

DUV Products and Business Opportunity

Ron Kool

Executive Vice President – Business Line DUV

DUV Products and Business Opportunity

Key messages

- DUV immersion system revenues increased over the last decade to over 50%, and is an important driver of ASML's growth
- Over the next 5-7 years DUV sales expected to remain important and its composition is expected to change from mainly systems sales to about 50% systems and 50% Installed Base Management sales
- ASML is systematically developing its DUV service and field upgrade product portfolio to meet customer requirements and improve performance and/ or extend the lifetime of its installed base, while optimizing its sales opportunities in this space
- DUV is well prepared to maintain margins during this transition by:
 - an innovative DUV Technology Roadmap aligned with customer roadmaps
 - adopting commonalities between EUV and DUV module development
 - continuously improving its operations to become leaner and more efficient, while driving quality of systems, services and field options up

TWINSCAN DUV Product Roadmap

Roadmap in place to deliver next generation DUV systems

	2017	2018	2019	2020	2021	2022 2025
ArFi 1.35 NA 38nm	Extend immersion overlay & focus for multiple patterning. Matched overlay to support EUV insertion Extend throughput for cost reduction						
ArF 0.93 NA 57nm	Extend overlay to support shrink						
KrF 0.93 NA 80nm	Extend throughput for cost reduction						
0.80 NA 120nm	Extend throughput for cost reduction						
i-line 0.65 NA 350nm	Extend throughput for cost reduction						

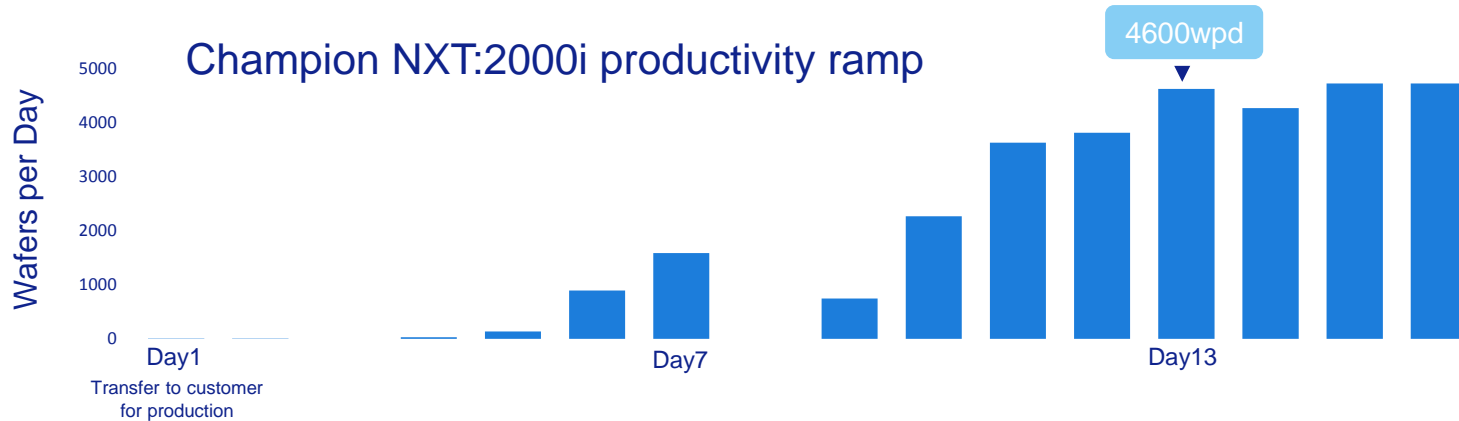
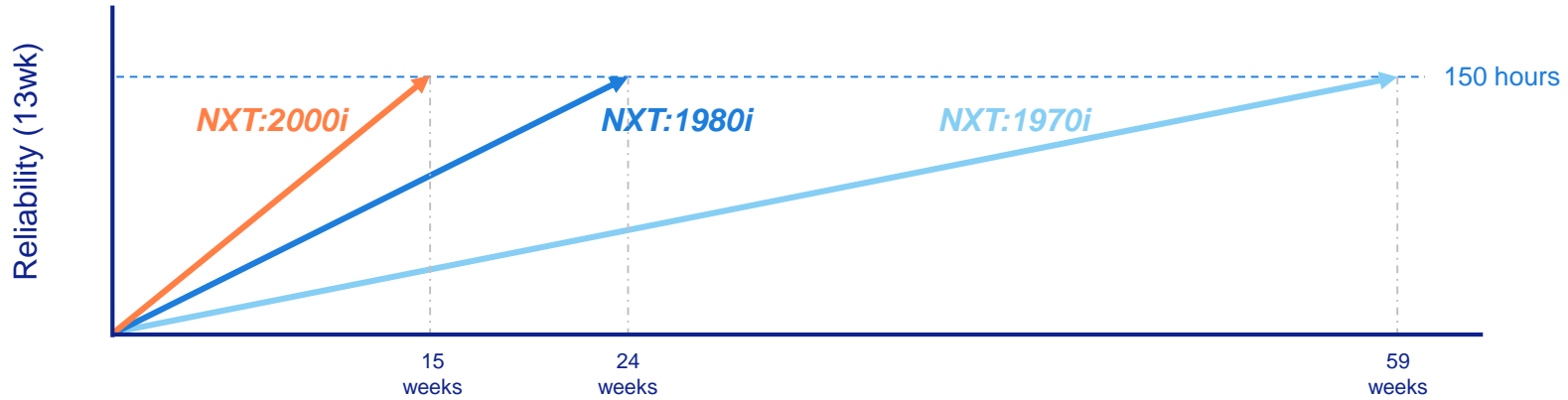
Product
Matched Machine Overlay|Throughput

