STREICHER

Advanced Vacuum

STREICHER Advanced Vacuum

Michael Feist

STREICHER Group

- Over 100 years of experience
- Technically skilled, flexible, and innovative across many business segments
- Over 4 600 dedicated employees
- More than 30 locations worldwide
- Flexibility of small companies combined with a strength of a large STREICHER Group

Advanced Vacuum

Pipeline & Plants

Mechanical Engineering

Electrical Engineering

Civil & Structural Engineering

Raw & Construction Material

STREICHER Gruppe

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Advanced Vacuum

STREICHER Maschinenbau

STREICHER Bohrtechnik

STREICHER ecotec

STREICHER Drilling Technology

Kolb Design Technology

ZIERER

VTA

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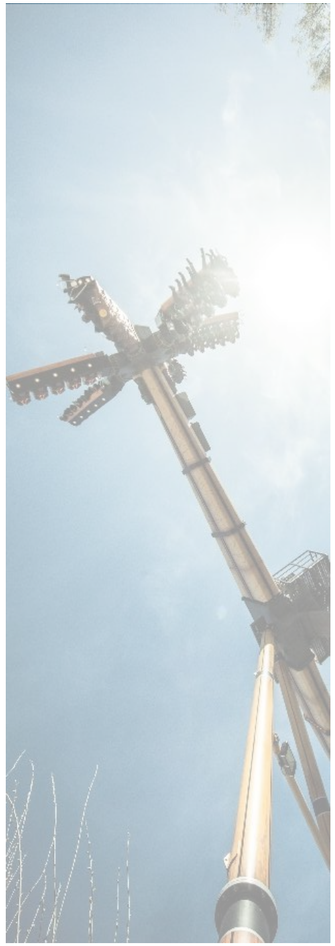


ZIERER

VTA

STREICHER Advanced Vacuum

- Joint brand of:
  - STREICHER Maschinenbau Deggendorf (DE)
  - STREICHER Pilsen (CZ)
  - MAX STREICHER – Department of Electrical Engineering and Automation, Deggendorf (DE)
- Three locations in Germany and Czech Republic
- More than 30 years of engineering and manufacturing expertise
- Approx. 720 employees
- A total of 13 spacious production halls
- Assembly facilities up to 100 tons

STREICHER

Advanced Vacuum

We make the difference

- End-to-End Engineering & Manufacturing Expertise
- Single Point of Contact – Reduced Coordination Effort
- Turnkey Vacuum Systems – 100 % Responsibility
- Optimized Time-to-Market & Short Project Lead Times
- Your Reliable Scale-Up Partner
- Minimized Over-Engineering and Defect Engineering

Why Advanced Vacuum?

- Comprehensive vacuum solutions tailored to your requirements

- From concept to reality:

  Mechanical & electrical engineering

  Inhouse manufacturing

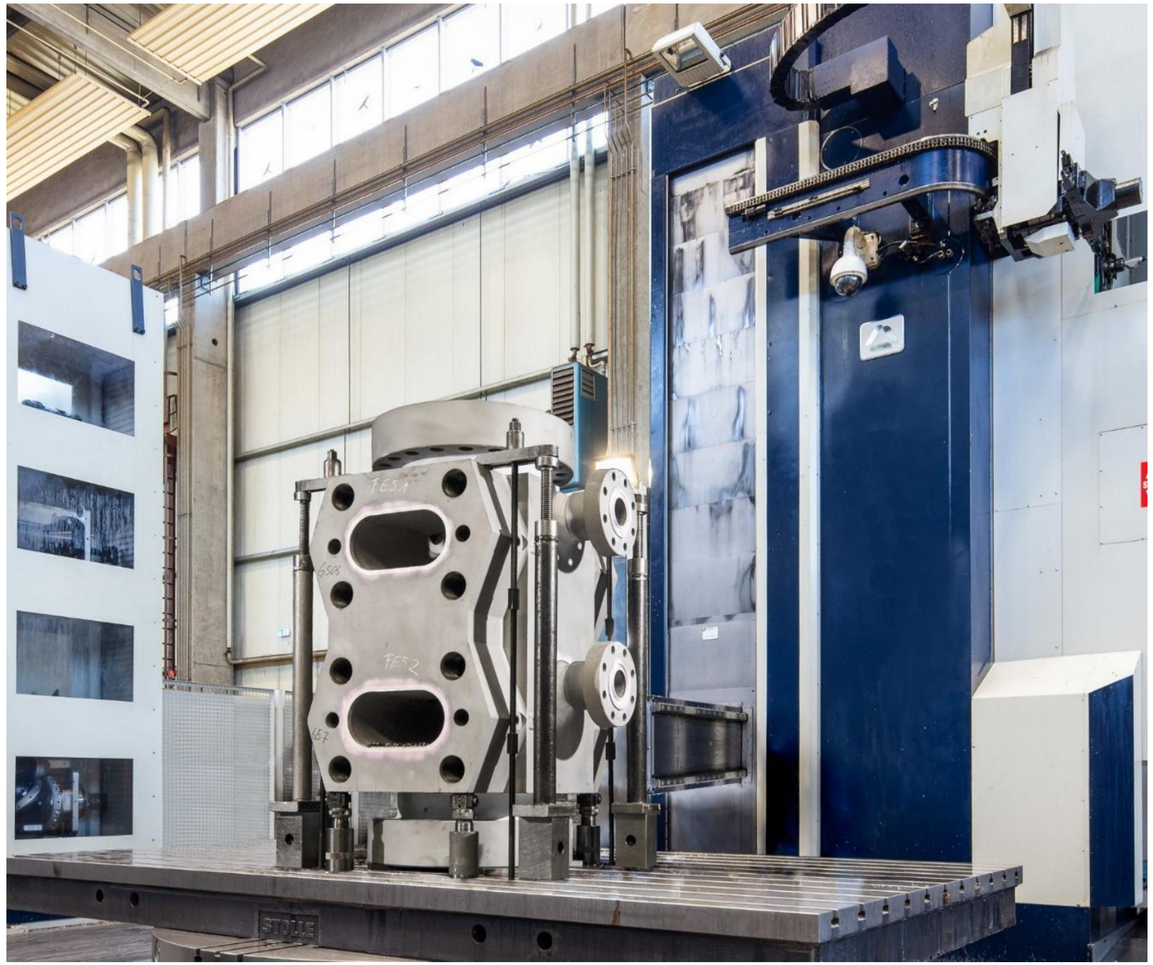
  Assembly (FAT/SAT)

