Milling robot does the messy job of clearing blocked drainpipes

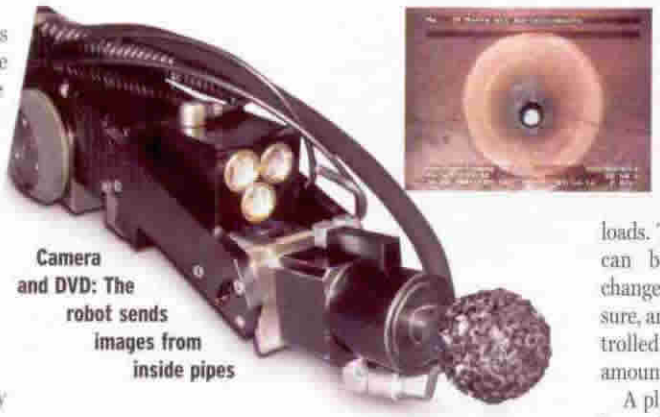
Robot is driven by a robust air motor that is suitable for use in extreme environments

A resilient milling robot has been developed to carry out the dirty work repairing drainage pipes, eating through any obstacle in the drain networks.

Use of the robot has the potential to reduce traffic congestion caused by digging up roads, as drainage pipes can be repaired rather than replaced.

The EU Robot 150 milling robot is made by German firm BRM. It is inserted through a manhole into the defective drainpipe. It can clear debris, straighten pipe sockets, and bevel protruding supports. The operation is monitored by a camera and documented on DVD.

The robot is fitted with a Deprag Schulz air motor. Deprag said air motors are ideal for extreme conditions because they are robust and take up very little space.



Camera and DVD: The robot sends images from inside pipes

The air motor which drives the milling head is only 118mm long and 57mm wide. It has a power output of 600W, nominal torque of 0.95Nm and speed of 12,000rpm. Deprag said it takes up a third of the space and a fifth of the weight of a comparable electric motor.

The air motor is based on a simple principle: the air pressure created by a compressor produces the rotation of the motor. In a vane motor the rotor turns in the eccentric cylinder. In its slots are vanes which are forced outwards by the centrifugal force produced. Work chambers are created for the expanding air pressure and through this expansion of the compressed supply air the pressure energy is transformed into kinetic energy and rotation is produced.

The performance delivered by the air motor is almost constant at various speeds. It can then also be operated with a wide variety of changeable loads. The motor performance can be altered through a change in the operating pressure, and the speed can be controlled by reduction in the amount of air supplied.

A plus-point for application in a milling robot is the power density of the drive. Additionally air motors can be loaded until standstill.

If the mill head does come up against a seemingly unconquerable obstacle and sits fast, then no damage is done – if overburdened, the motor just stops. When the load is removed it can run immediately again and this can occur repeatedly even in high duty cycles.

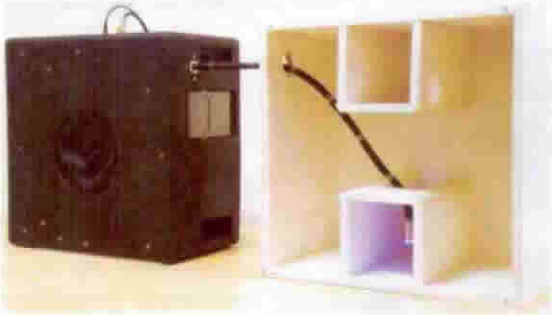
Tiny snake-arm robot wriggles into confined spaces

OC Robotics has developed a snake-arm robot that is only 12.5mm in diameter.

The arm is the smallest on a snake-arm robot to date and uncoils out of a briefcase-sized box where it is stowed.

The robot is 610mm in length, with longer arms under development. It was designed for the US Department of Defense which needed a way of inspecting and working inside confined or cluttered spaces. OC has delivered the first device and it is now under operational evaluation.

Snake-arm robots have flexible arms without elbows, so they can follow their nose into confined spaces. Conventional industrial robots are virtually impossible to manoeuvre in cluttered places because their elbows get in the way. At the other end of the scale, endoscopes are very flexible but are also floppy and it can be difficult to make them go where you want them to, especially if the path is particularly complex. OC says that snake-arm robots are flexible and compliant, like endoscopes, but they are fully controllable like a robot and can be precisely positioned.



Reptilian robot: Slithers out of a box that holds the batteries

The latest snake-arm is deployed out of a fully portable box weighing 10kg excluding internal batteries. Power is supplied via mains, external battery or internal battery. The device is joystick-controlled via a laptop. At the tip of the arm is a camera and tool.

OC said that, in addition to military uses, the scale of the device is also suitable for minimally invasive surgery.

Device gets workpiece in position accurately

Schunk Intec has developed a device that it claims can even out tolerances such as positioning inaccuracies by robots, or deviations between the nominal and actual position of a workpiece.

Schunk's AGE-F compensation unit dispenses with pneumatic components and uses springs to permit a defined amount of flexibility. The system has three different spring firmnesses available for each size.

Additionally, this can be preloaded to specific values using a setscrew. The AGE-F can be flexibly adapted to the application by selecting and setting the springs.

Without compensation, unavoidable deviations mean either the robot or workpiece has to deflect, giving rise to high forces, which can damage machines or workpieces.

Because the Schunk device operates purely mechanically, it is flatter, said the company, making it "especially suitable" for use in compact spaces. It is also equipped with junction roller guides rather than sliding guides, making it less susceptible to tilting and able to move easily.

This means, said Schunk, that force can be applied over a longer travel distance. Grippers can be used with longer fingers.

The AGE-F has an ISO flange pattern for attachment to the robot flange, and also can screw on grippers such as the Schunk PGN+ and PZN+ directly without an intermediate plate.

The position on the X and Y axes is acquired by two teachable proximity switches, each of which can interrogate two positions.