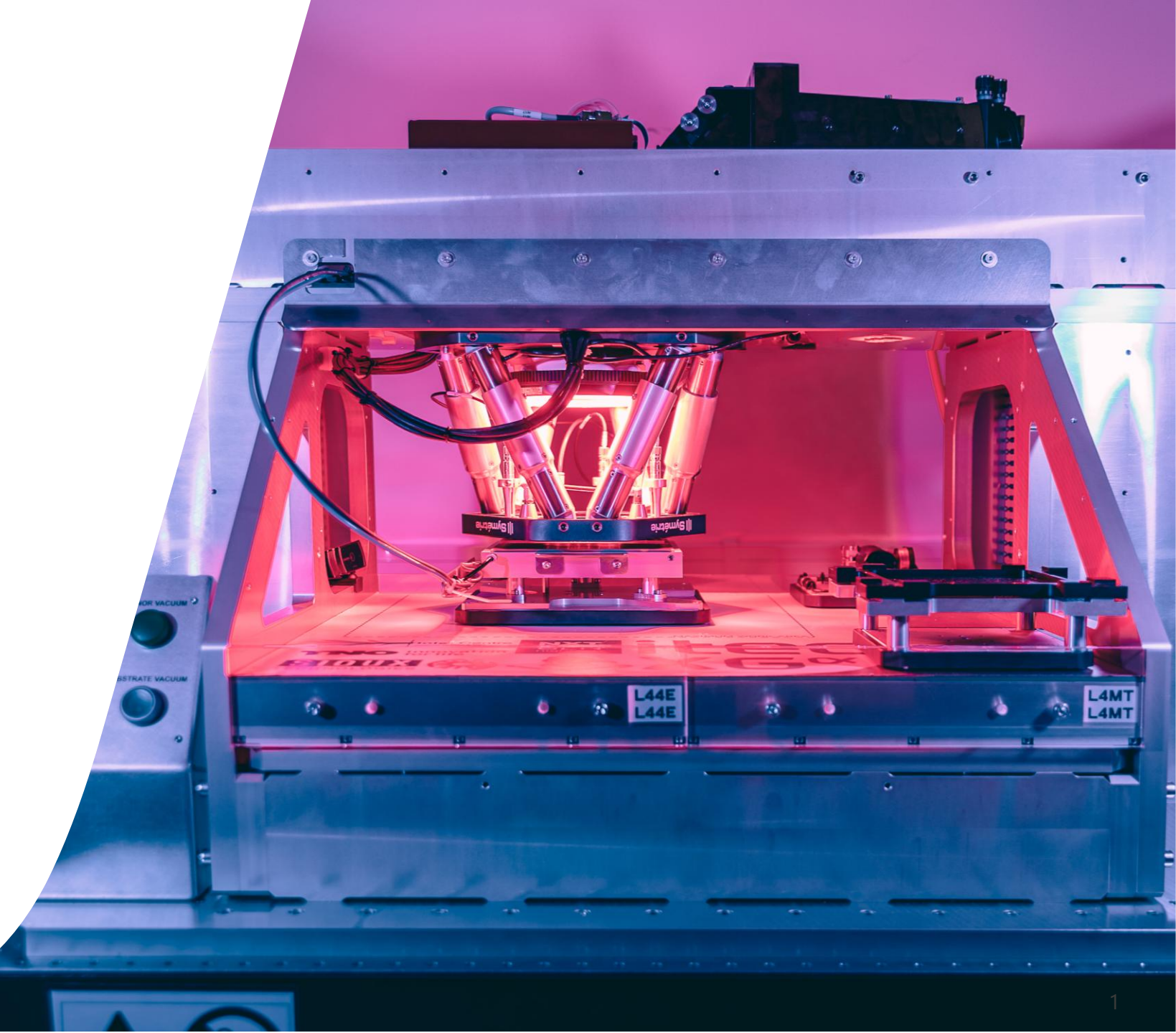
ITEC Advanced Packaging

Towards Robust, high-throughput, high-yield low-cost-of-ownership mass transfer equipment

Visit Fraunhofer
10 December 2025

APECS
Fraunhofer IZM
Forschungsfabrik Mikroelektronik Deutschland
Fraunhofer Institute for Reliability and Microintegration IZM



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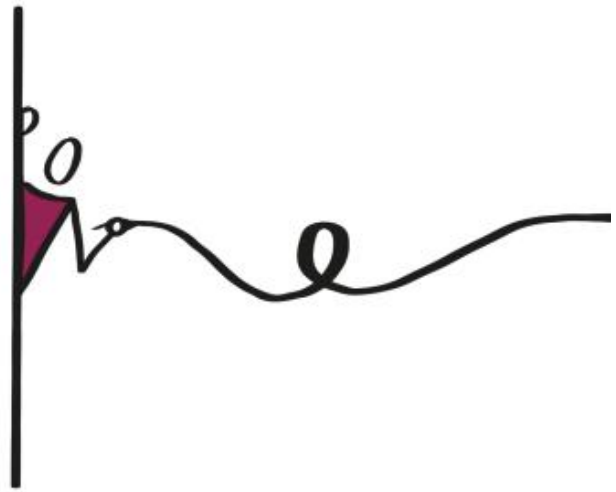
Redefining semiconductor manufacturing



ITEC established as the equipment department of Philips Semiconductors

1991

ADAT2 6" die bonder

1992

Philips Semiconductors became NXP

2006

ADAT3 8" flip chip

2014

ITEC became a separate entity

2021

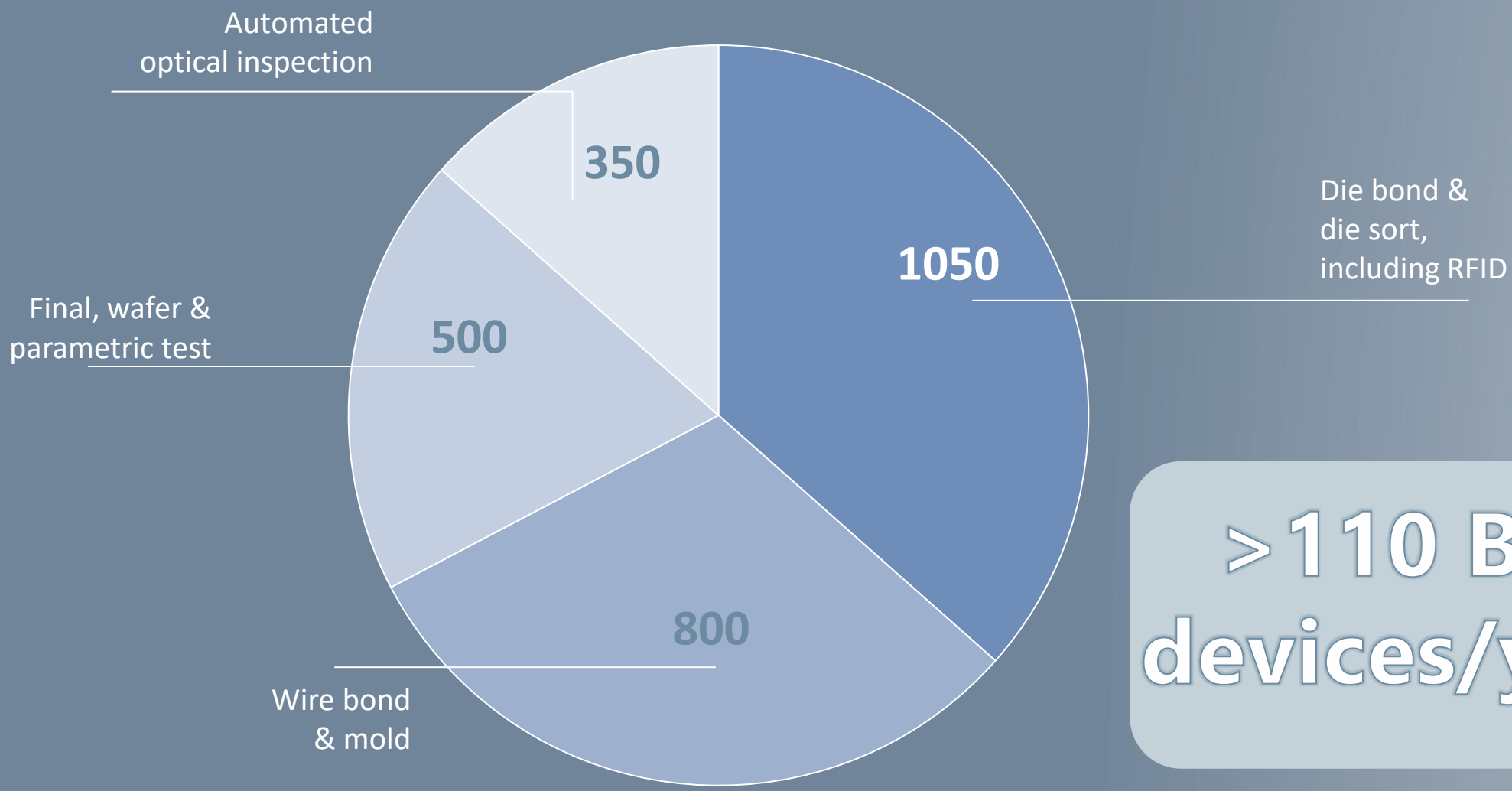
ADAT3 XF TwinRevolve

2024

30+ YEARS OF REDEFINING SEMICONDUCTOR MANUFACTURING

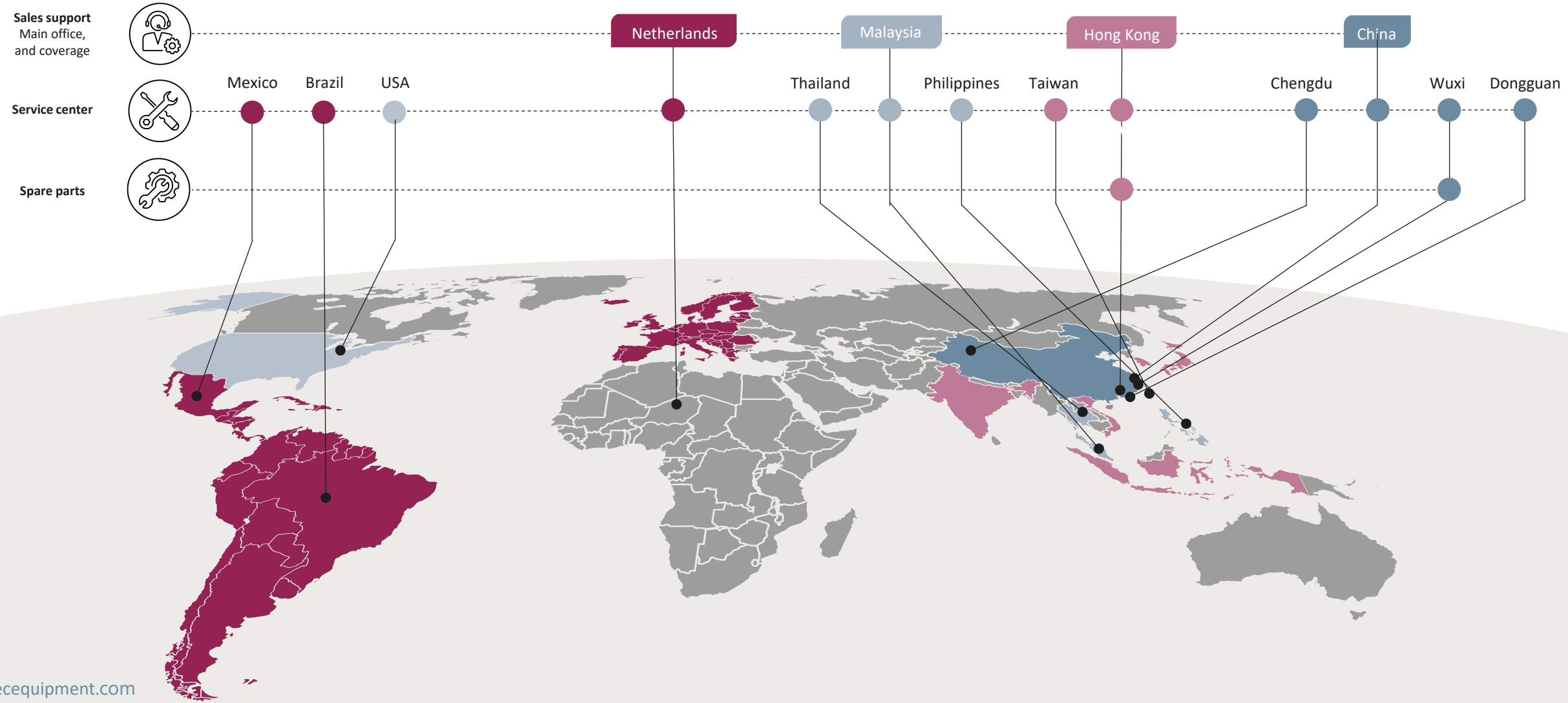
In 1987, “Breakthrough in Manufacturing” (BIM) was simply a new concept. Now, over 30 years later, BIM aptly describes ITEC`s own approach to pushing the boundaries of semiconductor productivity. We develop breakthrough technologies and build state-of-the-art equipment that enables our customer to mass-produce semiconductor products of the highest quality.

