Industry Business Briefing Session

KONICA MINOLTA 150 YEARS

Toward Growth in the Semiconductor Manufacturing Field

Optical Components Business for Semiconductor Manufacturing Equipment

October 10, 2023

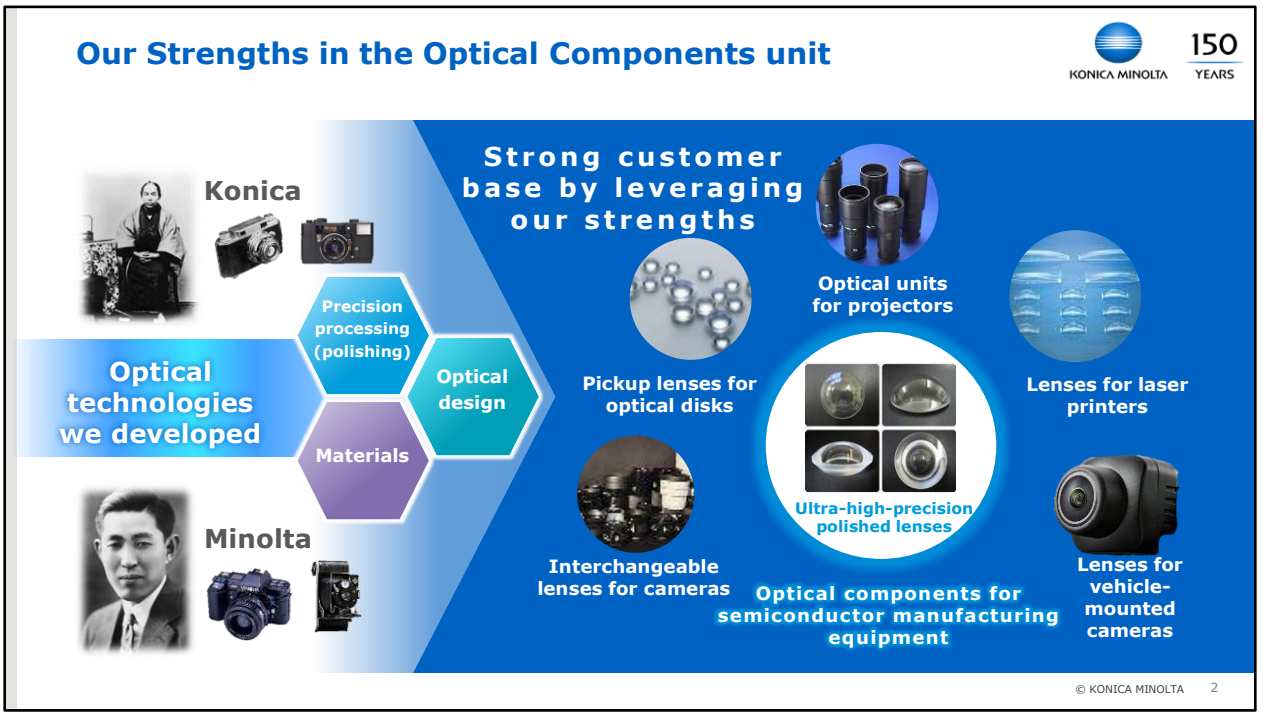
Yoshiyuki Nomura

Corporate Vice President

General Manager, Optical Component Business Unit

Giving Shape to Ideas

My name is Yoshiyuki Nomura, and I am in charge of the optical components business. I will explain the optical components business for semiconductor manufacturing equipment as a part of our efforts in the area of semiconductors.



Let me begin by explaining the strengths of our optical components business as a whole.

Looking back to before the business merger, both Konica and Minolta engaged in businesses related to photography, developing their own unique optical technologies. The optical technologies developed in the founder's business continue to support the business today as one of our core technologies.

Our key strengths lie in the precision processing including polishing technologies and materials techniques unique to an optical manufacturer, as well as the high-end optical design technologies ranging from geometrical optics to wave optics. These strengths have enabled us to develop such a broad range of optical products as pickup lenses for optical disks and optical units for high-luminance projectors used in movie theaters. This resulted in laying the foundation for a strong customer base.

