

SUSS MicroTec - Capital Markets Day

Program

10:00	Welcome and Introduction	Frank P. Averdung
10:30	Overview product lines: Mask Aligner Coater/Developer Substrate Bonder Photomask Equipment	
11:30	Site Visit	Dr. Markus Arendt
13:00	Lunch	
14:00	Strategic Outlook	Frank P. Averdung



Capital Markets Day
Sternenfels, October 20, 2011

Disclaimer

This presentation contains forward-looking statements relating to the business, financial performance and earnings of SÜSS MicroTec AG and its subsidiaries and associates. Forward-looking statements are based on current plans, estimates, projections and expectations and are therefore subject to risks and uncertainties, most of which are difficult to estimate and which in general are beyond the control of SÜSS MicroTec AG. Consequently, actual developments as well as actual earnings and performance may differ materially from those which are explicitly or implicitly assumed in the forward-looking statements. SÜSS MicroTec AG does not intend or accept any obligation to publish updates of these forward-looking statements.

Content

I. SUSS MicroTec today

II. Sternenfels, a Business Location with Potential

III. Our four Product Lines:

Mask Aligner

Coater/Developer

Wafer Bonder

Photomask Equipment

IV. Strategic Outlook

SUSS MicroTec – A Global Player



Optimizing Structures – Shaping the Future



Garching

- + SÜSS MicroTec AG HQ
- + Development and production:
 - **Mask Aligner**
 - **Bond Aligner**
- + Core competencies:
 - **Exposure**
 - **Alignment**



Sternenfels

- + Development and production :
 - **Bonder**
 - **Coater and Developer**
 - **Photomask Equipment**
- + Core competencies :
 - **Wet processing**
 - **Wafer bonding**

Divestment of SUSS Photomask Precision Inc.



- + Sale of SUSS MicroTec Precision Photomask Inc. to Compugraphics Inc., Los Gatos, CA
- + Sale of all assets
- + Limited synergies with core business units
- + Focus on profitable and high growth business areas
- + Supports the expansion of the SUSS MicroTec Photo Mask Equipment
- + Eliminating competitive overlap with prospective customers

The Purchaser:

- + Compugraphics is a globally acting mask manufacturer with mask shops in the US, UK and Germany

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- II. **Sternenfels, a Business Location with Potential**
- III. Our four Product Lines:
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 - Coater/Developer
 - Wafer Bonder
 - Photomask Equipment
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Sternenfels – Our Major Production Facility

- + The production site was built in three steps between 1991 and 1998
- + Total costs of land and building the facility amounted to approx. € 20 million
- + SUSS MicroTec paid € 4.5 million for the land and the buildings in 2010
- + 15.000 m² production facilities
- + 34.000 m² land
- + 270 employees, of which approximately 50 are temporary workers

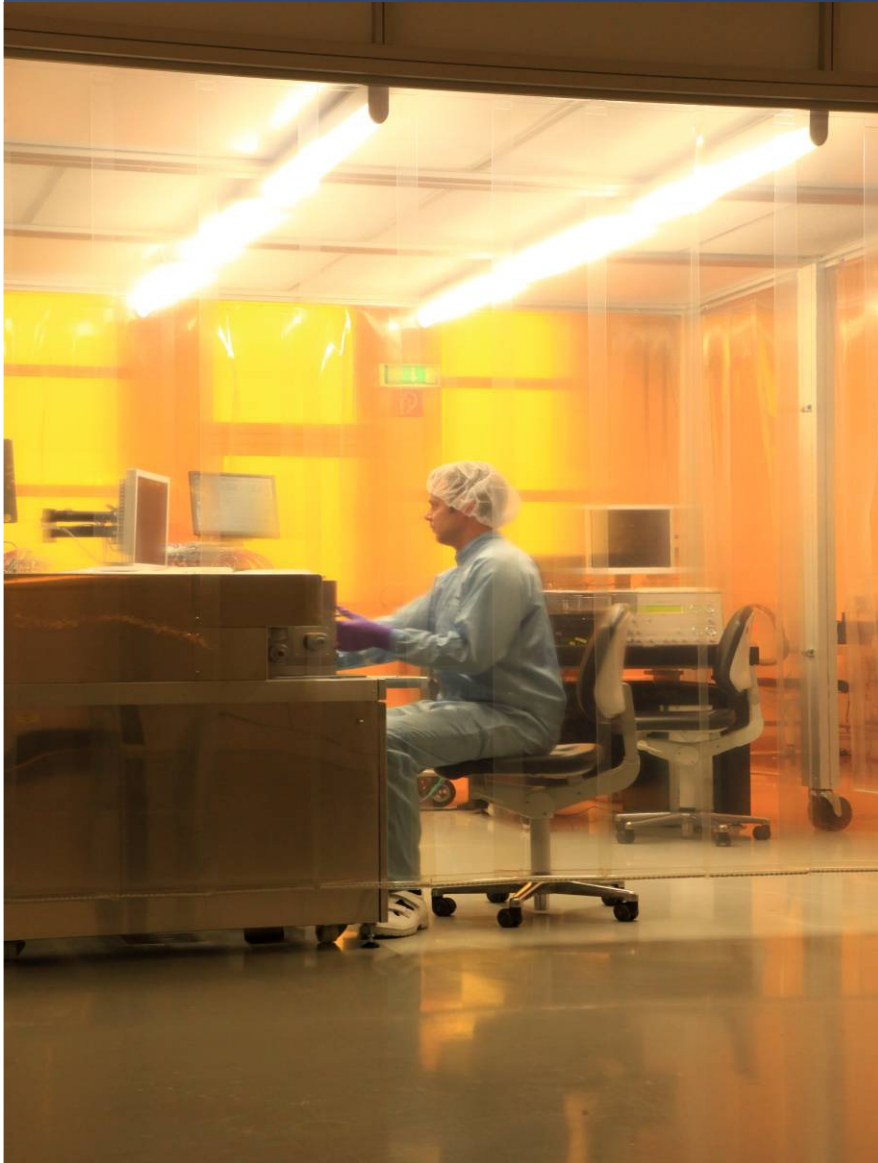


Sternenfels - Synergies and Flexibility

- + Three product lines under one roof: Photomask Equipment - Coater/Developer - Bonder
- + Modern production facility with two large clean rooms supporting future business expansion
- + Reduction of complexity and establishment of flexible production structures
- + Synergies in purchasing, administration and research and development



Sternenfels - The new Competence Center



- + Competence center for wet processing and wafer bonding
- + Establishment of a research and development center:
 - Technology
 - Product development
 - Application development
- + Customer Care Center
- + Supply Chain Management

Sternenfels - Site for Volume Manufacturing



Divisions and Products

Segments

Photomask
Equipment

Lithography

Substrate Bonder

Products



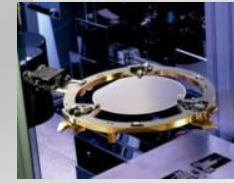
Mask Track



Mask Aligner



Coater/
Developer



Wafer Bonder

Process Steps

Frontend

Backend



Photomask Cleaning



Alignment
Exposure
Nano Imprinting



Coating
Developing



Bond Alignment
Permanent Bonding
Temporary Bonding

Production Sites

Sternenfels

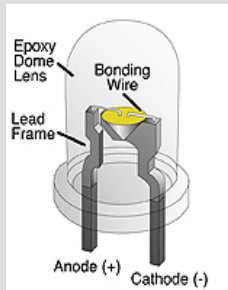
Garching

Sternenfels

Markets

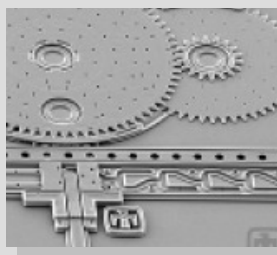
LED

General Lighting,
HB and UHB LED

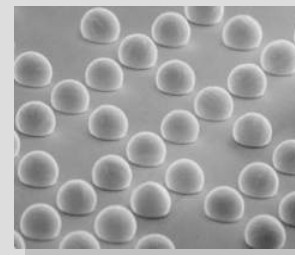
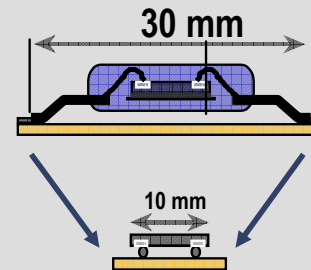


MEMS

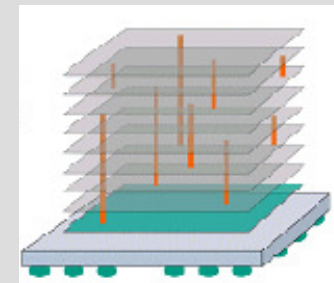
Computing, Automotive,
Medical Applications ...



