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Engineering a transformation at Sellafield

A new contracting approach used at Sellafield is making project work more collaborative and efficient



SELLAFIELD LTD, THE NUCLEAR DECOMMISSIONING Authority company responsible for Europe's largest inventory of radioactive waste, is in the midst of a transformation.

The aim is to remove hazards faster and clean up the 6km² site in Cumbria, northern England more quickly. To achieve the improvements in performance needed to bring this about, Sellafield Ltd has changed the way it deals with its supply chain.

Contractors are now appointed through an array of strategic alliance frameworks. The oldest is the Design Services Alliance (DSA), in which Sellafield Ltd is a partner alongside six international engineering firms. This 15-year agreement began in 2012, and it provides £80-100 million of engineering, design and safety-case assessment services every year. In Sellafield Ltd's Operations Division project office, the DSA has streamlined managerial structures to make project work more collaborative and efficient, leading to significant savings.

Kevin Norman, a commercial manager who helped to put the changes in place, says: "The issue wasn't with designers. They will usually work together with no problems. The issue was the management and the best thing we did was getting the managers to work together.

"We introduced a new management structure and integrated the management team. This resulted in more

open and frank discussion taking place at an earlier stage so that both parties understood each other's risk."

In the previous structure, Sellafield Ltd led and took all decisions on engineering design delivery for all projects in a particular operating unit. Now this role is shared between a design service integrator (DSI) and a senior project engineering manager (SPEM).

Currently, all of the SPEMs are Sellafield Ltd employees and all of the operations division DSIs are from DSA partner Axiom (a JV comprising Assystem, Jacobs, Mott MacDonald and Wood).

Norman says the new-style working relationship would still work with a DSI from Sellafield Ltd and a SPEM from the DSA partners. It resulted in more focus on future workloads and better forecasting and planning. "Early discussions about project scope are much more acceptable than before," he adds. "It is no longer a master-servant relationship."

Another benefit is a leaner managerial structure. Mark Hilton, a DSA commercial manager, explains: "The reduction in management is partly due to the organisational change but also how we engaged the management. We took a central view of the requirements across the board and then agreed the team required to work across the portfolio, which resulted in a small number of full-time roles instead of a larger number of part-timers."

The changes have been backed up by the introduction of CEMAR, new contract management software which has made the process much more transparent and helped to reduce work in progress to about £300,000 from more than £2 million.

When the DSA started in 2012, 97% of its work for the Operations Division was done on a reimbursable basis, with the framework functioning like an agency for recruiting people from the Axiom partners. Now, nearly 80% of the DSA's work for Sellafield's Operations, Decommissioning and Major Projects divisions are scoped and incentivised.

Phil Holden, design manager in the projects office of Sellafield Ltd's Operations Division, says: "The transition of strategy towards scoped-target-cost works has facilitated numerous benefits but the main two for me are that the team focuses and plans the scope, considering the exact

requirements to deliver it in advance of order placements, which improves accuracy, lowers costs and improves awareness and behaviours within the teams heading us towards fit for purpose solutions.

"The second is we were able to ask what people were doing, understand this and identify and eliminate waste. This was made up of unnecessary reporting, personal preferences, convoluted communications channels and people who were under utilised."

The DSA contract has helped to cut costs on projects by more than £90 million since 2012.

John O'Brien, Sellafield Ltd's head of engineering design capability, says this was achieved by removing unnecessary scope; smarter procurement; lean techniques and innovative or simpler design; improved systems of work; and providing resources at short notice.



Above: The DSA was instrumental in devising the demolition strategy for Sellafield's Pile 1 Chimney

EXAMPLES OF SAVINGS DELIVERED THROUGH THE DSA:

£12.7m

installing a new electrical distribution system in Special Nuclear Materials (North) that dispensed with the need for new switchrooms to be fitted with transformers.

£9.3m

on project manager instructions for the waste retrievals, waste handling and building services/control room packages of the Pile Fuel Cladding Silo project (a 30% saving on the building contractor's estimates).

£6.2m

on permanent in-duct modifications to re-route a drain to the Enhanced Actinide Removal Plant and shut down of the Segregated Effluent Treatment Plant. This would have required a new purge discharge route for one of the legacy ponds. The saving comprised £205,000 cash and avoiding a £6m project (replaced by minor asset care improvements).

