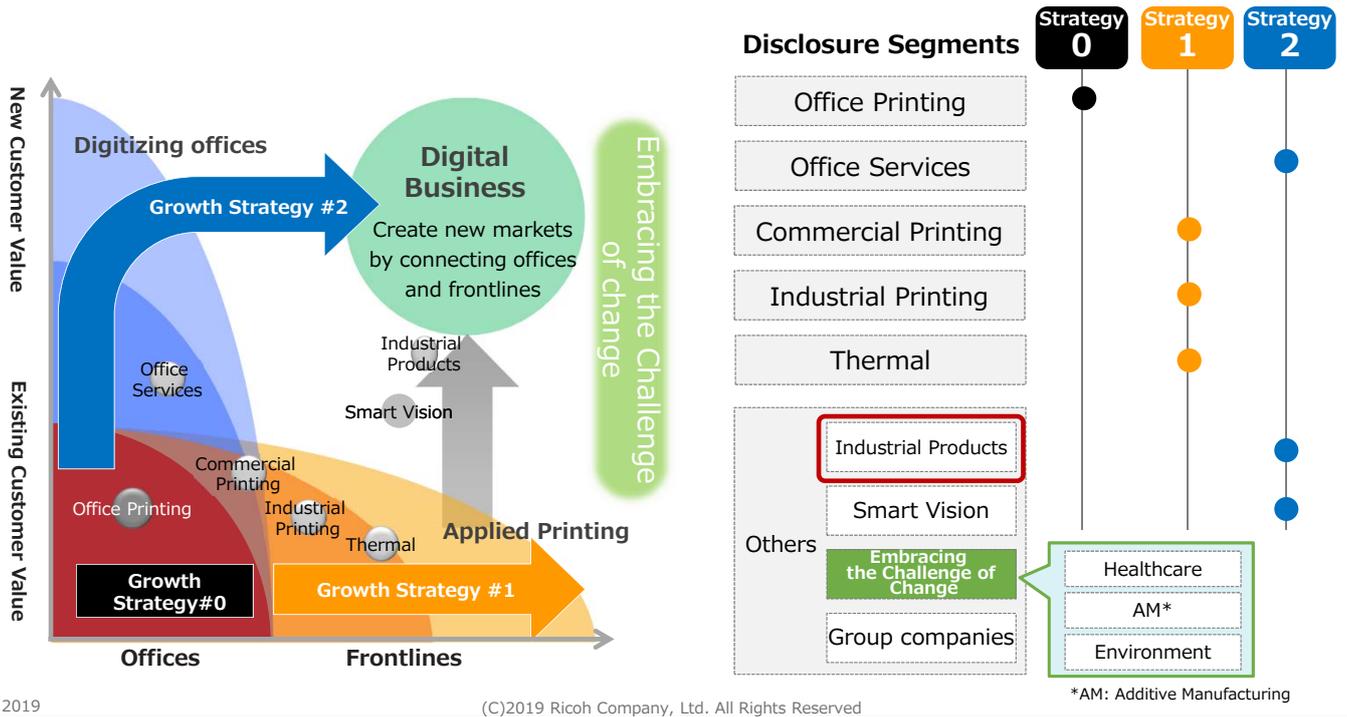


**Industrial  
Products  
Business**

**April 11, 2019**

**Yasutomo Mori  
General Manager of  
Industrial Products Business Group  
Ricoh Company, Ltd.**

- Hello to you all. I'm Yasutomo Mori. I will explain the strategies of the Industrial Products Business Group today.

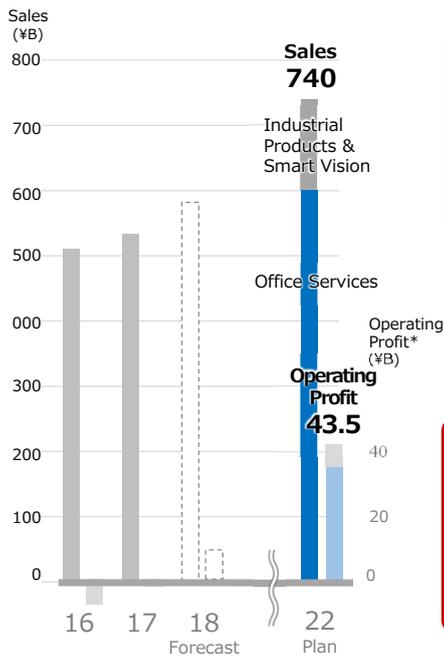


April 11, 2019

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\*AM: Additive Manufacturing

- Our business is part of Growth Strategy #2.



