



Delivering Sensor &
Microelectronic
Solutions Worldwide...

Over 500 million die shipped per year

www.semefab.com



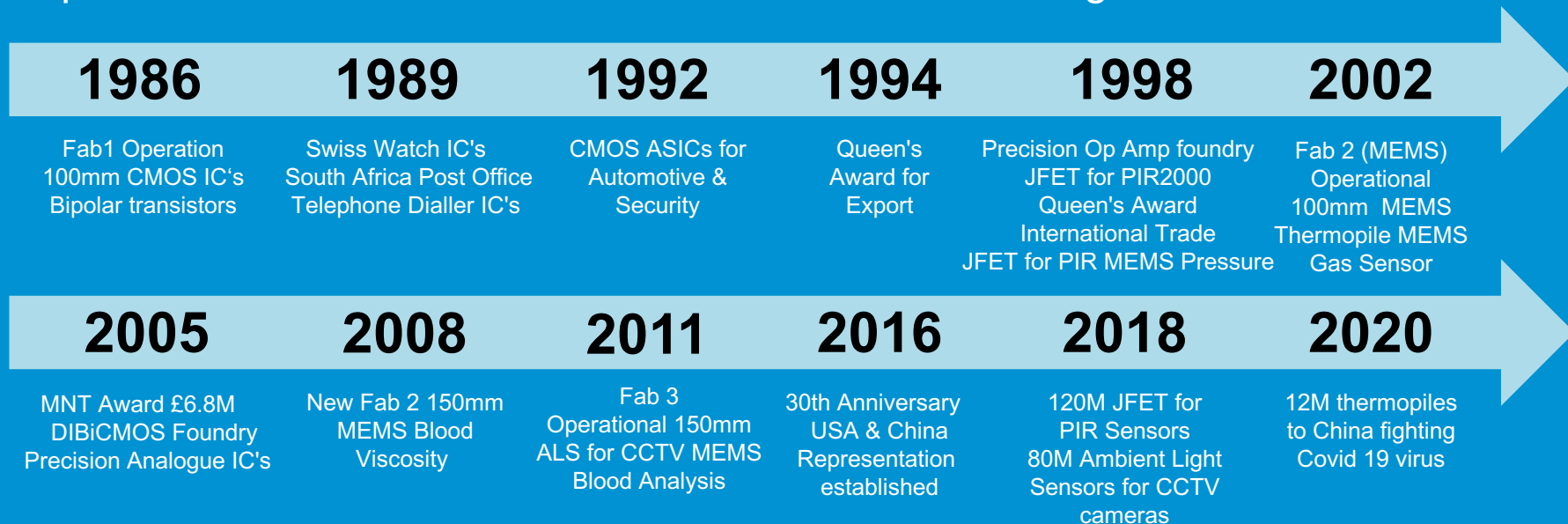
Our Vision

To put Semefab at the heart of today's life enhancing semiconductor and MEMS sensor products.

To be your MEMS & power switching semiconductor foundry.

An Impressive Record Since 1986

Semefab have an impressive track record of process development, process induction and volume foundry supporting silicon-based MEMS, CMOS, ASIC, Bipolar-Linear & Discrete semiconductor device technologies.



Global Reach, >80% Exports



Delivering Sensor & Microelectronic Solutions Worldwide...

- Semefab operates 2 wafer fabs on a single site in Glenrothes, UK, across a broad technology base of MEMS sensors and CMOS & Linear IC's, Discrete Power Semis (Schottky & TCIGBT).
- Close liaison with our highly experienced process engineering team ensures a successful outcome to process development/induction and process optimisation leads to high yield, cost effective manufacture.

'For your semiconductor device or technology requiring fabrication, make Semefab your first call.'

