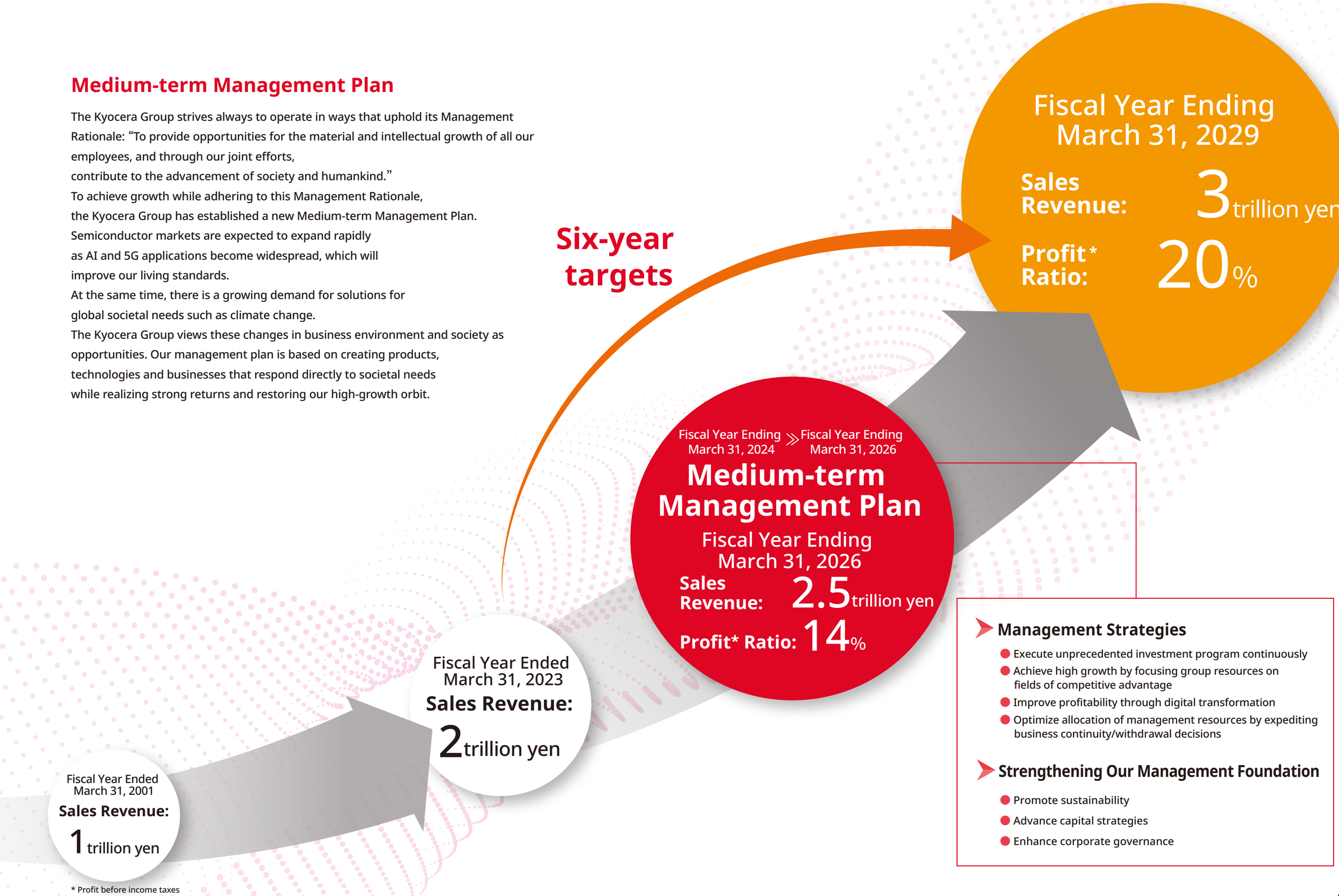
Medium-term Management Plan

The Kyocera Group strives always to operate in ways that uphold its Management Rationale: “To provide opportunities for the material and intellectual growth of all our employees, and through our joint efforts, contribute to the advancement of society and humankind.”
To achieve growth while adhering to this Management Rationale, the Kyocera Group has established a new Medium-term Management Plan.
Semiconductor markets are expected to expand rapidly as AI and 5G applications become widespread, which will improve our living standards.
At the same time, there is a growing demand for solutions for global societal needs such as climate change.
The Kyocera Group views these changes in business environment and society as opportunities. Our management plan is based on creating products, technologies and businesses that respond directly to societal needs while realizing strong returns and restoring our high-growth orbit.



Management Strategies

- Execute unprecedented investment program continuously
- Achieve high growth by focusing group resources on fields of competitive advantage
- Improve profitability through digital transformation
- Optimize allocation of management resources by expediting business continuity/withdrawal decisions

Strengthening Our Management Foundation

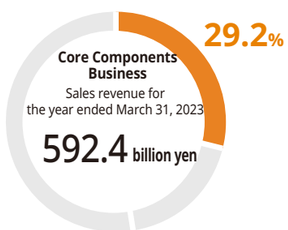
- Promote sustainability
- Advance capital strategies
- Enhance corporate governance

* Profit before income taxes

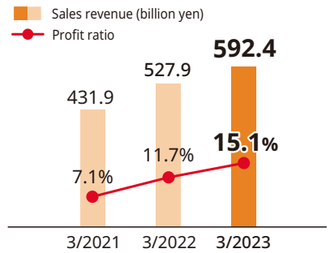
At a Glance

Core Components Business

Sales Composition Ratio



Sales Revenue/Profit Ratio



Financial Results for Year Ended March 31, 2023

Sales revenue for the year ended March 31, 2023 increased by 64.5 billion yen (12.2%) over the previous year, to 592.4 billion yen. Business profit increased by 27.9 billion yen (45.2%) over the previous year, to 89.5 billion yen; and, business profit ratio improved to 15.1%.
Sales revenue increased due mainly to rising sales of high-value-added products, such as organic packages and boards for information and communication infrastructure-related markets in the Semiconductor Components Unit, as well as fine ceramic components for semiconductor processing equipment in the Industrial & Automotive Components Unit. Business profit increased significantly due to increased sales, as well as the impact of the weaker yen.