Installed base of ITEC equipment over 2700 tools worldwide

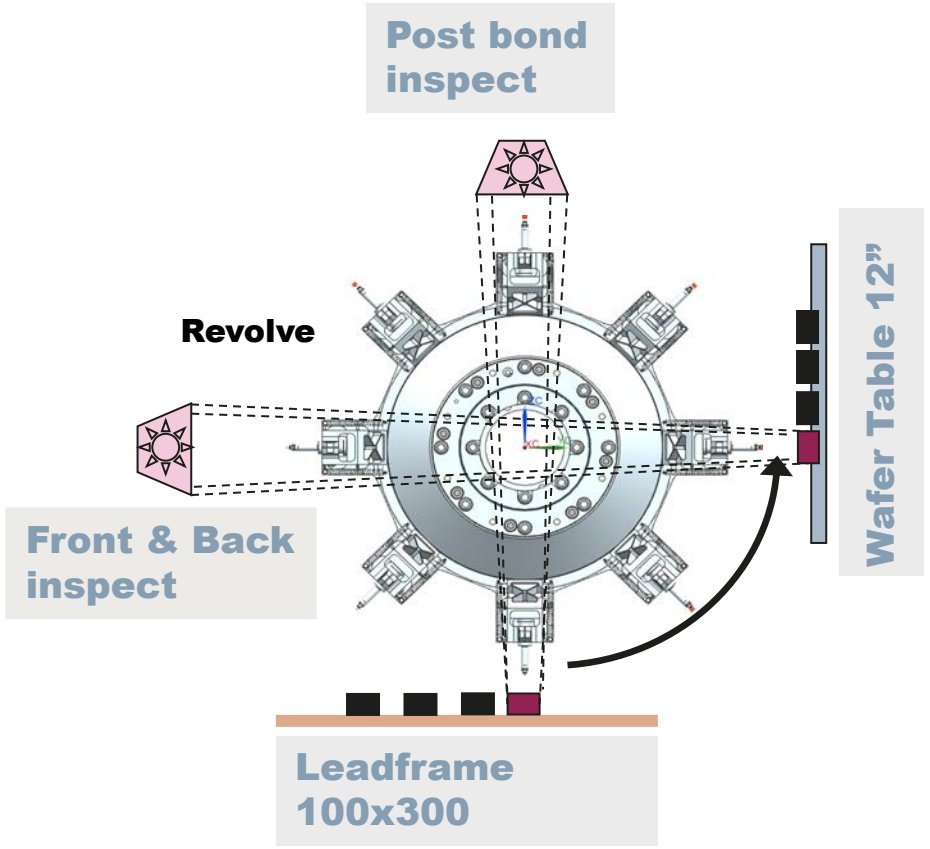


>110 Bn devices/year

Global presence and service support

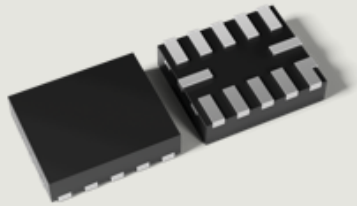


XF principle explained by Dutch windmill



ITEC equipment excels in a range of applications

Packages



Logic

- Typical packages: TSSOP, VSSOP, DHVQFN, **FC-QFN** etc.
- Up to 40 pins

Power discretes

- Typical packages: DPAK, D^2PAK, LFPAK, CCPAK, etc.
- 2-10 pins
- Including big & thin dies and **source down flip chip**

Small signal discretes

- Typical packages: SOT, SOD, DSN, DFN, QFN, **FC-QFN** etc.
- 2-8 pins

Other metrics

- 0.15-5 mm die size
  (up to 10 mm under development for power)
- Up to 20,000+ units per strip
- Direct bond & flip chip like **FCOL**

New member of the ADAT3 XF family: Introducing XF TwinRevolve

ADAT3 XF DBSG die bonder

- Strip to strip glue
- **72k UPH→ 20 dies per sec**
- 1.3M /day

ADAT3 XF DS die sorter

- Wafer to tape (WLCSP)
- 60k UPH
- 1.3M /day

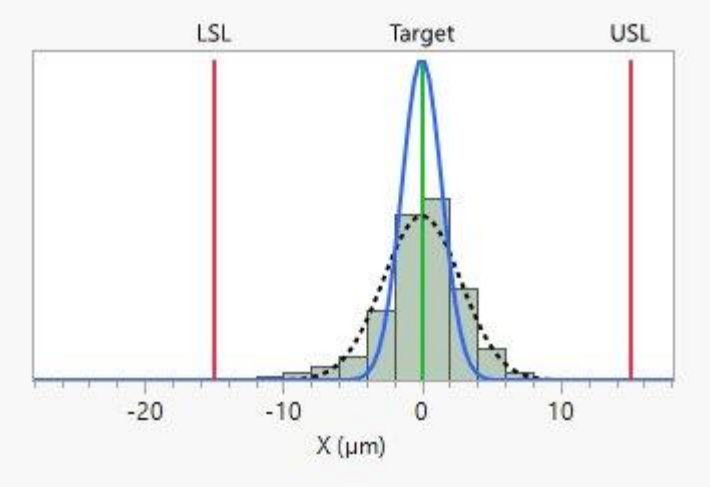
ADAT3 XF DBS in-line die bonder

- Strip to strip
- In line with PbSn screenprint
- In line with clip attach & reflow
- 60k UPH

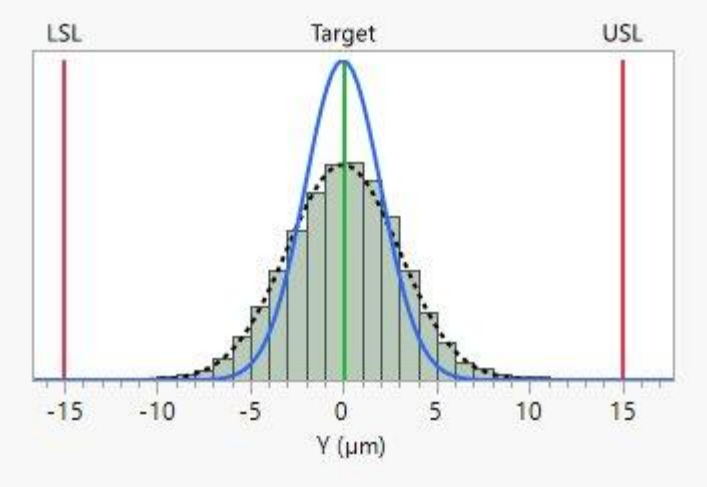
ADAT3 XF TwinRevolve die bonder

- Flip-chip die bond
- Flux screenprint inspection station
- **60k UPH**
- Multiple tools installed at large IDM

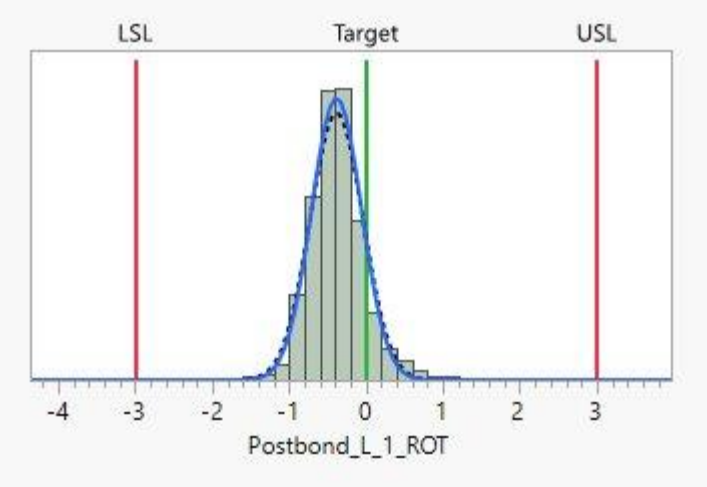
DIE 0.4x0.6 X-Y-R ACCURACY @ 54K UPH and 99.94% YIELD



Cpk: 1.78



Cpk: 1.66



Cpk: 2.54

	X (µm)	Y (µm)	Postbond_L_1_ROT
N	17652	17652	17652
Mean	-0.0	0.0	0.4
Std Dev	2.81	3.01	0.34
Min	-26	-14	-3.9
Max	10.1	12.3	3.51

<3σ10µ

ADAT3 XF TwinRevolve

The next steps for our XF TwinRevolve

✓ Advanced packaging

- **Chip to Wafer (FO interposer)**
- **Chip to Panel**

✓ Flexibility

- Normal Die Bond
- Flip Chip Die Bond
- Die Attach Film
- EFEM Loader/Unloader
- OHT/ARV/AGV

✓ Range :

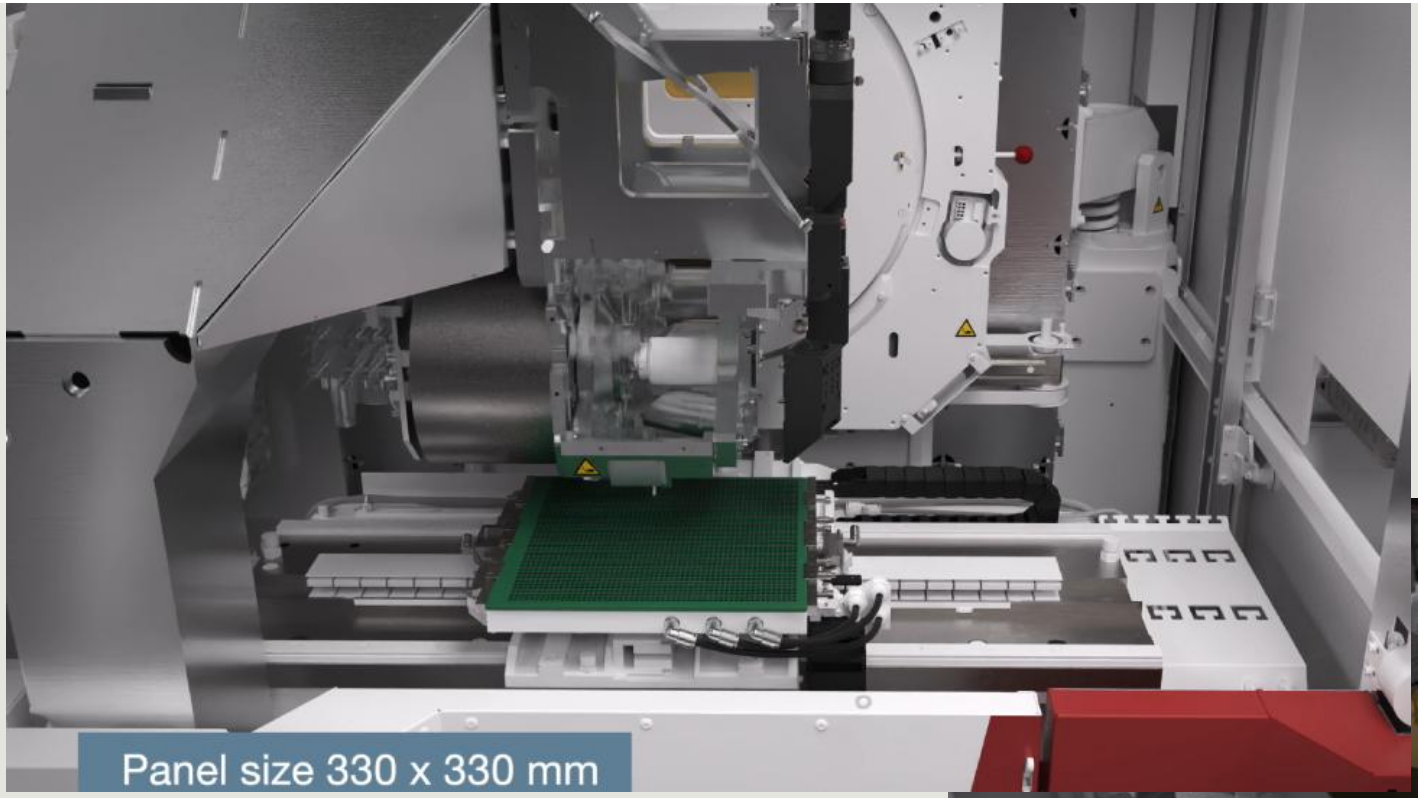
- C2W → 8" or 12" target wafer & source wafer
- C2P →Panel 330*330 mm
- Diesize 0.15-10 mm
- Die thickness 30-50 µ
- Bondforce 0.15-5N