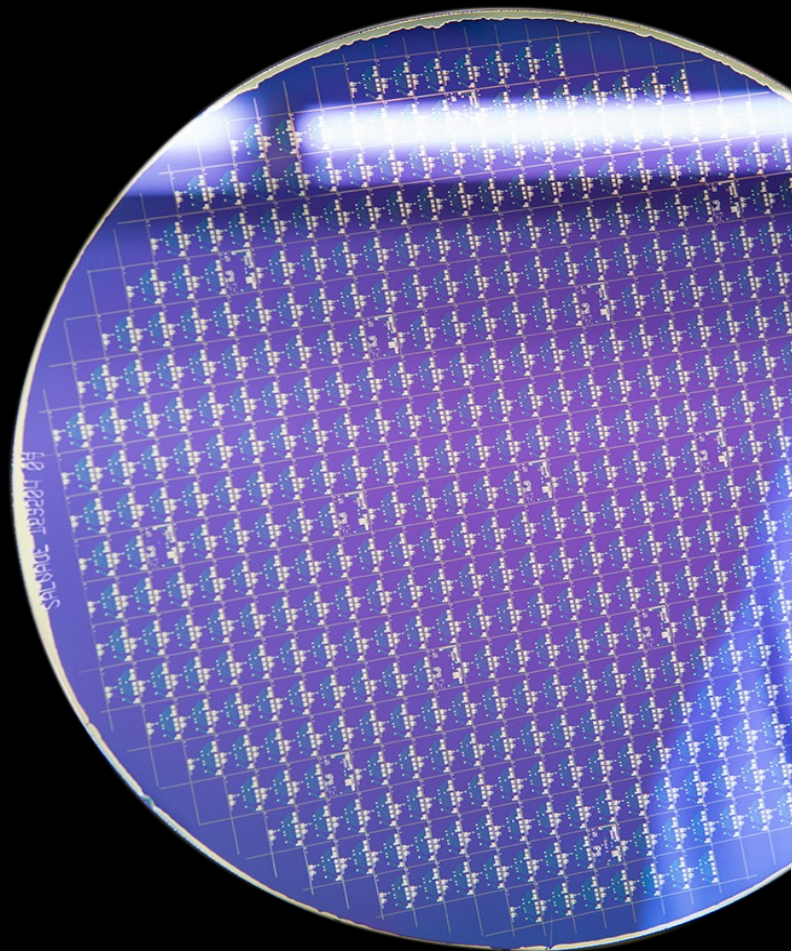
OUR SERVICES

MEMS Foundry

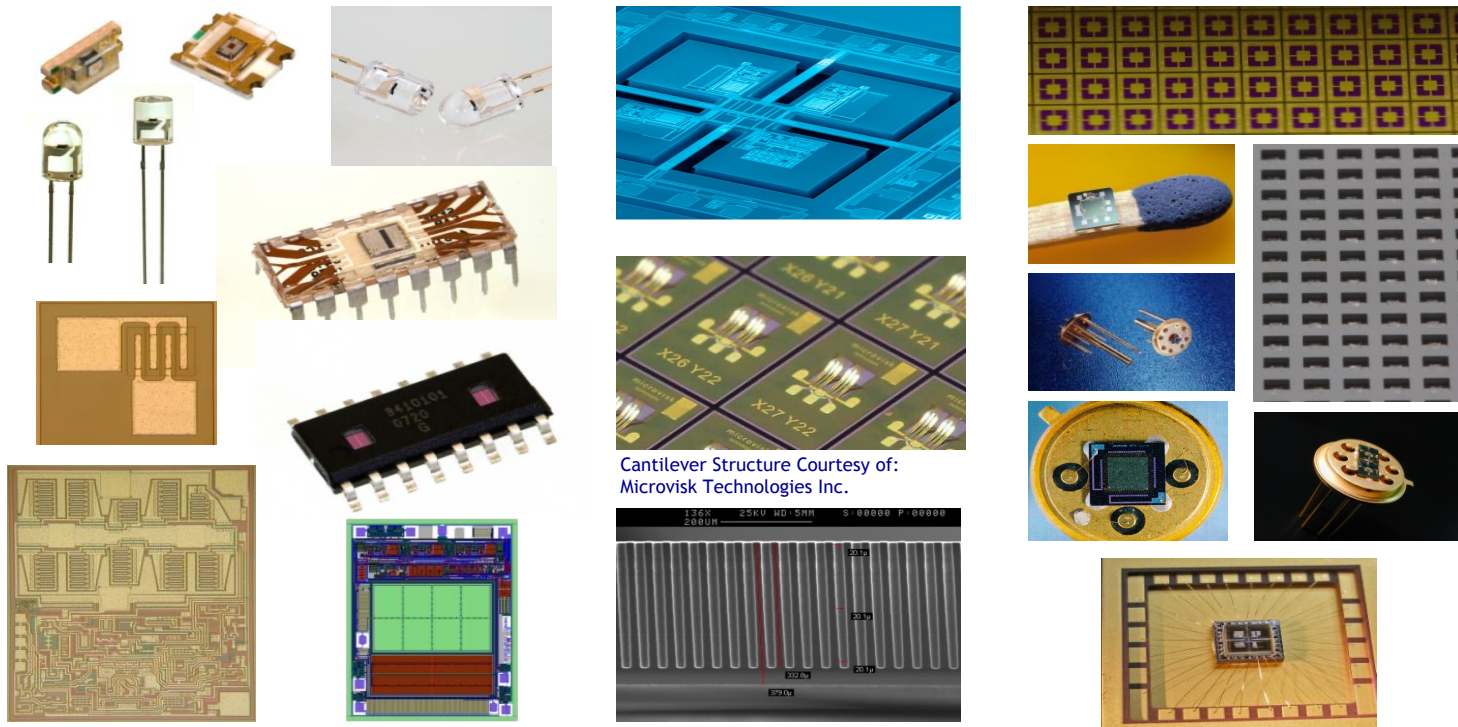
IC Foundry

Discrete Power Semis

Semefab products

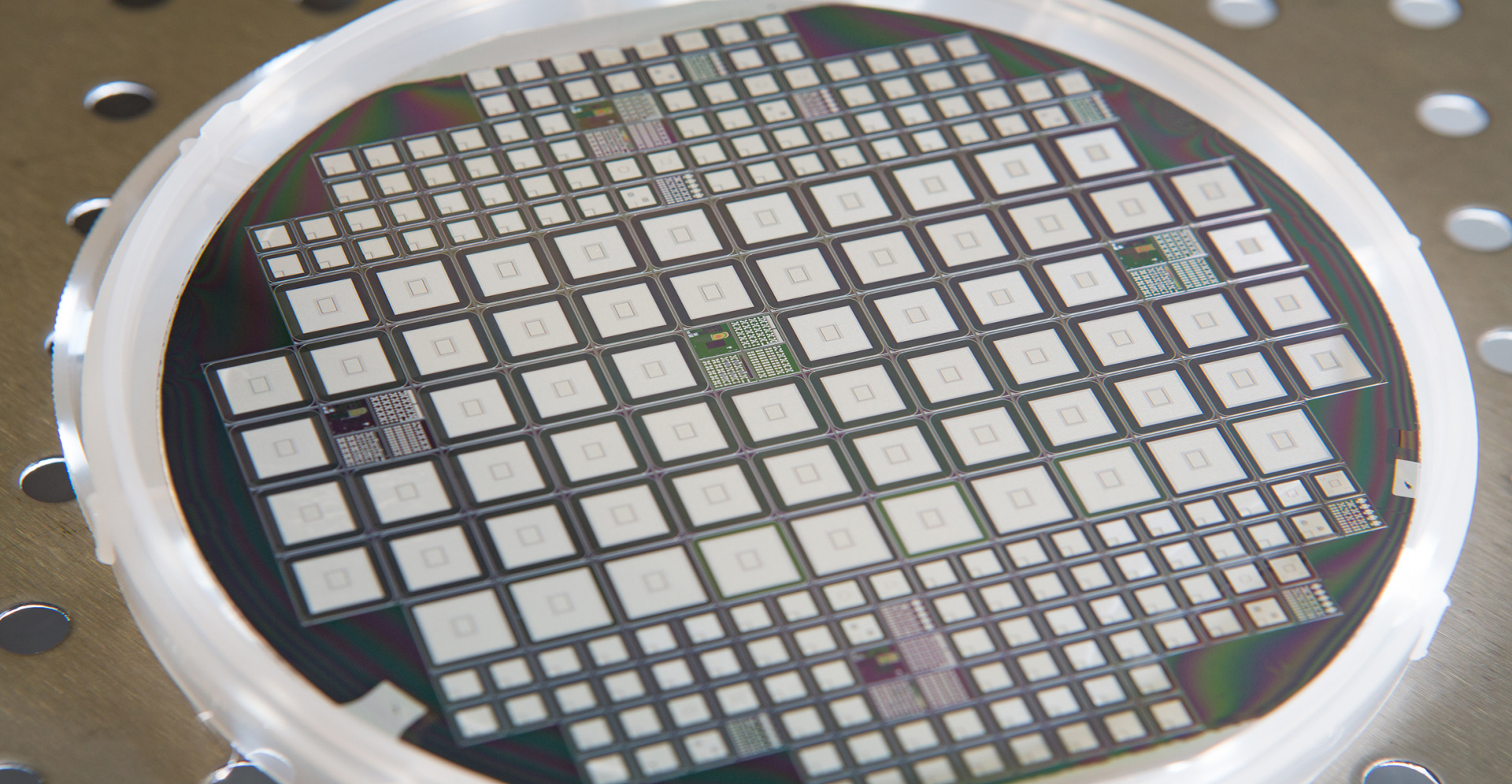


Extensive Process Portfolio



Cantilever Structure Courtesy of:
Microvisk Technologies Inc.

► Limited Illustration – much of our foundry portfolio is customer proprietary



Our Strengths

- We operate in diverse market sectors on a global scale.
- Stable business - when one sector of region is down it is often compensated for in other areas.
- Strong track record across diverse sectors. Inc. Automotive, Security, Medical, Industrial, Energy and Consumer sectors.
- Global customer base. Europe, North America and Far East.

‘Each day, Semefab silicon makes a positive contribution to people’s modern lifestyle and improves their environment, security and safety.’

Semefab Overview

- ▶ Commercial Foundry
- ▶ CMOS/Bipolar Foundries – 6”
- ▶ MEMS Foundry – 6”
- ▶ Ship >500 million die/year
- ▶ Design & Development Partnerships
- ▶ Technology Inductions
- ▶ Established 1986
- ▶ Global Fabrication Player
- ▶ ≈75% Export Bias
- ▶ >35 Customers Worldwide
- ▶ £15.5M T/O, 15-20% PBT
- ▶ 130 Employees

Foundry Operations

Fab Operations:

- ▶ Fab 3: 6" MOS/Bipolar to 0.8 μ m
- ▶ Fab 2: 6" MEMS to 0.8 μ m
- ▶ Probe & Test Operation
- ▶ ISO9001, ISO14001
- ▶ UL & ESA Approval

Diverse Process Portfolio:

- ▶ MEMS
- ▶ Si Gate CMOS & Opto CMOS
- ▶ Metal Gate CMOS & PMOS
- ▶ Power SiC Schottky Diode
- ▶ Power TCIGBT
- ▶ Linear Bipolar
- ▶ PiN Photo Diode
- ▶ Lateral FET
- ▶ Low Noise N Channel JFET
- ▶ DMOS RF MOSFET
- ▶ Power Bipolar
- ▶ Fast Recovery Diode



Production Capacity

- ▶ Fab 3: 35,000 6" wafers per year capacity, potential 75,000
- ▶ Fab 2: 25,000 6" wafers per year capacity
- ▶ Probe & Test:
 - ▶ *Test floor supports wafer test & package test*
 - ▶ *Electrical parametric testing*
 - ▶ *Sensor functional testing e.g. low pressure etc.*
- ▶ Assembly: Subcontracted to Far East
- ▶ Final Test: In house or Far East



Device Applications Served

ASIC & IC Foundry :