Major Products and Services

Industrial & Automotive Components Unit


Semiconductor Processing Ceramic Components


Optical Units for Industrial and Medical Use


Glass Spherical Lenses

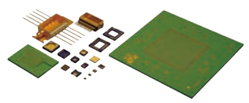

EV Relay Part

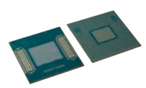

SOFC Cell Stacks


Automotive Camera Modules


Oxygen Sensor Heaters

Semiconductor Components Unit


Ceramic Packages


Organic Packages


Substrates for Millimeter Wave Radar

Others


Dental Implants

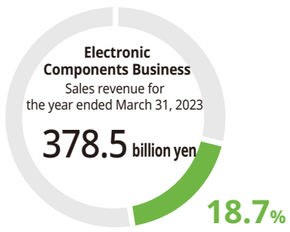

Orthopedic Implants


Jewelry

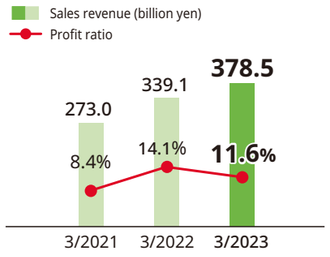

Ceramic Kitchen Tools

Electronic Components Business

Sales Composition Ratio



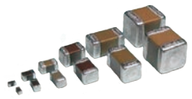
Sales Revenue/Profit Ratio



Financial Results for Year Ended March 31, 2023

Sales revenue for the year ended March 31, 2023 increased by 39.4 billion yen (11.6%) over the previous year, to 378.5 billion yen. However, business profit decreased by 3.8 billion yen (-8.0%), to 44.1 billion yen; and, business profit ratio declined to 11.6%.
Sales revenue increased due to growing demand for components such as ceramic capacitors, mainly for industrial and automotive-related markets, and due also to the weaker yen.
However, business profit decreased due to higher costs for various raw materials and inputs, weaker demand for smartphone components, and extraordinary charges including pension obligations in the Kyocera AVX Components Corporation Group.

Major Products and Services


Multilayer Ceramic Chip Capacitors


Tantalum / Polymer Capacitors


Super Capacitors


Antennas


Crystal Devices


SAW Devices

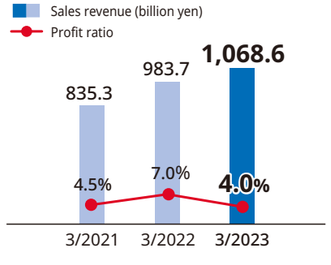

Power Devices


Connectors

Solutions Business

Sales Composition Ratio

Sales Revenue/Profit Ratio



Financial Results for Year Ended March 31, 2023

Sales revenue for the year ended March 31, 2023 increased by 84.9 billion yen (8.6%) over the previous year, to 1,068.6 billion yen. However, business profit decreased by 26.5 billion yen (-38.5%), to 42.2 billion yen; and, business profit ratio declined to 4.0%.
Sales revenue increased due to rising sales of major products as well as the impact of the weaker yen in the Document Solutions Unit and the Industrial Tools Unit. However, business profit decreased, due to a substantial decline in sales of mobile phones in the Communications Unit, as well as the recording of a one-time cost in connection with structural reforms, including inventory write-downs, and higher costs for raw materials, energy and logistics in each business.

Major Products and Services

Industrial Tools Unit


Cutting Tools


Pneumatic and Power Tools

Document Solutions Unit


MFPs


Printers


Commercial Inkjet Printers

Communications Unit


Communication Engineering


Smartphones


5G Devices

Others


Solar Cells


SOFC Systems


Clay-type Storage Batteries


Inkjet Printheads

HUDs

Core Components Business

Director,
Managing Executive Officer
Executive General Manager of
Core Components Business

Hiroshi Fure

We are investing aggressively in facilities to serve semiconductor-related markets, which have potential for high medium- to long-term growth, to expand production capacity and improve productivity.

Our Core Components segment comprises following businesses: fine ceramic components(our founding product line), automotive components, optical components, semiconductor-related components, medical equipment, and jewelry.

In semiconductor-related markets, which have strong growth potential, we are expanding capital investment to increase production capacity and productivity while addressing societal needs. In regard to the reinforcement of management infrastructure, we are increasing the speed of human resource cultivation and the optimization of business processes to address common segment-wide issues that have not been sufficiently responded to by individual divisions. We continue to cultivate a corporate climate that promotes future dreams and work positively to facilitate success and realize the management philosophy.

Vision

We realize the management rational by providing core products of sustainable society and creation of healthy and fulfilling life.

Priority Measures

1 Reinforcing Semiconductor-related Market Strategy

Anticipating high medium- to long-term growth in semiconductor-related markets, we are increasing production and investment aggressively in package substrates and fine ceramic components for semiconductor manufacturing equipment. We will increase both capacity and productivity, promoting the development of smart factories through reconstruct efforts at existing plants, expanding DX, and building new factories, as we prepare for future expansion of demand.

