EUROPEAN
SPALLATION
SOURCE

Sample environment for Imaging and Engineering instruments

Update

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2026-04-20

1

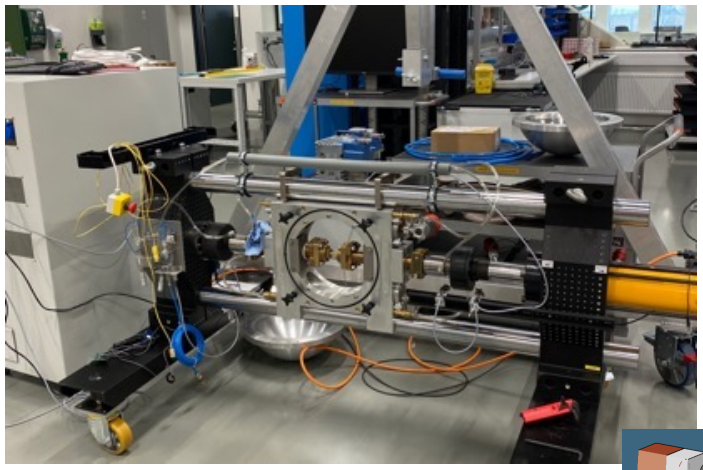
Mechanical processing

NPI stress rig

MEC-002

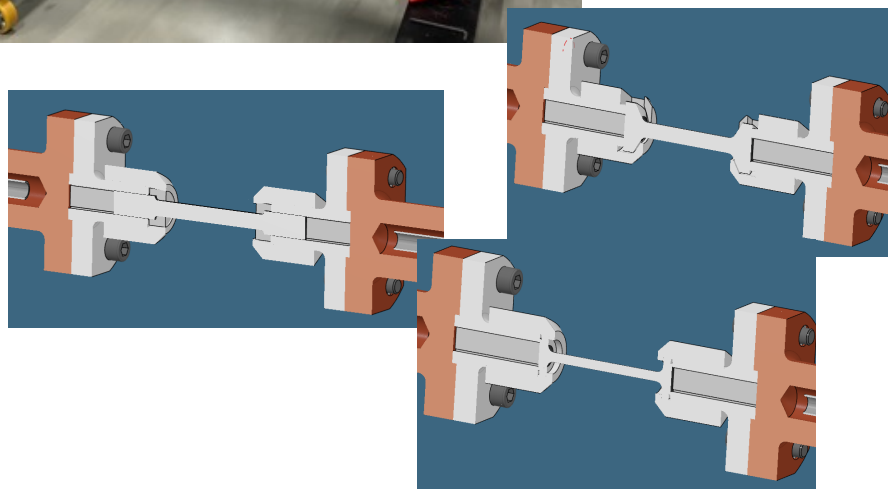
Main specifications:

- 40/60 kN uniaxial deformation rig
- Compression and tension
- Body up to 100 kN
- Heating possible by resistive heating
- Cooling grips
- Chamber for inert atmosphere and vacuum
- For BEER



Status: In tests

- Optimization of load PID
- New temperature control (Eurotherm)
- Control integration in EPICS (nearly finished)
- Mechanical integration on going
- New grips for flat samples, compression/tension, tension with threads: conceptual design finished in review before manufacturing



NPI stress rig

Tests with Alfa Laval

Samples : piece of heat exchanger

Experiment :

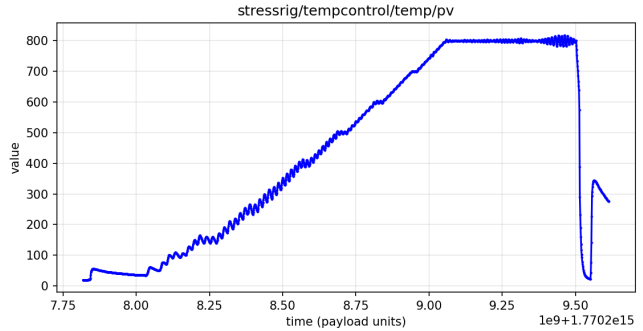
- Constant load in compression of ~ 800 kN
- Increase temperature by step up to maximum

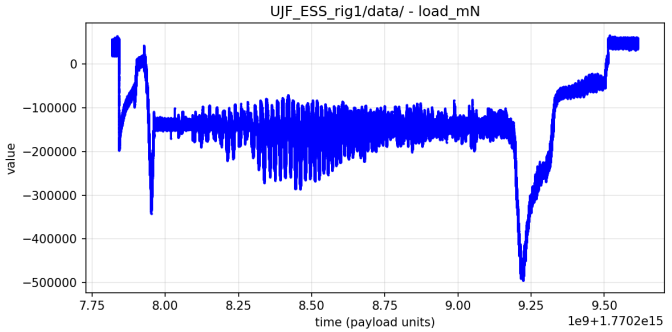
Results:

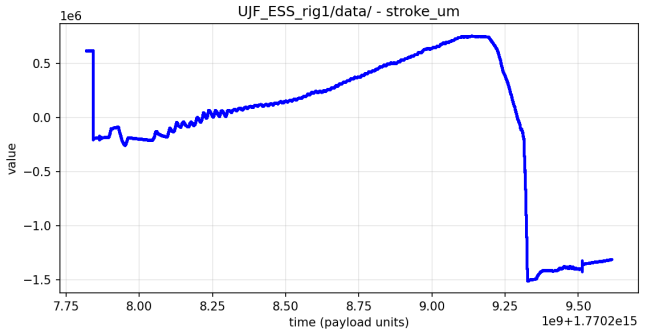
- Mechanical integrity kept up to 800 C
- Temperature increase impossible above 800 C

Future work:

- Improve temperature measurements (thermocouple + pyrometer)
- Improve load PID for this type of sample







NPI stress rig

Continuation

More tests :

- Compression + temperature (continuation) to obtain better homogeneity and stability.
- Tensile mode (basic testing)
- Induction heating
- Resistive heating
- Cooling speeds

New developments

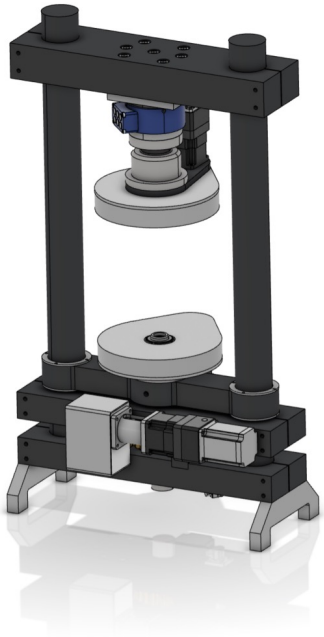
- Chamber: with vacuum, inert gases, inert gas with partial pressure, with dynamic partial pressure
- Extensometer compatible with chamber + high temperature (Optical techniques or/and HT extensometer)
- Emission acoustic system

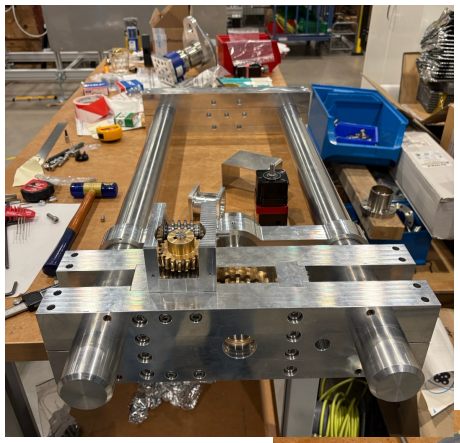
Other materials:

- Aluminium
- Titanium
- Cu
- B4C
- SiC
- Non conductive materials

Torsion/rotation rig

MEC-005





Main specifications:

- 40 kN deformation rig
- Unixial and torsion deformation
- Sample rotation for tomography

Status:

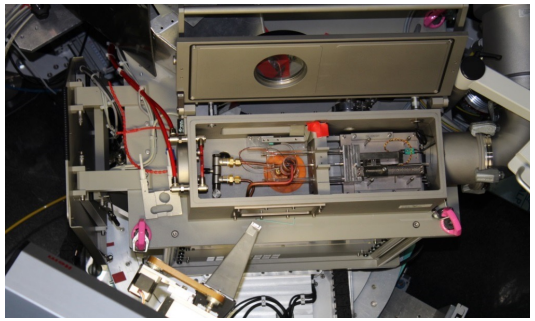
- Mounting/Manufacturing nearly finished
- Electronic control box nearly finished
- Configuration of the box will be done by MC and control integration by ECDC

Dilatometer

MEC-001

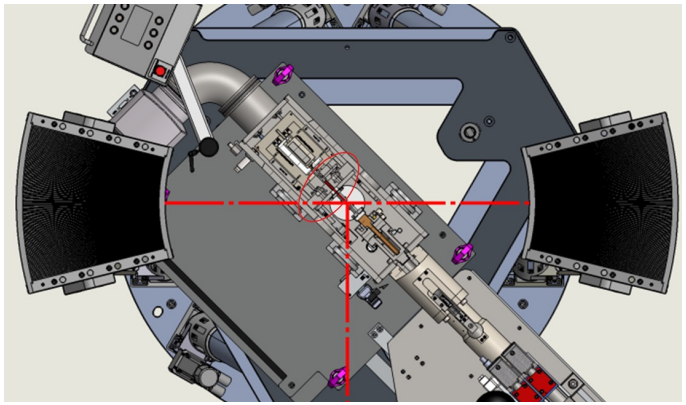
Main specifications:

- For thermo-mechanical testing
  - Precise measurement of deformation versus temperature
- Can be used in and out of the beam
- Induction heating
- Can include tension or/and compression deformations
- Quenching option
- Exact specifications to be determined



Status:

- 2 potential suppliers identified: LINSEIS and TA instruments
- Procurement procedure without CFT started
- Options include quench, deformation and low temperatures
- Geometrical constraints limiting the detector coverage in discussion



2

Furnaces

Vacuum furnaces

HTP-001 & HTP-002

Main specifications:

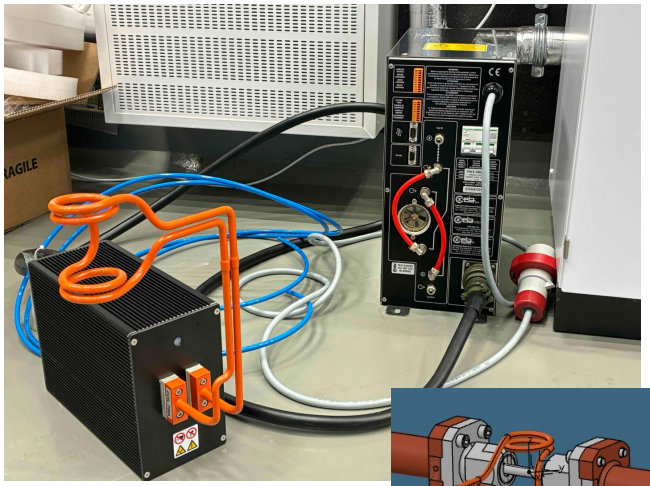
- Vacuum furnaces
- Niobium (HTP-001) : up to 1600 C
- Vanadium (HTP-002): up to 1000 C

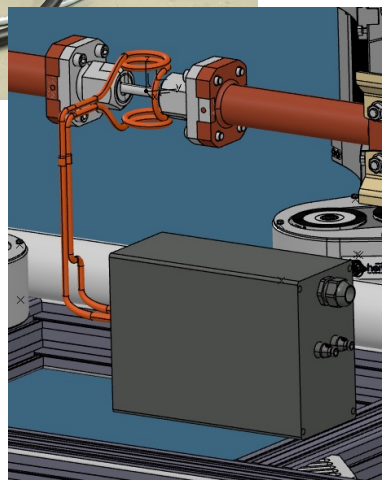
Status:

- Quotation received for the vanadium furnace
- Responsibility for the projects (including purchase) moved to the sample environment group

Induction furnace

HTP-004





Main specifications:

- For conductive samples between 8 and 15 mm of diameter
- Standalone or with a deformation rig (torsion/rotation or uniaxial)
- Maximum temperature depends on the sample (> 2000C)
- High cooling and heating rates
- Can be used in air or in a chamber
- Different coil geometries possible
- 12 kW / 30-60kHz

Status:

- Equipment received and tests on going
- Next step: control integration and adaptation to the 100 kN deformation rig

UHT furnace

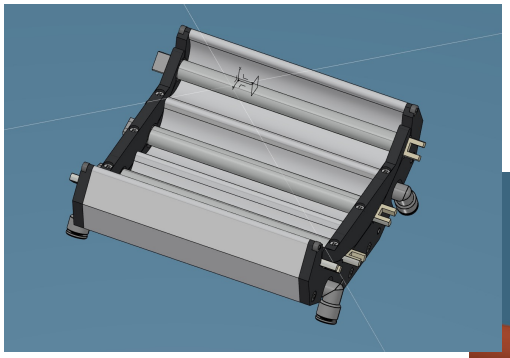
HTP-005

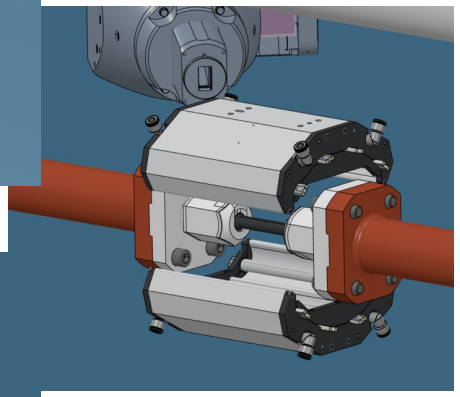
Main specifications:

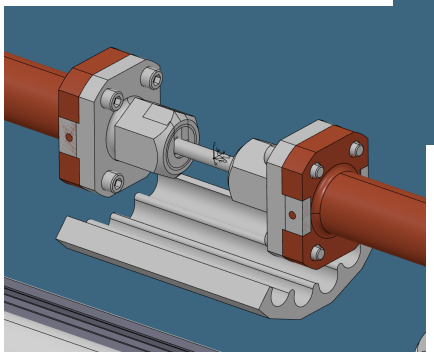
- Chalmers/ISIS VR project
- Short wave IR lamp furnace based on ENGIN-X lamp furnace
- Planned to go up to 1800C
- In vacuum, inert atmosphere or air (max temp TBD)
- Adaptable to NPI stress rig or standalone

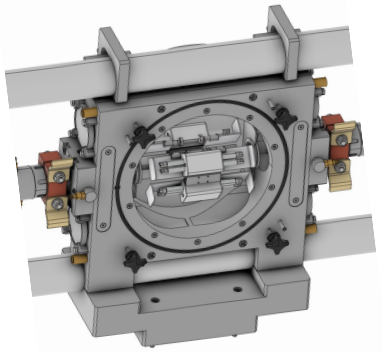
Status: In development

- New reflectors designed and sent to manufacturing
- Bulbs in procurement (Lead time 7 weeks)
- Vacuum chamber for tests available
- Electronics system in discussion (power supply + temperature controller)









Finish presentation