✓ Speed & accuracy

- Accuracy 3σ5µ
- Units per hour up to **50k Uph**
- **5x times faster** than alternatives

XF CHIP TO WAFER /PANEL SNEAK PREVIEW

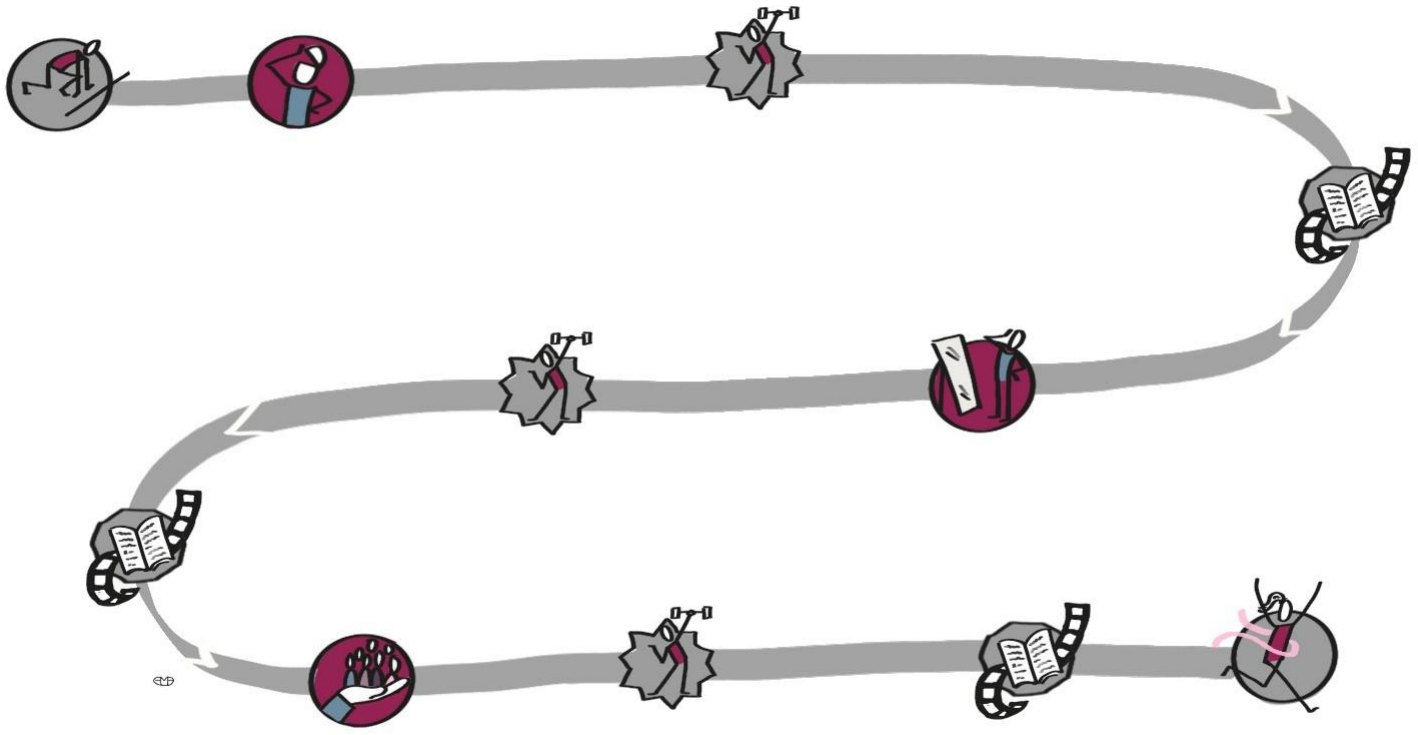
XF Chip to wafer 50k uph 3σ5µ accuracy



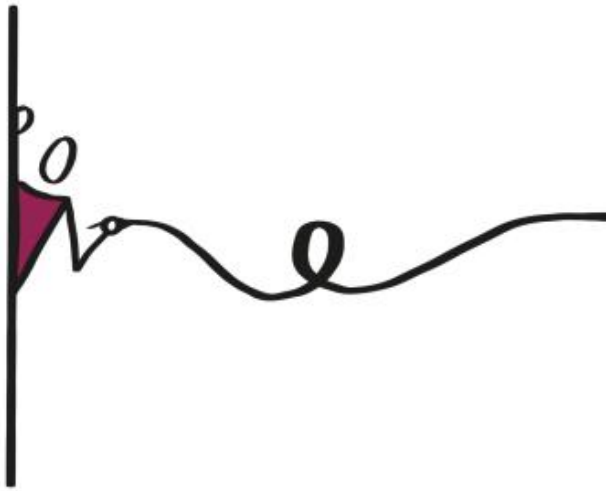
Panel size 330 x 330 mm

“12”-8” target & donor wafer

Roadmap – Technology Roadmap Nxtgen Chip Assembly



Redefining semiconductor manufacturing



ITEC NXTGEN CHIP ASSEMBLY ROADMAP – ADVANCED PACKAGING

ENABLING LOW-COST HIGH-VOLUME & EXTREME-HIGH-VOLUME MARKETS

Semicon Power:

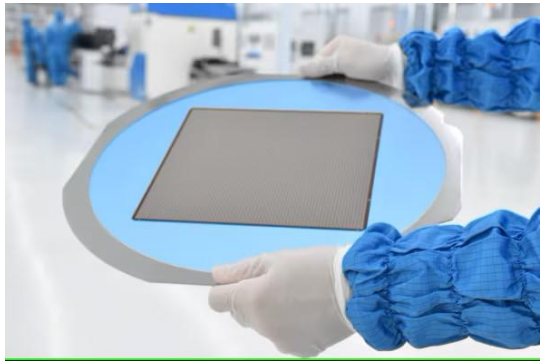
20µm twelve-inch wafer

image Infineon.com

RFID Semiconductor:

smart tags

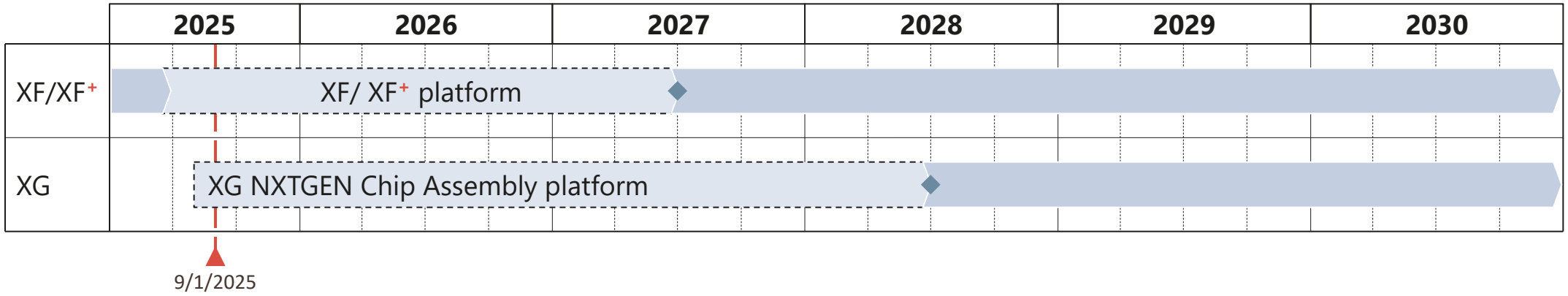
image ups.com



Semiconductor:

panel Level / wafer level

image stmicroelectronics.com



ITEC NXTGEN CHIP ASSEMBLY ROADMAP - ADJACENT MARKETS

ENABLING LOW-COST HIGH-VOLUME & EXTREME-HIGH-VOLUME MARKETS

LED foil for lighting & signage: tracXon

miniLED 3D display

image TracXon

MicroLED :

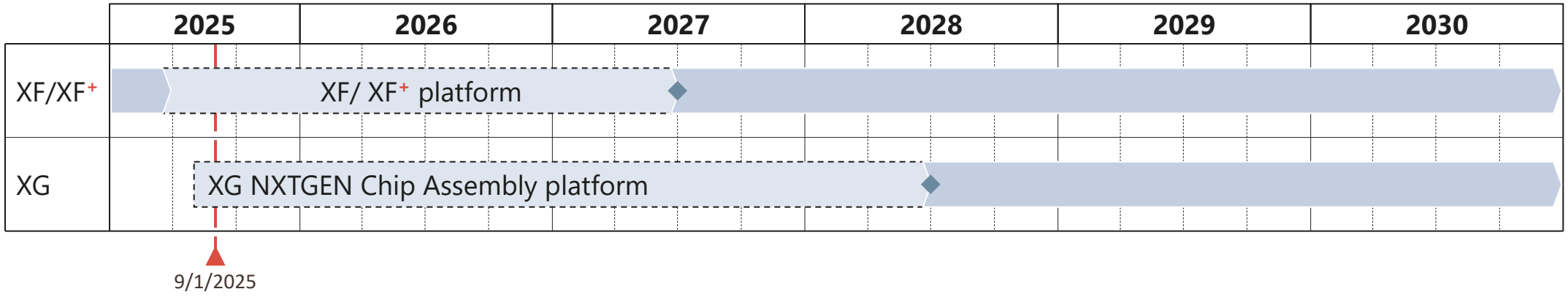
brighten future displays

image garmin.com

Photonic Chiplets:

breakthrough in high-performing computing

image tno.nl



XG-ALPHA

LIGHTING UP THE FUTURE USING LASER TECHNOLOGIES

ITEC home – process:

- low-cost IR laser, glass carrier or Si carrier

Compatible with others:

- XG-Alpha configurations support both LIFT processes for any IR and UV laser wavelength

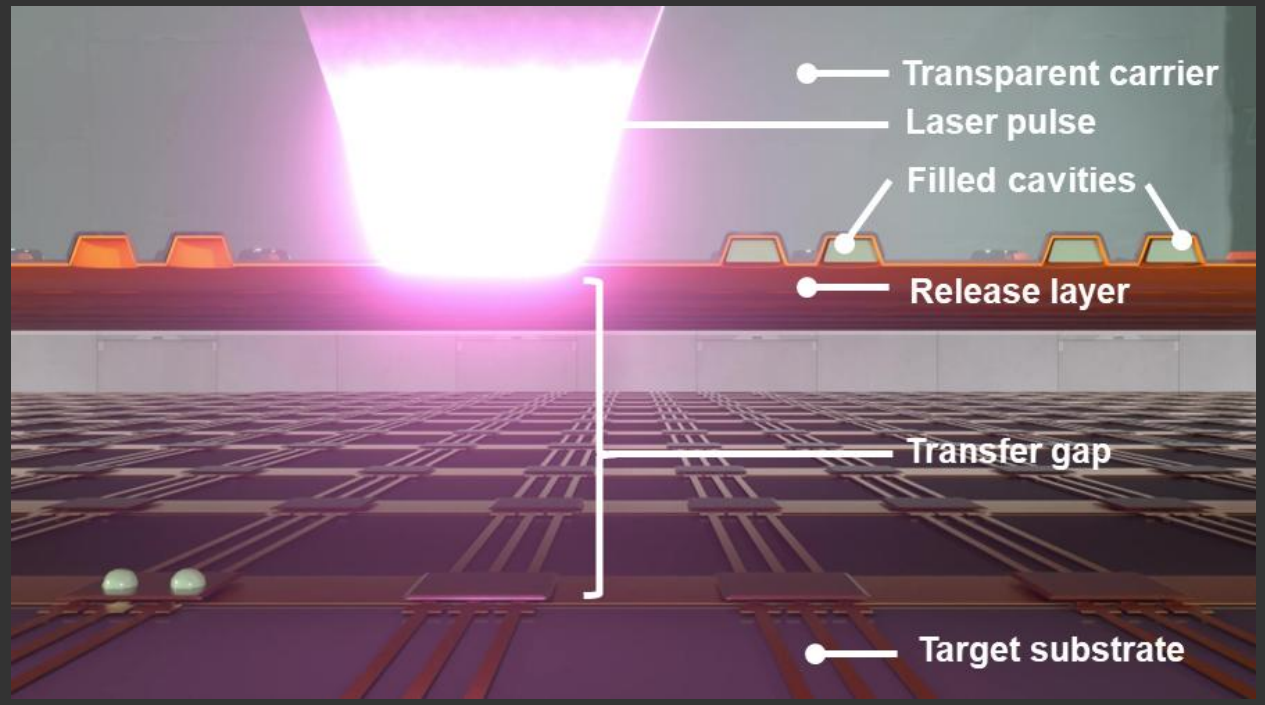
Laser Based Assembly - Technology Toolbox