  Cleaning and testing in cleanroom

  After sales services

Engineering, design and simulation

- Concept studies and technical consulting
- Vacuum engineering
- Multi-body simulation (MBS)
- Vibration simulation (ROMs)
- FEM structural simulations
- Thermal simulations (CFD analyses)
- Control technology (EPLAN & PLC)
- CE consulting & conformity process, Functional safety
- OT security (IEC 62443)
- Pneumatic & hydraulic planning
- Manufacturing documents
- 3D CAD systems: CREO, Solid Works, Autodesk, Inventor



Inhouse manufacturing

- 16 CNC machining centers, various other machines
- Travel distances up to 30 m (X-axis), up to 6 m (Y-axis)
- Mechanical machining up to 50 t per unit
- Used materials: stainless steel, nickel alloys, aluminum, carbon steel, clad plates
- Welding of a wide range of materials (> 890 WPQRs)
- Inhouse accredited test laboratory for weld process qualification
- Surface finish: Blasting and painting; Mechanical polishing of process surfaces; Electropolishing, nickel plating, gold plating, etc.
- Control cabinet construction, ATEX protection, UL 508A

Cleaning and cleanrooms

- Controlled environment for semiconductor industry, nanotechnology and laser technologies
- Temperature and humidity computer controlled to ensure precise manufacturing and assembly
- All test data documented and saved
- Cleanrooms: 1.407 m^2
  - Component weight: ≤ 50 t
  - Classification: ISO 5 to ISO 8
  - High purity cleaning
  - Assembly of switching cabinets

Cleanliness Testing

- Wipe test
- UV and white light inspection
- ORK/SCP measuring probe
- Residual gas analysis (RGA)
- Residual gas analysis on vacuum chamber
- Residual gas analysis of individual parts
- Fourier transform infrared spectroscopy (FTIR)

Mechanical, pneumatical and electrical assembly

- Assembly of components weighing up to 100 t (unit weight) and 15 m total height
- Vacuum infrastructure installations, including process gases
- Integration of heating and cooling systems
- Electrical installation
- Cleanroom integration
- Integration into customers' IT controlling and network structures
- Factory Acceptance Test at STREICHER
- Site Acceptance Test at customer sites

Application fields of our vacuum systems

Aerospace Testing Infrastructure

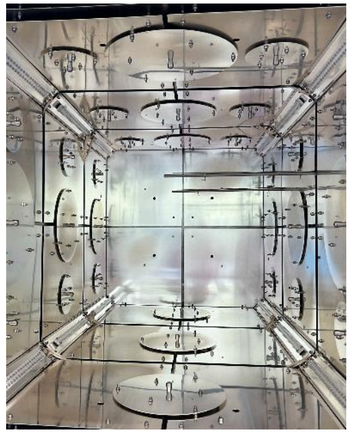
- Thermal Vacuum Chamber Systems - TVACs
- Propulsion testing
- RGA and TQCM diagnostics and data acquisition

Semiconductor Industry

- UV cleaning
- RGA chambers
- Bake-out chambers
- Special custom vacuum chambers
- UHV vacuum chambers

Vacuum Technology for Transformers & HV

- Drying and oil filling of transformers and condensers
- Partial discharge tests under pressure and vacuum



Fundamental Research

- Large complex systems
- High temperature applications
- High activation energy beams

Laser Technology

- Laser Beam distributions
- Laser Compressor chambers
- Stable optical tables in vacuum chambers

Cryogenic Applications

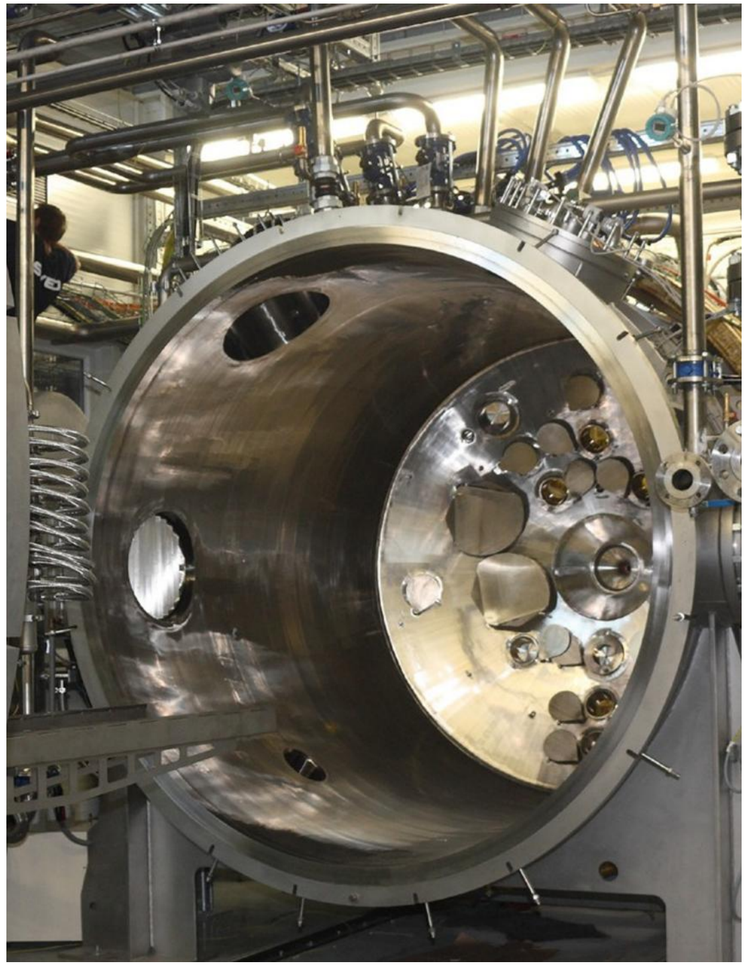
- TVAC Systems
- Gas liquefaction
- Cryogenic cells
- MLI insulations
- Radiation shields design and integration

