengthening chemical substance and environmental risk management at overseas sites in 2019

Taking EHS (environmental, health and safety) into Account When Developing Materials for Cutting-edge Semiconductors



New chemical substances are often used when developing new materials for cutting-edge semiconductors. For this reason, the Company is enhancing collaboration between the EHS Div. and the Research and Development Dept. as a key measure in the first fiscal year of the "TOK Medium-Term Plan 2021." TOK is working to improve data coordination between the EHS Div. and the Research and Development Dept. with a better chemical substance database in order to have systems in place for properly managing chemical substances and rapidly providing products to customers. For chemical substance registration applications in foreign countries, we are creating a framework for timely registrations by having local subsidiaries coordinate with the EHS Div. to monitor progress.

Kimitoshi Kato *General Manager, EHS Div.*

Promoting EHS Activities with Capabilities of Diverse Human Resources

■ Rapid Response by Non-Japanese Employees

The EHS Div.'s human resources make it one of the most diverse organizations within the Group, and non-Japanese employees and senior employees in particular are a driving force behind advances in environmental and occupational health and safety activities. As the pace of revisions to local laws and regulations gains momentum overseas, especially in Asian countries, our Chinese and South Korean employees have been instrumental in keeping abreast with local laws and regulations, accelerating the process of registering and receiving approval for chemical substances from foreign government institutions.

■ Abundant "Know-Why" Among Senior Employees

Because cumulative past experience has proven to be very effective in environmental and occupational health and safety activities, roughly half of the employees in the EHS Div. are over the age of 50. Our senior human resources have insight into the advantages and disadvantages of newer and older production facilities, and are experts in environmental management and occupational safety thanks to their decades of experience working on the front lines of production at TOK. These senior employees have not only "know-how," but also "know-why" (knowledge that allows them to immediately know why something may have happened), a precious management resource that backs the Company's ability to sustain value creation.

Enhancing Engagement with Suppliers

■ "Creating Together" as TOK's Lifeline

Instead of working solely on its own, TOK's lifeline is "creating together," through working closely together with its suppliers from the raw material composition stage and sharing targeted quality standards, to further reduce the environmental impact of its products such as photoresists, while increasing added value. The Company periodically exchanges opinions with and performs audits at its main suppliers around the world, and shares throughout its supply chain the standards required by TOK and its customers. In this way, we provide authentic environmental value to our customers and society.

■ Creating Cutting-edge Environmental Value with Suppliers

Collaborating with our suppliers is a key factor in making further advances in the high purification technology that creates environmental value, as well as developing materials for next-generation power semiconductors. Not only TOK, but also its suppliers, must make investments and take risks in their pursuit of the highest levels of purity in the world and the development of cutting-edge materials. Key personnel from TOK and its suppliers are devoted to ensuring successful outcomes to their projects, and regularly convene Technical Review Meetings (TRM), Management Review Meetings (MRM), and Executive Review Meetings (ERM).

Pursuit of Best Practices through Participation in "Communities"

■ Activities in Responsible Care Committee at Japan Chemical Industry Association

TOK actively participates in "communities" of stakeholders within the industry that aim to minimize risks associated with hazardous chemical substances, air pollution, and workplace accidents. We aim to deepen knowledge about the latest innovations and best practices in environmental conservation and occupational health and safety. The Japan Chemical Industry Association, a group of companies in the chemicals sector, periodically hold meetings of the Responsible Care Committee, which provides opportunities to hear about the latest developments at the plants of each company, in the context of chemical substance management, environmental conservation, security and disaster prevention, and dialogue with local communities. These meetings also inform the Company's activities in environmental conservation and occupational health and safety.

■ Participation in chemSHERPA

In July 2017, TOK adopted the chemSHERPA information transfer schemes for chemical substances contained in products. Initially proposed by the Ministry of Economy, Trade and Industry, chemSHERPA was established with agreements of some electronics-related companies. The scheme aims to create a common format for accurately and efficiently conveying information about chemical substances contained in products from upstream to downstream operations. As the organization that manages chemSHERPA, JAMP*¹ counts 443 companies*² (including TOK) as members. Through this organization, TOK obtains the latest information about chemical substances and broader trends, which is used to further improve its management of chemical substances.

*1 Joint Article Management Promotion-consortium

*2 As of June 27, 2019

Formulating the Next Long-term Environmental Targets

■ To Advance the Creation of Environmental Value from a Long-term Standpoint

TOK has set various environmental targets for 2020 to guide the creation of environmental value from a long-term perspective, and these targets are fast approaching their final fiscal year. With the intention of advancing the TOK Group's environmental initiatives and creation of environmental value from a long-term standpoint, the Company's new investment plans incorporate environmental considerations and energy conservation as a part of its basic assumptions. The Company is preparing to incorporate the details of TCFD* and other guidelines into the formulation of its new long-term environmental targets for 2020 and beyond. TOK intends to heavily incorporate these guidelines while testing various arrangements and KPI settings that make the most sense for its operations, which entail the continued development of fine chemical products in high value-added fields that experience rapid technological change. We hope that our stakeholders are excited to see how the TOK Group will continue to create environmental value.

* Task Force on Climate-related Financial Disclosures

Creating New Environment Value through Business Activities

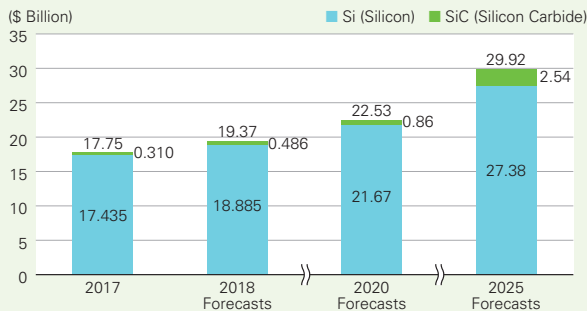
As introduced in the Special Feature (pages 30–31), TOK continues to contribute to solutions for the worsening problem of climate change through the stable supply of g-Line and i-Line photoresists for power semiconductors, for which it has the world's top share*¹. Recently, the Company has focused on the following R&D projects to provide new environmental value in the future.

*¹ Share of sales volume for 2017 (Source: Fuji Keizai's "Whole View of Photo-functional Material and Product Market 2018")

Development of High-heat-resistant Photoresists for Next-generation Power Semiconductors

The power semiconductor market is projected*² to grow at an average annual rate of 6.7% through 2025 and reach \$29.9 billion by 2025, a figure that is roughly 1.7 times higher than 2017. SiC (silicon carbide) power semiconductors, regarded as a leading next-generation power semiconductor, greatly improve the electric power efficiency of electric vehicles, solar power generation and power sources of industrial machinery, and are expected*² to see a compound annual growth rate of 30% and reach \$2.5 billion by 2025, or about 8.2 times larger than in 2017. SiC power semiconductors are currently produced using conventional i-Line photoresists with lithography, etching, and high-temperature treatment processes. In this field, TOK is developing high-heat-resistant photoresists that will reduce the number of production processes and increase pattern precision. By combining high-heat-resistant resins with conventional i-Line photoresist technologies, this product features both high heat resistance and high resolutions. With this product, TOK will be able to contribute more to solutions for climate change through next-generation power semiconductors.

*² Source: Yano Research Institute "Survey on Global Power Semiconductor Market (2018)," published on January 15, 2019



Note 1. Manufacturer shipment value basis
Note 2. Estimates shown for 2018, 2020 and 2025

Next-generation power semiconductors (SiC semiconductors) market:
CAGR 30% (2017 to 2025)
 TOK is developing high-heat-resistant photoresists.

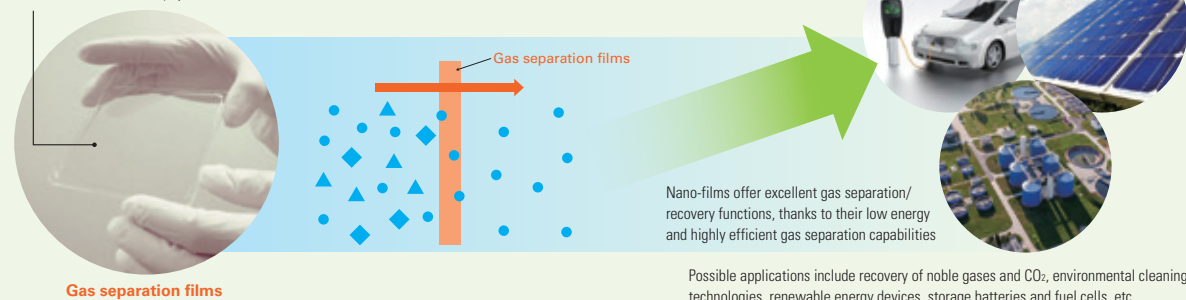
Conventional power semiconductors (Si semiconductors) market:
CAGR 5.8% (2017 to 2025)
 TOK stably supplies g-Line and i-Line photoresists. (The world's top share*¹)

Developing a Gas Separation Membrane for Separating and Capturing Rare Gases and CO₂

As a new business, TOK is developing a gas separation membrane for efficiently separating and recovering rare gases and CO₂ with low energy requirements based on the "nano membrane" developed in 2016 with help from NanoMembrane Technologies, Inc. (Headquarters: Higashi-ku, Fukuoka City/Representative: Toyoki Kunitake), which has been designated as a RIKEN Venture*³ by RIKEN. This gas separation membrane, which has a thickness roughly one-thousandth the thickness of a human hair, can potentially be used in applications for re-using helium, a rare gas needed in the semiconductor production process, as well as the environmental field, renewable energy devices, storage batteries and fuel cells. The Company is promoting open innovation with universities, companies, and research institutions to further advance its development.

