Semefab

Sensor and Silicon Solutions

By Zack Sharon

Semefab Overview

- Custom Wafer Fabrication
- Ship ~115 million Dies / year
- Development Model
  - Full Technology Cycle
- Volume Model
- Design Partnerships
- Technology Transfers
- Established 1986
- Private Ownership

- ~£7M turnover (FY08)
- Global Fabrication Player
- ~64% Export Bias
- >35 Customers Worldwide
- £13.6M Capex Investment

- Fab 1: 2.0µm – 3.0µm
- Fab 2: 0.45µm
- Fab 3: 0.45µm

Manufacturing Operations

Fab Operations

- Fab 1: 4” Multi-Process
- Fab 2: 4” & 6” MEMS
- Fab 3: 6” Multi-Process
- Wafer Test Operation
- ISO9001, ISO14001, BS5750
- UL & ESA Approval
- Investors in People
- Team of 98 People
  - 2% Doctorate
  - 7% Masters
  - 12% Graduate
  - 15% Technicians

Diverse Process Portfolio

- Si Gate CMOS & Opto CMOS
- Metal Gate CMOS & PMOS
- HV DI BiCMOS
- Mixed Signal ASICs & Opto ASICs
- Linear Bipolar & Epitaxial Bipolar
- Discrete DMOS RF MOSFET
- Discrete Lateral FET
- Discrete Low Noise N Channel JFET
- Discrete P Channel MOSFET
- Discrete PiN Photo Diode
- Power MOS
- Power Bipolar
- Fast Recovery Diode
- MEMS

Development Model

- Open Access Facility for Industry and Academia
  - *Technology Partnering*
  - *Background & Foreground IP agreements*
- Full Technology Cycle – *Feasibility – Proof of Concept - Prototypes*
- Commercialisation Focus
  - *Tangible Development Outcomes*
  - *Funding Justification – Research, Venture Capital, Investor…*
- In-house Design Simulation & External Partnerships
- Semefab Process Development & Process Engineering Integration
- Seamless Transition from Development to Volume
- In-house Test Operation for product development

Volume Model

- Fab 1: Fabrication capacity of 50,000 4” wafers per year
- Fab 2: Fabrication capacity of 25,000 4”/6” wafers per year
- Test floor supports wafer test & package test
  - *Electrical parametric testing*
  - *Sensor functional testing i.e. pressure etc.*
  - *Actual device packaging is subcontracted*
- Fab 3: Planning 25,000 6” wafers volume per year
  - *Fab3 design phase starts September 2009*
  - *Fab 3 scheduled operational date June 2010*
- Semefab is your low risk, value-add fabrication partner

Diverse Portfolio

ASIC Portfolio:

- Garage Door Opener
- JFET PIR Sensor
- Ionisation Smoke Detector
- Optical Smoke Detector
- Automotive Wiper
- Automotive Window Lift
- PSU Watchdog
- Light Sensing & Switching

Foundry Portfolio:

