



<KOMATSU IR-DAY 2022 >

GIGAPHOTON'S GROWTH STRATEGY

December 15, 2022

Gigaphoton Inc.
President and CEO
Katsumi Uranaka

My name is Uranaka from Gigaphoton Inc. Today I would like to talk about Gigaphoton's growth strategy.

Agenda

- Gigahoton's Business Overview
- Gigahoton's Growth strategy
 - Growth strategy overview
 - (1) DUV Lightsource for Lithography
 - (2) DUV Lightsource for New Business Development
 - (3) Business Development of EUV Lightsource
- Summary



Here is today's agenda. First, I will give an overview of Gigahoton's business and introduce what kind of company Gigahoton is, and then I will explain Gigahoton's growth strategy in three parts. Finally, I will conclude with a summary.

Corporate Overview

Company name	Gigaphoton Inc.
Business	Development, manufacturing, and sale of DUV lightsource used for lithography tools in semiconductor manufacturing and for other uses, and Extreme Ultra-Violet lightsources
Established	2000/8/1
Capital	5 Billion Yen
Stockholders	Komatsu Ltd.
Head Quarters	400 Yokokurashinden, Oyama-shi, Tochigi-ken 323-8558, Japan
President & CEO	Katsumi Uranaka
Employees	1219 (as of April 30,2022)



GIGAPHOTON CONFIDENTIAL | DOC#: GPD2022-255

First of all, I would like to introduce our company profile.

The company name is Gigaphoton Inc. and its main business is the development, manufacture, sales, and maintenance service of DUV light sources for semiconductor lithography, DUV light sources for other applications, and EUV.

Gigaphoton was established on August 1, 2000.

Gigaphoton started as a joint venture between Komatsu and USHIO.

Since 2011, Gigaphoton has been a wholly owned subsidiary of Komatsu Ltd.

It is located in Oyama City, Tochigi Prefecture, approximately 40 minutes from Tokyo by Shinkansen bullet train.

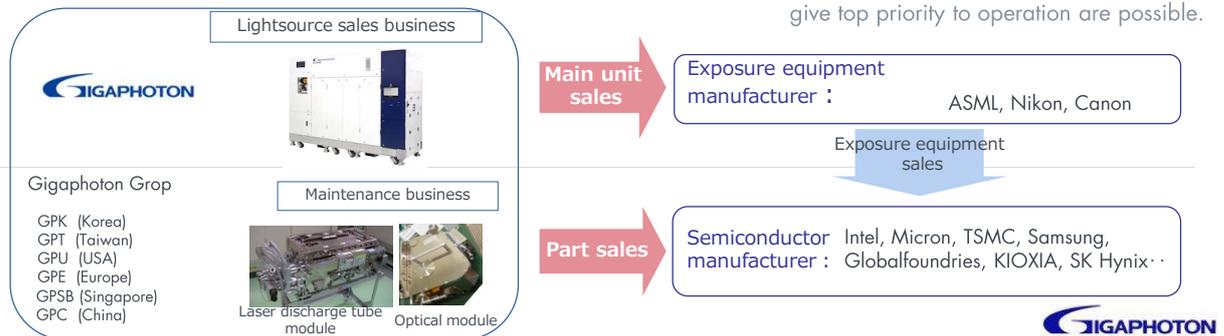
As of April 30, 2022, we had 1,219 employees.

The number of employees is increasing by 100 to 200 every year as the business expands.

Business Model of DUV Lightsource For Semiconductor Lithography

■ Composite business model of main unit (lightsource sales) and parts (maintenance business).

- ▶ The main unit is sold to exposure equipment manufactures.
- ▶ After the main unit is sold, a parts sales (pulse pay-as-you-go) contract is concluded with the semiconductor manufacturer to provide maintenance.
 - What is Pulse Pay-as-you-go? : Billing system based on laser usage(pulse usage x pulse unit price)
(Gigaphoton Advantage) Stable profits, extended component life directly linked to cost reductions, etc
(Customer Advantage) Cost management is easy, and maintenance plans that give top priority to operation are possible.



Let me explain Gigaphoton's business model of DUV light sources for semiconductor lithography.

First, there are two main businesses.

The first is the business of selling the excimer laser light source itself.

The other is to sell the light emitted from the device to customers.

First of all, in the case of sales of the light source itself, the customers are ASML, NIKON, and CANON.

We deliver excimer lasers to these three companies, which are then integrated into exposure systems at their respective companies and delivered to semiconductor manufacturers such as Intel, Micron, TSMC, and Samsung.

After the delivery, the parts sales and maintenance business will follow.

Parts sales are based on a pulse-based pay-as-you-go system.

This means that each semiconductor manufacturer is charged and sold according to the amount of light used in the production of their semiconductors.

This model is a win-win situation for both the customer and our company.

Sales of the laser itself account for about 30% of our sales, and sales of components account for 70%.