*³ A company started up with core technologies from research projects at RIKEN, and was designated through satisfying certain conditions.

Thickness: less than 1/1,000th that of a strand of hair



Message from the Director in Charge of General Affairs and Human Resources

We will expand tough assignments to foster self-reliant human resources that boldly take risks.

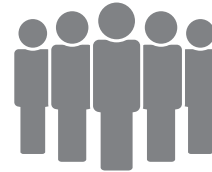
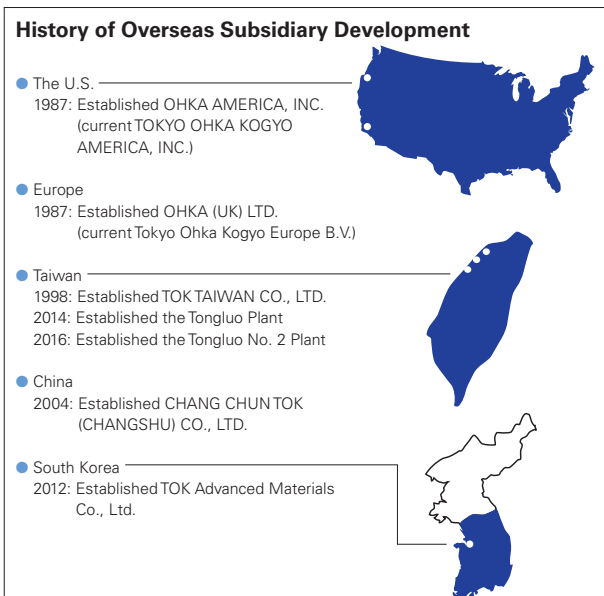


Kunio Mizuki *Director, Executive Officer, Department Manager, General Affairs Dept.*

Megatrends

■ Globalization of Electronics Industry/Growth in Asian Economies

Since the dawn of Japan's semiconductor industry, TOK has refined its technologies in lockstep with Japanese semiconductor manufacturers, its customers, especially during the period of rapid development in the 1980s. Our development and sales personnel also honed their strengths through a process of being trained and disciplined by customers. Thereafter, amid the megatrends of globalization in the electronics industry and expansion in Asian economies, our overseas customers in the U.S., South Korea, and Taiwan began to lead the global semiconductor industry, and we always stayed close to our customers to rapidly meet their stringent requirements for performance, quality, and service in semiconductor photoresists and high-purity chemicals. This allowed us to grow considerably alongside our customers. As 5G and IoT begin to take off in society, however, the pace of technological change is accelerating in the entire electronics industry, and development difficulty increases every year. Against this backdrop, TOK is reforming its business portfolio by strengthening marketing and striving to establish new earning pillars in order to become a "100-year company" in 2040. However, taking a passive approach, by growing alongside our customers, will not be enough to achieve these goals. More than ever before, we need to develop self-reliant human resources that are keen



Policy on Utilizing Human Resources

Since its founding, employees have been the greatest asset of the TOK Group. The Company's human resource policy is based on the following five principles, derived from its long-held philosophy that human resources are a company asset.

- ▶ Never forget that business always starts with "people."
- ▶ Any discrimination within the Company and among employees is strictly prohibited.
- ▶ Ensure full compliance with applicable laws and regulations, as well as fair and equal compensation.
- ▶ Educate personnel and promote creativity to become a company that develops innovative technologies.
- ▶ Ensure personnel systems are based upon performance, emphasizing and ensuring transparency.

to actively take on risks. Under the "TOK Medium-Term Plan 2021," "enhancing personnel measures" is one of our most important management issues.

Risks and Opportunities

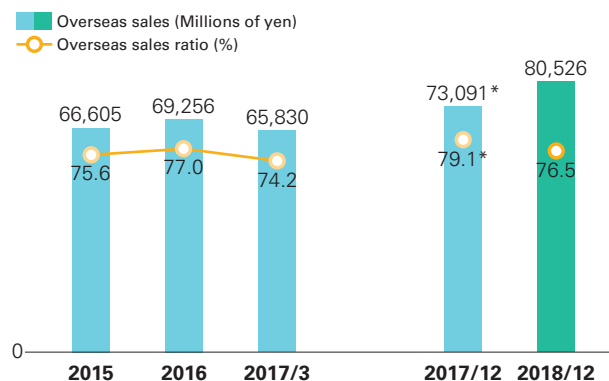
■ Expanding Tough Assignments for Domestic Human Resources an Issue

As overseas sales have expanded, overseas business has come to account for about 80% of consolidated net sales, with the remaining 20% from Japan, but the opposite is true for employees. Only 20% of consolidated employee numbers are overseas, and 80% are in Japan. We are well aware of the risk that opportunities for tough assignments for employees to hone their skills with domestic customers are on the decline in Japan.

■ Overseas Customer-oriented Sites Present Numerous Growth Opportunities for Human Resources

As sales have expanded overseas, R&D functions, production facilities, and human resources have also expanded at our customer-oriented sites in the U.S., South Korea, and Taiwan. These overseas customer-oriented sites have served well as venues and opportunities for tough assignments for employees dispatched from Japan to improve through close interactions with local customers, collaboration with non-Japanese employees and local suppliers, and learning more about environmental and safety laws and regulations at local governments. These tough overseas assignments have become a ladder for advancement to management positions at TOK. Additionally,

Overseas sales/overseas sales ratio



* Due to a change in fiscal year-end, the fiscal year ended December 31, 2017 was an irregular nine-month period in Japan, and 12 months overseas.

local non-Japanese employees have opportunities to grow and improve their knowledge of cutting-edge fields, by learning more about the Company's world-leading microprocessing technology and high purification technology.

Key Measures in the TOK Medium-Term Plan 2021

■ Expanding Detailed Measures for Inclusion of Employees from Diverse Backgrounds

In light of these risks and opportunities, under the "TOK Medium-Term Plan 2021," management has defined "strengthen human resources who can perform research, make decisions, and take actions on their own initiative" as one of its company-wide strategies. Through the Personnel System Reform Project launched in September 2018, TOK is promoting the hiring of diverse human resources and taking bold steps to reform the personnel system and expand its training systems. Through these and other measures, we have started to carry out initiatives to strengthen human resources so they can better pursue various business opportunities with customers and see them through to a successful conclusion.

With regard to hiring diverse human resources, we adhere to a policy of "Diversity and Inclusion*" with the aim of strengthening competitiveness by proactively and continuously seeking to hire foreign nationals, mid-career professionals, and women. We are especially focused on measures to promote "Inclusion." Specifically, for female employees we are offering more choices for work styles depending on their life stage while enhancing support for childrearing. For non-Japanese employees, we strive to be a welcoming environment for different cultures and languages, and offer support in terms of their work and private lives through periodic face-to-face meetings. For non-Japanese employees who mainly work at our sites in Japan, we offer financial assistance for taking the Japanese-Language Proficiency Test. TOK is ready to implement concrete measures during the current medium-term plan for promoting inclusion among employees with due consideration paid to their individual attributes and unique situations.