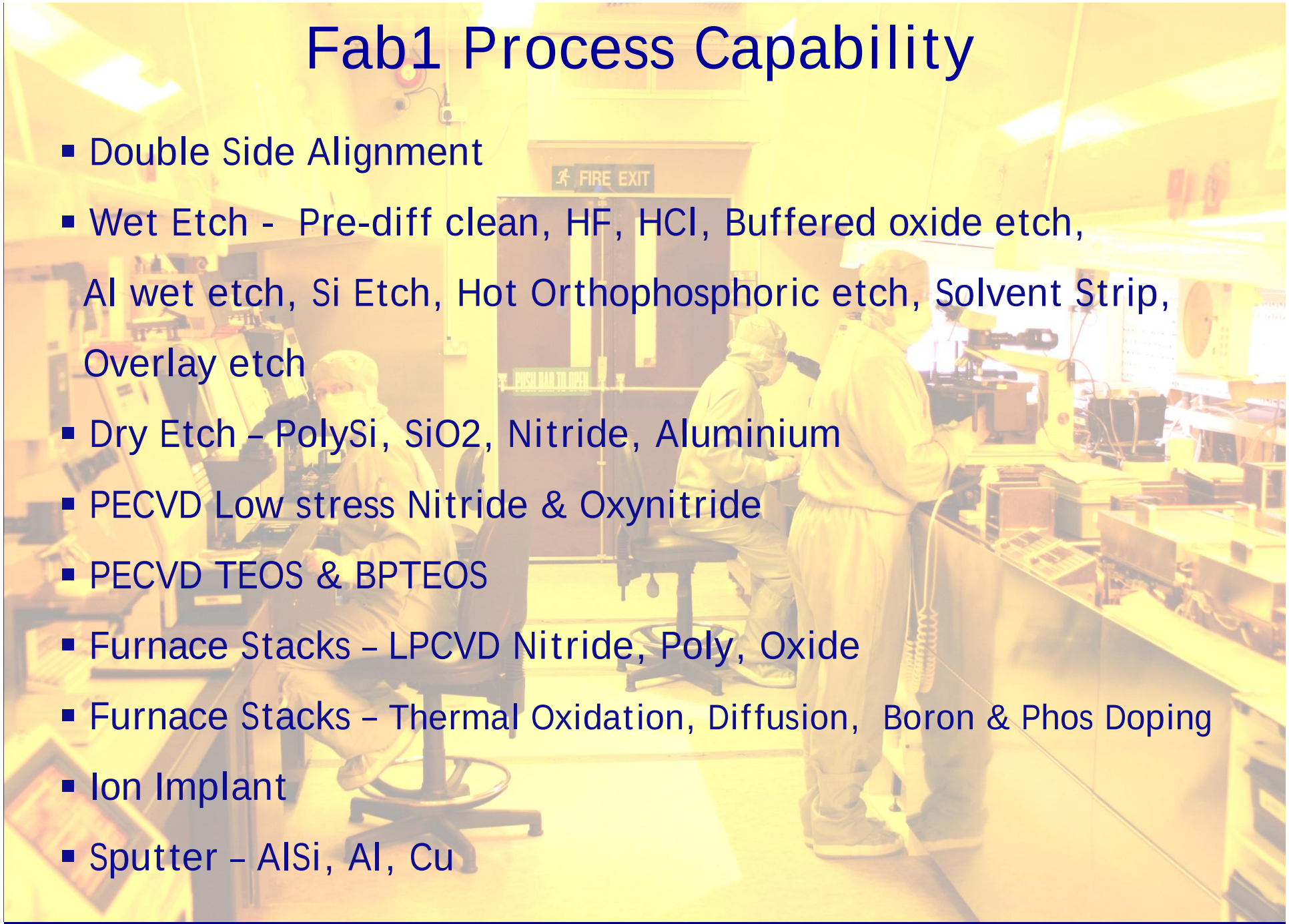
- Precision Op-Amps
- Mains Borne Signalling
- Secure Telecoms
- RF Base Stations & PMR
- Audio Amplification
- Power Devices & Modules
- X-Ray Detection

MEMS Portfolio:

- Pollution Control
- Automotive Engine Mgt
- Automotive Air Quality
- Altimeters
- Ear Thermometers
- Optical Transceiver
- Pressure Sensors
- Gas Sensors
- Temperature Sensors

MEMS Development: > 22 Active Development Projects

Fab1 Process Capability



- Double Side Alignment
- Wet Etch - Pre-diff clean, HF, HCl, Buffered oxide etch, Al wet etch, Si Etch, Hot Orthophosphoric etch, Solvent Strip, Overlay etch
- Dry Etch – PolySi, SiO2, Nitride, Aluminium
- PECVD Low stress Nitride & Oxynitride
- PECVD TEOS & BPTEOS
- Furnace Stacks – LPCVD Nitride, Poly, Oxide
- Furnace Stacks – Thermal Oxidation, Diffusion, Boron & Phos Doping
- Ion Implant
- Sputter – AlSi, Al, Cu