**Current
Product status**

Released
Development
Next under Definition

NXT:2000i: record-time ramp and reliability

Improved maturity on NXT platform enables faster time to ramp

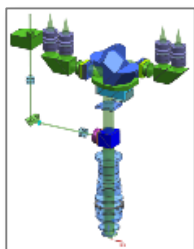


DUV focus: innovation and cost leadership

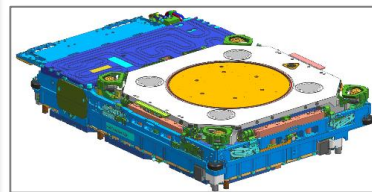
- Leadership in immersion reinforced with the NXT:2000i, featuring a next-generation alignment sensor, focus & leveling system and laser innovation
- Technology roadmap extended with the introduction of next- generation wafer stages and a high-order lens manipulator, also enabling extensions in our Applications product portfolio – to support 5nm and beyond
- NXT platform implementation for ArF dry together with the next generation stages, providing higher-productivity tools with improved overlay and leveraging commonalities
- Systematic productivity improvements on KrF models enabled 7% CAGR, raising peak performance to over 5,000 wafers per day at overlay levels below 4nm
- Continued support for 200mm demand, both in existing installed base as well as new tools



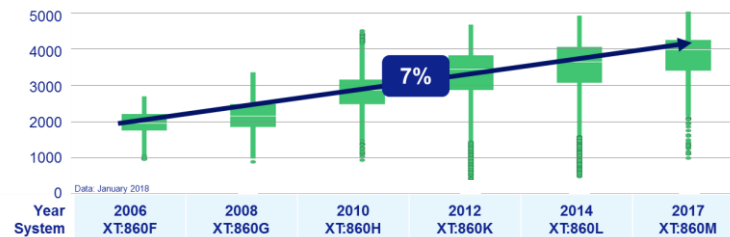
NXT:2000i



ORION



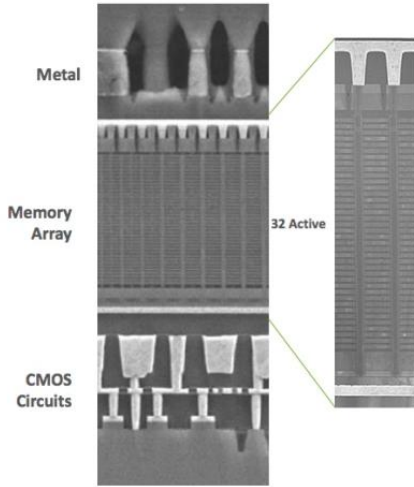
Next generation stage



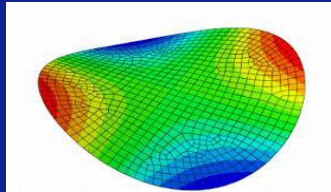
KrF productivity development – 7% CAGR

3D NAND manufacturing enabled on XT(dry) and NXT(immersion)

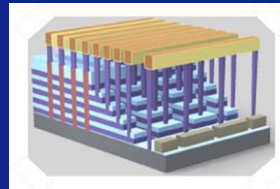
Increased wafer stress, high aspect ratios and topologies require tool changes



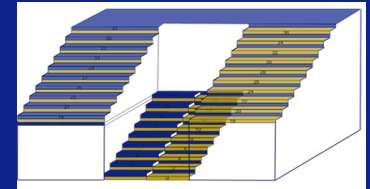
Increased Wafer Stress



Higher Aspect Ratio Processes



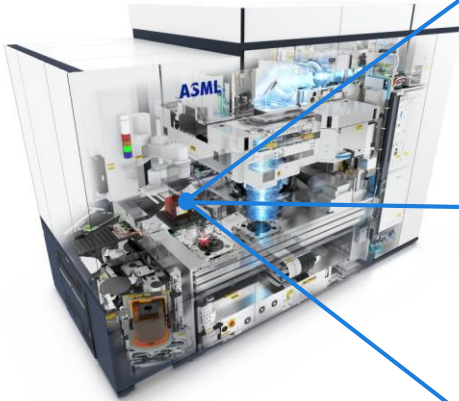
Larger Topology



Challenges addressed by both hardware and software solutions, working closely with Application solution to improve performance

