



Mechatronics

Frencken Group

November 2022
Henri Wijnants

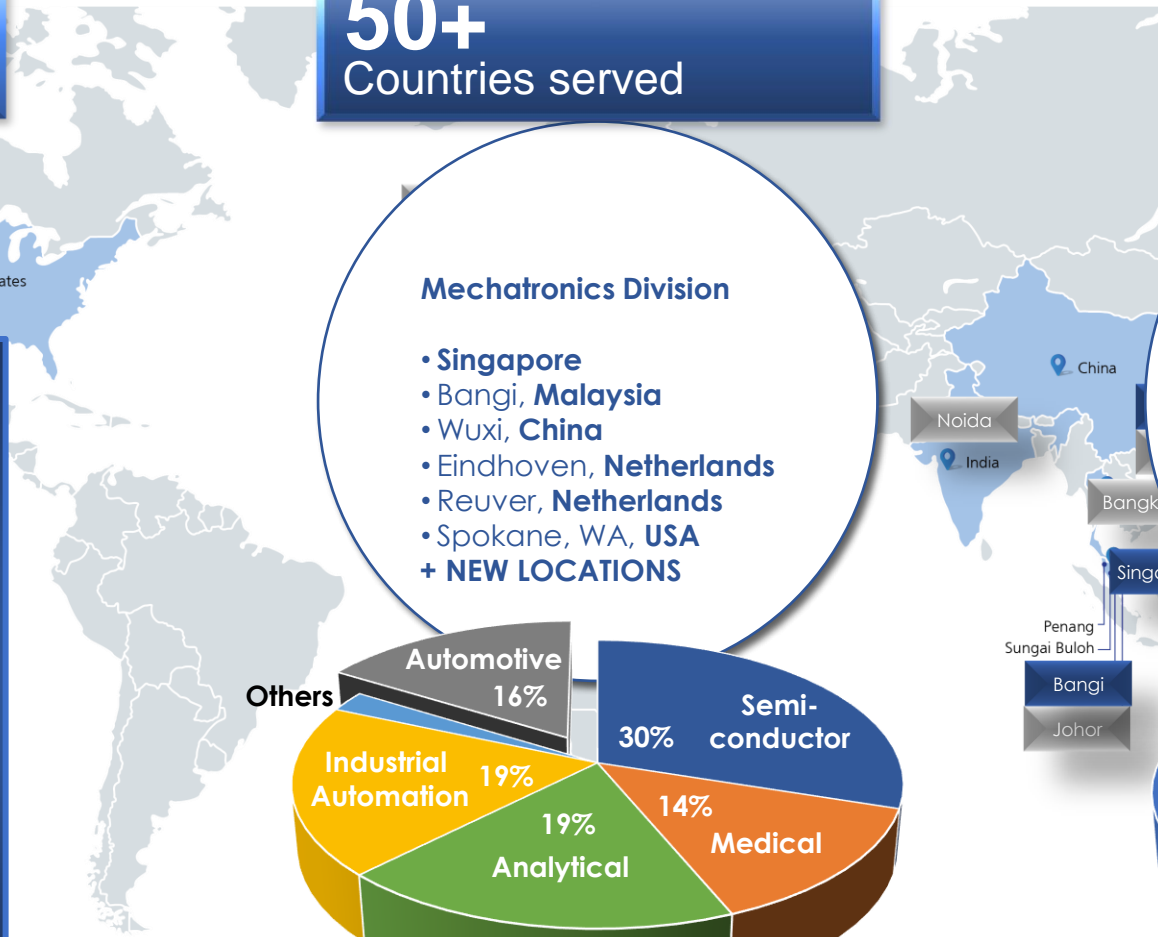
New Business Development

FRENCKEN OVERVIEW

18
Operating sites

50+
Countries served

3,500
Employees worldwide

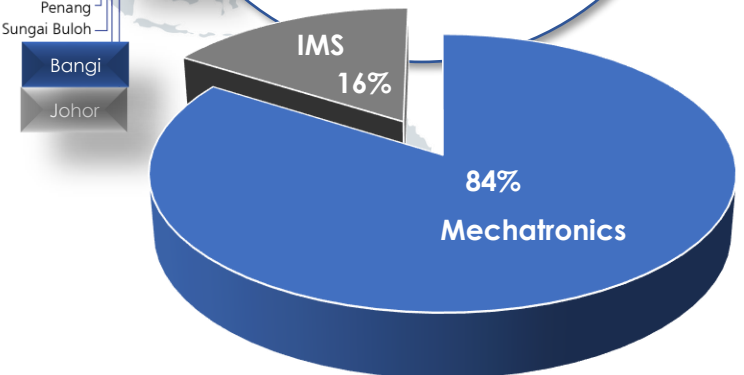
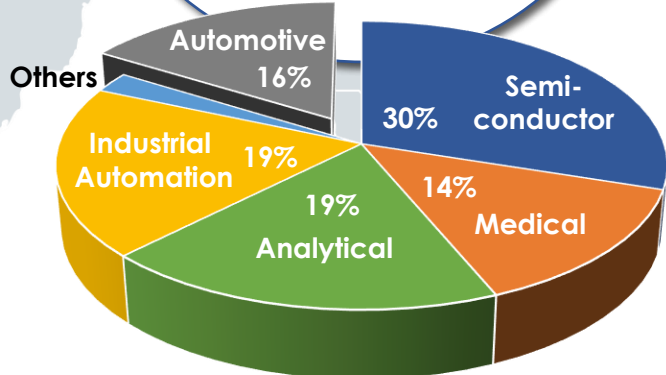


Mechatronics Division

- Singapore
- Bangi, Malaysia
- Wuxi, China
- Eindhoven, Netherlands
- Reuver, Netherlands
- Spokane, WA, USA
- + NEW LOCATIONS

IMS Division

- Zhuhai, Chuzhou, Tianjin, China
- Bangkok, Thailand
- Johor, Sungai Buloh, Malaysia
- Noida, India
- Grenchen, Switzerland
- Rotterdam, Netherlands

