EUROPEAN
SPALLATION
SOURCE

Sample environment for Imaging and Engineering instruments

Update

PRESENTED BY CAROLINE CURFS

2025-09-26

Agenda

1 Mechanical processing

2 Furnaces

3 Users SES

PhD at ESRF (Materials Science Beamline ID11), France/instituto de Ceramica y Vidrio, Spain

- Time resolved diffraction, fast phase transformations, metastable phase
- Al, Ni, Ti, C system

Post-doc at ANSTO, Australia

- Installation and commissioning of the strain scanner at HiFAR,
- Building Australian neutrons RS community

ASRP fellow at the University of Newcastle, Australia

- Time resolved diffraction with neutron and synchrotron sources

Post doc at ESRF (Materials science beamline ID11), France

- Commissioning of the ID11 Extension (3DXRD)
- Support of users mainly for in-situ/operando diffraction experiments

Scientist at ESRF (Powder diffraction beamline ID31/ID22), France

- HR residual stress measurements and in situ diffraction
- Steel and Shape memory alloys

Researcher at CEA for theNanoelectronic IRT programme

- Construction and commissioning of a reflectometer at ESRF, BM05
- Industrial users experiments microelectronic

Industrial liaison scientist at HZG, Germany

- Various diffraction experiments for industrial users (experiment, data reduction, analysis and reporting) including:
  - Residual stress measurements with conical slits
  - In situ measurements with dilatometer
- Commissioning of a 3DXRD

1

Mechanical processing

NPI stress rig

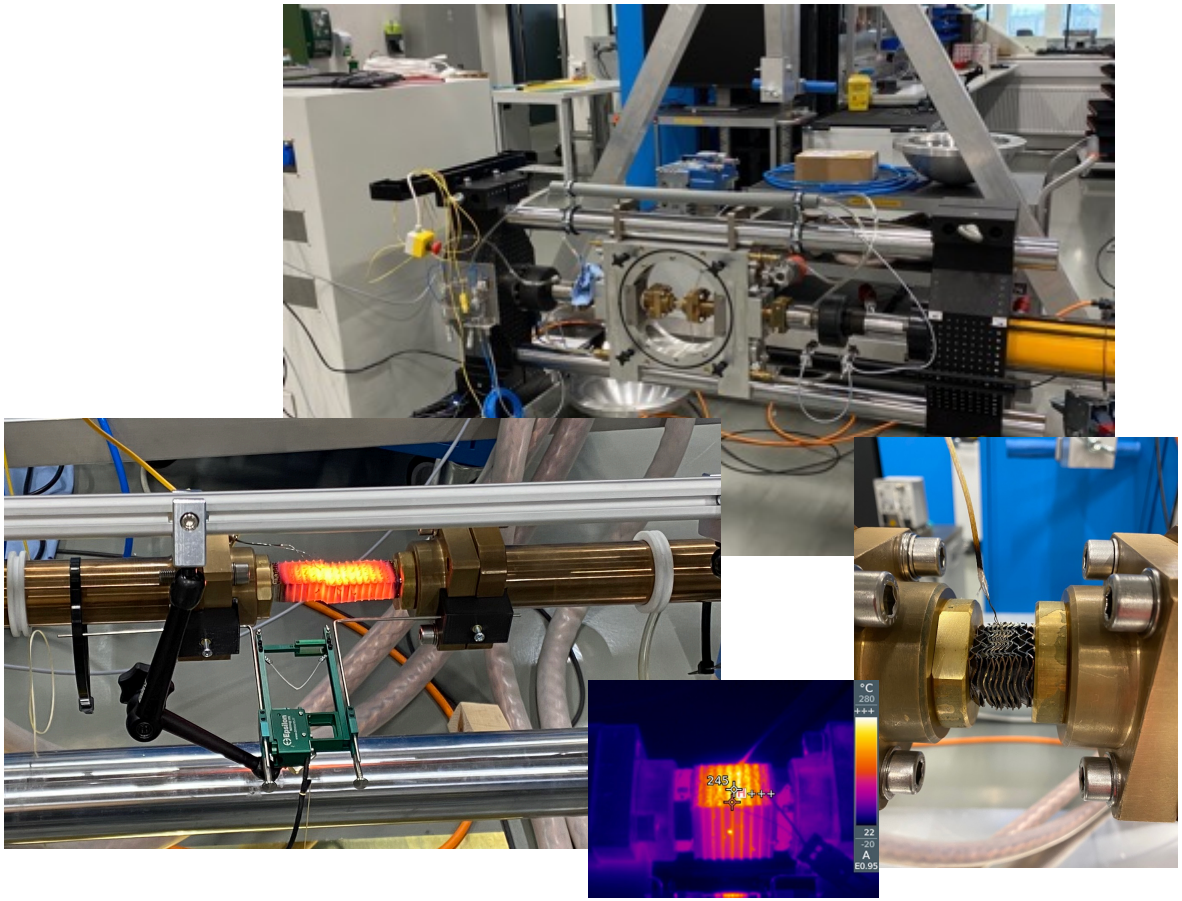
MEC-002

Main specifications:

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

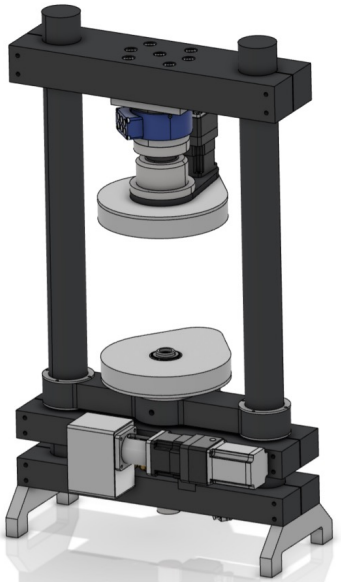
Status:

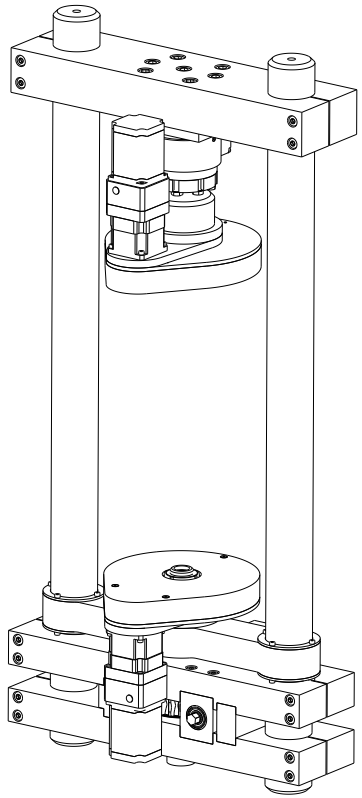
- In tests
- Control integration nearly finished
- Mechanical integration in design
- New grips: conceptual design on going



Torsion/rotation rig

MEC-005





Main specifications:

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

Status:

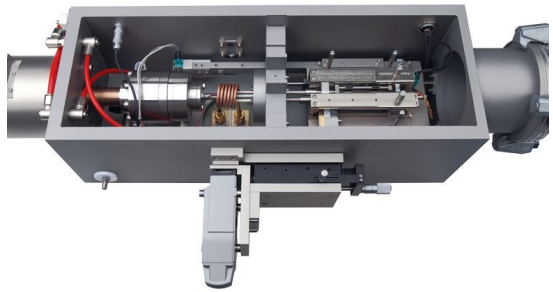
- Off-the-shelf parts purchased
- Manufacturing in progress (planned to be finished 11/25)
- Electronic control box nearly finished – waiting for rig

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:

- Definition of specifications
- Meetings with potential suppliers

Other mechanical processing SES

MEC-003 and MEC-004

MEC-003: 5-10 kN uniaxial stress rig

- For soft matter
- Can be used on ODIN
- Project start > 2027

MEC-004: Gleeble (physical simulation)

- Public-Private Partnership
- Can be used out of the beam and in the beam
- Project start > 2027

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:

- HTP-001: waiting for transfer from LLB
- HTP-002: Quotation received but above budget – Other options in discussion
- Control trolley in discussion

Induction furnace

HTP-004

Main specifications:

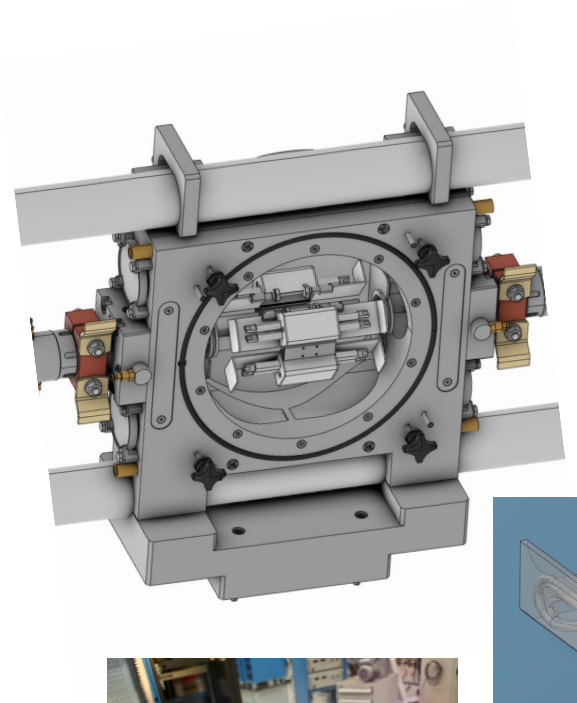
- For conductive samples between 8 and 15 mm of diameter
- Standalone or with a deformation rig (torsion/rotation or uniaxial)
- Maximum temperature depends on the sample (> 2000C)
- High cooling and heating rates
- Can be used in air or in a chamber
- Different coil geometries possible
- 12 kW / 30-60kHz

