

# NMI3 FP7 JRA Sample Environment

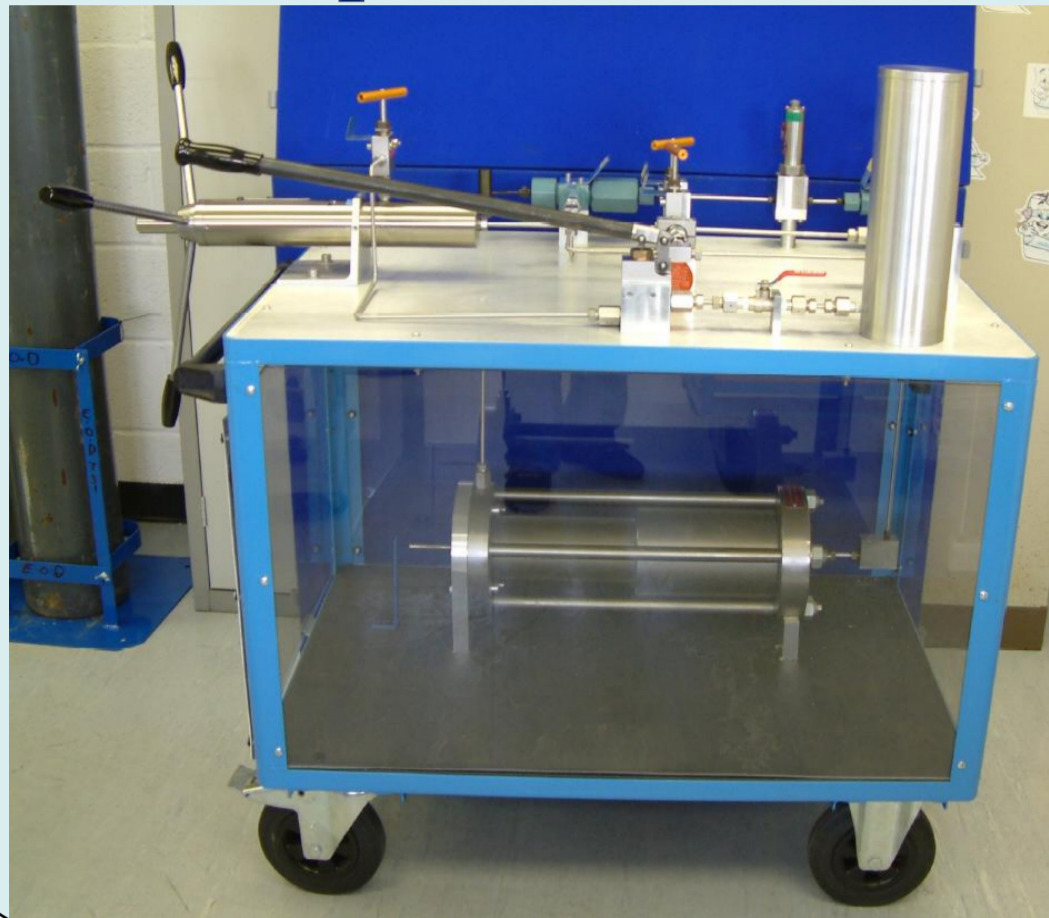
## High Pressure task: ISIS progress

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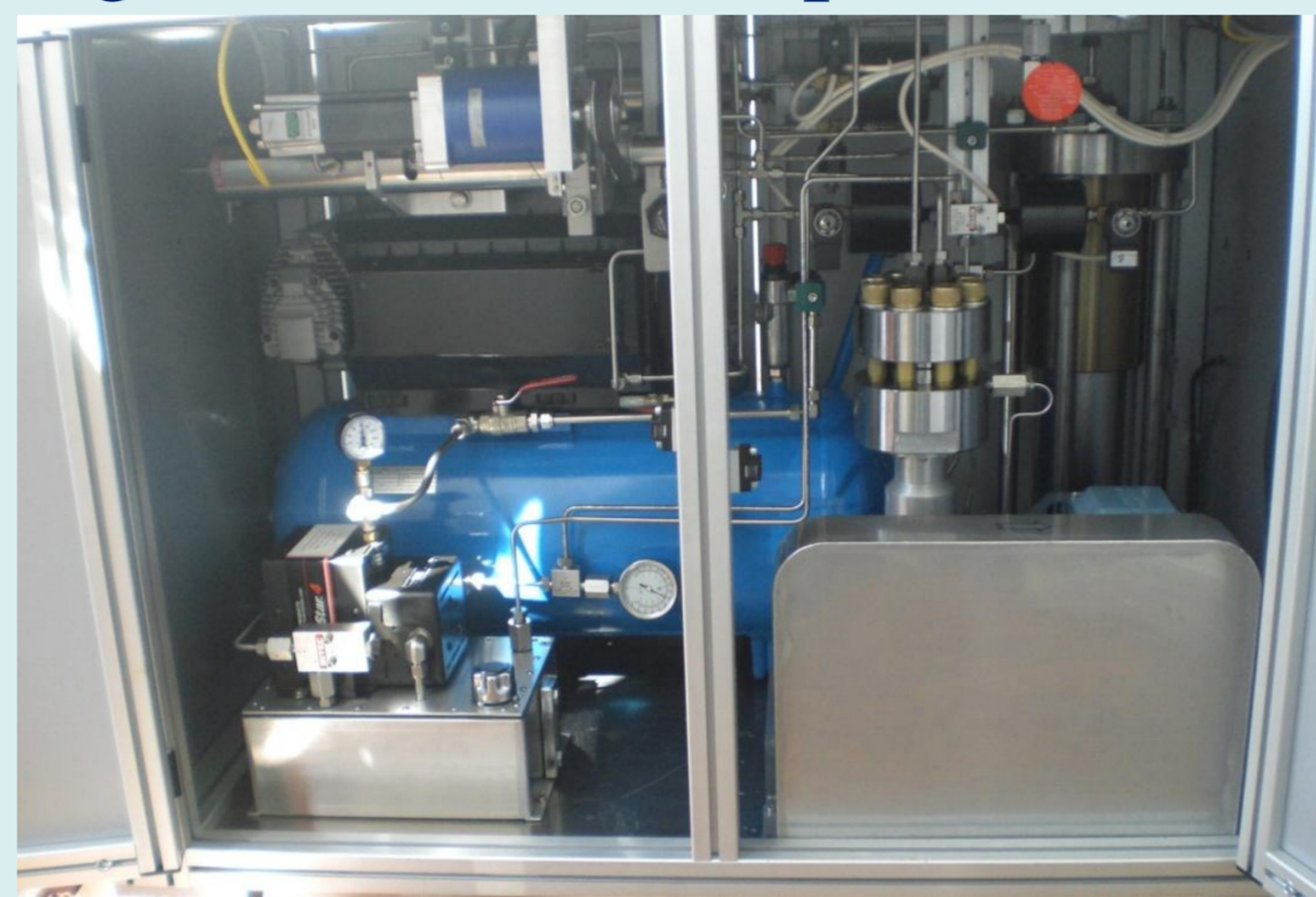
ISIS Facility, STFC, Rutherford Appleton Laboratory, Harwell, Didcot, UK