Therefore, if you ask us what our main business is, we do not sell the laser itself, but the light emitted from the laser.

Product Portfolio

Lineup

Semiconductor Lithography

KrF
G60K



ArF dry
GT45A



ArF immersion
GT66A



DUV lightsource for processing
GIGANEX series



Option
Gas recycling equipment (hTGM)



Gigaphoton's business is maintenance, development, manufacturing, and sales of **lightsource** used in semiconductor manufacturing.

- ✓ DUV lightsource for lithography
- ✓ DUV lightsource for processing (GIGANEX series)
- ✓ Gas recycling equipment (hTGM)



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Here is our product lineup.

The upper row is DUV light sources for semiconductor lithography, and the lower row is KrF, ArF dry, and ArF liquid-immersion light sources according to their wavelengths.

The lineup includes all excimer lasers required for semiconductor lithography.

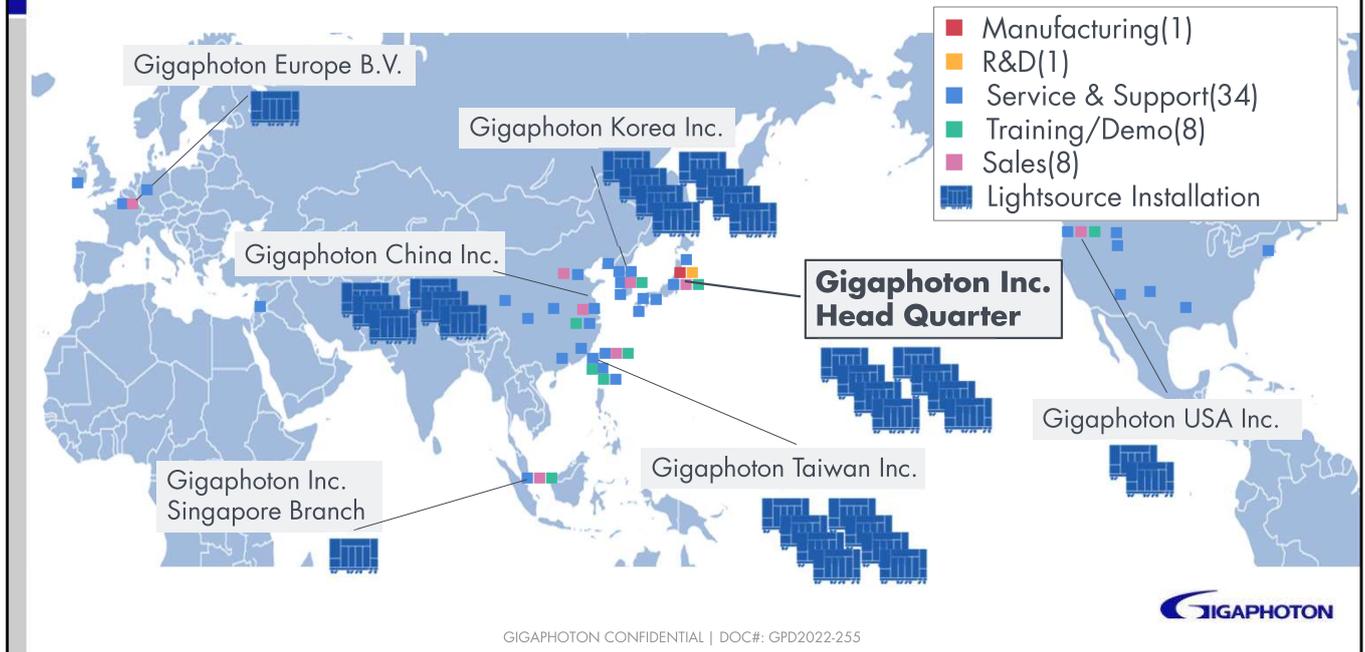
The left side of the bottom row is a newly developed Giganex series DUV light source for processing, which was developed in response to the need to successfully convert excimer lasers to processing applications.

DUV light source for processing. Compared to the light source for exposure, the purity of the light is reduced, which is unnecessary for processing applications, but the power is higher, so the power is used for processing.

On the right side of the bottom row is a gas recycling system, an optional product. This equipment recycles neon gas at the customer's plant.

As shown above, our main products are DUV light source for semiconductor exposure, DUV light source Giganex series for processing, and optional gas recycling equipment.

Worldwide Lightsource Installation and Operation



This is the base for manufacturing, R&D, and service.

Basically, production and R&D are located in Japan.

For service, we have set up service centers near each semiconductor customer, and when necessary, we can be at the customer's location within 2 hours.

Our customers are mainly front-end processors.

Our customers are mainly in the front-end process, and our major customers have factories in Taiwan, Korea, Japan, China, and the United States.

As shown in this map, we are able to service all of our major customers.