NXT – NXE design commonality

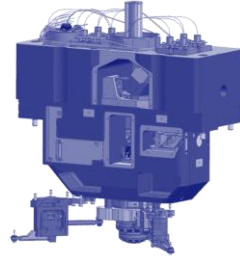
**DUV:
NXT:2000i**



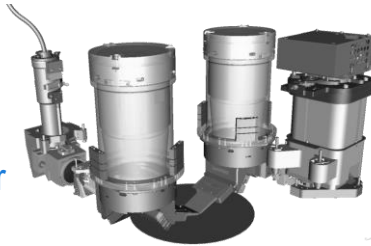
Deep Ultra Violet lithography:

- Wavelength: 193nm (atmospheric)
- Reflective optics (lenses)
- Reflective reticle

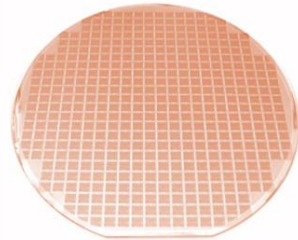
**ORION
Alignment
Sensor**



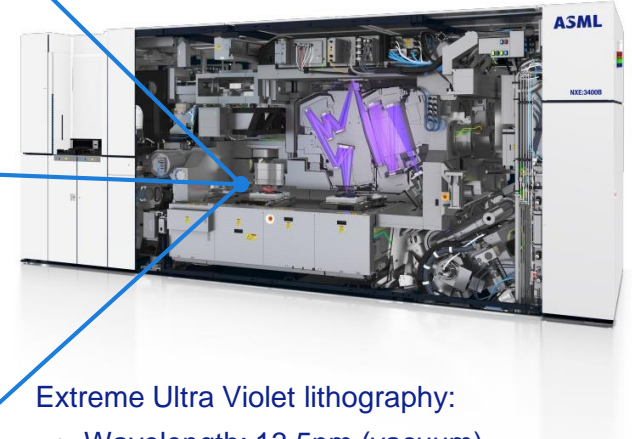
**UV
Level
Sensor**



**Grid
Setup
Wafer**



**EUV:
NXE:3400C**



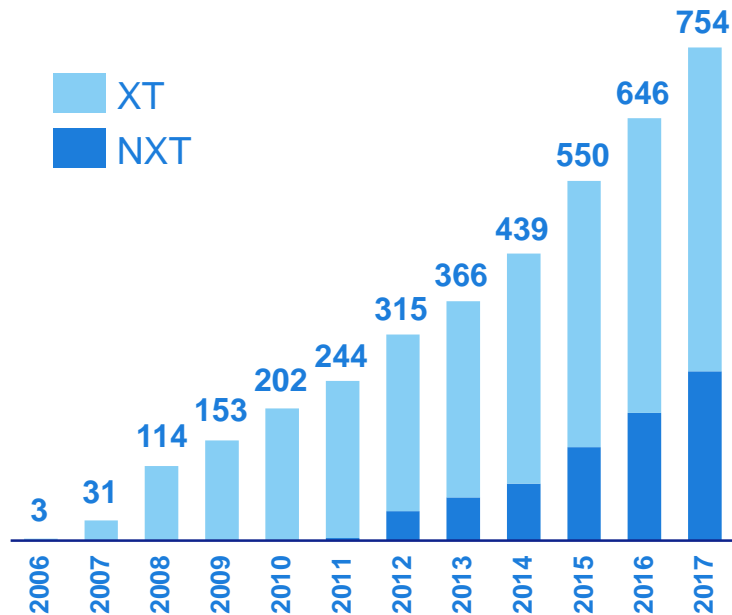
Extreme Ultra Violet lithography:

- Wavelength: 13.5nm (vacuum)
- Reflective optics (mirrors)
- Reflective reticle

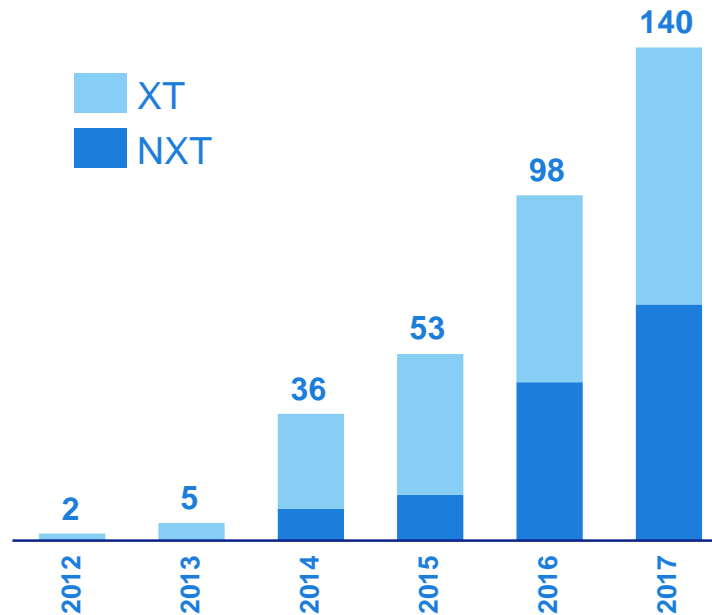
Steep growth of systems with > 1 million wafers per year

