OC Robotics and TWI Ltd have combined a snake-arm robot with a 5kW laser to enable a selective, remote-controlled approach to dismantling and decommissioning complex structures in hazardous and confined nuclear environments.

**DEFINE**

**Objectives**
Integrate a high powered laser with a snake-arm robot to demonstrate:
- Remote single-sided cutting using a fibre laser
- Non-mechanical, non-contact cutting process
- Cutting access holes in confined spaces
- Following a tool path precisely, required for laser cutting and other processes

**Business case**
Decommissioning of nuclear facilities represents a critical long-term challenge to the industry.
Remote single-sided cutting of vessels, support structures, flasks and pipe work is a basic, ubiquitous process.
This technology is relevant to the global nuclear sector and other decommissioning and maintenance tasks in the petrochemical and processing sectors.

**DESIGN**

**Snake-arm**
A 2.5m long, 100mm diameter self-supporting snake-arm robot with integrated navigation camera and lighting was adapted to carry the laser cutting head.
Snake-arms have a hollow bore that can carry services such as a laser fibre.
The snake-arm control system co-ordinates tip motion with the laser control to cut a variety of different substrates.

**Laser cutting head**
TWI Ltd investigated the laser’s cutting capabilities on materials and thicknesses representing pressure vessels, I beams, box structures and tubes.
TWI Ltd has performed pioneering work in the use of lasers for nuclear decommissioning, enhancing the technology readiness level of laser cutting and laser scabbling.

**DELIVER**

**Operation**
Operating in a mock-up through a 1m long, 200mm diameter penetration, LaserSnake avoided obstacles and cut a hole in a wall to allow access beyond – in order to reach and cut the primary target.
After nose-following through the new access hole, pre-programmed cutting paths were used to cut the target pipe.

**Conclusion**
The LaserSnake project demonstrated single-side laser cutting for remote disassembly in confined spaces. Snake-arm solutions can deliver cost reductions and efficiency improvements for nuclear decommissioning whilst improving safety by minimising the level of human intervention.
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.