Strategy : Zero Emission Target



Gigaphoton will achieve **Carbon Neutral by 2030**

- ✓ We are committed to the semiconductor industry's goal of carbon neutral



We will replace a part of fossil-energy to **renewable energy** as using multiple ways (around 30% will be replaced in 2030, and all of them will be replaced in 2050)

- ✓ Hydrogen co-firing power generation,
- ✓ Combined heat and power system,
- ✓ Solar power generation,etc



We will purchase **J-credit** (a kind of Non-fossil Certificate in Japan) to offset greenhouse gas emission (around 70% in 2030 – the rest of replacement of renewable energy)



Products to **support customer's Zero Emission activities**

- ✓ Gas recycling equipment (hTGM), electrical power monitors for DUV light sources and low power consumption light source



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Gigaphoton, partly because we are in the semiconductor industry and partly because we are a member of the Komatsu Group. Achieving carbon neutrality is a very important goal for Gigaphoton, especially since the semiconductor industry has aggressive plans for this carbon neutrality.

In particular, the semiconductor industry is making aggressive plans for carbon neutrality.

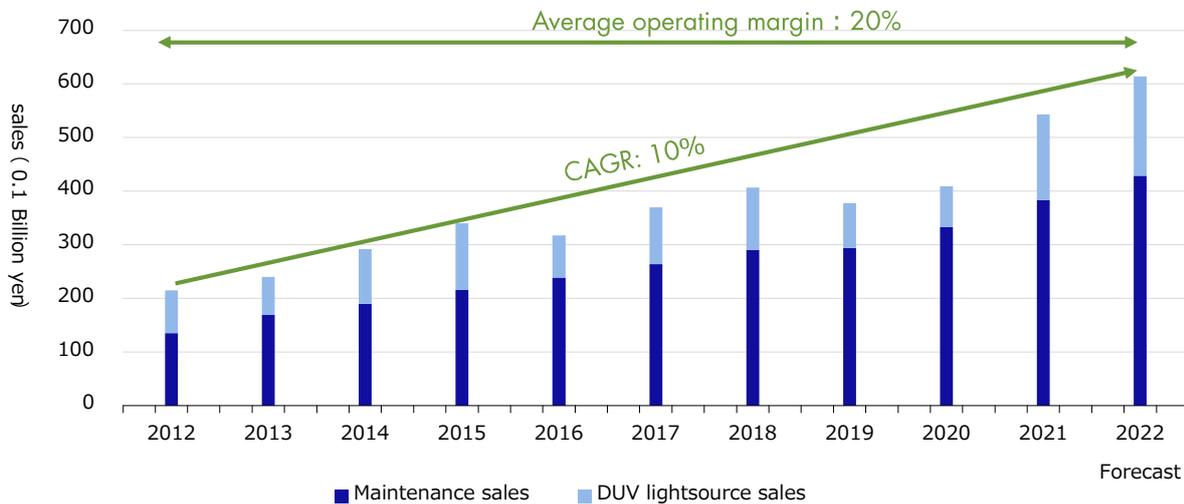
Our goal is to achieve carbon neutrality by 2030 in cooperation with our customers.

Specifically, we will promote the introduction of renewable energy and actively utilize J-credits.

We are also developing products that contribute to our customers' carbon neutrality as a matter of course.

These include devices that recycle neon gas, the price of which has skyrocketed due to supply shortages, and light sources with low power consumption.

Sales trends



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This is the sales trend of our company.

Over the past 10 years, the average annual growth rate has been 10%, and the average operating margin has been 20%, maintaining a very high growth rate and operating margin.

The dark blue bar graph shows laser maintenance sales, and the lighter blue bar graph shows laser sales.

As you can see, laser sales increase or decrease depending on the semiconductor investment status of the year.

However, laser maintenance sales are basically proportional to the cumulative number of units shipped, and thus grow steadily.

In this way, the fact that laser maintenance sales account for more than 70% of our total sales is the foundation that makes our business solid.

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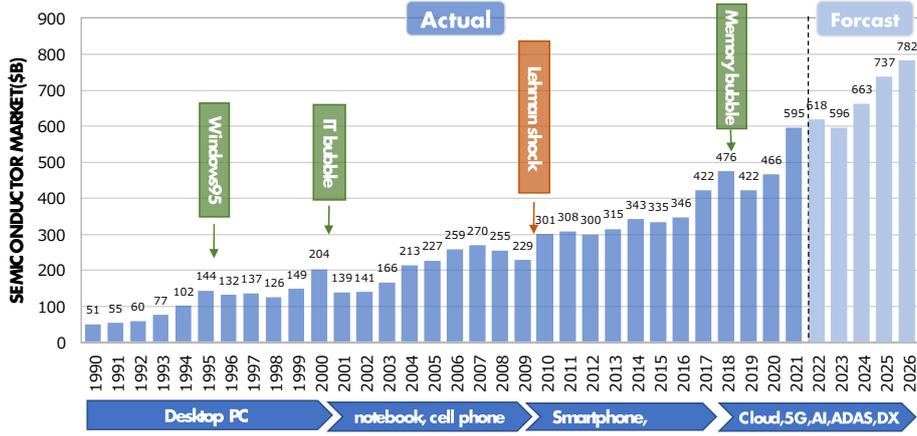


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Next, let me explain Gigaphoton's growth strategy. Gigaphoton's business can be broadly divided into three areas: our main business, DUV light sources for exposure light. The new business development of DUV light sources, which will start in the future, and We are also exploring the business of EUV light sources. I will now explain our business in these three areas.