### Report on current inert gas pressure cell technology (D21.02)

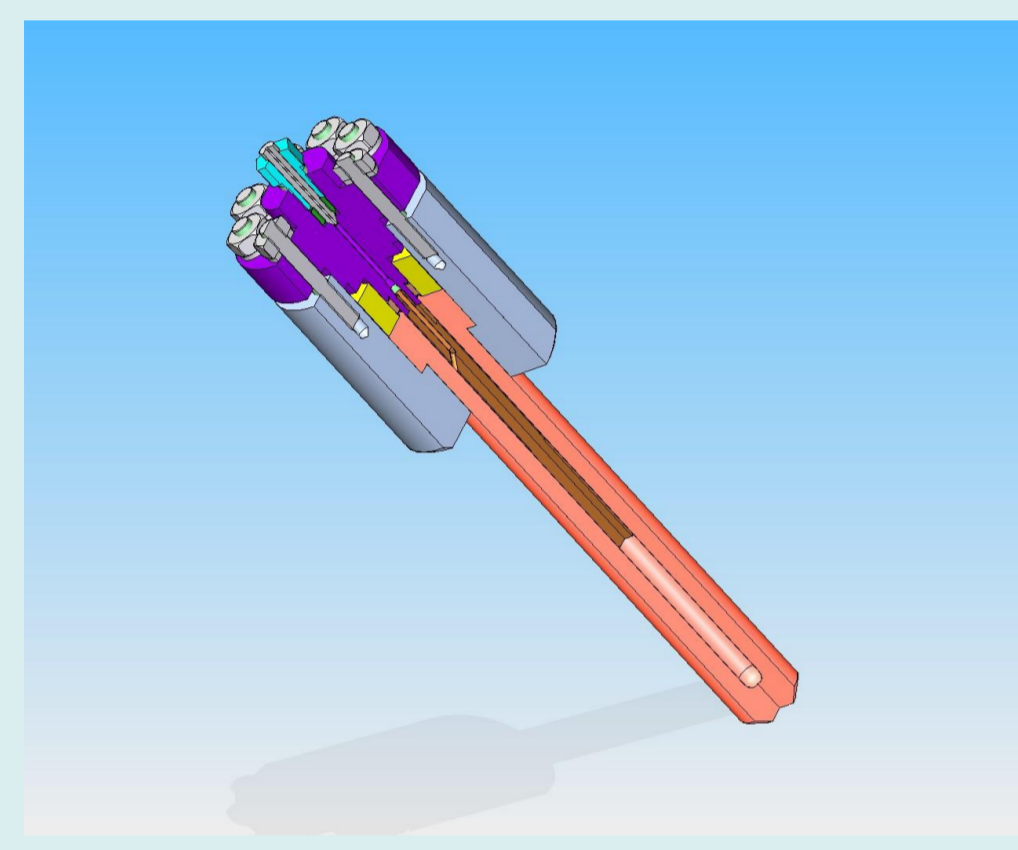
In the report we review a high pressure technique based on a gas medium compression. Published in: [2010 arXiv 1007.3135](#)