* Inclusion: Acknowledging and taking advantage of the skills and opinions of diverse human resources

■ Reforming Personnel Systems and Expanding Training Programs

As shown on the next page, TOK is augmenting its level-based training program as a part of reforms to its personnel system, and expanding its training programs. The Company is also keen

Graduate turnover within 3 years of joining the Company



Number of non-Japanese employees

	2015	2016	2017/3	2017/12	2018/12
Number of non-Japanese employees (non-consolidated)	5	6	11	11	11
Number of non-Japanese employees (consolidated)	259	301	312	323	378
Ratio of non-Japanese employees (consolidated, %)	16.8	19.2	19.5	20.0	22.6

Indices related to female employee participation*1

	2015	2016	2017/3	2017/12	2018/12
Ratio of women among new graduates (%)	45.0	40.0	45.8	29.2	43.3
Ratio of women among the overall employees (%)	10.2	10.6	11.4	11.7	12.3
Difference in average tenure figures for men and women (years)	7.7	8.0	8.7	8.9	9.2
Ratio of women in senior and middle management (%)	0.5	1.1	1.5	2.0	2.4
Ratio of women on the Board of Directors (%)	0.0	8.3	8.3	8.3	8.3 ²

*1 Non-consolidated basis (employees exclude those seconded from TOK to other companies and contract workers, and include people seconded from other companies to TOK)

*2 As of 2019

Number of users of childcare-related systems

	2015	2016	2017/3	2017/12	2018/12
Childcare leave system (number of users)	10	13	4	4	12
Shorter working hours (number of users)	10	4	2	2	6
Childcare time (number of users)	4	11	12	12	13

to reallocate personnel as a way of increasing opportunities afforded by tough assignments, based on the analysis that management training has been inadequate in the past, a recent issue in its personnel system. By implementing an allocation strategy across departments for the next generation of senior management candidates, division managers, and candidates for the next generation of department managers, TOK intends to improve their organizational management capability, ability to coordinate across organizations, ability to analyze problems, strategic capabilities for solving problems, and capacity for judgment. By giving employees tough assignments to gain first-hand experience, we aim to enhance their overall level of experience and responsiveness, and prepare employees for upper-level management positions. To raise awareness that training subordinates is one of the important missions of managers, we are also considering the introduction of a training regimen for mastering coaching skills.

Level-based Training Program

Program

■ New Employee Training Program

The objective of this year-long training program is to familiarize new employees with the Company's production and inspection processes for products, as well as teach them the basics about being a member of society and TOK's identity.

- Basic Education for Global Personnel
- New employee training, factory training, training after three months of joining, language instruction at home, language camps

■ Training Program for Senior Staff

Basic education is provided in order to facilitate work within each business site and with related departments, on topics such as logical thinking, logical communications, leadership, and accounting knowledge.

■ Training Program for Junior Managers

With the intention of training effective managers or executives, we provide instruction based on a repetitive learning process for consistent management and problem solving, on topics including communication methods for instructing and educating subordinates, understanding current conditions, clarifying and improving problems and issues, and devising measures and strategies to solve issues.

■ Training Program for Assistant Managers

With the objective of instilling the ability to solve problems, we provide settings for group learning, discussions with directors and report presentation events on topics including analyzing progress of the medium-term plan, identifying, defining and solving problems and issues, and creating strategies for solving problems. Assistant managers receive training on the fundamentals to become department managers and executives through learning the necessary management philosophy, as well as theory on problem analysis and solving strategies to lead organizations in perpetuity while staying one step ahead of the times.

■ TOK Global Practical Training for Selected Members and Training for Locally Hired Non-Japanese Employees

TOK continues to concentrate on TOK Global Practical Training for Selected Members, which was introduced in 2014 as a measure to train employees before reassignment or being given tough assignments. The Company needs human resources with attributes including flexibility, speed, toughness, communication skills, and foreign language ability. Related courses are shown below.

As a new measure, the Company is advancing the TOK Group Core Human Resource Training Program, which is also geared toward locally hired non-Japanese employees at overseas subsidiaries, for the purpose of training talented human resources who will become key leaders of the Group in the future to continue increasing the corporate value of the Group over the long run. This program furthers an understanding of TOK's history, principles, and strategies for overseas subsidiaries, and opens up discussions about the future leaders and other topics. By experiencing collaboration in overseas business simulations, employees in the program build the coherent perspectives and values of the TOK Group on their own.

Ensuring the Health and Safety of Human Resources

■ Health & Productivity Management

We recognize that employee health is essential for sustainable value creation, and it is also a prerequisite to raising the happiness of Group employees. Since 2015, TOK has implemented Data Health Plans in collaboration with the Tokyo Ohka Kogyo Health Insurance Society, which use a PDCA cycle for preventing and discovering diseases while encouraging employees to take better care of their health. In 2017, we focused efforts on preventing illnesses from becoming worse through the early detection and treatment of diseases, including offering to pay the full cost of influenza vaccinations for employees.

In 2018, the Company launched My Health WEB as a new portal for health-related information, and began offering convenient information for improving knowledge and awareness about health. We also made an effort to improve employee awareness of presymptomatic medicine (to lead healthier lives), such as by holding the walking festival via My Health WEB. As a result of these ongoing initiatives, in February 2019, TOK

TOK Global Practical Training for Selected Members Content

Theme	Content
Kick-Off Seminar	Participants learn the fundamentals of different cultures and English communication and methods for accurately expressing the points they wish to convey.
Win-Win Communication	Participants learn how to identify points of commonality and difference with a person having a different opinion, as well as how to negotiate and craft solutions.
Overseas Training	Participants directly experience a different culture and find ways to "break out of their own shells" to quickly solve problems under a given set of difficult circumstances.
Leadership	Participants define and imagine for themselves "ideal leadership" and create a plan of action to bridge the gap between the current reality and the ideal.
Mental Toughness	Participants become aware of their own level of growth through challenging exercises with people who are not Japanese. They come to understand their own abilities and strengths and to control motivation.

Increasing Employee Happiness Leads to Greater Satisfaction for All Stakeholders



At TOK, the graduate turnover rate within 3 years of joining the Company has been zero for a majority of years, and the percentage of annual paid leave taken is much higher than the average for the manufacturing industry. However, we are still not satisfied. U.S. companies have data that happier employees are more creative and efficient at work, while missing or quitting work less often. There is also research finding that corporate performance is proportional to employee happiness. With the idea of focusing on not only employee satisfaction, but also their happiness, we are committed to reforming our personnel systems to create a fair personnel evaluation system, while improving employee satisfaction with their work environments and benefits. Furthermore, we aim to increase the happiness of each and every employee so they can perform to the best of their abilities, which should lead to the sustainable enhancement of corporate value and greater satisfaction for all stakeholders.

Kazuhiko Nakayama *General Manager, Human Resources Div.*

was recognized for a second straight year in the 2019 Certified Health & Productivity Management Outstanding Organizations Recognition Program (White 500) by the Ministry of Economy, Trade and Industry and the Nippon Kenko Kaigi.

■ Labor Union Also Involved in Health Management and Empowering Female Employees

The Tokyo Ohka Kogyo Labor Union was formed in 1976 and has a union shop agreement with the Company. As of December 31, 2018, there were 1,021 labor union members affiliated with the Company, and 80.6% of all employees are members of the labor union. Since the labor union was first formed, labor and management have maintained good, cooperative relations. Once every two months, the central labor-management meeting takes place on the operating environment and other labor-management issues. As a part of this, we have concluded various labor agreements that include provisions on occupational safety and health for maintaining good labor and workplace conditions. When changes in working patterns are made for business purposes, they are always discussed in advance with the labor union.

Moreover, the labor union is involved in promoting health management and the empowerment of women in the workplace, while also planning and implementing recreational activities (sports, tourism, and theatergoing, etc.). The labor union also creates opportunities for female employees to receive training and network among themselves.

Respect for Human Rights

■ Basic Concept

The TOK Group has declared its respect for human rights and prohibits discrimination, and strives to understand and accept diverse values without regard to gender, age or nationality.

Based on this foundation, in line with one of our management principles, namely the creation of a frank and open-minded business culture, we are committed to developing a safe and sound working environment where each and every one of our employees can work in a motivated manner.

■ Respect for Human Rights

Respect for human rights is a fundamental basis for sustainable value creation through international business activities. The TOK Group respects the basic human rights of individuals, diverse values, personality and privacy based on the TOK Group Personnel Management Rules and TOK Group Compliance Standards of Conduct, and has pledged to never infringe on the human rights of officers and employees based on birth, nationality, race, ethnicity, belief or religion.

We conduct company-wide activities aimed at raising awareness of human rights, and have put in place systems such as collaboration with legal firms to respond to complaints and carry out improvements.

■ Prevention of Harassment

TOK has codified “Detailed rules concerning harassment” and set up contact points and clarified procedures for handling harassment incidents. To prevent or correct harassment, we also strive to raise awareness among all employees through harassment prevention training.

In recent years, the Company has taken more steps to prevent harassment by making rules for preventing maternity harassment and paternity harassment, as well as by clarifying contact points and procedures for handling harassment incidents.

Message from the CFO

By strengthening balance sheet management, TOK is fortifying its financial position to sustain value creation in a frank and open-minded culture, while focusing efforts on dialogue with stakeholders.



Yoichi Shibamura *Senior Executive Officer, Department Manager, Accounting and Finance Dept.*

Toward Enhancement of Corporate Value

■ Management Principles and Our Social Value

Since its establishment in 1940 as a fine chemicals manufacturer that develops and supplies high-purity chemicals, TOK has diversified into a broad range of fields, starting from functional materials for black and white TVs to high-performance printing materials, panel materials, and semiconductor microprocessing materials. TOK has seen great success from its long-running endeavor of contributing to society by developing quality products with outstanding technologies (not bulk chemicals) and encouraging thorough debate to this end among employees without regard to their rank or position.