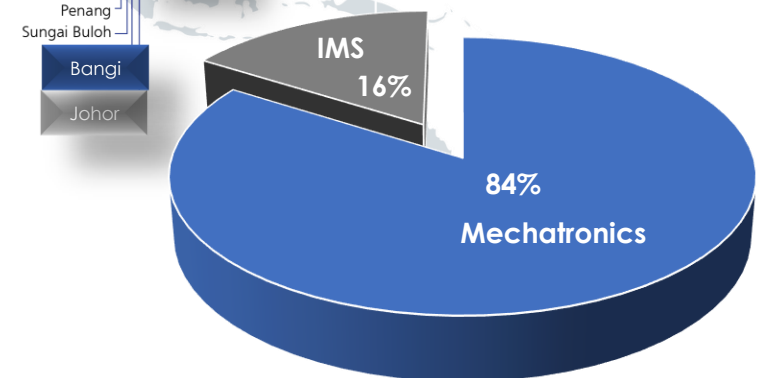
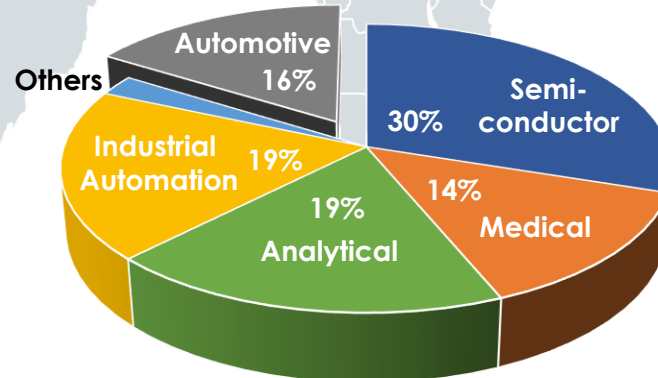
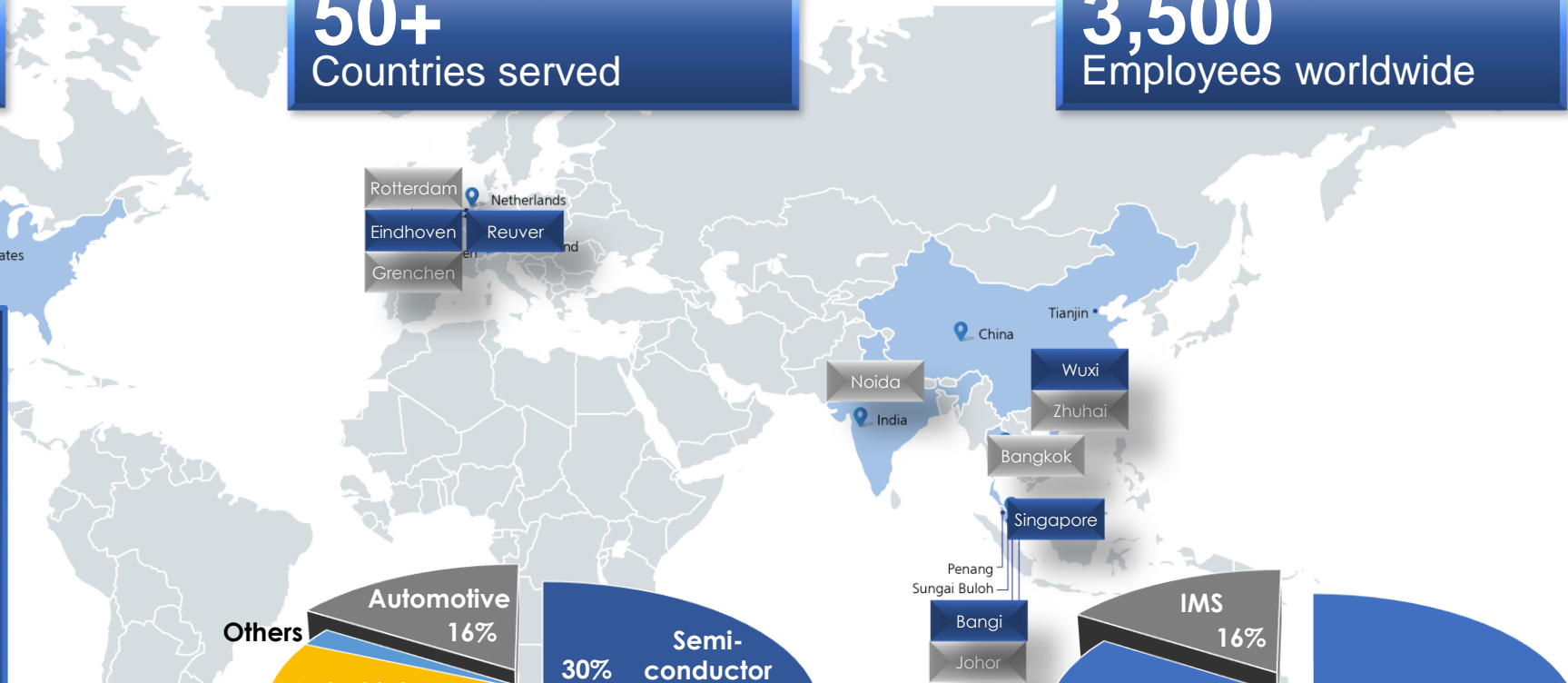
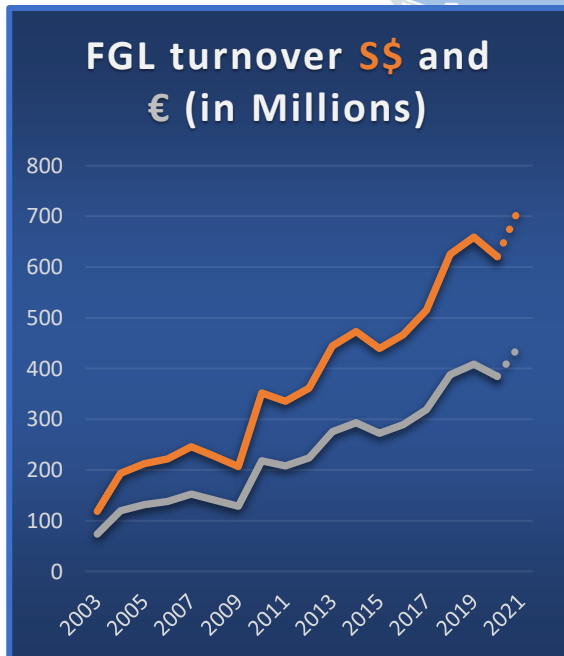


FRENCKEN OVERVIEW

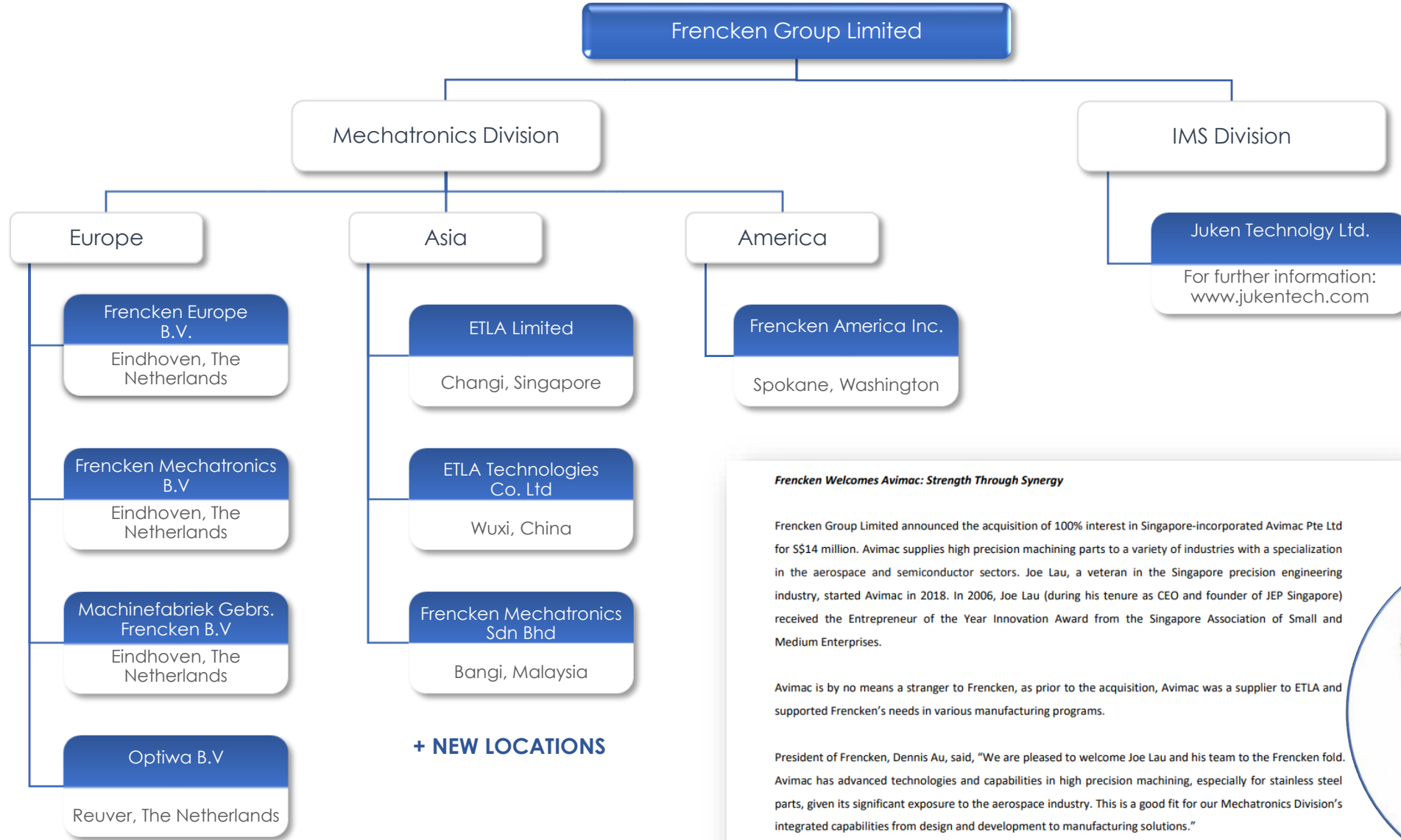
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FRENCKEN MECHATRONICS DIVISION



Frencken Welcomes Avimac: Strength Through Synergy

Frencken Group Limited announced the acquisition of 100% interest in Singapore-incorporated Avimac Pte Ltd for S\$14 million. Avimac supplies high precision machining parts to a variety of industries with a specialization in the aerospace and semiconductor sectors. Joe Lau, a veteran in the Singapore precision engineering industry, started Avimac in 2018. In 2006, Joe Lau (during his tenure as CEO and founder of JEP Singapore) received the Entrepreneur of the Year Innovation Award from the Singapore Association of Small and Medium Enterprises.