**13 - 15 kbar hydraulic intensifier (D21.06)**



**10 kbar automated gas handling system (M21.2.1.2)**



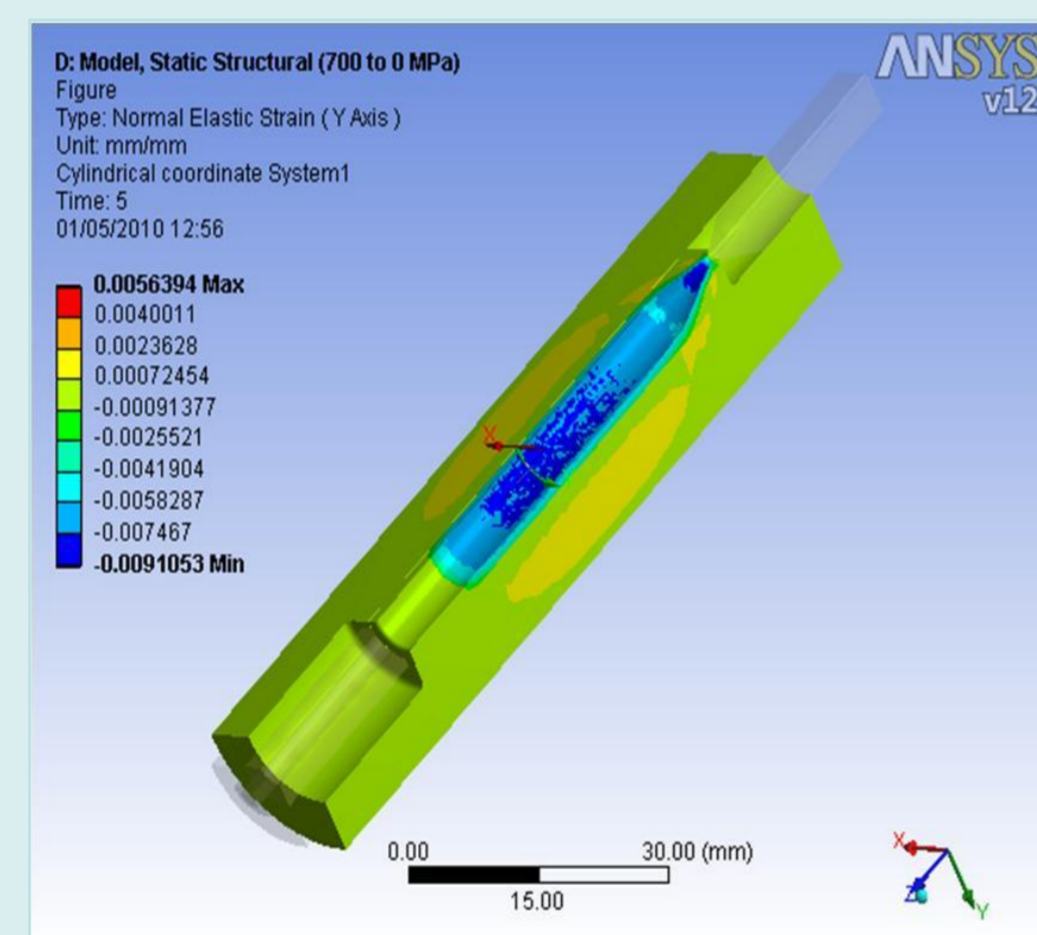