**Growth Strategy #2 toward FY2022**  
**Expand Office Services business earnings and create new businesses**

**Office Services:** Reinforce our structure and invest extensively to expand operations and create a business model that produces stable earnings  
 Digitizing frontlines : RICOH360 data service

**Industrial Products:** Combine optical technologies that Ricoh has amassed over the years with Internet of Things, artificial intelligence, and other advanced technologies and visualize information through information conversion from data recognition processes to enhance the productivity of societies

April 11, 2019

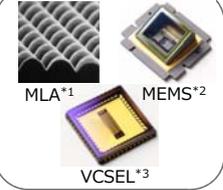
\*: excluding extraordinary costs

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- Our Growth Strategy #2 goal is to expand Office Services business earnings and draw on Ricoh’s core technologies to create new businesses.
- Our mission is to cater to the needs of manufacturing sites.
- We are harnessing Ricoh’s optical, precision, watch, lens, and other core technologies to combine advanced technologies as far as possible, visualize information, and build new value to become a large business by FY2022.

## Industrial Products Business

Supplying modules and devices by leveraging our prowess in miniaturization, precision machining, and digital technologies amassed in cameras, watches, and MFPs, focusing on automakers and industrial equipment manufacturers

Optical modules	Industrial smart systems	Precision equipment parts and industrial equipment
<p><b>Automotive</b></p>  <p>World's smallest vehicular stereo camera</p>  <p>Laser-scanning head-up display</p> <p><b>Projection</b></p>  <p>Projector optical modules</p>	<p><b>Industrial computers</b></p>  <p>Industrial computers and CPU boards</p>  <p>Industrial robots</p> <p><b>Key optical devices</b></p>  <p>MLA*<sup>1</sup> MEMS*<sup>2</sup> VCSEL*<sup>3</sup></p>  <p>MFPs</p>	<p><b>Precision equipment parts</b></p>  <p>Precision machined parts for automotive engines</p> <p><b>Industrial equipment</b></p>  <p>Industrial machinery facilities for automating manufacturing processes</p>

\*1: Microlens Array \*2: Micro Electro Mechanical Systems \*3: Vertical Cavity Surface Emitting Laser  
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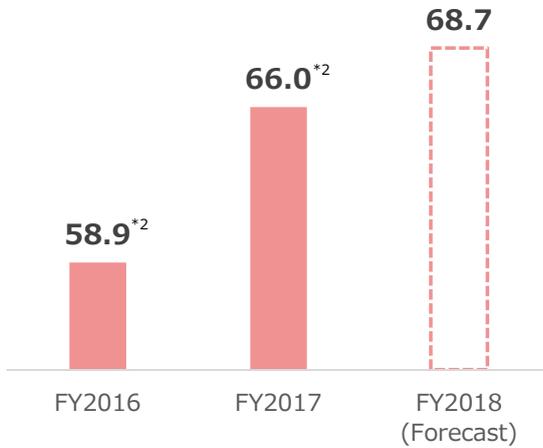
3

- We have broadly three main product categories.
- In all of them, we combine technologies that we have amassed in our camera, watch, and multifunctional printer businesses to supply modules and devices for automobiles and industrial equipment.
- In the optical modules business on the left, we maintain two product lines. One is automotive. The main offering here is our stereo camera, whose role is to assist with automatic controls for vehicles. We are also in the final stages of development for the head-up display module. The second line is projection. Our modules are installed on Ricoh's ultra-short throw projectors. We also provide optical units to many projector manufacturers.
- For industrial smart systems, we offer industrial computer embedded boards to numerous production facilities and equipment manufacturers.
- Our three key optical devices are vertical cavity surface emitting lasers, micro lens arrays, and micro-electrical mechanical systems, which together deliver the three functions of emitting, transmitting, and reflecting light. Some of these devices are to be found in Ricoh's MFPs.
- Finally, we offer precision equipment parts and industrial equipment. The parts employ precision machining technologies amassed in watch and other businesses. We supply high precision parts to car manufacturers for use in their engines. On the industrial equipment front, we produce and sell industrial facilities integration offerings and inspection lines.