140 systems crossed the >1.5 million wafers per year (WPY) mark

Number of systems > 1 million WPY



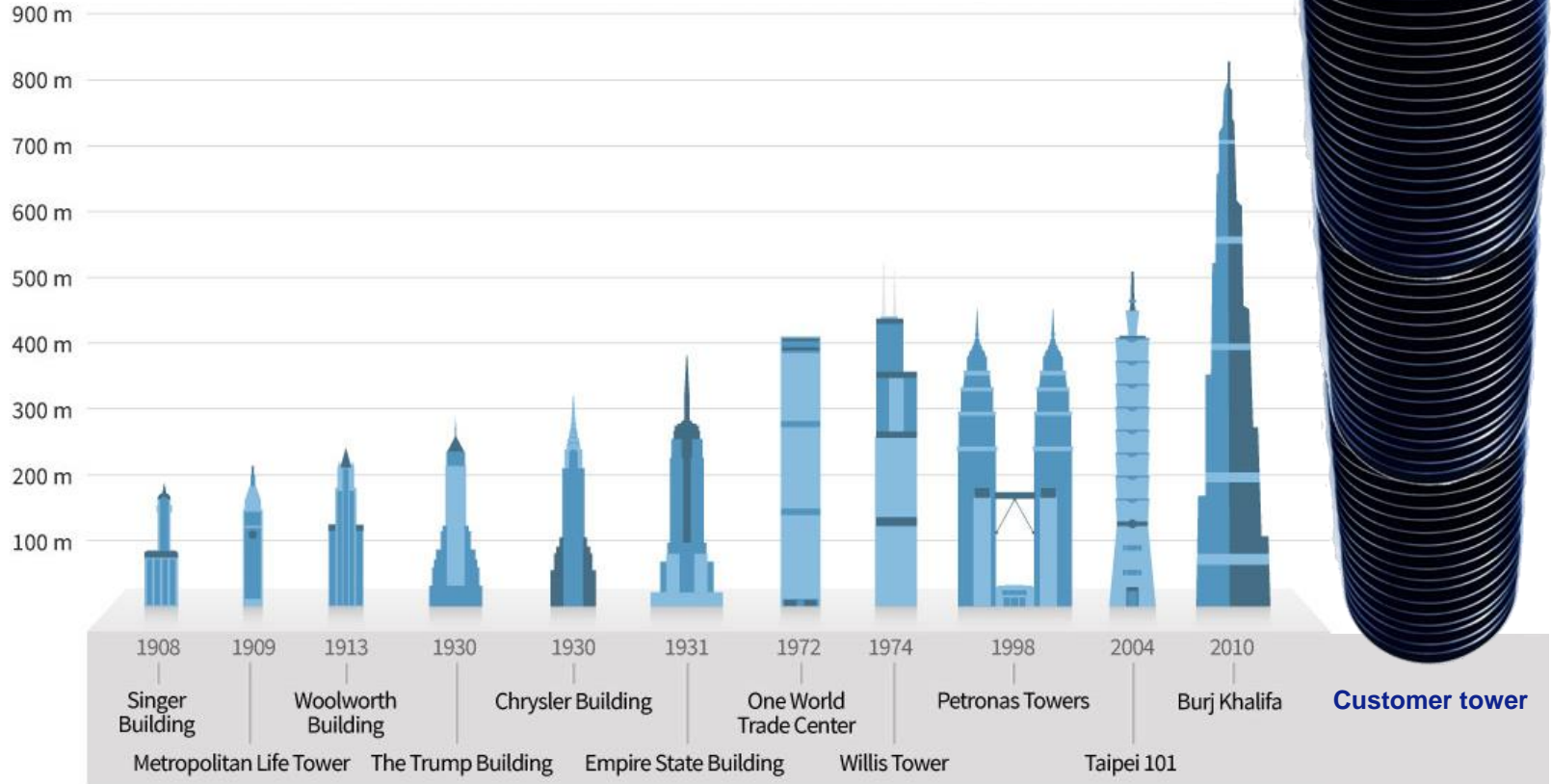
Number of systems > 1.5 million WPY



Holistic productivity approach is expected to bring the 1st tool above 2 million WPY in near term