Semiconductor Market

- Demand for semiconductors is currently about \$600 billion and is expected to grow at about 6% per year due to the expansion of IoT and DX.
- In the exposure light source market, in addition to ArF light sources, a significant increase in demand for KrF light sources is expected.



Source : Created by our Company based on Gartner data



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First, let me give you an overview of the semiconductor market, which is our business domain.

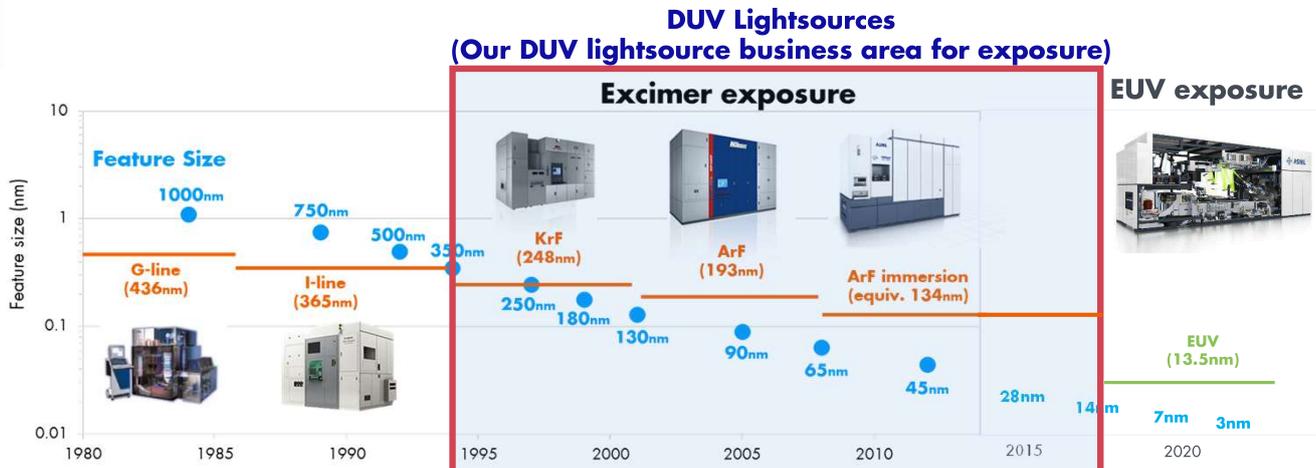
The semiconductor market is expected to grow steadily until 2030.

Until now, smartphones and tablets have driven the semiconductor market, but from now on, cloud computing, 5G, AI, ADAS, DX, and other applications will drive the demand for semiconductors.

Applications such as cloud, 5G, AI, ADAS, DX, and so on will drive the demand for semiconductors, which will steadily grow.

We believe this is a very attractive market for us.