Reference projects

Note: All presented projects are not covered by NDA, and we have a customer approval for presentation.

Compressor Vacuum Chambers

- L1, L2, L3, L4PW delivered since 2014
- For R&D laser processes, installed at laboratory ELI Beamlines
- Cleanliness ISO 5
- Operating vacuum: $1x10^{-7}$ mbar

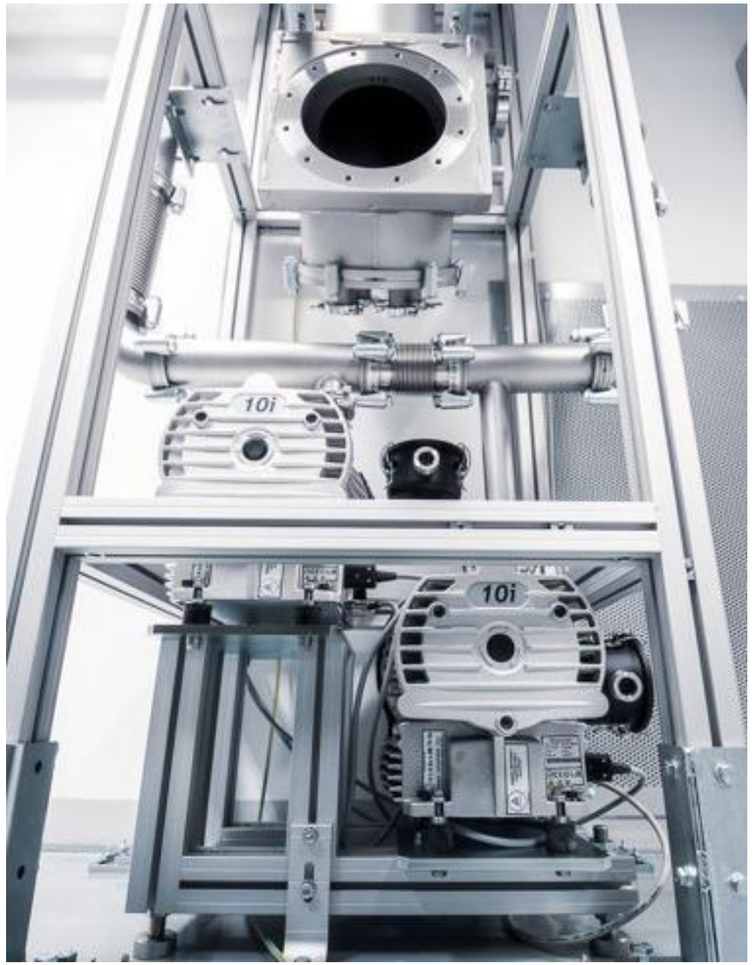


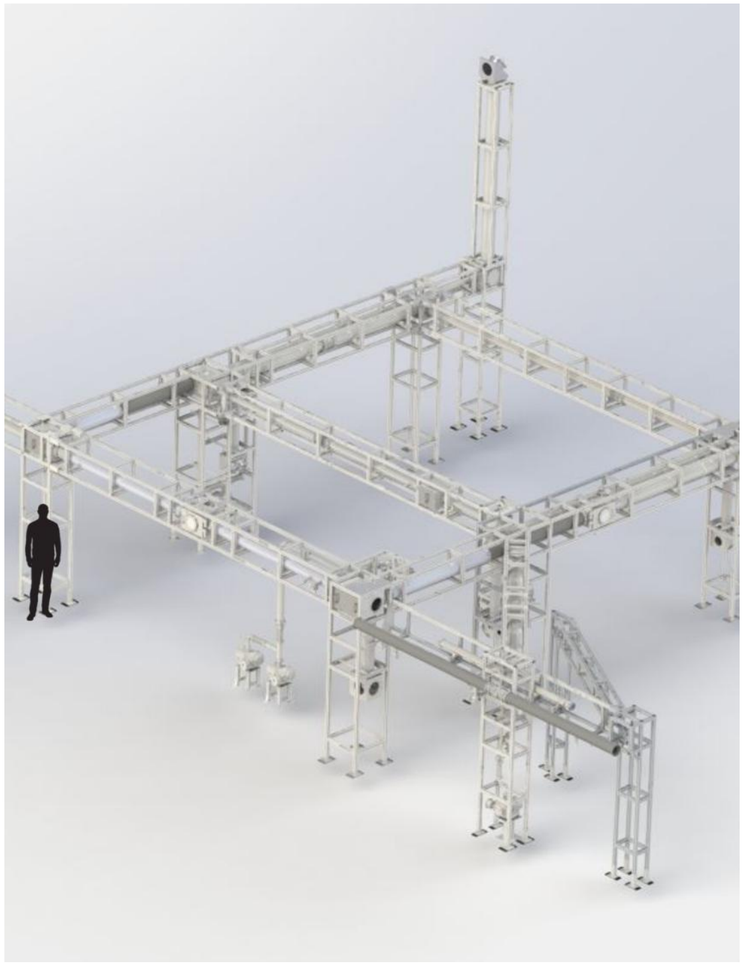
Testing Vacuum Unit HELCZA F4E

- High Heat Flux Test Facility for Testing of ITER EU First Wall Components
- Integration of technology into the vacuum chamber by STREICHER

L4 Compressor Vacuum Chamber

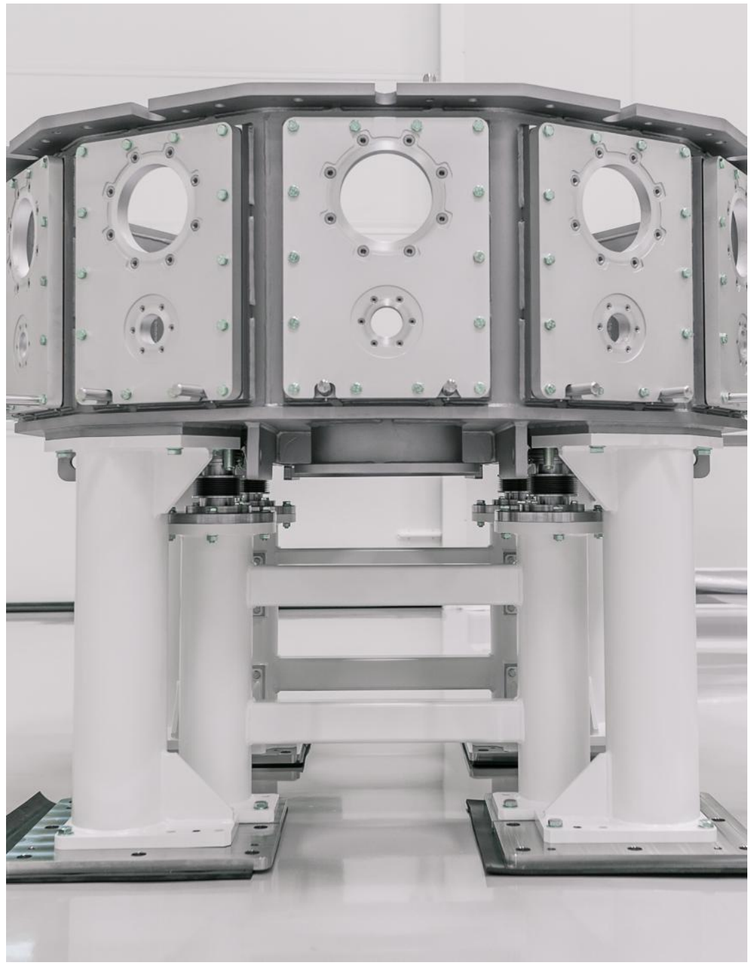
- Compressor Vacuum Chamber for National Energetics and ELI Beamlines
