

## Press Release

### Drainage repair system

**Drainage repair is a challenge for underground engineering specialists. A common scene used to be that of stressed excavator operators, annoyed residents and impatient drivers. Today however, modern restructuring concepts leave torn up road surfaces a thing of the past. A resilient milling robot can carry out the dirty work in drainage pipes. Extremely small and also extremely tough, it eats through any obstacle in the drain networks.**



Now the digger can stay in its depot, as digging for days on end is no longer necessary. Defective drainage pipes are not replaced but restored. The milling robot used by Bodenbender GmbH located in Hessen for their PL-Inliner drain sanitation system is a type EU Robot 150 made by BRM GmbH in Biebergemünd. It is inserted through a manhole into the defective drain pipe. Now the preliminary work can begin for perfect repair. Debris is cleared, pipe sockets straightened, protruding supports beveled and in-growing roots removed. The entire operation is monitored by the inbuilt camera and documented on DVD.



What kind of motor can perform these high performance tasks under extreme conditions? DEPRAG Schulz GmbH & Co. in Amberg is a leading supplier of air motors. They have developed a little powerhouse within the milling robot which never gives up, even when confronted the worst imaginable filth. Air motors are ideal for use in extreme conditions due to their construction. They are extremely robust and take up very little space whilst being highly powerful and are also totally reliable.

The air powerhouse which drives the milling head of the Bodenbender GmbH milling robot is only 118mm long and 57mm wide. A power output of 600W, nominal torque of 0.95Nm and speed of 12,000rpm all make this drive ideal for application in the smallest spaces. It only takes up a third of the size 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 following occurs: The rotor turns in the eccentric cylinder. In its slots are vanes which are forced outwards by the centrifugal force which is 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 which is 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 big plus-point for application in a milling robot is the power density of the drive. It is also at home in the smallest of pipes! Additionally air motors can be loaded until standstill! If the mill head does come up against a seemingly unconquerable obstacle and sits fast, then this is no problem for the air drive. If overburdened the motor just stops and does not incur any damages. When the load is removed it can run immediately again and this can occur repeatedly even in high duty-cycles. When using an air motor work does not stop because of overburdening or motor damage.

Helmut Pfeifer, application engineer at Bodenbender GmbH, is very satisfied with DEPRAG's air vane motor: "Their efficiency under the most extreme conditions in drainage pipes is unsurpassable". This brings us to a further advantage: air is a fundamentally unproblematic energy source. There is no danger from electrical wires or any other kind of electricity, or of short circuits. An anti-corrosion coating is added to protect against adverse conditions in the wet and aggressive dirt of the drainage pipes. An additional bonus is that the air is supplied to the air motor before the milling robot dives into the drains. In this way the motor, through internal high pressure, has already sealed itself and dampness and dirt particles have no chance of penetrating in.



Once all milling work has finished and the drain cleaned, the next step in modern sanitation can be taken. A liner hose is cut to the correct length of the section of drain which needs clearing by the PL-Inliner system of Bodenbender GmbH. It features a needled felt weave and is externally coated with a PVC layer. The hose section is filled with CombiTec epoxy resin on-site and run through an impregnation table so that it is evenly spread out.



Next the prepared liner is rolled in an inversion drum. Using a precisely fitting washer, the end of the hose is fixed to the drum and 0.4 bar pressure is blown into the defective pipe during the inversion process. Now the needle felt weave is coated with epoxy resin is on the outside and the coated side of the liner is inside. Next the inverted liner is filled with hot water and the resin reacts. 90 minutes later the liner hose can be removed from the drum and the sanitation is finished. By means of the ball head miller, the milling robot cuts through any excess which is stuck together.

Bodenbender GmbH located in Biedenkopf-Breidenstein in Hessen has been active in drain servicing technology for over 30 years. Drain sanitation and TV monitoring are as much a part of their extensive service range as innovative drain sanitation technology like the PL-Inliner system. Badly damaged pipes, difficult intersections and bend sections can be inserted quickly and without using an excavator or digging, thereby saving costs.

All materials and machines "are designed from experience and constantly improved upon", explains Helmut Pfeifer. "That makes the collaboration with professional partners such as DEPRAG irreplaceable ". DEPRAG located in Amberg regularly creates innovative solutions for their client's wishes. "85% of all our projects are special solutions. We offer individually designed standard motors even in small quantities at the client's request, from special motors up to fully automatic production systems", explains Product Manager Dagmar Hierl.

The standard motors are combined with various gear designs: planetary gears, spur gears, or worm gears. The spectrum of client specific motor solutions offered by the company includes non-ferrite motors made from materials such as glass ceramic and plastic.

The international leading supplier of air motors, automation and screwdriving technology with a team of 600 employees, provides full service for almost every branch of industry globally. Their core business is concentrated on the manufacture and development of air motors for every application. Decades of experience enable the DEPRAG engineers to provide valuable support for their clients in the customization of motor design.

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