

# Rotary Deployment Arm

## Trawsfynydd, UK



### | The Challenge

Trawsfynydd is a former Magnox nuclear power station situated in the Snowdonia National Park in Gwynedd, Wales. The plant became operational in 1965 and eventually closed in 1991 and has since been under a decommissioning program that is expected to last several decades. Part of the decommissioning challenge of the Trawsfynydd power station is to safely access, retrieve and package the highly contaminated debris resulting from operations of the plant for many years. The waste consists of effluent, sludge and solids (fuel element debris mainly) that required full remote handling operations throughout the process.

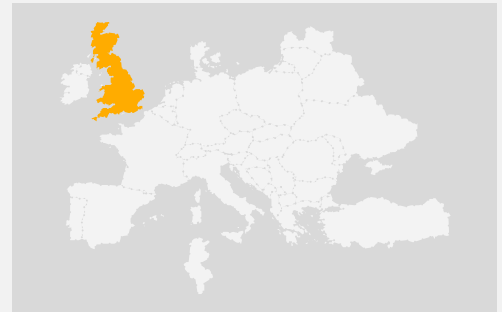
### | Veolia's Solution

The first tank cleaning project of its kind, Veolia Nuclear Solutions provided design, build and testing of two long reach manipulator robotic arms called the Rotary Deployment Arm (RDA1 and RDA2). The RDA provided a highly capable and versatile solution for very difficult tank retrieval tasks. The system was required to be compatible with 4 different tanks of various shapes, sizes, and operating environments. The system was required to be easily moved from tank to tank, through existing plant rooms and doors with limited head room, taking into account existing equipment, and penetration locations, with limited to no alterations.

### | A Groundbreaking System For The Industry

The features of the RDA's construction consisted of a mast and forearm assembly built out of carbon fiber and stainless steel as well as electromechanical and hydraulic components that could provide actuation. The seven degree of freedom manipulator design provided the necessary long reach and high payload considerations; up to ~10m vertically, ~5m horizontally, and with nearly a 50kg capacity at full extension.

All of which needed to fit within a compact containment box no larger than an oversized refrigerator and be deployable through 250mm floor penetrations.



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#### Contract Facts:

Duration: 2009-2011 (*Retrieval Operations Completed in 2019*)  
CLIENT: NDA, Magnox

Custom Tank  
Cleaning  
Manipulator

Multitude of  
Tools  
Developed for  
Various Tasks

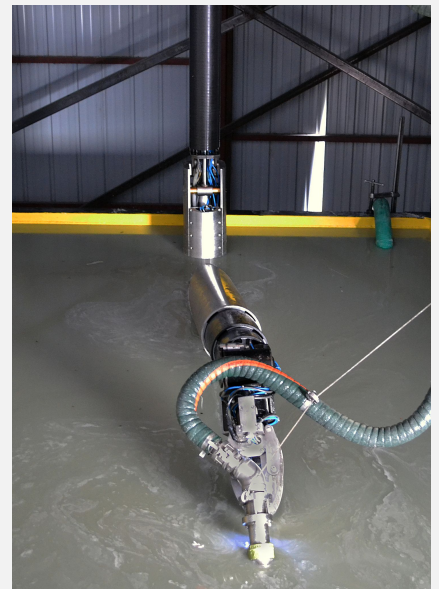
Highly Versatile Solution for Difficult  
Tank Retrievals



Custom tools were developed to meet any retrieval challenges operators may face during operations. The tools consisted of a: pressure washer, petal grab, scoops, shovels, scrapers and a number of different pumping tools; eductors, submersible pumps and vacuums. The enhanced control system allowed operator flexibility by allowing for joint-by-joint and inverse kinematic movement. In addition the system could operate submerged up to 4m of effluent inside the tanks.

## | The Benefits

Completion of retrievals at the Trawsfynydd site ended in 2019 giving the RDA systems nearly eight (8) years of operational run-time in extremely harsh environmental conditions. In total, the RDA retrieved more than 170 cubic meters of waste during operations. The RDA was proven to be safe, reliable, durable, maintainable, versatile, reusable and most importantly, a proven functional solution never before seen in the nuclear cleanup industry.



*It was a pleasure working with a team of talented engineers on the design of an innovative manipulator that was able to meet a very challenging set of headroom, access, and payload an reach requirements. It was even more of a pleasure to work again with the team as the design was translated, through manufacture, assembly, testing and comprehensive trials, into two identical operational systems. These systems have been working for a number of years at Trawsfynydd Power Station and have successfully completed retrieval and segregation of large volumes of waste in a number of different storage tanks.*

*- Alan L Smith, Principal Consultant: Remote Operations, Magnox Ltd.*



### ROTARY ARM CAPABILITIES

- 50kg capacity
- 10m vertical reach
- 5m horizontal reach
- carbon fiber / stainless steel mast and forearm

### VNS EXPERTISE:

- Long-Reach Manipulator Technology
- Remote-Handling
- Waste Retrieval
- Sorting and Segregating
- Buffer Storage
- Customised Tooling