

# DUV Products and Business Opportunity

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Public

# ASML

# ASML Small Talk 2021

Investor Day  
Virtual



# DUV products and business opportunity

## Key messages

**DUV demand** is at a record high and expected to remain strong for the foreseeable future driven by both the **Advanced** and the **Mature** market segments

Innovation in technology for the **Advanced Logic and Memory market** will continue; we extended the roadmap on all **wavelengths**, with **performance** and **productivity** improvements on the **NXT** platform to support the industry's cost and energy efficient scaling

The **Mature market including More than Moore applications** presents a growth opportunity by building on the **XT** portfolio in combination with solutions addressing the specific requirements of market segments like power devices, sensors

With the aim to **optimize the installed base** for our customers, there is an increased focus on **value added services** in combination with **productivity** and **performance upgrades**



- **Markets**

Advanced Logic and Memory

Mature Logic and Analog nodes,  
and More than Moore markets

Installed base

# DUV business outlook improved significantly

Driven by strong markets, increased process complexity and installed base growth

## 2018

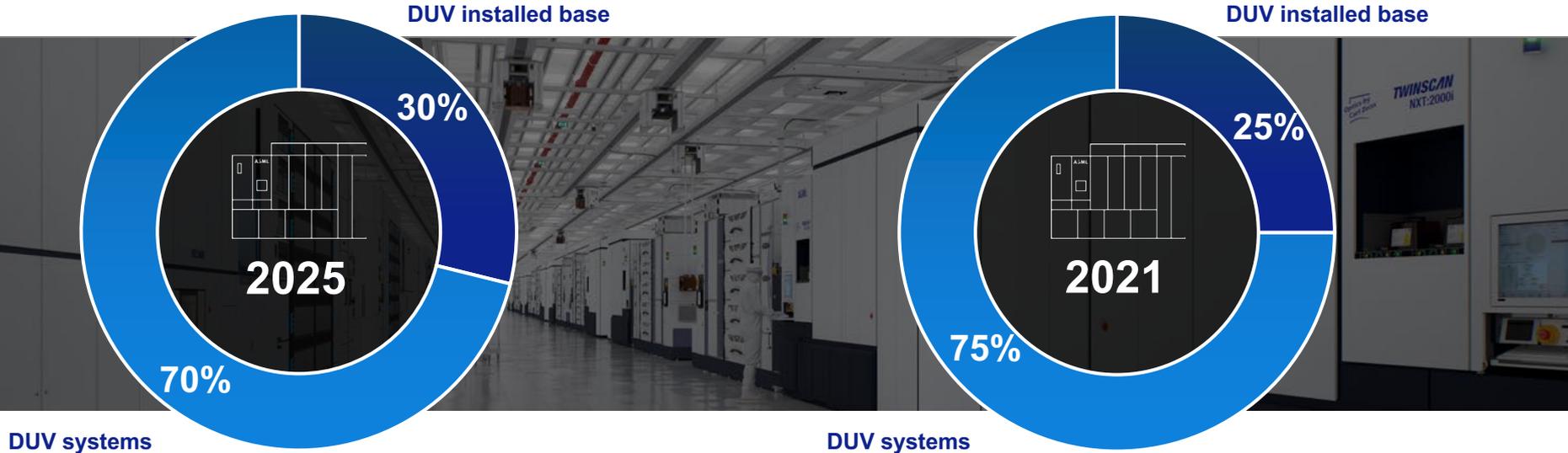


In 2018 our forecast assumed a reduction in immersion demand due to EUV adoption, market growth in line with historical trends

# DUV business outlook improved significantly

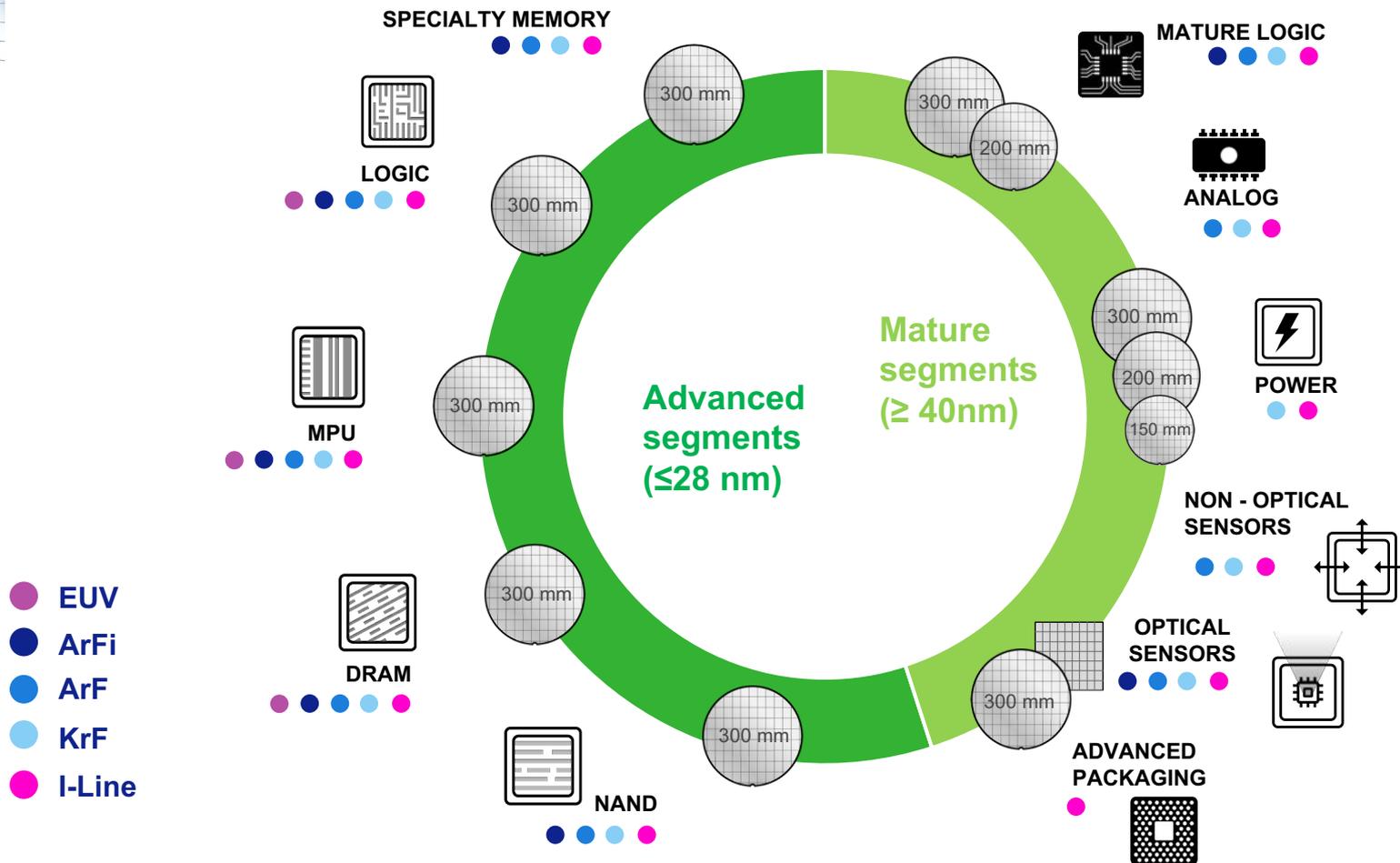
Driven by strong markets, increased process complexity and installed base growth