Fab2 Layout

600m^2

Class 100

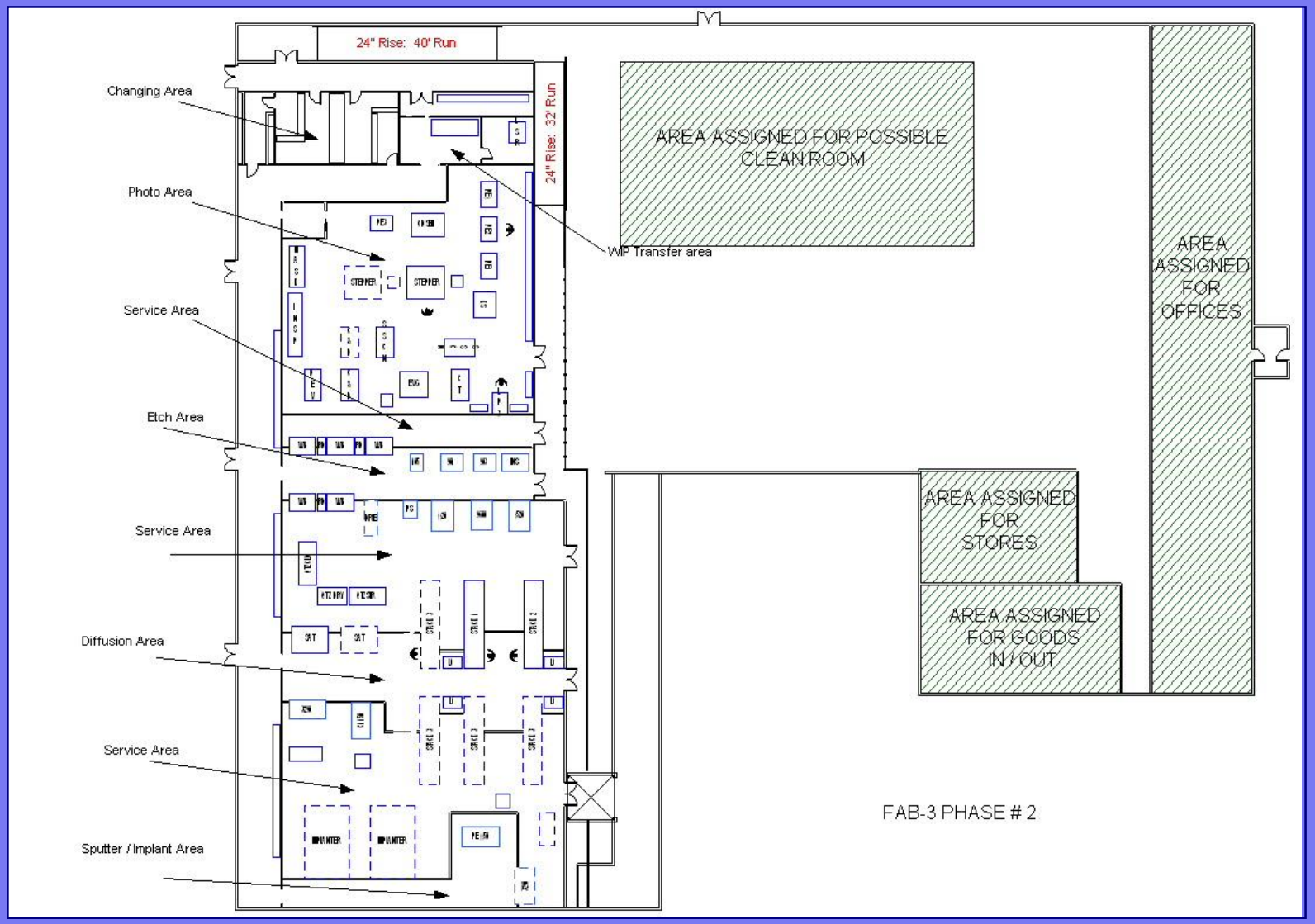
Photo is class 10

Central corridor is class 1000

Fab2 Process Capability

- Oxidation Stack
- Wet Etch - Pre-diff clean, HF, HCl, Buffered oxide etch, Al wet etch, Si Etch, Solvent Strip
- KOH wet etch, Lift-off
- Multi-Metal Sputter – Au, TiW, Al, AlSi, AlCu, Ti, Ni, NiCr, Al2O3, Constantan, SiCr, Sn
- Evaporation – Cr, Ni ,Pt, Au, Ti
- Dry Etch – Oxide, Poly/Nitride
- Double side aligner
- Stepper
- PECVD Thin Films - SiO2, SiN, SiON
- Wafer-Wafer & Wafer-Glass Bonding Anodic, Eutectic, Fusion, Glass-Frit
- Coat/Develop track – bulk dispense
- Coat/Develop track – syringe dispense
- Polyimide – coat & bake
- XeF2 dry etch release
- HF vapour dry etch release
- Deep Reactive Ion Etch (Fab1 Annexe) *STS Pegasus*
- Electroplating of Cu and Au
- Resist strip dry etch

Fab3 Layout



1,200m^2 Class 100

Fab3 Planned Process Capability

- Furnace stack – LPCVD Oxide, Poly, Nitride
- Furnace stack – Oxidation, Drive, Boron & Phos Deposition
- Double side aligner
- Stepper
- Wet etch
- Dry etch – Oxide, Poly/Nitride, Metal etch

  LAM Rainbow platform
- Sputter – Al, AlSi, AlCu with pre-etch

Test Operations Capability

- Reedholm Instruments RI20/RI40 Parametric Tester(3)
- Tesec 8101TT - Discrete Device Tester (3kV/20A) (1)
- Exatron SOIC / DIP Handler (2)
- Multitest SOIC / DIP Handler –400C to +1250C (5)
- Electroglas 2001X Wafer Auto-prober (6)
- Wentworth 1050 Semi-auto Prober (high-voltage) (1)

Thank you – Any Questions?

Semefab (Scotland) Ltd., Newark Road South, Eastfield Industrial Estate, Glenrothes, Scotland, UK

Telephone: +44 1592 630630 Fax: +44 1592 775265 Web: www.semefab.co.uk