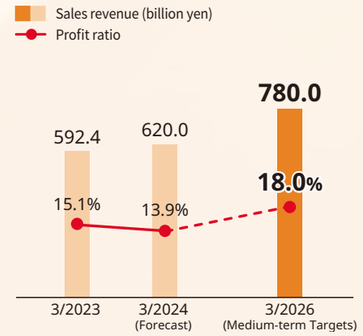
2 Enhancing Our Sustainable Business Structure

We will accelerate efforts to reduce energy consumption by modeling electricity demand at each facility, designing efficiency enhancements, and deploying them horizontally within each segment.

3 Human Resource Cultivation through Project Activities

We organize cross-departmental projects to resolve urgent priorities quickly, while emphasizing skills development and employee motivation. By linking these initiatives to human resource development, we can build a foundation for employee advancement and continued growth.

Business Targets



Market Environment and Demand

Within the semiconductor market, compound annual growth rates (CAGR) for logic chips and memory chips are estimated at 11% and 5%, respectively, with rising demand for cutting-edge products in the medium-to-long term. Regarding semiconductor manufacturing equipment, advancing technology is changing manufacturing models and processes, fueling demand for fab upgrades. Between 2022 and 2030, demand for exposure equipment is expected to double, while demand for etching and film formation equipment is expected to increase 2.5x. Demand for organic package substrates, currently in an adjustment phase, is expected to grow alongside network investment in the medium-to-long term. In these circumstances, our Core Components Unit will focus on large multilayer substrates for high-added-value applications, and will collaborate with strategic clients to promote business expansion.

Major Impact of the Medium-term Management Plan

Kyocera's Semiconductor Components Unit will expand sales to 490 billion yen, with increased production of organic package substrates for information and telecommunications applications. The Industrial & Automotive Components Unit will expand sales to 250 billion yen, with increased production of fine ceramic parts for cutting-edge semiconductor manufacturing equipment. In regard to investment, we will work closely with customers to finalize plans while confirming procurement and construction cycles to promote rapid completion of new plants and buildings. Three-year capital investment is planned to expand from 172.6 billion yen in the current three-year period to 400.0 billion yen, a 2.3x increase, in the next three years. Through the establishment of new buildings preparing for a long-term increase in demand, and conducting reconstruct of existing buildings, we are improving the productivity and expanding the production capacity of major projects. This capital investment is planned to achieve production capacity increases of 2.4x in semiconductor organic components; 1.8x in fine ceramic components; and 1.4x in semiconductor ceramic components. It represents the greatest capital investment campaign in the Kyocera Group's history, and will prepare us for expansion in the medium-to-long term.

Examples of Priority Measures

Expanding Production of Organic Package Substrates

Increasing Capacity and Improving Yield with Cutting-Edge Equipment

We are currently prioritizing production capacity expansion for organic package substrates, which are expected to drive growth. Demand for PCs and smartphones is currently weak, and inventories have increased at network-related customers due to deferred data-center investment. In the medium- to-long term, however, demand for organic package substrates will grow to support the higher-performance semiconductors required by generative AI applications, 5G communications, and automotive safety systems. In response, we are expanding our Kagoshima Sendai Factory to increase production of high-end large multilayer packages and substrates. We plan to increase monthly production capacity of flip-chip ball-grid array (FC-BGA) packages by 2.3x to support network-related customers.

Conceptual drawing: New building at Kagoshima Sendai Factory (planned to open in March 2025)

Construction of New Factories in Japan

Existing Plants Undergo Reconstruct Efforts; New Factory Site in Isahaya City, Nagasaki Prefecture Will Further Expand Manufacturing

After reassessing our response to the rapid expansion of demand over the past two years, Kyocera is now planning up-front investments from a medium- to long-term perspective to expand production capacity and enhance our work environment. Beyond expanding existing manufacturing factories, it has been about 20 years since Kyocera last built an all-new factory at a new location in Japan. After studying the local transportation infrastructure, human resources, energy costs and other factors, we recently acquired land for a factory on a new industrial site in Isahaya City, Nagasaki Prefecture. We are planning to manufacture fine ceramic components there for semiconductor manufacturing equipment and semiconductor package substrates, which are expected to rise in demand. Production will start in the fiscal year ending in March 2027, and annual production is planned to reach 25 billion yen in the fiscal year ending in March 2029.

Conceptual drawing: New factory in Isahaya City, Nagasaki Prefecture (planned to open in March 2027)

Electronic Components Business

Director,
Managing Executive Officer
Executive General Manager of
Electronic Components Business
Koichi Kano

Managing Executive Officer
Deputy Executive General
Manager of Electronic
Components Business
Shiro Sakushima

Executive Officer
Deputy Executive General
Manager of Electronic
Components Business
Jeff Schmersal

By focusing on our core areas of expertise and leveraging synergies between Kyocera and KYOCERA AVX, we aim to increase market share and profitability to achieve our medium-term management goals.

The Electronic Components Segment represents a fusion between Kyocera's Japan-based Electronic Components Group and our U.S.-based global subsidiary, KYOCERA AVX. In the electronic components markets, which is predicted to grow, we continue providing products and solutions that are differentiated from our competitors, aiming to maintain our advantage as an industry leader in customer support. Based on the relationship of trust between Kyocera and KYOCERA AVX built up over more than 30 years of collaboration, we will leverage our respective strengths to create synergies that provide new value to society.