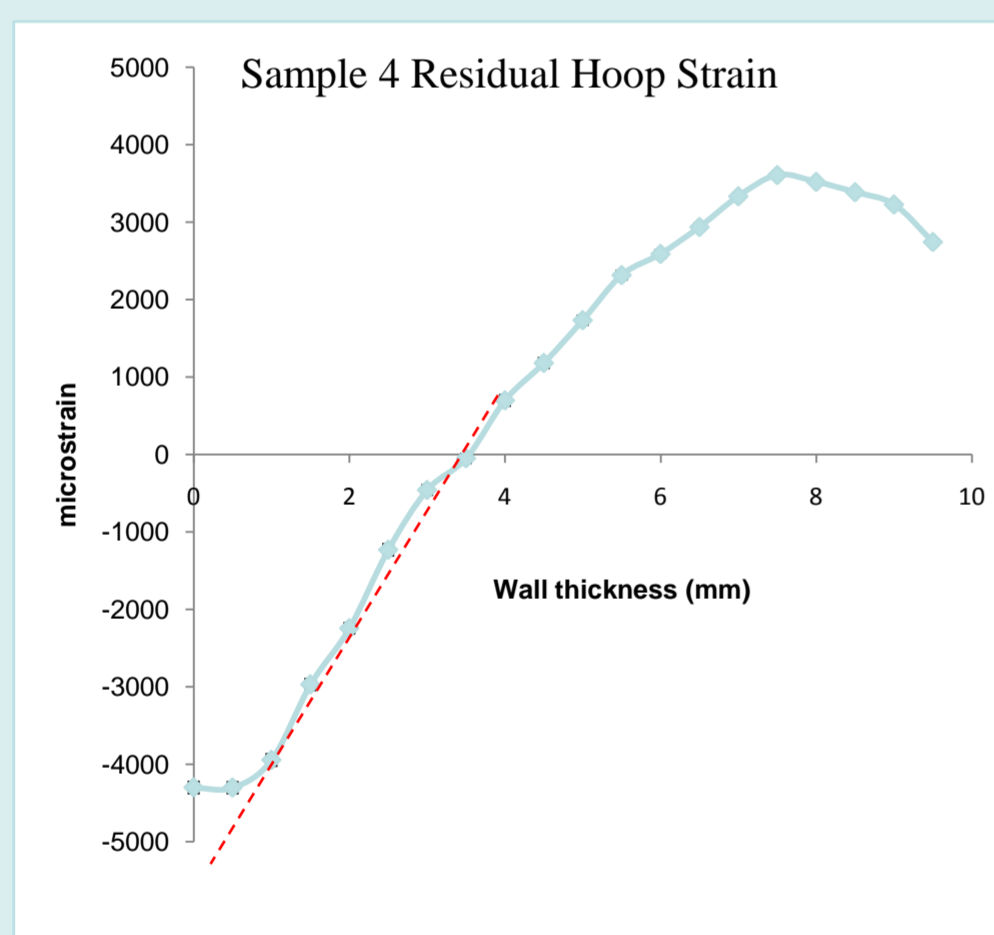
### Manufacture and test prototype cell for 4 kbar hydrogen and up to 700K (D21.08)

