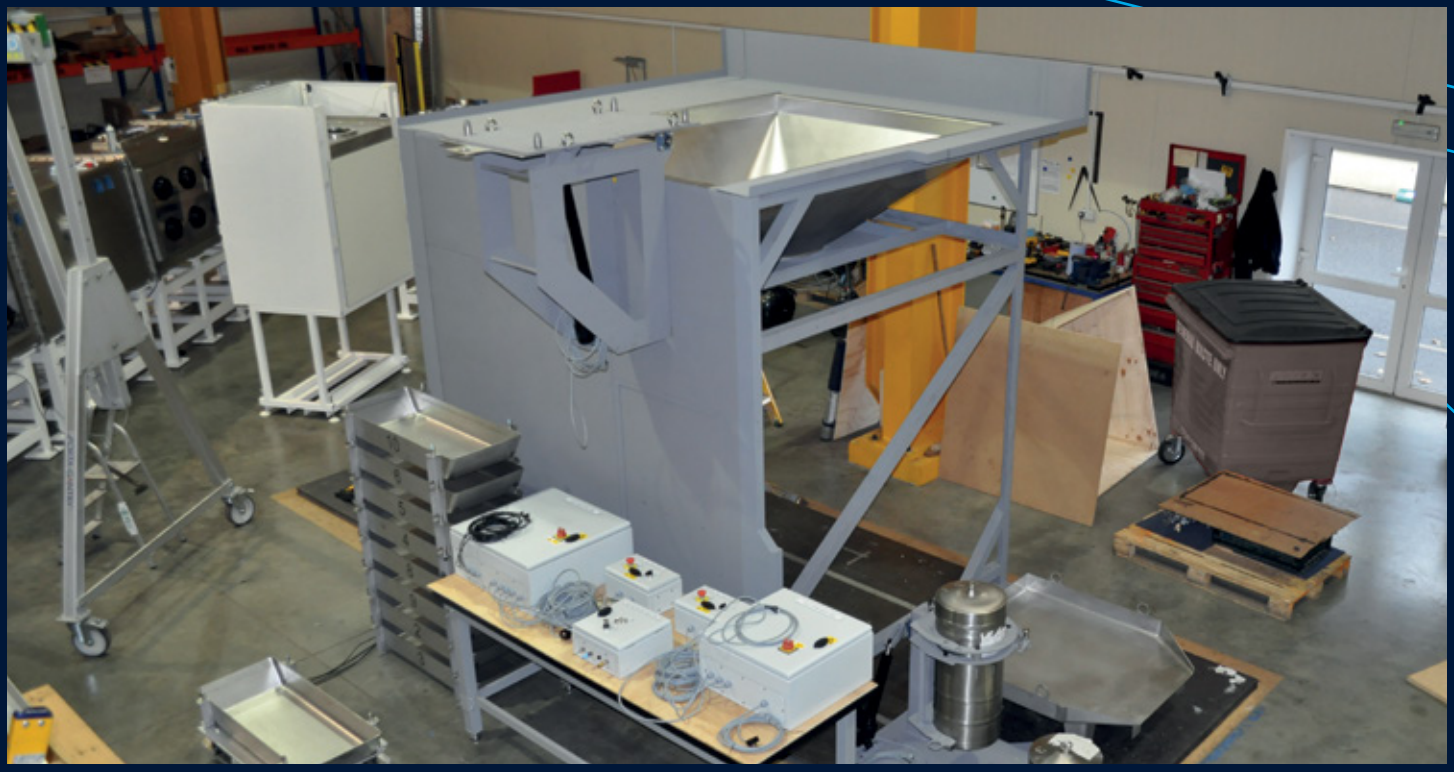
Aquila Nuclear Engineering

REMOTE HANDLING

CASE STUDY

PROJECT TITLE: **IN CAVE EQUIPMENT**
CLIENT: **MAGNOX**



AIMS AND OBJECTIVES

Aquila was awarded the contract to design, manufacture, assemble and test at works, and subsequently install on site, a range of remotely operated in cell equipment to assist with decommissioning at the Post Irradiated Examination (PIE) facility at Magnox Berkeley Site.

ABOUT THE CLIENT

Magnox Ltd is the management and operations contractor responsible for safely managing 12 nuclear sites and one hydroelectric plant in the UK, working for the sites' owner, the Nuclear Decommissioning Authority (NDA).

Magnox is responsible for managing the sites through their lifecycles, overseeing all aspects of defuelling and decommissioning.