Vision

Contributing to customers and society through the development of valuable electronic components

Priority Measures

1 Investing in Fields of Competitive Advantage

Our aggressive capital investment will focus on next-generation oscillation components for timing devices, tantalum capacitors, and MLCCs for aerospace, medical, and industrial applications.

2 Expanding Global Production Bases

We will optimize our global manufacturing network by increasing production and building a supply system for key products — including MLCCs at KYOCERA AVX's new factory in Thailand, and crystal components at its factory in Vietnam.

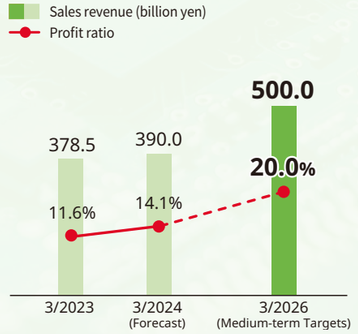
3 Improving Productivity Through Automation

We ensure diverse labor strengths through the expansion of global KYOCERA AVX production bases, energy saving through the automation of production processes, and improvement of quality stability through automated control of AI robots.

4 Developing Unique Technologies

We will combine KYOCERA AVX's advanced capabilities in the design of low-ESL products with Kyocera's small-form-factor MLCC production technologies. In addition, the group's U.S. R&D base will continue to conduct research on cutting-edge technologies.

Business Targets



Market Environment and Demand

The electronic components market expands by facilitating new advances in electronic equipment. Among major Kyocera Group products, connectors are forecast to grow at 4% CAGR, multilayer ceramic capacitors (MLCCs) at 10%, timing devices at 5%, and polymer tantalum capacitors at 7%. We will actively implement these major products into growth industries, such as industrial equipment, in-vehicle components, medical care, and aerospace technologies, by utilizing global sales networks, distribution channels, small and high-precision technologies contributing to IC integration that KYOCERA AVX possesses. We aim to maintain high market share in tantalum capacitors and timing devices, while expanding our share of the MLCC and connector markets. We continue to expand market share through the establishment of our unique technologies with a focus on fields in which we maintain a competitive advantage utilizing such technologies.

Major Impact of the Medium-term Management Plan

We aim to increase market share and profitability by leveraging synergies where Kyocera and KYOCERA AVX have differing core competencies. KYOCERA AVX's global sales networks and relationships with leading customers represent strong drivers for the expansion of Kyocera electronic component sales. In regard to manufacturing, we will implement Kyocera production technologies into KYOCERA AVX facilities seeking energy savings and efficiency to improve productivity. These synergies will be vital to our goal of expanding the electronic components business faster than the market's overall growth rate. Investments to optimize production will also include new facilities in Thailand and at Kagoshima Kokubu plant in Japan, and automated production lines at KYOCERA AVX's existing production sites aiming to expand the production capacity of our major products.

Examples of Priority Measures

Strengthening Sales Synergies Between Kyocera and KYOCERA AVX

» Establishing Global "One Face" Sales Structure Will Help Maximize Profits by Deploying Global Strategies Across the Organization

An umbrella organization has been established over the Kyocera Electronic Components Group Headquarters in Japan and U.S.-based KYOCERA AVX to place product marketing functions in local business divisions and maximize profit opportunities through collaboration. As part of this effort, in April 2023 we established a global business strategy based on Global "One Face" Sales Structure. In response to customer requests, we unified customer contact points and transaction conditions, creating a global business structure, with local on-site managers in the United States, Europe, and Asia.

Global "One Face" Sales Structure

Investment Strategies

» Promoting Facility Investment to Establish a Structure for Increasing Production and Optimizing Global Bases While Promoting DX to Improve Productivity

We are planning active investment to optimize the Kyocera Electronic Components Group and KYOCERA AVX production bases. By establishing the global production system in preparation for the expansion of production capability, and actively adopting digital technologies essential for automation and labor saving, we are planning for capital investment of 210 billion yen for three years. Specifically, in addition to the construction of a new factory building at KYOCERA AVX Thailand and a new building at the Kokubu Factory in Kagoshima Prefecture, we are promoting labor saving and implementing automated lines into KYOCERA AVX bases with the aim of achieving an increase in production of 1.9 x for MLCC, 1.8 x for timing devices, and 1.4 x for tantalum capacitors compared with the fiscal year that ended in March 2023.

Conceptual drawing: New building at Kagoshima Kokubu Plant
(planned to open in November 2024)

Solutions Business

Director, Managing Executive Officer
Executive General Manager of
Solutions Business

Norihiko Ina

We strive for the further expansion of our business as we pursue growth strategies, structural reform, and creation of new businesses aiming to provide solutions that meet our customers and societal challenges.

The Solutions segment consists of seven product lines: information equipment, industrial tools, telecommunications equipment and services, printing devices, smart energy, and displays. These product diversity help us maximize business opportunities by leveraging interdivisional synergies to address new market needs. Ultimately, these synergies give birth to new businesses that contribute to humanity and society.

Vision

Make as many people as possible happier and society better

The Kyocera Group looks beyond conventional frameworks to create new value. It is no longer enough to offer high-quality, high-added-value products, and services; we must provide new innovations that contribute to sustainable growth worldwide.

Priority Measures

1 Growth Strategies and Structural Reform for Existing Businesses

Our plans to expand existing businesses involve implementing new growth strategies and enhancing lower-profit, lower-growth businesses through structural reform.