Advanced Packaging
Semiconductor Industry



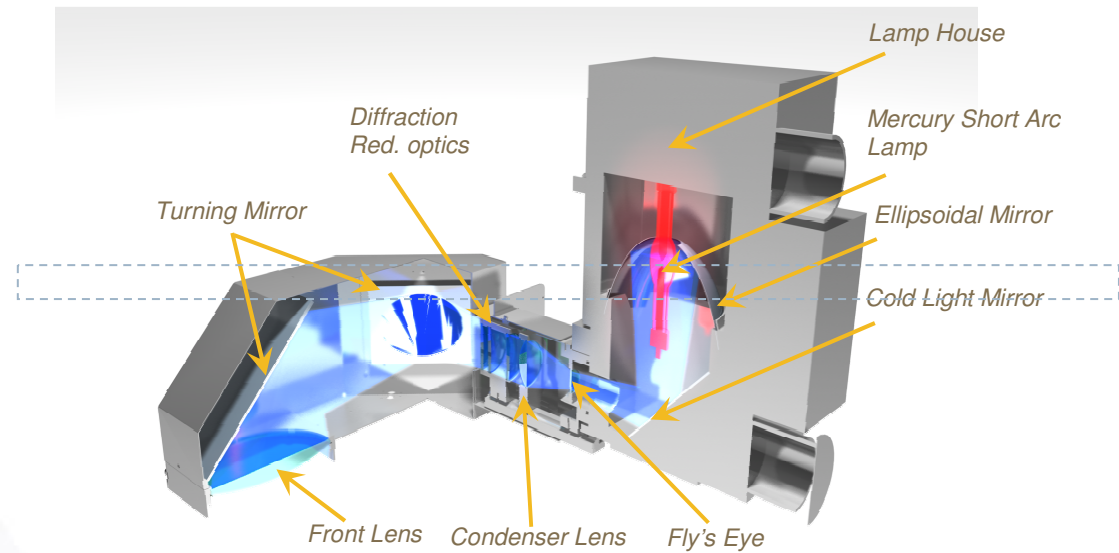
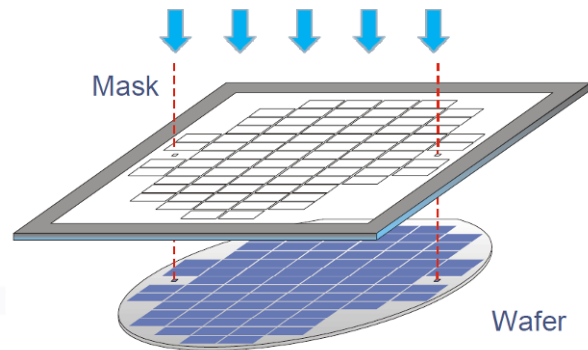
3D Integration/ Stacking
Semiconductor Industry



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Mask Aligner – A Look at the Inside



Mask Aligners are 1X full field exposure systems that offer an excellent cost of ownership and ease of use compared to competing stepper technology.

Mask Aligner – Product Overview

Manual Equipment (100mm, 150mm, 200mm)



MJB4 MA6 MA/BA8 Gen3

Support also emerging applications like UV-NIL, SCIL, bond alignment, wafer level microlens UV replication and UV-bonding (SMILE).

Automated Equipment (100/150mm, 200mm, 300mm)



MA100/150e /MA200/300 Gen2

Provide best possible cost of ownership by achieving highest throughput at superior alignment accuracy. Combine state of the art pattern recognition with excellent print results. Different product enhancements available to further optimize and advance the level of automation.

Integrated Lithography Clusters (200mm and 300mm)



LithoPack 200 / 300

SUSS Lithography Clusters are integrated coat, bake, expose, develop solutions that especially used in volume production.

Mask Aligner – The right Equipment for every Target Market

	Manual Equipment	Automated Equipment	Integrated Lithography Clusters
LED General Lighting, HB and UHB LED	✓	✓	✓
MEMS Computing, Automotive, Medical Applications ...	✓	✓	✓
Advanced Packaging Semiconductor Industry		✓	✓
3D Integration/ Stacking Semiconductor Industry		✓	✓
Research and Development	✓	✓	✓

Mask Aligner – Focus on Growth Markets

+ LED

- Trend to larger substrate sizes with continued pressure to reduce cost / lumen.
- Development of dedicated LED lithography equipment to meet technological requirements at best cost of ownership.

+ MEMS

- Trend to 200mm fabrication for mature products and customized solutions for emerging applications
- Development of specific 200mm lithography solutions plus integration of new technologies (i.e. SELECT)

+ Advanced Packaging

- Mainly driven to reduce cost and form factor for chip and system packages with high pin count
- Fastest growing semiconductor packaging technology
- Development and launch of emerging WLP technologies like FanOut WLP and 3D WLP for MEMS and LED just happening now
- Development of 200 and 300mm WLP solutions to offer best possible cost of ownership

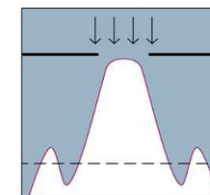
Mask Aligner – Challenges

- + Competition with higher performance lithography technology (projection vs. proximity printing)
- + Continued efforts to improve and strengthen the strong position in cost of ownership:
 - Yield improvements (CD uniformity, overlay accuracy, uptime, etc...)
 - Throughput improvements
- + New development of Next Generation Exposure Optics based on micro lens arrays which delivers superior optical performance plus customized illumination and optical proximity correction (frontend lithography technologies)

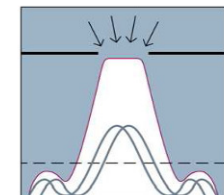


Parallel Light

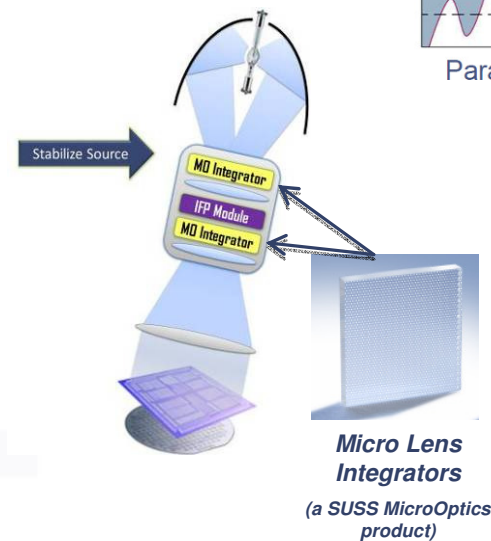
Diffuse Light



Parallel Light



Apodization

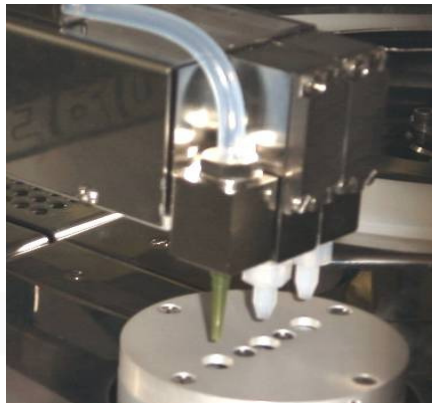


Content

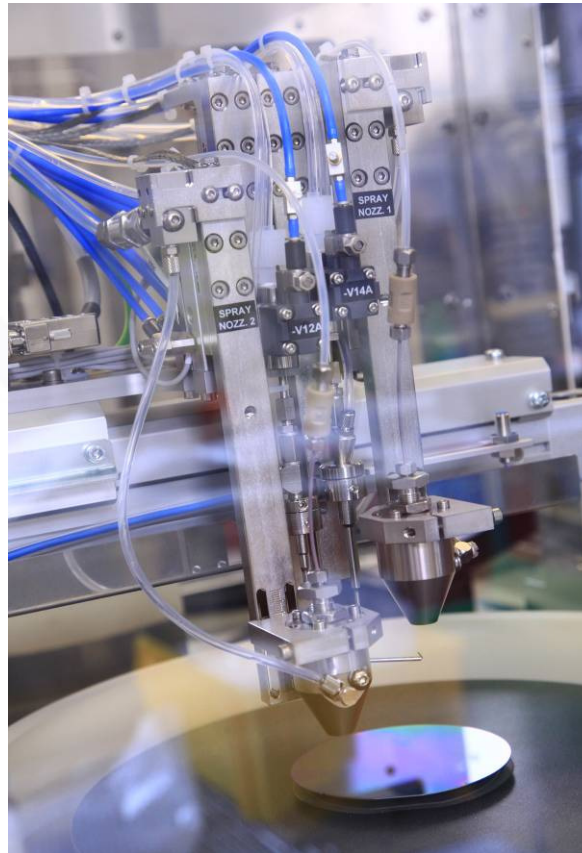
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Coater/Developer – A look at the Inside