- Evacuation of the entire assembly with turbopumps to an ultimate vacuum of 5,1 x 10^{-8} mbar
- Inner surface hand-polished and double baked Viton sealings used
- Cleanliness conditions ISO 5
- Dimensions: 3,5 x 4,5 x 18 m
- Accurate entry and diagnostics flange positioned 1,1 mm in the building's coordinate system

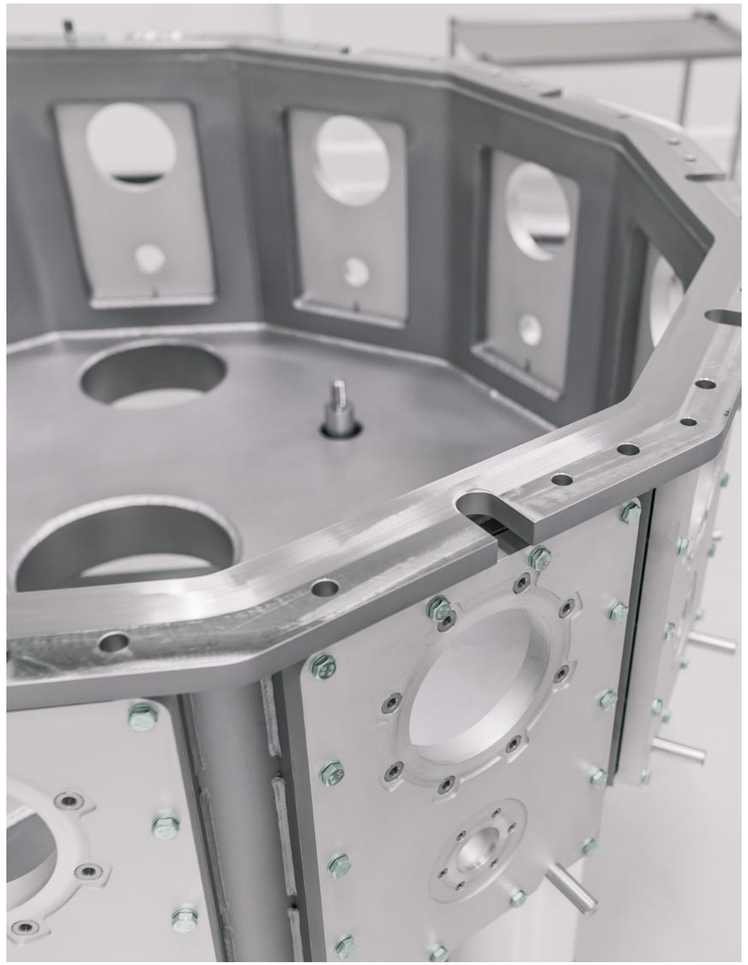




Vacuum Laser Beam Distribution

- Laser beam distribution for Research Centre HILASE
- Design and installation of mirror chambers, pipeline and support construction
- Delivery including vacuum control from two areas using 7 dry pumps
- Total length of control system cables: 1 100 m
- Total number of assembled components: 9 374 pcs





