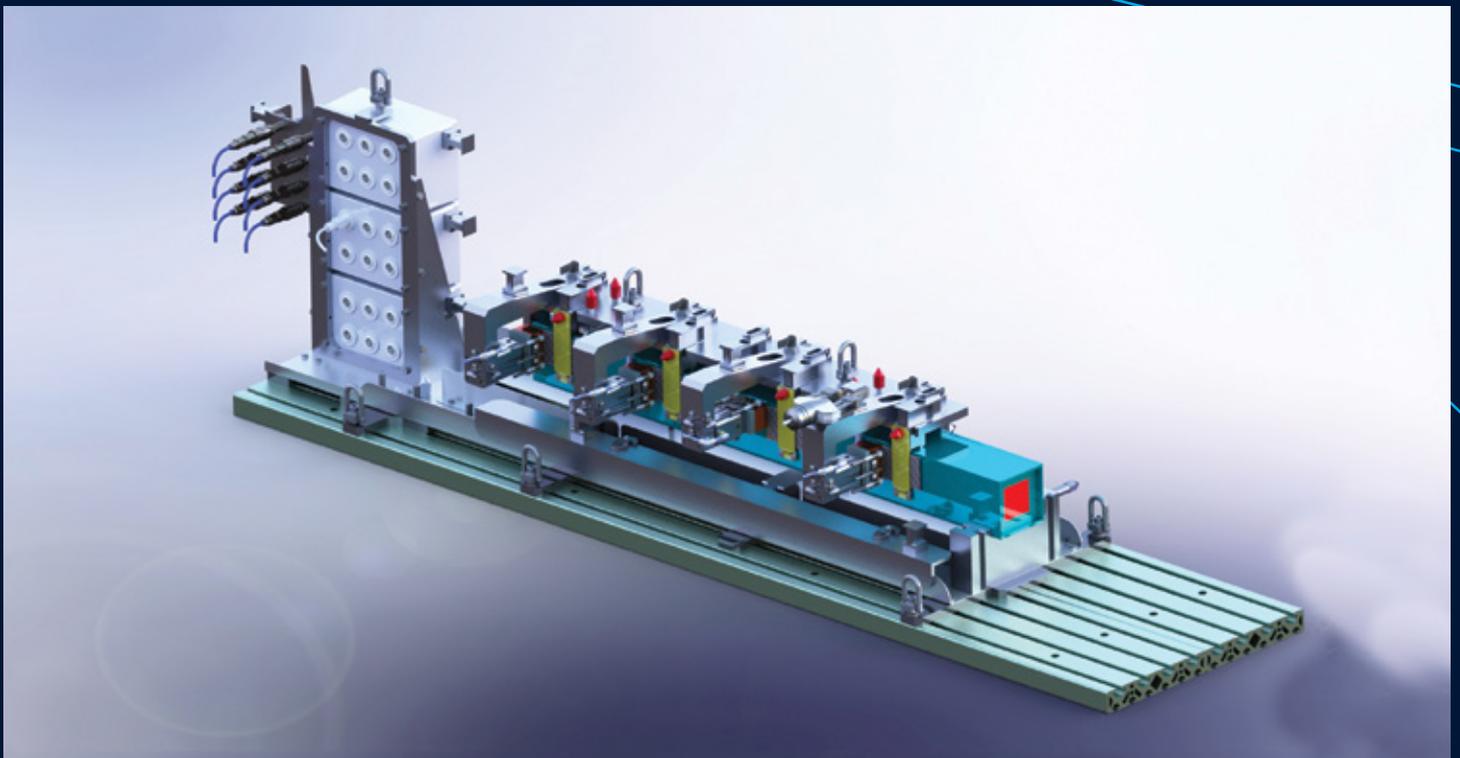




## CASE STUDY

PROJECT TITLE: **RESIDUAL STRESS RIG**

CLIENT: **NATIONAL NUCLEAR LABORATORY (NNL)**



### AIMS AND OBJECTIVES



The project was to design, manufacture, factory test and install a residual stress rig for use in a shielded cell. The rig would be used to measure the end of life (EOL) stress remaining in the structure. These stresses are dependent on the service conditions and the mechanical properties of the materials used in its manufacture.

### ABOUT THE CLIENT



The National Nuclear Laboratory (NNL) operates a number of facilities offering research, development and consultancy services to the nuclear industry. At the Sellafield site, the NNL Windscale Laboratory operates a range of radiation shielded facilities where nuclear materials are processed and examined. Services include Post Irradiation Examination (PIE) of nuclear fuel and irradiated material, radioactive waste handling and material analysis and testing.

## SCOPE AND PROJECT SOLUTION

The Residual Stress Rig comprises the following parts:

- The Strain Gauge Frame
- The Strain Gauge Application Frame
- The service umbilical
- The Data Acquisition System
- The temperature and pressure control system

The Residual Stress Rig is used to apply strain gauges to precise locations on one side of a component, which will later be cut through at the opposite side to release stress within its structure; that stress will be measured as strain. The component will be located within a shielded facility where 'hands on' operation is not possible. The application of the strain gauges will be done remotely.

It is intended to mix and apply the strain gauge adhesive, outside the shielded facility. This therefore necessitates that the strain gauges, with the adhesive already applied, are accommodated within a structure (strain gauge frame), which is then transported through the facility and into location. Once there, the component is lifted on to the strain gauge frame. The frame will be precisely aligned, thus placing the strain gauges at the correct position relative to, but not touching, the component. At this stage, the component will be secured to the strain gauge frame, such that it is stable but unclamped thus preventing unmeasured stress being introduced into it.

The attachment of the strain gauges is achieved using a strain gauge application frame that consists of a number of air actuators, incorporating a pressure pad and heater within a holding framework. The strain gauge application frame is latched to the strain gauge.

## SUMMARY

The functional design specification provided by NNL, was reviewed and interpreted by the Aquila engineers during the invitation to tender. Aquila provided a fully costed 3D design with the bid and subsequently, secured the contract.



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## ACCREDITATIONS



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