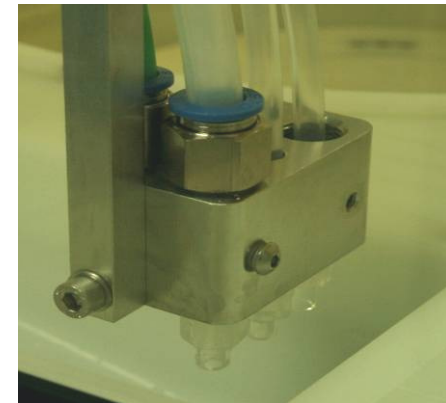
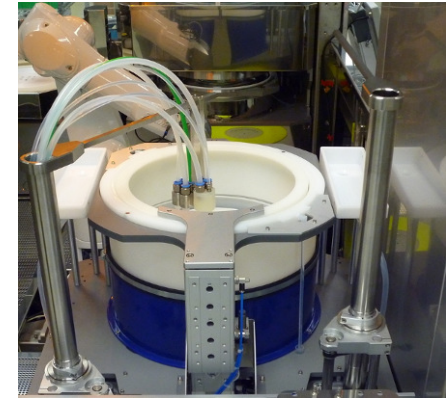
Spin Coater



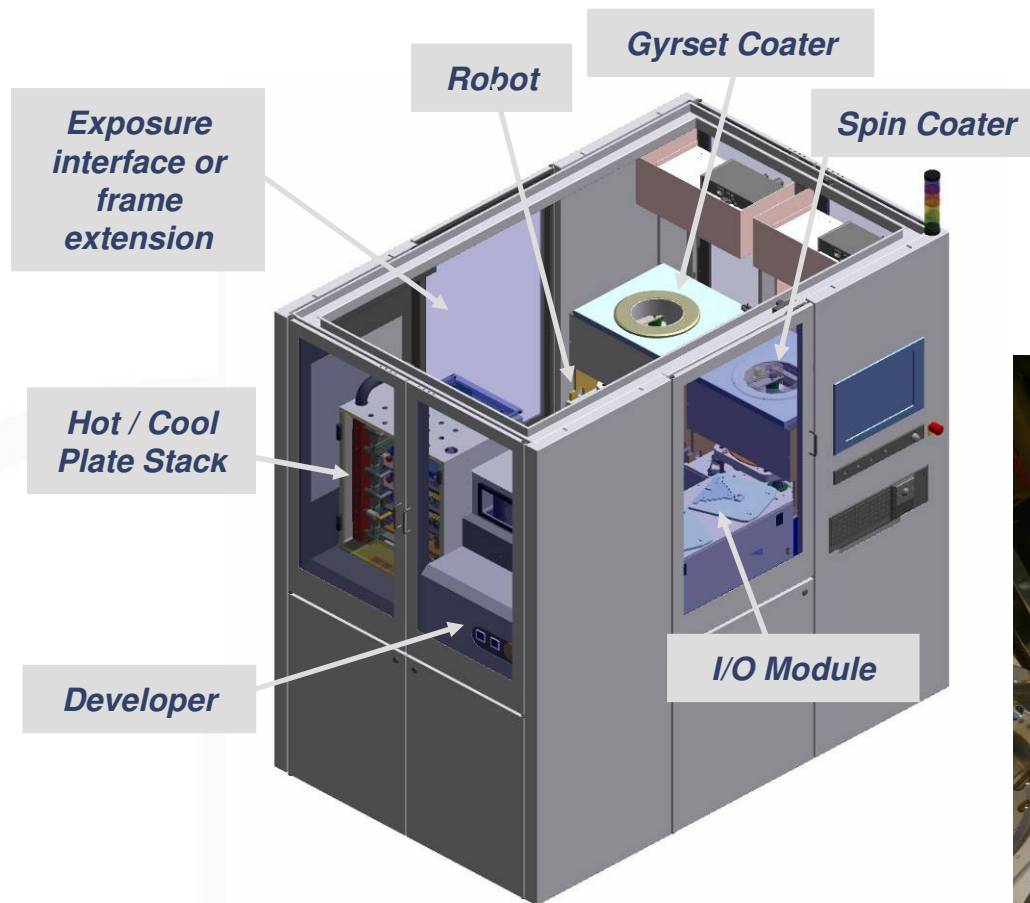
Spray Coater



Developer

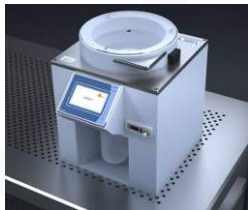


200mm Automated Coat/Develop Cluster



Coater/Developer –Product Overview

Manual Equipment (200mm, 300mm)



LabSpin 6/8 Delta80 RC/12 RC

LabSpin Systems, the smallest coater/developer system for basic applications are offered as table top systems or for integration into a wet bench.

The Delta series is the perfect tool for R&D, universities and start-up companies.

Automated Equipment (200mm, 300mm)



Gamma, ACS200 Plus,
ACS300 Gen2

Highly automated, modular systems for wafers up to 300mm configurable with different modules like:
spin/spray coaters,
aqueous/solvent developer,
primer and temperature stack.

Integrated Lithography Clusters (200mm and 300mm)



LithoFab 200 / LithoPack 300

SUSS Lithography Clusters are integrated coat, bake, expose, develop solutions that especially used in high volume production for unmatched process stability.

Coater/Developer - The right Equipment for every Target Market

	Manual Equipment	Automated Equipment	Integrated Lithography Clusters
LED General Lighting, HB and UHB LED	✓	✓	✓
MEMS Computing, Automotive, Medical Applications ...		✓	✓
Advanced Packaging Semiconductor Industry		✓	✓
3D Integration/ Stacking Semiconductor Industry		✓	✓
Research and Development	✓	✓	✓

Coater/Developer – Focus on Growth Markets

+ LED

- Trend to larger substrate sizes with continued pressure to reduce cost / lumen.
- Development of dedicated LED lithography equipment to meet technological requirements at best cost of ownership

+ MEMS

- Trend to 200mm fabrication for mature products and customized solutions for emerging applications
- Development of specific 200mm lithography solutions plus integration of new technologies (i.e. Spray Coating)

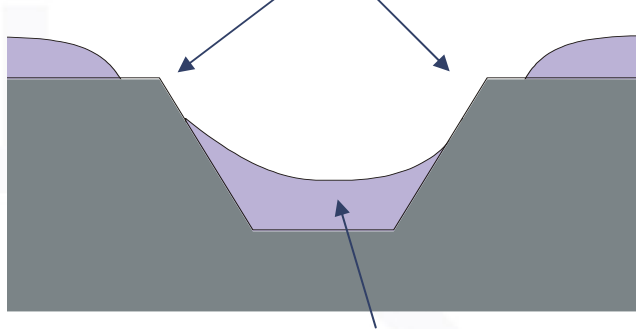
+ Advanced Packaging

- **Thick resist** photo lithography is an indispensable element of wafer bumping and advanced wafer level packaging
- The challenges of photoresist processing in the field of wafer bumping and wafer level packaging requires very careful design of coat, bake and develop modules in order to attain suitable production quality performance
- Combining the AltaSpray Technology with the SUSS LGO Optics guarantees most effective patterning of **high topographies** for various applications