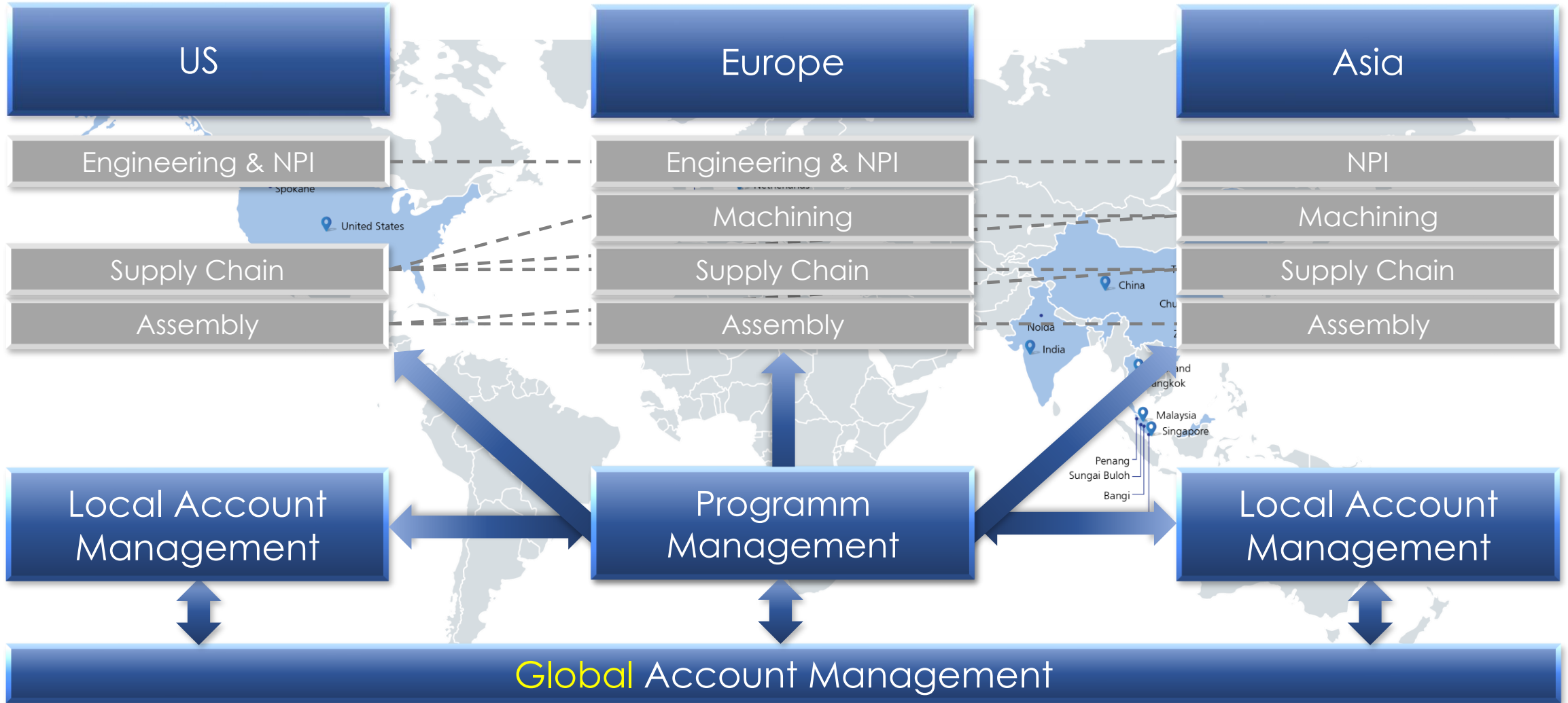
Avimac is by no means a stranger to Frencken, as prior to the acquisition, Avimac was a supplier to ETLA and supported Frencken's needs in various manufacturing programs.

President of Frencken, Dennis Au, said, "We are pleased to welcome Joe Lau and his team to the Frencken fold. Avimac has advanced technologies and capabilities in high precision machining, especially for stainless steel parts, given its significant exposure to the aerospace industry. This is a good fit for our Mechatronics Division's integrated capabilities from design and development to manufacturing solutions."

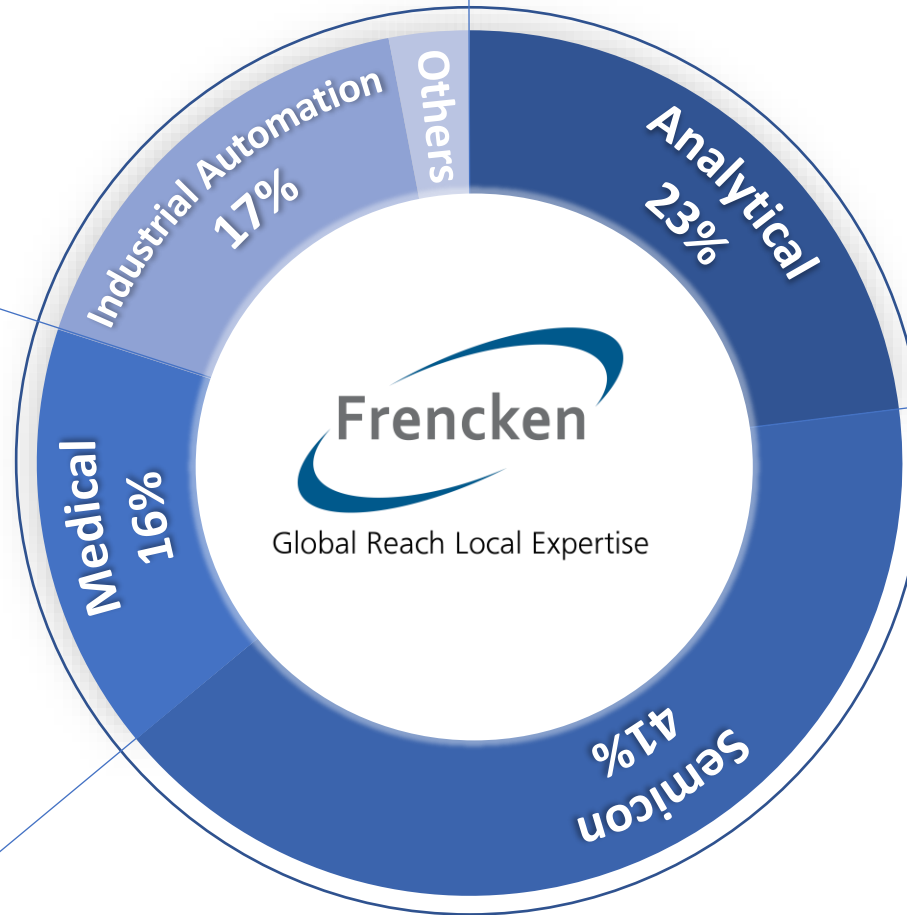


Dennis Au

FRENCKEN MECHATRONICS GLOBAL APPROACH



MARKETS AND CUSTOMERS



GLOBAL TECHNOLOGY SOLUTION PARTNER

Global Reach, Local Expertise

Competences

Innovate: Build to Specification, Manufacturing Process development, customer request enhancement and innovation

Design and Engineering: Optimization of TPD to DfX, Industrialize design, Optimize cost, quality and delivery, collaborate in create product specification to production, partnering customer product roadmap development

Manufacturing: Precision and complex machining, frames, sheet metal and complex assembly

Sustaining: Global supply chain management, Product lifecycle management, Process and quality control

Value Proposition

Enable partners to focus and excel in their CORE business

Support partners' total product life cycle and accelerate time to market

Provide access to our global distribution of centers of excellence to accommodate global market approach