- | | |
|------------------------|--|
| ▶ Opto CMOS ASIC | <i>Optical Smoke Detector</i> |
| ▶ OptoCMOS | <i>ASIC + FILTER Light Sensing & Switching</i> |
| ▶ OptoMCMOS | <i>Hazard Flasher</i> |
| ▶ CMOS ASIC | <i>Smoke detector address</i> |
| ▶ MCMOS ASIC | <i>Garage Door Opener</i> |
| ▶ CMOS ASIC | <i>Automotive Windscreen Wiper</i> |
| ▶ CMOS ASIC | <i>Automotive Window Lift</i> |
| ▶ CMOS ASIC | <i>EC Motor Controller Interface.</i> |
| ▶ CMOS Foundry | <i>Secure Telecoms</i> |
| ▶ DI BICMOS | <i>Precision Op-Amps</i> |
| ▶ Linear Array | <i>Solar battery charger controller</i> |
| ▶ Precision analogue | <i>Operational Amplifiers</i> |
| ▶ Ambient Light Sensor | <i>CCTV Cameras</i> |



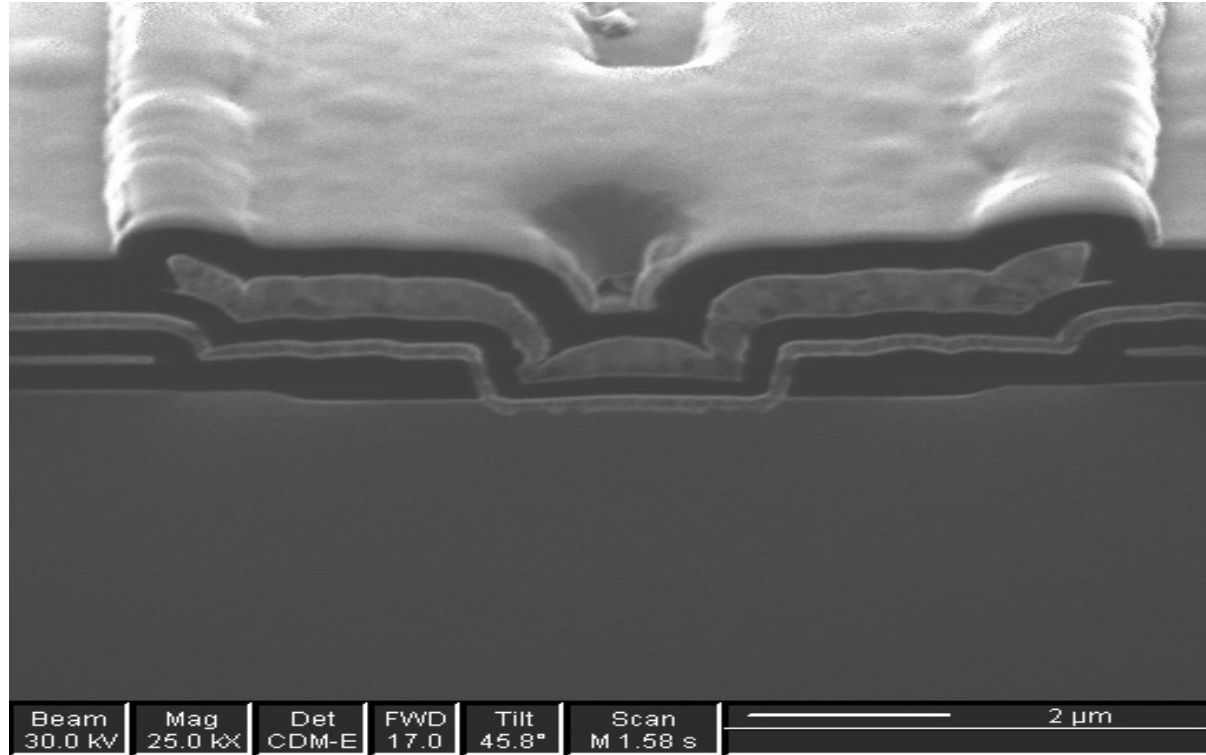
Device Applications Served

Discretes:

- ▶ **JFET** *PIR Motion Sensors*
- ▶ **PIN DIODE** *Light Sensing*
- ▶ **LATERAL MOSFET** *Audio Power Amplification*
- ▶ **TCIGBT POWER** *Power Devices & Module*
- ▶ **FRD** *Power Devices & Module*
- ▶ **RFMOSFET** *RF Base Stations & PMR*
- ▶ **PHOTODIODE ARRAY** *Precision Measurement*
- ▶ **SiC Schottky Diode** *Power Converters*



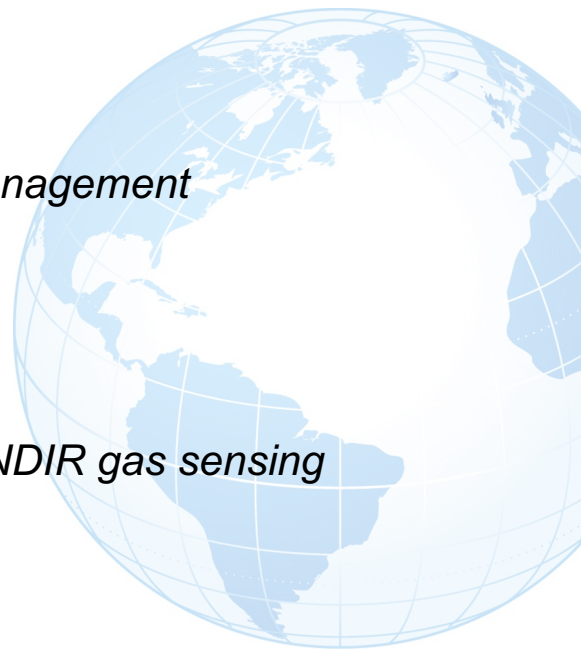
1GHz RF LDMOS Cross Section



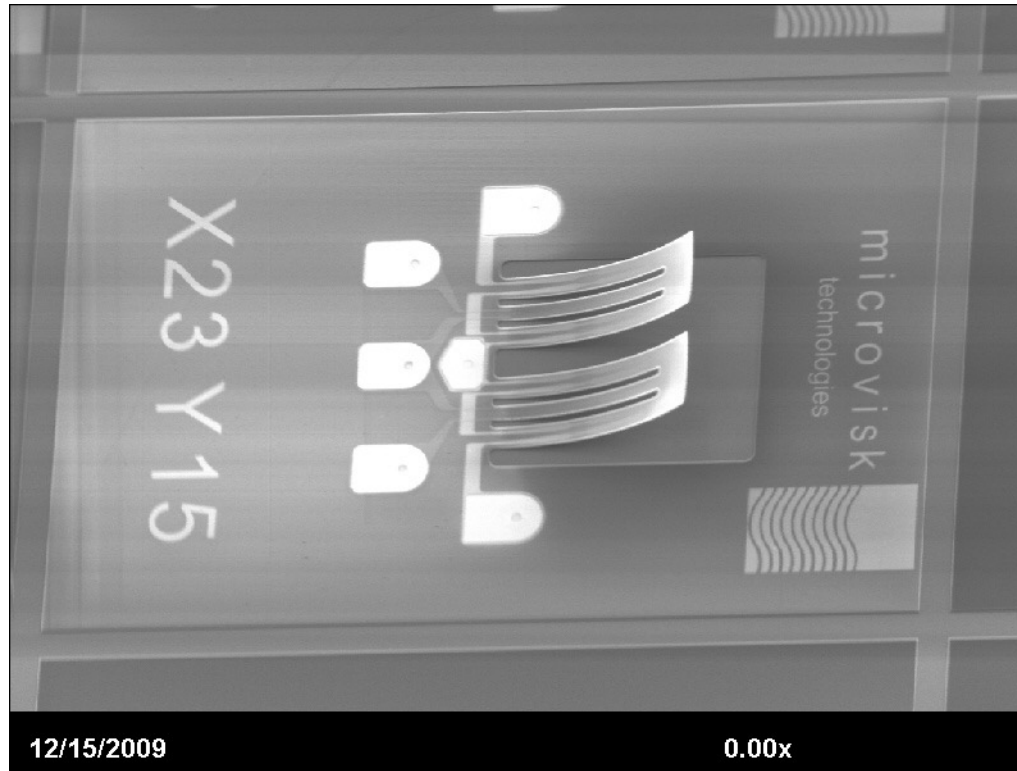
Device Applications Served

MEMS Foundry:

- ▶ **NO2 & CO detectors** *Automotive Air Quality*
- ▶ **Pressure Sensor** *1 Bar Automotive Engine Management*
- ▶ **Pressure Sensor** *Altimeter, Diving, Industrial*
- ▶ **Pressure Sensor mBar** *Medical –respiratory*
- ▶ **Thermopile** *Non contact temperature & NDIR gas sensing*
- ▶ **Liquid Viscosity Sensor** *Blood coagulation*
- ▶ **Gas Thermal conductivity** *Gas flow measurement*



Blood Viscosity Sensor



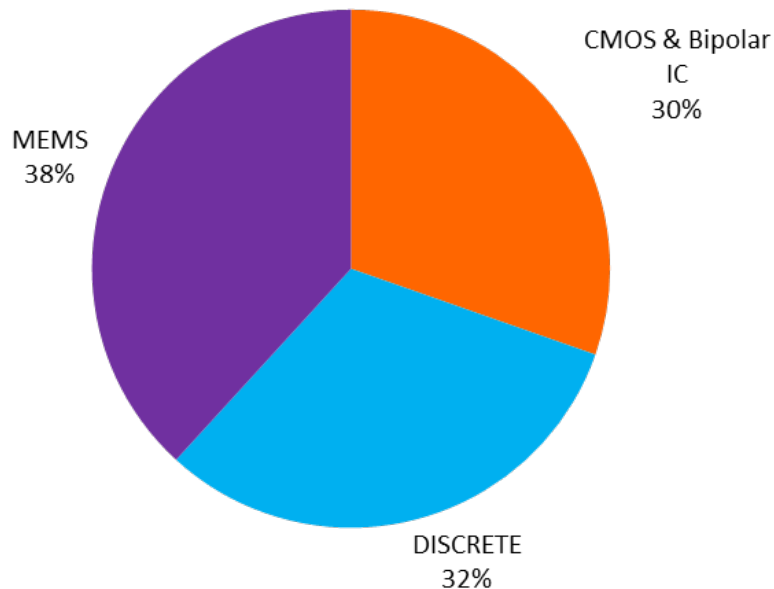
Projects in Development

- ▶ MEMS micro hotplate
- ▶ MEMS ToF liquid flow sensor
- ▶ HP Thermopile
- ▶ Harsh Media Pressure Sensors
- ▶ SiC Schottky Diode 650v; 1.2kV; 1.7kV; 2.3kV; 20/40 Amps
- ▶ TCIGBT 1.2 & 1.7kV; 20/40 Amps