## 2021



Drivers include technology innovation, increase in process complexity resulting in more demand at all wavelengths, and growth in the installed base business opportunity

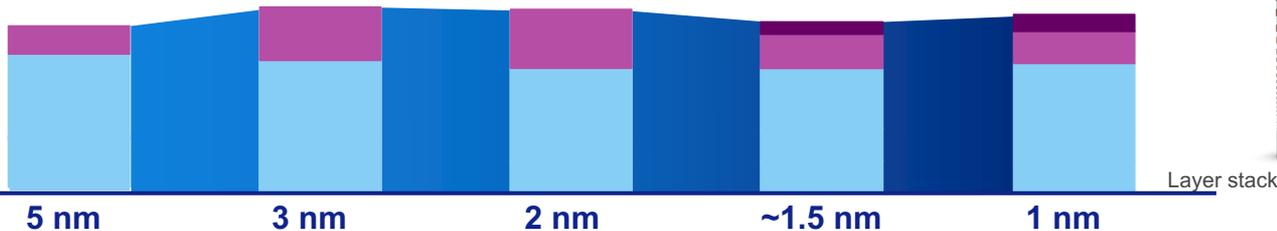
# DUV addresses numerous market segments



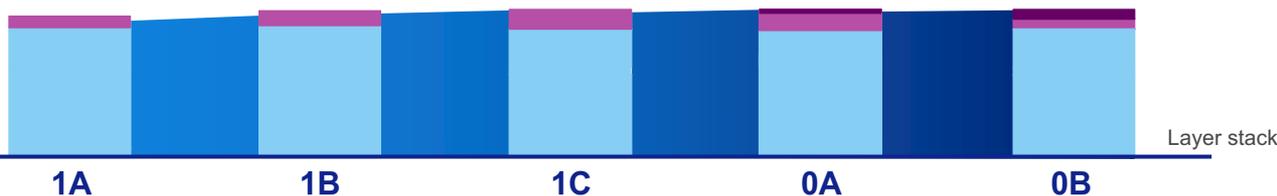
# Projection of lithography layers by technology

Lithography layer count grows, driven by DUV and EUV

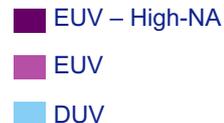
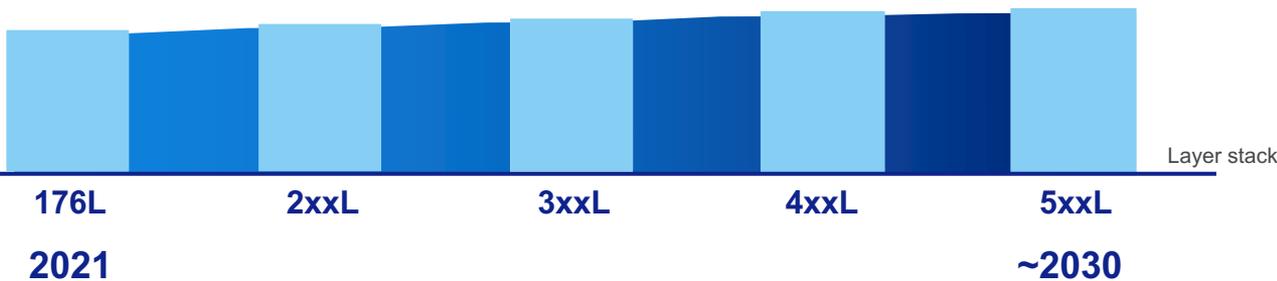
Logic



DRAM

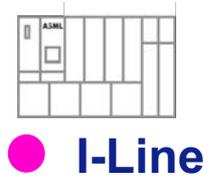
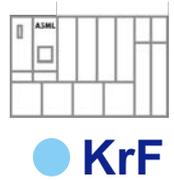
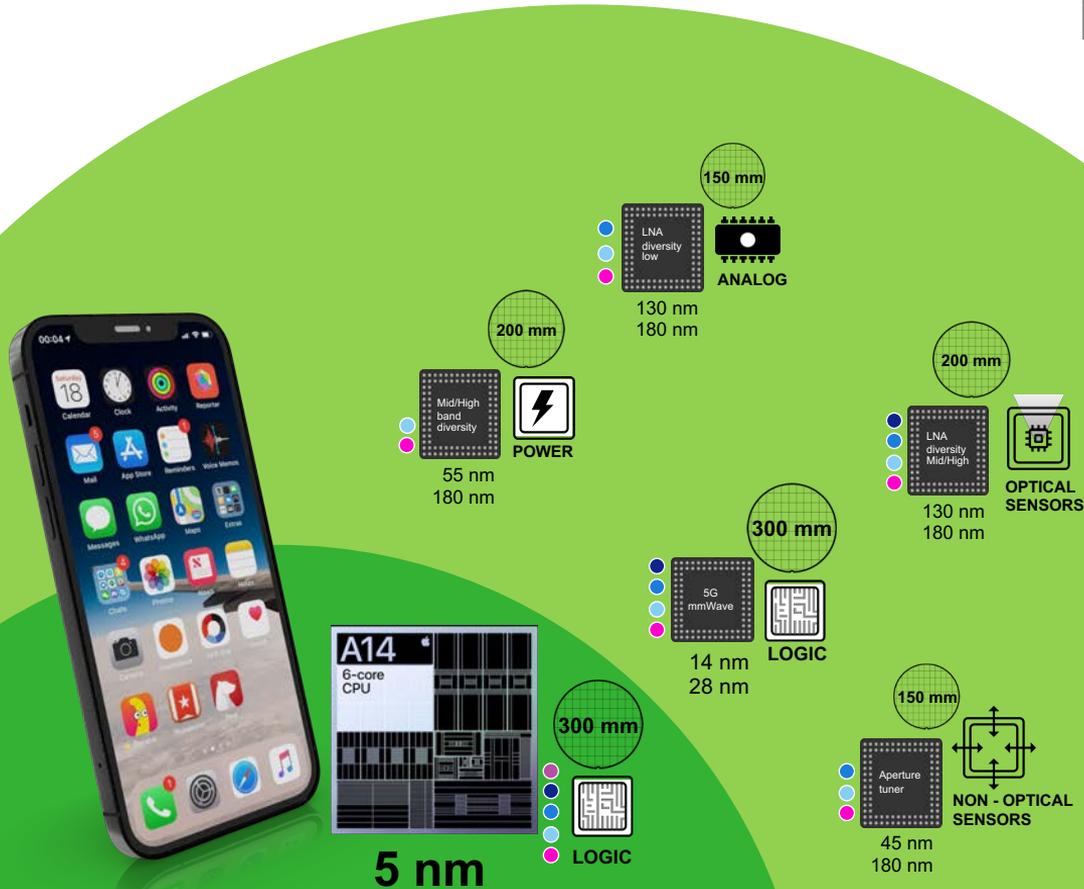