Key Market Segments

Semiconductor



Analytical



Medical



Industrial Automation



FRENCKEN MECHATRONICS DIVISION

Our Manufacturing and
Engineering Expertise



Solution
Development &
Engineering



Precision
Machining



Sheet Metal
Fabrication



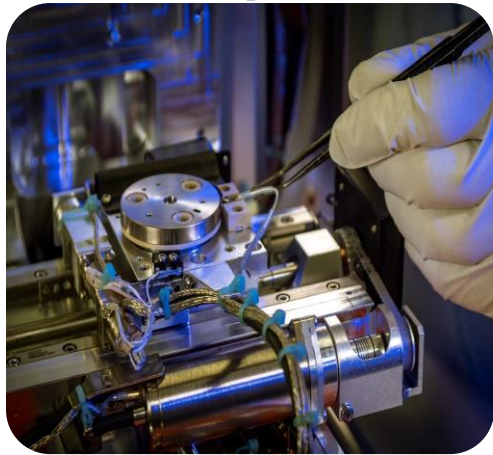
Cleaning



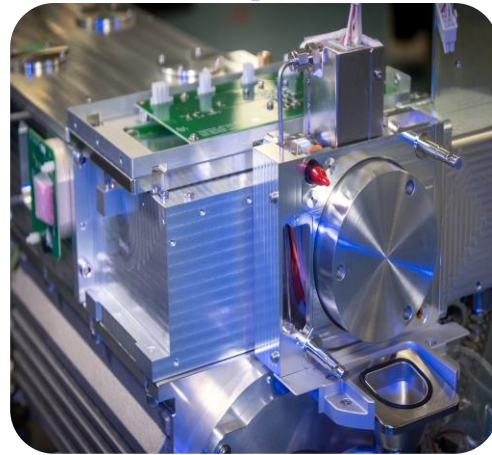
Built to
Specification/Print
and complex
Assembly

FRENCKEN MECHATRONICS DIVISION

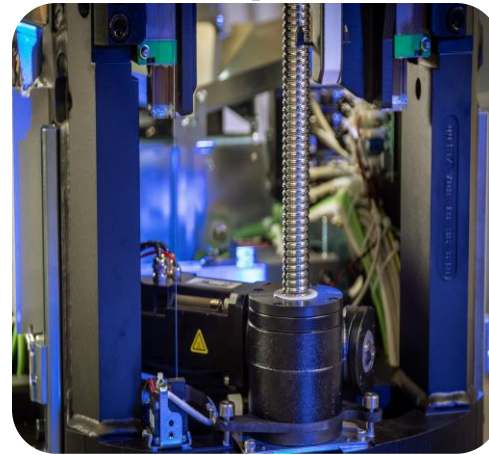
Our Focus Areas



Accurate
positioning



High Vacuum



Motion Control



Particle Optics

ENABLING PROCESSES: OUR TOOLBOX

- Product Enhancement & Specification Improvement
- Reduction of Total Cost of Ownership
- Full Product Development
- High Voltage components Design and Manufacturing
- DfX – manufacturing, assembly, service, safety, test, reliability
- Product Creation Process (NPI) according ISO-13485 (including HALT/HAST Testing and CE/UL/CB/510(k) Support)
- FDA 21 CFR Part 820 environment
- Ultra Cleaning
- High precision machining
- High tech Total Level Assembly and qualification
- Supply Chain Management (Including Product transfer from Customer and to our Global Facilities)
- Sustaining
- Product Life cycle management
- Configuration Management

ENABLING PROCESSES: ULTRA CLEANING

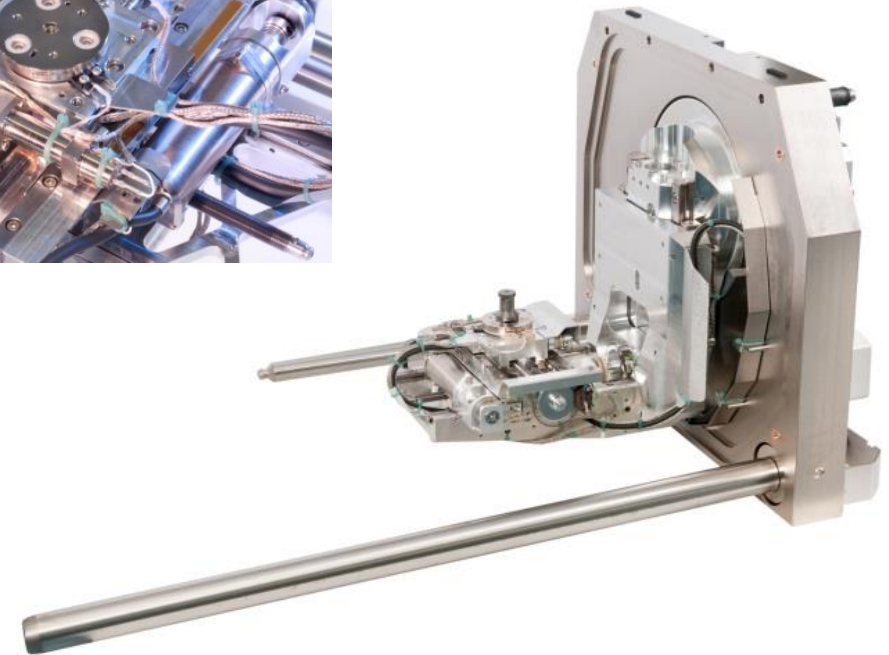
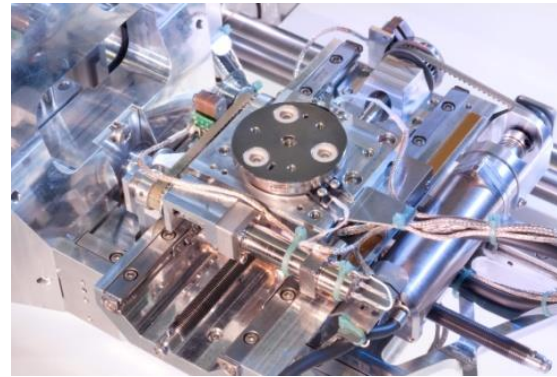


OUR CUSTOMERS, YOUR REFERENCES



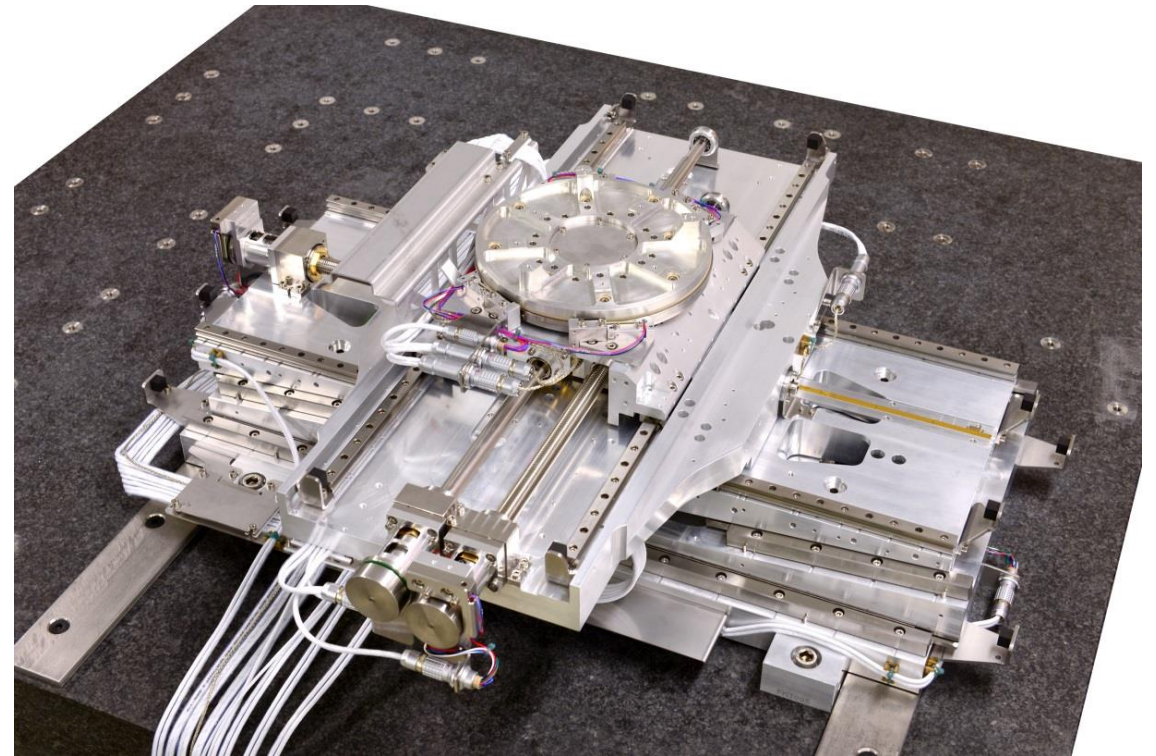
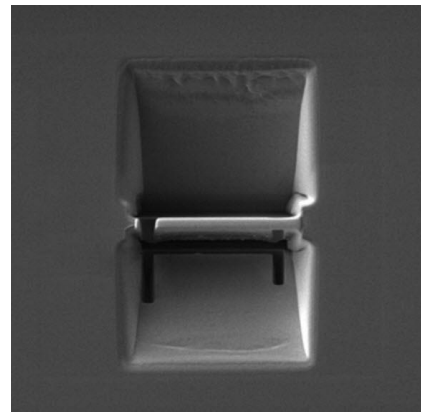
Design & Engineering