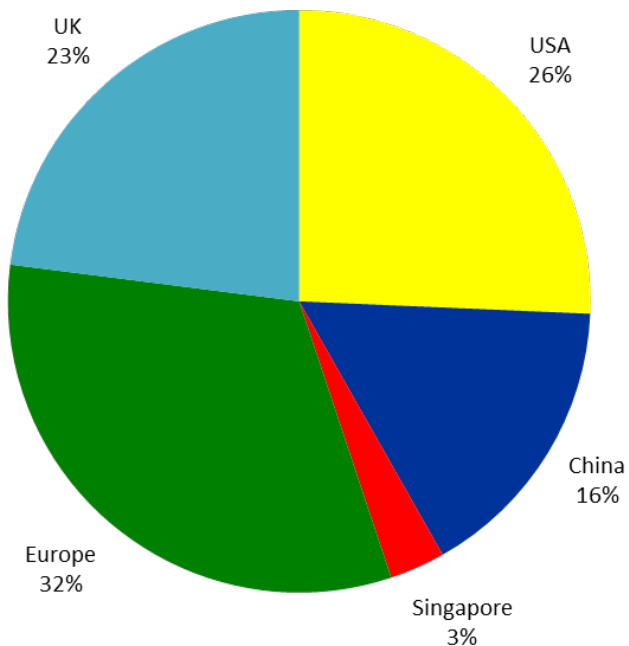
Global Business Distribution

FY2023 by sector



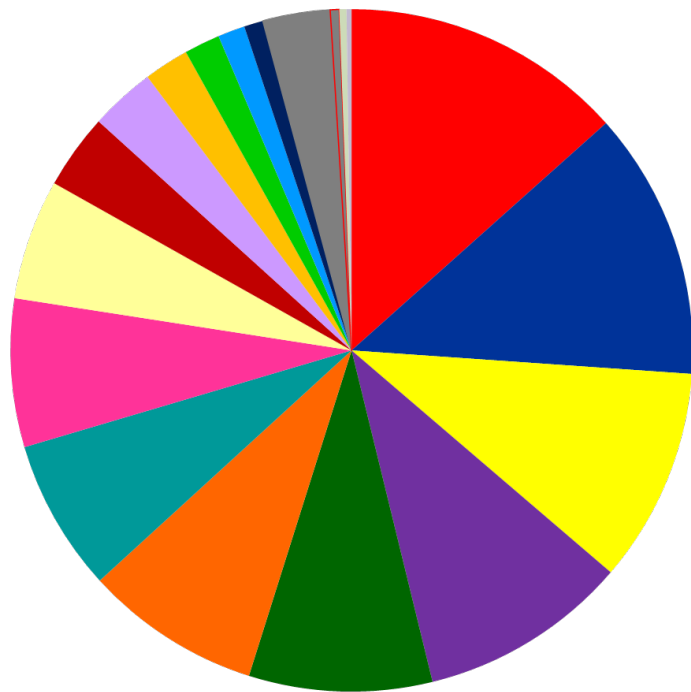
Global Business by Region

FY2023



Customer Distribution

Customers FY2023 by %

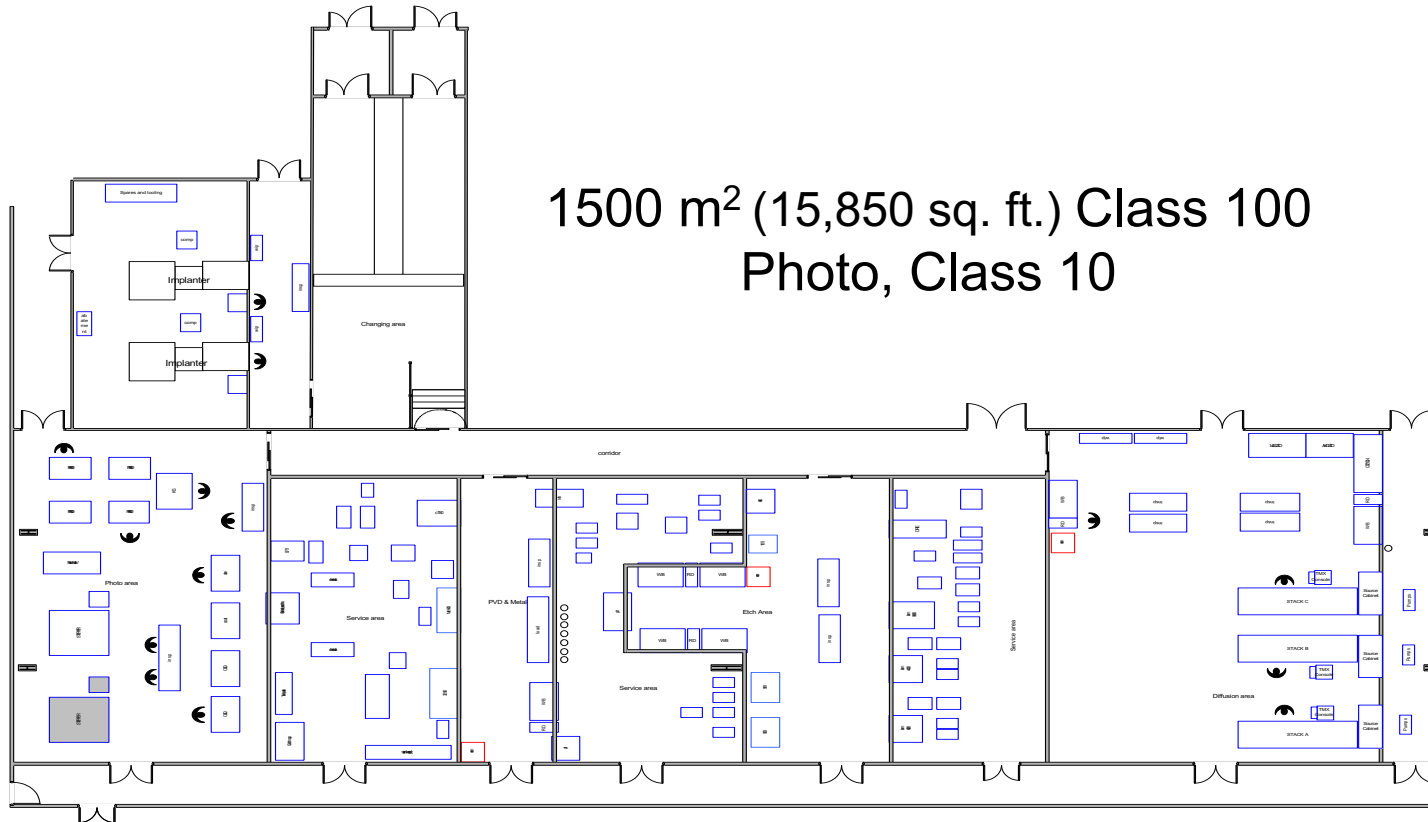


Fab3

Mos/Bipolar 150mm



Fab3 – 6" CMOS/Bipolar



Fab3 – Process Capability

- ▶ ASML 5500 Stepper to 0.8 μ m (capable to 0.5 μ m)
- ▶ Perkin Elmer Projection Alignment to 2.0 μ m
- ▶ Furnace Stack 1: Oxidation, Oxidation, LPCVD PolySi (in situ Phos dope), Phos deposition
- ▶ Furnace Stack 2: Oxidation, Oxidation, LPCVD Nitride (Std & Low Stress), Boron deposition
- ▶ Furnace Stack 3: Oxidation (SiC), Oxidation, Alloy, LPCVD BP-TEOS
- ▶ Mercury Automated Pre-Diffusion Clean System
- ▶ Wet Etch – BOE, Metal etch, Solvent strip, PDC
- ▶ SVG8800 Coat / Develop Track
- ▶ LAM 4420 Nitride / Poly Etch
- ▶ LAM 4520 Oxide Etch
- ▶ LAM 9600 Metal Etch



Fab3 – Process Capability

- ▶ Varian 3290 Al/1%Si, Al/1%Cu , TiW Sputter with pre-etch
- ▶ Varian 350DE Ion implanter, B, P,As
- ▶ Varian 180XP High Current Ion implanter, B, P, As
- ▶ STS Pegasus DRIE
- ▶ EVOS 5000 RF etch & Metal Sputter
- ▶ Novellus PECVD Thin Films - SiO₂, SiN, SiON



