

CAPITAL MARKETS DAY 2020

INSIGHTS PHOTOMASK EQUIPMENT

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PHOTOMASK TECHNOLOGY TREND

- + All three frontend lithography choices (193i, EUV and NIL) remain under consideration - **Fig1**
- + Comparing to 193i, EUV will reduce lithography steps by a factor of 4, aiming to improve manufacturing cost, reduce process complexity, and increase device yield. But still many challenges... - **Fig2**
- + Multi-beam writing tools are expected to shorten the mask writing time against conventional single-beam writing tools - **Fig3**
- + Increasing use of machine learning – **Fig4**



Fig1: Frontend Lithography Choices

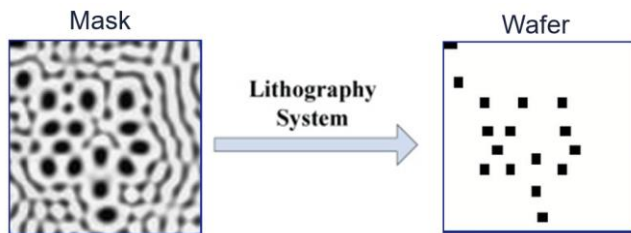


Fig4: AI based hot spot correction

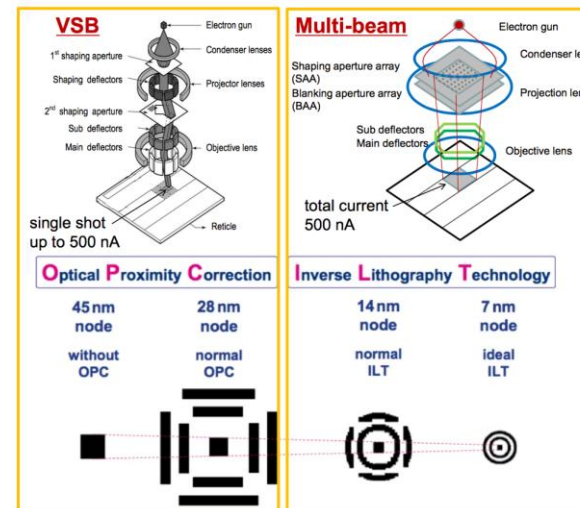
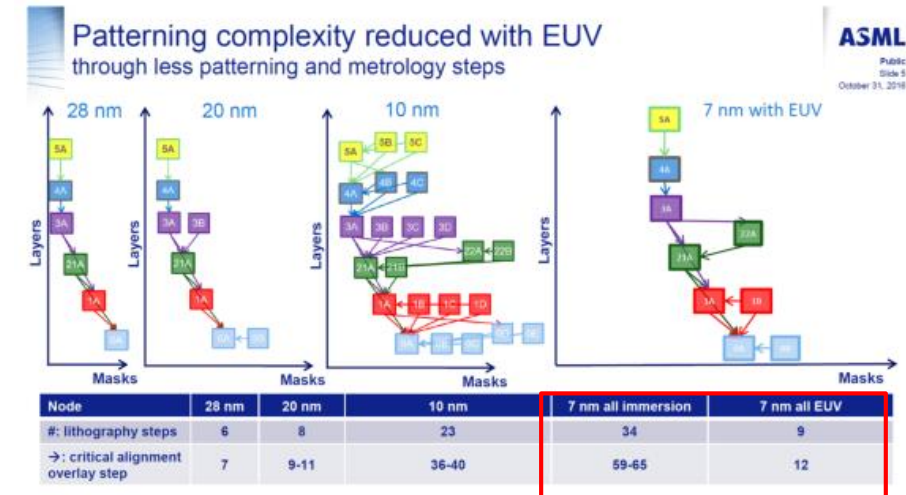