Coater/Developer – Challenges I

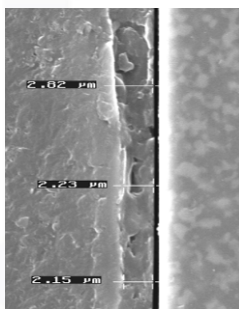
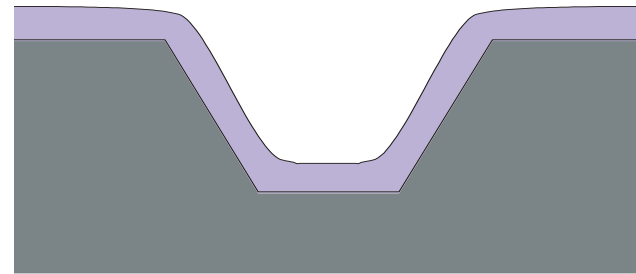
Spray Coating

Resist film tends to tear at the topography edges

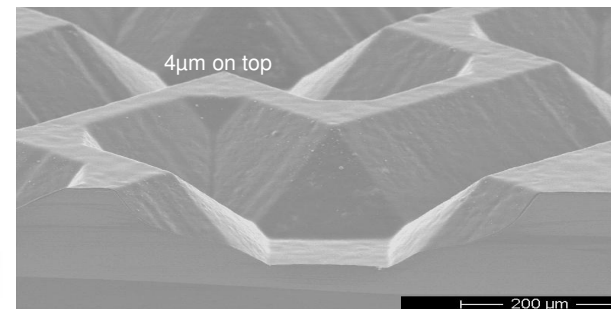
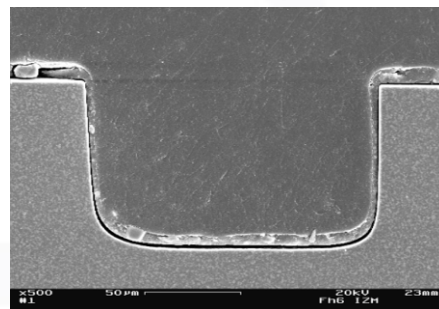


Limited control of resist thickness at the bottom of the topography

Goal: Uniform coating of topography



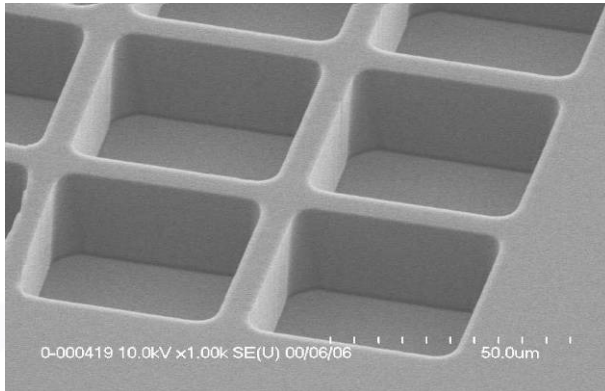
AZ4999, positive resist,
4μm top / 2.2μm sidewall coverage



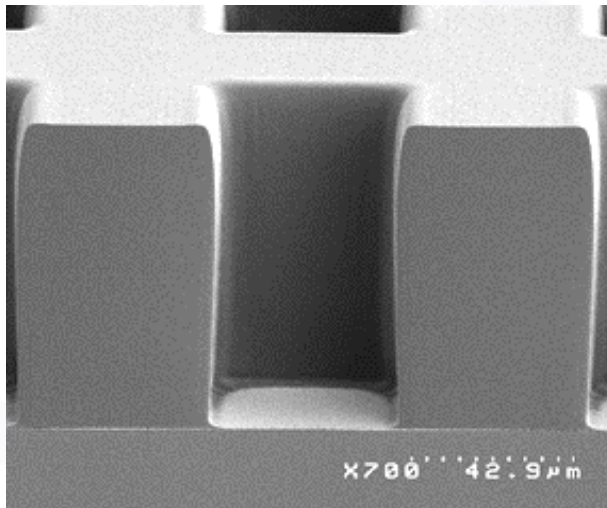
AZ4999, positive resist,
4μm coverage over 200μm deep KOH structure

Coater/Developer – Challenges II

Thick Resist Coating / Developing

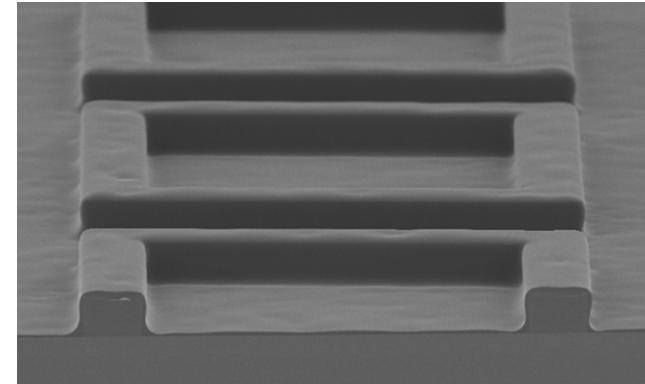


*TOK PMER PLA900, positive resist,
10µm lines / 40µm spaces*

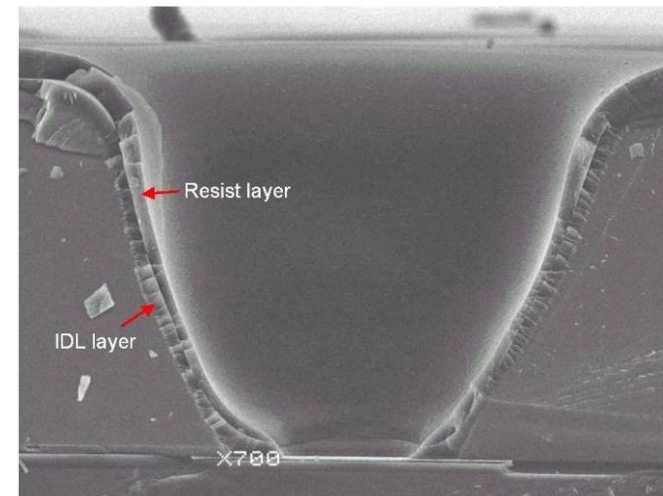


*JSR THB151-N, negative acting,
75 micron thick*

3D Coating/ Developing



*AZ 4999 positive resist, 10µm thickness,
50µm l/s across 200µm deep etched trench,*



*Positive resist on passivation layer,
Via size: opening 140µm, depth 120µm
Used for image sensor packaging*

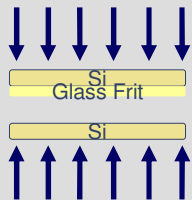
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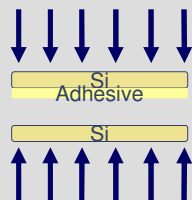
Wafer Bonder – Overview Bonding Technologies

Thermocompression Bonding

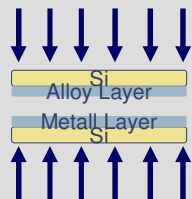
Glass frit bonding



Adhesive bonding

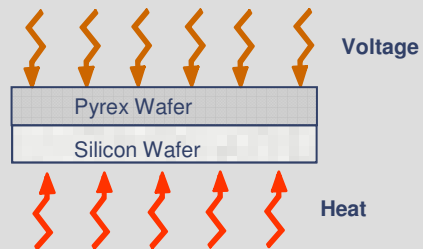


Eutectic bonding



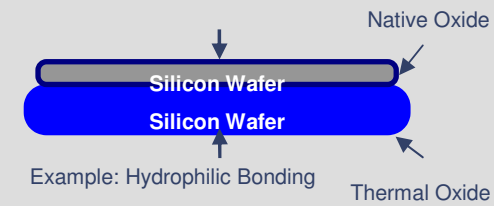
- Parameters: heat, pressure
- Processes: eutectic, glass frit, adhesive
- Wafer material: "free of choice"

Anodic Bonding



- Parameters: heat, high voltage
- Wafer material: Si and Borsilicat glass (PYREX)

Fusion Bonding



- Parameters: pressure, heat
- High requirements to the wafer surface
- Wafer material: "free of choice"