These gigantic towers took years to build

In one year an ASML's scanner output¹: > 1km of wafers

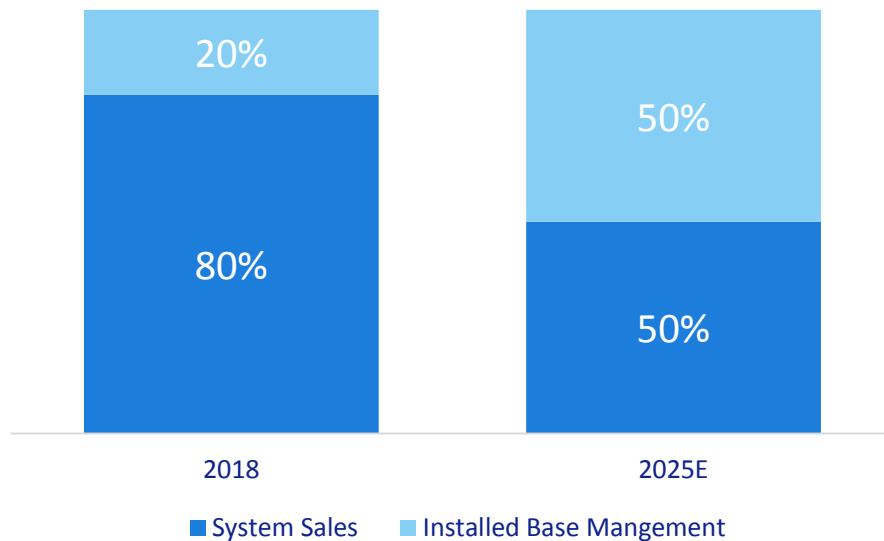


¹: >1.5 million wafers per year

Expected total DUV revenue trend

Growing importance of Installed Base Management revenue

DUV Sales



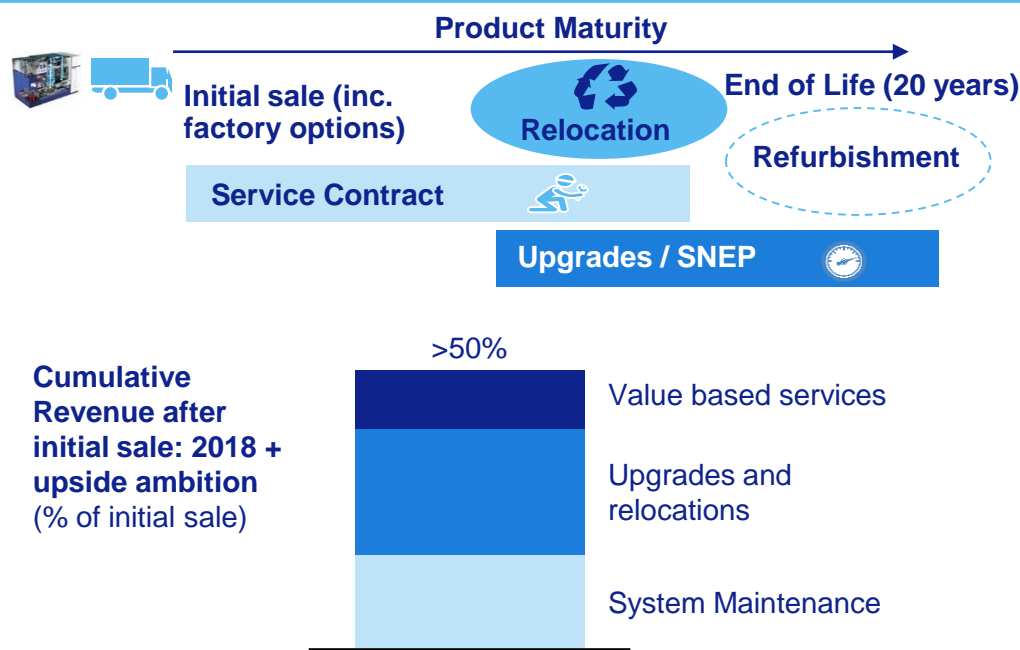
Sales trend drivers

- We expect a continued technical and economical need for **(high-end) immersion and dry systems**, at **reduced** system sales levels due to increasing EUV adoption.
- **Installed Base Management** revenue expected to **increase** due to the:
 - Growing **installed base**
 - Offering of **value based** services and upgrade products
 - Development of **differentiated solutions** (e.g. 3D-NAND)
 - Roll-out of **life extending products** (e.g. upgrades)