Polygon Vacuum Chamber

- Vacuum chamber for Research Centre ELI Alps in Hungary
- DN 1500 mm including decoupled optical table with high-vacuum performance

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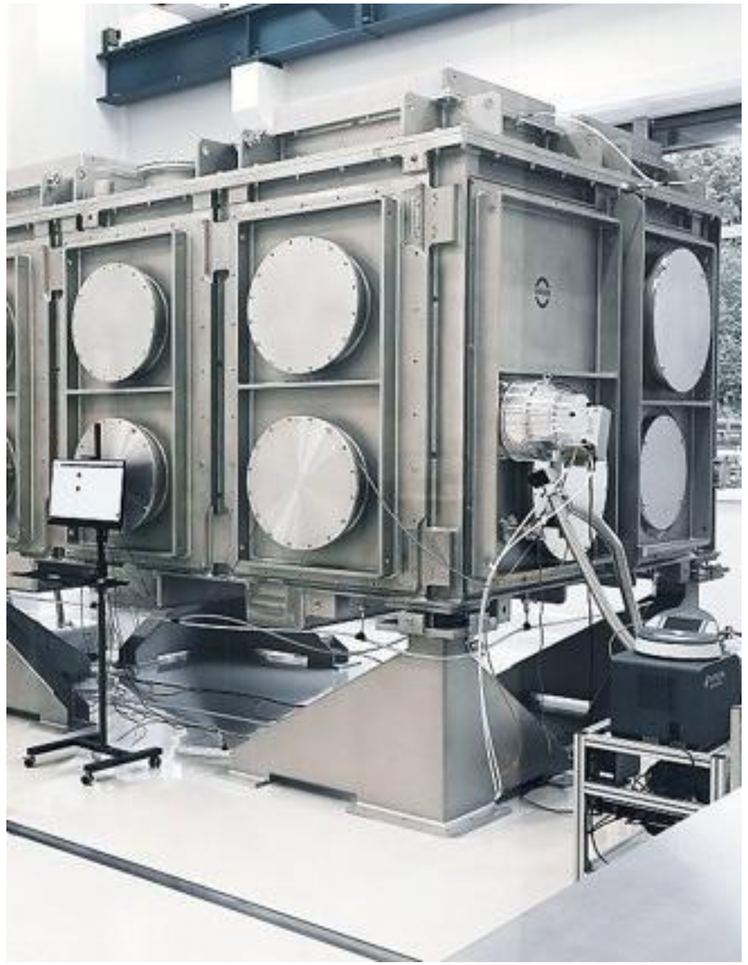
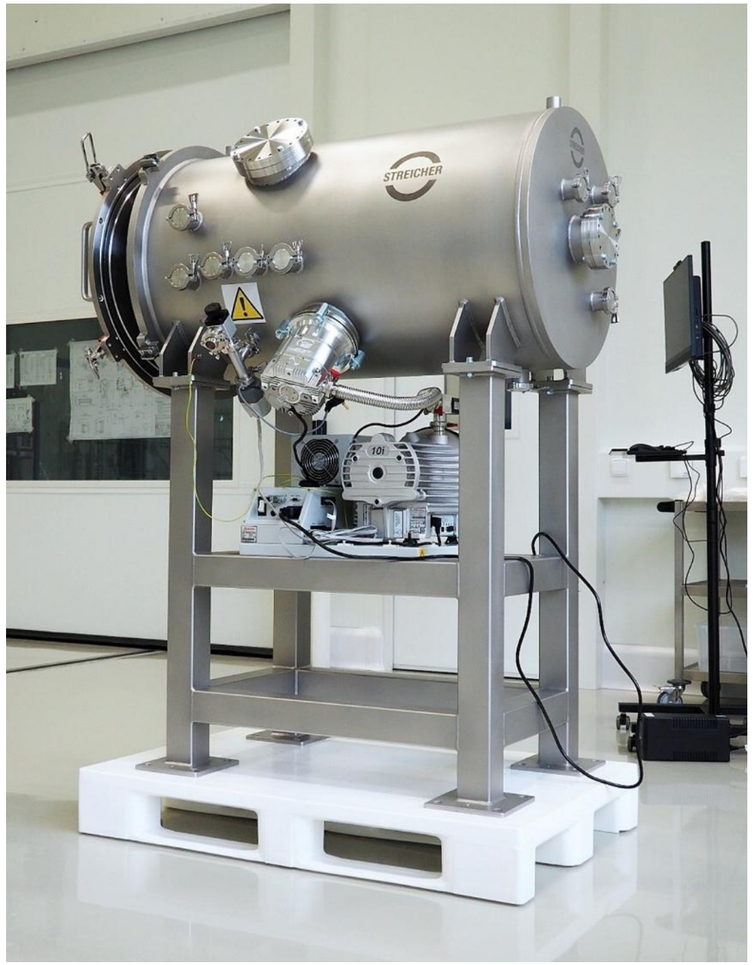


