

Snake Robots: Market Shares, Strategies, and Forecasts, Worldwide, 2015-2021

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Abstracts

Confined spaces exist. A confined space exists because of a lack of ability to take apart or dismantle components. Confined spaces exist in nuclear reactors where radiation is dangerous for human, aircraft inside the wings and other small spaces that need to remain intact, the human body which likewise cannot be dismantled easily, industrial processing plants that have containers, underwater environments, ship-building, and space. Buildings, roads, pipelines and other man-made spaces all have confined spaces. The world is full of awkward confined spaces.

Snake-arm robots are self-contained portable devices and extensions to existing systems. These products build on software and hardware technology.

Snake robots used for small space access, inside airplane wing access, first responder tasks, and surgery: They are used for going where nothing else can go. Snake robots provide systems that significantly improve traditional open surgery by consolidating the number of minimally invasive access ports to one and eliminating open surgery.

The automated process revolution has come to robotics, used in surgery, industry, ships, airplanes, first responder help, and communications. Automated process is being implemented via robots. Robots are automating systems, providing significant improvement in the accuracy of surgery and penetration of spaces that were previously impenetrable.

According to Susan Eustis, lead author of the study, "A confined space needs long smooth snake shapes to achieve access. Confined spaces exist by design (aircraft engine), by failure (collapsed building) or naturally (human body). Existing open surgery can be replaced in large part by robotic and minimally invasive surgery (MIS). Minimally invasive surgery MIS, drug therapies, radiation treatment, and emerging interventional

surgical approaches complement robotic surgery techniques as a replacement for or complement to open surgery. The snake robots reduces the number of ports needed to gain access and repair the heart.”

According to Susan Eustis as she continued: “The companies that get an early foothold in the market have significant strategic advantage. The robotic snake leverages a new technique for robotic movement that benefits users by providing efficient access to difficult spaces. This factor is driving demand for snake robot systems. Since robotics provide a precise, repeatable and controlled ability to perform procedures in tight spaces, they are increasingly in demand.”

During a robot assisted surgical procedure, the patient-side cart is positioned next to the operating table with the electromechanical arms arranged to provide access to the initial ports selected by the surgeon. Metal tubes attached to the arms are inserted through the ports, and the cutting and visualization instruments are introduced through the tubes into the patient’s body. The surgeon performs the procedure while sitting at a console, manipulating the instrument controls and viewing the operation through a vision system. When a surgeon needs to change an instrument the instrument is withdrawn from the surgical field using the controls at the console. This is done many times during an operation.

The aging US population has supported demand for robotic surgical instruments, since the occurrence of health issues that require medical devices is higher in the elderly population. Buoyed by strong demand and sales, industry profit margins have increased. Snake robot device markets at \$33.6 million in 2012 are anticipated to reach \$2.3 billion by 2019 as next devices, systems, and instruments are introduced to manage access to difficult spaces through small ports when large openings are unavailable or inconvenient.

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