Over the past decade, we also have provided optical components for semiconductor manufacturing equipment using ultra-high-precision polished lenses that minimize errors in accordance with customer specifications. In this way, we have firmly built relationships of trust with major manufacturing equipment companies.

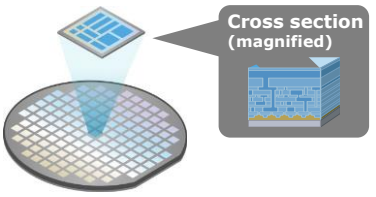
Based on this foundation, we aim to further expand our business in the area of semiconductor manufacturing, a key area of the strengthening areas for Industry. Today, I will explain our efforts in this area.

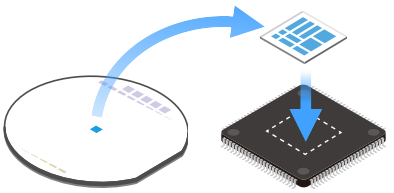
Optical Components for Semiconductor Manufacturing Processes

KONICA MINOLTA 150 YEARS

Front-end process
(forming circuits on wafers)

Back-end process
(cutting out wafers into chips)





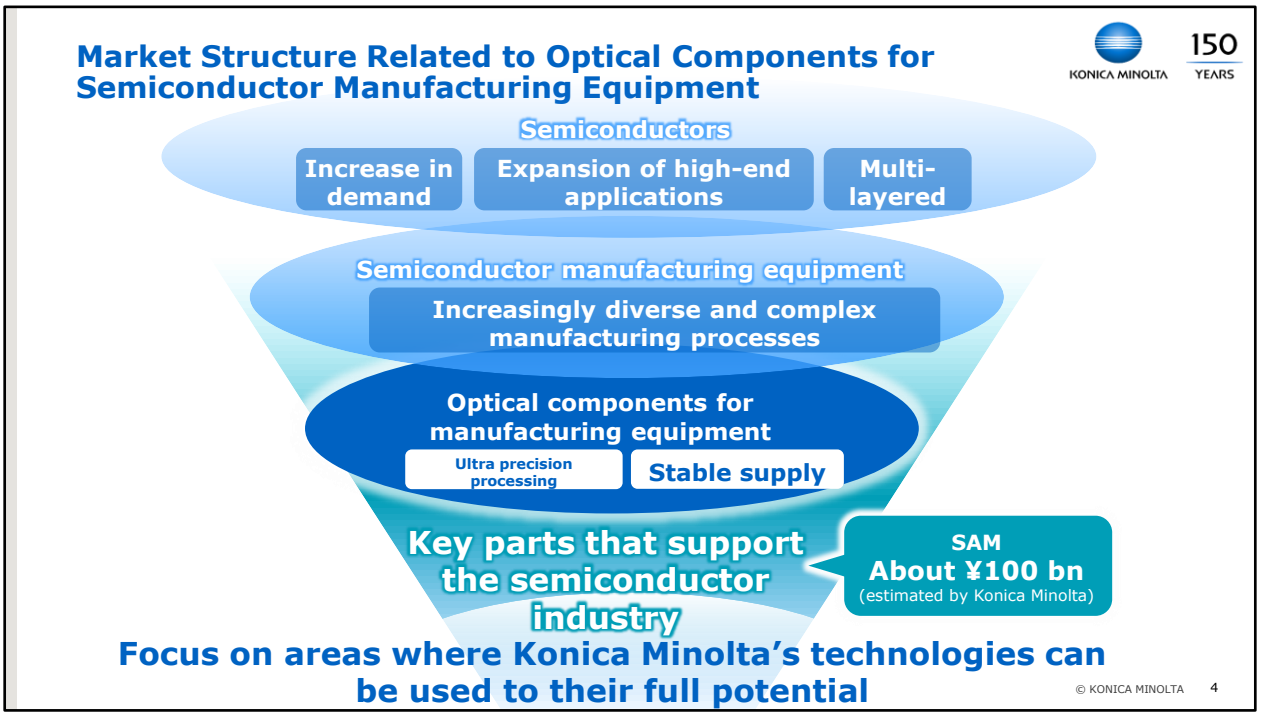
Equipment in which optical components are used includes:

- Mask inspection equipment
- Exposure equipment
- Etching equipment
- Wafer defect inspection equipment
- Exposure equipment for WLP*1/ printed-circuit boards

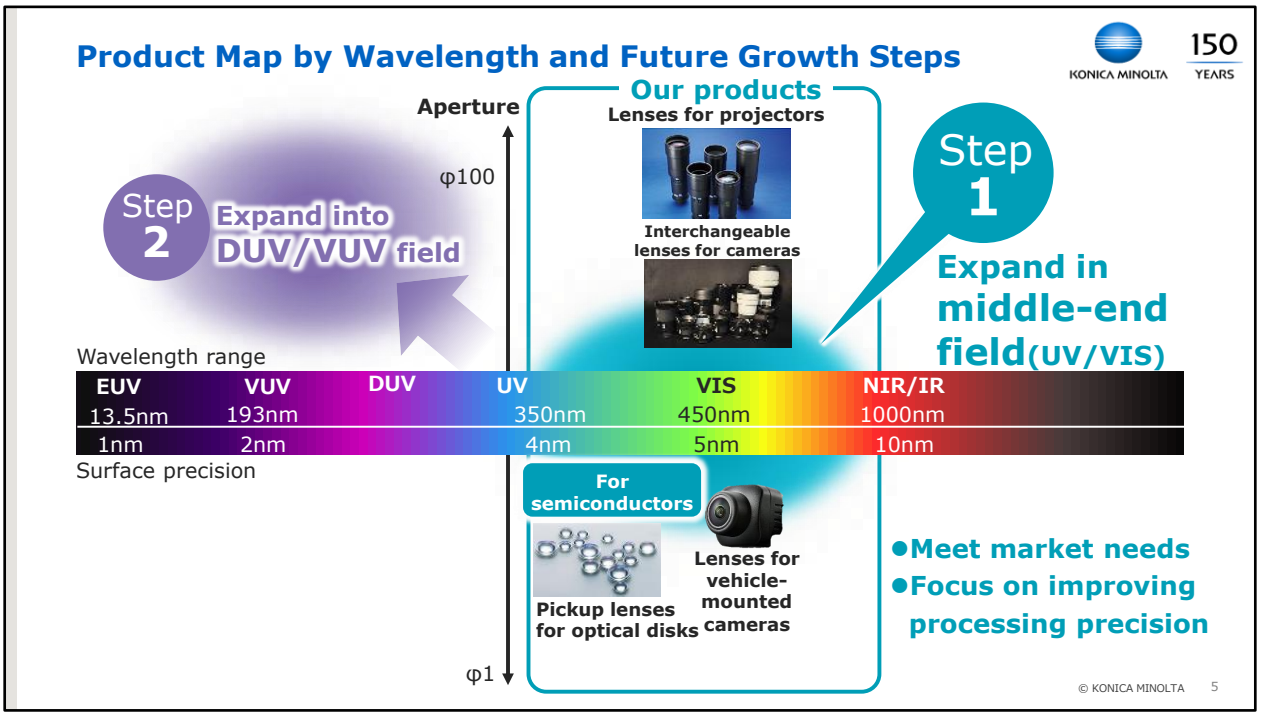
*1 Wafer Level Package, a cutting-edge package format characterized by small mounting area, etc.