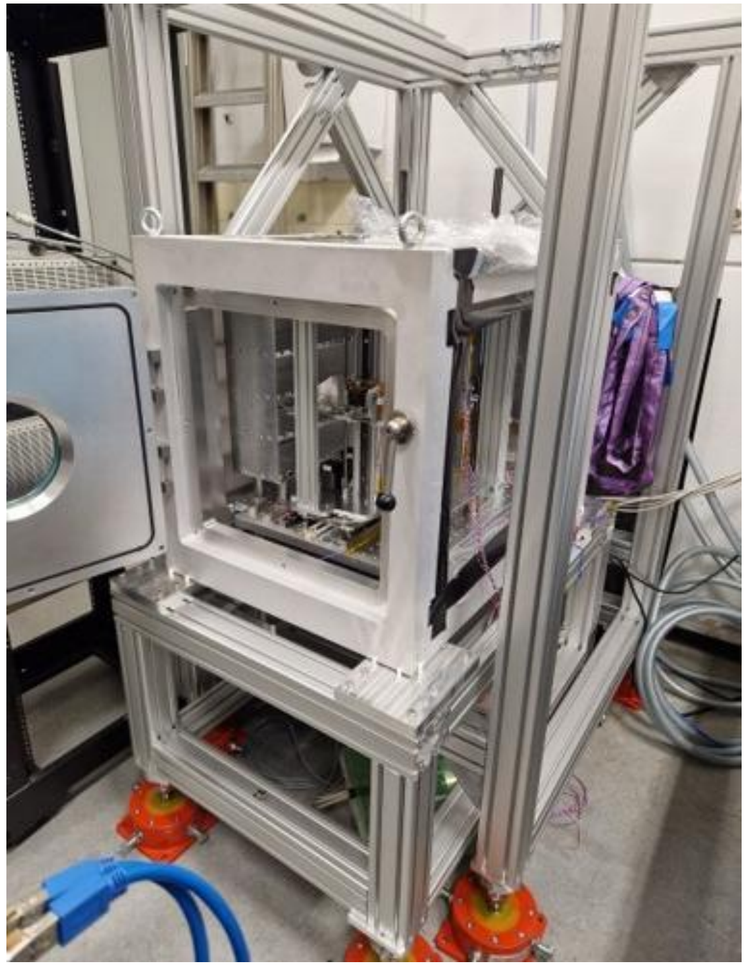
MOB Chamber

- Vacuum chamber for ELI Beamlines
- Inner free space of 3,6 x 1,8 x 1,9 meters
- Large optical table with two levels welded with electron beam
- Ultra-stable foundation optimized by FEM simulation and build on granite blocks



Simulation Vacuum Chamber

- Simulation chamber for Space sector of the National Centre for Nuclear Research in Warsaw
- DN 600 mm including movable table and vacuum control system

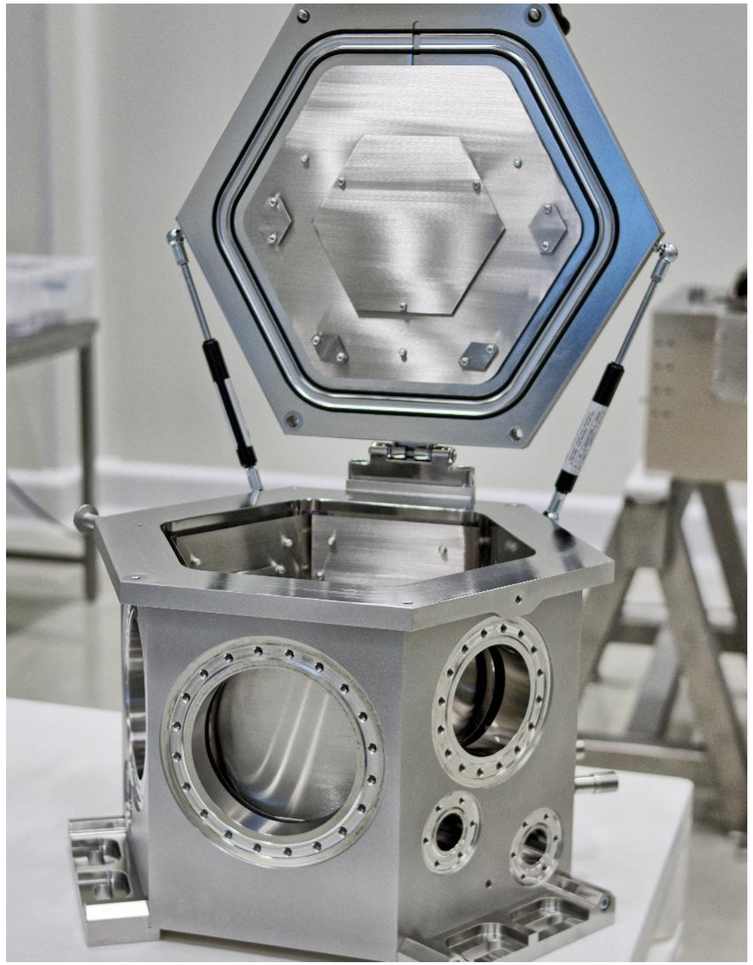


Modular S-CUBE Chamber

- Vacuum chamber for GSI Helmholtz Centre, TU Darmstadt
- S-CUBE allows great accessibility for installation:
  - access any side anytime for easier installation
  - easy to modify, upgrade or extend the system in the future
  - decoupled optical table or similar accessory is simpler for integration