***LIFT** (**L**aser **I**nduced **F**orward **T**ransfer) of materials and components between substrates in proximity*

Holst Centre
Powered by imec & TNO

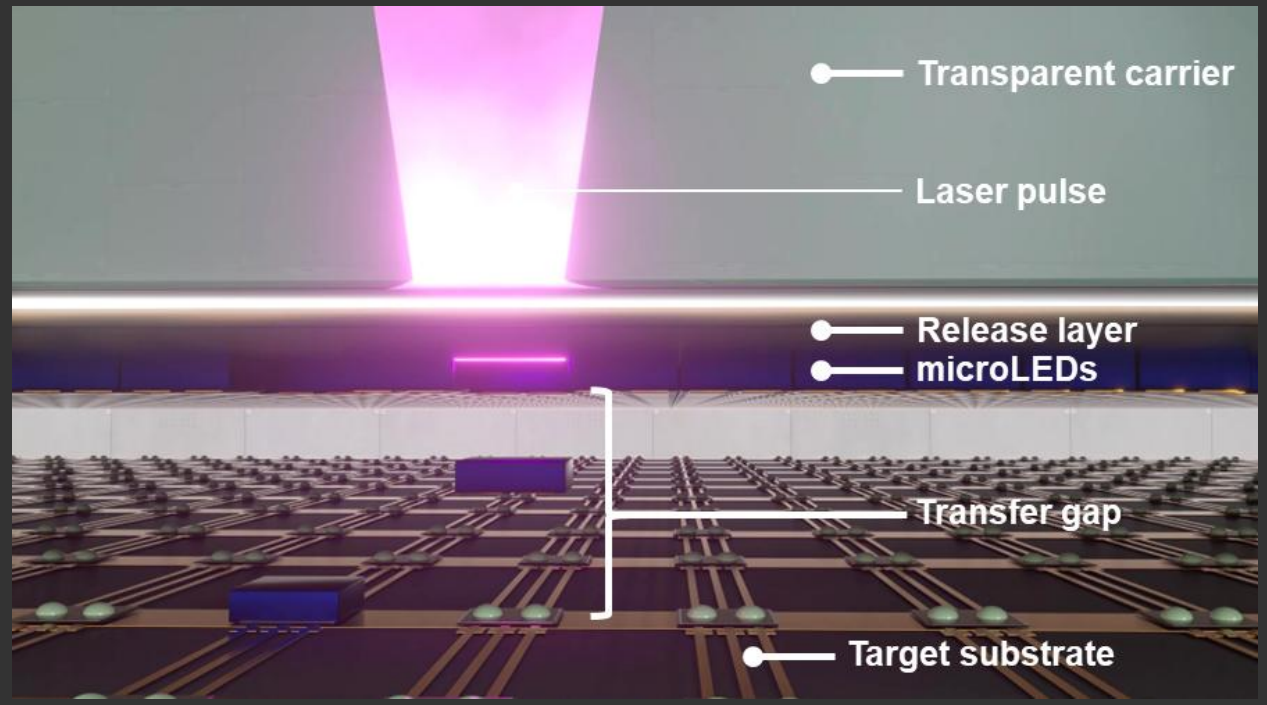
At Holst Centre: Proprietary release stacks used to transfer components and interconnect materials via a low-cost laser source

Interconnect Printing



high-throughput | noncontact | digital | **permanent release layer** | **high resolution**

Component Transfer



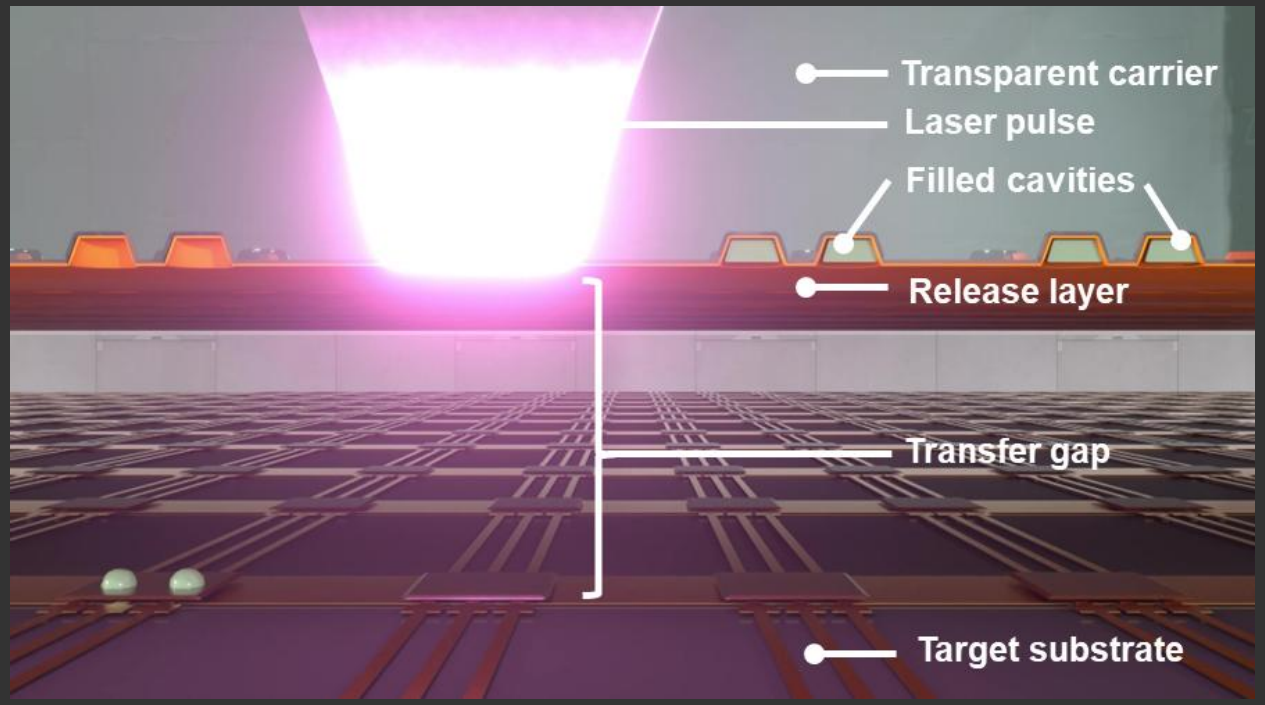
non-explosive | accurate | high-throughput | noncontact | die-on-demand

Interconnect Printing – LIFT2.0

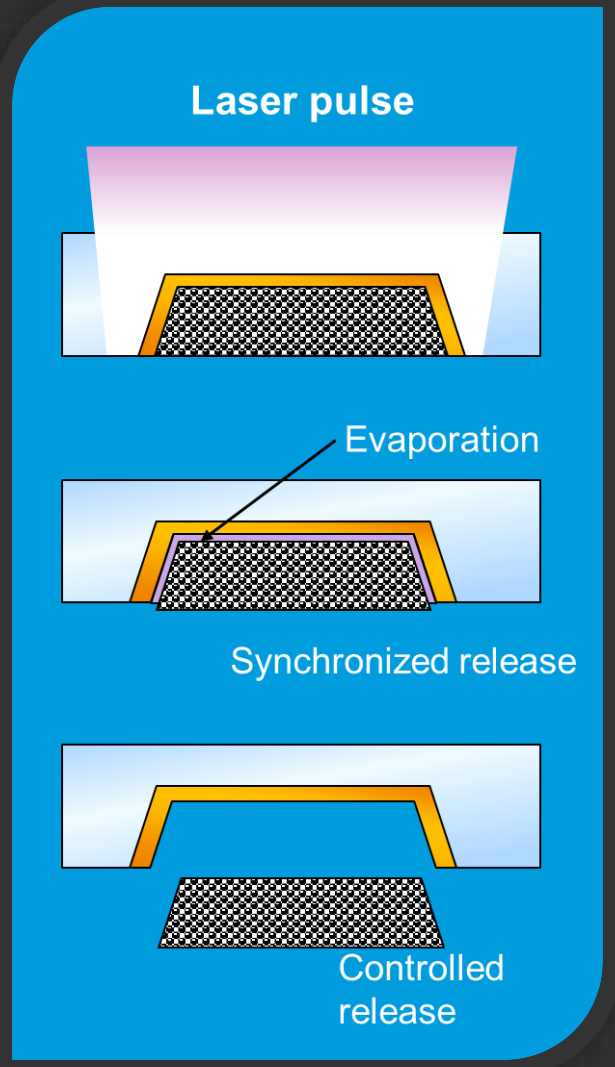
Material printing *between substrates in proximity*

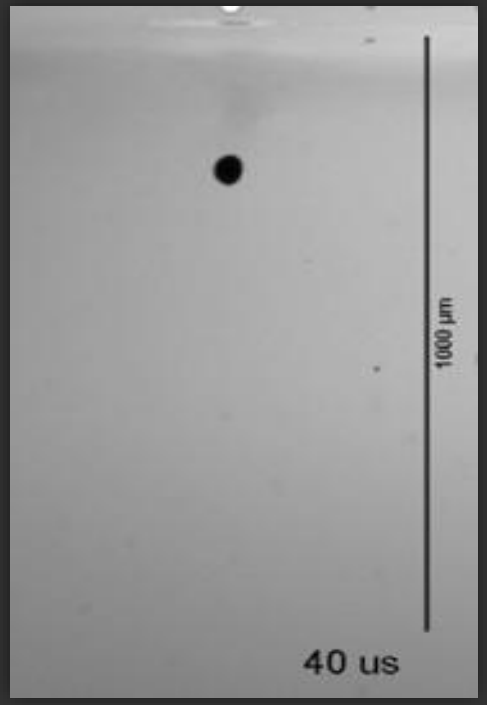
Holst Centre
Powered by imec & TNO

Interconnect Printing



high-throughput | noncontact | digital | **permanent release layer** | **high resolution**



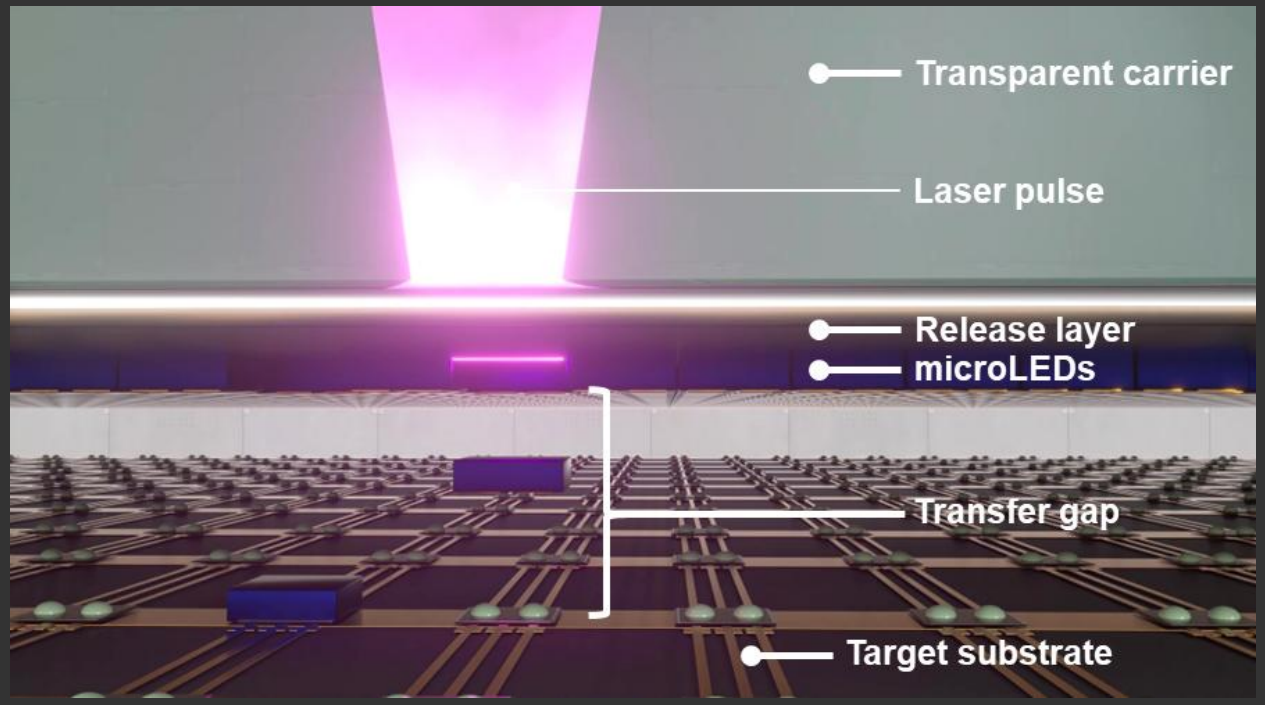


Visualization snapshot
(40µm dot of solder paste)