£5.4m

on procurement and construction savings during the detailed design of the SIXEP Contingency Plant project. This will be achieved by the use of 21st century tools, a reduction in the number of cables through the use of a Profibus, energy saving measures such as LED lights, and the removal of a second standby universal power supply.

£4.5m

on a new approach to Long-Term Periodic Reviews that reduced the burden on plant resources, cutting costs by 76%. This work was done by a central LTPR project delivery team set up by the Operations Division in October 2014.

£3.5m

against the estimated cost of contracted work packages in support of the Magnox Swarf Storage Silo (MSSS).

£6.1m

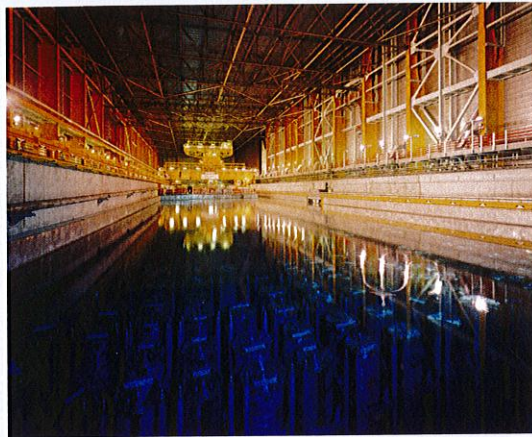
on new proposals for handling and storage of drums in the Engineering Drum Stores.

Above: Sellafield's Pile Fuel Storage Pond

Right: Paul Tait, Sellafield Ltd commissioning engineer (left) and Rhys Evans, Axiom mechanical engineer, working on a test rig for Sellafield's SIXEP Contingency Plant



Right: Multi Element Bottles in the Thorp Receipt and Storage pond at Sellafield



Far right: A container of highly active waste being loaded onto a ship to Germany – the DSA achieved savings of more than £400,000 on Sellafield's Vitrified Residues Returns programme



He adds: "Collaboration between Sellafield Ltd and the DSA partners in integrated teams is key to producing the best results."

O'Brien lists the strengths of the DSA as:

- Shared aims and commitments to outcomes through visibility of programme outcome requirements;
- Rigorous, visible forward planning of work at a whole site level to make best use of skills in the design and implementation chain;
- Import of best practices from large, multi-client, multi-sector engineering design organisations;
- Aggregation of work into sizeable common packages;
- Challenge to existing designs and evolution towards more standardised assets with appropriate whole life costs.

The DSA may make an even more significant contribution in future. Jeff Heyes, Sellafield Ltd's head of engineering – decommissioning, says: "The idea is to use the supply chain partners' best practice to deliver innovative solutions. To do that, one of the aspects we need to look at is how we give them problems to solve rather than solutions to deliver."

A good example of this is a project to demolish the Pile 1 Chimney, one of the most visible Sellafield landmarks.

The chimney, 110m high, was constructed in the late 1940s to discharge filtered cooling air from a reactor. It is close to various nuclear facilities, and is topped by a

diffuser—a concrete box weighing about 1400 tonnes. This presents unique decommissioning challenges which had to be overcome alongside considerable radiological and conventional constraints.

DSA partner alliance Progressive, which comprises Aecom and Cavendish Nuclear, developed techniques to cut up the concrete using diamond wire and lower it down in seven-tonne blocks using a tower crane tied to the 110m high chimney.

The preliminary design was completed within eight months instead of the expected 12 months, and avoided the need to design a waste processing system, saving £360,000. Savings will continue throughout the life of the project because it uses proprietary equipment adapted for the nuclear sector and an independent tower crane that will increase throughput by up to 500%.

Sellafield Ltd described the project as an excellent example of collaborative working.

The DSA also enabled Sellafield Ltd to make significant savings on the preparations for waste retrievals from the Magnox Swarf Storage Silo (MSSS). Progressive reassessed the condition of the MSSS buildings and showed, to the satisfaction of the regulator, that they would be robust and safe enough without additional strengthening work. This saved £1 million and cut 13 months from the estimated programme time, freeing up resources for work on hazard reduction elsewhere on the site. ■