Wafer Bonder – Overview

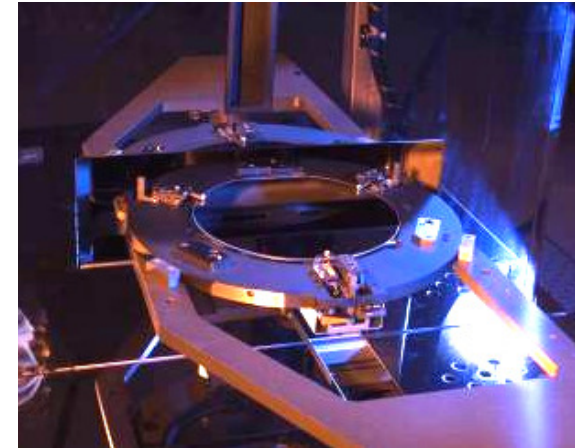
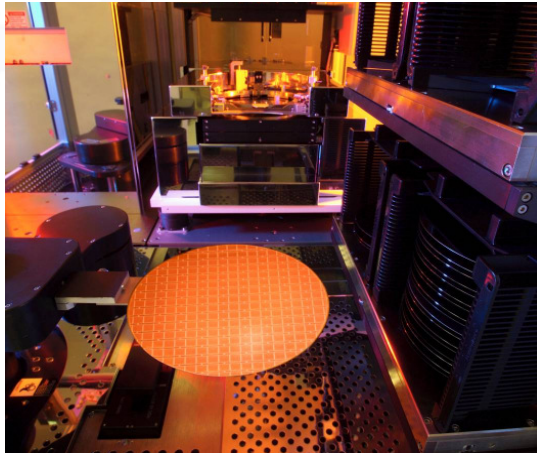
Bond Aligner



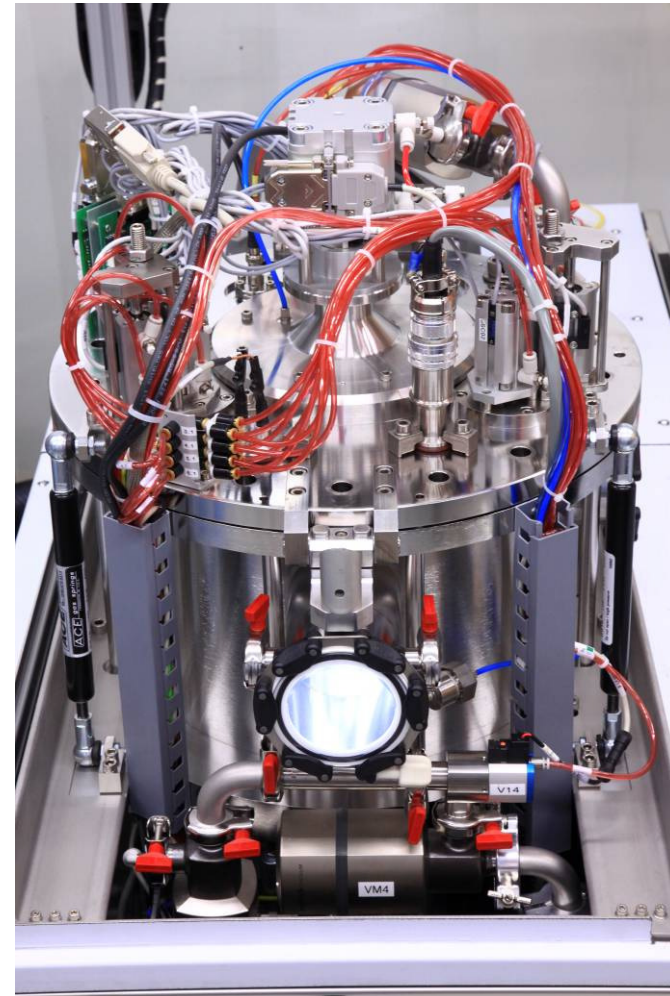
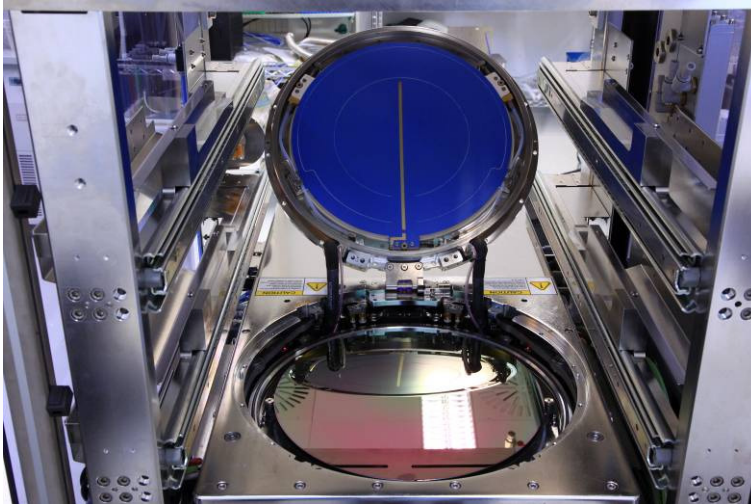
Wafer clamped
into transport fixture
after alignment



Wafer Bonding



Wafer Bonder – A Look at the Inside



Wafer Bonder – Product Overview

Manual Equipment
(Small pieces to 200mm)



SB6L / SB8L

SB6e / SB8e

Manual Wafer Bonders are designed for R&D, pilot production and low labor cost production environments

One chamber designed for all types of bond processes – including anodic, glass frit, thermocompression, polymer and adhesive bonding – offers ultimate flexibility

Semi-Automated and
Automated Equipment
(up to 200mm)



CB200M

CBC200

Semi-Automated Wafer Bonders allow for high Performance Wafer Bonding

Achieve unmatched pressure uniformity, alignment stability and thermal performance with the CB200M wafer bonder for MEMS, 3D stacking and LED bonding applications.

Automated Equipment
(200mm and 300mm)



XBC300

Automated Permanent & Temporary Wafer Bonding Systems are designed for volume production.

Wide selection of process modules for permanent and temporary bonding allows for greater flexibility

High throughput with smallest footprint

Substrate Bonder - The right Equipment for every Target Market

	Manual Equipment	Semi-Automated Equipment	Bond Cluster
LED General Lighting, HB and UHB LED	✓	✓	✓
MEMS Computing, Automotive, Medical Applications ...	✓	✓	✓
Advanced Packaging Semiconductor Industry			
3D Integration/ Stacking Semiconductor Industry	✓	✓	✓
Research and Development	✓	✓	✓

Substrate Bonder – Focus on Growth Markets

+ **CMOS Image Sensors** (Permanent Bonding: Si-Si, Si-Glass)

- Driven by mobile device market and e-mobility

+ **LED** (Permanent Bonding: Metal-Metal, e.g. Au-Au, Temporary Bonding and Debonding in R&D)

- Driven by the digital lifestyle and the trend to increase energy efficiency

+ **MEMS** (Permanent Bonding)

- MEMS production relies on permanent bonding technologies for the capping layer
- Trend from Glas-Silicon to Metal-Metal, e.g. Al-Ge
- Development of new bonding chamber designed for new MEMS applications (up to 90 kN bond force)
- Automated platform with 6 modules for high volume throughput (CBC200)

+ **3D-Integration** (Temporary Bonding and Debonding, Permanent Bonding: Metal-Metal, e.g. Cu-Cu, Cu-Sn)

- Open-Platform-Strategy allows SUSS MicroTec to serve different applications/customers with the same platform
- SUSS MicroTec supports all currently available temporary bonding and debonding technologies

Overview on Temporary (De-Bonding): Traditional vs. New Processes

New Trend:

Mechanical Room Temperature Release / Release Layer Approaches

 **ThinMaterials**

Material made by **WACKER**



SUSS XBC300

brewer science

ZoneBOND™

Traditional Methods:

Thermal Slide

brewer science

WaferBOND™

Laser Release

3M

Wafer Support System

DU PONT

The miracles of science™

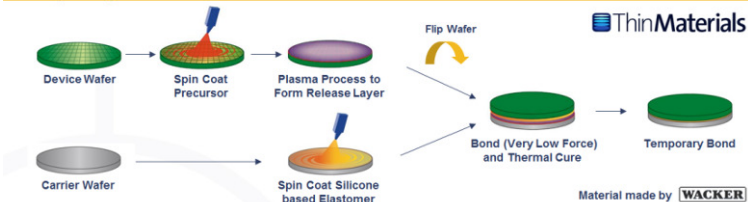
HD-3007

Overview on Temporary Bonding and Debonding: Traditional Slide and Laser Debond vs. New Peel-Off Processes

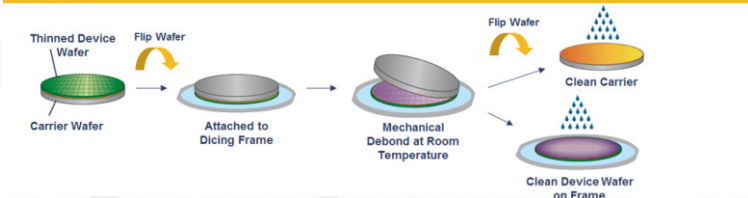
New Room Temperature / Peel-Off Debonding that meet 3D-IC requirements