Multiple opportunities to increase Installed Base revenue

Services over the lifetime of a system

NXT:1980 example

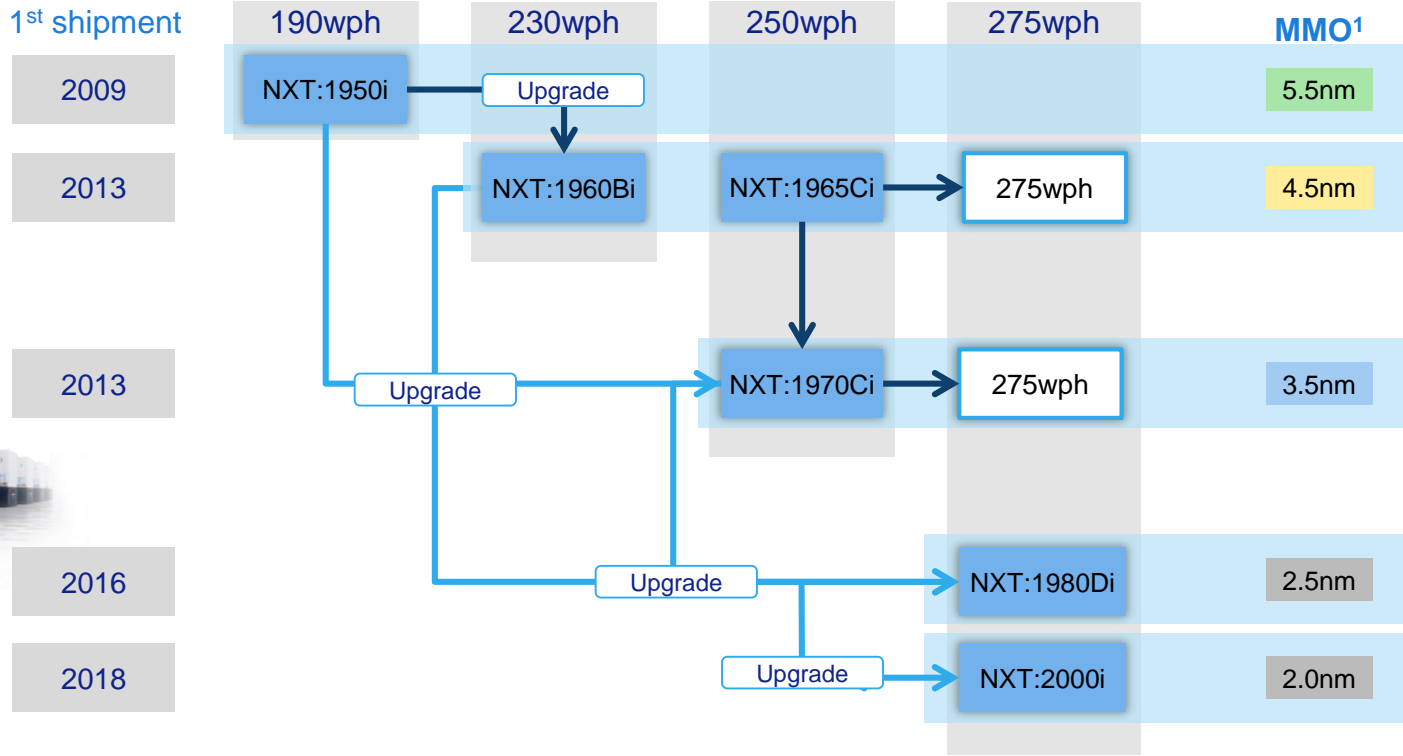


Opportunity for cumulative revenue after initial sales more than 50% of initial value:

- System Maintenance
- Upgrades and relocations
- Value based services

NXT system upgrade roadmap extended to NXT:2000i

Enabling capital efficient system investments for our customers



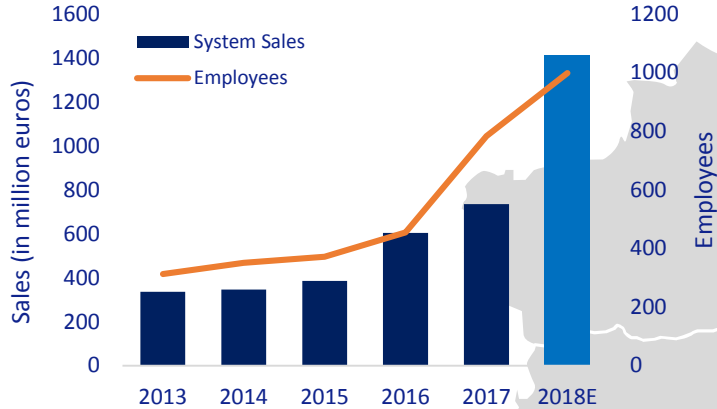
¹: MMO: Matched Machine Overlay

ASML offers range of products beyond standard service

System Availability and Stability	Committing to availability and stability performance
Factory Output	Securing more wafer per day and therewith shortening production cycle times
Data Products	Providing data interfacing capability, giving customers capability to use data in their fab automation
Hybrid Service	Enabling customers to do part of the system maintenance on mature DUV systems
Relocations	Providing customers the service to re-allocate tools between factories

