

Solving Sellafield's 4 Ds problem

By the U.K. National Nuclear Laboratory
and Sellafield Ltd

Though robotics solutions have been used across many industries, for many purposes, Sellafield Ltd has begun to bring robotics to the U.K. nuclear industry to conduct tasks in extreme environments. The Sellafield site, in Cumbria, United Kingdom, contains historic waste storage silos and storage ponds, some of which started operations in the 1950s and contain some of the most hazardous intermediate-level waste in the United Kingdom. There is a pressing need to decommission these aging facilities as soon as possible, as some of them pose significant radiation risk.

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The U.K. National Nuclear Laboratory's Colin Fairbairn (left) and Ben Smith (in pre-COVID days) work on the Box Encapsulation Plant (BEP) robots project at the NNL's facility in Workington, Cumbria, U.K.
Photos: UKNNL

In some of these facilities, Sellafield operators must work in limited-access and/or dangerous environments, with conditions often described using the 4 Ds: dirty, dark, dangerous, and dull. Through the use of remote robotics, however, Sellafield can remove operators from these dangerous environments and also assist with boring, repetitive tasks, thus reducing the risk of human error.

Two of the commercial robots that have been customized for the BEP work.





Above: Fairbairn and Smith work at the remote teleoperation control center for the customized robots, which supports the removal of human operators from hazardous environments.

The United Kingdom's National Nuclear Laboratory works alongside Sellafield to explore the use of robotics and artificial intelligence solutions on Sellafield sites through the Sellafield Central Robotics and Artificial Intelligence Team (SL Central RAI Team). This team conducts continuous research into evolving RAI solutions in both the supply chain and academia to understand where the modification of inexpensive commercial-off-the-shelf (COTS) technology is suitable, or whether a more tailored, bespoke solution is required. Examples range from small, adapted, COTS remotely operated vehicles used typically for exploration and measurement of radiation, to the pictured robotic arms (photos taken before the COVID health emergency) typically used for manipulation of larger objects and controlled from a remote control desk.

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A worker calibrates a laser-cutting robotic arm at the NNL's facility in Preston, Lancashire, U.K.
Photo: UKNNL



For each of these solutions, the robot is operated remotely, removing the risk of human exposure. Beyond this, the sourcing and implementation of these solutions are conducted with the end users in mind, ensuring that the robotics are deemed fit-for-purpose by the very individuals intended to use them.

It is through exploration of these potential solutions, in collaboration with the end users, that the SL Central RAI Team can utilize robotics that remove operators from dirty, dark, dangerous, and dull environments, while improving efficiencies to manage the historic legacy waste on a shorter timescale. ☒

For further information, contact the SL Central RAI Team at robotics@sellafieldsites.com.