

The In-Cell Decommissioning System's Snake Arm™ is deployed into a cell with 3D laser image scanner attached.



PEOPLE
WHO
INNOVATE

CASE STUDY:

In-Cell Decommissioning System (IDS)

OVERVIEW

Cavendish Nuclear has created one complete engineered system for decommissioning redundant nuclear reprocessing cells by combining spatial & radiometric scanning, remote deployment and virtual reality (VR) control with proven tools and end-effectors. Our In-Cell Decommissioning System is a Remote Deployment Device (RDD) which has increased the capability and speed with which redundant active reprocessing cells can be decommissioned by utilising a 'point and teach' approach controlled remotely by VR. The system has led to safer and more cost-efficient operations.

KEY INFORMATION

Customer: Innovate UK, Sellafield Ltd, Nuclear Decommissioning Authority & BEIS

Potential Site: Sellafield

Value: £1.5 Million

Competition: Innovate UK - Integrated Innovation for Nuclear Decommissioning

Capabilities: Design,
Engineering,
Manufacture,
Assembly Commission,
Test, Install and Demonstrate



The system uses 3D imaging and radiological scanning technology to create a VR user interface for programming automated cutting operations achieved using a Laser Snake™ remote deployment device.

OUR SOLUTION IN DETAIL

Our Approach

Cavendish Nuclear developed the concept into a fully operational system over a 13 month period. Successful integration of the deployment devices, various tools and VR user interface enabled functional testing of the system on vessels and pipework inside a purpose-built laser cell. The tests and trials that followed successfully demonstrated the range of tasks the In-Cell Decommissioning System was designed to perform, including its ability to:

- Map and characterise the internals of active cells using 3D laser scanning and gamma spectrometry technology.
- Use the data to program a remote deployment device via the VR user interface to conduct repetitive size reduction laser cutting operations inside the cell.
- Execute the program to cut away a large number of small sections of in-cell material.

To combine the robotic Laser Snake™ arm of OC Robotics, a laser cutting torch supplied by The Welding Institute (TWI), the RadScan® 3D gamma dose rate scanning technology of Cavendish Nuclear, and the VR expertise of the Babcock group to create a remotely-operated platform that protects workers from radiation while allowing them much greater visibility of congested plant and hazards.

IDS achieved safer, faster and more cost efficient operations than conventional methods by successfully demonstrating the following benefits:

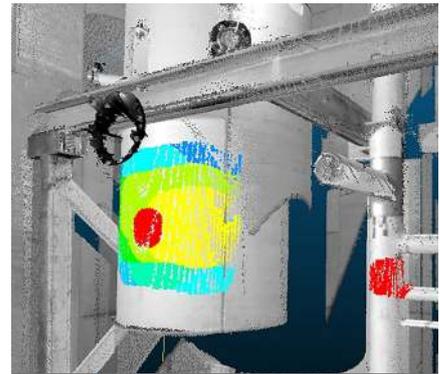
- A fully remote solution
- A requirement for less people and equipment involved in the process
- Reduced man-machine interface
- Improved understanding of the operating environment
- Low risk pre job planning and checking via the VR interface
- Automated operations giving repeatability
- Improved waste tracking and packing.

Collaborative Working

Cavendish Nuclear, a wholly owned subsidiary of Babcock International Group, partnered with OC Robotics of Bristol supported by The Welding Institute (TWI) to provide a diverse knowledge base and skills to create something unique and otherwise unachievable.

Key Learning

The development of innovative technologies and techniques is vital to supporting the Nuclear Sector Deal to realise a reduction of 20% in decommissioning costs of the UK legacy versus the current baseline. In support of this, Cavendish Nuclear is committed to developing and supporting innovations, which deliver effective solutions to the nuclear industry's most challenging decommissioning projects; safer, faster, at lower cost.



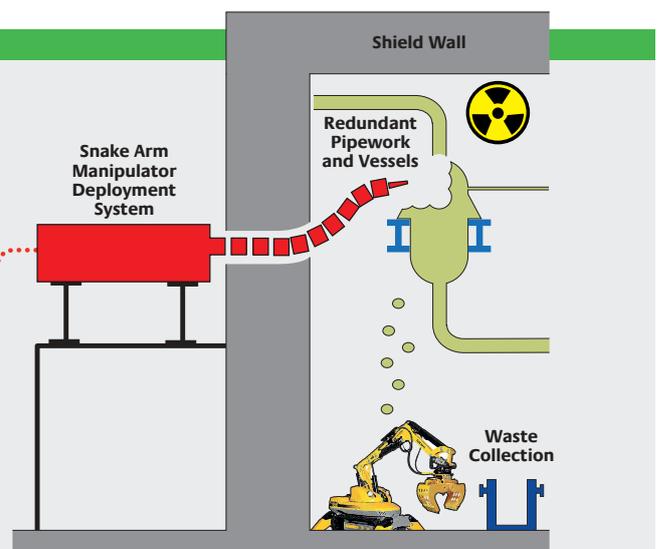
3D point cloud surface model image of pipework and vessels with radiological image overlaid to create VR operator environment.

IDS has the potential to transform the way in which active cells and other redundant nuclear facilities are decommissioned on different nuclear licenced sites in the UK and abroad. Its modular assembly means that it can be tailored to suit specific applications and its functional capabilities can be adapted using a range of deployment systems and tools. This innovative system is something Cavendish Nuclear is actively promoting to clients across the nuclear industry. The results of the inactive trials have exceeded expectations and the demonstrations have generated a considerable amount of interest from a number of clients.

The next challenge in the development of the system will be in decommissioning an existing redundant cell on a nuclear licenced site.

HOW IT WORKS

The remote deployment device is used to conduct 3D surface image and radiological scans. 3D models create the VR environment. The VR user interface enables the operator to program, check and refine automated cutting operations. Once satisfied, the operator downloads data to the Laser Snake™ which size reduces the cell components into small coupons. These are then collected and placed into waste containers using a Brokk.



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