The prototype of **4 kbar up to 700K** high pressure hydrogen gas cell has been designed, manufactured and tested at ISIS facility. The cell wall thickness has been optimized for **Inconel**.

The design pressure of the cell has been set up at **4.4 kbar at 700K**.

The cell has been successfully tested up to **5.835 kbar at 20 C**, which, should satisfy design pressure requirements at **700K**.

### Developing a prototype of 8 kbar inert gas cell.

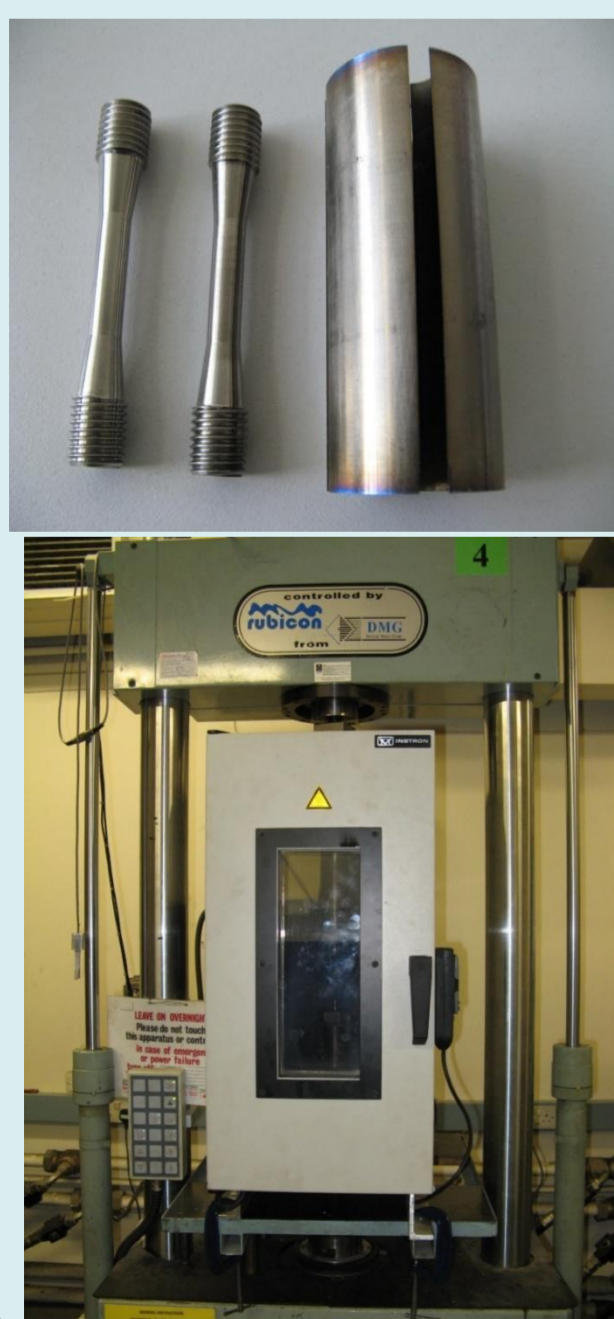
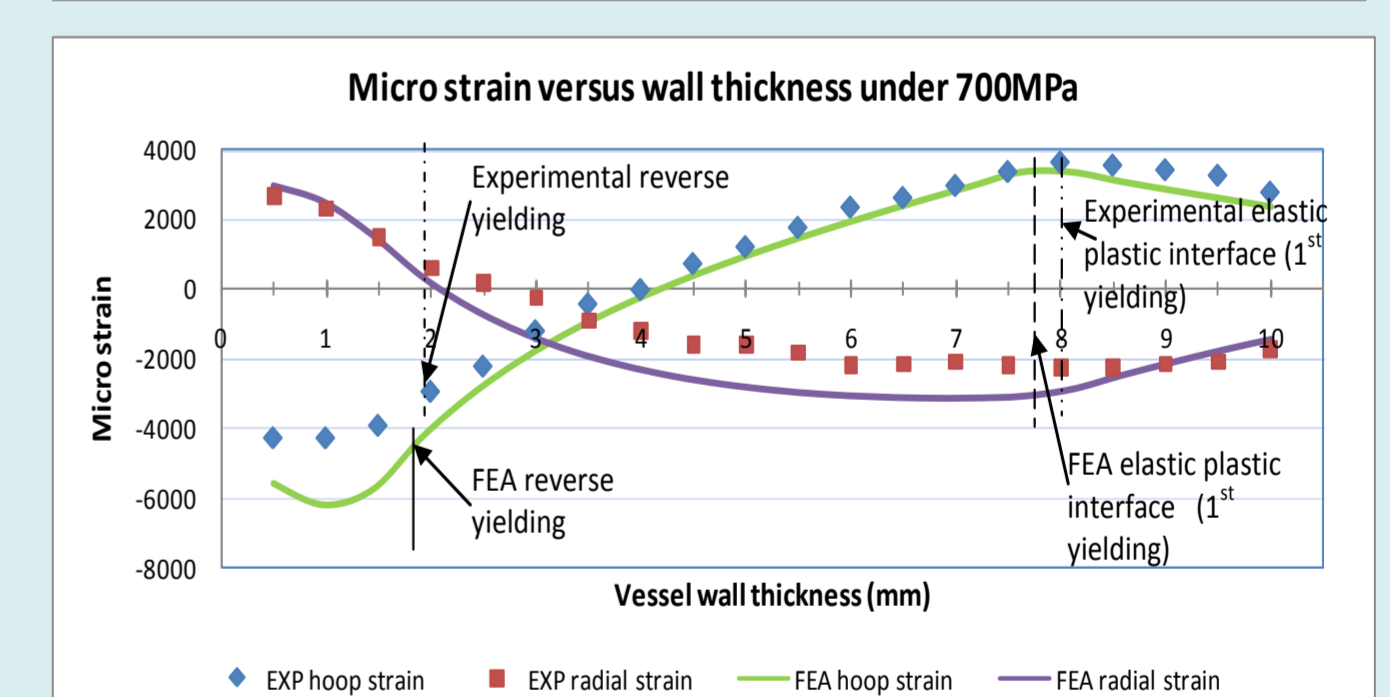
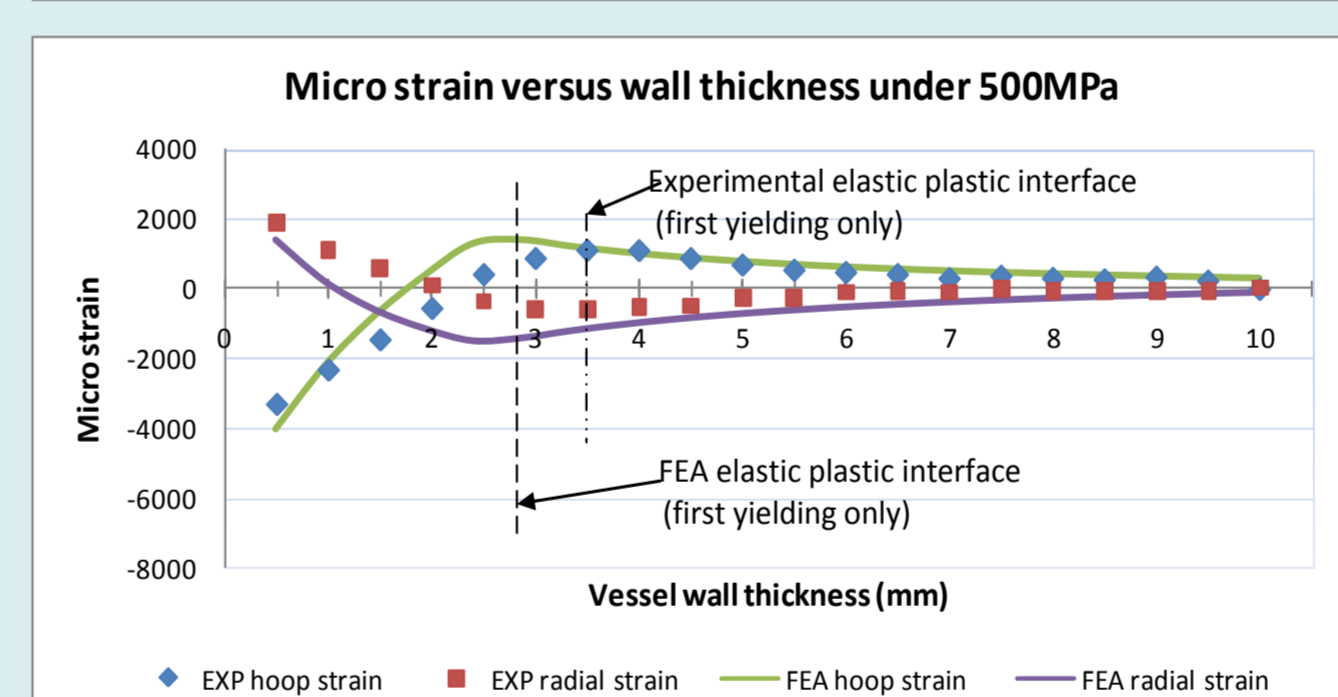
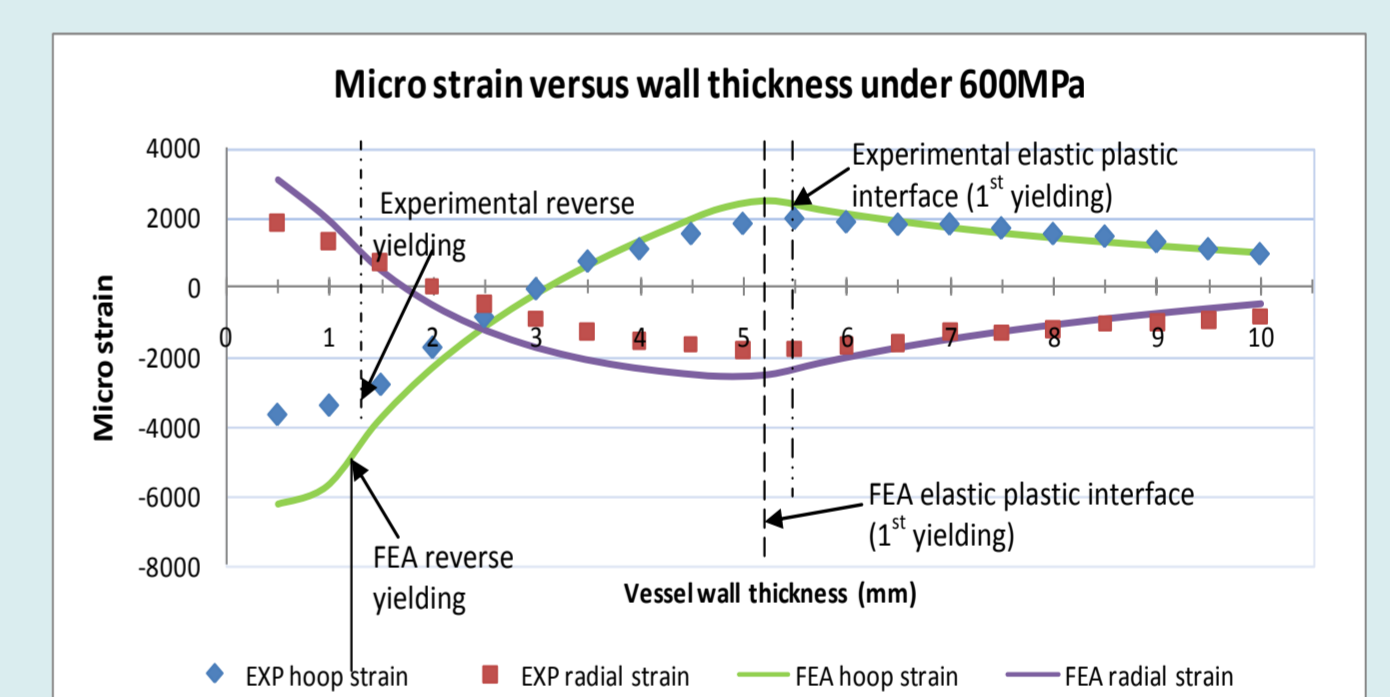
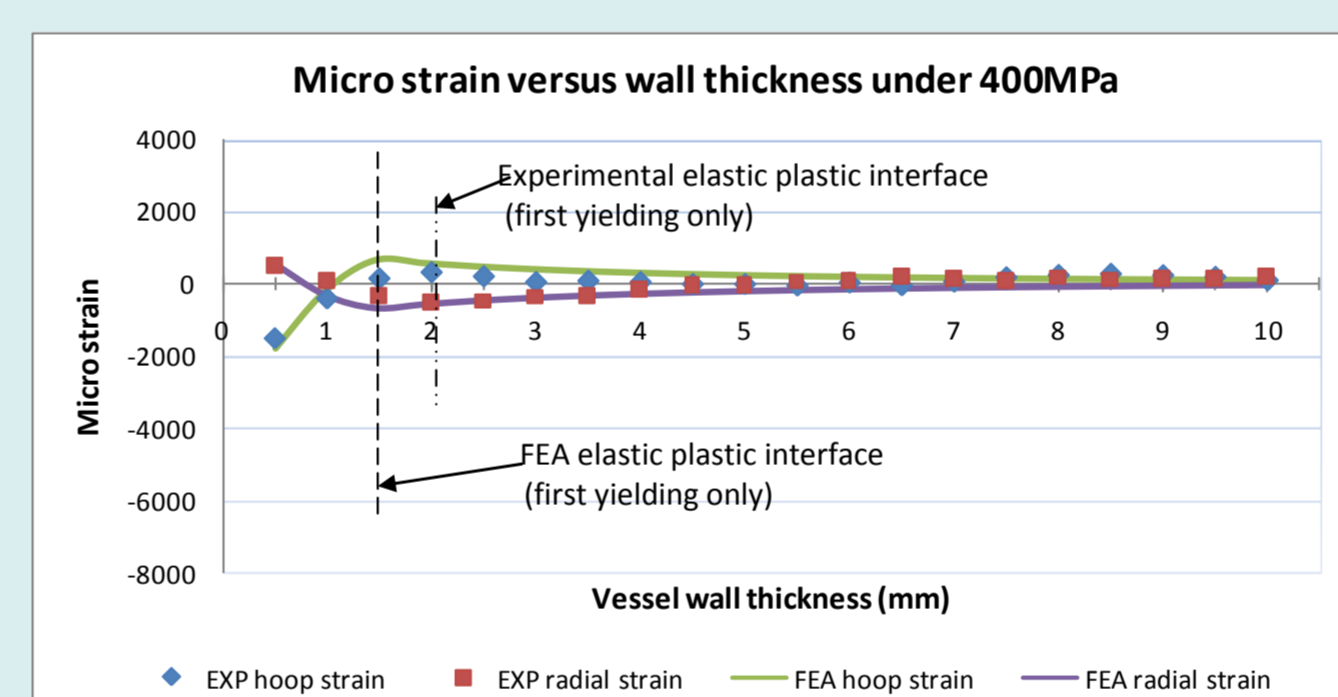