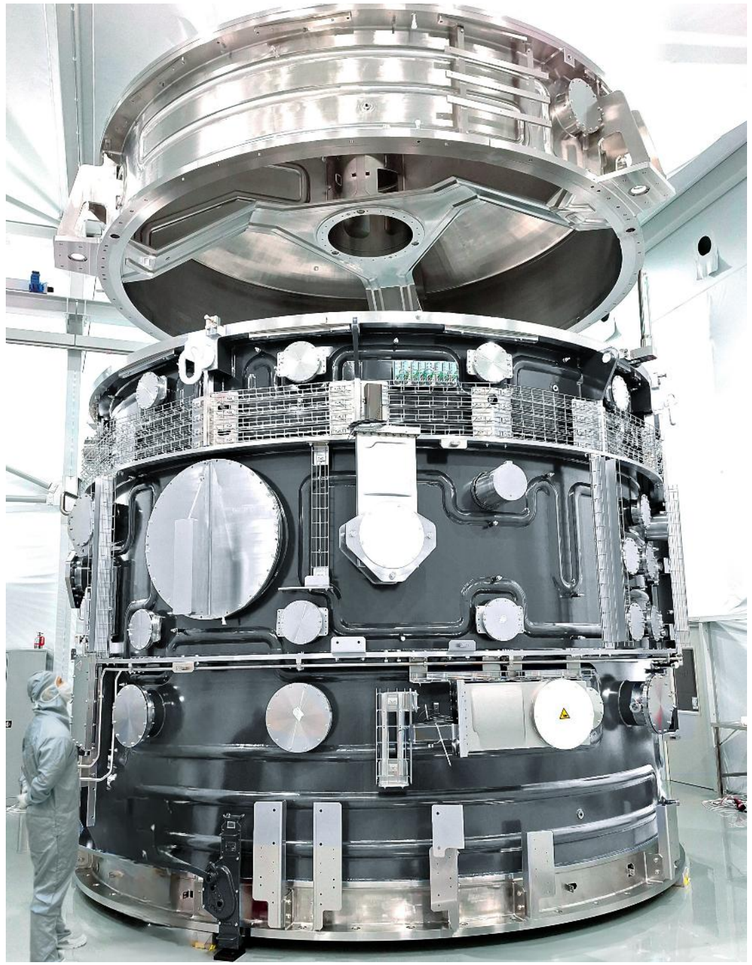
Aluminum Vacuum Chambers

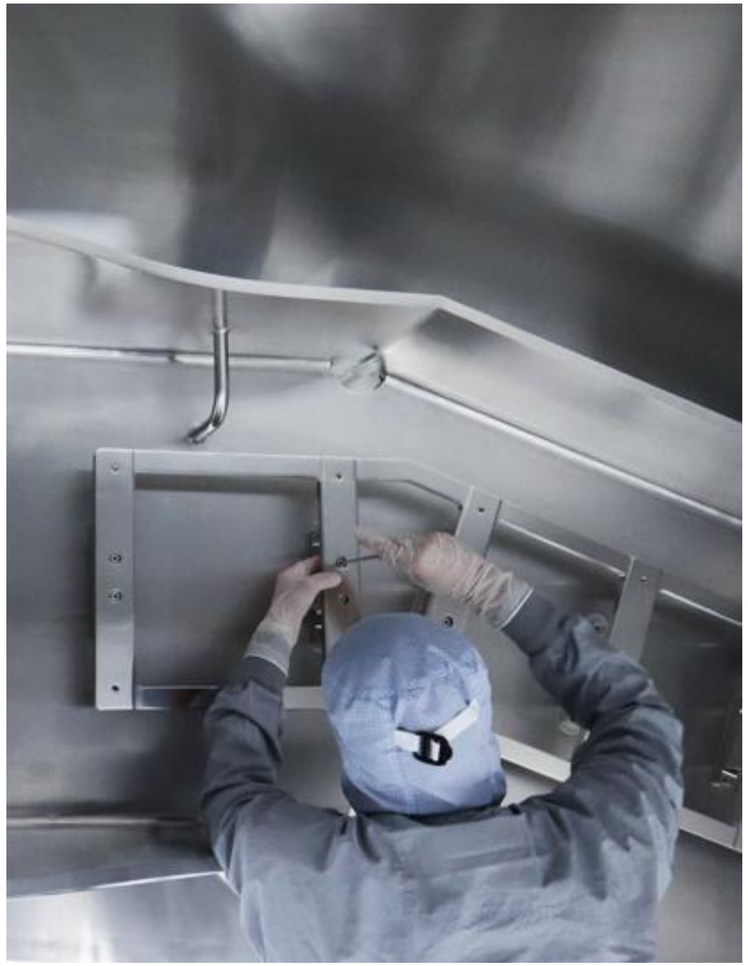
- Vacuum chambers for ELI Beamlines
- Welded chambers for laser beam distribution
- ISO5 clean conditions
- RGA test as an acceptance criterion
- W x H x L: 2100 x 2560 x 2100 mm



Testing Chamber

- Testing chamber for ESA
- Table filled with liquid nitrogen operating from -186 ° C - +200 ° C
- CFD standard flanges with double Viton sealing on the top lid
- Integration of a laser-coating system
- Electropolished inner walls





Ultra Clean Vacuum System

- Semiconductor industry
- Vacuum level: 10^{-7} mbar
- Total weight: 43 tons
- Overall height: 6 m
- Outer diameter: 5,3 m
- Particle Cleanliness: SCP 5
- Bake-out function
- High level automation (14 control cabinets)
- Integration and assembly at customer site
- Maintenance contract
- Total number of components: 6.375 pcs

