

Pre-Conditioning LOT 4 Cementation

Client: Magnox



Remote Handling

Aims and objectives

Aquila was awarded the contract to design, manufacture and factory test plant & equipment to allow Intermediate Level Waste (ILW) that has been generated at the Magnox Hinkley Point A site, to be packaged safely for long-term storage and future disposal at the national Geological Disposal Facility. This case study describes the Pre-Conditioning Facility External Mixer.

Cyclife EDF Group - Subsidiaries



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The client

Magnox 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 defueling and decommissioning.

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Project overview

The scope included the sizing of the building to install and operate the mixer system, design and supply of the mixer, cement delivery system and all associated plant and equipment. The system needed to be designed to be capable of being operated locally during commissioning or remotely during operations and the entire functionality had to be demonstrated during an integrated Factory Acceptance Test (FAT).

Cyclife Aquila designed and supplied Lot 4, providing equipment and services required for pre-conditioning Sludge wastes. Lot 4 will pre-condition the waste by mixing with cement powders in the External Mixer and pouring into a Concrete Box (CB) which shall finally be transported by others to the Modular Intermediate Level Waste Encapsulation Plant (MILWEP) for encapsulation by casing the CB lid. Lot 4 will receive into the External Mixer, wet sand from Sludge Retrieval and wet sludge from the Sludge Dewatering & Effluent Treatment.

The pre-condition external mixer broadly consists of the following components:

- Cement Silo
- Screw Feed
- Cement Hopper, including load cells
- External Mixer

Access and support platform structure, including crane runway beam and hoist

Control System

The equipment is located inside a new building which has been specially designed to accommodate other work packages and their interfaces.

Cement Silo

The Cement Silo is a Commercial Off The Shelf (COTS) 30m³ silo with proprietary safety system custom level detection. The design is based on existing equipment for industrial cement batching plants which run continuously.

Screw Feed Conveyor

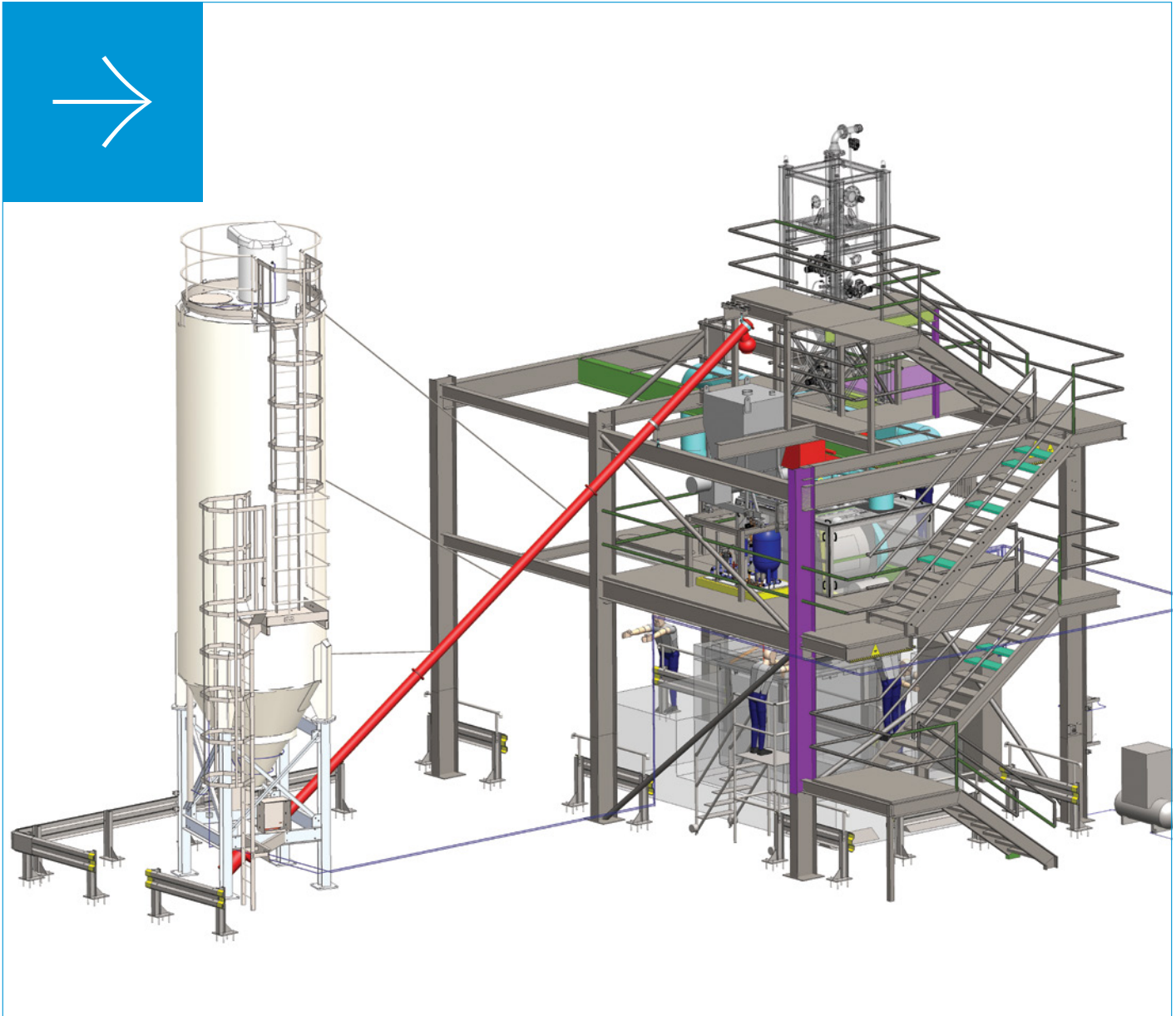
The Screw Feed is 11m long and forms part of the cement feed to the external mixer. It connects the silo, which is external to the building, to the cement hopper above the mixer and is supported from the silo outside, and by the structural steel work inside.