3D-NAND



# Our end markets are increasingly interdependent

## Requiring an integral portfolio of solutions



# DUV product portfolio to support all market segments

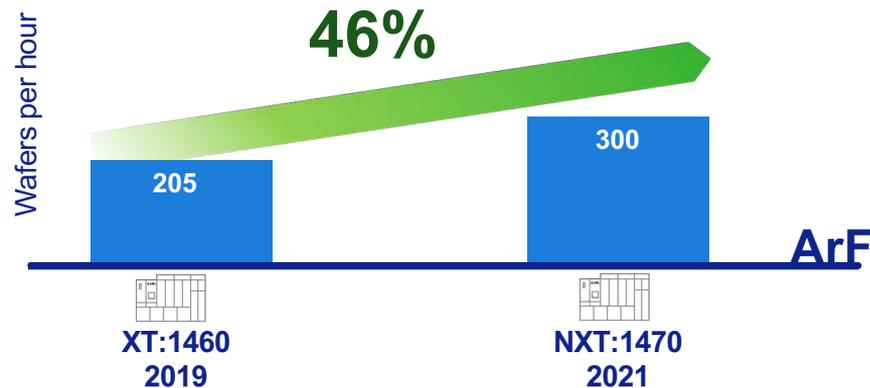
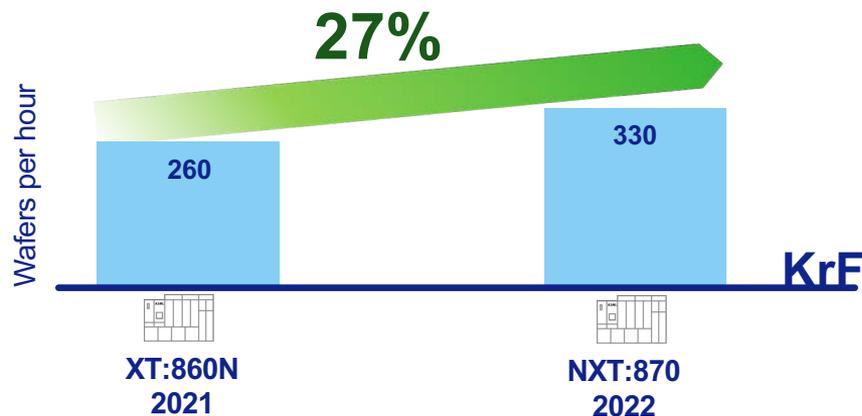


Product: Matched Machine Overlay (nm)|Throughput(wph)

Product status: Released | Development | Definition

\*\*Wafer inner field

# NXT transition improves KrF and ArF productivity significantly



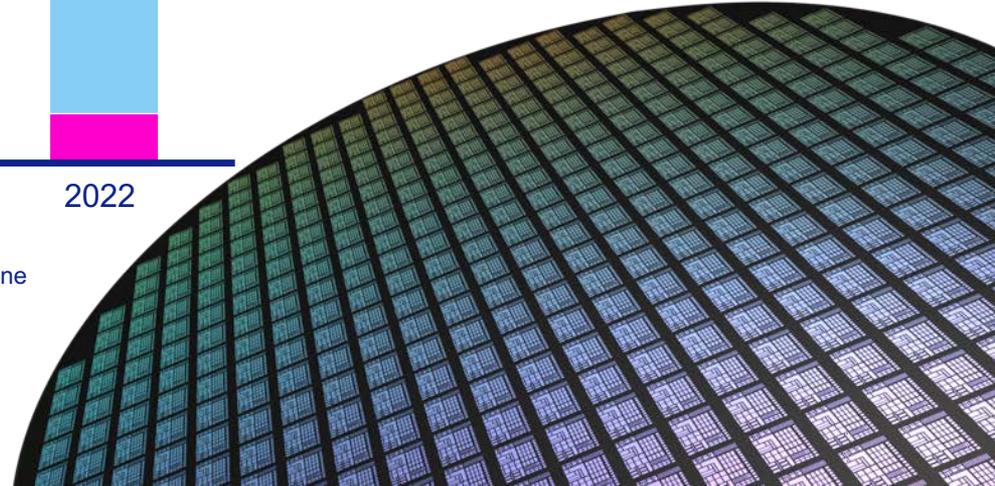
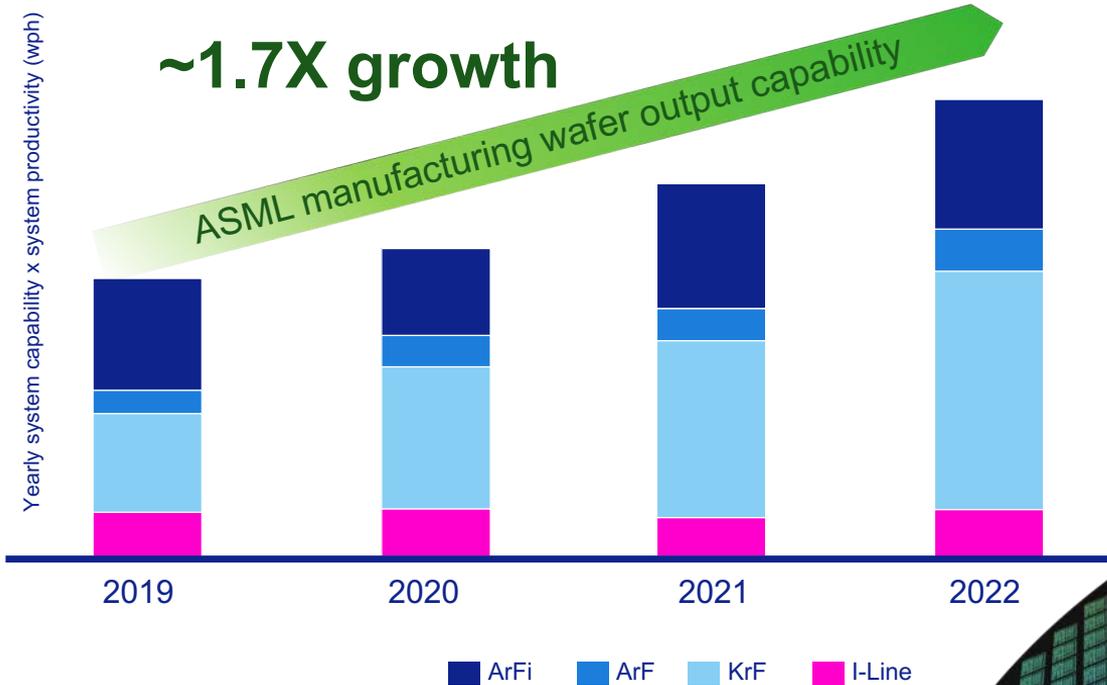
NXT:1470 first litho system  
to show >300wph