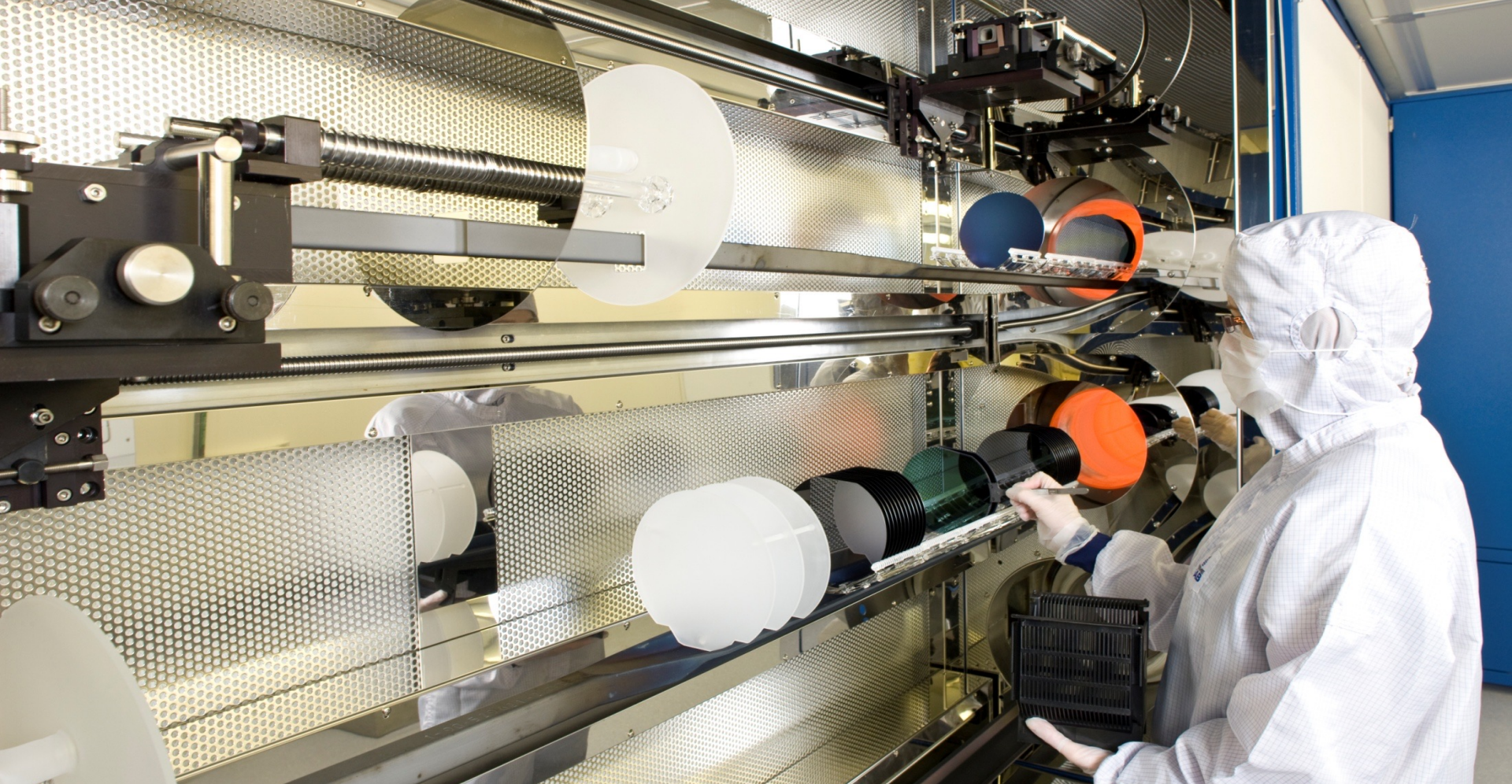


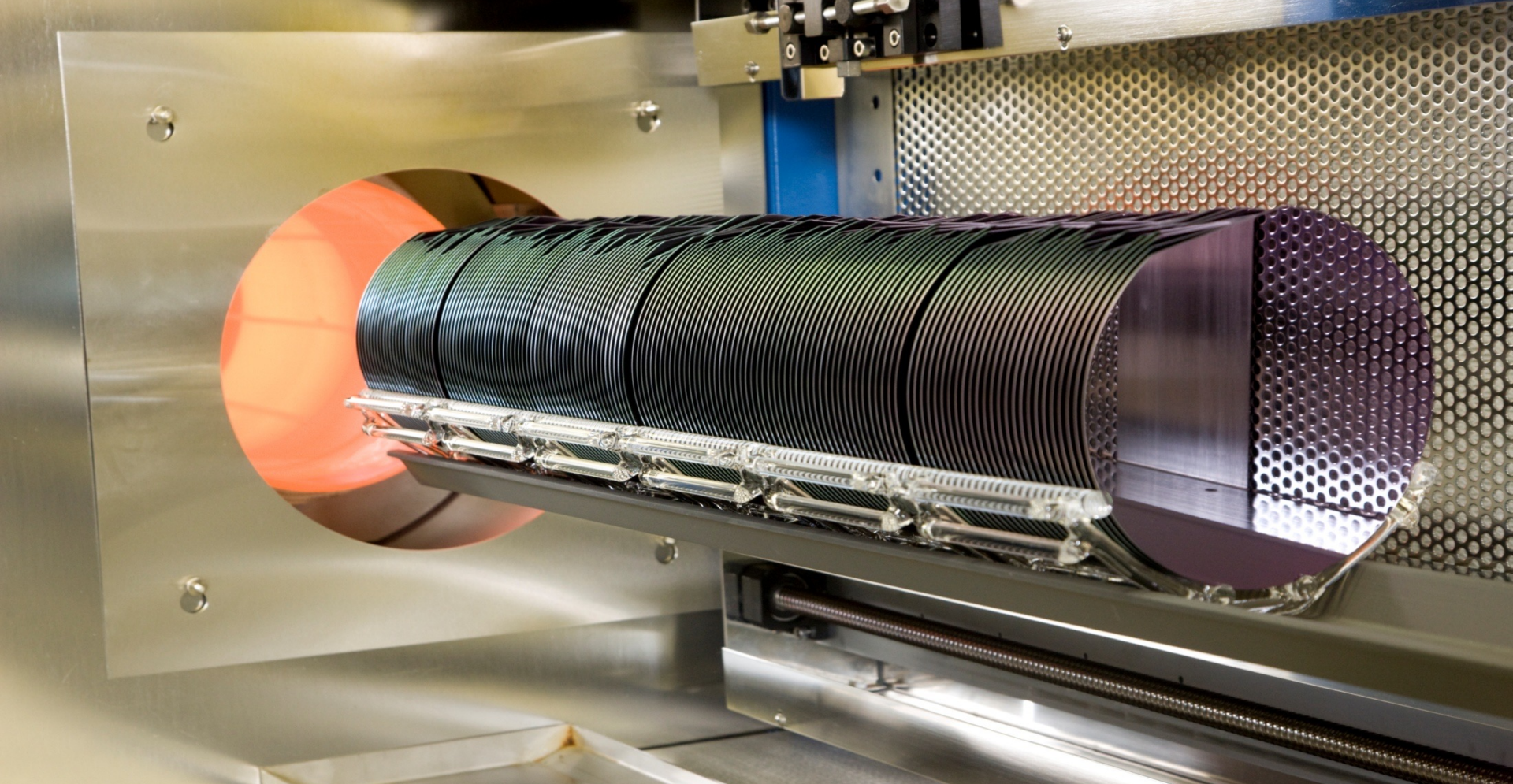




Fab3 – 6" CMOS/Bipolar









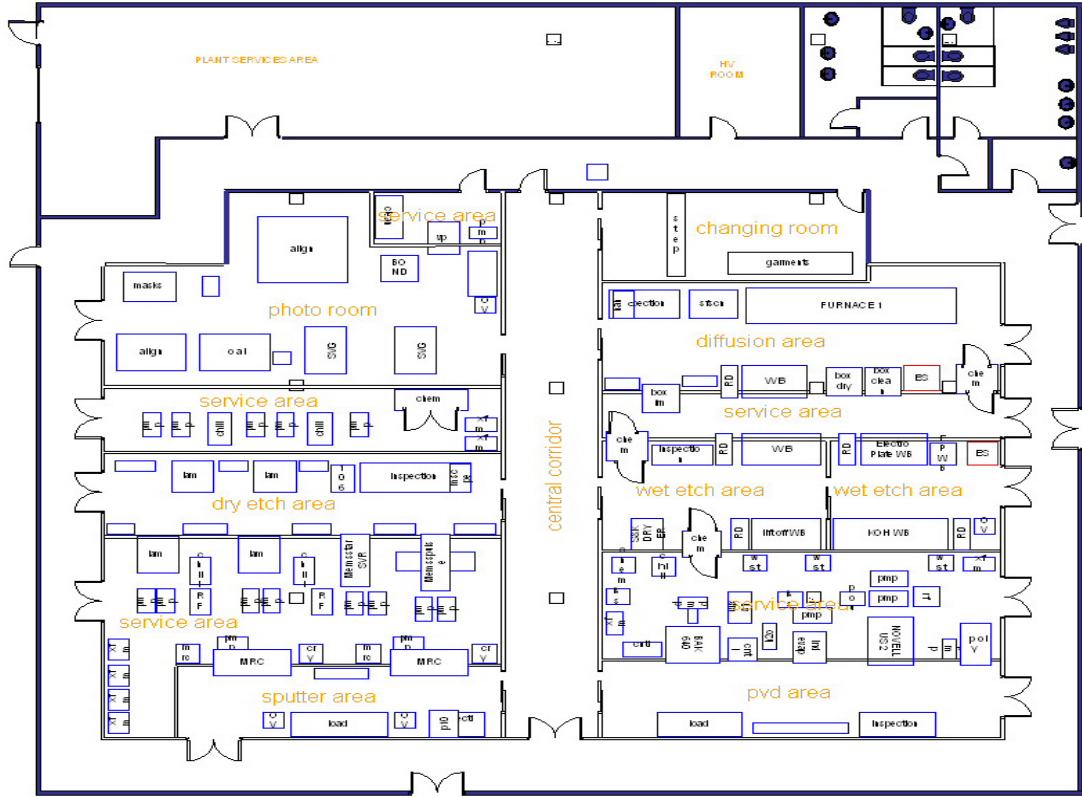


Fab2

MEMS 6"



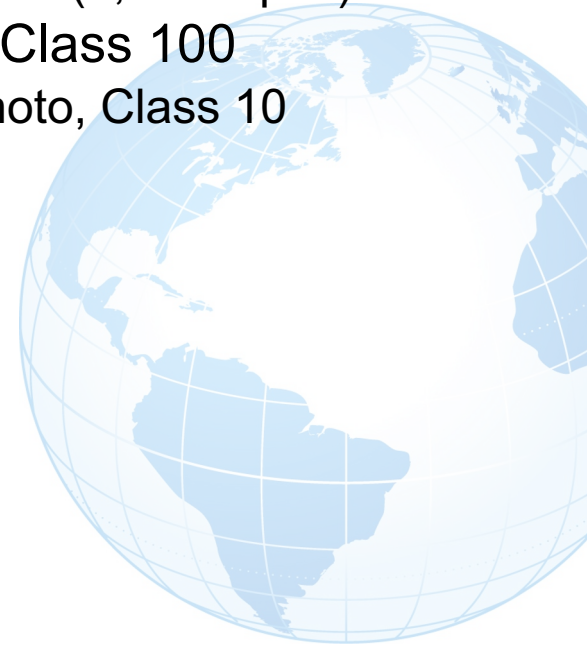
Fab2 – 6" MEMS



800 m² (8,450 sq. ft.)