Silicone Based Adhesive / Room Temperature Peel-Off Debond TMAT (Thin Materials)

Temporary Bond

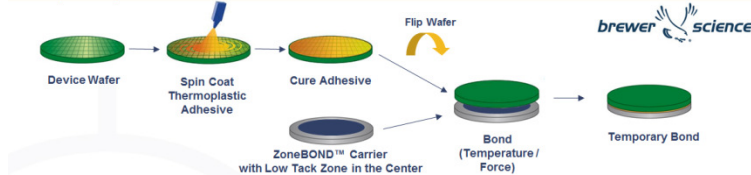


Debond

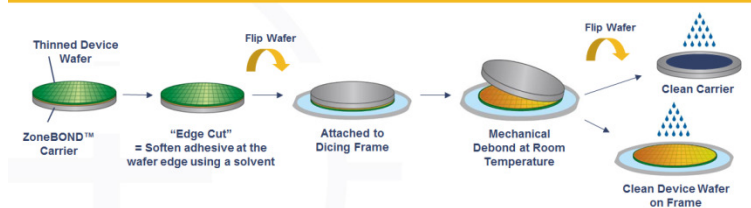


Thermoplastic adhesive / Room Temperature Peel-Off Debond Brewer Science ZoneBOND™

Temporary Bond



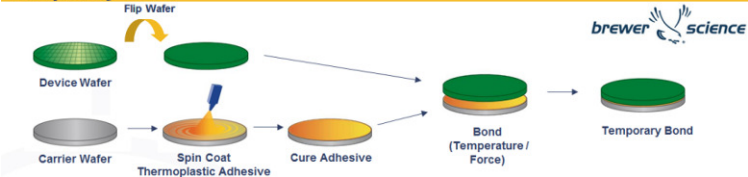
Debond



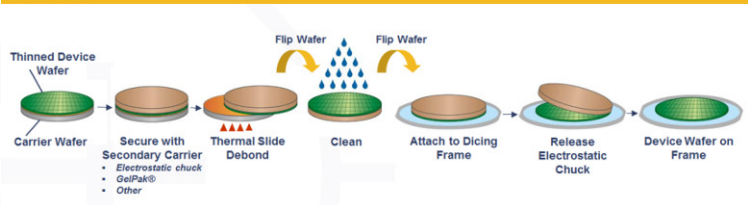
Traditional Thermal Slide and Laser Debonding

Thermoplastic Adhesive / Thermal Slide Release: Brewer Science WaferBOND™ (HT10.10)

Temporary Bond

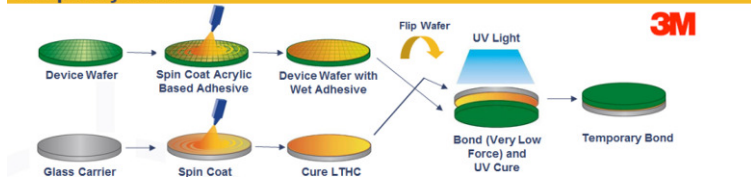


Debond

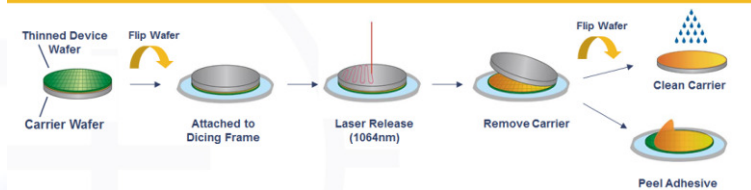


UV Curable Adhesive / Laser Release: 3M™ WSS (Wafer Support System)

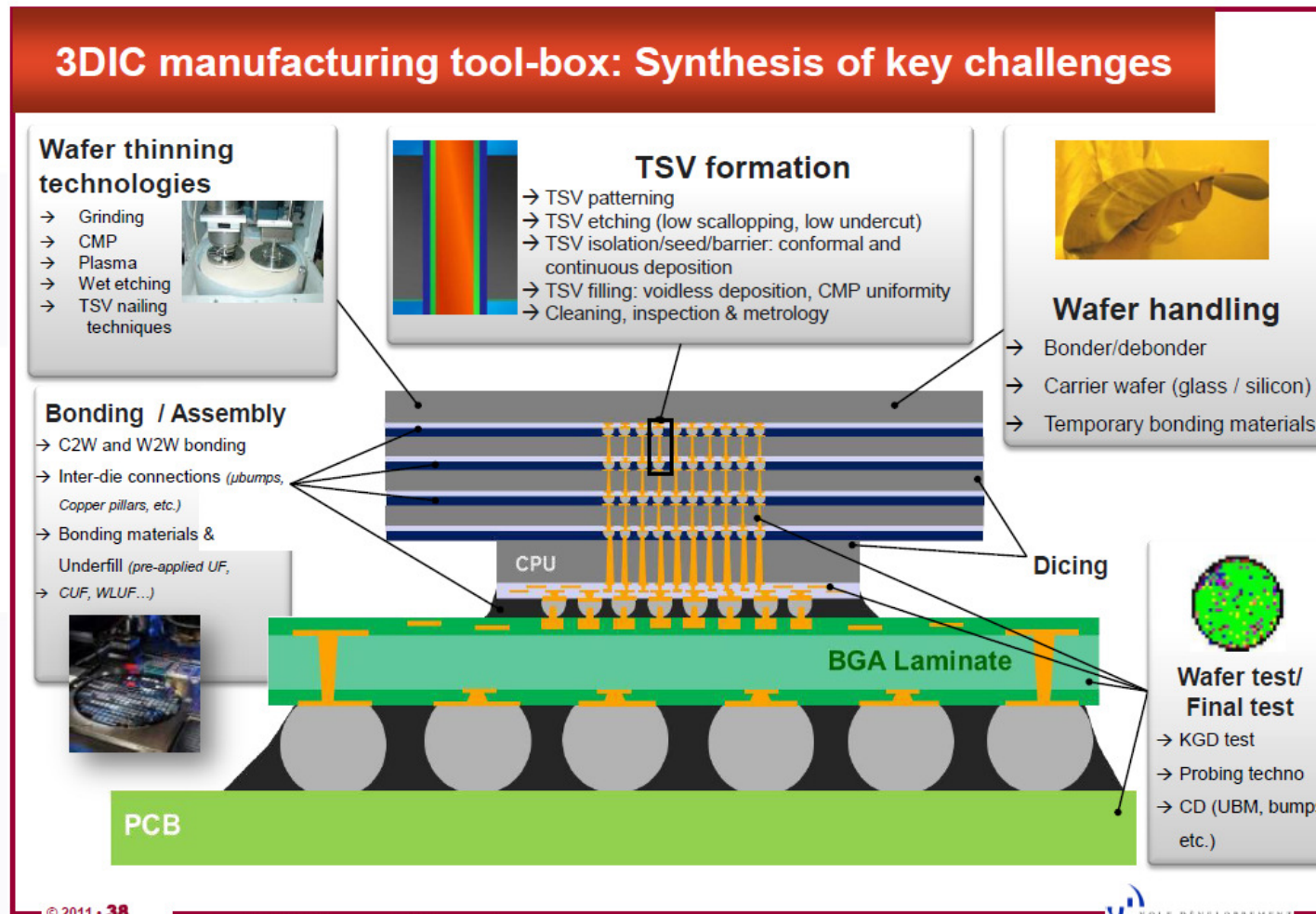
Temporary Bond



Debond



Challenges of 3D- Integration



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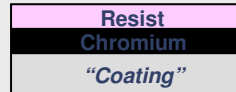
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Photomask Manufacturing Process

1. Chrome blank production

2. Resist coating

3. Baking process of coated blank



4. Pattern Data from Customer

5. Maskshop creates instruction set for direct writing equipment

6. Exposure by laser or electron beam writing equipment

to create latent image on Photomask Blank

7. Post Exposure Bake

to fix the latent image



8. Develop Blank

to remove resist in exposed area

Solvent or alkaline based developer

Developed Resist

"Developing"

9. Etch chrome

to transfer exposed pattern from resist to chrome

Acid based etch med

Etched Chrome

"Etching"

