



ABB Advant OCS to control BNFL's new waste vitrification line

This latest contract follows ABB's successful completion of the BNFL THORP automation system--believed to be one of the largest distributed control applications worldwide.

Client: British Nuclear Fuels Limited (BNFL)
Location: Sellafield
Scope of Work: Advant OCS



British Nuclear Fuels Limited (BNFL) contracted ABB to supply a major automation scheme which provided integrated monitoring and control for their new Line 3 extension of its Waste Vitrification Plant (WVP) at Sellafield. The scheme featured an ABB Advant OCS (open control system), custom designed applications programs and a large PLC network.

The new Waste Vitrification Plant (WVP) Line, designed and engineered entirely by BNFL, takes advantage of the latest control technology and draws on experience gained during ten years of operating the advanced waste vitrification process.

ABB's Advant OCS provides supervisory control of the wet process to vitrify highly active liquor (HAL) – one of the waste constituents from THORP and other BNFL facilities at Sellafield for reprocessing spent nuclear fuel. There are communication links between the Advant OCS and a PLC-based system, which ABB sub-contracted Thurnall of Irlam to supply, for controlling the mechanical handling of the encased vitrified material.

The HAL waste from the reprocessing facilities enters the WVP plant as a wet stream and is vaporized into powder form which reduces the material's volume by as much as two-thirds. It is then mixed with crushed (frit) glass, heated, poured into stainless steel containers and then cooled, rendering the waste safely incorporated in the glass. The containers are then top-welded and decontaminated before being transferred to a store adjacent to the vitrification plant where the material and its environment are closely monitored.

The ABB Advant OCS will accommodate 2,300 input and output signals and will include eight Advant 500 Series operator stations, a dual-function Advant operator/engineering station, an Advant IMS station and four Advant AC460

control sub-systems with TRIO Remote I/O. The system controls evaporation of the liquid feed stock, the mixing with glass frit and melting and pouring into stainless steel containers.

The subsequent mechanical handling of the containers--decontamination and transfer to engineered stores--is controlled by five group PLCs, linked to 34 system PLCs connected via MODBUS communications to 62 text-based operator display devices. PLCs, interfacing directly with the Advant OCS, are also installed on parts of the wet process where an element of local control is required.

Special ABB application programs were custom designed to oversee the product throughout all process stages and provided a performance database from which plant personnel generated reports through their Information Management Stations (IMS) for analysis. Through the "Container Track-

ing" program, for example, the Advant OCS communicates with group PLCs to validate and record the position of all containers in the process and generates a product quality profile on each unit. A specifically designed Operational Database records the plant's performance by collecting information from sequences run either on the Advant OCS or on the mechanical handling PLCs.

In order to meet training and development requirements, BNFL purchased a small ABB Advant OCS with third-party software to provide a true simulation of the plant. Elements which, for safety reasons, could never be created for training purposes on the real plant, were put into practice safely and cost-effectively.

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