- Applications:
 - Sample positioning in e-beam and ion beam.
- Customer demands:
 - Develop a cost efficient stage with the highest possible spec (80% spec → 25% of the costs)
- Frencken responsibilities:
 - Development (white box)
 - Supply Chain Management
 - Assembly, test and product life cycle management
- Key technologies:
 - High Vacuum
 - Accurate Positioning



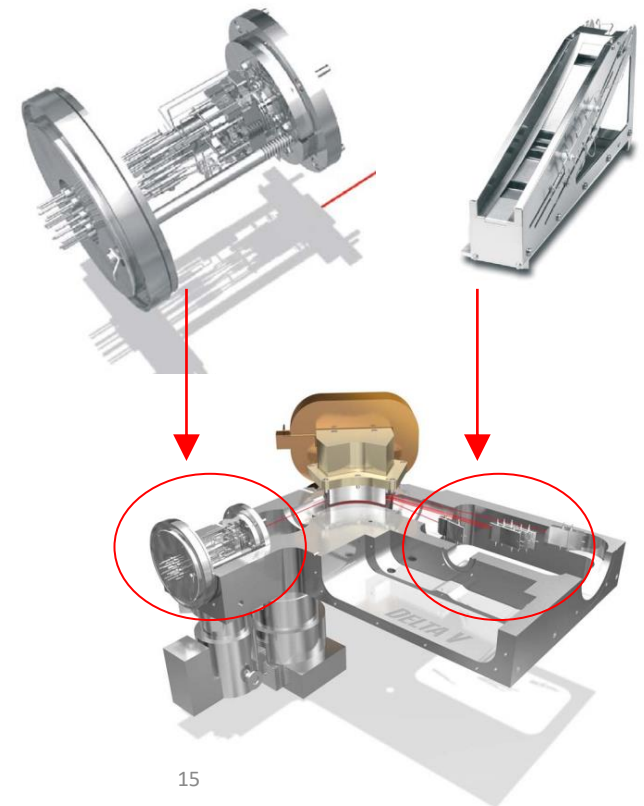
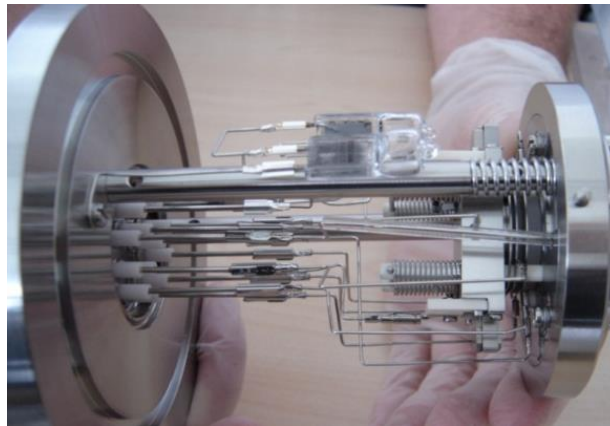
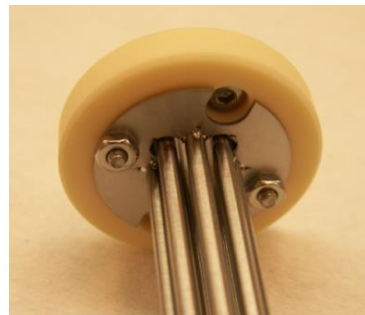
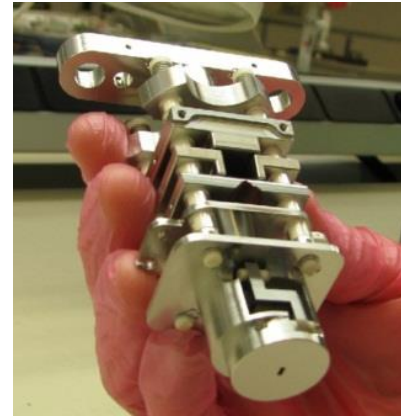
Design & Engineering

- Applications:
 - High throughput TEM sample preparation for semiconductor and data storage
- Frencken responsibilities:
 - Co-Development
 - Supply Chain Management
 - Assembly, test and product life cycle management
- Key technologies:
 - High Vacuum
 - Accurate Positioning
 - High speed



Design & Engineering

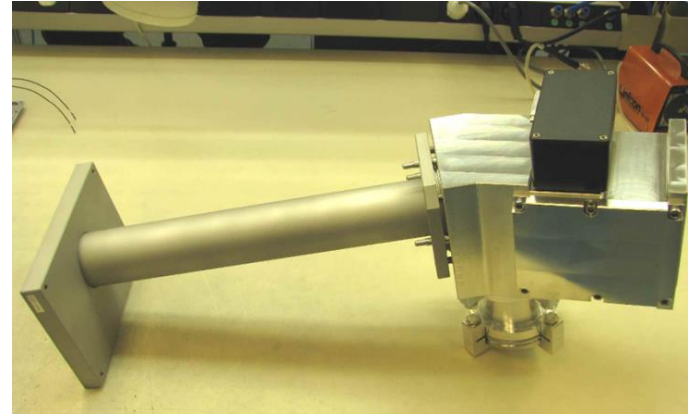
- Assembly & testing
- Supply chain management
- Quality control
- Clean room environment



Design & Engineering

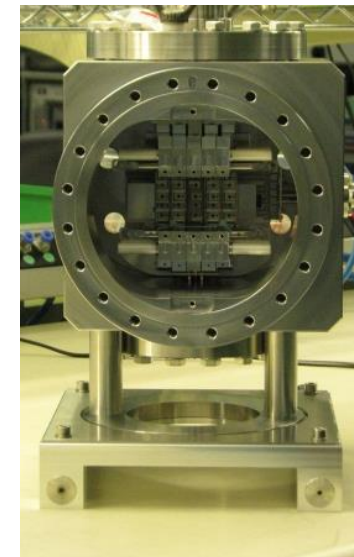
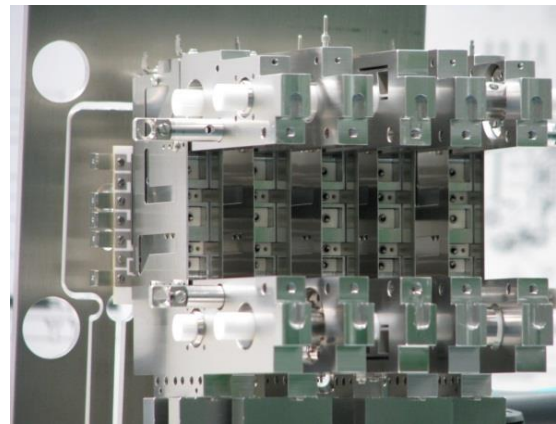
ETD transfer tube with flatapol rods

- High volume supply to Europe and USA



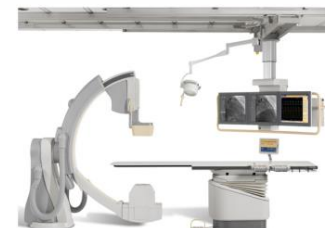
Helix multi collector

- Noble gas mass spectrometer
- Ultra high vacuum 1.10^{-8}



MEDICAL DEVICES: ADVANCED MOTION AND CONTROL

- Full Product Design
- Reduction of Total Cost of Ownership
- Product Creation Process (NPI) according ISO-13485 (including HALT/HAST Testing and CE/UL/CB/510(k) Certification)
- Supply Chain Management (Including Product transfer from Customer and to our Global Facilities)
- Product Life Cycle management
- Configuration Management



MEDICAL DEVICES: ADVANCED MOTION AND CONTROL

- Full Product Design
- High tech Total Level Assembly and qualification
- Product Creation Process (NPI) according ISO-13485 (including HALT/HAST Testing and CE/UL/CB/510(k) Support)
- FDA 21 CFR Part 820 environment
- Supply Chain Management (Including managing the transfer within our global facilities)
- Sustaining
- Product Life cycle management



... resolving grass in a football stadium
---CONFIDENTIAL---

- Resolution "40X"
(0.25 μm)² / pixel
- Full color:
24 bits / pixel
- Storage:
11 GB / (15 mm)²
- Data rates:
> 1 GB / sec.