 3

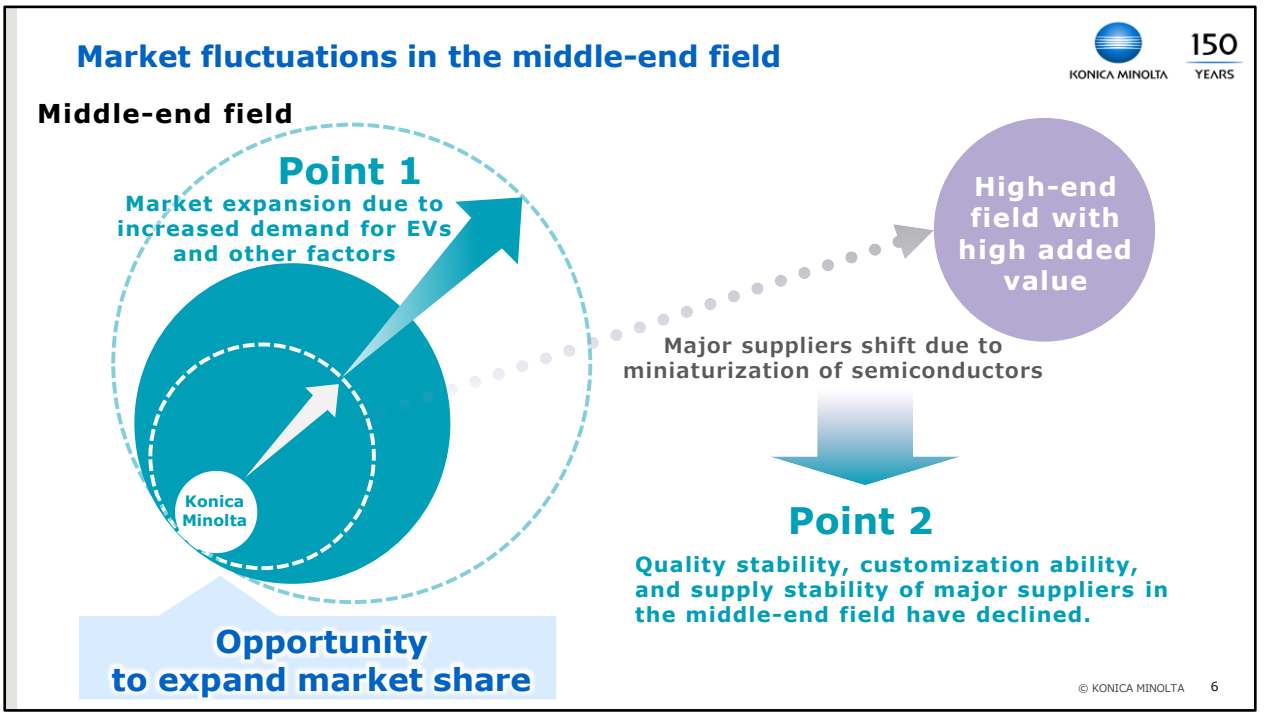
I will now explain the opportunities for optical components in the semiconductor manufacturing process.
Semiconductors are manufactured by forming circuits on disc-shaped wafers and cutting them into chips.
The semiconductor manufacturing process can be broadly divided into a front-end process and a back-end process.
The front-end process is the process up to the formation of circuits on wafers.
The back-end process is the process of cutting out wafers with formed circuits and turning them into chips.
Each process uses different types of semiconductor manufacturing equipment. In particular, optical components are incorporated into mask inspection equipment, exposure equipment, etching equipment, and wafer defect inspection equipment that are used in both the front-end and back-end processes.