**Sales\*1**

**Sales composition by business**

(Billions of yen)



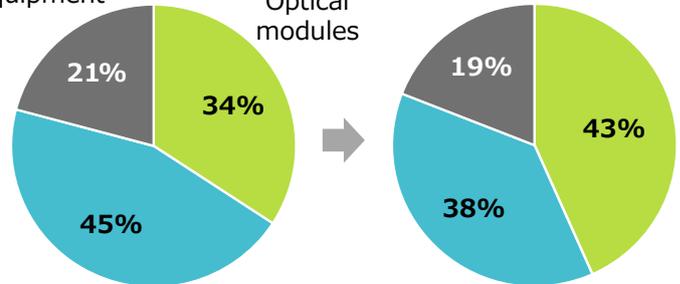
\*1 : Sales include Ricoh-group sales  
\*2 : Excluding Sales of Ricoh Electronic Devices

FY2016

FY2018  
(Forecast)

Precision equipment  
parts and industrial  
equipment

Optical  
modules



Industrial  
smart systems

**¥58.9 billion**

**¥68.7 billion**

- I will now discuss results for our business.
- Sales in FY2016 were 58.9 billion yen. The forecast for FY2019 is 68.7 billion yen, representing annual growth of around 8%. Growth is particularly high in the automotive area of our optical modules business.

	Market trends	Core customers	Ricoh's strengths	Initiatives and results
<b>Stereo cameras</b>	<ul style="list-style-type: none"> <li>Growing adoption of crash-prevention systems and rising demand for stereo cameras</li> </ul> <p>(Billions of yen) <b>Global auto stereo camera market forecast*1</b></p> <p>FY2016 FY2017 FY2018 FY2019 FY2020 FY2021 FY2022</p>	Automotive parts manufacturers	<ul style="list-style-type: none"> <li>Distance measurement technology (parallax calculation algorithm) that can accurately measure small obstacles</li> <li>Three-dimensional image recognition and data processing technologies that can swiftly detect road surface irregularities</li> </ul>	<ul style="list-style-type: none"> <li>Launched the world's smallest*2 vehicular stereo camera</li> <li>Lead*3 the domestic market for installations on compact cars, accounting for 24% of unit sales</li> <li>Created world's first collision-avoiding automatic steering system (installed on premium Japanese car models)</li> </ul>
<b>Head-up displays</b>	<ul style="list-style-type: none"> <li>Installation rate to keep rising</li> <li>Displays to become larger</li> </ul> <p>(Billions of yen) <b>Global head-up display market forecast**4</b></p> <p>FY2016 FY2017 FY2018 FY2019 FY2020 FY2021 FY2022</p>	Car manufacturers	<ul style="list-style-type: none"> <li>Developing vehicular laser head-up display units free of postcard-sized*5 rectangles and featuring high contrast, and wide color gamut</li> <li>Laser scanning method for large displays</li> </ul>	<ul style="list-style-type: none"> <li>Head-up displays materialized with Ricoh's key devices Micro Electro Mechanical Systems and (MEMS and Micro Lens Arrays)</li> <li>→ Collaborating with automakers to develop world's first laser head-up display</li> </ul>
<b>Projectors</b>	<ul style="list-style-type: none"> <li>Projector market flat overall</li> <li>→ Business and education markets shrinking</li> <li>→ Consumer and industrial demand growing</li> </ul>	Projector manufacturers	<ul style="list-style-type: none"> <li>Ultra short-focus and high-precision molding technologies to create high-quality lens units with short focal lengths</li> </ul>	<ul style="list-style-type: none"> <li>Supply bright, high-definition lenses to 13 top projector manufacturers</li> <li>No.1 in projector lens market, with a share of 23%*6</li> </ul>