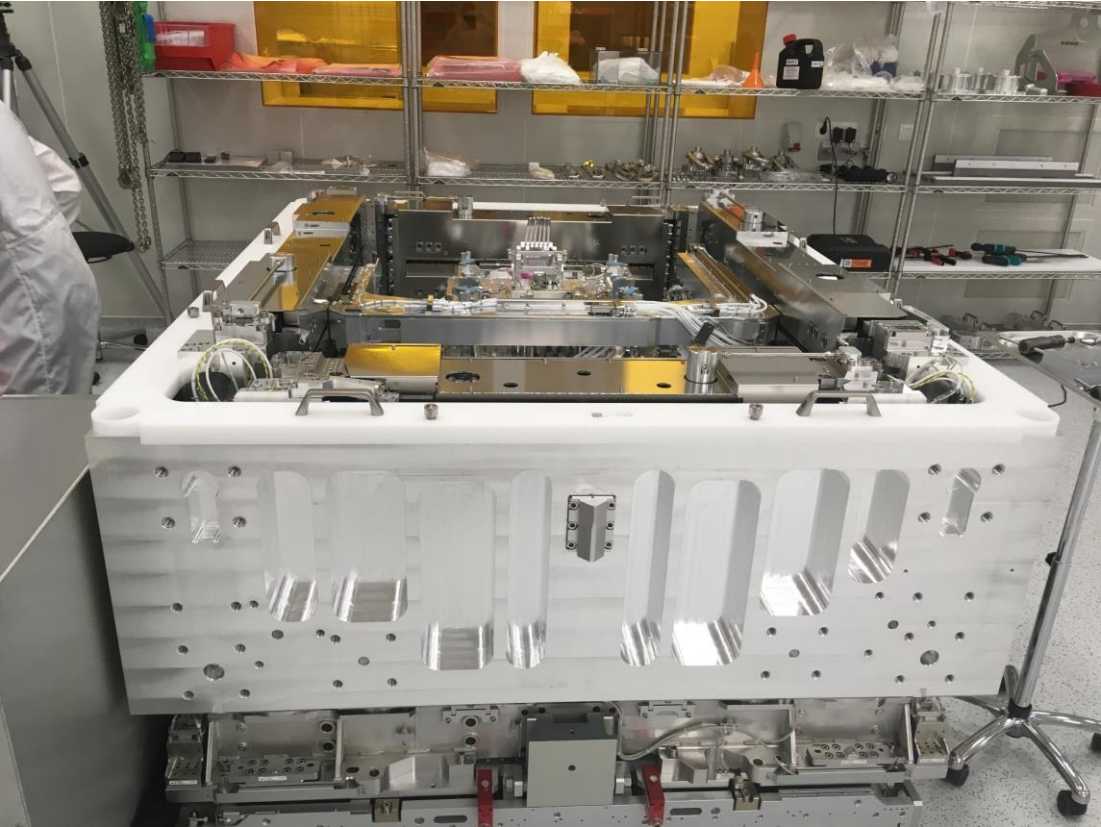
... recording asphalt structure from a race car

SEMICON EQUIPMENT: ULTRA HIGH VACUUM SYSTEM

- Module Design
- Product Creation Process (NPI)
- Ultra Cleaning
- High precision machining
- High tech Total Level Assembly and qualification
- Product Life cycle management

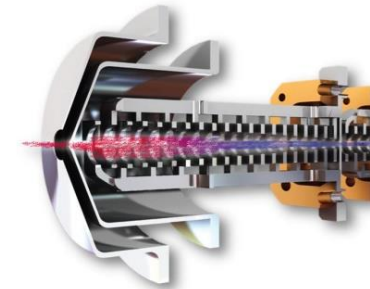


High level Assembly



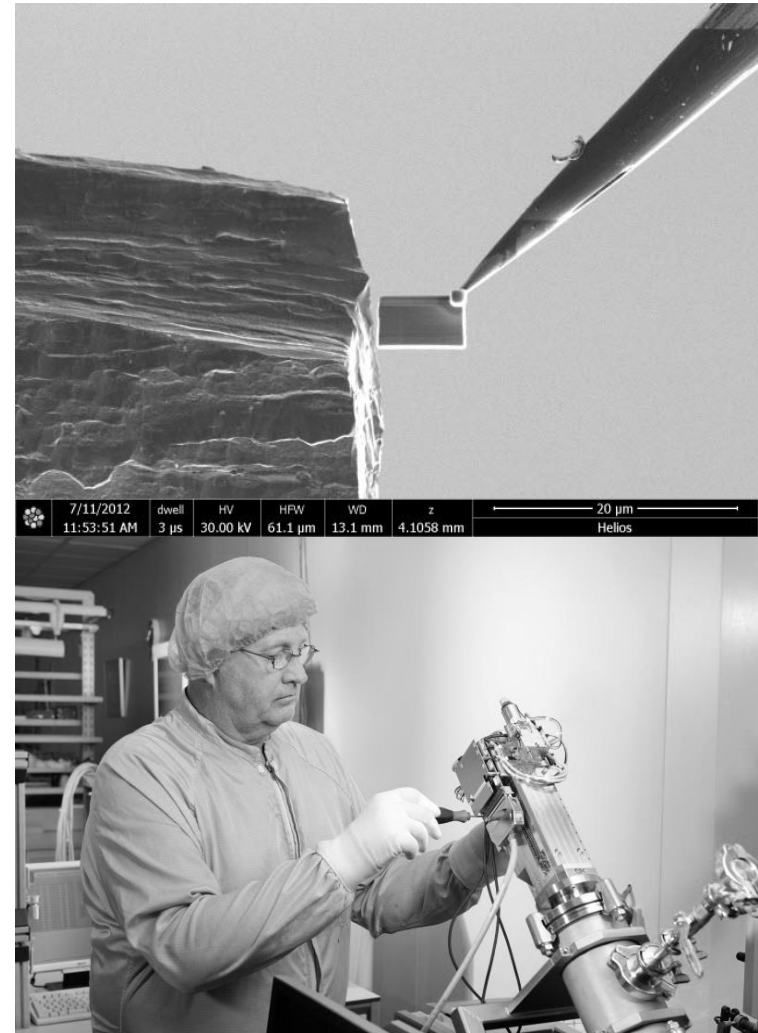
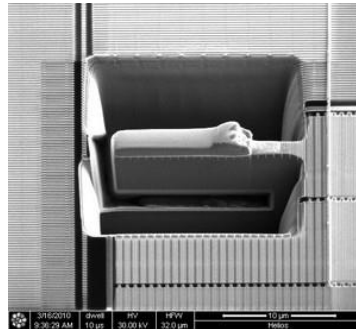
ANALYTICAL DEVICES: PARTICLE OPTICS

- Product Enhancement & Specification Improvement
- Reduction of Total Cost of Ownership
- DfX – manufacturing, assembly, service, safety, test, reliability
- Product Creation Process (NPI) according ISO-13485 (including HALT/HAST Testing and CE/UL/CB/510(k) Certification)
- FDA 21 CFR Part 820 environment
- Ultra Cleaning
- High precision machining
- High tech Total Level Assembly and qualification
- Supply Chain Management (Including Product transfer from Customer)
- Product Life cycle management