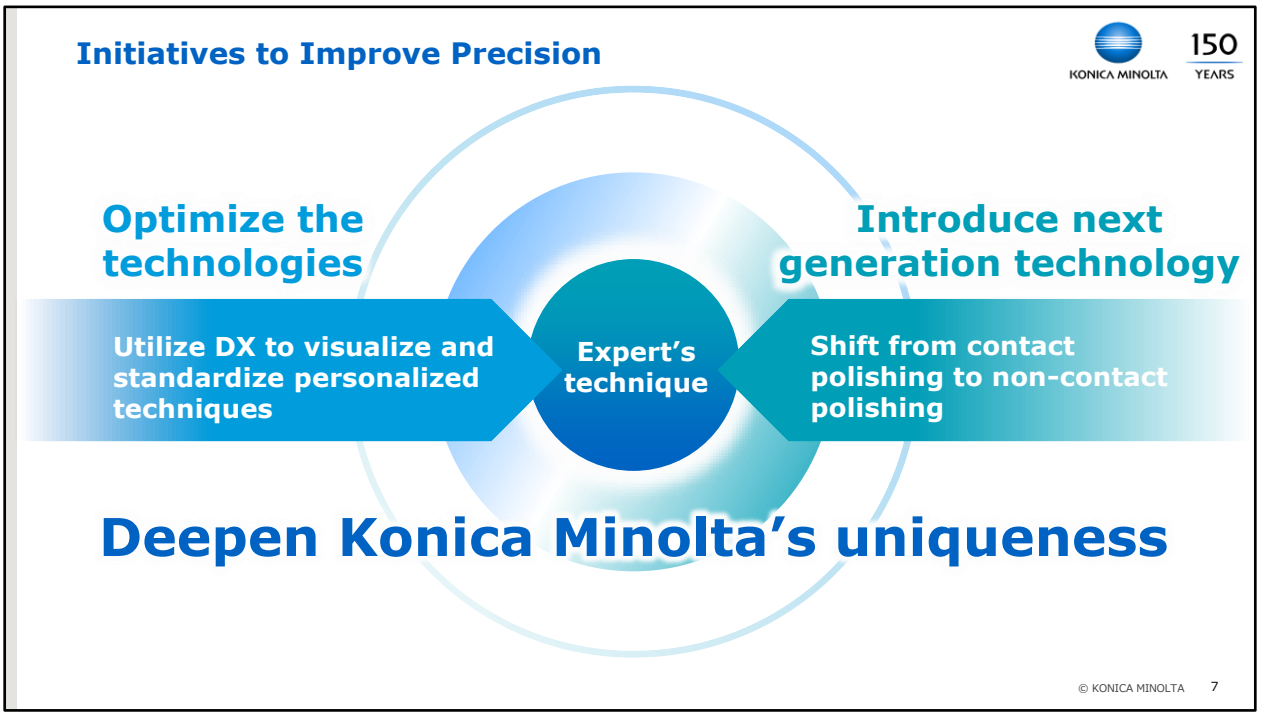
This chart shows the market structure related to optical components for semiconductor manufacturing equipment.
First, for semiconductors, demand is expected to grow over the long term, reflecting the progress of digitization and other factors. Demand is also increasing for high-end applications such as 5G and self-driving features, requiring a higher speed and capacity. This has led to the development of multi-layered chips.
In response to the circumstances, semiconductor manufacturing processes are also becoming more diverse and complex, spurring the need for semiconductor equipment manufacturers to address such issues.
The optical components we provide to semiconductor equipment manufacturers are one of the key parts that support the semiconductor industry. Given the need to customize our products to meet every need of equipment manufacturers and to provide a stable supply of products, we will leverage our strengths to provide them with value.
The optical components market for semiconductor manufacturing equipment applications is quite large, with a total accessible market of ¥800 billion. However, considering the vast range of product performance and other factors, we intend to focus our efforts by targeting areas where the technologies we have cultivated to date can be used to their fullest potential. Currently, the key target market we intend to approach over the medium to long term is estimated to be around ¥100 billion in size.