For nearly 80 years, our four management principles have been passed down without changing, i.e., “Continue efforts to enhance our technology,” “Raise the quality levels of our products,” “Contribute to society,” and “Create a frank and open-minded business culture.” These management principles are evident in every aspect of development, manufacturing, and marketing. I believe TOK is a unique company among manufacturers above a certain size around the world, a “permanent venture company” with a culture of having a great time together developing technologies in a frank and open-minded environment in its DNA since its founding. Leveraging this DNA as much as possible, TOK is keen to further improve its social value by meeting expectations with chemicals to help solve climate change and issues in the era of 5G and IoT.

Management Principles

Continue efforts to enhance our technology

Raise the quality levels of our products

Contribute to society

Create a frank and open-minded business culture



Shigemasa Mukai
TOK founder

■ Focusing on Dialogue with Stakeholders while Ensuring a Financial Position that Facilitates Frank and Open-Minded Development

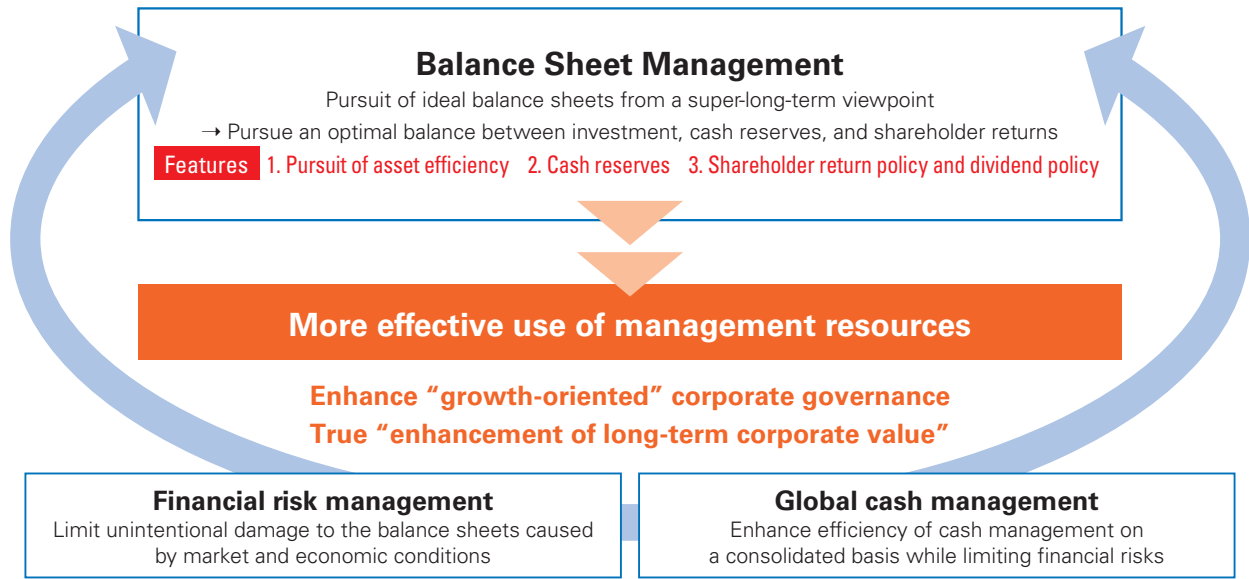
As the officer in charge of finance, I am concentrating my energies on ensuring the Company has a robust financial position that facilitates frank and open-minded development, while elevating our willingness to take on challenges and our venture spirit, with our DNA, as exemplified in our management principles, a driving force behind long-term sustainable growth and a source of social value. While taking the longer view instead of focusing on the short term, we are careful to base our analysis and decisions on an objective and cool-headed viewpoint when assessing investment returns and efficiency.

In my dialogue with shareholders, investors and other stakeholders, I make a concerted effort to convey TOK’s unique traits and strengths as a long-run R&D-driven company and as a company that always strives to be a global niche top company. As we embed various messages in our financial capital strategy, I intend to continue dialogue with stakeholders so they become long-run supporters.

■ Taking a “Growth-Oriented” Approach to Corporate Governance

I focus on “growth-oriented” corporate governance as the CFO in ESG initiatives for sustainable enhancement in corporate value. During the “TOK Medium-Term Plan 2021,” I believe my primary mission is to strengthen the balance sheet management that began during the previous medium-term plan, simultaneously managing financial risks on a worldwide basis while managing cash on a global basis. We are in position to bring about true “enhancement of long-term corporate value” with due consideration paid to our stakeholders, including shareholders, investors, customers, employees, and local communities.

“The trinity” of balance sheet management, financial risk management, and global cash management



Financial Capital Strategy in the Medium-Term Plan

■ Review of the “TOK Medium-Term Plan 2018”

TOK saw two major successes with its financial strategies during the “TOK Medium-Term Plan 2018.”

The first success was changing the end of the fiscal year to December, starting in fiscal 2017. Previously, the TOK Group ended its fiscal year in March, presenting in its consolidated results at the domestic companies including the parent company ending their fiscal years on March 31, and overseas subsidiaries ending their fiscal years on December 31 (with a three-month delay). However, with the overseas sales ratio up to nearly 80%, and in light of the globalization of business and international division of operations over the past few years, management decided to unify the end of the fiscal year to December for both domestic and overseas companies in 2017 to improve transparency in the disclosure of results. This has enhanced our accountability to investors, while also accelerating and fine-tuning consolidated management.

The second success was plotting a path forward for strengthening balance sheet management. Details about this measure were disclosed at the same time as the “TOK Medium-Term Plan 2021.” From the initial stages of the previous medium-term plan, however, TOK has been advancing measures with an eye on the balance sheets and a strong awareness of the capital cost. Specifically, the Company implemented a ¥10 billion share buyback in 2017. Then in the following year, the Company essentially swapped equity for debt as a result of long-term debt financing to raise ¥10 billion for capital investments, taking a major step forward in strengthening balance sheet management.

Over the three years of the previous medium-term plan, TOK stepped up efforts to return value to shareholders, which exceeded the total amount of free cash flow during this period when including share buybacks. Our financial capital strategy in the “TOK Medium-Term Plan 2021” serves as a clarification of management’s stance on strengthening shareholder returns while focusing more on the balance sheets.

■ Background to Major Shift in the Financial Capital Strategy

There are two factors behind our major shift in the financial capital strategy in the “TOK Medium-Term Plan 2021.”

The first factor entails a major turning point for the TOK Group approaching in the business environment. As various innovations are likely to emerge in the electronics industry, its main domain, from the advent of 5G and IoT, TOK is continuing to make swift and bold investments as a “permanent venture company” with the intention of sustaining growth toward its vision of a “100-year company” in 2040. Maintaining distinctive growth over the long run will hinge on our decision that a new financial capital strategy based on balance sheet management with a long-term viewpoint is necessary.

The second factor is major changes on Japan’s capital market, as demonstrated by the creation of two new codes*. Viewing these major trends as an opportunity to change itself, TOK reassessed how it will genuinely work for investors and other stakeholders with a strong awareness of the capital cost. Amid these major changes, management came to better understand the importance of having a new financial capital strategy based on balance sheet management from the standpoint of how to better serve its long-run investors that have been supporting and encouraging TOK, a long-run R&D-driven company.

* The two new codes are Japan’s Stewardship Code in 2014 and the Corporate Governance Code in 2015.

Policies on cash reserves

As a long-run R&D-driven company, TOK will calculate **cash reserves from the standpoint of securing the necessary funds.**

- Develop technologies in anticipation of a super-long time frame
- Continuously tackle challenges over a super-long time frame
- Respond rapidly when the unexpected happens (restoration, rebuilding, etc. from major disasters)

$$\text{Cash reserves} = \text{Working capital} + \text{Investment reserves} + \text{Risk reserves}$$

Financial Capital Strategy in the TOK Medium-Term Plan 2021

In 2019, TOK announced and started its new financial capital strategy, and its intention of pursuing an optimal balance between investments, cash reserves, and shareholder returns. Management is delighted that these new policies have been positively received by our shareholders and investors. We made a significant pivot in strategy with a target of 3.5% for DOE, and many of our shareholders and investors have agreed with this new policy.

However, the reason for this approach to balance sheet management stems from TOK's belief that business growth over the long run is its overriding imperative. Considering the competitive landscape and the Company's position within it lately, management believes a fair amount of cash reserves are necessary for the future. In this regard, I believe we must continue dialogue to clearly explain our policy on cash reserves to shareholders and investors.