Component Transfer – Fast Accurate Selective Component Transfer

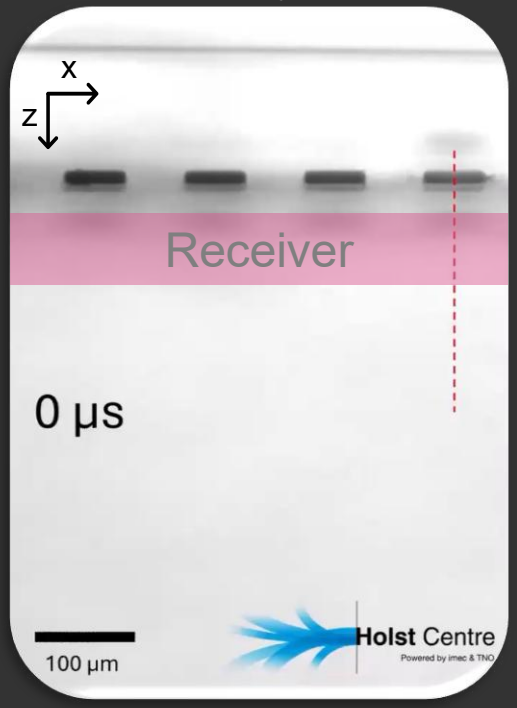
***Laser Die Transfer of** components between substrates in proximity*

Component Transfer

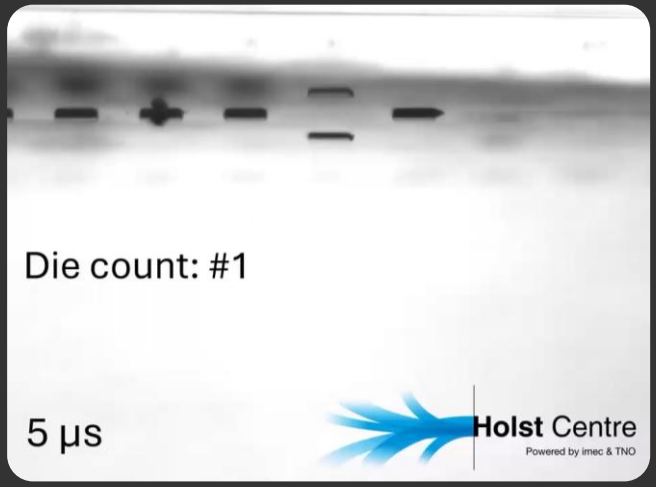


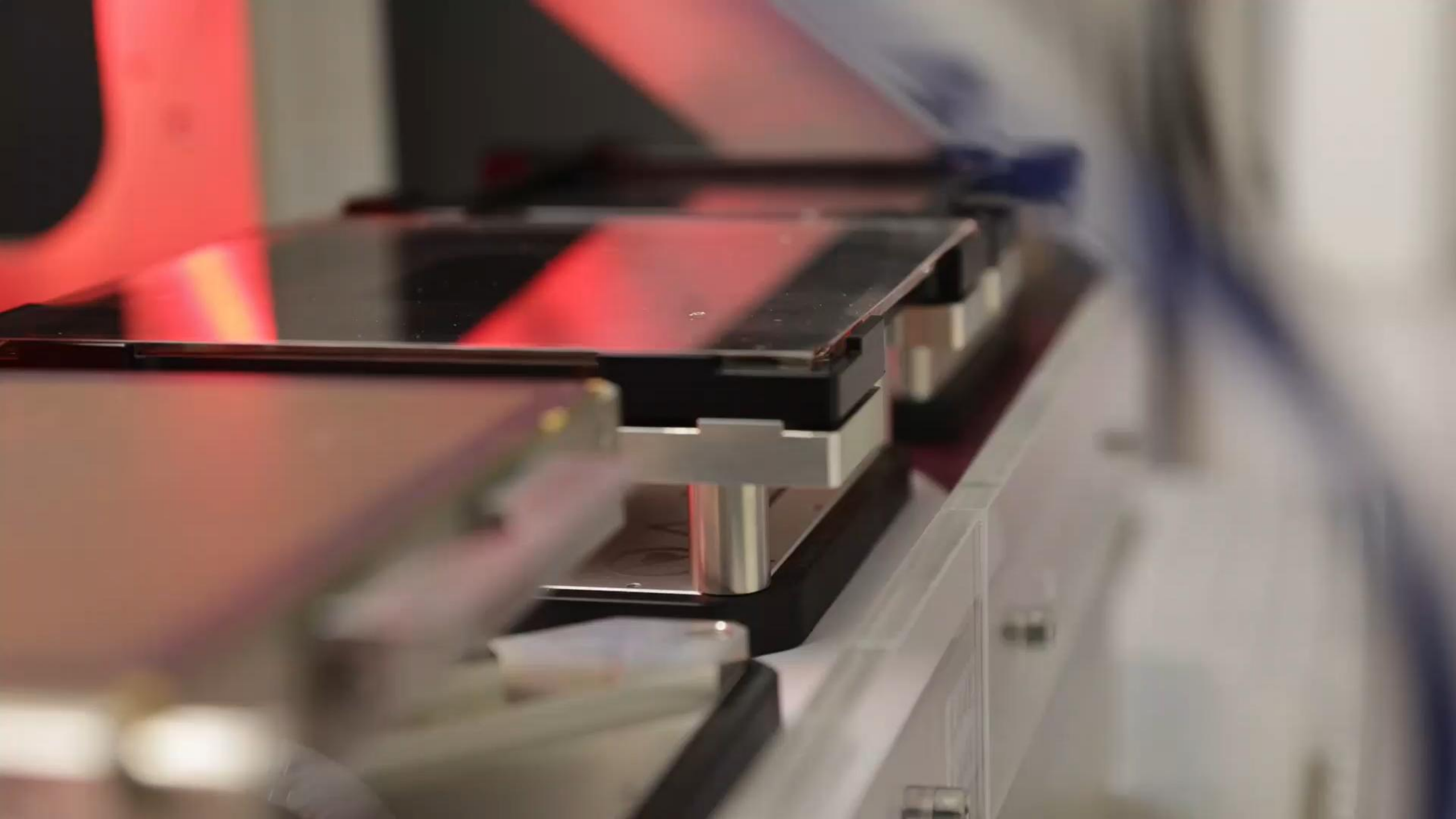
non-explosive | accurate | high-throughput | noncontact | die-on-demand

Process Dynamics



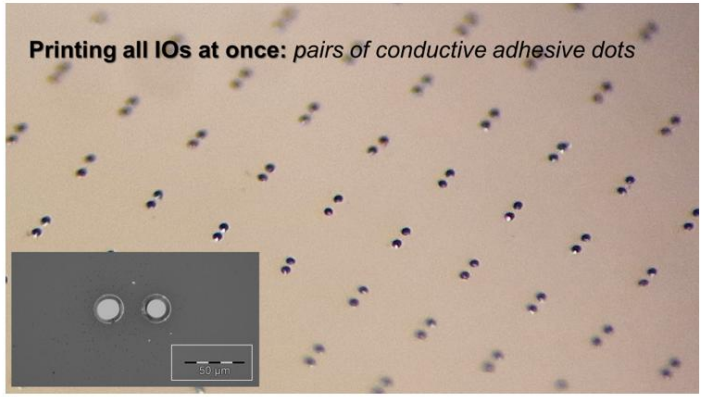
Process Reproducibility



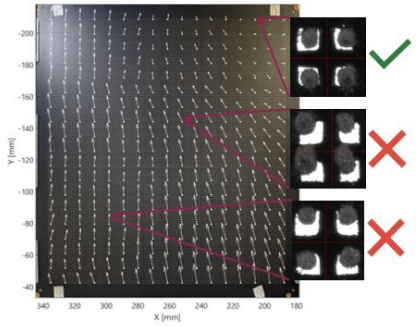


XG-ALPHA - FEATURES

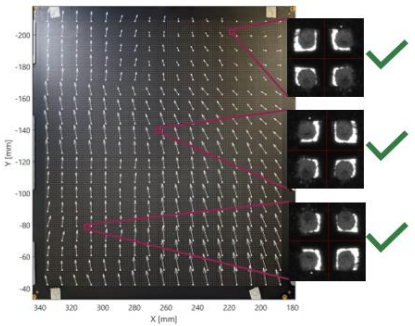
ITEC Laser Induced Forward transfer – ANY MATERIAL



ITEC XG Corrects for Substrate Inaccuracies – ALWAYS ACCURATE

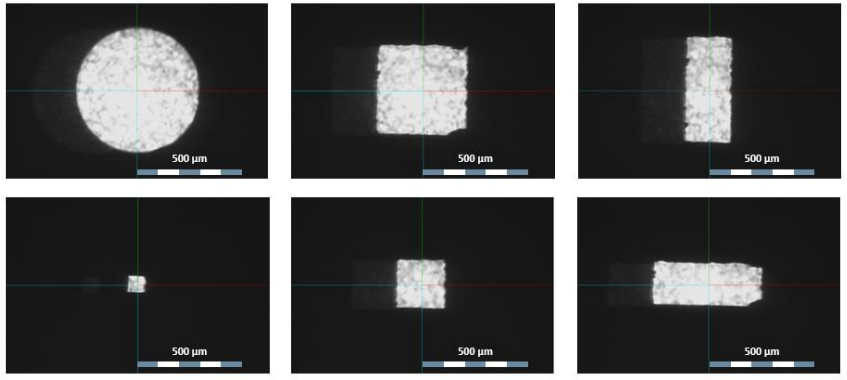


Stencil Printing performance

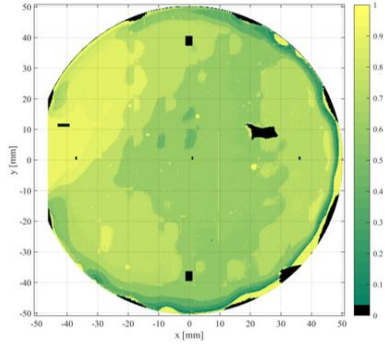


ITEC LIFT performance

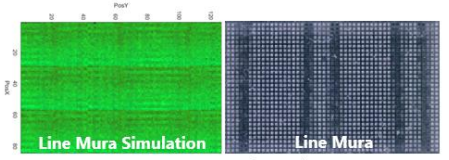
Adaptable aperture – LASER SPOT ADJUSTABLE TO LED DIMENSIONS ENABLING SELECTIVITY