Ultra Clean Vacuum System

- Semiconductor industry
- Vacuum level: 10^{-8} mbar
- 12 turbo molecular pumps
- Volume: 30 m^3
- Hinged door (4 m x 3 m)
- Automated residual gas analysis
- Outer temperature-controlled exoskeleton
- High-level automation
- Particle Cleanliness: SCP 5
- Integration and assembly at customer site
- Maintenance contract
- Total number of components: 5.560 pcs

Thermal Vacuum Space Simulation Chambers

- Highly flexible testing platform operating from -200 ° C - +250° C
- Standard types TVAC 300 - 1200
- Temperature-controlled table and shroud including vacuum control
- On-site installation part of the delivery

Thermal Vacuum Chamber System TVAC+

- Comprehensive test system for simulating outer space and variable thermal conditions
- Enables components to be tested in a clean, high-vacuum environment down to <1 × 10^{-7} mbar
- Cleanroom compatible design
- User friendly operation
- Ergonomic configuration for testing

Thermal Vacuum Space Simulation Chamber

- Simulation chamber for Norsk Elektro Optikk
- Highly flexible testing platform operating from -40 ° C - +100° C
- Standard type TVAC 1000 with special laser viewport
- Temperature-controlled table and partial shroud including vacuum control
- Pressure control also in range between 30-600 mbar (stratospheric conditions)

TVAC Chamber with Cleanroom Integration

- Temperature control using thermal oil -80 ° C - +150° C
- Integration into cleanroom wall
- Chamber placed on rails for future upgrades

S-CUBE Hexagonal

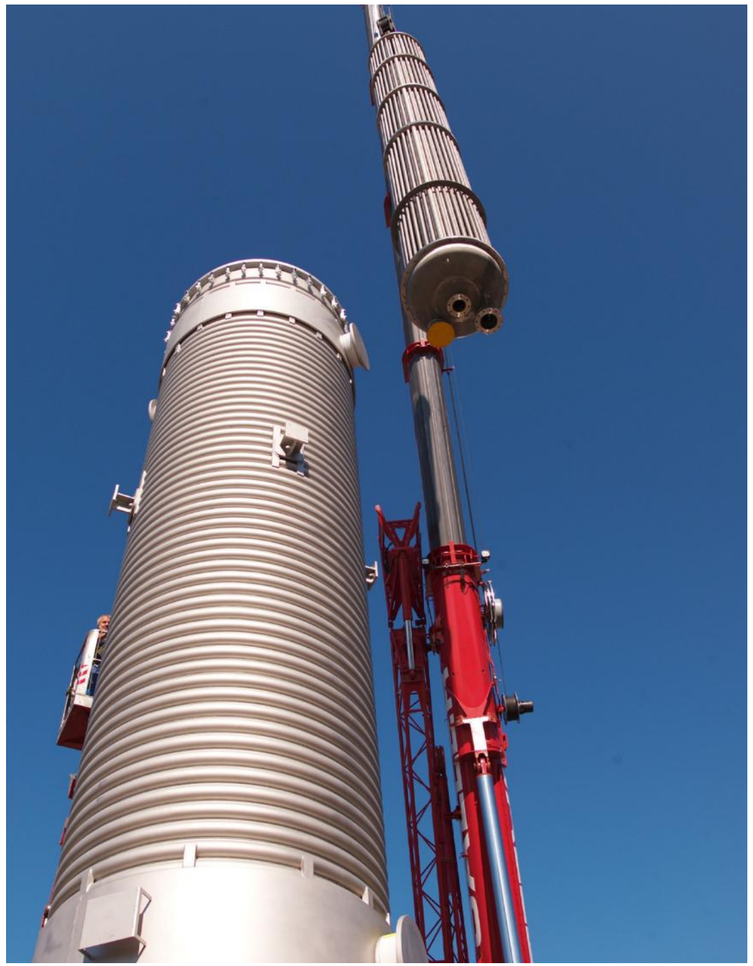
- Modular chamber for ARDOP
- Width over 2 meters
- Removable walls and breadboard
- Three sides on hinges and three fixed
- Cleaned in cleanroom ISO6

Vacuum Food Mixing Units

- Various material combinations
- Outer wall heated with water, insulated and then enclosed with stainless steel

Cryostat Vacuum Vessels

- Different cryostat vacuum vessels for FAIR GSI Helmholtz Centre in Darmstadt
- DN 1.900 mm
- Manufactured from carbon steel with passivated vacuum surfaces



Chemical Plants and Components

- Evaporators, separators, condensers
- Formula definition based on customer substances
- Complex support from laboratory testing to final plant installation

Modular Vacuum Chamber

- Modular vacuum chamber for assembling in inert gases for ISP France
- Including locking chambers
- Electrical cabinets
- Placed in clean room ISO 8

Vacuum Coating Units

- Different vacuum coating units for architecture glass, displays, mirrors
- Structural and fatigue simulation to ensure long chamber lifetime
- Both industrial and research application with different cleanliness levels

Vacuum Heat Treatment and Metallurgy

- Manufacturing based on customer documentation
- FAT functional HOT tests

Invitation

We would be pleased to welcome you personally to our company at:

- STREICHER Maschinenbau GmbH & Co. KG, Josef-Wallner-Straße 5, 94469 Deggendorf, Germany
- STREICHER, spol. s r.o. Plzeň, K Lomu 426, 332 09 Štěnovice, Czech Republic

Michael Feist
Mobil / Mobile: +49 151 17430573
E-Mail: michael.feist@streicher.de

Looking forward to your challenges!