2 Expanding Businesses Through Product Line Synergies

Kyocera aims for synergies, combining unique capabilities from diverse product lines for results that can't be achieved through conventional methods.

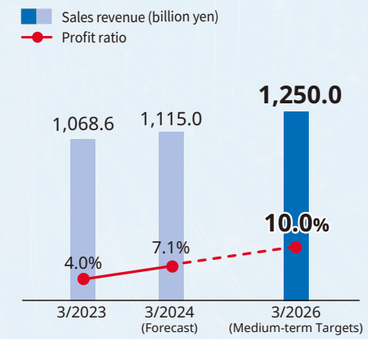
3 Growth Through Early Commercialization

We will seek competitive advantage by swiftly commercializing new concepts, including inkjet textile printers and AI-based collaborative robot services.

4 Creating New Businesses

The Kyocera Group incubates promising concepts using a variety of proven frameworks to create foundations for future high-growth businesses.

Business Targets



Market Environment & Demand

As sustainability awareness rises globally, the products and services offered by Kyocera's Solutions segment are also required to be energy efficient and recyclable. In energy-related markets, demand for renewable energy is expected to grow further due to rising electricity prices and growing interest in achieving a sustainable society. In the communication market, expectations for high-capacity, low-latency communications are expected to increase in the future due to the spread of 5G millimeter wave and other factors. The Solutions segment will accurately identify these market environments and demand trends and contribute to solving the problems of customers and society by providing environmentally friendly products and solutions to social issues.

Major Targets of the Medium-Term Management Plan

Our Solutions segment encompasses a wide range of businesses. We continually assess each business in terms of market and profit potential and concentrate resources to maximize growth. Existing businesses focus on developing new products and services to address evolving market needs. Those with low profit performance will develop structural reform plans for rapid improvement. For ideas that are "one step away" from commercialization, we link them with existing product lines and other initiatives to achieve early commercialization. In addition, we utilize a variety of frameworks to create new mechanisms for generating the next new business idea. Through these efforts, we aim to achieve sustainable growth in existing businesses, while developing new businesses that respond to the needs of our customers and society.

Examples of Priority Measures

Growth Strategies and Reforms at Key Product Lines

Information Equipment Growth Strategies

In the information equipment and printers businesses, we will seek greater market share by aggressively introducing new environment-friendly products that expand on our long-life design expertise. In the commercial inkjet printer market — the next frontier in printing — we will provide a unique on-demand print solution that respond to the need for multi-type small lot, reduces waste, and contributes to a sustainable future. Further, using our Enterprise Content Management (ECM) system, which can centralize documents, images, and other data scattered across the network, we will help more customers optimize their workflows and information management for more sustainable operations.

Structural Reform: Corporate Smart Energy Group

In addition to building and selling solar cells, Kyocera's Smart Energy division will launch a higher-value-added business offering solar cell and storage battery systems and renewable power services. These reforms will contribute to higher profitability for the company and a more sustainable world for consumers.

Developing Collaborative Product Line Synergies

Maximizing Software Competencies

Manufacturing hardware and applied knowledge software have become equally important in developing new products and services. We will achieve new synergies by maximizing the software competencies currently deployed at each product line globally. Original hardware and software proficiencies will create the new frameworks to expand our business.

Maximizing software competencies

Commercializing New Concepts Sooner

From Concept to Market: Environment-Friendly Products (Inkjet Textile Printer) ▶P.11

The inkjet textile printer is an example of Kyocera's swift approach to commercializing new products. Enabled by our unique printhead and pigment technologies, Kyocera's water-free concept eliminates a massive source of industrial wastewater, solving one of the textile printing industry's greatest sustainability challenges. Our miniaturized equipment also offers greater freedom to locate "on-demand" print sites closer to delivery locations. This maximizes small-lot and quick-delivery advantages, and avoids mass disposal due to overstocking, greatly reducing environmental impact.

Inkjet textile printer

Creating New Businesses

New Businesses That Address Societal Needs

By examining the markets and capabilities of each product line, integrating them, and exploring innovative solutions to societal needs, the Kyocera Group will create new businesses for sustainable growth.

Expanding R&D

Our Vision

We will continue to be a pioneer in creating new value at the forefront of technology by mastering unique methods of manufacturing. We hope to extend the vision of our founder, Dr. Kazuo Inamori, who once said, “What we aim to do next is what other people tell us we could never do.”

Collaborative Value Creation

Ranging from materials to services, the Kyocera Group’s diverse businesses serve four main markets: information and communications; automotive; environment/energy; and medical/healthcare. Sustainable growth requires collaboration internally, across segments, and externally, including open innovation with engineers in other companies and in academia. By building collaborative relationships, we hope to provide greater value to society by fulfilling our Management Rationale and creating a more sustainable future.

In-house Collaboration

R&D in Japan

We are building a network of engineers at four major Kyocera Group R&D centers in Japan to foster horizontal collaboration. We will remove interdivisional barriers by integrating members from operations and R&D, and maximize our collaborative power to create new businesses.

R&D Outside Japan

To address global needs, our plans for expanding collaboration with research centers outside Japan include an international research base with KYOCERA AVX. We will establish a Kyocera Group-wide R&D structure to develop game-changing technologies with new approaches and collaborative themes.

External Collaborations

With Other Companies

Through collaboration with other companies, we will integrate technologies to advance more quickly from proof-of-concept to commercialization, and will develop a pipeline of talented leaders who can launch new businesses. We will also promote open innovation and information exchange with inventors outside of Kyocera.