As explained earlier, TOK's approach to cash reserves considers that all of our business rivals in cutting-edge fields are multifaceted divisions of large-scale companies. Although we are confident that our technological development capabilities and ability to collaborate closely with customers as a B-to-B

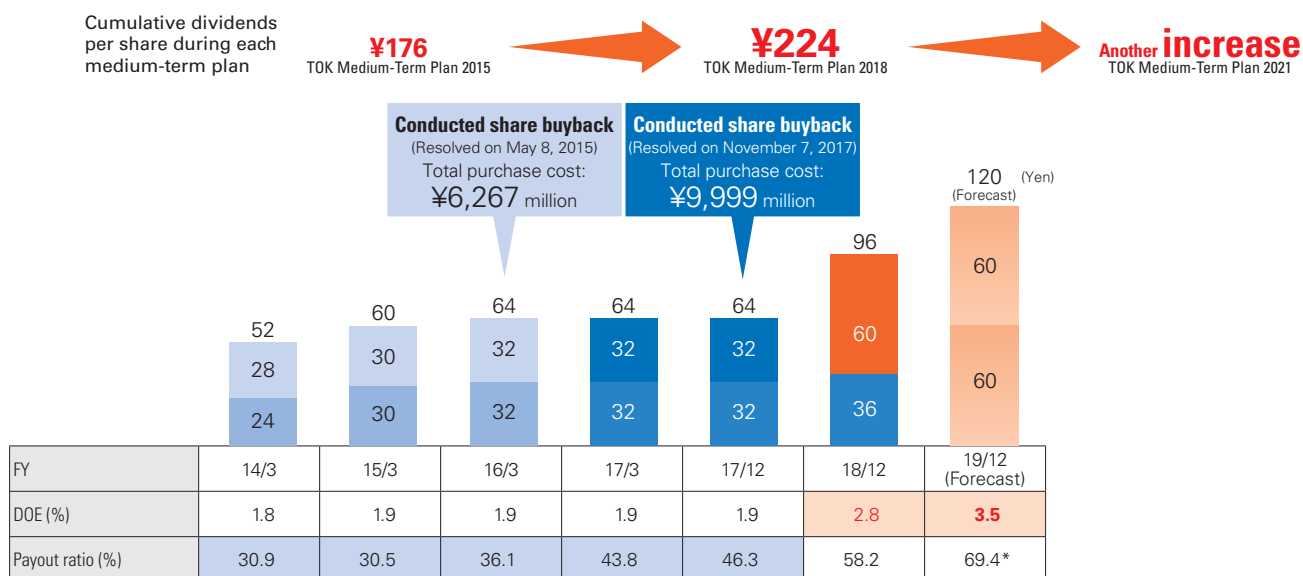
company are better than rivals, we must have a relatively large amount of cash reserves to ensure TOK has the capacity to invest on a par with rivals and keep pace with the competition in terms of development and investments. Management pays due consideration to investment and asset efficiency by gauging and pursuing asset efficiency with ROIC and IRR indicators, and by focusing more efforts on periodic reviews of reasons for cross shareholdings.

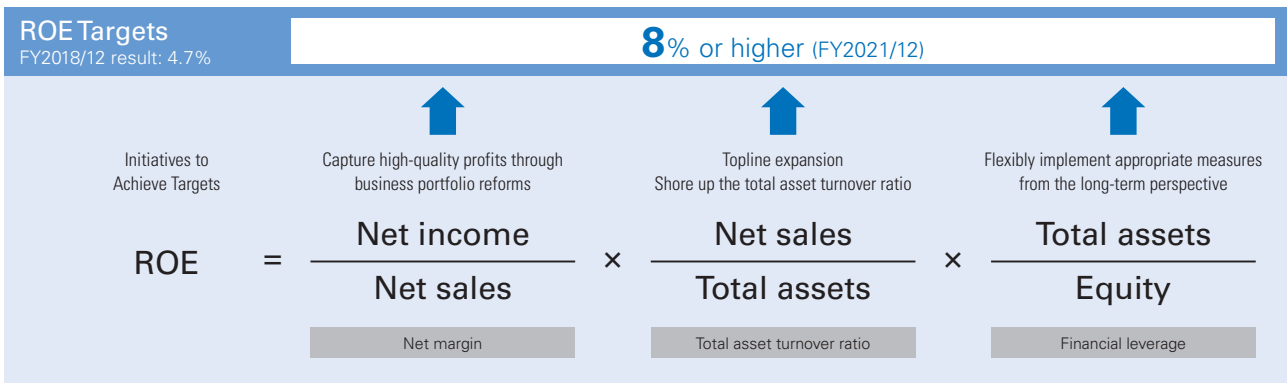
Improving ROE

The Company targets an ROE of 8% or higher by the fiscal year ending December 31, 2021 in the "TOK Medium-Term Plan 2021." To achieve this target, management aims to increase the net margin by generating high-quality profits through a reform of its business portfolio.

For now, the Company will carry on with structural reforms while expanding investment. The three years of the "TOK Medium-Term Plan 2021" are positioned as an interim period for reaping benefits from past initiatives to advance and add higher value to products in the photoresists for semiconductor front-end processes and high-purity chemicals field. TOK aims to increase the net margin to around 10% by the fiscal year

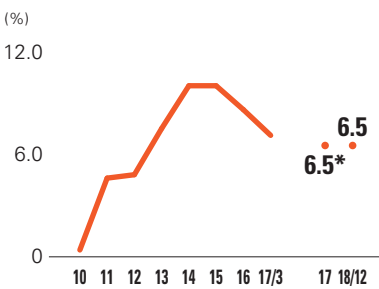
Shareholder returns and dividends per share



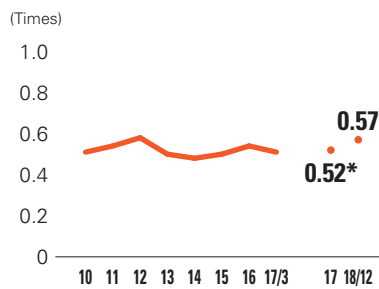


10-year trends of ROE-related indicators and ROE

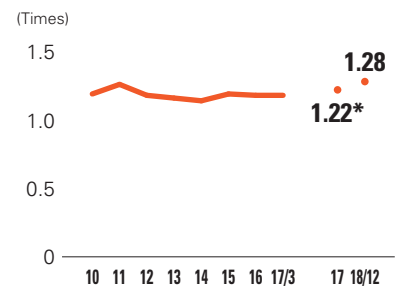
Net margin



Total asset turnover ratio



Financial leverage



* The fiscal year ended December 31, 2017 was an irregular nine-month period due to a change in fiscal year-end.

ending December 31, 2021 if earnings stay within its best-case scenario target range. The Company projects the total asset turnover ratio will improve to 0.7 times in its aim to strengthen and instill balance sheet management. As a result of swapping equity for debt during the previous medium-term plan, financial leverage was 1.28 times (equity ratio of 78.0%), and we believe this level can be maintained or increased to a certain degree. With this as a possible scenario, the Company aims to achieve an ROE of 8% or higher by responding in a proper and timely manner to changes in the business environment, investment conditions, and financial situation. Our policy of targeting a DOE of 3.5% is also a moderate measure for the denominator towards ROE growth, and we are also taking flexible measures toward share buybacks and from the standpoint of measure for the denominator.

■ Evolving Global Cash Management

As a part of balance sheet management, TOK is concentrating on evolving global cash management. Overseas operations have expanded thanks to deepening our strategy of building close relationships with customers, and the international division of operations has accelerated between Japan and overseas subsidiaries, and among overseas subsidiaries. Consequently, the flow of money within the Group has become more diverse and complicated on a worldwide basis, necessitating a more thorough approach to cash management to effectively deploy capital throughout the Group.

Of the surplus funds at overseas subsidiaries, the portion excluding cash reserves for investments and necessary working capital is in principle concentrated at the parent company, while a parent-subsidiary finance scheme is also being created

for unexpected situations. We are working to quickly create this scheme because it will also serve as a means of controlling financial risks related to fluctuations in foreign exchange rates and liquidity, in addition to being an effective way to strengthen balance sheet management on a consolidated basis.

■ Strengthening Tax Governance on a Worldwide Basis

In addition to focusing on global cash management, TOK is strengthening tax governance on a worldwide basis. We are creating an appropriate tax governance system with the parent company as a control tower that gathers know-how about taxation on a consolidated basis and for each entity, with the intention of addressing issues in international taxation including problems associated with transfer price taxation and strengthening base erosion and profit shifting (BEPS) measures in advanced countries. As its first step, the TOK Group is researching taxation and tax customs in all regions where it conducts business, while also assessing conditions in product markets, to formulate a transfer price policy. At the same time, TOK aims to improve collaboration among sites with the parent company as a control tower, and qualitatively improve its tax governance systems at domestic and overseas sites.