# We will support our customers' wafer demand By increasing factory output and scanner productivity

Yearly system capability x system productivity (wph)

**~1.7X growth**

ASML manufacturing wafer output capability



## Markets

- **Advanced Logic and Memory**

Mature Logic and Analog nodes,  
and More than Moore markets

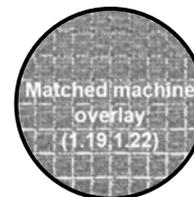
Installed base

# NXT:2050i in volume manufacturing at customers

## 20% overlay improvement, faster reliability and productivity ramp-up



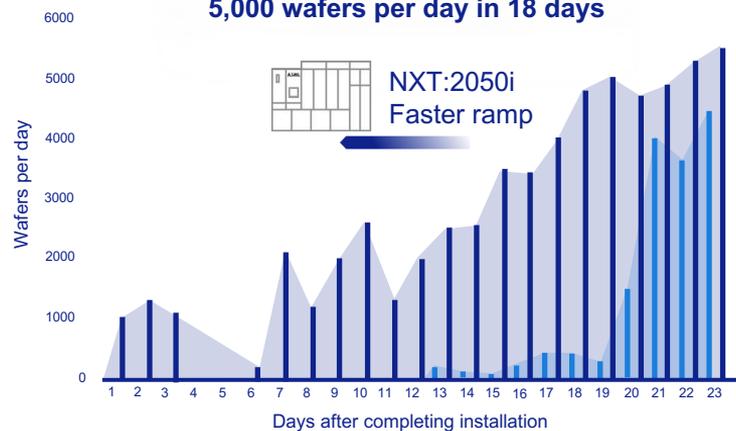
NXT:2050i



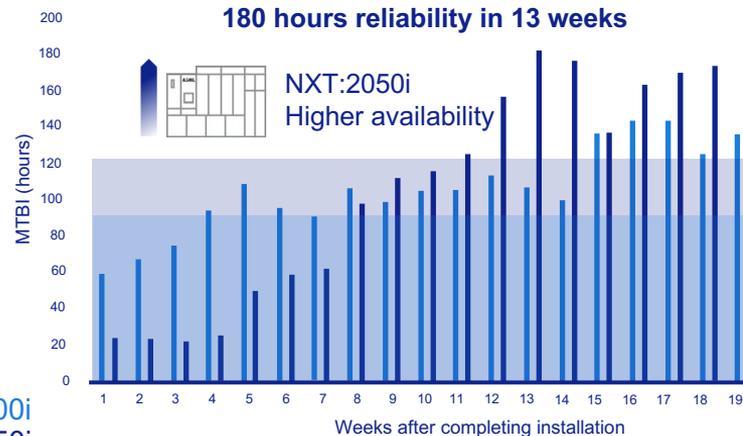
Matched machine overlay ~1.2 nm

Dedicated chuck overlay ~0.8 nm

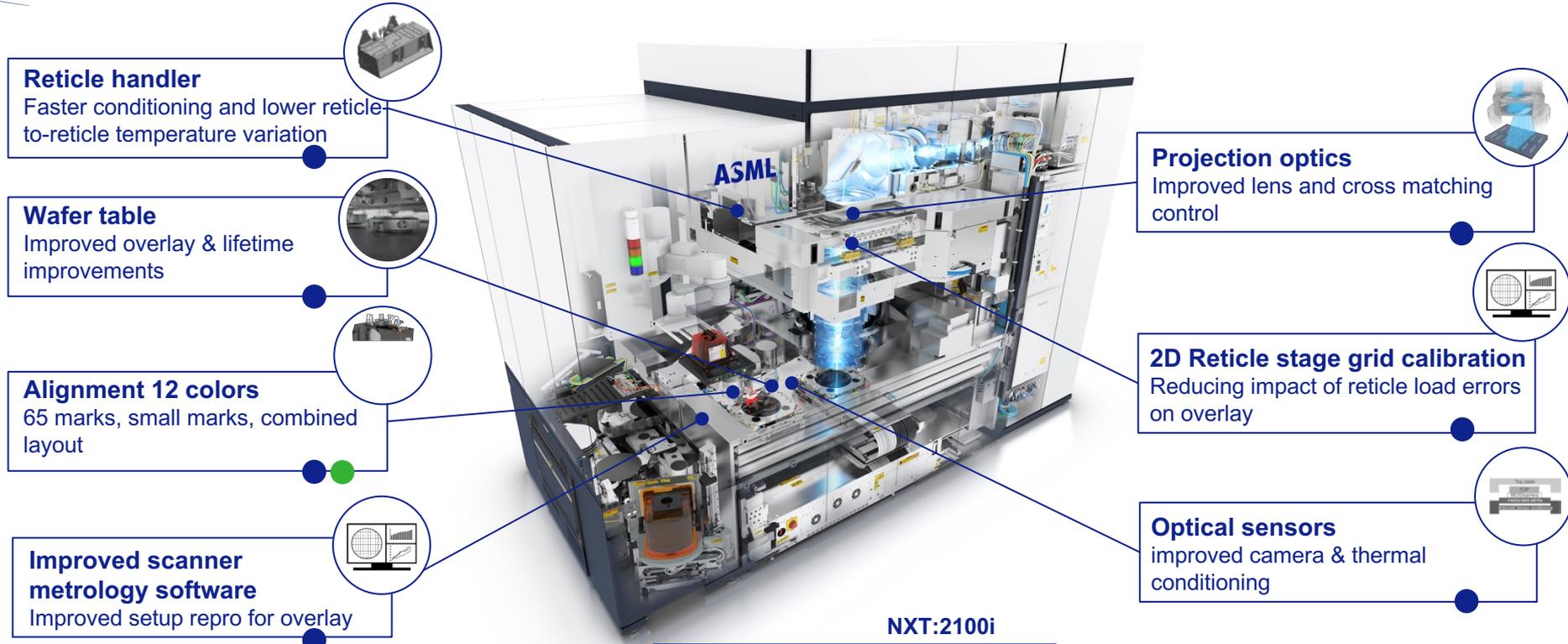
5,000 wafers per day in 18 days



180 hours reliability in 13 weeks



# NXT:2100i makes a 20% step in on product overlay vs the NXT:2050i for a typical DRAM application



**Reticle handler**  
Faster conditioning and lower reticle to-reticle temperature variation



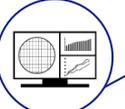
**Wafer table**  
Improved overlay & lifetime improvements



**Alignment 12 colors**  
65 marks, small marks, combined layout