10. Resist stripping + pre cleaning

to remove resist from chrome surface

Solvent or acid based stripper

Stripped Resist

"Stripping"

11. Metrology

12. Inspection for defects

13. Repair of defects

14. Final Cleaning

Acid and alkaline based cleaning media

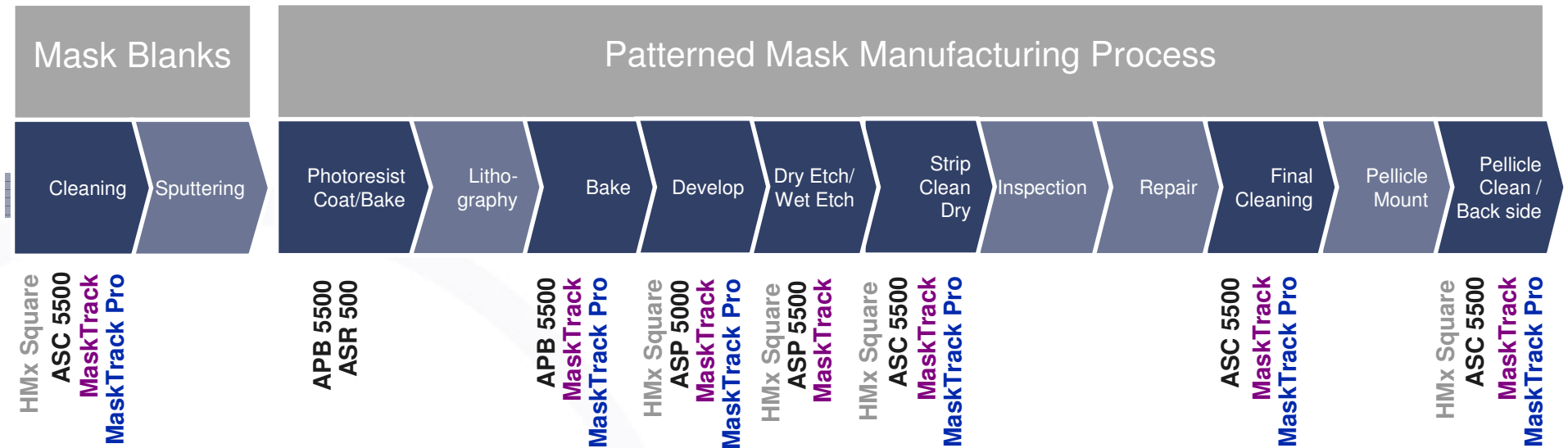
"Cleaning"

15. Pellicle mounting

to protect active layer from particles

16. Final Inspection

Mask Manufacturing Products



SUSS MicroTec Photomask Equipment is installed and operates in every single merchant and captive mask shop around the world.

Photomask Equipment – Product Overview

250 nm to 90 nm



ASx Series

HMx Series

The ASx Series is the photomask processing platform for 250nm to 90nm technology nodes.

HMx is manually operated and enables processing of small series or pilot production of special substrates.

> 90 - 32nm



MaskTrack

MaskTrack is a multi-purpose, fully-automated platform for imprint mask cleaning and critical photomask processing; Post Exposure Bake, Develop, Strip and Clean.

< 32 nm



MaskTrack *Pro*

MaskTrack *Pro* was designed to balance the most stringent conditions of 193i 22nm hp DPT, Extreme Ultraviolet Lithography and Nano-Imprint Lithography processing with innovative techniques to maximize mask performance.

Photomask Equipment - Challenges

193i DPT Challenges

- Pellicle adhesive removal
- CD, phase & overlay stability
- Haze prevention
- Pattern fragility
- Electrostatic
- Surface layer integrity
- Mask lifetime
- Mask availability

EUVL Challenges

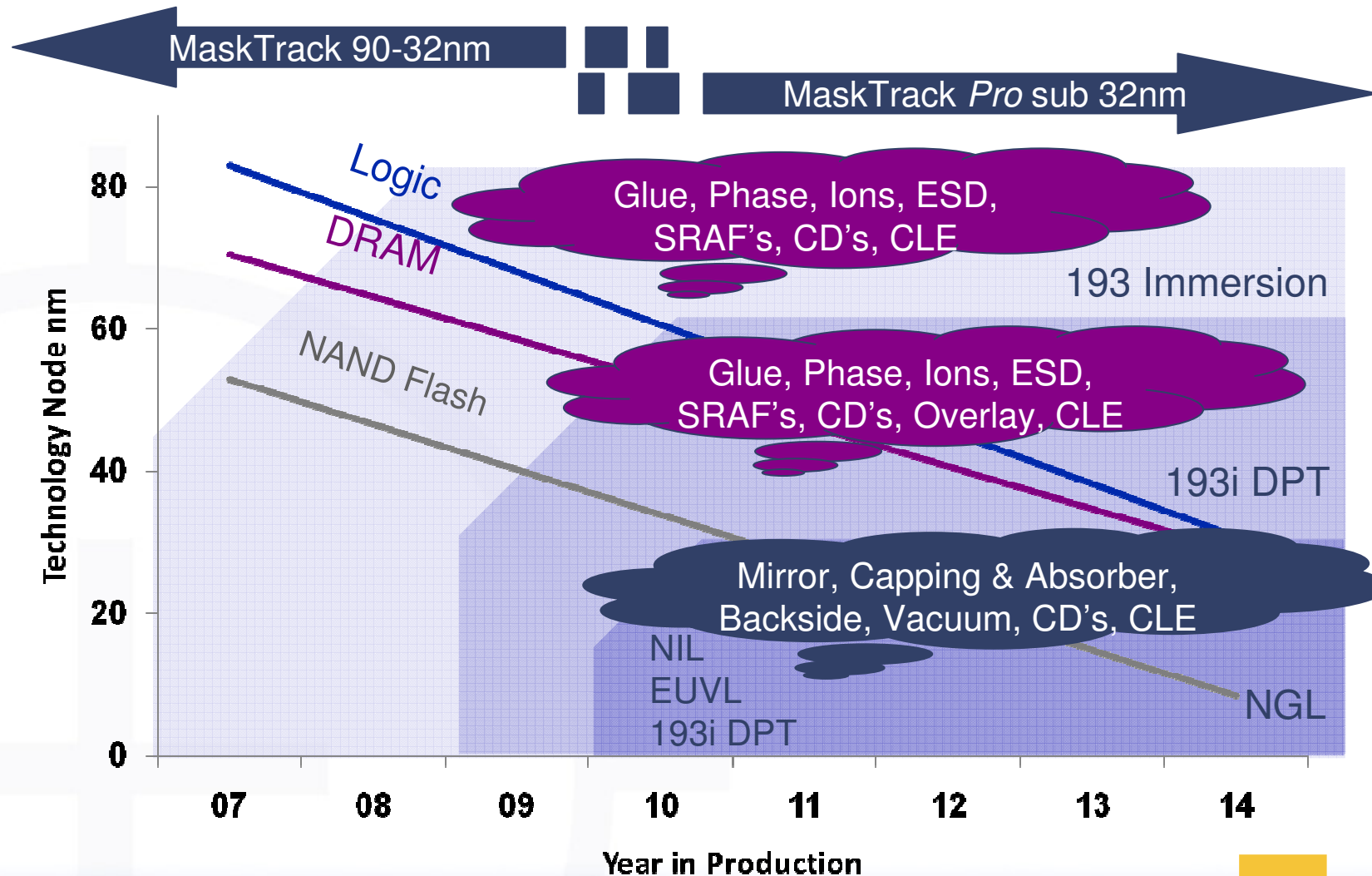
- Vacuum compatibility
- Carbon deposition
- CD & overlay stability
- Pattern fragility
- Surface layer integrity
- Heat sensitivity of mirror stack
- Mask lifetime
- Mask availability
- Backside particles



Cleaning Requirements

- 100% removal of sub -20nm particles
- No residual ions or moisture
- Minimum change to optical properties of surface layers
- Highest first -pass cleaning yield
- Zero ESD, Galvanic erosion or Electric field material migration
- No pattern damage (incl. SRAF)
- Precise removal of carbon deposition
- Zero damage to mirror stack or absorber