Technological Transition of Lightsources For Exposure



Source: ASML, Nikon, Canon

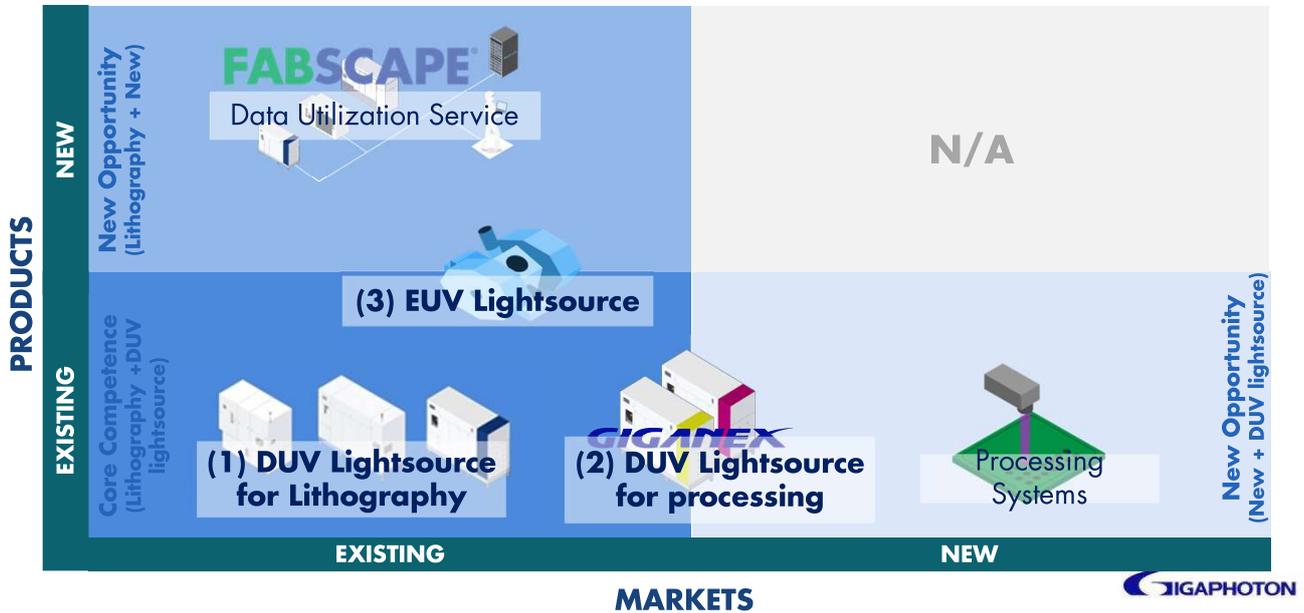


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This figure illustrates the range covered by our excimer lasers. As you know, our excimer lasers cover KrF, ArF, and ArF immersion, which are light sources covering these three wavelength regions.

In addition, DUV light sources are also used in factories that use EUV lithography. For example, if 80 exposures are required to manufacture a single chip, 20 to 30 of them are EUV exposures, and the rest are DUV exposures. The number of exposures required to manufacture a single chip is increasing with each successive generation. Therefore, it is said that the demand for DUV light sources will not disappear, but rather increase, even as miniaturization continues to advance in the future.

Growth Strategy



I will now explain our growth strategy.

We will start with our current main business, DUV light sources for exposure, which is shown in the lower left of the figure.

Naturally, we will steadily work to make the trunk of this business thicker and sturdier.

In addition, we will use our DUV light source technology in different markets, which is the DUV light source for processing on the right side.

From there, we are also looking at the processing equipment on the right, which is the left-to-right flow of the diagram.

Next, moving up from the main business, we are looking to add value within the current market.

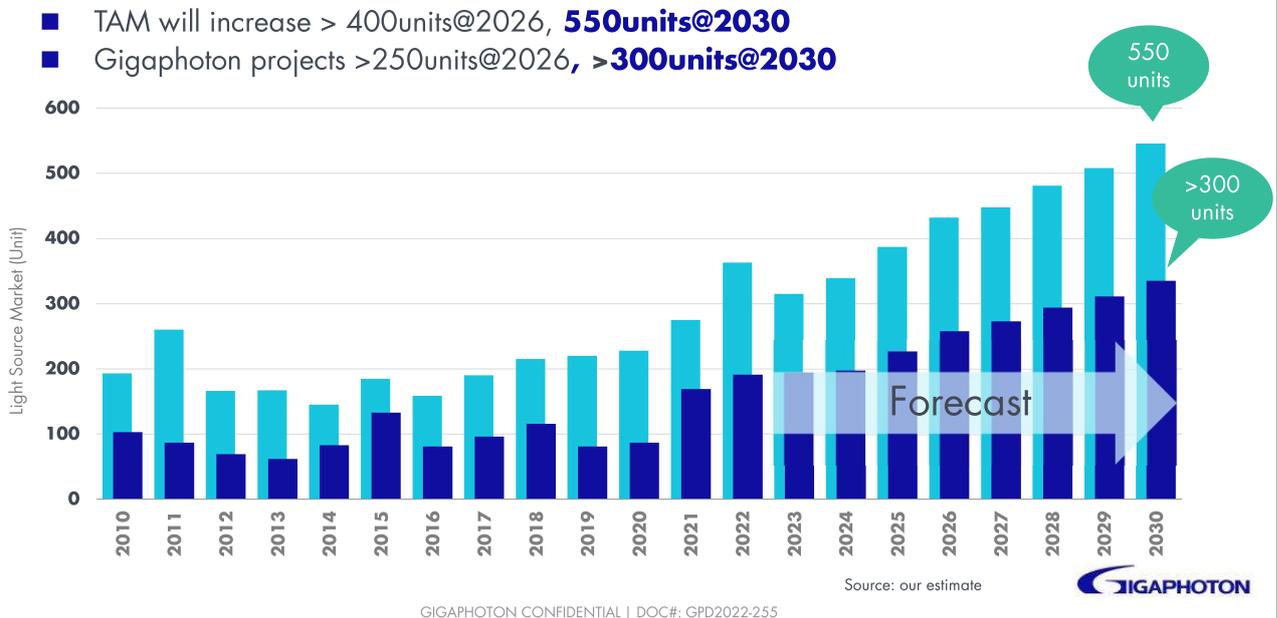
First, as a light source manufacturer, we will further contribute to the semiconductor business with a new light source called EUV light source.