Class 100

Photo, Class 10



Fab2 – Process Capability

- ▶ ASML 2500 i-Line Stepper to $0.8\mu\text{m}$
- ▶ Double side proximity alignment to $2.0\mu\text{m}$
- ▶ Furnace Stack: Oxidation; LPCVD PolySi
- ▶ Wet Etch - PDC, HF, BOE, Al etch, Si Etch, Solvent Strip
- ▶ KOH wet etch
- ▶ Acetone & NMP Lift-off
- ▶ MRC Multi-Metal Sputter – Au, TiW, Al, AlSi, AlCu, Ti, Ni, NiCr, Al_2O_3 , Constantan, SiCr, Sn
- ▶ Balzers Evaporation – Cr, Ni, Pt, Au, Ti, Ta
- ▶ 6" Dry Etch: LAM Rainbow Oxide, Poly/Nitride



Fab2 – Process Capability

- ▶ Novellus PECVD Thin Films - SiO₂, SiN, SiON
- ▶ EVG Wafer-Wafer & Wafer-Glass Bonding - Anodic, Eutectic, Fusion
- ▶ SVG8800 Coat/Develop track – bulk dispense
- ▶ SVG8800 Coat/Develop track – syringe dispense
- ▶ Polyimide – coat & bake
- ▶ XeF₂ dry etch release of Polysilicon
- ▶ Resist strip dry etch, Matrix 101
- ▶ Critical point drying CO₂ / IPA
- ▶ STS Pegasus DRIE & APS