(a) Experiment results (ENGIN\_X)

(b) The FEA model

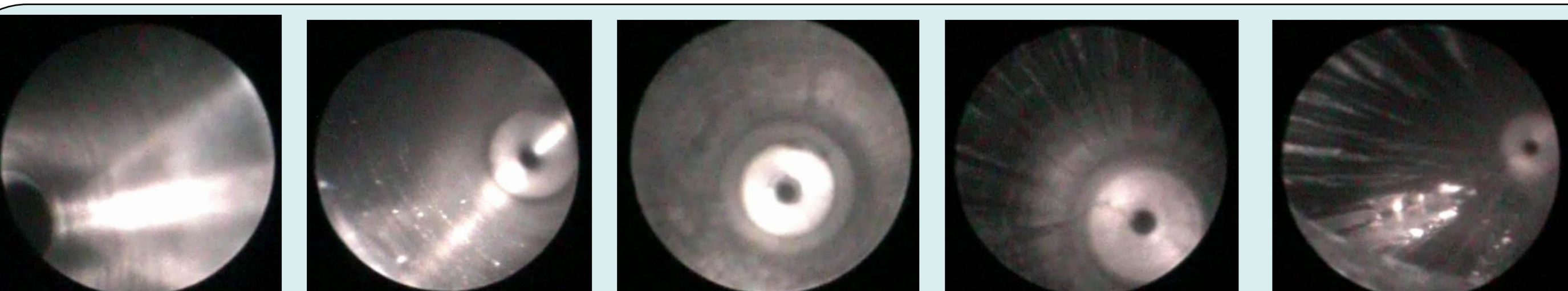
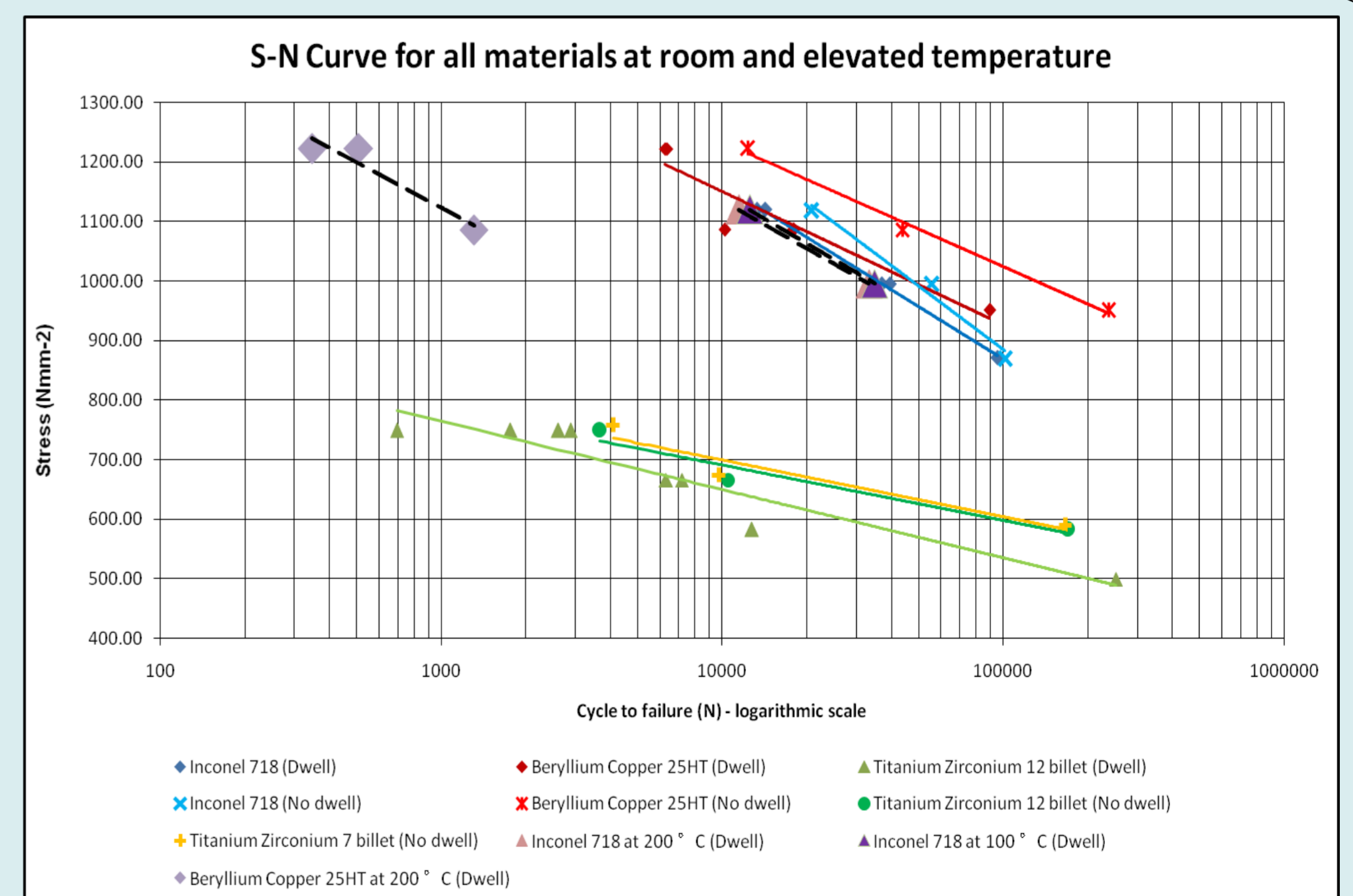
Experiment results and FEA model for sample 4 (**700MPa** autofrettage pressure)

We made five identical simplified aluminium 7075 alloy sample cells designed for 8 kbar burst pressure.



### Joint ISIS - Imperial College London project: looking for material for new generation of high pressure cells.

- Cell construction materials must be high-strength, hydrogen-compatible, temperature and fatigue resistant.
- ICL is making for ISIS *tensile*, *S-N fatigue* and *cyclic stress-strain tests* for **Inconel 718**, **titanium-zirconium** alloys and **beryllium-copper**.



0 kbar    2 kbar    6 kbar    7 kbar    7.6 kbar  
**Prototype of 8 kbar inert gas cell (endoscope photos)**

The JRA project is supported by the **European Commission** under the **NMI3 FP7** program.