\*1: Techno Systems Research survey (2018) \*2: From Ricoh research as of April 2017 \*3: Ricoh estimate for domestic compact car unit sales in 2018 \*4: Ricoh estimate based on Techno Systems Research unit forecasts (large displays with horizontal viewing angles exceeding 7%) \*5: LCD head-up displays with backlight leaks reflects on screen shapes, seen mainly in low-light conditions \*6: Techno Systems Research survey in 2017  
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- I will now discuss market environments and strategies for three businesses.
- I will start with optical modules, where our growth is greatest.
- Most of the latest vehicles, including compact cars, incorporate stereo cameras and cameras for crash prevention systems. Ricoh's strength is that its cameras are incredibly small and can swiftly detect slightly uneven road surfaces. We have a 24% installed based share in Japanese compact car segment.
- Japanese premium models employ Ricoh stereo cameras that can detect road irregularities at high speeds. As well as helping prevent collisions, our systems can automatically turn steering wheels if collisions are imminent.
- I will now talk about head-up displays. Recent vehicle models increasingly incorporate these systems. Conventional head-up displays look like five- or six-inch LCDs at a distance. But Ricoh developed a laser head-up display. We are going to form alliances with Japanese car manufacturers, and look for launches of our offerings early next fiscal year.
- The greatest strength of Ricoh's setup is the large display size. Conventional offerings are just five- or six- inches. But we can create much larger ones, and I believe that we can create a new business by combining stereo cameras with head-up displays.
- We can draw on our optical technologies in the projector business, in which we are a world leader. Ricoh is No. 1 in the projector lens market, with a share of 23%.

# Optical Modules Business (Business Strategies)



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<b>Key business strategy</b>	<b>Develop and deploy products delivering original customer value by harnessing our strengths in optical technology</b>	FY2022 sales target: ¥48 billion
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	Domain strategy	Measures	KPI (FY2022)	Results stance
<b>Stereo cameras</b>	<ul style="list-style-type: none"> <li>Deploy in upmarket models</li> <li>Expand in overseas markets</li> <li>Use in in-vehicle cameras</li> </ul>	<ul style="list-style-type: none"> <li>Propose new products for Japanese and European premium cars</li> <li>Jointly promote with Chinese auto parts manufacturers</li> <li>Jointly develop automotive seat sensors with major European player IEE*1</li> </ul>	<ul style="list-style-type: none"> <li>Supply to more than 2 new customers</li> <li>* Business scale exceeding ¥20 billion (FY2018 result: ¥11 billion)</li> </ul>	Further expanding earnings
<b>Head-up displays</b>	<ul style="list-style-type: none"> <li>Establish new position in large head-up displays with high contrast and wide color gamut displays</li> </ul>	<ul style="list-style-type: none"> <li>Agree on specifications with joint developers and commercialize</li> <li>Supply samples to customers other than above and globally market with demo cars</li> </ul>	<ul style="list-style-type: none"> <li>Supply to 1 current codeveloper</li> <li>Secure more than 2 new customers</li> </ul>	Make forward development investments
<b>Projectors</b>	<ul style="list-style-type: none"> <li>Leverage strengths in ultra short-throw projectors to cultivate new consumer and industrial markets</li> </ul>	<ul style="list-style-type: none"> <li>Bolster laser TV*2 lens lineup</li> <li>Strengthen embedded projector proposals in signage field*3</li> </ul>	<ul style="list-style-type: none"> <li>Laser TV lens unit sales: More than 500,000</li> <li>Industrial embedded projector orders: From more than 10 companies</li> </ul>	Secure stable earnings

\*1: IEE S.A. is a leading automotive sensor company based in Luxembourg \*2: Large-screen televisions employing projector technology \*3: Including guidance displays for passage walls and floors  
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- This page presents our optical module business strategies.
- In stereo cameras, we aim to deploy our offerings in upmarket cars and expand in overseas markets, drawing on those positions to cultivate in-vehicle cameras as well as those providing drivers with exterior views.
- For head-up displays, we will establish a new position in large displays with very high contrast and wide color gamuts. We look for domestic car manufacturers to adopt our offerings and then roll them out globally.
- In projectors, we will cultivate new markets. Focuses are the industrial and signage fields, which are getting considerable attention even if the growth there is not as great as in regular office and healthcare areas.

