OC Robotics

Controllable snake inspectors and applications
OC Robotics was founded in 1997 to be a leading provider of robotic, engineered solutions.

SME based in Bristol, UK

Robots have been developed for a wide variety of applications:

- Nuclear inspection & repair
- Aerospace
- Defence – investigation & bomb disposal
- Oil & gas inspection
- Tunnel boring machine cleaning & inspection
- Power plant inspection
Snake-arm Robots

Introduction to OC Robotics & snake-arm robots

Flexible ‘scopes
Small, flexible inspection tools for accessing confined areas.
Not self-supporting.
Limited controllability.
Zero accuracy.
Limited or zero payload capacity.

Snake-arm robots
Flexible robots for accessing confined areas.
Self-supporting.
Controllable & steerable.
Excess DOF enables obstacle avoidance.
Moderate accuracy.
Moderate payload capacity.

Industrial robots
Stiff, stable movable platforms.
Self-supporting.
Limited collision avoidance capability.
High accuracy.
High payload capacity.
Snake-arm Robot

Introduction: nose-following
Snake-arm robot

Opportunities

• Restricted access environments
• Confined structures – internal obstacles
• Hazardous spaces or explosive atmospheres
• Health and safety
• Stable process delivery within challenging environments
Snake-arm robot

APPLICATIONS
Snake-arm Robots

Small diameter

- <3” diameter
- Flexible, compliant systems
- Stiff arms, capably of delivering process tools
- Fully steerable along their length
Snake-arm robots

Remote Access Non Destructive Examination

- USAF Aircraft Structural Integrity Program required inspections inside wingboxes often requires structural disassembly or inspectors
- Development of a remote inspection tool to deliver NDI sensors to critical hard-to-reach areas within open-cavity aircraft structures
- Versatile design for deployment in various aircraft, ranging from large to small and differing inspection modalities.
RANDE program
Remote Access Non Destructive Examination

- 3” access holes
- Remove inspectors from confined hazardous spaces
- Improve stability to deploy NDI tools
- Reduce time for inspection by removing need to disassemble aircraft
- Reduce risk of damage due to dismantling
Snake-arm Robots

Mobile snake-arm robot

- 2” diameter
- Mobile robotics to explore human scale environments
- Omnidirectional vehicle used to deploy snake-arm
- Over 2m reach beyond vehicle footprint
- Tether free control
Snake-arm Robots

Long reach

- >3” diameter
- Reach up to 16”
- Payloads up to 44lbs
- Repeatable motion and precise tip motion
- Tools include:
  - Cameras
  - Welding
  - Laser cutting
  - Water jetting
  - Grippers
  - Eddy current/UT
  - Vacuum
  - Torqueing
Snake-arm Robots for Nuclear Applications

LaserSnake

- Nuclear decommissioning
- Reduce frequency of human intervention
- Deliver single sided non-contact cutting by fibre laser
- Remotely operated
- Lower fume than other hot cutting methods
Snake-arm Robots

SeeSnake

- Radiological characterisation of complex nuclear spaces
- Orthogonal LIDAR used to produce a 3D environment map
- Gamma sensor obtains radiation information
- Software used to calculate radiation levels within the environment
Snake-arm Robots

JetSnake (Construction)

- Cleaning and inspection in Tunnel Boring Machine (TBM)
- Robotic intervention to reduce frequency of human interventions
- High-pressure cleaning
- Pressurised environment
- Visual inspection of cutting heads
- Profilometry of cutting disks

Two 4.2km subsea tunnels will be excavated using the world's largest TBM
Snake-arm Robots

• Offline pressure vessel inspection
• Industry wide aim to reduce human inspection
• Deliver visual and NDT systems
• Adaptable to cope with varying internal environments
Snake-arm Robots

Integration – complete solutions
Snake-arm Robots

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