Industrial Products

Integrating core and advanced technologies to deliver new value

We are harnessing our accumulated technological strengths while cultivating our businesses to contribute to industrial innovations.

Industrial Products Business

Yasutomo Mori
Corporate Senior Vice President
General Manager of
Industrial Products Business Group
Ricoh Co., Ltd.

Strategic direction

The Industrial Products business encompasses a range of industrial application fields, and contributes to social progress.

We offer opto modules that draw on our optical technology strengths to increase customer value. Our industrial smart systems combine advanced sensing technology with IoT and AI technologies. In precision equipment parts, we develop and sell precision machine parts, primarily for automobiles, and aim to expand our business.

Providing value to society

We integrate optical and image processing technologies to visualize information while combining control technologies and parts to contribute to safer and more secure societies through advanced vehicles and autonomous driving.

Sales

(JPY billion)

	03/17	03/18	03/19
Total	66.6	76.4	**58.5**
B	20.3	20.5	
A	46.3	55.9	

A Industrial Products
B Electronic devices
(semiconductor devices)

Note: Sales for the year ended March 31, 2019 does not include revenues from the electronic devices business, which we transferred.

Driving innovations in the automotive sector and other areas of the industrial product field

In opto modules, we integrated our optical and image processing technologies to cultivate a range of products, centered on offerings for advanced driving assistance systems and autonomous driving.

We manufacture the world's smallest vehicular stereo cameras, with which we have top share in the Japanese compact car market. We are building a development and mass production structure for the world's first laser scanning head-up displays (HUDs), which employ our proprietary laser technologies to deliver outstanding color reproduction and visibility. In the projection business, our strengths are in ultra-short focus and high-precision molding technologies. We offer projection lenses for offices and educational institutions. We are expanding our supply of small-short and ultra-short focus projector modules to cater to rising demand for industrial embedded applications.

In industrial smart systems, we provide new value for IoT by integrating sensing and computing technologies. For example, we developed a system that combines proprietary sensors and data analysis technology to map the vibrations of operating facilities and machinery, preventing accidents and shortening downtimes. We supply top-quality industrial embedded computers that cater to the operational stability needs of robots and medical and financial equipment.

In precision equipment parts, we draw on precision machining technology that we cultivated over many years in our watch business. We are focusing on precision automotive components, as well as precision machines parts that enhance the environmental performances of engines.

In industrial equipment, we offer production facilities and image inspection equipment that automate manufacturing processes and cut labor costs, centered on the fast-growing lithium-ion battery-related market.
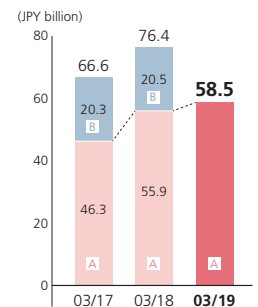
On-board stereo camera

Laser-scanning HUD
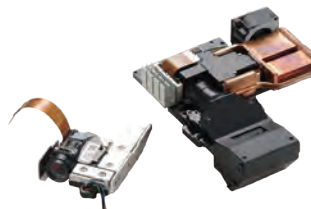
Short focus and ultra-short focus projector modules

Precision machined parts

Creating unique imaging value

We are drawing on our core technologies to deliver value through new imaging and data service businesses.

Smart Vision Business

Wataru Otani
Corporate Vice President
General Manager of Smart Vision
Business Group
Ricoh Co., Ltd.

Strategic direction

Consumers and businesses alike can take advantage of the 360° still images and movies of the RICOH THETA camera. We offer cloud services for businesses using this imaging platform. We draw on artificial intelligence and image processing technology amassed from the accumulated data to create new value and bolster our services range to broaden customer business potential. We will step up efforts to create digital cameras that find favor among customers for perfectly matched usage requirements.

Providing value to society

We seek to streamline corporate operations by leveraging image bundling technologies and our expertise in developing and managing business cloud services to provide more convenience and help enhance quality of life for customers.

Sales

(JPY billion)

03/17	03/18	03/19
25.3	19.4	**18.3**

RICOH THETA Z1

PENTAX K-1 II

RICOH GR III

RICOH WG-60
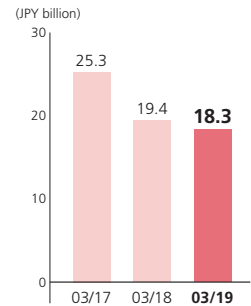
Providing solutions that bring together 360° images with the latest image processing and artificial intelligence technologies

We launched the THETA 360.biz official partner program in July 2018 to expand the usage of images from the RICOH THETA ›**1** 360° camera. THETA 360.biz is a corporate cloud service that we initiated in October 2014 that dynamically displays images from this camera on customer websites. Companies in the real estate business, for example, can use what has proven a very popular augmented reality application for tours that link multiple 360° images with room floor plans. With the number of customers using our setup steadily increasing, we plan to extend services to used car sales, hotels, tourism and construction sites.