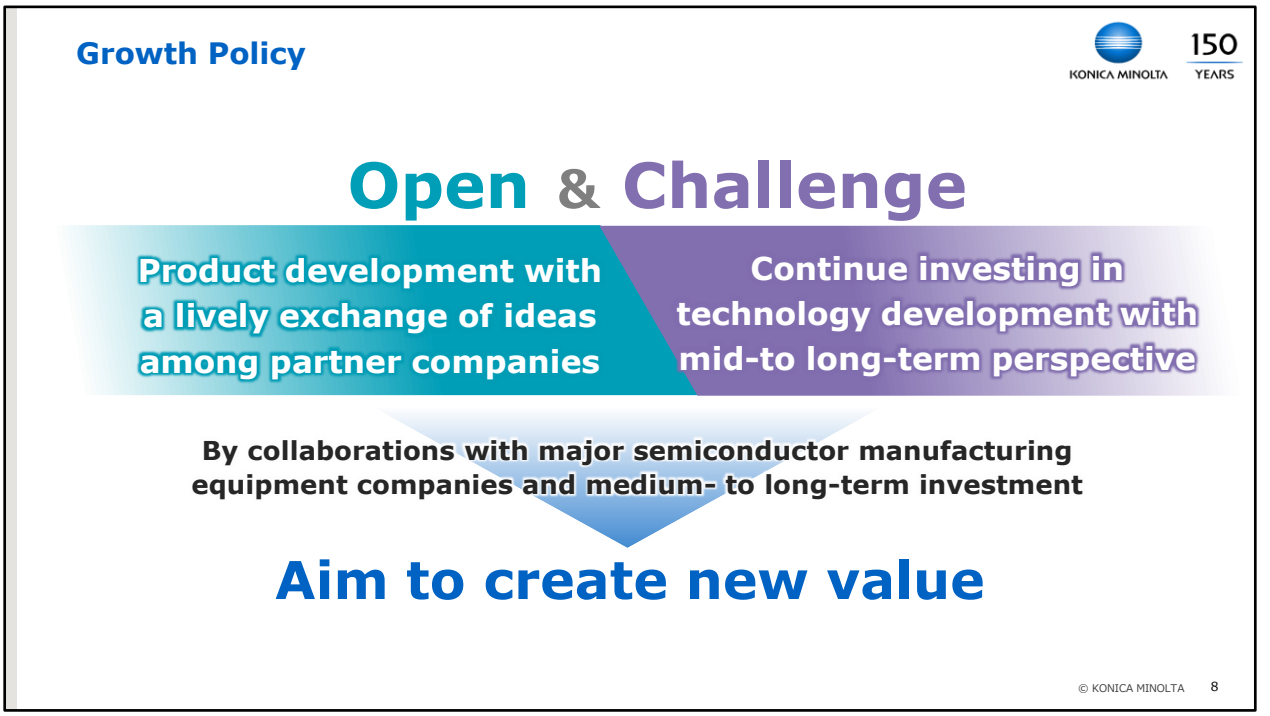
Based on product performance, I will explain our focus areas and future development.
This is a mapping of our products, with wavelength range on the horizontal axis and aperture on the vertical axis.
The left-hand side shows the shorter wavelength range. Typically, the shorter the wavelength, the higher the required surface precision. Surface precision is a parameter that indicates how much flatness is allowed on the surface of a lens. An example of this would be a flatness requirement with an error of 2 to 3 mm, or a grain of rice, within the inner area of the Yamanote Line.
We have offered products in a broad array of lens diameters, covering the lenses for so-called "entertainment", such as high-precision projector lenses and lenses for vehicle-mounted cameras, as well as technical lenses ranging from UV to Visible. Capitalizing on our strength in this area, we have provided optical components for semiconductor manufacturing equipment in the UV-VIS field, creating steady relationships with our customers.
We believe that a two-step approach is necessary to further expand our business in the area of semiconductor manufacturing.
The first is to expand our market share in the middle-end field of UV-VIS. The second is to expand into the DUV/VUV field, which we have yet to penetrate. During the period of the Medium-term Business Plan, we will focus on strengthening Step 1, and proceed with technical preparation and challenges for Step 2 in collaboration with major semiconductor equipment manufacturers.