Cement Hopper

The Cement Hopper is located above the external mixer and is primed concurrently with other operations. Load cells control the amount of cement charged. When the External Mixer is ready, a second short screw conveyor rapidly discharges the hopper contents into the mixer. The hopper and screw are isolated from the mixer by an automated valve to protect cement in the hopper, aid ventilation airflow and minimise spread of contamination.

External Mixer

The External Mixer is a bespoke design based on an existing 500l nominal capacity mixer for industrial cement batching plants, which run continuously. It is used to mix radioactive sludge and sand materials with cement powders



and water for encapsulation and long term storage in concrete boxes. The mixer is adapted for this application with lights and cameras for remote operation and radar level measurement to prevent it from being overfilled. The mixer is designed to be disposed of into a concrete box at the end of its life.

Access Support Platform

The Access Support Platform is the main supporting structure for the external mixer and other equipment. The platform is compliant with codes and standards for steel structures

and allows for operator access across three floors, through gantries and stairways. Safety barriers have also been included to mitigate against accidental collision with the structural steelwork.

The structure incorporates a 6000kg crane for mixer installation/change out and other lifts associated with normal operation.

Control System

The External Mixer equipment is designed to be operated remotely and to interface with other work packages to control the mixing

process. It is generally operated by remote means but has the facility for local operation through a local Control System.

Factory Assembly & Testing

The equipment is designed with standard or dedicated lift points, reducing the requirement for unusual or special lifting. Aquila constructed the structural steelwork at a reduced height and provided a mock-up of the cement silo to allow the equipment to be assembled and tested within Aquila's workshop.

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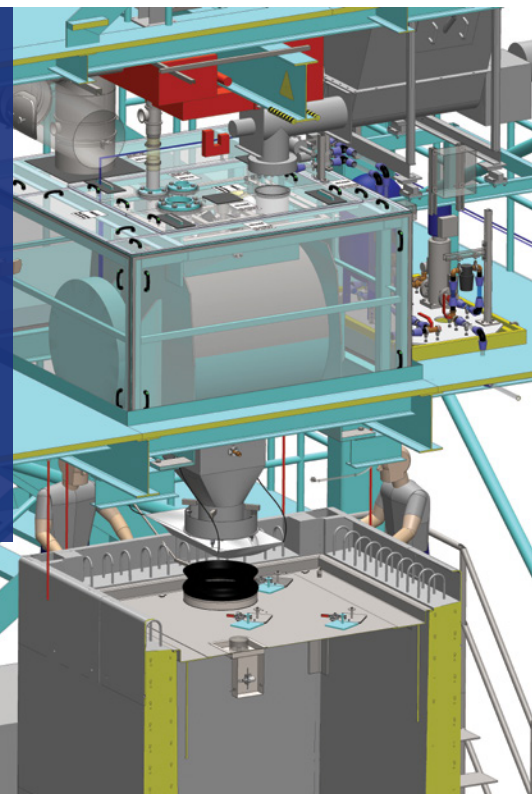
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Summary



The equipment and components were designed and manufactured in line with conventional methods to ensure a wide availability of skills and negate the need for specialist techniques.



Contact us

T: +44 (0) 1962 717 000
E: info@cyclifeaquila.com

www.cyclifeaquila.com