With Universities

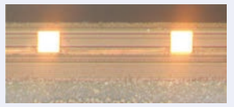
We aim to create ripple effects on markets and society through comprehensive alliances with universities, combining innovative research perspectives in science, technology, and economics. In March 2023, Kyocera participated in a collaboration with University of Tokyo, and we now are in discussions with Kyushu University in planning curriculur themes.

Creating New Value

It has become difficult to address diverse societal challenges using one material or technology alone. Kyocera Group R&D teams will contribute to our goal of achieving 3 trillion yen in annual revenue in the fiscal year ending March 2029 by creating new businesses that integrate a wide range of technologies developed through a global research network.

Onboard Optical Module

Analysts expect electricity use by data centers worldwide to increase 15X by 2030 [1], making power efficiency an urgent priority. To address this challenge, we are developing an onboard optical module that converts digital signals in the server’s processor from electrical data into power-saving laser light. We are also co-developing next-generation “green data center” technologies through a collaboration with the Green Innovation Fund [2] that aims to turn R&D innovations into commercially successful pro-ducts.



Cross-sectional view of Optical circuit wiring to be incorporated in onboard optical module

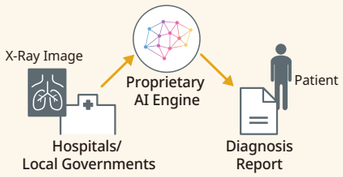
Space Business

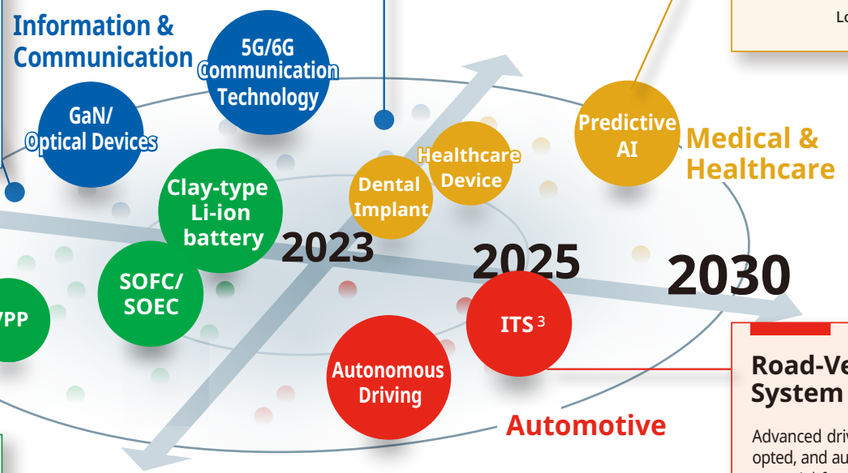
Inter-Satellite Optical Communication

To support next-generation information and communications infrastructure, Kyocera will enter the inter-satellite optical communication business. Initial efforts will focus on developing optical components, laser transmission and reception modules, and space-based communications equipment. By providing energy-saving, cost-efficient solutions, we will support satellite mega-constellations that can expand human connectivity and help close the digital divide.

Artificial Intelligence (AI) System for Diagnosing Osteoporosis

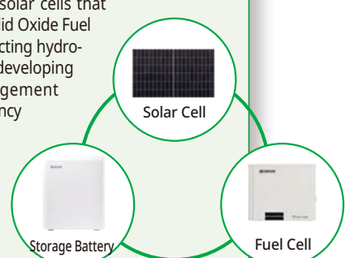
Osteoporosis is a condition that weakens the skeletal system, often resulting in fractures and the need for long-term care. It often progresses for years before symptoms appear, making early diagnosis key to successful outcomes. Kyocera and the University of Tokyo have jointly developed a patented AI technology to assess bone density using X-Ray images taken during routine health exams. It’s simple and painless, and provides a standard metric for bone density monitoring.





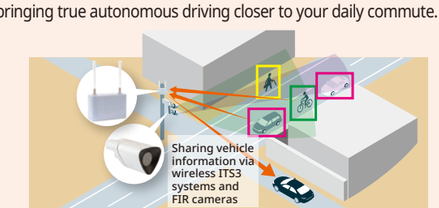
Creating an Energy Management System

Kyocera’s Smart Energy business is built on three technologies: energy storage system; solar cells that generate renewable energy; and Solid Oxide Fuel Cells, which provide power by extracting hydrogen from utility gas. We are now developing a next-generation energy management system that enhances power efficiency using predictive analytics to optimize the energy supply/demand balance. We aim for a sustainable, low-carbon future, with local communities revitalized through local energy production for local consumption.



Road-Vehicle Communications System

Advanced driver assistance systems (ADAS) are already widely adopted, and autonomous driving technologies will ultimately become essential for traffic safety amid aging and declining populations. However, many technical challenges remain, including affordable systems to transmit and receive highly accurate information about road conditions and hazards. Kyocera is helping to solve these challenges by developing wireless roadside infrastructure devices and far-infrared (FIR) cameras for road-vehicle communication systems, bringing true autonomous driving closer to your daily commute.