In addition, our FABSCAPE service, which is at the top of the list, is a data diagnostic service.

This is a data service business that provides integrated management across various systems in semiconductor factories.

From the next slide, I will explain in the order of (1) to (3).

(1) DUV Lightsource for Lithography : The Market is Expected to Expand Significantly



This is the market size of DUV light sources for lithography, which is our core market.

We expect this to increase steadily in line with the growth of the semiconductor market.

The light blue figure here is the TAM for DUV light sources, or global demand, and the dark blue figure is our sales volume.

In the past, until around 2020, we sold about 200 TAMs per year, and our sales share was between 40% and 60%, so our annual sales volume fluctuated between 80 and 120 units.

We expect to sell about 200 units this fiscal year, which is about double the number we have sold in the past.

In the long run, we expect TAM to increase to 550 units by 2030.

Assuming that we take a 60% share of sales, this would mean an increase to over 300 units by 2030.

This is the current status of our mainframe business and our outlook for the future.

(1) DUV Lightsource For Lithography : Installation Status of Gigaphoton's Lightsources

- From 2022, **3x installation growth** is expected
- **By 2030**, installation number will reach close to **4,000 units**



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Next is the maintenance business.

I mentioned earlier that the maintenance business accounts for 70% of our sales.

The size of the maintenance business is almost proportional to the cumulative number of units shipped and in operation in the market.

Once equipment is sold, it continues to operate for more than 20 years without being discarded, so the accumulated number of units increases steadily each year.

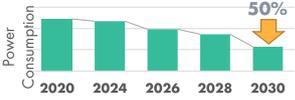
Therefore, the increase in the number of accumulated units leads to the growth of the maintenance business, which in turn leads to the stability of our business.

As I mentioned earlier, the fact that more than twice as many units will be installed each year after 2021 means that the growth in the number of units in operation will also double.

The total number of machines installed is currently about 2,000, but is expected to grow to 4,000 by 2030.

This means that the maintenance business will double in 2030 compared to the current level, so it is important to make it a profitable business.

(1) DUV Lightsource For Lithography : ① Competitive products

RAM	TECHNOLOGY	SUSTAINABILITY
<p>Long Life Developed long-life consumable parts to extend maintenance intervals and improve availability</p>  <p>AI Preventive Maintenance Raise uptime to 99.8% by utilizing proactive equipment monitoring/maintenance and AI preventive diagnosis</p> 	<p>High Output Development of a high-output light source increases equipment throughput and contributes to improved productivity</p> <p>G60K achieves 1.5 times more output than the previous generation</p>  <p>R&D Investment High development investment of 10% of sales</p> 	<p>Gas recycling Reduction of Neon gas by using together with gas recycling equipment</p>  <p>85% recycle ratio</p> <p>Power reduction Reduce power consumption of DUV light sources</p> 
<div style="background-color: #6a3d9a; color: white; padding: 10px; font-weight: bold; font-size: 1.2em;">DATA PRODUCT</div>		

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(1) DUV Lightsource For Lithography : ② Strengthen Production System – Capacity Expansion

Gigaphoton extends production capacity to support semiconductor industry growth.

■ 2021(as of Q3/E)

- Increased production capacity to **140%**

- Current facility (full utilization)
- Optimization of production process
- Acquisition of new equipment
- Enhancing supply chain management

Completed!

■ 2022

- Increase production capacity to **180%**
- P3 Annex (on going)

■ 2023

- Increase production capacity to **230%** to meet market demand.
- P4 Building



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As I mentioned earlier, the market will expand significantly in the future, and we will need to substantially increase our production capacity to meet demand. We are currently working on a three-year plan to increase production, with a plan to increase capacity by 230% by 2023, based on the FY2020 level of 100%.

The plan is on track through 2022, with 180% of the increase completed. By increasing capacity to 230% after the fall of 2023, we will be able to meet our customers' strong demand for lasers.

We are confident that this increase will be sufficient to meet our customers' strong demand for lasers and the supply of maintenance parts.

(1) DUV Lightsource For Lithography : ② Strengthen Production System – Building plan

- P4 building will be completed in July, 2023 and Production Capacity will be extended more.



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This is a top view of our factory building. P1 and P2 are the production building and P3 is the office building. This year, we added an R&D building called P3 Annex.

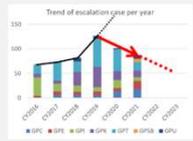
We are currently constructing a new production building called P4, which will be completed in the fall of next year. This will complete a 230% increase in production.

(1) DUV Lightsource For Lithography : ③ Strengthen the service system

- Proactive support for higher availability
 - Proactive equipment monitoring and maintenance will improve the availability of DUV lightsources.
- Improve worldwide FSE's skill
 - We are engaged in a variety of initiatives to educate our personnel.