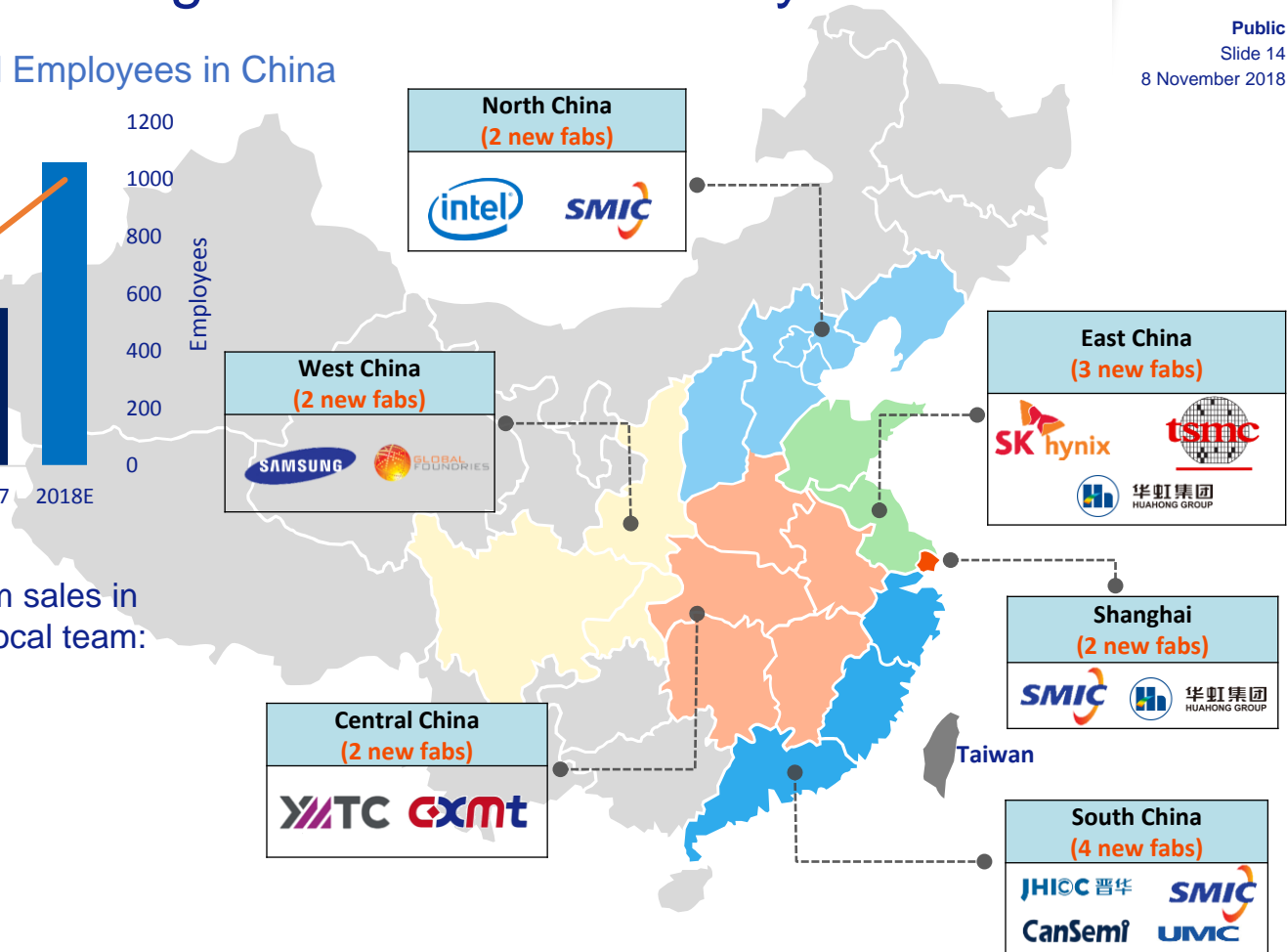
ASML China Business grows with the industry

ASML System Sales and Employees in China



Strong increase of ASML system sales in China supported by a growing local team:

- 13 offices across China
- 2 R&D centers
- 1 training center
- 11 warehouses
- 1,000 employees



DUV Products and Business Opportunity

Summary

- DUV immersion system revenues increased over the last decade to over 50%, and is an important driver of ASML's growth
- Over the next 5-7 years DUV sales expected to remain important and its composition is expected to change from mainly systems sales to about 50% systems and 50% Installed Base Management sales
- ASML is systematically developing its DUV service and field upgrade product portfolio to meet customer requirements and improve performance and/ or extend the lifetime of its installed base, while optimizing its sales opportunities in this space
- DUV is well prepared to maintain margins during this transition by:
 - an innovative DUV Technology Roadmap aligned with customer roadmaps
 - adopting commonalities between EUV and DUV module development
 - continuously improving its operations to become leaner and more efficient, while driving quality of systems, services and field options up