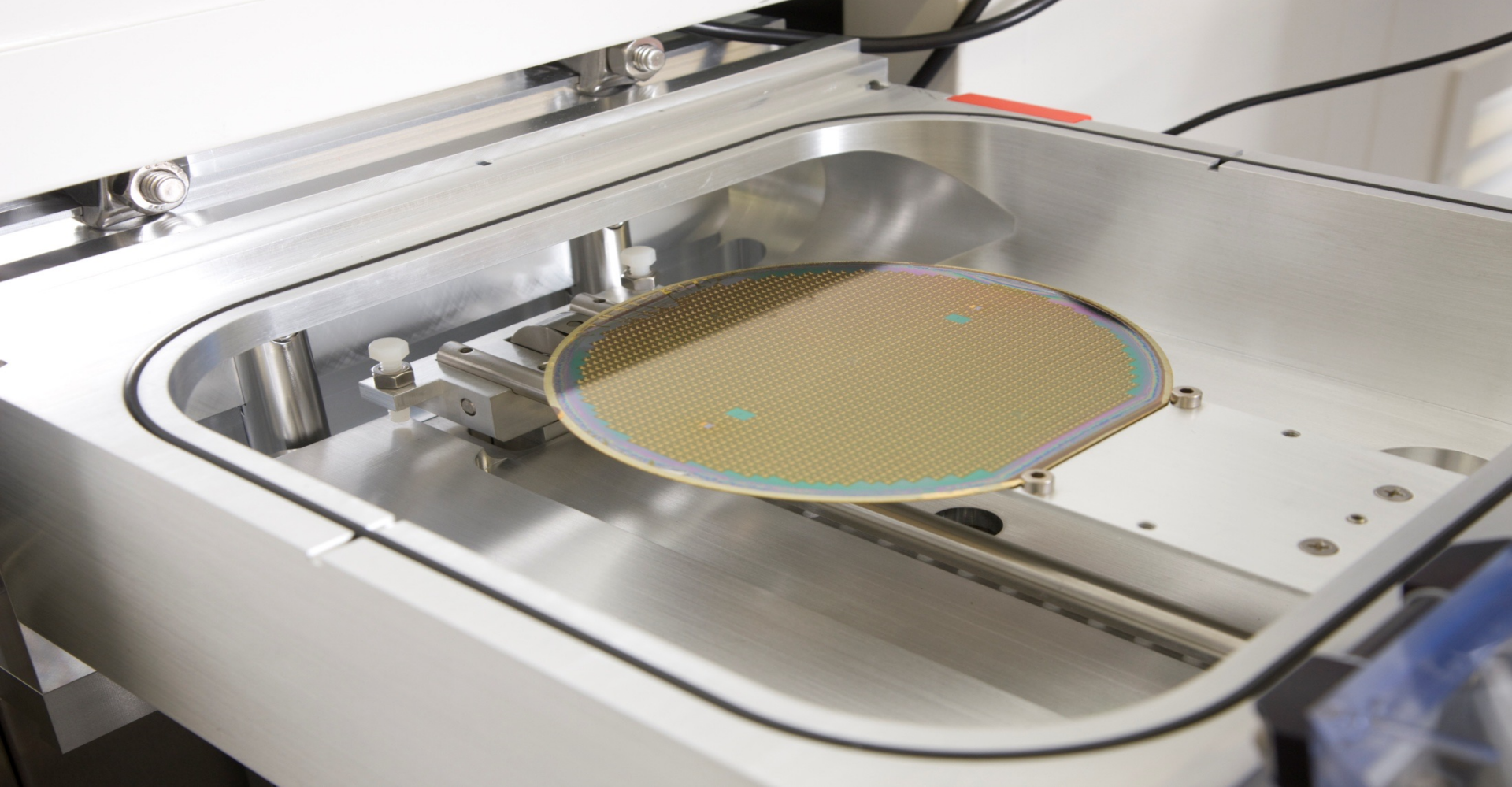












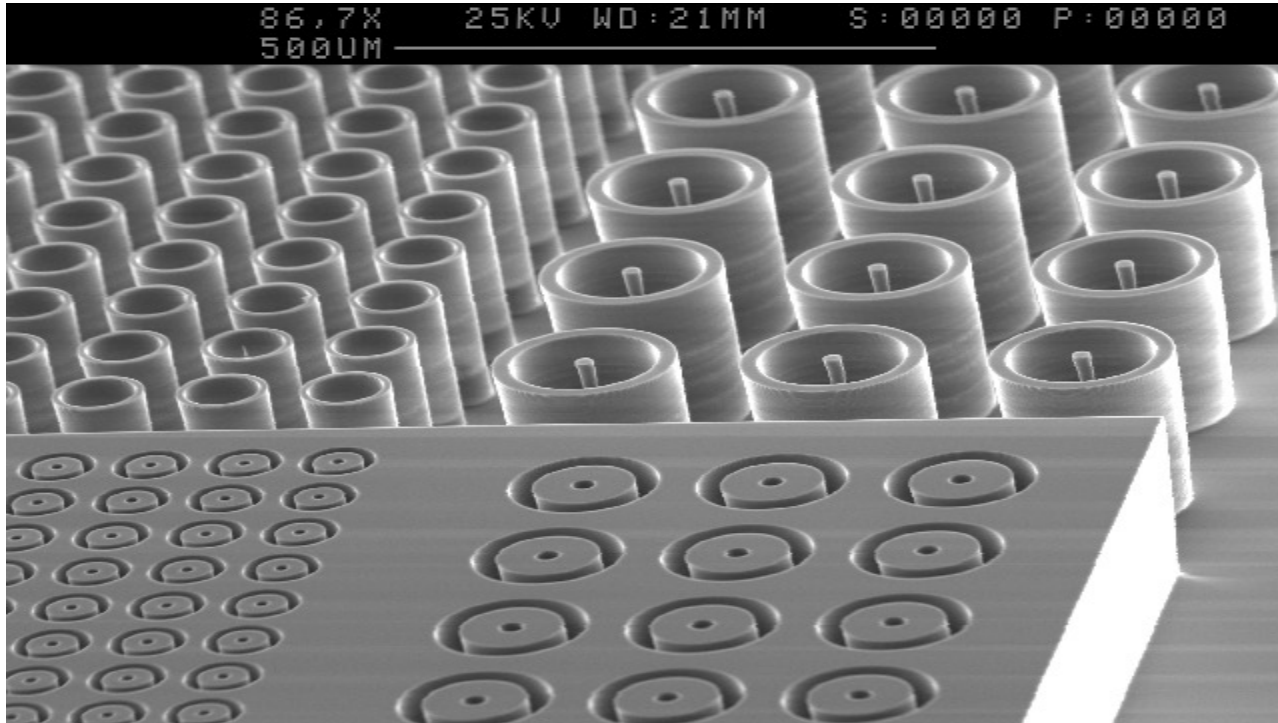








DRIE Test Structures



Probe & Test

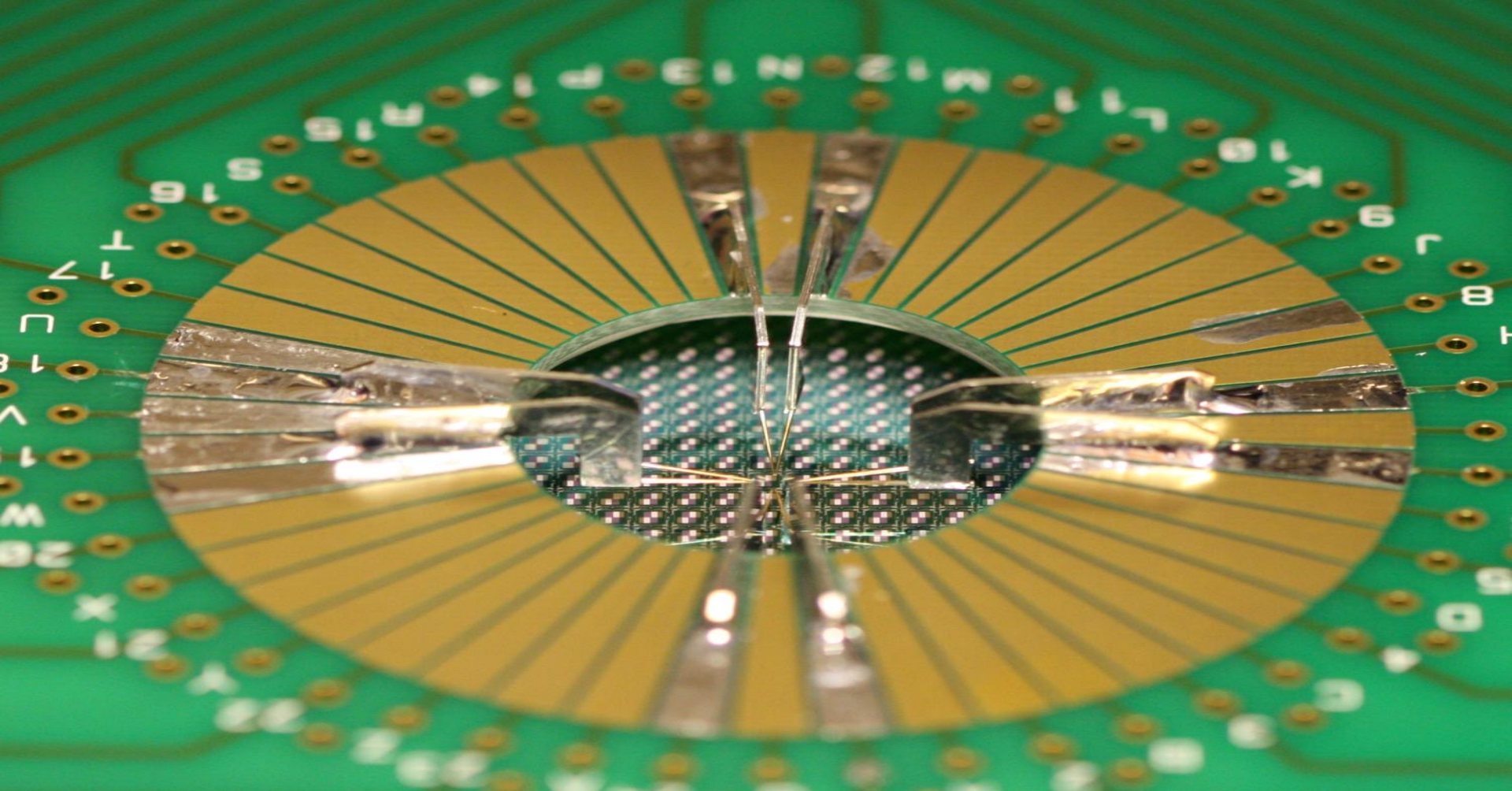


Probe & Test Capability

- ▶ 360m² (2,691 sq.ft.) Probe & Test Floor
- ▶ Class 100 Operating Environment (Hoods)
- ▶ Reedholm Instruments RI20/RI40 Parametric Tester (3)
- ▶ TPixie Mixed Signal ATE (4)
- ▶ Tesec 8101TT - Discrete Device Tester (3kV/20A) (1)
- ▶ Multitest SOIC / DIP Handlers - 40°C to +125°C (5)
- ▶ Electroglas 2001X Wafer Auto-probers (7)
- ▶ Wentworth 1050 Semi-Auto Prober (high-voltage) (1)
- ▶ Thermostream (1)









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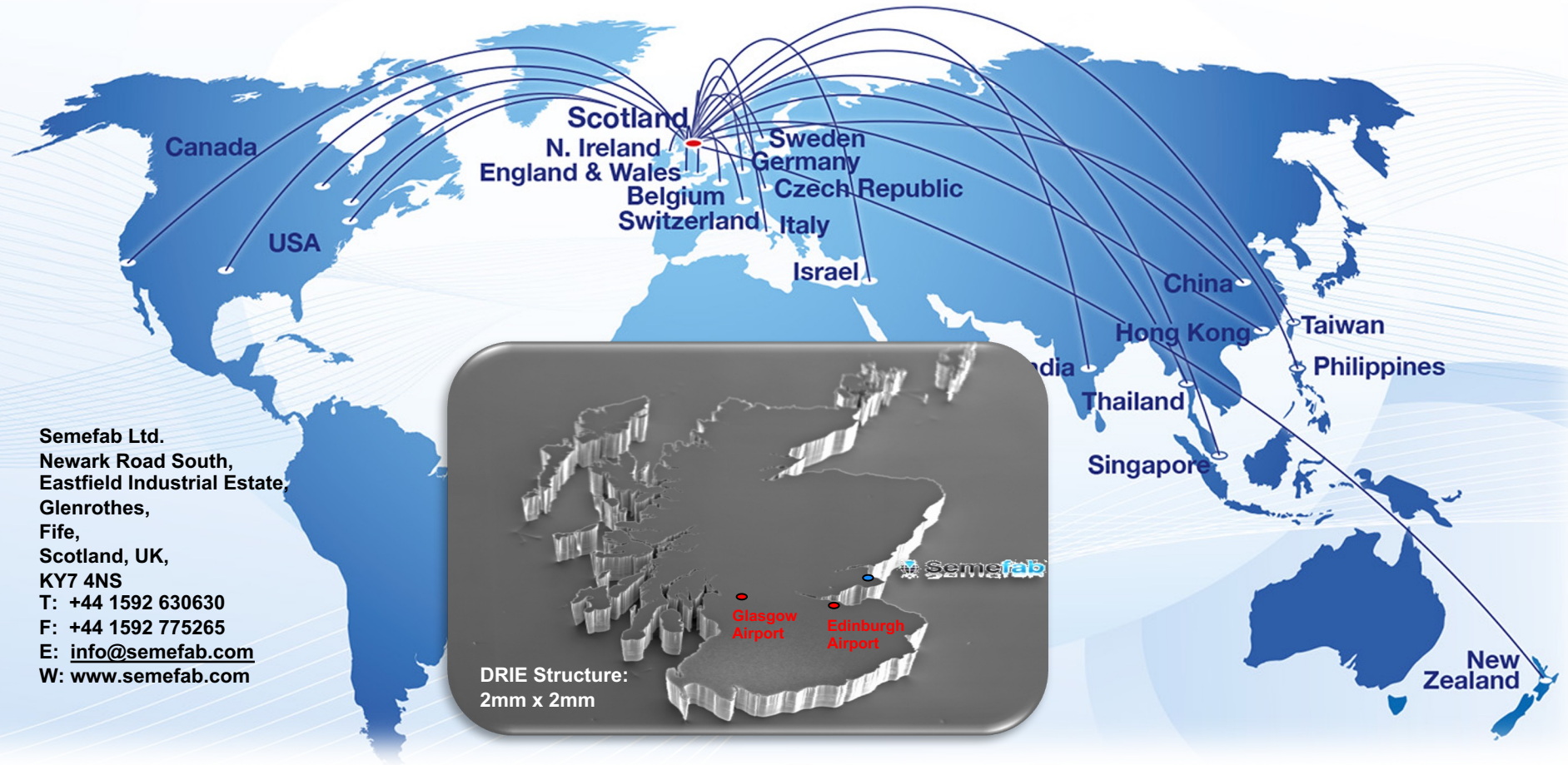
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