Nuclear decommissioning case study: Sellafield

Snake-arm robot capability demonstration

Sellafield requires a dextrous remote handling capability to conduct safe, cost efficient exploration and characterisation of nuclear facilities. Snake-arm robots are general purpose delivery tools for confined space working in hazardous areas.

Environment

The Sellafield site contains a wide range of ponds, vaults and cells, often containing unknown radiation risks. Manual entry is not appropriate. A mock-up was built representing a dry processing cell containing pipework and vessels. Access to the cell was via 150mm diameter, 1m long, horizontal and vertical penetrations.

Define

Objectives

To demonstrate snake-arm robots in an unstructured, unknown environment performing:

- Visual inspection
- Remote handling
- Radiological inspection
- Sampling loose material
- Water-jetting

Design

Two snake-arms and a range of tools

Two 2.5m long, 100mm diameter, self-supporting snake-arm robots were constructed. One snake-arm robot was equipped with a water-jetting head. The second was equipped with a three degree-of-freedom wrist-and-gripper with integrated camera and lights.

The generic gripper interface allowed a range of tools to be deployed. All tool services were routed inside the snake-arm.

Deliver

Operation

Snake-arm nose-following allows the operator to fly the tool using the tip mounted cameras, with the arm following. This intuitive control mode allows the operator to snake between pipes and into vessels.

All tasks were completed in under 4 hours. Arm exchange took less than 15 minutes. The time to change between vertical and horizontal deployment was 45 minutes.

Conclusion

The trials demonstrated the versatility, rapid deployment and intuitive operation of snake-arm technology. The slender, lightweight arm is a safe, cost effective, generic deployment method for a range of tools in hazardous, confined spaces.
OC Robotics

OC Robotics are world leaders in confined space automation - our snake-arm robots are designed specifically for remote handling operations within confined or hazardous spaces.

The Explorer catalogue

The Explorer range of snake-arm robots are general purpose tools which occupy the mid-range for diameter, reach, payload, curvature and precision.

The catalogue shows all of the available configurations and can be downloaded from our website.

Bespoke solutions

Confined spaces are nearly all different. The work to be completed may involve a wide range of tools.

OC Robotics delivers bespoke solutions to clients across a wide range of industries. Our engineers focus on solving customer problems, with solutions including snake-arm robots as well as other engineering and robotics.

Snake-Arm Simulator

Download the free version of Snake-Arm Simulator from our website to test drive a snake-arm and experience the intuitive nose-following control first hand.

We offer consultancy services to analyse your requirements using our proprietary tools.