



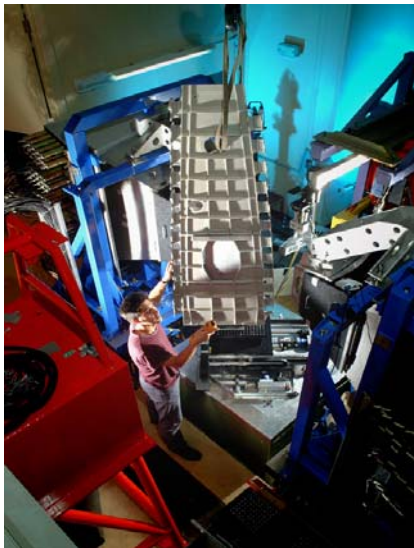
Residual Stress Analysis (Synchrotron & Neutron Science)

The [ISIS](#) spallation neutron source is able to use neutrons to give us accurate 3D imaging of lattice spacing in metals. This ability, using the ENGIN-X instrument, has been used to look at residual stress in wing ribs in order to solve a manufacturing issue.

Residual stresses are the stresses which are "frozen in" to materials and components even when no in-service loads are applied. In many structural engineering applications it is important to account for and control these stresses. We use neutrons and synchrotron X-rays to probe these stresses non-destructively, deep within the bulk of engineering components and materials. Typically the measurements influence the development of novel processing technologies and new structural materials.

For example, work in the **aerospace industry** has been carried out at [ISIS](#) to analyse:

- Novel joining methods (e.g. friction welding methods)
- Surface treatments (e.g. laser peening)
- Composite reinforcements
- Fatigue of welded aerospace components
- Crack propagation.



The ENGIN-X instrument:
measuring residual stress
within friction stir welds on an
Airbus prototype wing rib.

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