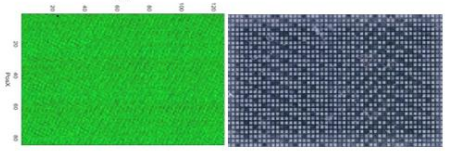
BIN MIXING REQUIREMENTS – REDUCING OPTICAL ARTIFACTS WITHOUT SPEED-LOSS



Input Material – EPI Wafer

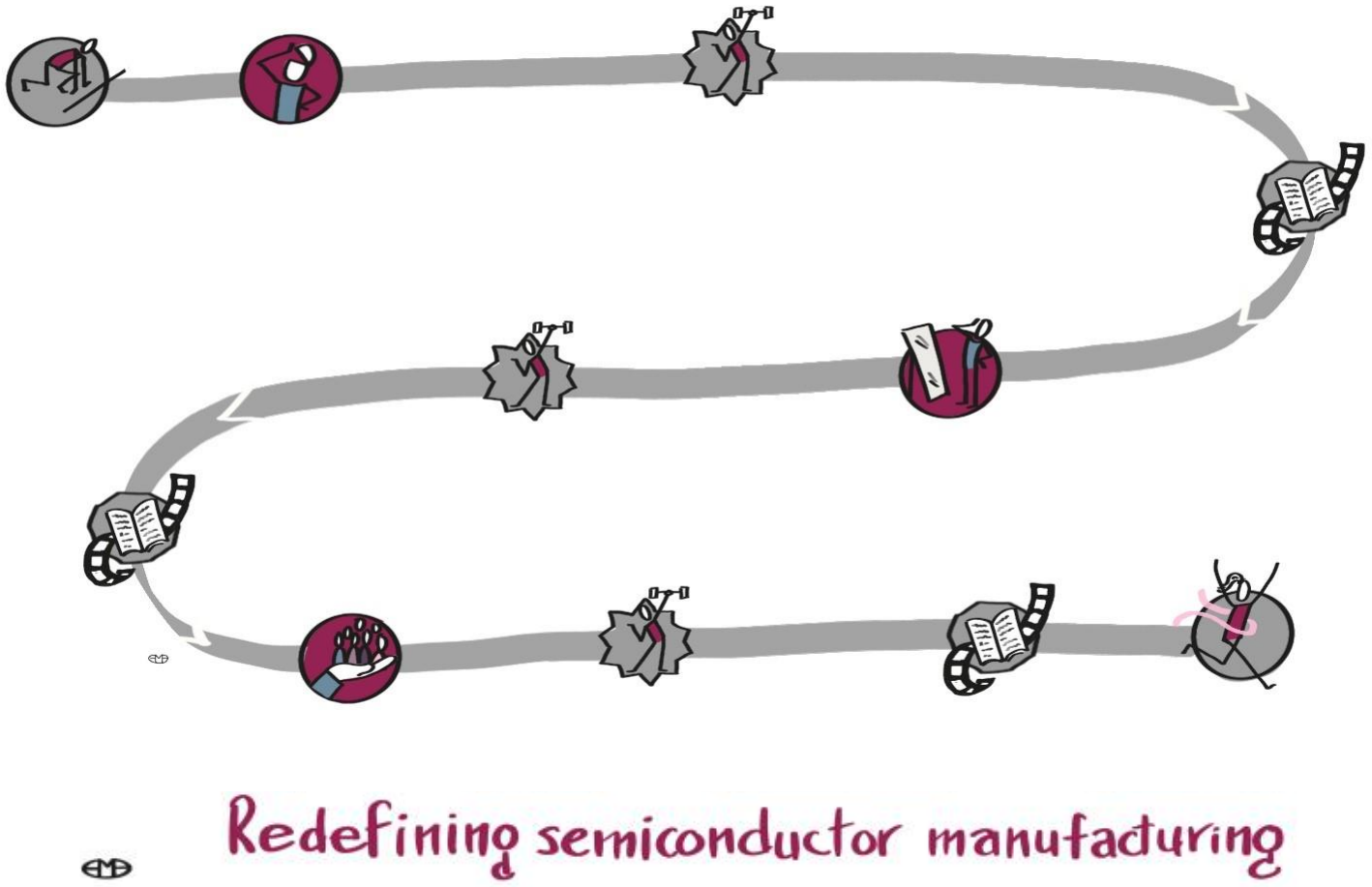


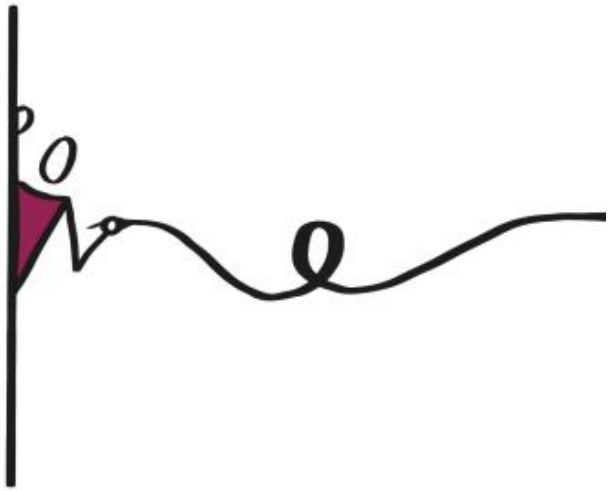
1:1 Mass transfer result



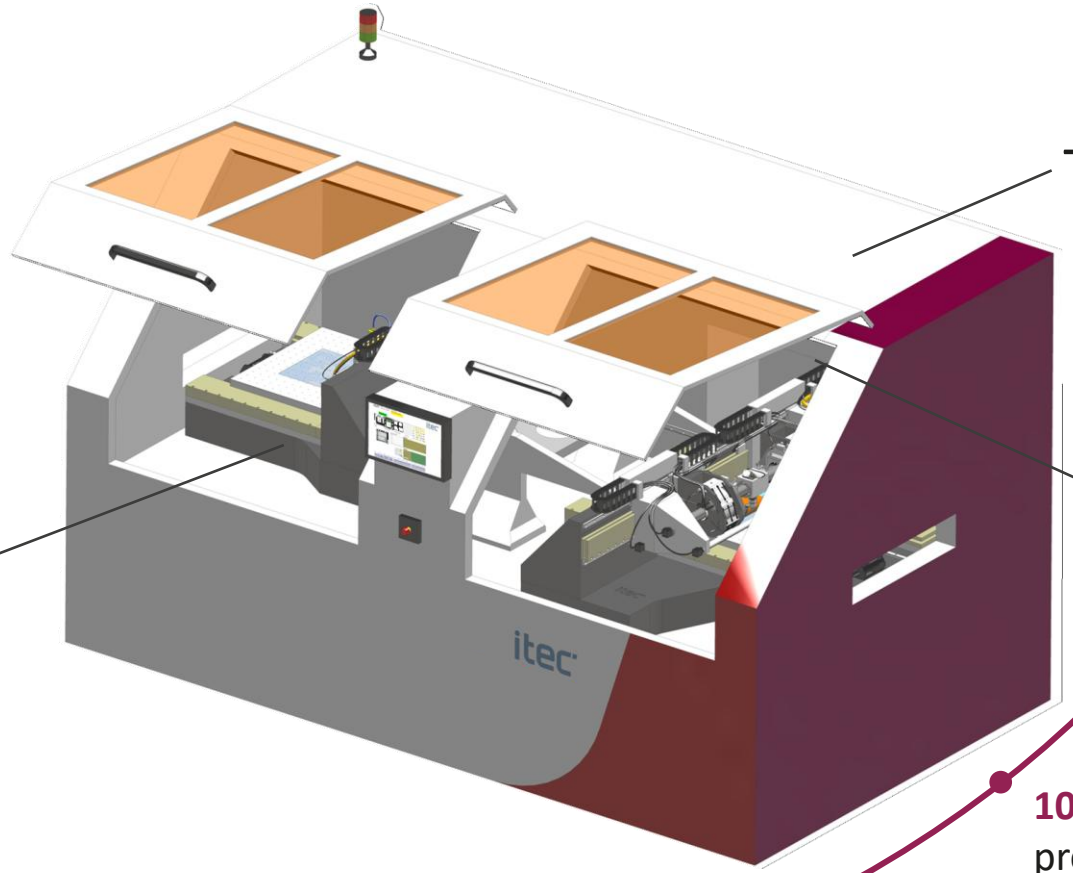
ITEC Bin mixing result

Roadmap – WHAT IS NEXT?





ITEC ADAT XG – INDUSTRIAL EQUIPMENT FOR SMALL DIE LASER ASSEMBLY



Throughput **Xx Muph**[1]

Flexible placement including **pitch translation** and **bin-mixing**

Accurate **direct die attach**, ±1 µm (1σ)

100% Inspections, inline pre- and postbond vision

Process directly from **Wafer**, down to 10 µm die size

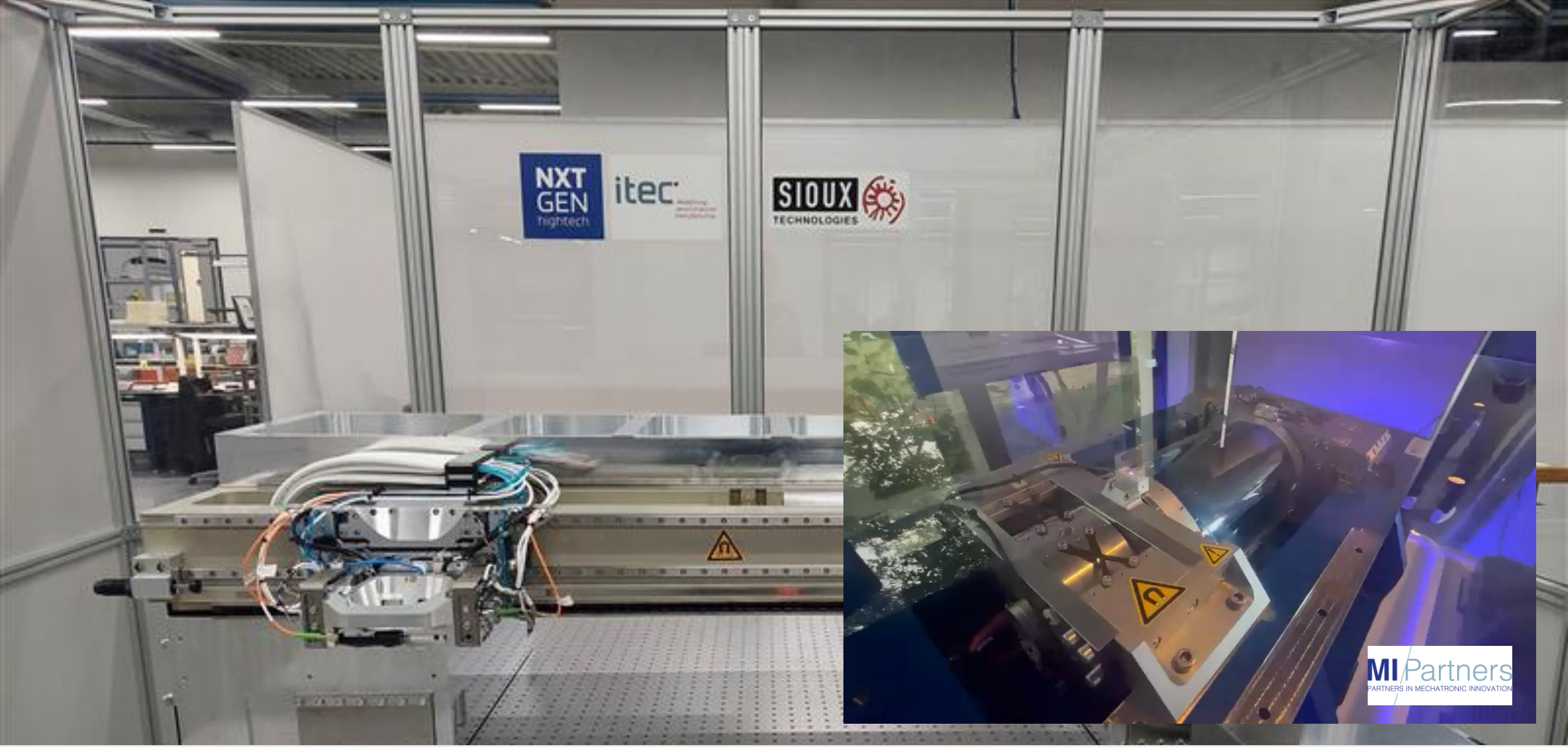
4 – 12” Wafer capability

Web width 50 – 600 mm

Multirow (>10-up)