Review of Operations

Material Business

Manufacturing and sales of electronic functional materials and high-purity chemicals



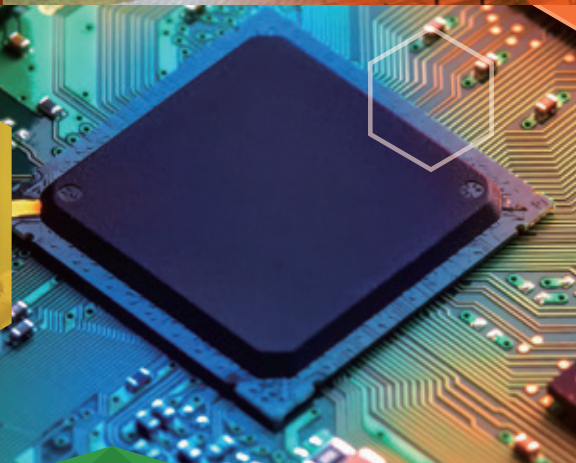
Keiichi Yamada

Director, Officer, Department Manager,
Marketing Dept.



TOKTAIWAN CO., LTD.

TOK Advanced Materials Co., Ltd.



Quality policy

Aim to be a globally trusted corporate group by inspiring customers with high value-added products that have satisfying features, low cost and superior quality. Deepen and expand existing business domains and swiftly launch new business domains.

Each one of us clearly understand current situation and challenge ourselves with a sense of crisis.

1. Strengthen marketing ability, be motivated by a strong sense of crisis, prepare well, and take immediate action.
2. Promote human resource development for global operation.
3. System to capture customer's voice accurately and to respond them immediately.

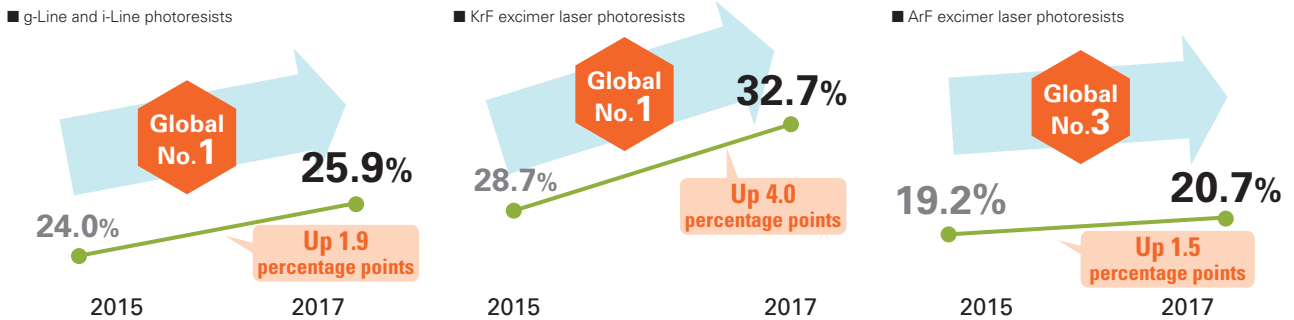
Material Business Performance

(Millions of yen)

	FY2017/3	YoY*	FY2017/12 Result*	FY2017/12 Calendar year adjustment*	FY2018/12 Result		
					Change	%	
Net sales	86,558	78,842	90,532	98,250	102,626	+4,376	+4.5
Electronic functional materials	53,074	47,318	51,230	56,947	58,793	+1,845	+3.2
High-purity chemicals	33,475	31,026	38,676	41,165	43,733	+2,567	+6.2
Other	9	496	623	134	95	(39)	(29.3%)
Segment income	14,470	12,448	12,816	14,868	15,075	+207	+1.4
Segment income margin	16.7%	15.8%	14.2%	15.1%	14.7%	—	—
Segment assets	97,542	—	106,220	—	104,903	—	—
Depreciation	5,831	—	5,833	—	6,769	—	—
R&D costs	7,513	—	6,371	—	7,856	—	—

* Due to the change in fiscal year-end, adjusted results for the fiscal years ended December 2016 and December 2017 are presented as adjusted figures for nine months' (April–December 2016) earnings of companies that ended their fiscal years in March 2017 (the Company and its domestic consolidated subsidiaries). Revised results for the fiscal year ended December 2017 are presented as adjusted figures for 12 months' (January–December 2017) earnings of companies that end their fiscal years in March (the Company and its domestic consolidated subsidiaries).

Global market share for semiconductor photoresists (sales volume basis in 2015 and 2017)



Source: Fuji Keizai's "Overview of Photo-Functional Material and Product Market 2016" and "Whole View of Photo-Functional Material and Product Market 2018"

Review of the "TOK Medium-Term Plan 2018" Short of targets for ArF excimer laser photoresists despite advantages in cutting-edge fields

During the "TOK Medium-Term Plan 2018" (fiscal year ended March 31, 2017 to fiscal year ended December 31, 2018), as the global semiconductor industry expanded strongly, TOK further deepened its strategy of building close relationships with customers that began in earnest under the "TOK Medium-Term Plan 2015," and moved on reforms to its business portfolio with a focus on creating high added value as an R&D-driven company.

More specifically, in ArF excimer laser photoresists, TOK tapped into demand for 10nm-level semiconductors and acquired its adoption on processes less than 10nm. In KrF excimer laser photoresists, the Company focused efforts on expanding adoption of thick-film photoresists for 3D-NAND. In high-density integration materials, the Company worked on the development of materials for cutting-edge package processes and MEMS, such as for fan-out wafer level packages. In high-purity chemicals, TOK endeavored to introduce new clean solutions. Furthermore, TOK concentrated on the development of applications for its products in IoT sensors, electronic components, and power devices.

As a result, sales of KrF excimer laser photoresists expanded for 3D-NAND, implants and IoT sensor applications. In high-density integration materials, thick-film photoresists also expanded strongly for fan-out wafer-level packages in high value-added smartphones. In high-purity chemicals, the Company won large contracts for supplying high value-added thinner and clean solutions for 10nm-level processes. Moreover, a major customer decided to use the EUV photoresists the Company has been developing as a new application for

7nm semiconductors. TOK scored major successes in the cutting-edge fields of miniaturization.

In ArF excimer laser photoresists, TOK concentrated on strengthening development and investing in facilities to regain market share, but fell short of targets due to insufficient customer adoption in Asia and delayed production plans at customers in North America and Asia.

Key Measures of the First Year of the "TOK Medium-Term Plan 2021"

Opportunities to work on new development themes in a retreating market

The semiconductor market grew to \$468.7 billion in 2018, the largest it has ever been, but signs of a slowdown have strengthened in 2019 due in part to weakness in memory. According to World Semiconductor Trade Statistics (WSTS) announced in June 2019, the semiconductor market is projected to shrink by 12.1% in 2019, compared with the previous year.

The "TOK Medium-Term Plan 2021" was started in a retreating market, but the semiconductor industry is forecast to continue growing over the medium to long term on demand related to 5G and IoT. When market growth slows, our customers tend to pivot toward the development of the next generation of devices. It is therefore an opportune time for TOK to strengthen marketing based on "the trinity" of sales, development, and manufacturing, and focus all its energies on new development themes with an eye on the medium to long term.

TOK's Human Resource



Hee-sung, Lim

Manufacturing Team,
TOK Advanced Materials Co., Ltd.

Creating Advantages by Combining the Two Cultures of South Korea and Japan

At TOK Advanced Materials, our customer-oriented site in South Korea, we have worked hard to earn the trust of our customers and provide them with high levels of satisfaction through high-quality TOK products. Robust communication among the Korean and Japanese employees is vital to achieve this. In South Korea, we have a culture based on speed and willingness to take on challenges, and our customers prefer quick feedback and proactive

responsiveness to their needs. The semiconductor market is expected to continue growing on heavy investments as advances are made in 5G and IoT. By blending the artisan spirit of Japanese employees and willingness to take on challenges of South Korean employees, we will further refine our photoresists and build advantages by creating a solid production system for EUV photoresists used in cutting-edge semiconductors.