Fig3: Photomask Writing Choices

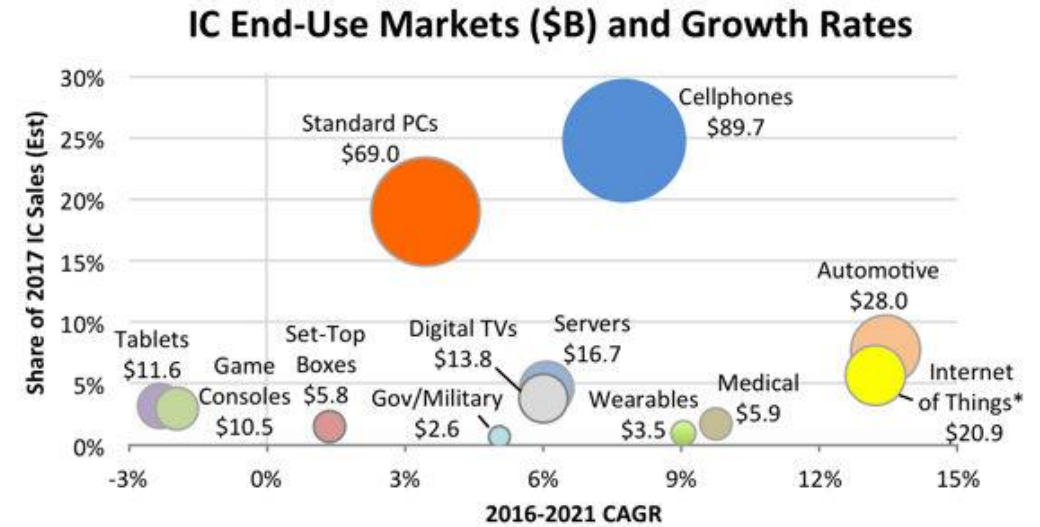


Source: ASML Public Presentation at Oct 31st, 2018

Fig2: Lithography Steps Comparison:193i vs EUV

MOORE'S LAW MARKET TREND

- + Industrial computing power (standard PCs) and mobile devices (cellphones) are the main drivers today – Fig5
- + High NA (0.55) EUV scanner will be launched after 2021 – Fig6
- + 26 EUV scanners (NXE3400 series) will be shipped in 2020
- + Many leading customers are preparing for capacity extension: Samsung, SK Hynix, TSMC and Intel – Fig7
- + Equipment market forecasted at ~5% CAGR (2018-25)



*Covers only the Internet connection portion of systems.