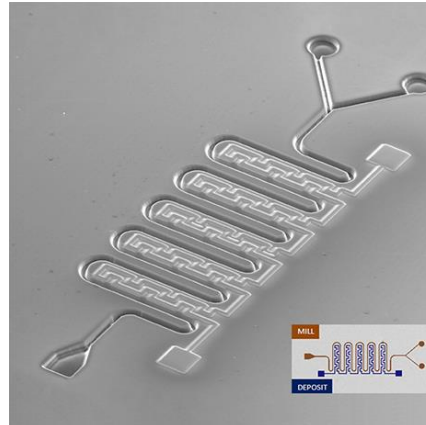
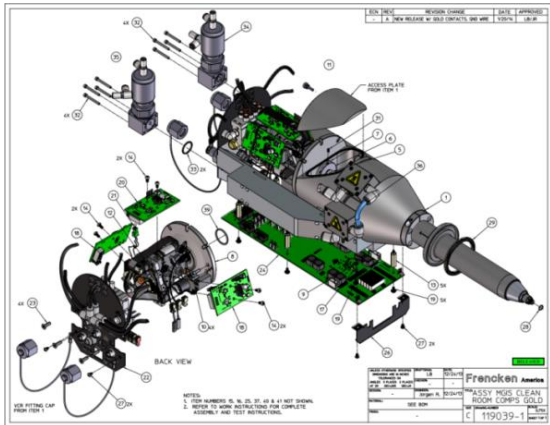
ANALYTICAL DEVICES: ACCURATE POSTIONING

- Product Enhancement & Specification Improvement
- Reduction of Total Cost of Ownership
- Full Product Development
- Ultra Cleaning
- High precision machining
- High tech Total Level Assembly and qualification



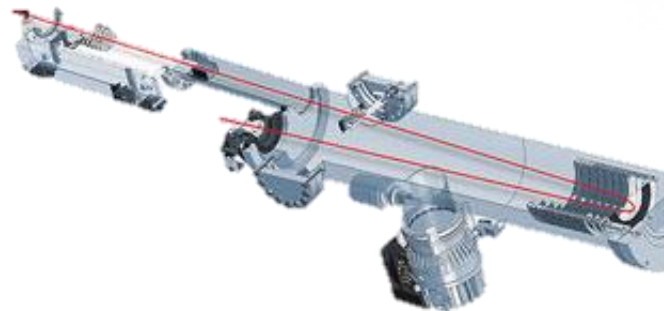
ANALYTICAL DEVICES: MOTION & CONTROL

- Full Product Development
- Product Creation Process (NPI)
- Ultra Cleaning
- High precision machining
- High tech Total Level Assembly and qualification
- Supply Chain Management Sustaining
- Product Life cycle management



ANALYTICAL DEVICES: PARTICLE OPTICS

- Product Enhancement & Specification Improvement
- Reduction of Total Cost of Ownership
- High Voltage components Design and Manufacturing
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- Supply Chain Management (Including Product transfer from Customer)
- Ultra Cleaning
- High precision machining
- High tech Total Level Assembly and Qualification



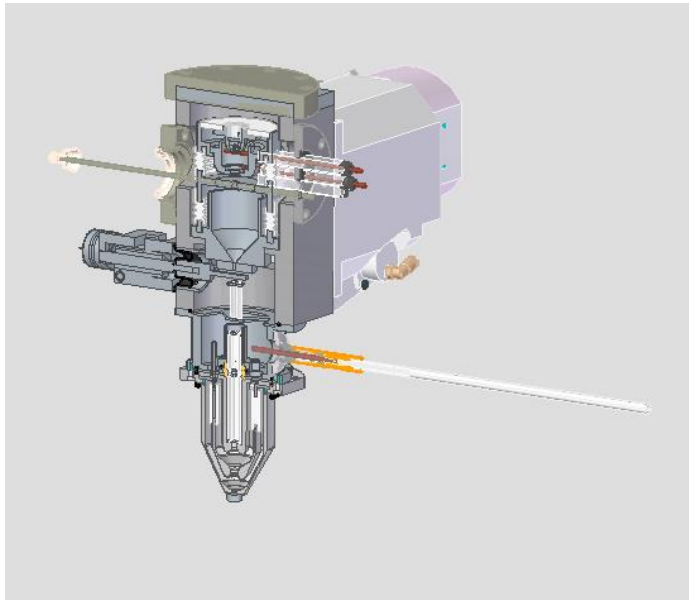
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- Product Life cycle management

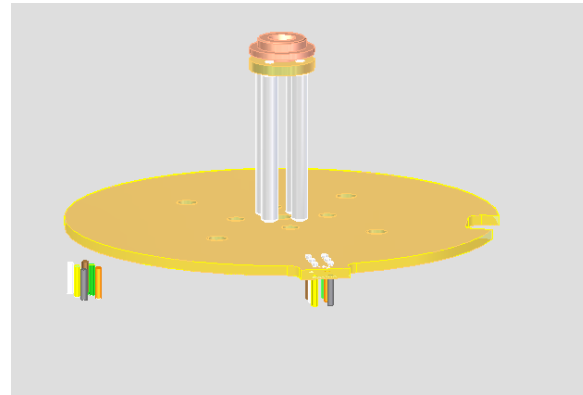


EXAMPLE: ION OPTICS AND ELECTRON OPTICS DESIGN

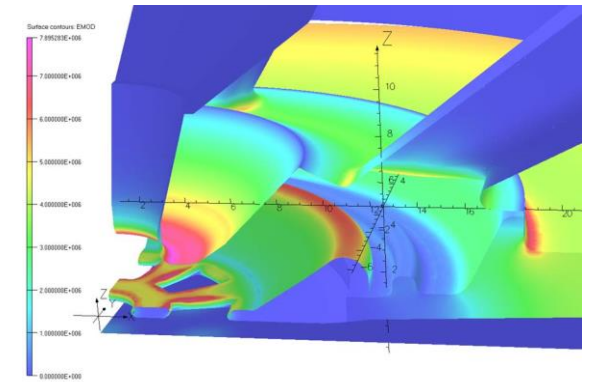
Full design of Ion source (20 kV+) in dual beam microscope



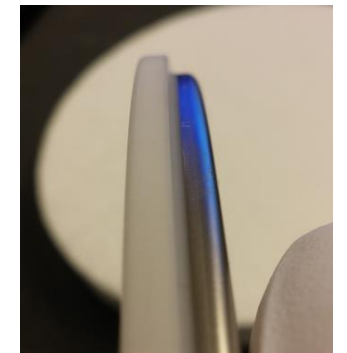
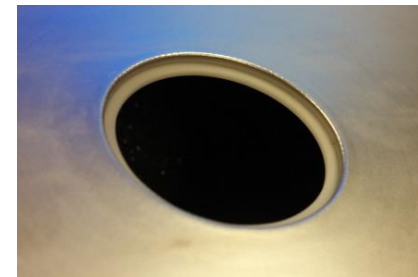
Full design
Value Quadrupole with PCPB
interconnection feed trough



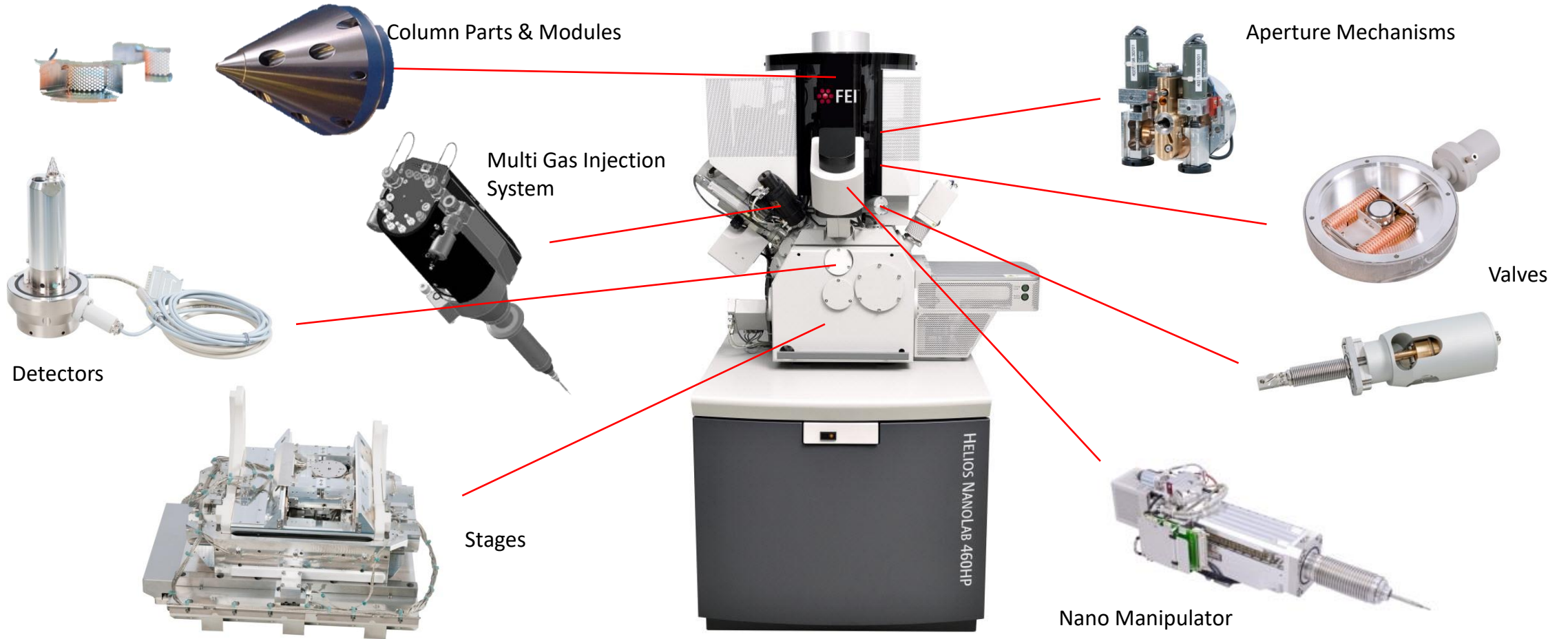
Simulation of High voltage designs (External)