SWOT Analysis — Material Business —

- Global structure of close relationships with customers (Japan, the U.S., South Korea, Taiwan)
- Earnings drivers in both the pre-process and post-process of semiconductor manufacturing
- Development capability in cutting-edge materials (miniaturization, high-density integration, 3D packaging)
- Proposal ability for semiconductor manufacturing processes (synergies with Equipment Business)

Strengths

S

Weaknesses

W

- Fewer customers, with the same number of photoresist manufacturers
- Over-concentration of business domains in the electronics industry (delay in new business development)
- Resistance to price hikes based on industry business practices

O

Opportunities

- Increasing needs for ultra-miniaturization (ArF and EUV photoresists)
- Growing needs for cutting-edge packaging technologies (2.5D, 3D semiconductor packaging)
- Volume of data growing due to AI and IoT
- New semiconductor needs from launch of 5G communications systems

T

Threats

- Rising cost of development due to increasing technological difficulties
- Deterioration in market environment with U.S.-China trade friction and tensions between Japan and South Korea
- Increased investment outlays for inspection and production equipment in connection with ultrahigh purification
- Higher costs of next-generation exposure equipment

In EUV photoresists, an end has come into sight for its development on the 7nm process, so we are shifting development resources to the 5nm and 3nm processes. TOK is working to have its ArF excimer laser photoresists adopted in newly emerging opportunities through miniaturization by 1nm. KrF excimer laser photoresists are almost finished for 96-layer 3D-NAND, so we are turning our attention to the development of these photoresists for 128-layer 3D-NAND. We are also advancing the development of high-heat-resistant photoresists for next-generation power semiconductors (see page 47) and chemically amplified i-Line photoresists for 5G applications.

Creation of new value using a super clean room

At our new R&D Building (Sagami Operation Center) being completed in September 2019, we will concentrate on open innovation in existing businesses, such as photoresists and high-purity chemicals for cutting-edge semiconductor processes, in addition to open innovation in new business development. This new R&D Building features the latest equipment for addressing various technological needs, seeds, ideas, and concepts, as well as security to protect confidential secrets between TOK and its development partners. The new building also functions as a value creation site where people form long-term relationships and external stakeholders can better understand the exciting technologies of the TOK Group.

The new R&D Building has a super clean room with world-leading levels of cleanliness to handle hazardous

substances. We expect this super clean room to contribute greatly to the development of materials for next-generation miniaturization products, such as EUV photoresists for 5nm and 3nm semiconductors. Having successfully developed materials for the 7nm process recently, we are seeing new benefits emerge, such as knock-on effects in the development of materials for the 5nm process. TOK will continue to concentrate resources on development in cutting-edge fields of miniaturization.

Addressing new customer needs for cleanliness

In the development of materials for cutting-edge semiconductor processes, needs for higher levels of cleanliness have begun to increase for eliminating contaminants* to extreme levels, in addition to higher levels of purity that reduce impurities as much as possible.

For example, introducing this concept of cleanliness is one reason why TOK was able to successfully develop clean solutions that were adopted by a major customer producing 10nm-level semiconductors. The super clean room in the new R&D Building will take these initiatives to the next level, advancing the creation of new value in clean materials with contaminants reduced to the lowest possible level.

* Contaminants are substances that are theoretically unnecessary in chemical reactions.



New C-1 Building (under construction) at the Sagami Operation Center will have a super clean room



New B-6 Building at the Sagami Operation Center for open innovation

Initiatives in light-controlling technologies

TOK and its customers in the semiconductor and electronic components industries are making every effort to advance semiconductors and various devices in terms of miniaturization, higher purity, higher density, and better yields. Recently, needs have begun to increase for new technologies to control light. Below, we introduce TOK's initiatives in light-controlling technologies.

Light-Controlling Technologies to Become a New Core Competency

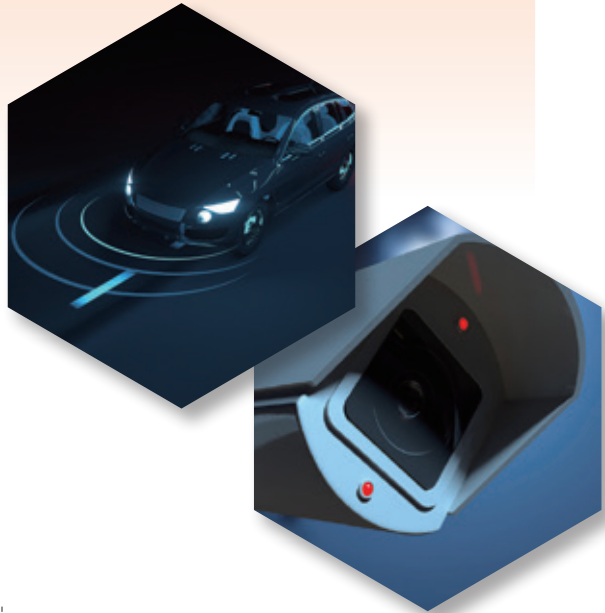
In the era of 5G and IoT, large volumes of optical sensors are likely to be incorporated into various devices, such as imaging devices for autonomous vehicles or security cameras. Current optical sensors convert light into electric signals at an efficiency that depends greatly on the strength of the incoming light. By controlling the refractive index of light, this conversion efficiency can be improved, creating new value.

In the era of 5G and IoT, needs are likely to increase for optical sensors effective in weak light situations, such as autonomous vehicles and security monitoring at night. TOK will contribute to the advancement of light-controlling technologies through the development of materials that can flexibly control the refractive index.

Inorganic Materials Key to Breakthroughs

Light-controlling technologies are very similar to the microprocessing technologies that TOK has accumulated over many years in the photolithography field, and the Company's accumulated know-how in high purity and yield improvement can be utilized in the process of turning these materials into products.

As materials that control the refractive index of light, TOK provides its customers with photoresists for IoT sensors and panel manufacturing. These photoresists are mainly composed of organic materials. Since organic materials alone are insufficient to attain exceptional features, in April 2018, TOK invested about ¥220 million



in Pixelligent Technologies, LLC in the U.S., a company that excels at developing inorganic materials with high refractive indexes. The two companies then commenced open innovation. TOK is assisting with R&D at Pixelligent Technologies, one of the world's leading manufacturers with the technology to mass produce zirconium oxide capped nanoparticles, a high refractive index inorganic material, with sub-10nm diameters. By combining the two companies' strengths, we aim to help solve various issues in a 5G and IoT society by scaling up production of inorganic materials with high refractive indexes and developing high refractive index material markets.

Outline of Pixelligent Technologies, LLC

- ◆ Location: Maryland, U.S.
- ◆ Representative: Craig Bandes
- ◆ Business description: Development, manufacturing, and sales of optical materials
- ◆ Established: 1999
- ◆ URL: <http://www.pixelligent.com/>



Beneficial for Lower Power Consumption

One more reason why TOK is focusing on the development of materials for light-controlling technologies is because high refractive index materials improve light extraction efficiency, in addition to improving the performance of various optical devices. This also brings

benefits in the form of lower power consumption. The Company also aims to help solve the problem of climate change by adding to its lineup of environmentally friendly products, including i-Line photoresists for power semiconductors and power device manufacturing equipment.

Review of Operations

Equipment Business

Manufacturing, sales and maintenance of semiconductor manufacturing equipment and panel manufacturing equipment

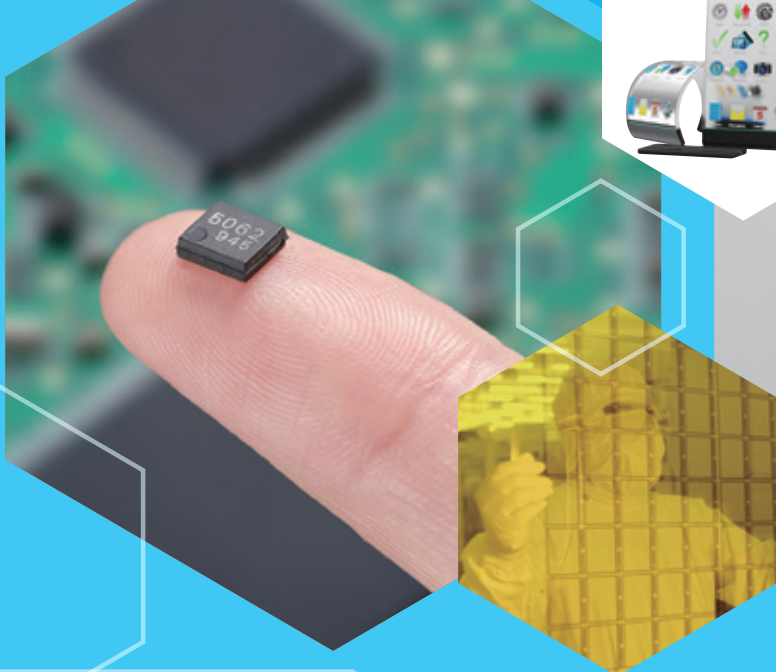


Tsukasa Honkawa

Officer, Department Manager,
Process Equipment Manufacturing Dept.



