Imaging | X-ray Tomography | Diffraction | X-ray Powder Diffraction | X-ray Diffraction

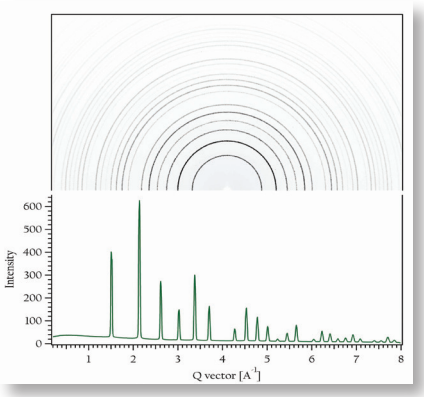
I12 Technical Information

I12 - Joint Engineering, Environmental and Processing (JEEP)

JEEP is a multi-purpose experimental facility designed to investigate structural integrity and structural changes in bulk samples using diffraction, imaging and tomography techniques.

The high intensity, high energy X-rays penetrate easily through bulk samples allowing ground-breaking large-scale engineering and processing experiments to take place, simulating the service conditions experienced by real engineering components while simultaneously monitoring their internal atomic and microscopic structure.

JEEP provides two experimental areas; the first providing high intensity X-ray for diffraction and imaging experiments. The second experimental area houses a flexible space for large-scale or complex engineering experiments to take place, for example strain scanning on an aircraft fan blade or investigation of an chemical process inside a large reaction vessel.



Beamline Specification

Beam modes	White beam Monochromatic beam
Energy range [keV]	50 - 150
Detectors	High resolution imaging cameras, large 2D diffraction detector, energy dispersive detector
Beam size at sample	From several 10s micrometers to 50 mm (internal) 100 mm (external hutch)
Sample size and mass (internal hutch)	Several mm - 100 mm, 50 kg for tomography, otherwise up to 200 kg
Sample size and mass (external hutch)	2000 kg, area of investigation up to 1 m x 1 m

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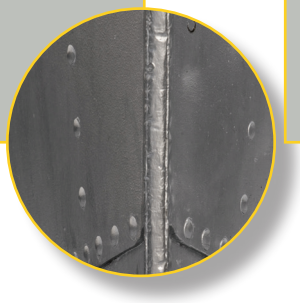
I12 Applications

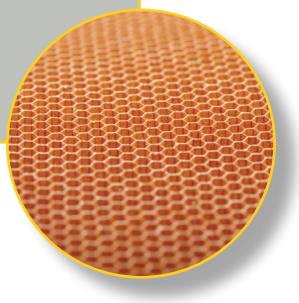
Engineering & Materials Science

- Structure and structural changes on the atomic and micro-structure level;
- Strain distribution and texture development;
- Cracks and voids, static or *in situ* during loading;
- Phase transitions;
- Re-crystallisation.



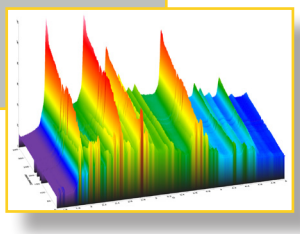
Imaging

- 3D radiographic high resolution imaging of components and materials:
  - Foams
  - Composite materials
  - Metallic foams
  - Composites
  - Casts



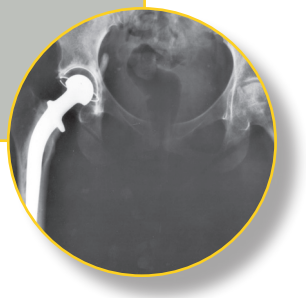
Chemical Engineering

- Investigation of processes inside reaction vessels e.g. molten salts in a furnace;
- *In situ* electrochemical processing
- Imaging of flow;
- Powder flow processes and compaction;
- Mixing in complex fluids.



Biomedical Imaging

- 3D quantification of mineral contents in bone and teeth;
- Mechanical behaviour of biomaterials under load e.g. bone;
- Interface structure between implant and tissue.



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