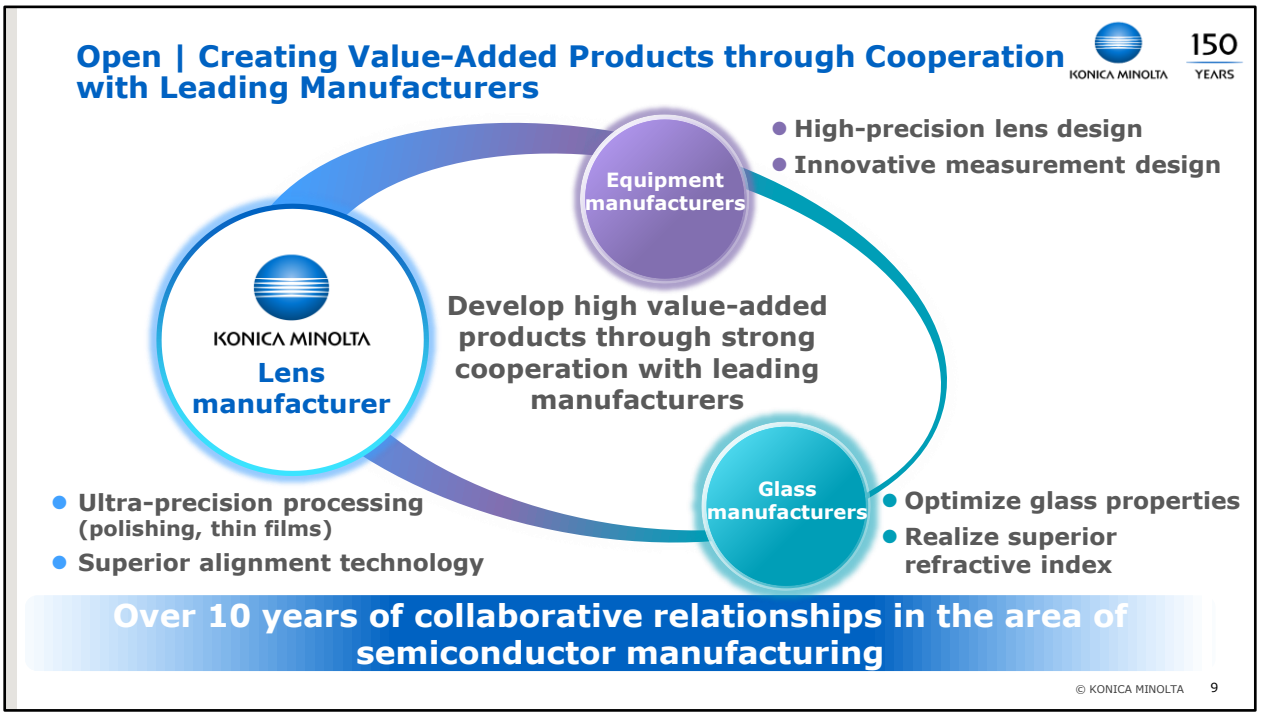
Let me explain the market opportunities in the middle-end field, which we aim to expand in Step 1.
In this area, we believe that the two points shown here are leading to opportunities for us.
The market for end products in the middle-end field, mainly for power semiconductors, is expanding due partly to an increase in demand for electric vehicles. Although we are already supplying products in the middle-end field, our market share is still limited. This indicates a significant growth potential in this area.
Amid progress in the miniaturization of semiconductors, major suppliers, with whom we compete, are beginning to shift to the high-end field with shorter wavelength ranges. This has led to a downward trend in both the middle-end supply capacity and customization capabilities tailored to customer needs. In response to these issues, we aim at increasing our market share by taking advantage of customization capabilities, which is one of our strengths.