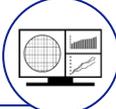
**Improved scanner metrology software**  
Improved setup repro for overlay



**Projection optics**  
Improved lens and cross matching control



**2D Reticle stage grid calibration**  
Reducing impact of reticle load errors on overlay



**Optical sensors**  
improved camera & thermal conditioning

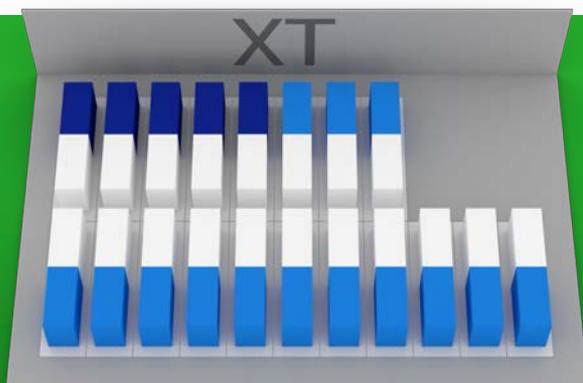


NXT:2100i	
Throughput	≥295wph
MMO	≤1.3nm
On Product Overlay	≤1.4nm (DRAM)

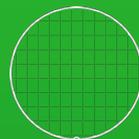
- Productivity
- Overlay

# NXT platform reduces capital investment, fab space

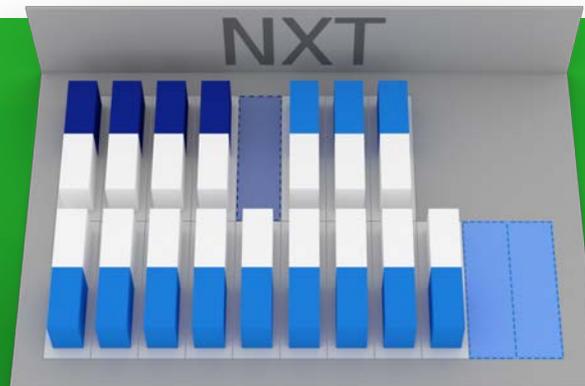
NXT brings 17% footprint reduction with 100k wafer starts per month



Fab pattern area

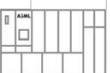


**Use case:**  
100 kwspm  
5 ArF (dry) layers  
20 KrF layers

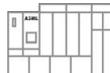


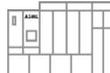
Fab pattern area

172m<sup>2</sup>  5 x XT:1460K (205wph)  
ArF(dry)

482m<sup>2</sup>  14 x XT:860N (260wph)  
KrF

Total \_\_\_\_\_  
**654m<sup>2</sup>**

140m<sup>2</sup>  4 x NXT:1470 (300wph)  
ArF(dry)