In Web advertising, we offer a service to distribute and display 360° banner ads that employ artificial intelligence learning. The service helps to triple click rates of still image banners. We aim to increase customer value in marketing, security, and other fields with various tools. One is our deep learning-based image recognition technology, which makes it possible to map the numbers of people in offices or popular areas. Another is client behavior analysis solutions that employ face authentication algorithms. We also seek to provide new value by incorporating various devices and ideas in our service, expanding functions with plug-ins and releasing multiple application programming interfaces and software development kits to offer an open environment for developers.

In February 2019, we opened the RICOH 360 portal, which integrates a range of solutions services employing 360° images. The portal uses accumulated 360° still image, video, and log data and unique data processing technology to offer value unique to 360° imaging. It also provides customer success story content.

We maintain a solid lineup of conventional digital cameras ›**2** that match customer interests. These offerings include the high-end RICOH GR III compact camera and action models that are waterproof, dustproof, and shock resistant.

Before CG
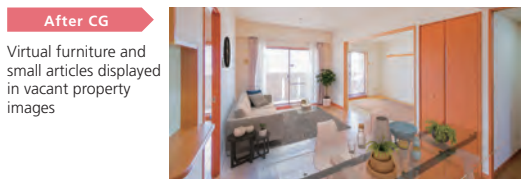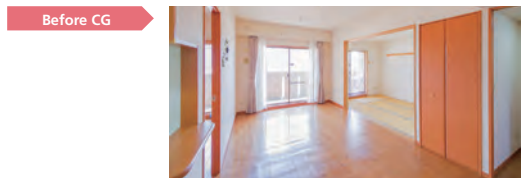
After CG

Virtual furniture and small articles displayed in vacant property images

RICOH-VR Staging

Refer to our website

1 RICOH THETA theta360.com/en/
2 Digital cameras www.ricoh-imaging.co.jp/english/products/index.html

▌ New Development

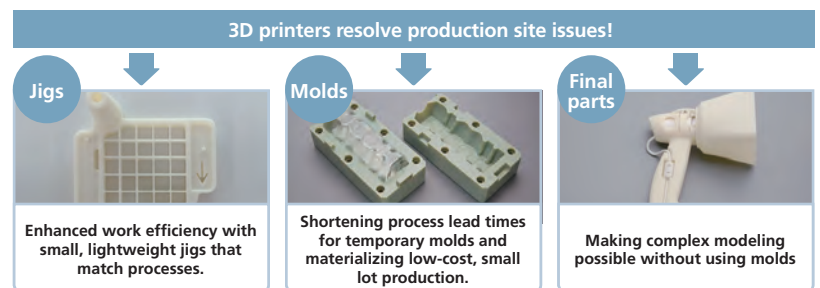# Driving future growth through proprietary technologies and solutions

Additive Manufacturing (3D printers)

September 2014 saw the Ricoh Group launch its Additive Manufacturing business. This business focuses on 3D printers ›❶ , which enable on-demand parts production. We have been selling 3D printers from Ricoh and other brands as well as providing comprehensive solutions that include materials and modeling services. We have thereby helped to resolve workflow issues while contributing to manufacturing innovations.

We established RICOH Rapid Fab centers in Japan (Atsugi, Shin Yokohama, Osaka, and Nagoya) and in the United Kingdom (Telford) so customers in manufacturing can talk with the Ricoh Group's technicians. Discussions cover regular prototyping and case studies relating to direct parts, molds, and jigs.

Our modeling services include one-stop design support for customers looking to create prototypes and final parts. We plan to roll out full-fledged contract manufacturing services for final products.

We intend to launch in-house-developed 3D printer for simple prototyping during the year ending March 31, 2020. We aim to further expand our business by bringing out models incorporating proprietary technology that offer high quality and shorten lead times.

3D printers resolve production site issues!

Jigs
Enhanced work efficiency with small, lightweight jigs that match processes.

Molds
Shortening process lead times for temporary molds and materializing low-cost, small lot production.

Final parts
Making complex modeling possible without using molds

Eco solutions

We assist customers with environmental management, and have started providing a range of solutions through which we can collaborate with them in materializing a decarbonized, circular economy.

In electricity sales services, we suggest ways to help customers reduce their overall power consumption. We promote the use of renewable energy through our solar power facilities operation and

Solar power facility operation and maintenance services

maintenance services that leverage our nationwide office equipment sales and service network in monitoring conditions and providing maintenance. We thereby help stabilize renewable energy supplies.

In May 2019, we began offering the RICOH Smart MES lighting and air-conditioning system in selected regions. This system employs our sensing and cloud technologies. The system uses sensing technology and cloud technology to detect the locations of people and light levels and room temperatures in each area. It automatically controls lighting, air-conditioning, and demand monitoring devices to conserve energy and maintain comfort. It realizes conservation and convenience at the same time. The system also makes it possible to collect data whether individuals are present or not and evaluates space usage. This helps to enhance workplace comfort by contributing to more comfortable work areas and optimal layouts.