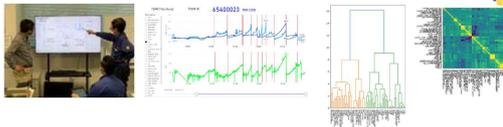
Proactive support overview

- ✓ Proper operation diagnostics
- ✓ Preparation for maintenance based on diagnostic
- ✓ Replace parts at the appropriate time



Health checks for new lightsources

- ✓ Visualization of data enables clear and speedy troubleshooting
- ✓ AI based health checks under development



WW trainer's meeting



Skill evaluation for FSE



Video manual



VR/AR training



Finally, I would like to explain how we are strengthening our service system. To help maintain high utilization rates at our customers' plants, we proactively diagnose equipment conditions and analyze data using AI. Preparation for preventive maintenance based on the results of such diagnostics and replacement of parts at the appropriate time will help achieve even higher utilization.

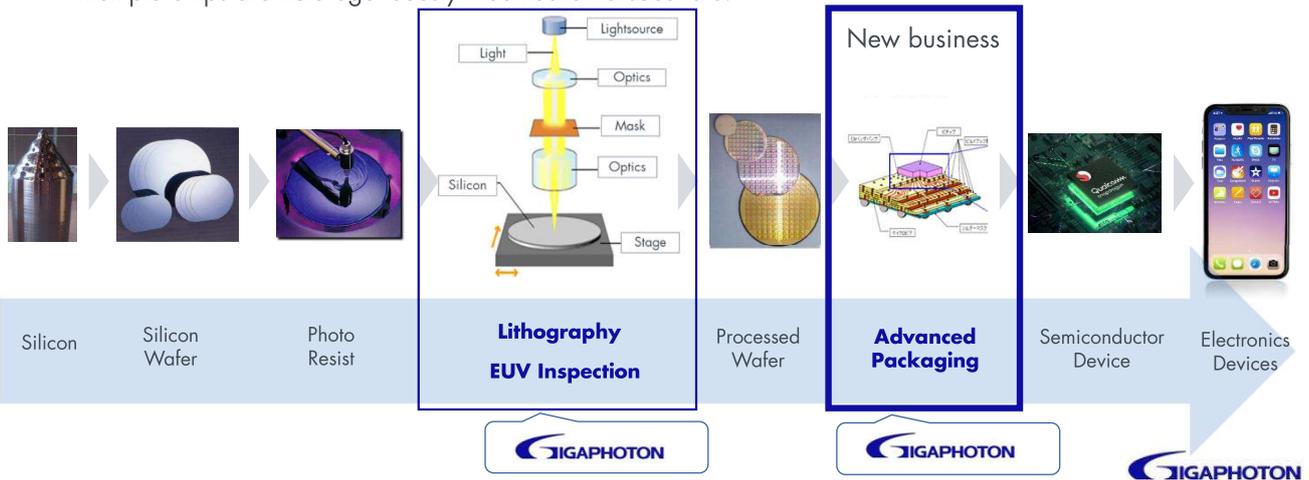
In addition, as the cumulative number of FSEs installed will increase significantly, it will be important to improve the skills of existing and future FSEs to be hired.

For example, WW trainer meetings, introduction of video manuals, FSE skill evaluation system, training using VR/AR, etc.

By implementing various human resource training programs, we hope to continue to provide a stable and high level of support.

(2) DUV Lightsource for New Business Development

- DUV lightsources have supported semiconductor miniaturization in front-end processes with KrF, ArF, and ArF immersion lightsources.
- Gigaphoton's DUV contribute to semiconductor miniaturization in **advanced packaging processes** where multiple chips are heterogeneously mounted on a substrate.



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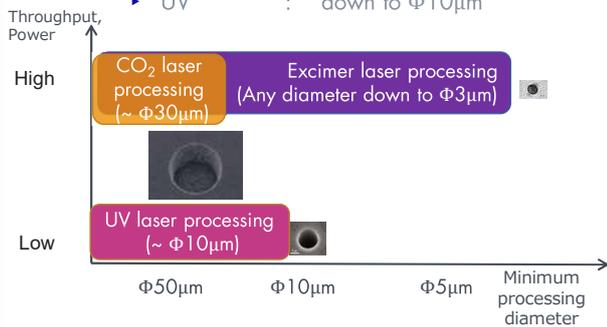
Next, as the second part of our growth strategy, I would like to explain our new business development of DUV light sources.

In our main business, excimer lasers are used as light sources for lithography, but in our new business, we will utilize excimer lasers in a process called advanced packaging.

(2) DUV Lightsource for New Business Development

Advantages of DUV Lightsource

- Excimer laser processing can process any diameter down to $\phi 3\mu\text{m}$ at the same time.
- While CO₂ or UV laser drilling tool can process one diameter in one time.
 - ▶ CO₂ : down to $\phi 30\mu\text{m}$
 - ▶ UV : down to $\phi 10\mu\text{m}$



Target market

- Micro VIA processing is required in the **advanced packaging process** for semiconductors, where multiple chips are heterogeneously mounted on a substrate.
- Based on the processing characteristics of DUV lightsource, we are considering entering a market that will require it around 2024.