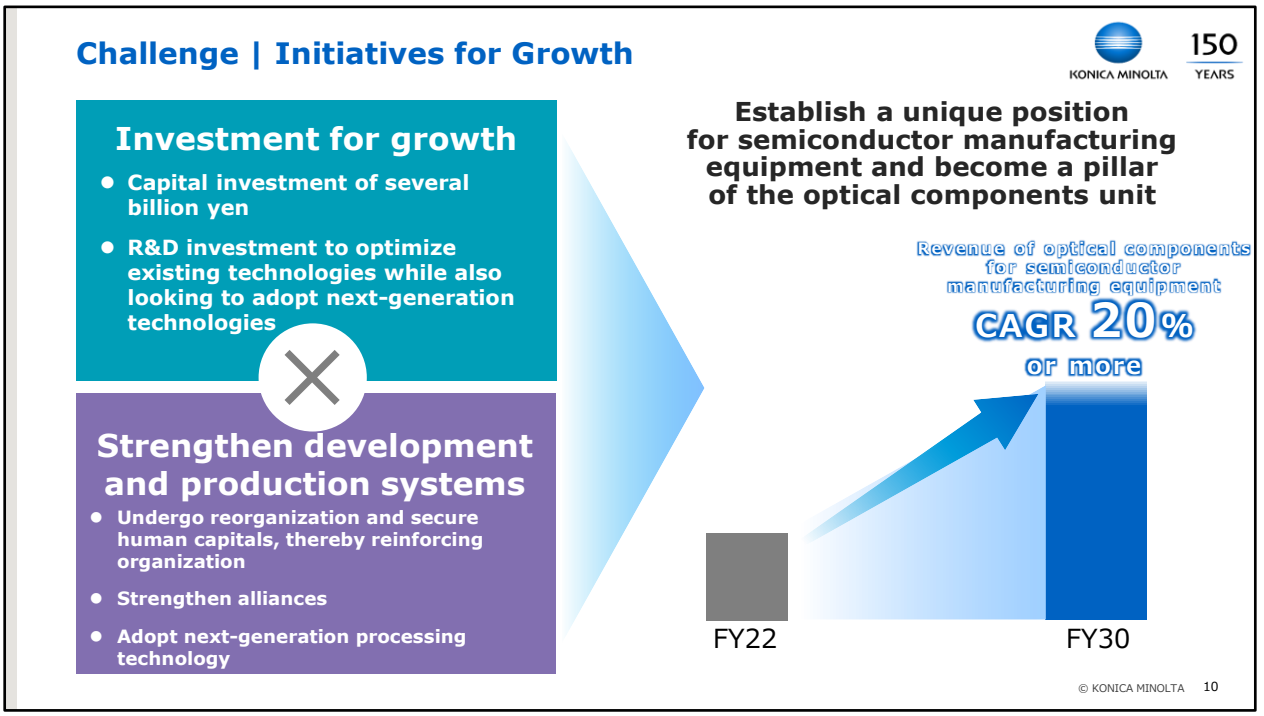
Next, I explain our efforts to expand into target areas.
There are two major points: optimization of the technologies we developed and improvement of processing precision by introducing new technology .
As I mentioned, we have optical technologies accumulated in-house that have been applied to projector lenses, interchangeable lenses for cameras, and other products.
Glass lenses, which are an essential part used in these products, are typically subjected to contact polishing. Specifically, the lens surface is ground down using a grinding stone to ensure the correct shape and surface precision. However, the condition of the grinding stone is subject to change slightly as both the lens and the grinding stone are ground down, a process known as "co-finishing." In this process, it is very difficult to achieve accuracy, and we rely on "expert's techniques" to a large extent.
To attain further expansion, we believe it is necessary to standardize techniques. To this end, we work to visualize our technique using DX. While this will enable us to produce products with high precision, it will also have the advantage of readily increasing capacity to expand the scope of our operations.
Contact polishing used to be uncertain, but we are now working on non-contact polishing as a new technology. Specifically, an ion beam is used to sharpen the lens surface at the atomic level, little by little.
While attaching importance to the world of experts, we will continue to evolve Konica Minolta's unique approach to manufacturing by integrating DX and new technologies.



We also consider the mindset to be important, and have adopted to "Open and Challenge" as our action guideline for the optical components business. Through collaboration with major semiconductor manufacturing equipment companies that we have cultivated over the years, we aim to create new value by promoting product development with a lively exchange of ideas among partner companies and by continuing to invest in technological development from a medium- to long-term perspective. I will explain specific initiatives shortly.



Our strength in the area of optical components for semiconductor manufacturing equipment lies not only in the technologies I have explained, but also in the collaborative relationships we have built with our customers.
We are already supplying products to leading companies in the semiconductor manufacturing equipment industry, taking into account their needs carefully in the development of our products. The quality of the glass used as raw materials for optical components is also of great importance. We are working closely with equipment manufacturers and glass manufacturers to develop high-precision optical components, in an effort to add value to the end product, the semiconductor manufacturing equipment.



Lastly, I would like to explain our growth strategy and goals for optical components for semiconductor manufacturing equipment. We believe there are two aspects that are necessary for our further growth: one is to further scale up our existing initiatives, and the other is to take on the challenge of what we, as the Optical Components Business Unit, have not done to date.

Specifically, the expansion of our existing initiatives includes investing more in capital expenditures and R&D. Capital investment in the optical components business to date has been very limited. Considering the need for more large-scale investments for growth, we will make capital investments of several billion yen for the expansion of the semiconductor field.

In addition, as part of initiatives unprecedented in the optical components business, we have begun to take on challenges in areas not adequately addressed up to now. These include: the launch of a department dedicated to optical components for semiconductor manufacturing equipment applications; strengthening of the organization by increasing human and the introduction of next-generation processing technology.

Through these efforts, we will establish a unique position in the area of optical components for semiconductor manufacturing equipment, making it one of the major pillars in the optical components business.

In terms of numerical targets, we plan to achieve a CAGR of 20% or more for the period from FY2022 to FY2030.

Thank you very much for your attention.