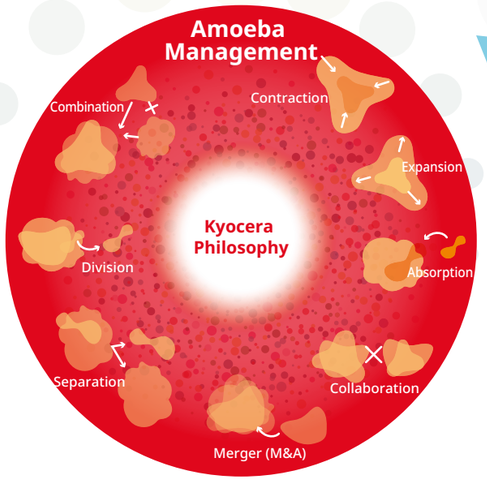


Note 1 : Calculated by using the “Impact of Progress of Information Society on Energy Consumption” created by the Center for Low Carbon Society Strategy at the Japan Science and Technology Agency (JST)
Note 2 : Funding project performed by the New Energy and Industrial Technology Development Organization (NEDO)
Note 3 : Intelligent Transport System

New Business Creation

As a key strategy for sustainable growth, Kyocera invests aggressively in research and development to create new businesses that maximize social and economic value. New businesses begin through a three-phase process: opportunity identification, business development, and commercialization. The organizational structure supporting each phase focuses on creating new products and services that respond to societal needs.

Opportunity Identification



Inter-Satellite Optical Communication

By providing cost-effective, energy-efficient optical modules for inter-satellite communication, we help establish a high-speed satellite network connecting users virtually anywhere on Earth. Such network will help bridge the gap between urban areas with advanced communications technologies and rural areas with poor communication environments due to the topography and other factors.

Automating Agriculture: Dwarf Rice ▶P.20

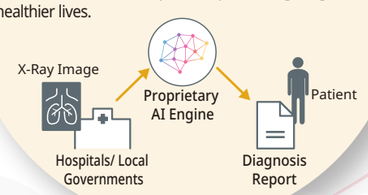
We are developing methods to address population-related food supply challenges by improving rice and lettuce yields using our proprietary LED lighting and automation technologies.

Enhancing Offshore Aquaculture ▶P.21

Kyocera is participating in a project to build an offshore aquaculture system combining LED lighting and IoT technologies for sustainable fisheries that minimize impact on our natural marine environment.

Artificial Intelligence (AI) System for Diagnosing Osteoporosis

By applying AI to X-Ray images taken during routine exams, we can assess bone density for early detection and treatment of osteoporosis, promoting longer and healthier lives.



Business Development

Onboard Optical Module

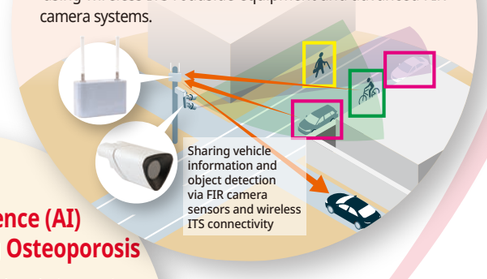
Kyocera's onboard optical module reduces electricity demand at data centers by converting electric signals into optical signals at the board level. Our goal is to help data centers around the world to reduce their power consumption, which is now rising dramatically.

Millimeter Wave Technology

We will continue to advance information technologies by developing millimeter-wave solutions, expanding the speed, coverage and capacity of 5G communications networks.

Road-Vehicle Communications System

To improve safety in traffic intersections and conditions beyond current autonomous driving capabilities, we are supporting smart transportation infrastructure using wireless ITS roadside equipment and advanced FIR camera systems.



Commercialization

Intelligent Collaborative Robot

In response to a shrinking labor pool, we use AI, 3D cameras, and cloud services to make intelligent collaborative robots useful in more applications.

High-Efficiency GaN Laser

Using gallium nitride (GaN), which is attracting attention as the next-generation material, we are developing high-output laser devices with greatly reduced power requirements, opening a new path to carbon neutrality while enabling new applications like ultra-high speed communication over laser light.

Inkjet Textile Printer ▶P.11

Kyocera's inkjet textile printing system has developed by integrating unique pigment ink and inkjet printhead technologies. Its water-free design offers great potential to eliminate wastewater from textile printing.

Contributing to biodiversity and food security with the cultivation of plants utilizing LED technology

Growing dwarf rice with LED lighting proven in lettuce cultivation

As part of our commitment to create businesses that address global needs, Kyocera has developed specialty light-emitting diode (hereafter, LED) technology for plant cultivation and has accumulated unique expertise. This lighting, based on violet-excitation LED devices, has already been applied to cultivate lettuce and other crops in Controlled Environment Agriculture. Kyocera is collaborating with business partners to improve this system toward establishing a business infrastructure for edible crop cultivation under optimized lighting. Global population is increasing, and demand for staple foods like rice is projected to outpace population growth by a factor of 2x, increasing the likelihood of food shortages.* Kyocera is experimenting with dwarf rice, a variety of limited height (about 20cm) suitable for indoor multi-shelf cultivation with artificial lighting systems.

* Calculated using data from World Population Prospects, the 2022 Revision, UN; World Food Supply and Demand Projections to 2031: The Results by the World Food Supply and Demand Model, Japan's Ministry of Agriculture, Forestry and Fisheries; and World Agricultural Supply and Demand Estimates, U.S. Department of Agriculture (March 8, 2023).

Cultivating Lettuce with Higher Nutrient Density Using LED Technology

Kyocera tested its first prototype LED lights for lettuce cultivation systems in 2014. Since then, our further development has succeeded in growing lettuce of higher nutritional value, including vitamin C levels comparable to grapefruit. Controlling the cultivation environment using LED lighting makes it possible to grow lettuce with more favorable characteristics, including superior flavor, as compared with cultivation under direct sunlight or other lighting systems.

