

# Current Projects

Research projects have been run through the Materials Technology Laboratory and its precursor facilities since 2014. With an extension of the Materials Technology Laboratory and new capabilities being added, we anticipate a broader range of projects in the near future.



Below are examples of current projects, highlighting some of the capabilities of the group:

- **Engineering data and design integration.** EUROfusion-funded work led by UKAEA (CCFE) with KIT, ENEA, CEA and MTA fusion research units also participating. We are leading the development of the structural integrity case, design criteria, materials database and materials handbook for the in-vessel components of the EU-DEMO reactor. Circa 12 FTE researchers per annum.
- **Small Punch Standardisation** with **CEN** and **ASTM**. The small punch test is a simple and cost-effective test that consists of punching a small plate of only 0.5 to 0.25 mm thickness until rupture. MTL is currently part of the small punch standardisation process both in Europe and USA.
- Development of techniques to extract quantitative data from the small punch test technique.
- **Developing new structural steels** that can extend the operating temperature and lifetime of a nuclear reactor.
- **Establishing digital image correlation** (DIC – see image below) as a method to quantify deformation in fusion reactor materials and optimisation of this process.
- **Understanding fracture toughness and ductile-to-brittle transition of EUROFER97** using Small Specimen Test Techniques, focusing on small punch testing.
- **Using cutting-edge techniques at X-ray beamlines to explore** the three-dimensional volume of **materials undergoing mechanical testing**.
- **Supported PhD projects including:** plasma-sprayed tungsten; high-entropy alloys for fusion applications; additive manufacturing of refractory alloys; irradiation effects in Cu; ductile-brittle transition temperature via high-resolution digital image correlation; vanadium alloys research; creep effects in 9%Cr steels; Focused Ion Beam residual stress; silicon carbide manufacture.