Metalized Ceramics;
11 kV application



Sub Module Assembly.



High Level Assembly

- Close cooperation during development
- Cross functional team
 - Production engineering
 - Supply chain management
 - Manufacturing
- Short lines and flexibility
- Industrialization and manufacturability know how
- Contains ion-optics: collision cell, DA lenses, 90 degrees deflection
- Vacuum chamber, including door and feed trough
- Process chamber, RF generator
- Electronics and process wiring (water and air)
- Assembly and testing
- De- vacuuming



Optical systems

— Ion Optical Modules



Features :

- Vacuum Applications
- Delicate machining items, OEM parts and assembly within the specified requirements.
- Supply chain management
- Project management
- Controlled environment assembly



Capabilities – Sheetmetal Fabrication

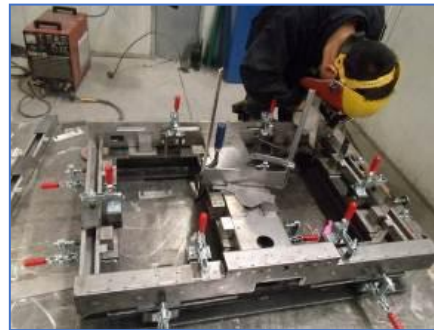
Features :

- Multiple welded sub-modules with tight tolerances control
- Complex 5-face/Horizontal machining process after welding
- Stringent requirements on surface finish (EN)
- Fixture design for welding and machining



TEST HEAD ASSEMBLY

TEST HEAD – FRAME WELDMENT



Capabilities – Build to Print Assembly

Turnkey Automation Systems for Storage Devices

Features:

- High precision motion control
- Vision guided Pick and Place
- Automated alignment system
- Automated screw fastening (M0.8)
- Short cycle time – 3 to 4secs
- > 60,000 unique items
- Project & Supply Chain Management
- Restricted access to assembly & testing room for IP protection

Execution :

- Machine Buildup (4 weeks LT)
- Station standalone cycle runs
- Line integration and buy-off
- Site installation and commissioning
- Production support and handover



Capabilities – Build to Print Assembly



Features :

- Focus on design for assembly, process & quality control and NPI process
 - Design For Assembly
 - Optimization of assembly process
 - Creation and validation of production tooling
 - System integration
 - Assembly, testing, repairs & upgrades
 - Value engineering and design for manufacturing (DfX)
- Manufacturing space
 - 3200 m² Controlled Environment area
- Key Technologies
 - Ion Source

Capabilities – Build to Print Assembly



Features :

- Delicate machining, fabricated items, OEM parts (>1300 part counts) and assembly within the specified requirements (+/- 10 micron parallelism)
- Supply Chain Management
- Project Management

In house manufacturing of core components.



Operational Roadmap – Factory Development Europe & US



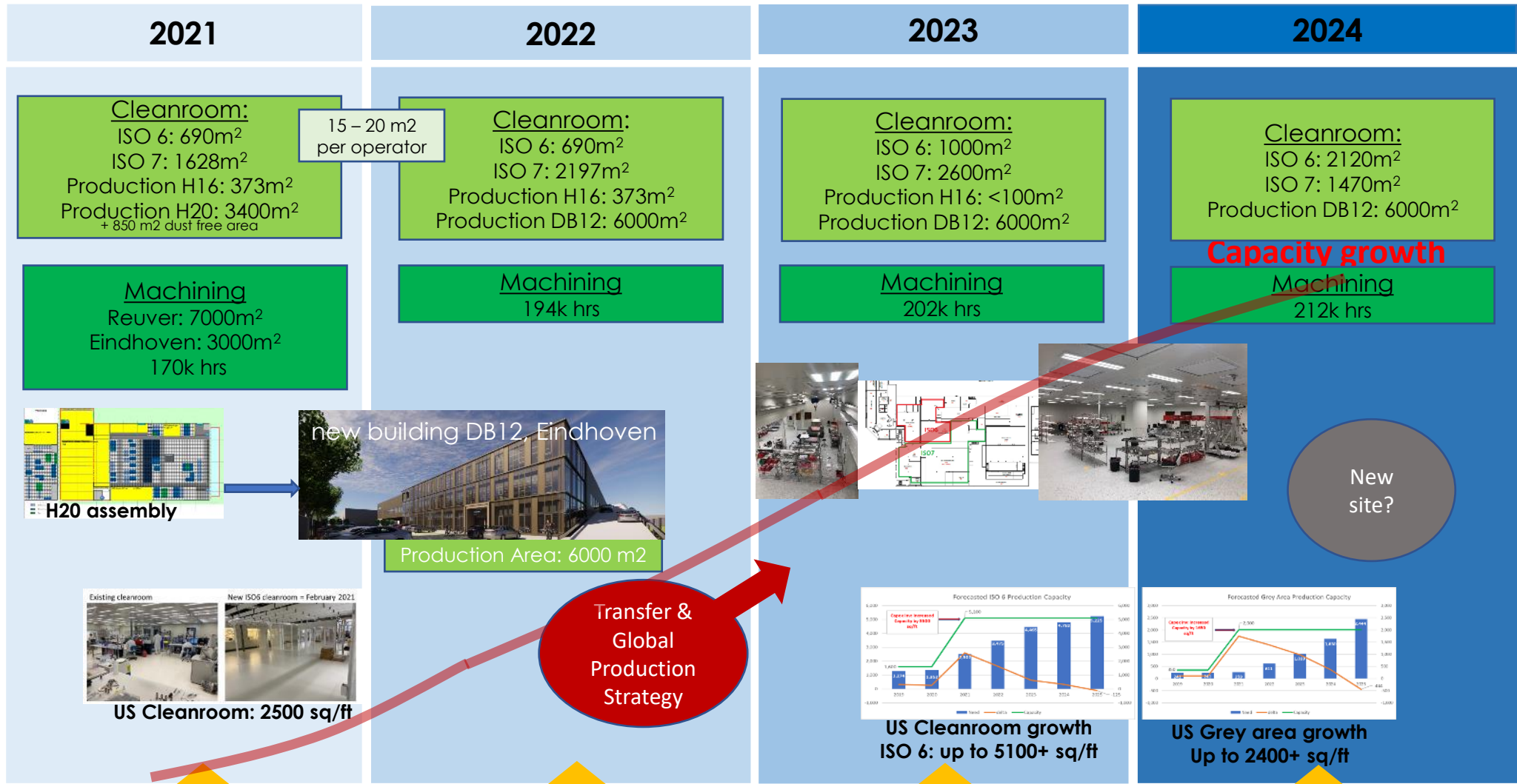
Assembly



Machining /Sheetmetal



Motors / Actuators



Building eco-system to hire needed capacity and capability
(making use of triple helix: Schools, Universities, Knowledge Centers, Industry companies, Local Governments)

Frencken Development & Expansion plans

Artist Impression of the new
Frencken Mechatronics Europe headquarters

April 2022 @ Dillenburgstraat 20 Eindhoven