Process Name	Intel 7	Intel 4	Intel 3	Intel 20A
Shipment start time	2022	2023	2024 ?	2025 ?
Process node	10nm+	7nm	5nm	2nm
Production name (for data center)				
Required processing diameter (Min.)	$\phi 30\sim 20\mu\text{m}$	$\phi 20\sim 15\mu\text{m}$	$\phi 14\sim 10\mu\text{m}$	

Source: Intel (Xeon Roadmap)



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First of all, let me explain why excimer lasers are used in advanced packaging.

In the state-of-the-art semiconductor industry, integration is being promoted through packaging that integrates chips in three dimensions, while at the same time miniaturizing the line width of circuits on chips to increase the level of integration.

At the same time, integration is being promoted by means of packages that integrate chips in three-dimensional directions.

In the advanced packaging process, microvias, which are microscopic holes for connecting layers, are required.

Conventional CO₂ and UV lasers have limitations in hole diameter. Specifically, CO₂ lasers are said to have a hole diameter of 30µm, while UV lasers have a hole diameter of 10µm.

On the other hand, drilling with excimer lasers has the potential to drill holes as small as 3µm, and is considered a promising technology.

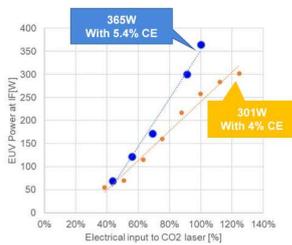
We hope that excimer lasers will be used in the next generation where they are needed and contribute to the miniaturization of semiconductors through advanced packaging.

(3) Business Development of EUV Lightsource

Development history

Phase	CY2000	CY2005	CY2010	CY2015	CY2020	CY2025
Original R&D	[Timeline bar from 2000 to 2005]					
National level development project research at EUVA on Hiratsuka site	[Timeline bar from 2000 to 2010]					
Original development at Hiratsuka site	[Timeline bar from 2005 to 2020]					
Original development at Oyama HQ	[Timeline bar from 2020 to 2025]					

■ In August 2022, we integrated our EUV R&D sites from Hiratsuka to Oyama. We will accelerate EUV development in the future by achieving synergy effects in EUV and DUV development.



■ EUV applications are considered for various possibilities.

- ▶ Mask inspection system
- ▶ Lithography (patterning)
- ▶ Critical processing such as line-and-space processing and hole formation for contacts, vias, and fine wiring

Source : 6th EUV-FEL WORKSHOP 2022.1.18 Gigaphoton's report



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As a third growth strategy, we are also pursuing business exploration of EUV light sources.

As some of you may know, we have been conducting research and development of EUV light sources since 2000. At this point, we have not yet been able to develop a business, but we have a competitive technology, so we are continuing our research and development. In August of this year, we integrated the EUV R&D unit that was located in Hiratsuka into the Oyama facility, which will accelerate our development efforts. We are also looking into various EUV applications, and we hope that this will lead to business with our customers.

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Finally, a summary.

Summary

- Gigaphoton provides exposure light sources, a key component of production equipment in the growing semiconductor industry. **Sales are growing at an annual rate of 10%; the company is a high-growth, highly profitable company with an operating margin of 20%.**
- The market for DUV light sources is expected to grow rapidly, with annual sales doubling and total installed base doubling by 2030.
- Growth strategy
 - ▶ **DUV Lightsource for Lithography**
① Competitive products, ② Strengthen production system, ③ Strengthen the service system
 - ▶ **DUV Lightsource for processing**
Entry into micro VIA processing in advanced packaging processes
 - ▶ **EUV Lightsource**
Development sites are integrated to accelerate development speed. Currently in business development phase.
- We aim to achieve carbon neutrality in 2030 with respect to our own **ZERO emission**. We are also actively contributing to solving our customers' environmental problems with **our gas recycling equipment**.



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Gigaphoton is a company that can provide competitive light sources and services in the fast-growing semiconductor industry. We are a high-growth, highly profitable company with steadily growing sales and a high operating margin.

We believe that the market for DUV light sources will not decrease and will continue to grow steadily even with the introduction of EUV light sources. We expect our annual sales volume to double by 2030 and the number of units installed to double as well, which means that the company itself will be able to grow significantly.

In addition to DUV light sources for lithography, we will also start new businesses to further accelerate our growth.

In addition, we will naturally aim to achieve carbon neutrality in 2030, which is a high target for our CO2 emissions. We are also actively researching and developing environmentally friendly gas recycling equipment to help our customers reduce their environmental impact.

That concludes my explanation.
Thank you very much.



GIGAPHOTON
The Future is Today

THANK YOU FOR
YOUR ATTENTION

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