Forward Looking Statements

ASML

Public

Slide 16

8 November 2018

This document contains statements relating to certain projections, business trends and other matters that are forward-looking, including statements with respect to expected trends and outlook, strategy, bookings, expected financial results and trends, including expected sales, EUV revenue, gross margin, capital expenditures, R&D and SG&A expenses, cash conversion cycle, and target effective annualized tax rate, and expected financial results and trends for the rest of 2018 and 2019, expected revenue growth and demand for ASML's products in logic and memory, expected annual revenue opportunity in 2020 and for 2025 and expected EPS potential in 2020 with significant growth in 2025, expected trends in the lithography system market, fab capacity by segment, the automotive and artificial intelligence industries, connectivity, semiconductor end markets and new semiconductor nodes, expected acceleration of chipmakers' performance for the next decade, expected EUV insertion and transistor density growth, trends in DUV systems revenue and Holistic Lithography and installed based management revenues, statements with respect to expectations regarding future DUV sales, including composition, margins, improvement of operations and performance, DUV product roadmaps, expected benefits of the holistic productivity approach, including in terms of wafers per year, expected industry trends and expected trends in the business environment, statements with respect to customer demand and the commitment of customers to High NA machines and to insert EUV into volume manufacturing by ordering systems, expected future operation of the High NA joint lab, statements with respect to holistic lithography roadmaps and roadmap acceleration, including the introduction of higher productivity systems in 2019 (including the expected shipment of NXE:3400C and expected timing thereof) and the expected benefits, ASML's commitment to volume manufacturing and related expected plans until 2030, ASML's commitment to secure system performance, shipments, and support for volume manufacturing, including availability, timing of and progress supporting EUV ramp and improving consistency, productivity, throughput, and production and service capability enabling required volume as planned, including expected shipments, statements with respect to growth of fab capacity driving demand in lithography systems, planned customer fabs for 200 systems and expected first output in 2019, expected EUV value increase and increase in EUV margins and ASML's expectation of EUV profitability at the DUV level, expected installed base of EUV systems, expected customer buildout of capacity for EUV systems, EUV estimated demand by market, expected increase in lithography intensity, statements with respect to the expected benefits of EUV, including year-on-year cost reduction and system performance, and of the introduction of the new DUV system and expected demand for such system, the expected benefits of HMI's e-beam metrology capabilities, including the expansion of ASML's integrated Holistic Lithography solutions through the introduction of a new class of pattern fidelity control, the extension of EUV to enable cost effective single patterning shrink with EUV, statements with respect to ASML's applications business, including statements with respect to expected results in 2018, expected growth of the applications business and expected drivers of growth, expected growth in margins, continued shrink and drivers, and expected accuracy, defect control and performance improvements, shrink being a key driver supporting innovation and providing long-term industry growth, lithography enabling affordable shrink and delivering value to customers, DUV, Holistic Lithography and EUV providing unique value drivers for ASML and its customers, expected industry innovation, the expected continuation of Moore's law and that EUV will continue to enable Moore's law and drive long term value for ASML beyond the next decade, intention to return excess cash to shareholders through stable or growing dividends and regularly timed share buybacks in line with ASML's policy, statements with respect to the expectation to continue to return cash to shareholders through dividends and share buybacks, and statements with respect to the expected impact of accounting standards. 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", "targets", "commits to secure" 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 the 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 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, including the impact of general economic conditions on consumer confidence and demand for our customers' products, competitive products and pricing, the impact of any manufacturing efficiencies and capacity constraints, performance of our systems, the continuing success of technology advances and the related pace of new product development and customer acceptance of and demand for new products including EUV and DUV, the number and timing of EUV and DUV systems shipped and recognized in revenue, timing of EUV orders and the risk of order cancellation or push out, EUV production capacity, delays in EUV systems production and development and volume production by customers, including meeting development requirements for volume production, demand for EUV systems being sufficient to result in utilization of EUV facilities in which ASML has made significant investments, potential inability to successfully integrate acquired businesses to create value for our customers, our ability to enforce patents and protect intellectual property rights, the outcome of intellectual property litigation, availability of raw materials, critical manufacturing equipment and qualified employees, trade environment, changes in exchange rates, changes in tax rates, available cash and liquidity, our ability to refinance our indebtedness, distributable reserves for dividend payments and share repurchases, results of the share repurchase plan and other risks indicated in the risk factors included in ASML's Annual Report on Form 20-F and other filings with the US Securities and Exchange Commission. These forward-looking statements are made only as of the date of this document. We do not undertake to update or revise the forward-looking statements, whether as a result of new information, future events or otherwise.

Public

ASML

INVESTOR DAY

ASML **SMALL** **TALK** **2018**

VELDHOVEN