Accurate **laser dispense**, any material, any size down to 10 µm

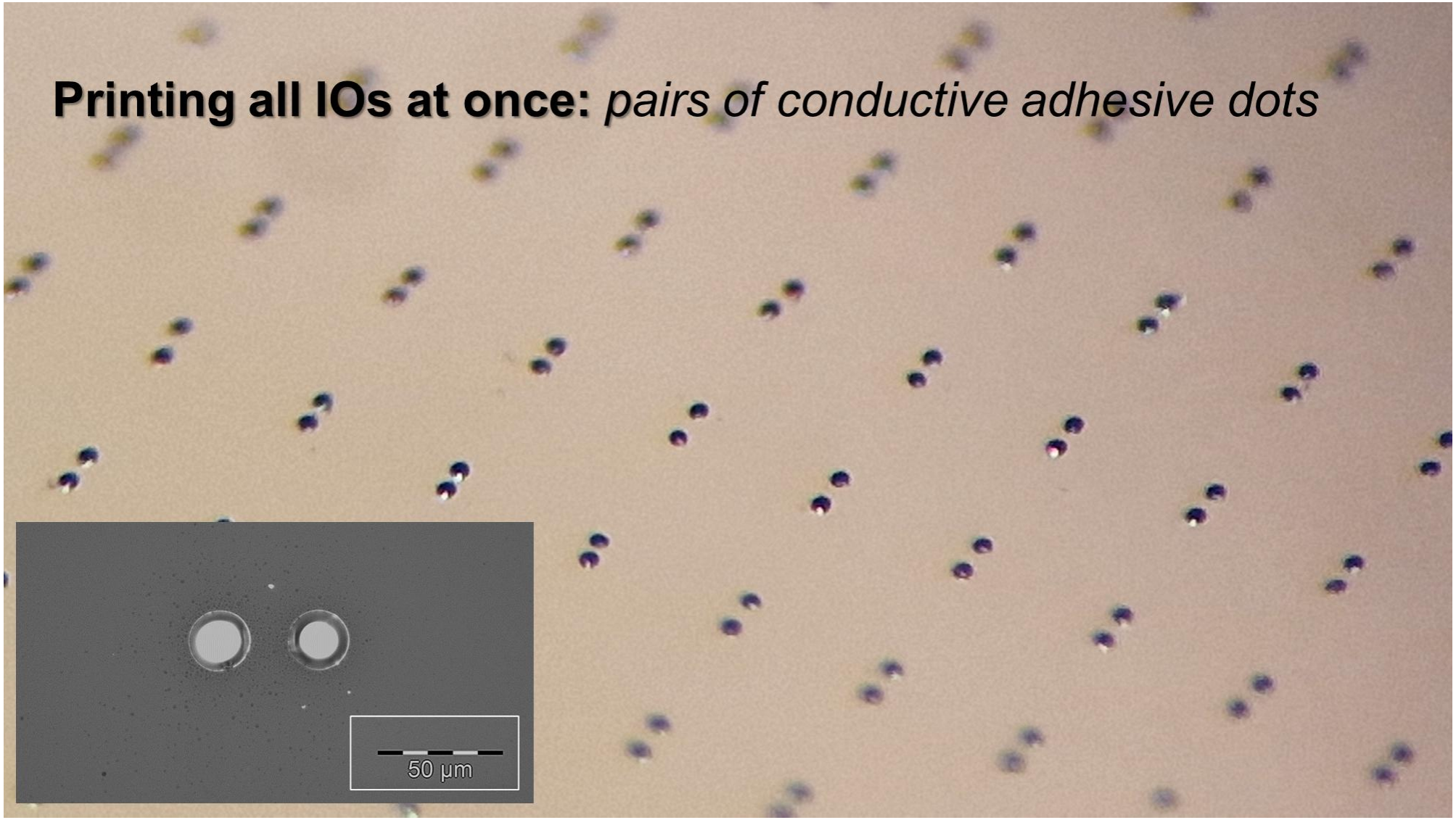
[1] depending donor and reciever substrates and application



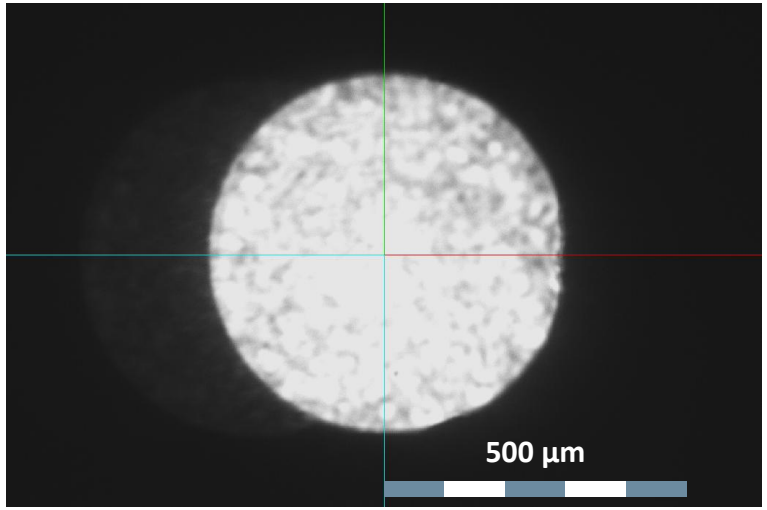
Expected 2028

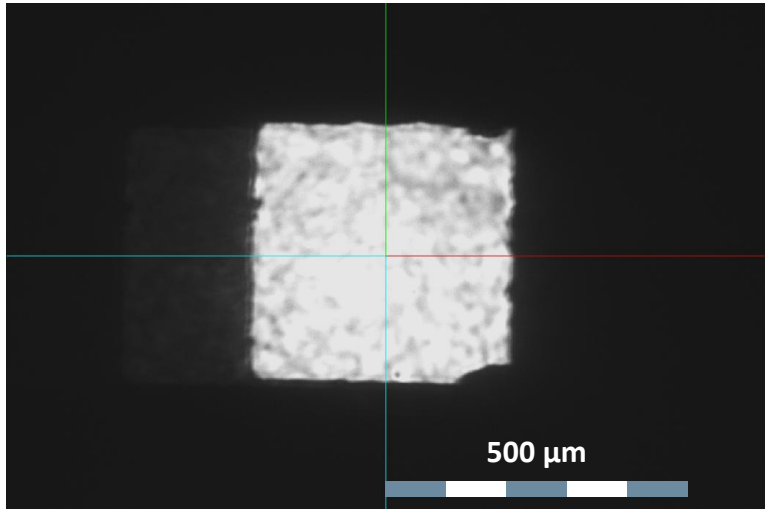
Redefining semiconductor manufacturing

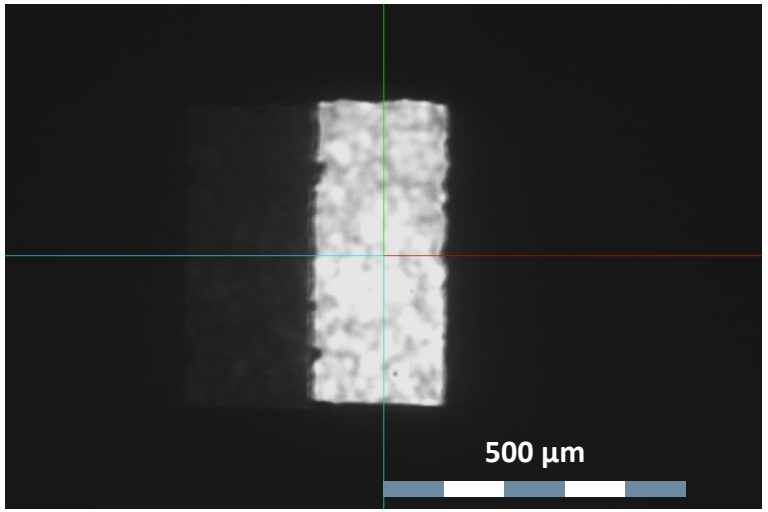
ITEC Laser Induced Forward transfer – ANY MATERIAL

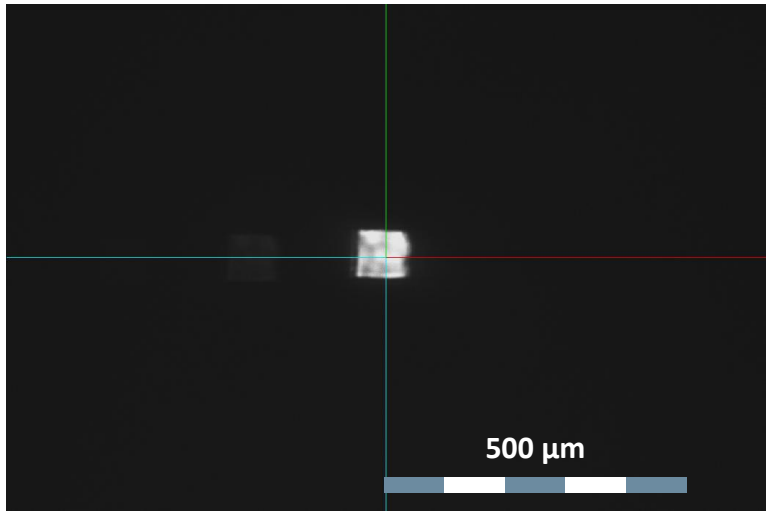


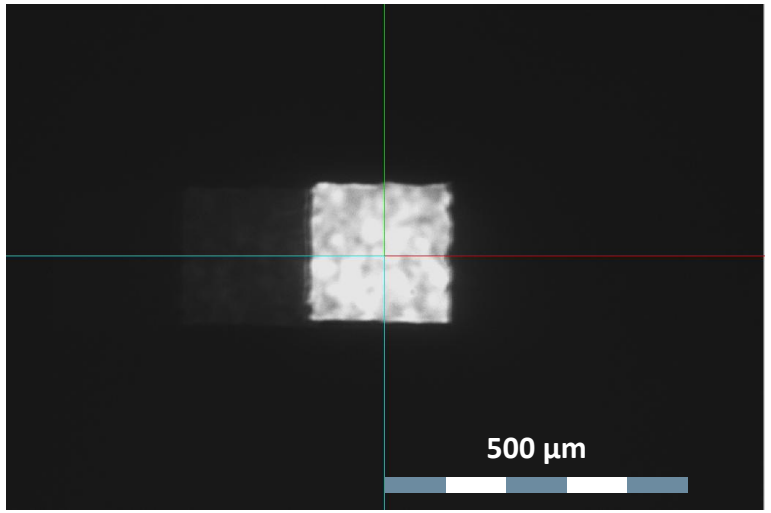
Adaptable aperture – Laser Spot Adjustable to LED dimensions enabling selectivity

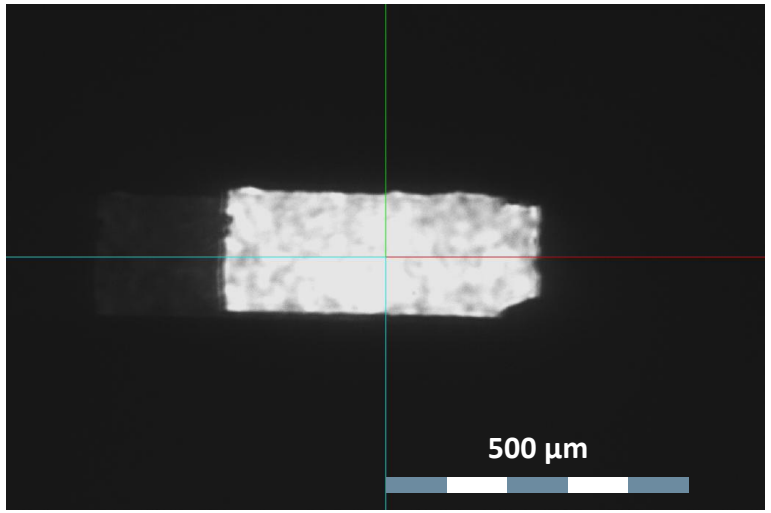












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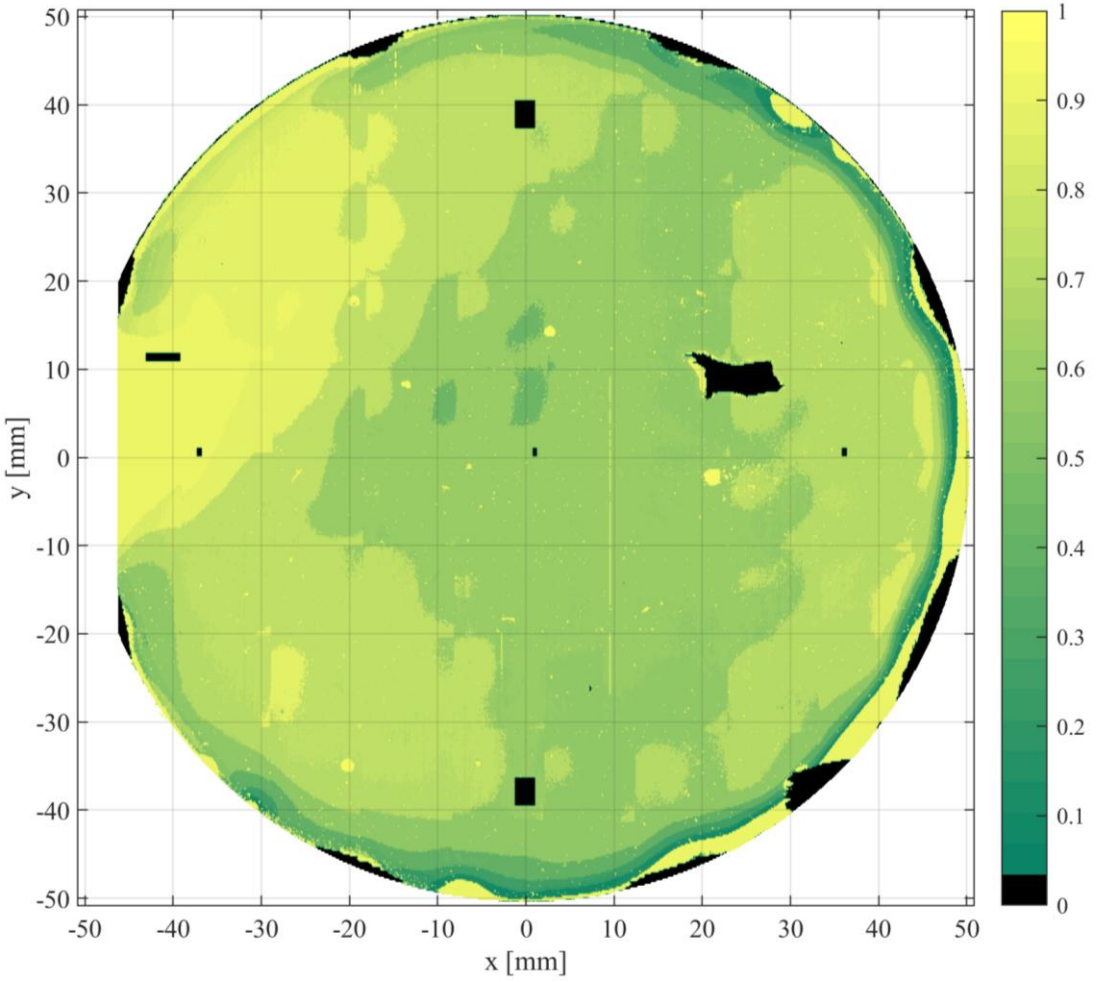