▣ Refer to our website

❶ **3D printer** www.ricoh.com/release/2015/1027_1.html

Healthcare

Japan has the most aged society among developed nations. Around 30% of its population will be above the age of 65 by 2020. The difference between average life expectancies and healthy lifespans is around 10 years. There is an urgent need to shrink that gap and alleviate rising medical spending and the workloads of medical professionals.

Ricoh entered the healthcare field >[1] in 2016. It focuses on the biomedical, medical imaging, and healthcare solutions fields. We aim to create new value by helping prevent illnesses, swiftly identify them, and rapidly treat them.

We are especially targeting brain and neurological disorders, and are cultivating operations that encompass diagnostics through drug discovery and regenerative medicine.

In the biomedical field, we employ inkjet technologies from our printers to develop bioprinting technologies, products, and services that reproduce biological tissue structures by ejecting live cells. In June 2019, we entered into an agreement with Elixirgen Scientific, Inc., to engage in joint biomedical operations supporting drug discovery based on cells differentiated >[1] from induced pluripotent stem (iPS) cells >[2]. >[2] We will launch a business centered on North America, and we will expand our drug discovery business, by making and selling iPS cell-derived cells and cell chips >[3] seeded >[4] with precisely differentiated cells. We will also support new drug development through outsourced evaluation services and drive drug discovery innovations with iPS cells.

In medical imaging, we began developing biomagnetic imaging systems in 2014. In April 2016, we acquired the MEG (magnetoencephalography) business of Yokogawa Electric Corporation.

Magnetoencephalograph measurements

We inaugurated sales in North America in October 2017. The domestic debut was in May 2018. In January 2019, we initiated brain functional checkup research with Hokuto Hospital.

Since 2014, we have collaborated with Tokyo Medical and Dental University and the Kanazawa Institute of Technology in developing a system to visualize nervous activity in spinal cords by noninvasively measuring the magnetic field with a view to commercialization. In July 2019, combined developments in hardware, software, and diagnostic techniques overcame what had been a daunting challenge of measuring the magnetic fields in the cervical and lumbar segments of the spinal cord. >[3] We also succeeded in measuring the neuromagnetic fields in such peripheral nerves as the carpal tunnel and brachial plexus. These achievements have broadened clinical applications of MSG (MagnetoSpino-Graphy) in a major step toward practical application.

In healthcare solutions, we develop products and services that support digitization and data usage for medical treatment and elderly care. In July 2018, we commercialized the Ricoh Mimamori Bed Sensor System for nursing home or nursing care facility. In January 2019, we launched RICOH Regional Health Net, an integrated medical care system. We are helping create a comprehensive community care system through this setup. That is because it provides uninterrupted support to patients by using cloud systems to manage and share a range of medical treatment, examinations, prescriptions, and nursing care information from local medical institutions, pharmacies, and nursing care facilities.

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[1] Differentiation (induction)
Producing target cells from iPS and embryonic stem cells.

[2] iPS cells (induced pluripotent stem cells)
Introducing several gene types into somatic cells makes it possible to differentiate embryonic stem cells and numerous other types of cell. The cells are self-replicating as they can repeatedly divide and proliferate.
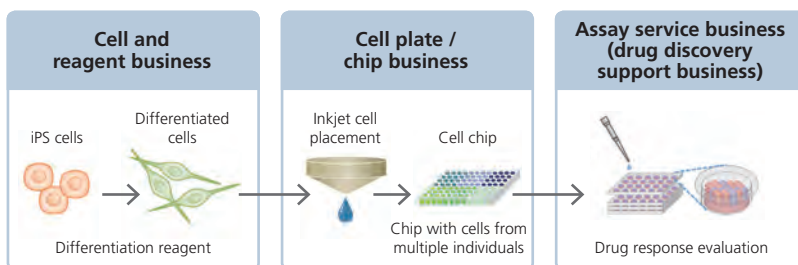
[3] Cell chip
A device that can arrange tens to thousands of cells on a substrate for observing reactions and changes in individual cells.

[4] Seeding
Seeding cells.

Drug discovery business steps

Cell and reagent business	Cell plate / chip business	Assay service business (drug discovery support business)
iPS cells → Differentiated cells / Differentiation reagent	Inkjet cell placement → Cell chip / Chip with cells from multiple individuals	Drug response evaluation

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Refer to our website

[1] **Healthcare** www.ricoh.com/technology/institute/research/healthcare.html
[2] **Joint biomedical operations** www.ricoh.com/release/2019/0619_1/
[3] **Biomagnetic measurement of lumbar, cervical, and peripheral nerves using magnetospinography** www.ricoh.com/release/2019/0724_1/