Lithography Driving Mask Challenges



Source: ASML, SUSS MicroTec



Site Visit

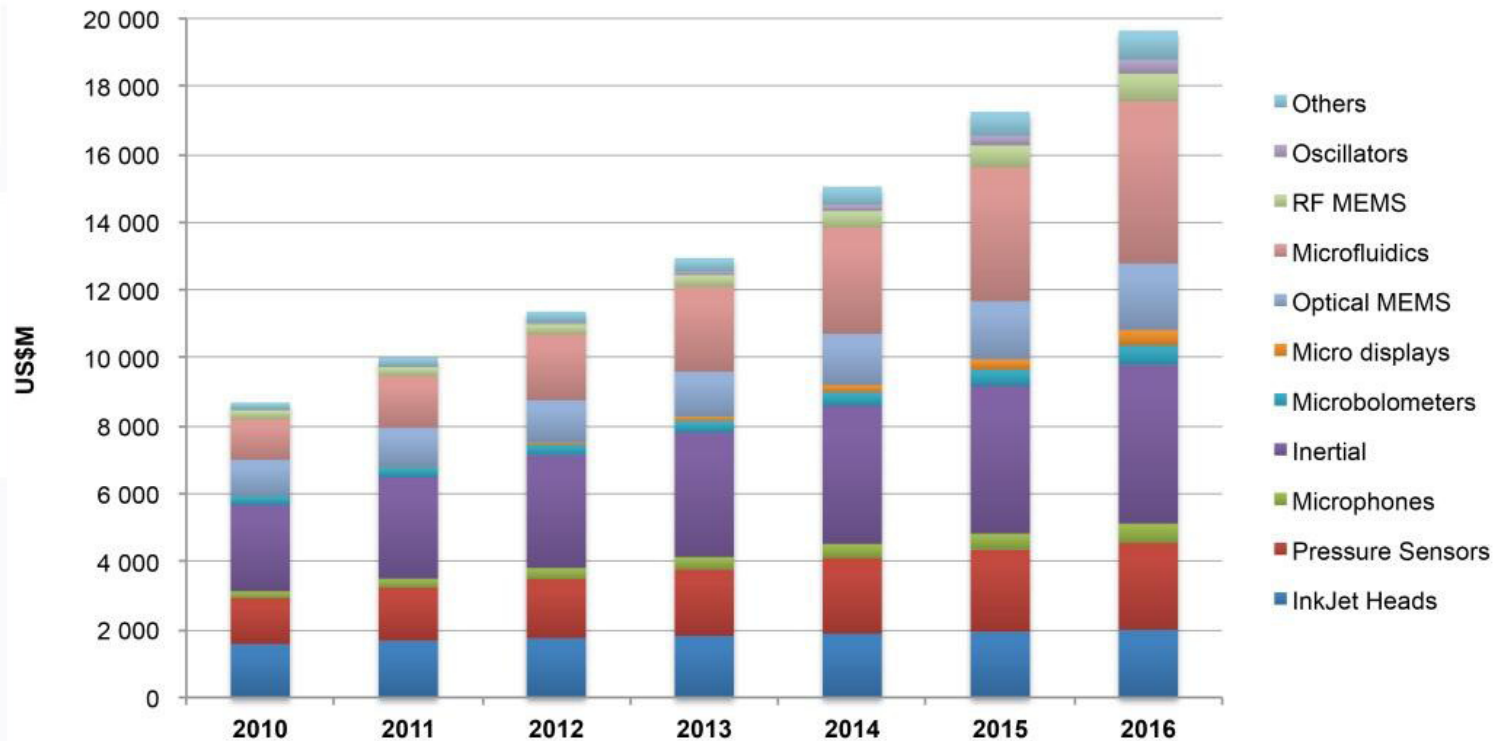
Content

- I. SUSS MicroTec today
- II. Sternenfels, a Business Location with Potential
- III. Our four Product Lines:
 - Mask Aligner
 - Coater/Developer
 - Wafer Bonder
 - Photomask Equipment
- IV. Strategic Outlook**

Market Forecasts I

2010-2016 MEMS markets forecast (in US\$M)

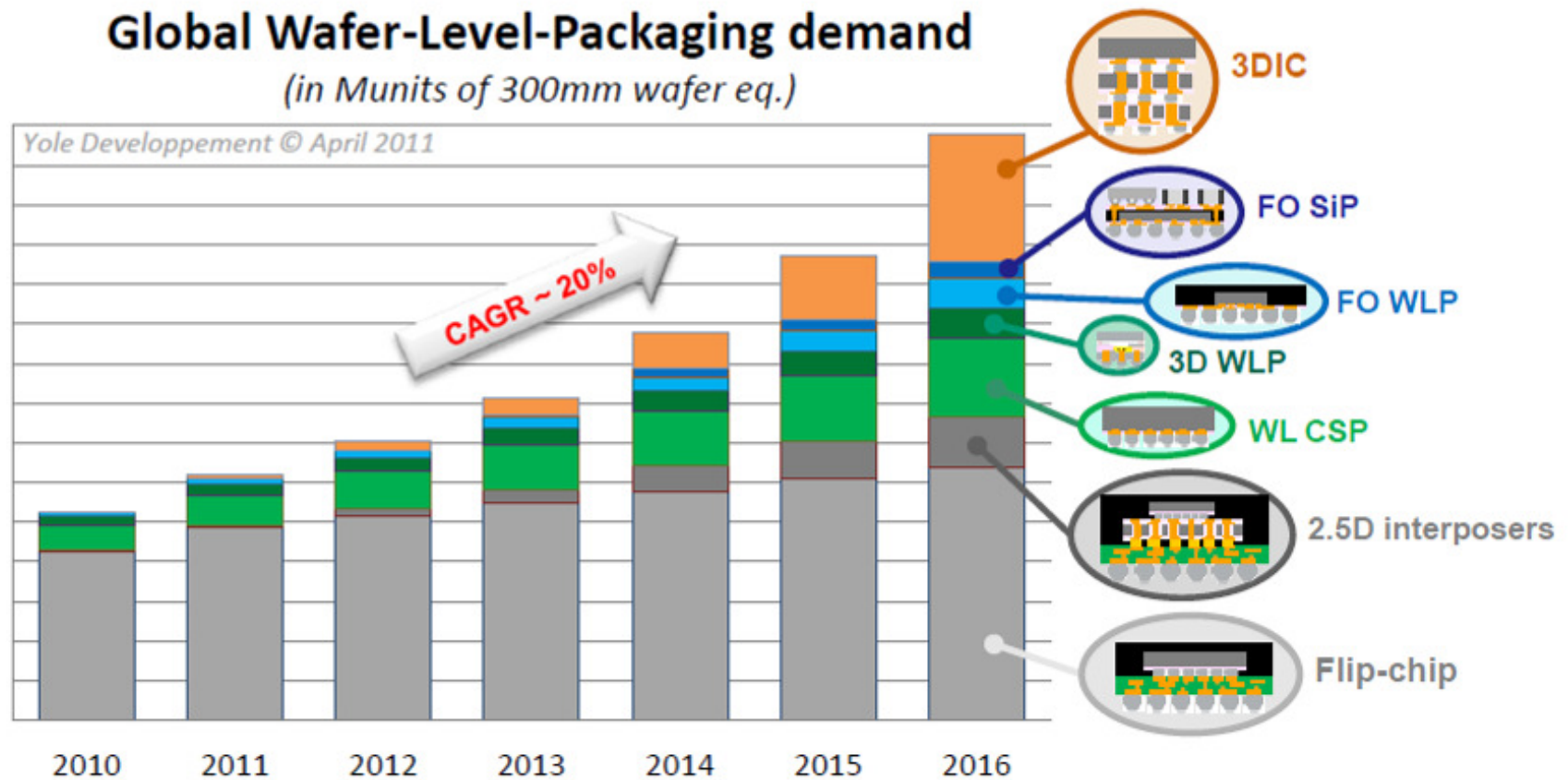
(Source : Status of the MEMS Industry Report, 2011)



© September 2011

Source: Yole Développement

Market Forecasts II



Source: Yole Développement

Guidance

Guidance

- + FY 2011e:
 - Sales of more than 170 € million
 - EBIT-margin 10% – 15%
- + Q3 2011e:
 - Order Intake € 30 – 40 million
 - Sales of approx. 35 – 40 € million

Investment case

- + Strong competitive positioning: first or second in the target markets
- + Expansion of the solid financial situation and increasing profitability
- + Strong fundamental growth in target markets
- + Significant mid term revenue opportunity
- + Evolve to a leading company in the semiconductor backend, enabling 3D integration while supporting “Moore’s Law” as well as “More than Moore”
- + Participate in the consolidation of the backend



Thank you!