421m<sup>2</sup>  12 x NXT:870 (330wph)  
KrF

Total \_\_\_\_\_  
**561m<sup>2</sup>**

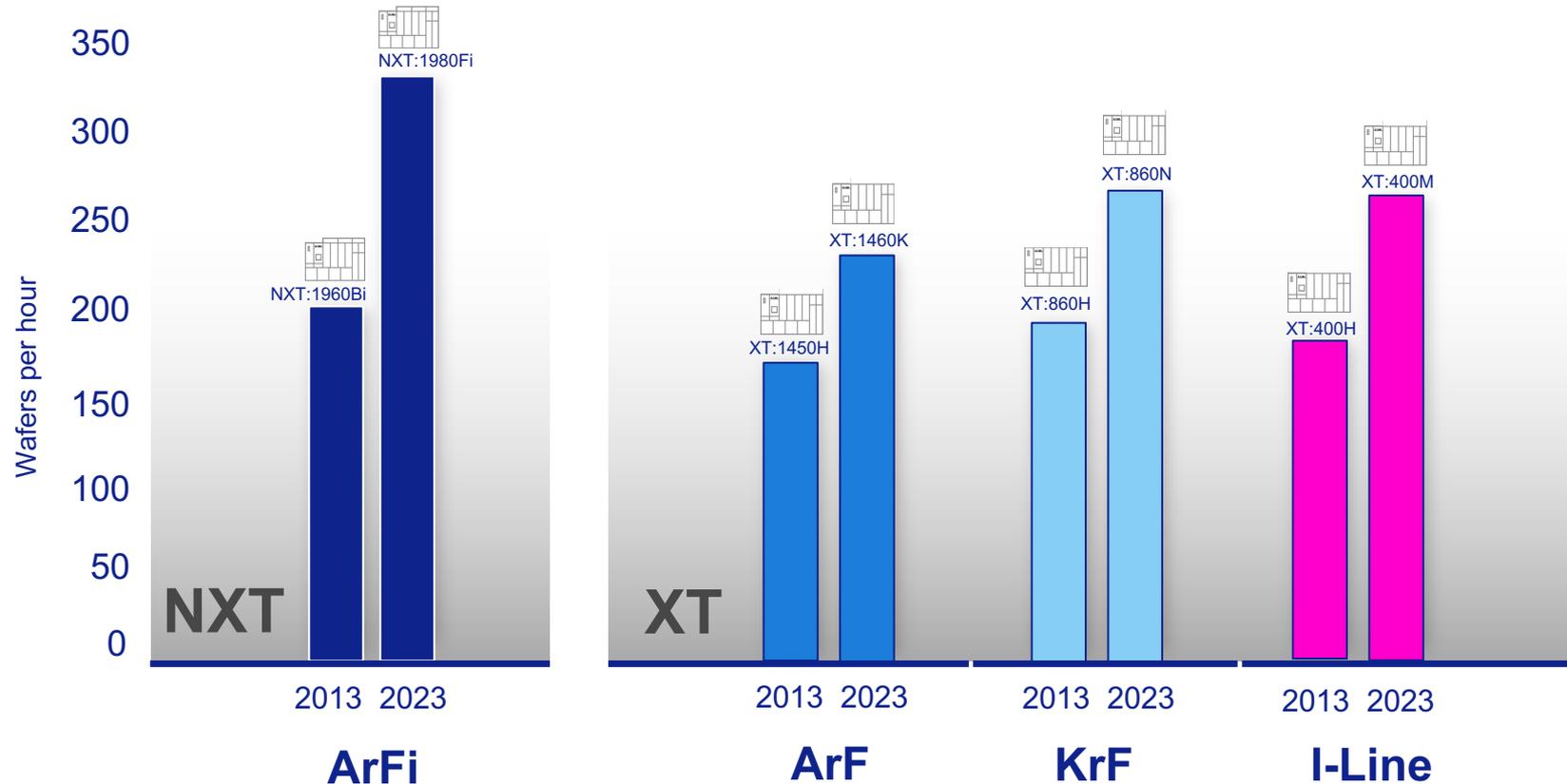
# Markets

Advanced logic and memory

- **Mature logic and analog nodes,  
and More than Moore markets**

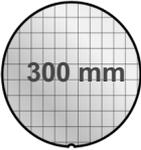
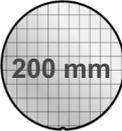
Installed base

# We support the growth in mature Logic and Analog nodes delivering ~30% improved productivity for the same process capability



# Mature Markets: differentiated application space

Strong growth expected short- and long-term driven by existing and new applications

Substrate Size [mm]	Substrate Thickness [μm]	ANALOG 	MATURE LOGIC 	OPTICAL SENSORS 	NON - OPTICAL SENSORS 	POWER 
	Thick					
	Standard (775)	Si	Si	Si		Si
	Thin			Glass		
	Thick				AlTiC	GaN on Si
	Standard (725)	Si	Si	SiGe SOI	Si	Si
	Thin			Glass	Ceramic	SiC
	Thick					
	Standard (675)		Si	SiGe SOI	Si	
	Thin				Ceramic GaAs	

# More than Moore market supported by the XT platform with application specific alignment and wafer handling options

## XT platform: ArF, KrF, i-line



### Wafer handling options

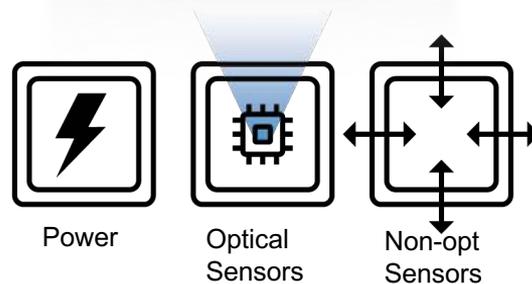
Wafer size: 150/200/300 mm

Wafer thickness: 0.3 - 1.5 mm

Materials: Si, GaN on Si,  
glass, Ceramic

Warpage

Wafer table flow and burl pitch



Devices with many variations in substrate (thickness)

### Alignment options

Alignment through glass

Backside alignment

SMASH extensions to 200 mm

# Markets

Advanced Logic and Memory

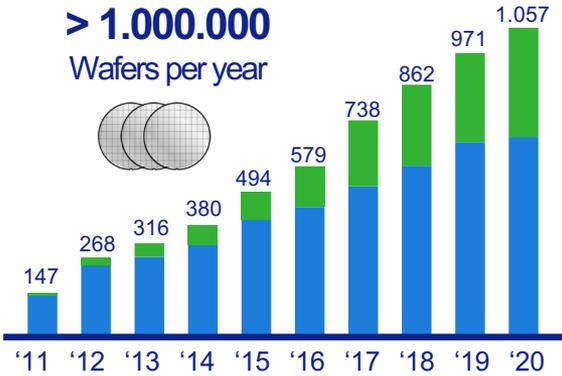
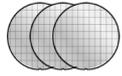
Mature Logic and Analog nodes,  
and More than Moore markets

- **Installed base**

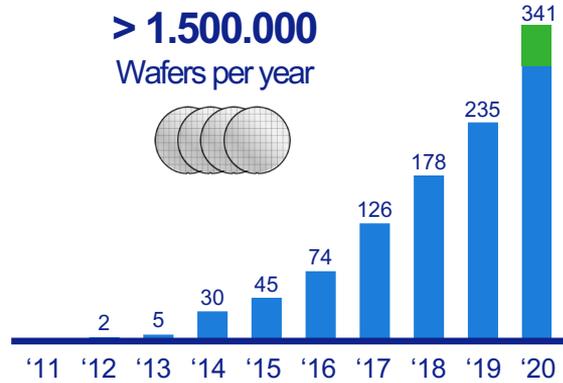
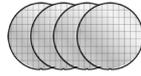
# Over 1,000 systems exposed more than 1 Million wafers in 2020