Source: IC Insights

Fig5: Growth potential Market Trend

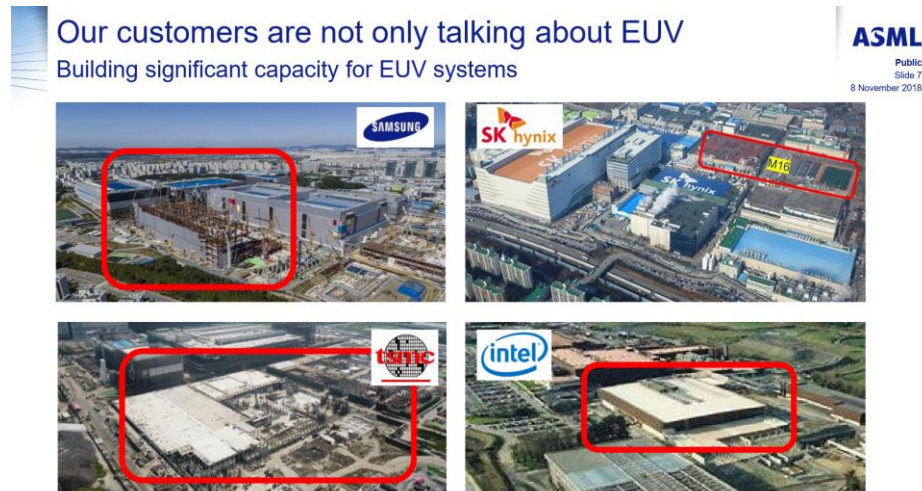


Fig7: Capacity Demands

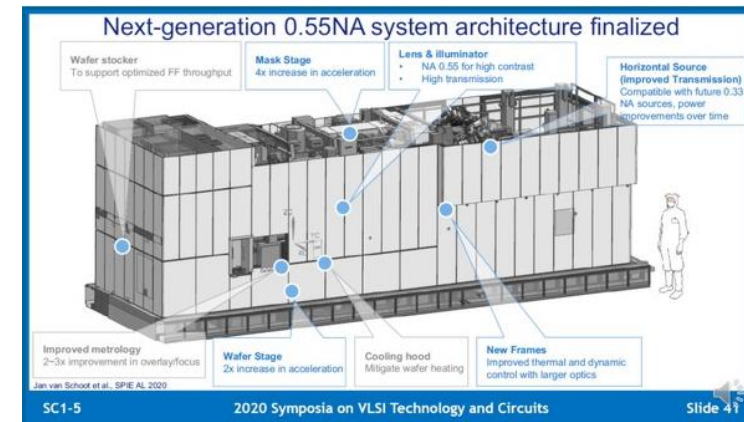


Fig6: ASML Next Generation EUV Scanner

PRODUCT PORTFOLIO

HMx

Cleaning structure sizes > 135nm



MaskTrack X

Cleaning structure sizes < 14 nm



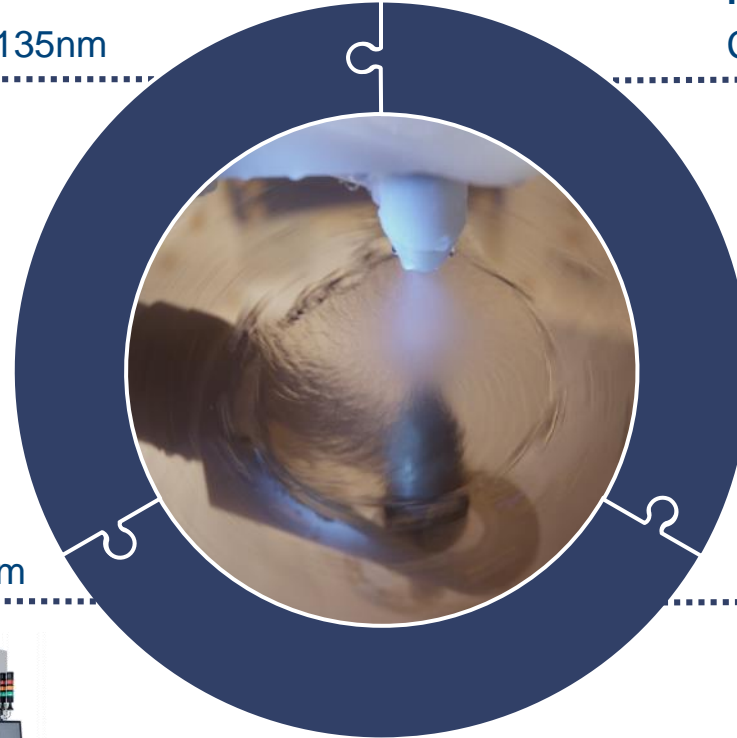
ASx

Cleaning structure sizes 90 - 135nm



MaskTrack Pro

Cleaning structure sizes 14 - 90nm





+ **SÜSS Core Competence:**

- **30+ years** photomask-specific experience
- **> 600** worldwide installed base
- More than **85% market share** in EUV mask cleaning
- Technical **cooperation** with many customers
- **Minimal pattern damage** to extend photomask lifetime
- **Green technologies** to improve safety and reduce cost

MEMS WAFER CLEANING



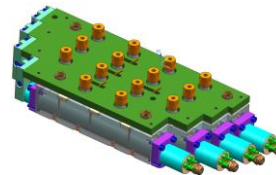
- + **Target Application:** MEMS process
- + **Applications:**
 - Polymer strip (resist, polyimide, other)
 - Final clean
- + **Motivations:**
 - CrustBuster technology vs aggressive solvent (e.g. NMP)
 - Fast time to market leveraging existing Japanese outsource supplier's low cost platform



Insitu-UV (ISUV)



CrustBuster (CB)



A close-up photograph of a hand holding a black marker, writing the words "Thank you!" in a cursive script on a white surface. The hand is positioned on the right side of the frame, and the marker is in the process of finishing the exclamation point. The background is plain white.