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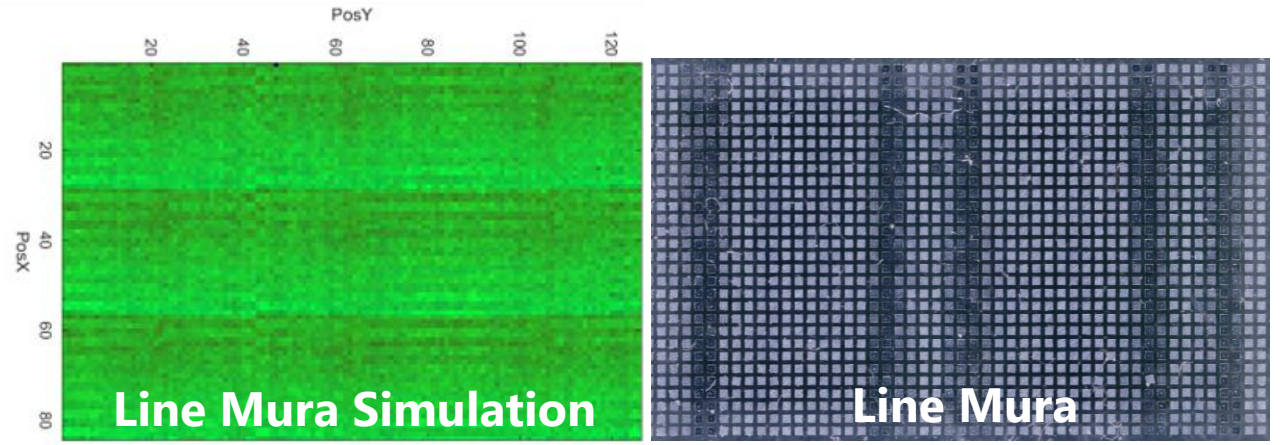

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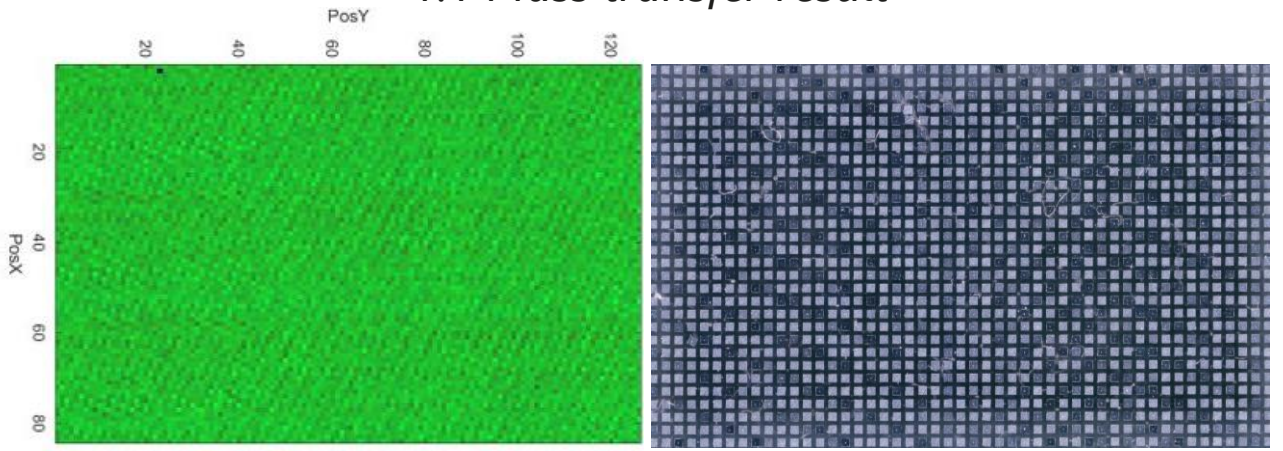

ITEC Bin mixing result

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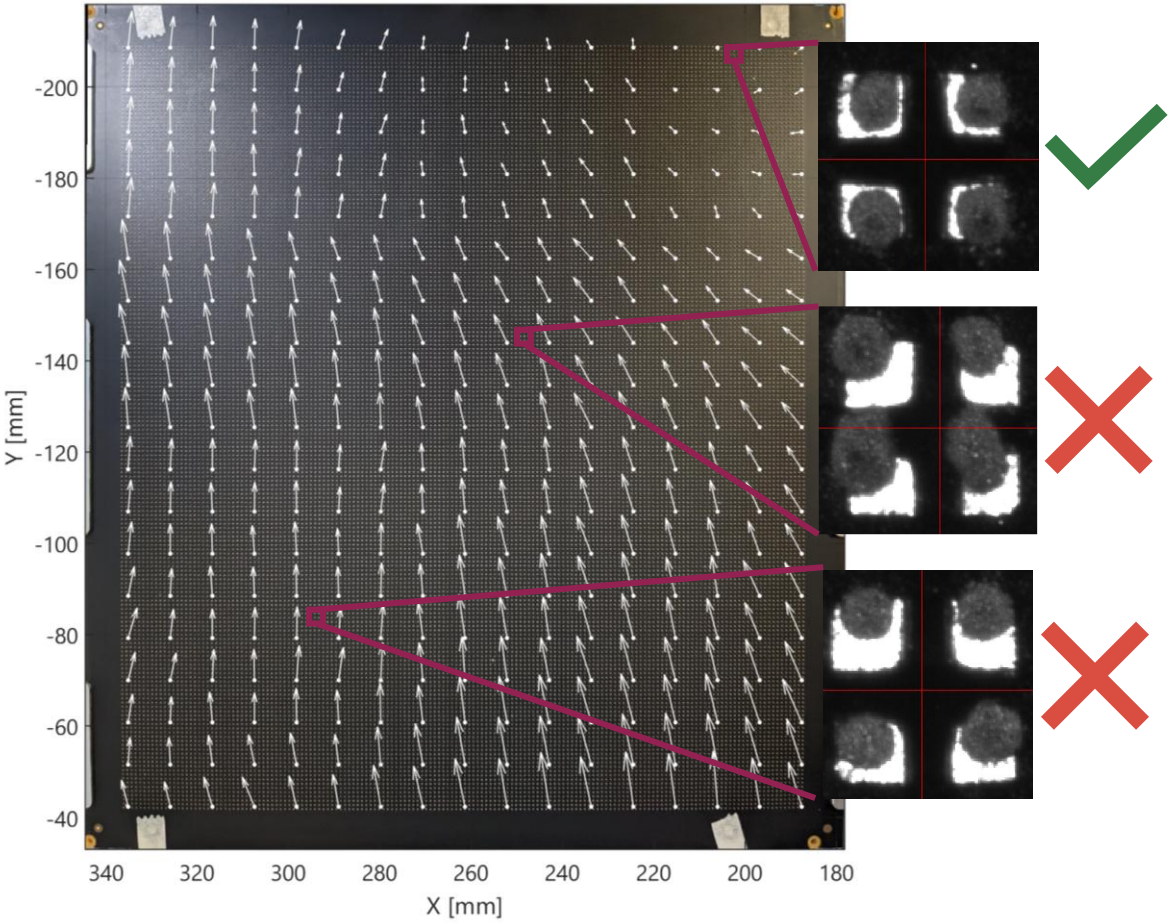
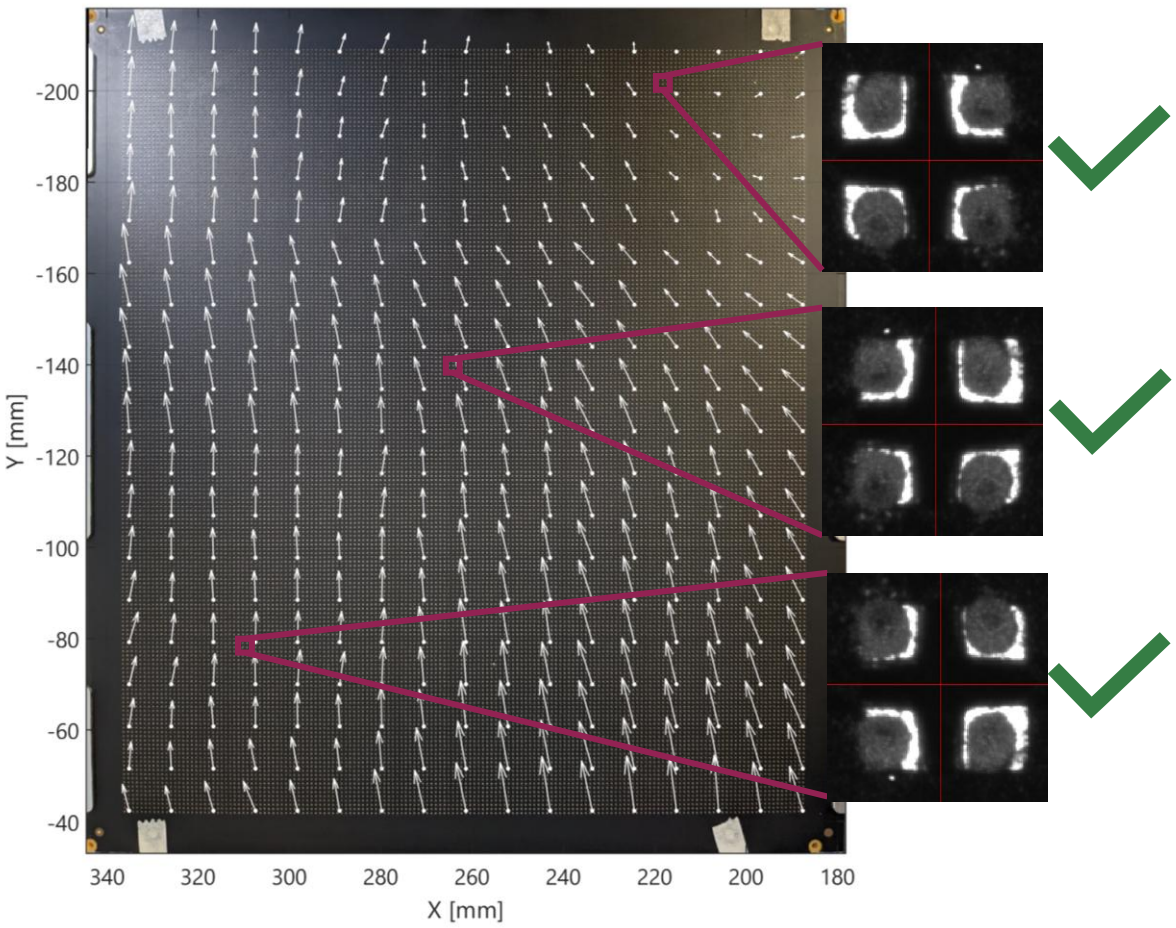


Stencil Printing performance



ITEC LIFT performance