16 systems exposing more than 2 million 300 mm wafers per year

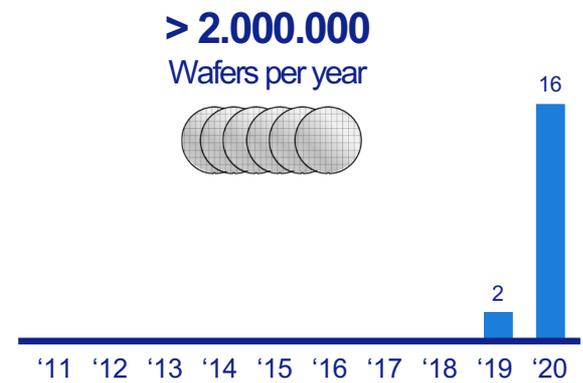
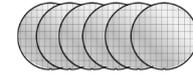
> 1.000.000  
Wafers per year



> 1.500.000  
Wafers per year



> 2.000.000  
Wafers per year

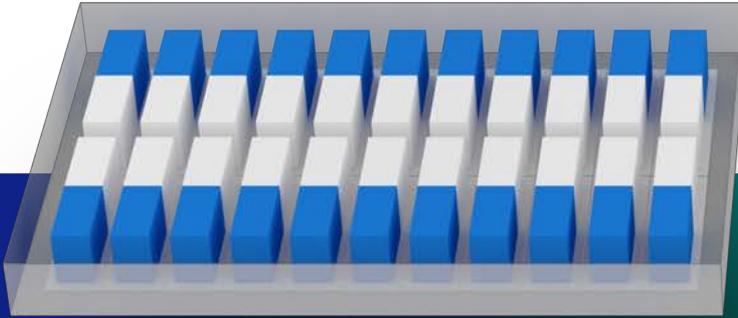


Foundry  
Memory

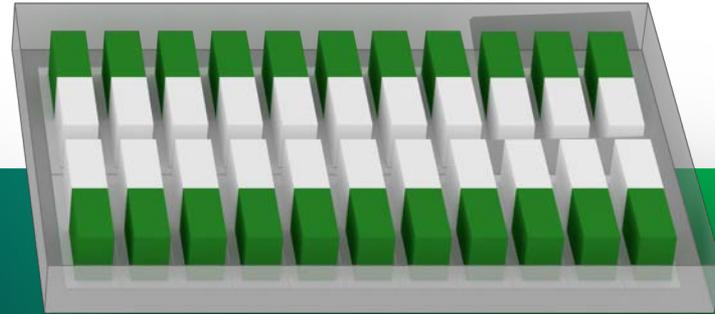


# Opportunities for the installed base productivity

## Wafer per day products



Enhancement packages



Wafer per day services

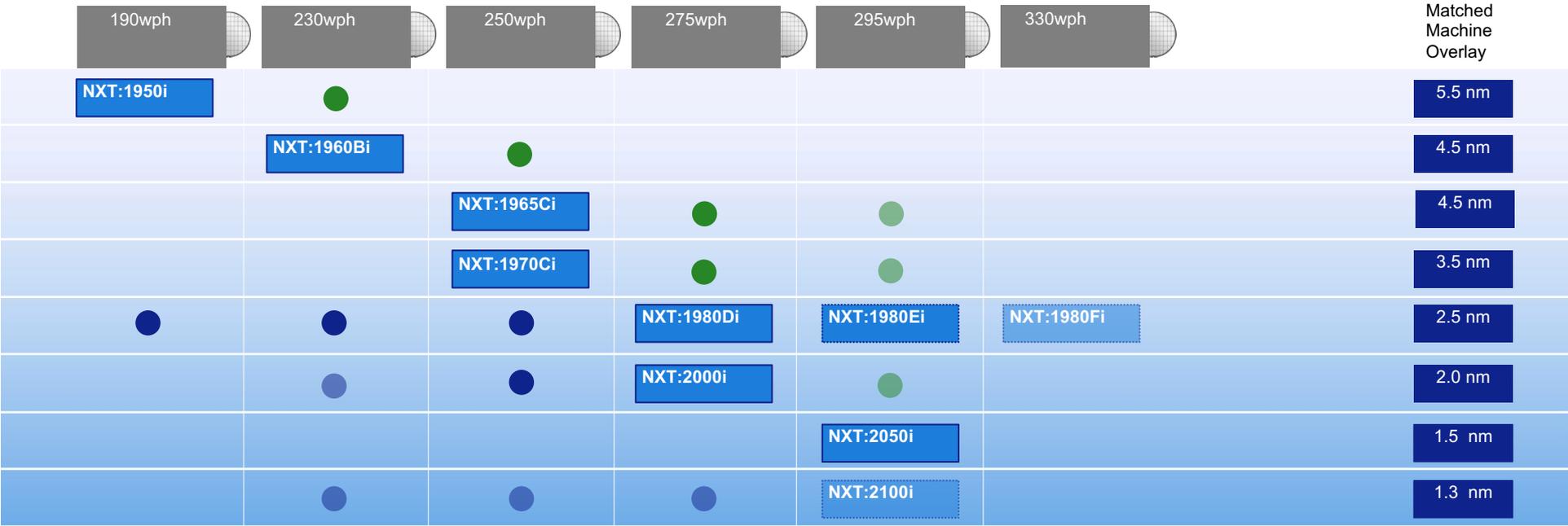
**Expand fab capacity at minimal lead time and investment**