Shonan Operation Center



Equipment Business Performance

(Millions of yen)

	FY2017/3	YoY*	FY2017/12 Result*	FY2017/12 Calendar year adjustment*	FY2018/12 Result		
						Change	%
Net sales	2,252	1,943	1,921	2,237	2,697	+459	+20.5%
Segment income (loss)	(750)	(333)	(664)	(1,073)	(883)	+189	—
Segment income margin	—	—	—	—	—	—	—
Segment assets	3,296	—	3,026	—	4,245	—	—
Depreciation	45	—	24	—	63	—	—
R&D costs	546	—	423	—	497	—	—

* Due to the change in fiscal year-end, adjusted results for the fiscal years ended December 2016 and December 2017 are presented as adjusted figures for nine months' (April–December 2016) earnings of companies that ended their fiscal years in March 2017 (the Company and its domestic consolidated subsidiaries). Revised results for the fiscal year ended December 2017 are presented as adjusted figures for 12 months' (January–December 2017) earnings of companies that end their fiscal years in March (the Company and its domestic consolidated subsidiaries).

In the semiconductor manufacturing equipment and display manufacturing equipment fields, TOK's business specializes in niche domains

Zero Newton bonding machine

An integrated machine able to bond carrier plates and silicon wafers with high precision



TIPS series UV curing machine

Orders came in for a new model that provides excellent film qualities with a more efficient process



Review of the "TOK Medium-Term Plan 2018"

Foothold gained in new fields, but many issues remain

In the Equipment Business, under the "TOK Medium-Term Plan 2018" (fiscal year ended March 31, 2017 to fiscal year ended December 31, 2018), the Company has concentrated management resources on three fields: the through-silicon-via (TSV) equipment field, a multilayering technology that layers semiconductor wafers in 3D, using a through-silicon process to pass between the layers; the UV curing machine field for OLED display manufacturing; and the next-generation display manufacturing equipment field.

In the TSV equipment field, TOK has advanced the introduction of TSV technologies by approaching foundries and OSAT manufacturers, and working on the development of applications for fan-out wafer level packages (FOWLP) and fan-out panel level packages (FOPLP). In the UV curing machine field, the Company has worked on approaching new applications and new lines. In the next-generation display manufacturing equipment field, the Company approached prototype development lines for flexible displays. Furthermore, TOK focused efforts on increasing sales of components and materials, as well as after-sales services like repair and remodeling, in these three fields.

As a result, in the TSV equipment field, TOK made some progress toward getting OSAT manufacturers to adopt its products as its efforts to "maintain and create consistently competitive businesses (technologies)" had an impact. In FOPLP, TOK's coating machines have secured a position on the world's first mass production lines.

In the UV curing machine field, the Company won orders for a new model in the TIPS series that provides excellent film qualities with a more efficient process while balancing detachability with performance improvements in heat resistance and dry etching resistance.

In the next-generation display manufacturing equipment field, however, delays were encountered in the development of mass production versions of flexible display manufacturing equipment, leading to the restructuring of the development structure. In the other two fields as well, target markets did not expand to an extent where the Company's technological advantages could be fully applied.

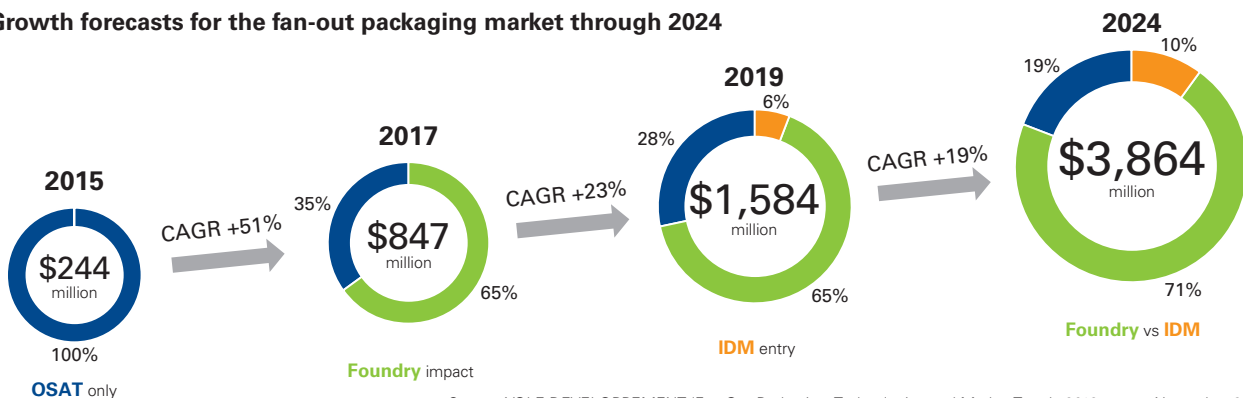
Issues that need to be addressed going forward include strengthening the supply chain to prepare for growth in sales, and slow progress establishing high-margin businesses, such as components.

Key Measures of the First Year of the "TOK Medium-Term Plan 2021"

Translate success in previous medium-term plan into steady order growth

As mentioned earlier, there are signs of slower-than-anticipated expansion in markets targeted by this segment, such as the semiconductor 3D packaging market, the FOPLP market, and the flexible display market. However, growth potential is strengthening in all of these markets. During the "TOK Medium-Term Plan 2021," the Company will develop business centered on its Materials & Equipment (M&E) strategy that entails proposing "processes" for equipment to draw out the unique characteristics of materials based on its deep understanding of materials.

Growth forecasts for the fan-out packaging market through 2024



Source: YOLE DEVELOPPEMENT 'Fan-Out Packaging: Technologies and Market Trends 2019 report, November 2018'

SWOT Analysis — Equipment Business —

- Track record in TSV equipment adoption, resulting advantage in technology and technological improvement
- Provides high-performance equipment for coating and stripping
- Knowledge of materials developed in the Material Business
- Lower break-even point using the fabless production method

Strengths

S

Weaknesses

W

- Still in the development phase, so business scale and profit contribution remain small (insufficient cash cycle)
- Large impact on profits from investments in development of prototypes, etc.

- Growth in 3D packaging market from diversification of high integration technology
- Expansion of next-generation display market
- Equal opportunities for products to be adopted in a new market

Opportunities

O

T

Threats

- Full-scale entry by major companies as competitors catch up
- Deterioration in market environment with U.S.-China trade friction and tensions between Japan and South Korea
- Introduction of high integration processes aside from 3D packaging

In the TSV equipment field, inquiries have increased from customers, especially in Asia, who are considering an entry into the back-end processing business of semiconductor manufacturing. With the number of requests to process samples including processing wafers using our equipment and to provide samples, on the rise, we are keen to lock in orders for our equipment.

In FOPLP equipment, TOK aims to solidify its position providing mass production equipment obtained through initiatives under the “TOK Medium-Term Plan 2018,” by concentrating efforts on further refining the completeness of equipment and preparing to ramp up production for when the market starts to expand. Under the M&E strategy, TOK aims for its photoresists to be used in panel level packaging, by leveraging its high market share in FOWLP packaging photoresists.

In flexible display production equipment, which had encountered development delays, TOK is rebuilding the development structure with a plan to commence sales in the first year of the “TOK Medium-Term Plan 2021.” This equipment is based on a single-wafer-type system (processes wafers one by one), not a batch-type system (processes multiple wafers collectively) that is currently the industry standard. Single-wafer-type systems make it easier to change process settings for each wafer, making it relatively simple to build processes for finishing coated layers at levels required by customers. In particular, the Company plans to finish this system with superior transparency in the films themselves, as needed by customers.

Taking steps to improve earnings

With the aim of improving earnings in this segment, we are taking the following steps to mitigate the high cost structure inherent in customizing each system as “one-of-a-kind” equipment.

First of all, the Company will redouble efforts to stabilize earnings though after-sales services, such as the provision of related materials, consumables and components, and equipment remodeling or overhauls. Although all of the equipment supplied by TOK are “one-of-a-kind” in principle, some fields of our equipment allow for economies of scale when multiple units are delivered in a single order. We are therefore focusing on expanding sales in such fields.

To accelerate development, TOK has reinforced development and design functions under the previous medium-term plan, and to increase development efficiency, the Company set up the Design Development Group as a new organization in 2018 to improve analysis and debugging in data simulations before prototypes are fabricated in a bid to reduce costs.

TOK's Human Resource



Hsiao-Wei Yeh

Bonding/Debonding Technology
Business Unit
TOK TAIWAN CO., LTD.

Aiming for Long-term Sustainable Growth with Excellent Solutions That Meet Customer Requirements

I sell equipment in Taiwan's semiconductor market, and the most important thing to me is providing excellent solutions that satisfy customer requirements. I believe this will lead to the sustainable growth of TOK over the long term. When a customer adopted Zero Newton for sensing devices, the Shonan Operation Center in Japan and TOK TAIWAN CO., LTD. worked closely together to solve any issues in

hardware and processes when customers launched plants. This has translated into good relationships of trust built over the long term between the customer and TOK. This has been an invaluable experience for me. In the future, I will aim for win-win outcomes by devoting myself to work with the intention of maintaining good cooperative relationship between the customer and the team at the Shonan Operation Center.