Market trends	Core customers	Ricoh's strengths	Initiatives and results
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<ul style="list-style-type: none"> <li>Growing need for embedded controllers and sensors for IoT and AI applications</li> </ul> <p><b>Domestic IoT market scale forecast (trillions of yen)*1</b></p> <p>CAGR13%</p>	<p>Industrial machinery manufacturers (including of robots, machine tools, measuring equipment, and cash machines)</p>	<ul style="list-style-type: none"> <li>High quality and stable supplies of controllers</li> <li>Advanced data analysis technology employing sensing devices and digital data processing technology</li> </ul>	<ul style="list-style-type: none"> <li>Long-term stable supply of top-quality products for robots, medical devices, financial equipment, and other platforms for which operational reliability is essential ⇒No. 1 in domestic industrial embedded controller market, with 22.3% share*2</li> </ul>
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<p><b>Key business strategy</b></p>	<p><b>Develop and market products delivering new value (IoT, artificial intelligence, and advanced sensing technology)</b></p>	<p>FY2022 sales target: ¥35 billion</p>
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Domain strategy	Measures	KPI (FY2022)	Initiatives and results
<ul style="list-style-type: none"> <li>Strengthen sensing business in industrial fields requiring site digitization</li> </ul>	<ul style="list-style-type: none"> <li>Market launches: Sensing business example                             <ul style="list-style-type: none"> <li>Machine tool vibration diagnostics system</li> <li>Advanced sensor VCSEL lighting</li> <li>CowTalk cattle management system</li> </ul> </li> </ul>	<p>Businesses from new product lines: More than 3 businesses (each worth ¥3 billion)</p>	<p>Expand sales by launching new products in new domains</p>

\*1: From IDC Japan press release issued on March 11, 2019, titled, Announcement of Forecasts by Domestic IoT usage cases (applications) and industrial sectors April 11, 2019 \*2: 2018 Fuji Keizai survey of unit sales numbers (C)2019 Ricoh Company, Ltd. All Rights Reserved

- This page presents our Industrial Smart Systems business.
- I am sure you are well aware that the market for embedded controllers is growing for IoT and artificial intelligence applications. Ricoh supplies such controllers, primarily to robot and machine tools manufacturers.
- We are No. 1 in Japan's industrial embedded controller market, with a share of around 22%. The quality of our controllers is a competitive strength. Even more important is that we can ensure long-term, stable supplies of various electronic parts and boards.
- We are developing new sensors to become new pillars of business. Vibration sensors are particularly promising. [We are set to begin doing business with robot and machine tools manufacturers in preventive maintenance sensors that can stabilize production facility operations.](#)

# Precision Equipment Parts and Industrial Equipment Business



Market trends	Core customers	Ricoh's strengths	Initiatives and results
<ul style="list-style-type: none"> <li>Sales of vehicles with internal combustion engines (mainly gasoline and diesel models) should keep rising, necessitating better environmental performances</li> <li>Lithium-ion battery market, principally for electric and hybrid vehicles, should expand significantly</li> </ul>	<p>Automotive parts manufacturers Electrical machinery manufacturers</p>	<ul style="list-style-type: none"> <li>Precision machining technology for materials that are hard to cut and shape</li> <li>Automated facilities development and integration</li> <li>Image inspection technology</li> </ul>	<ul style="list-style-type: none"> <li>Expanding business in automotive engine precision machined parts for which high quality and stable supplies are vital</li> <li>Supplying labor-saving automated production and image inspection equipment                             <ul style="list-style-type: none"> <li>Expanding orders for brisk lithium-ion battery market</li> </ul> </li> </ul>



<b>Key business strategy</b>	<b>Bolster existing customer base and expand business in new growth markets, centering on automotive industry</b>	FY2022 sales target: ¥17 billion
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Domain strategy	Measures	KPI (FY2022)	Results stance
<ul style="list-style-type: none"> <li>Expand orders for environmental parts (including for clean diesel and hybrid, fuel cell, plug-in hybrid, and electric vehicles)</li> <li>Broaden visual inspections to encompass the painting and other markets in which inspections are typically with the naked eye</li> </ul>	<ul style="list-style-type: none"> <li>Proposal activities to secure positions in new areas (fuel cell and electric vehicles)</li> <li>Improve defect detection capabilities of time-correlated visual inspection equipment</li> </ul>	<p>Sales in new domains: ¥2 billion increase per year in FY2022</p>	<p>Increase earnings through business expansion</p>

- Our precision equipment parts and industrial equipment business supplies components that are vital for automotive gasoline and diesel engines.
- With electric and hybrid vehicles gradually becoming mainstream, our business ties with car manufacturers have extended to facilities integration, including for lithium-ion battery production line inspection equipment. We aim to expand our businesses in such fields as our growth engines.



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- a. General economic conditions and business trend
- b. Exchange rates and their fluctuations
- c. Rapid technological innovation
- d. Uncertainty as to Ricoh's ability to continue to design, develop, produce and market products and services that achieve market acceptance in hot competitive market

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**Note: In this document, fiscal years are defined as follows:  
FY2018 = Fiscal year ended March 31, 2019, etc.**