# DUV immersion – upgrade roadmap

System modularity creates fab flexibility customers

- System
- Node extension package
- Productivity package
- Under study

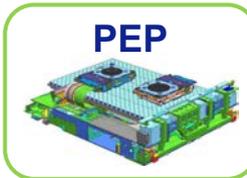
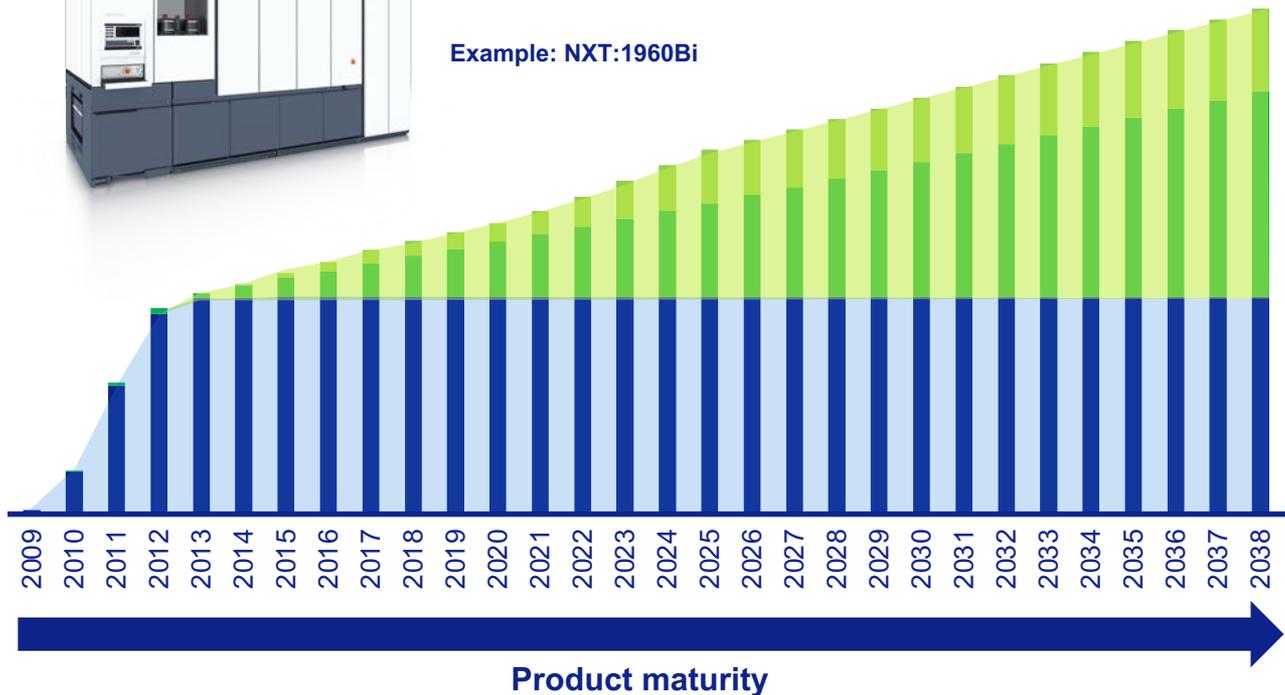


# Services and upgrades extend value and life of tool

## Main upgrades over NXT scanner life



Example: NXT:1960Bi



- Upgrades revenue
- Service revenue
- System revenue

# DUV products and business opportunity

## Key messages

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# Forward Looking Statements

This presentation contains statements that are forward-looking, including statements with respect to expected industry and business environment trends including expected growth, outlook and expected financial results, including expected net sales, gross margin, R&D costs, SG&A costs and effective tax rate, annual revenue opportunity for 2025, financial model for 2025 and assumptions and expected growth rates and drivers, expected growth including growth rates 2020-2025 and 2020-2030, total addressable market, growth opportunities beyond 2025 and expected annual growth rate in lithography and metrology and inspection systems and expected annual growth rate in installed base management, expected trends in addressable market up to 2030, expected trends in Logic and Memory revenue opportunities, long term growth opportunities and outlook, expected trends in demand and demand drivers, expected benefits and performance of systems and applications, semiconductor end market trends, expected growth in the semiconductor industry including expected demand growth and capital spend in coming years, expected wafer demand growth and investments in wafer capacity, expected lithography market demand and growth and spend, growth opportunities and drivers, expected trends in EUV and DUV demand, sales, outlook, roadmaps, opportunities and capacity growth and expected EUV adoption, profitability, availability, productivity and output and estimated wafer demand and improvement in value, expected trends in the applications business, expected trends in installed base management including expected revenues and target margins, expected trends and growth opportunity in the applications business, expectations with respect to high-NA, the expectation of increased output capacity, plans, strategies and strategic priorities and direction, expectation to increase capacity, output and production to meet demand, the expectation that Moore's law will continue and Moore's law evolution, product, technology and customer roadmaps, and statements and intentions with respect to capital allocation policy, dividends and share buybacks, including the intention to continue to return significant amounts of cash to shareholders through a combination of share buybacks and growing annualized dividends and statements with respect to ESG commitment, sustainability strategy, targets, initiatives and milestones. You can generally identify these statements by the use of words like "may", "will", "could", "should", "project", "believe", "anticipate", "expect", "plan", "estimate", "forecast", "potential", "intend", "continue", "target", "future", "progress", "goal" and variations of these words or comparable words. These statements are not historical facts, but rather are based on current expectations, estimates, assumptions and projections about our business and our future financial results and readers should not place undue reliance on them. Forward-looking statements do not guarantee future performance and involve a number of substantial known and unknown risks and uncertainties. These risks and uncertainties include, without limitation, economic conditions; product demand and semiconductor equipment industry capacity, worldwide demand and manufacturing capacity utilization for semiconductors, semiconductor end-market trends, the impact of general economic conditions on consumer confidence and demand for our customers' products, performance of our systems, the impact of the COVID-19 outbreak and measures taken to contain it on the global economy and financial markets, as well as on ASML and its customers and suppliers, and other factors that may impact ASML's sales and gross margin, including customer demand and ASML's ability to obtain supplies for its products, the success of R&D programs and technology advances and the pace of new product development and customer acceptance of and demand for new products, production capacity and our ability to increase capacity to meet demand, the number and timing of systems ordered, shipped and recognized in revenue, and the risk of order cancellation or push out, production capacity for our systems including the risk of delays in system production and supply chain capacity, constraints, shortages and disruptions, trends in the semi-conductor industry, our ability to enforce patents and protect intellectual property rights and the outcome of intellectual property disputes and litigation, availability of raw materials, critical manufacturing equipment and qualified employees and trends in labor markets, geopolitical factors, trade environment; import/export and national security regulations and orders and their impact on us, ability to meet sustainability targets, changes in exchange and tax rates, available liquidity and liquidity requirements, our ability to refinance our indebtedness, available cash and distributable reserves for, and other factors impacting, dividend payments and share repurchases, results of the share repurchase programs and other risks indicated in the risk factors included in ASML's Annual Report on Form 20-F for the year ended December 31, 2020 and other filings with and submissions to the US Securities and Exchange Commission. These forward-looking statements are made only as of the date of this document. We undertake no obligation to update any forward-looking statements after the date of this report or to conform such statements to actual results or revised expectations, except as required by law.

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