Enhancing Rice Cultivation with Optimized Lighting and Advanced Cultivation Technology

Kyocera will help resolve climate-related food insecurity in the most distressed regions of the world by supporting a new paradigm in agriculture. An improved rice cultivation technology using LED lighting could address malnutrition in developing regions, and could even be adapted to supply food for long-term lunar missions in the 2030s. Kyocera's experiments have shown encouraging results with dwarf rice, which is suitable for indoor multi-shelf Controlled Environment Agriculture. This system using Kyocera's LED lights is conducive to automation. We continue to collaborate with partner enterprises that share our business objectives and philosophy for the development of new cultivation systems, product distribution and sales into regional markets. Through further development of our unique technologies in high-speed cultivation systems, we aim to ensure annual crop yields exceeding those possible by conventional sunlight cultivation, and achieve early commercialization of this business.

MESSAGE

Collaborating in developing LED lights and automated cultivation systems for dwarf rice

Professor, Kyoto Prefectural University Graduate School of Life and Environmental Sciences

Takehiro Masumura

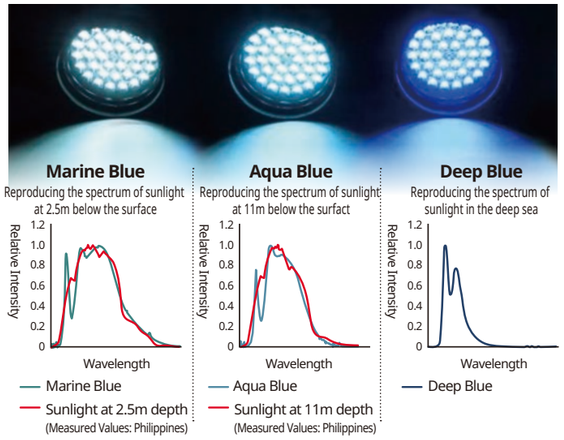
"Kyono-yume" is a dwarf rice variety that grows only about 20cm high. This makes it ideal for multi-shelf hydroponic cultivation at indoor growing facilities. It also has a short growing season — about three months from transplanting to harvest. The Kyocera Group has been working on LED lights tailored to dwarf rice cultivation with an automated cultivation system. We look forward to commercializing this technology.

Introducing Kyocera's specialized LED lighting system for marine life, now used in aquariums throughout Japan

Kyocera started development of LED lighting for coral farming in response to a business owner's request. Coral is difficult to culture, requiring a light spectrum very close to natural sunlight. When Kyocera began developing this technology, LED devices had already replaced fluorescent, mercury, and metal halide lamps in many conventional applications; however, LED lighting had never been successful in coral aquaculture. Kyocera thus created an LED solution optimized for marine life using LED light-mixing technologies developed by our CERAPHIC brand. We analyzed light spectra from water depths of 1m to 11m, and succeeded in creating the same spectra using LED devices — yielding a "marine blue" replicating the 2.5m environment and an "aqua blue" closely matching the spectra at 11m. Joint research with Shizuoka University verified marine blue and aqua blue as the most suitable for natural coral habitats at these respective depths. Kyocera introduced this aquarium LED lighting to the market in late 2018, and it has since been adopted by Niigata City Aquarium and many others throughout Japan.

LED Lighting Suitable for Coral and Other Aquatic Plants

Until recently, no equipment existed to measure the spectrum of sunlight underwater. Using devices that Kyocera developed to measure light at various undersea depths, we succeeded in obtaining offshore measurements around Bohol Island in the Philippines . The LED devices Kyocera created using this environmental data have been on the market since late 2018.



Aiming for Innovation in Aquaculture Using an IoT-controlled LED Lighting System to Optimize Growth

As part of the "COI-NEXT" program announced by Japan's Science and Technology Agency (JST) in March 2023, Kyocera joined the Nagasaki Blue Economy, an industry/academia co-creation effort to promote sustainable seafood production using open innovation. We are now proceeding through joint research with Nagasaki University and our own unique technologies to identify ways of preserving the marine environment while ensuring food security. Specifically, we are developing highly managed aquaculture based on smart offshore systems; and sustainable aquaculture technology using advances in synthetic seeds, or "synseeds." Our joint research is targeting unprecedented innovations that enable IoT-controlled aquaculture using LED lighting systems to optimize the growth of marine resources and seafood production with low environmental impact.

*CERAPHIC is a registered trademark of Kyocera Corporation.

Promoting Biodiversity Through IoT-Controlled Aquaculture and LED Lighting

In joint research with Nagasaki University, Kyocera is developing new technologies for growing fish, shellfish, and algae using light-optimizing LED devices and IoT-controlled aquaculture systems.

Nagasaki University
[Nagasaki Blue Economy]
Intelligent aquaculture

×

IoT Business Development Department
[Energy Harvesting Smart Buoy]
Power generation and monitoring/ Telecommunication and remote management

×

FL Business Development Department
[CERAPHIC®]*
Sunlight-Spectrum LED / Fish Culturing LED / Biological Conditioning LED

MESSAGE

Kyocera technology promises major contributions to aquaculture

Institute for East China Sea Research, Organization for Marine Science and Technology, Nagasaki University

Kiyoshi Soyano (Professor)

In the future, fish and shellfish farming will require producers to minimize labor requirements and environmental impact. This will require remote monitoring of fish and the marine environment, and automated AI-based feeding systems. New technologies are needed to enable more efficient growth, higher yields, shorter growth cycles and lower production costs. Custom-engineered LED lighting technology has shown great promise in aquaculture. We believe that Kyocera's marine engineering technology and LED lighting expertise have the potential to change the future of the fishing industry.