PROJECT OVERVIEW

The scope of the Shielded Area Caves Project was to install and commission the equipment necessary to retrieve and package the waste, for interim storage elsewhere on site. The whole retrieval and packaging process was to be completed in the shielded caves, using remote handling operations. The waste would be retrieved into trays for sorting, radiological assay and weighing, prior to being loaded into the final waste package.

In order to maintain regulatory compliance of the final waste packages, an accurate mass of the waste had to be ascertained during the retrieval process.

In addition to the originally installed equipment, the scope included the integration of a series of new design, build and install packages, which included:

- Waste Drum Tipper and Sorting Tray
- Waste Transfer Tray and Tipping Mechanism
- Waste Assay Table and Weigh Scales
- Final Package Filling Tundish, Support Frame and Seal

FULL SPECIFICATION

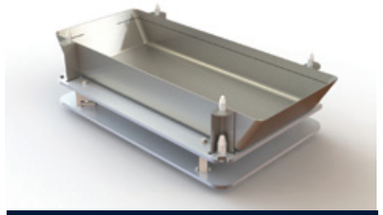
The Waste Drum Tipper Assembly receives loaded waste drums (60kg maximum) from the Cave Crane and clamps them in position, allowing Master Slave Manipulators (MSM) to remove the lid. The drum is then tipped using an actuator so that the contents are dispensed onto a Sorting Tray. Once empty, the drums are returned to the loading position and removed in preparation for the next drum.

1. Waste Drum Tipper and Sorting Tray

The waste can be observed and sorted on the Sorting Tray before it is swept into a Transfer Tray, again by MSM's. Once a Transfer Tray is fully loaded (100 kg), an automatic Tray Grab is brought into position using the Cave Crane. The grab is lowered onto the Transfer Tray and an indexing mechanism collects the tray.

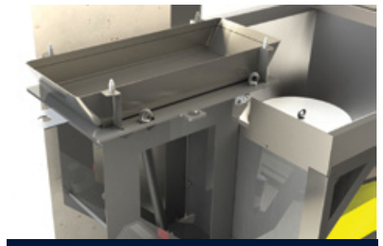
2. Waste Transfer Tray and Tray Grab

Loaded trays are carried through the cave where they are placed onto the Assay Weigh Scales. This provides the weight of the waste to an assay system which was supplied by others.



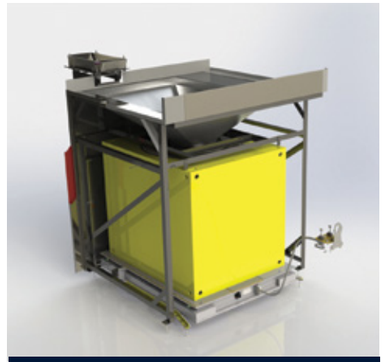
3. Transfer Tray

Again, using the grab, the Transfer Tray is removed from the Weigh Scales and lifted onto the Tray Tipper. This locks the Transfer Tray in place before lifting it to approximately 90 degrees, so that the waste is tipped in to the Filling Tundish.



4. Tray Tipper

Control of the Drum Tipper and Tray Tipper is completed by a pair of panels mounted on the front of the caves. Each panel features an emergency stop as well as the Tip/Return toggle switch.



5. Filling Tundish

The Filling Tundish assembly is a steel framework, supporting a funnel in the Magnox Dry Fuel Handling Facility (MDFHF). Prior to waste tipping, Ductile Cast Iron Containers (DCIC) are positioned beneath the Filling Tundish by air skate. Guide features and stops are provided to aid alignment and ensure the DCIC is concentric to the Filling Tundish.

Once positioned, an inflatable seal on the underside of the Filling Tundish frame, is used to seal the DCIC to the funnel, providing containment. When filling is complete, the process is reversed and an empty DCIC loaded to continue waste operations. A bung for the Filling Tundish is used when a DCIC isn't loaded to maintain containment.

The inflatable seal is controlled from a dedicated panel, mounted on the cave face, that features a gauge showing the seal pressure and a switch for, seal air, On/Off.

SUMMARY

SCOPE AND PROJECT SOLUTION

The specification presented by Magnox was well defined and, after two site surveys, Aquila was able to fully define the solutions for each piece of equipment. 3D models were included within the proposal to Magnox, together with a full technical description which clearly described the scope and principal of operation. Aquila worked hand in hand with Magnox in a collaborative manner, resulting in a pragmatic, cost effective solution.

Pragmatic, cost effective solutions, always

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ACCREDITATIONS

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CALDER GROUP

Aquila Nuclear Engineering is part of the Calder Group