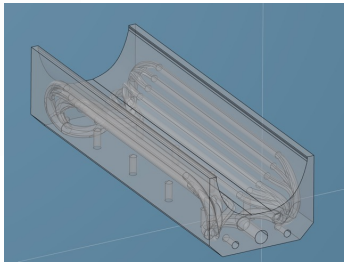
Status: In development

- Procurement of induction system on going (waiting for delivery)
- Control by eurotherm with pyrometers (specification TBD)

UHT furnace

HTP-005



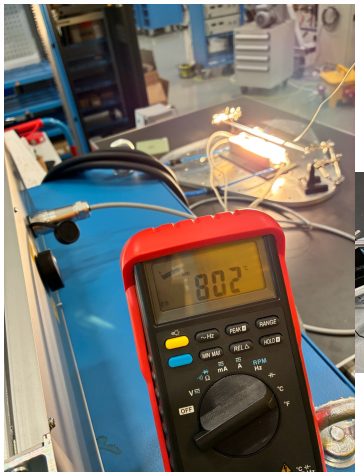


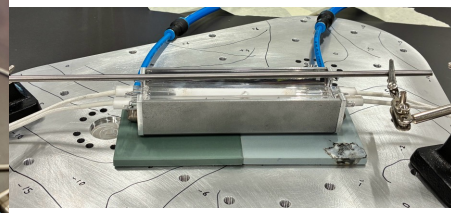
Main specifications:

- 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

- 3D printed reflectors with enhanced cooling designed and successfully tested
- Bulbs: in discussion with manufacturer to improved version
- Electronics on going
- Tests with new reflector + ISIS bulbs + electronic successful





With half power

3

Users sample environment systems

Users SE

Process

Beamtime allocated

Users send SES to ESS
(2 weeks before experiment)

Exchange Users/ ESS about the SES

- Utilities needed
- Communication protocol
- Drawings of the mechanical interface

B02 SE lab space /YMIR (outside the restricted zone)

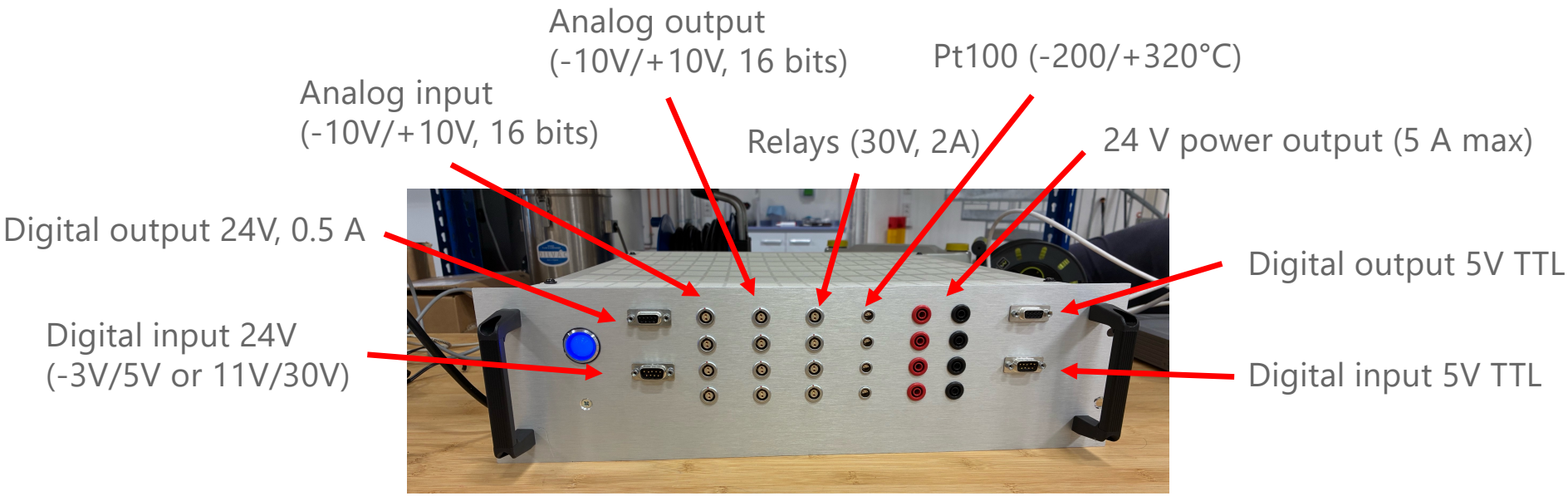
- Safety check
- Control integration
- Mechanical integration
- Tests with users (1 day before experiment)

Neutron Experiment

MacGyver Box

Multi-purpose I/O box for generic use

- Beckhoff PLC + modules
- Integrated into EPICS via Octopy running on IPC
- Can be custom-made



Finish presentation