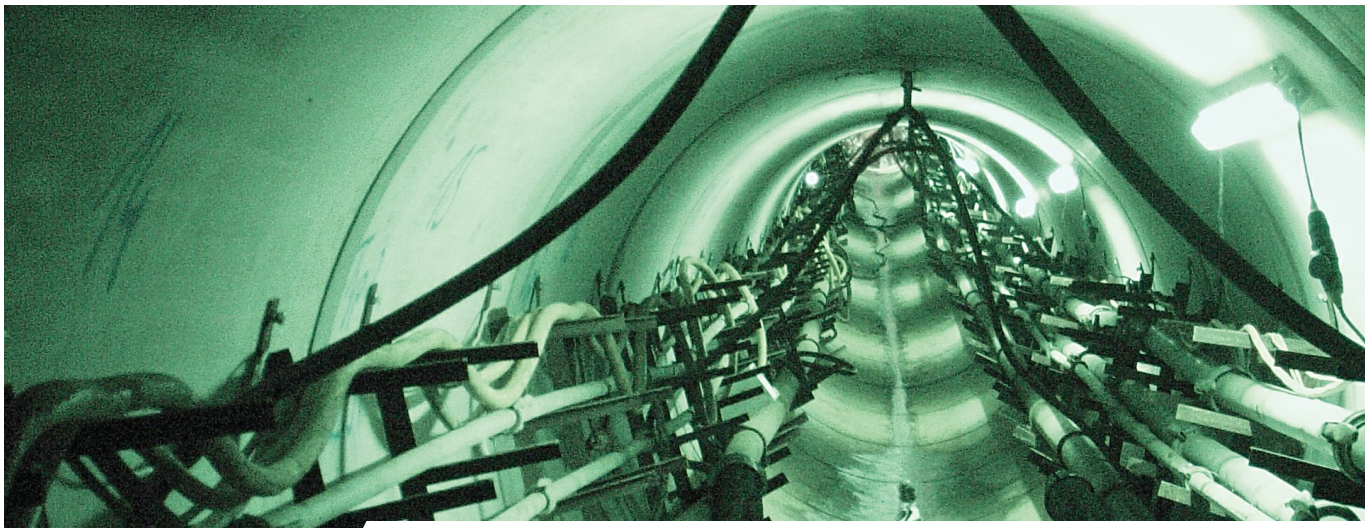

RESEARCH & DEVELOPMENT

Machines & Components

- Multi-mode TBM
- MH Box Machine
- Pipe Express
- E-Power Pipe
- ISP
- Mud pump monitoring system
- Bentonite lubrication system
- DCRM
- Erector simulator

New applications

Energy-efficient TBM

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00 Your Selected Files

Bentonite lubrication system

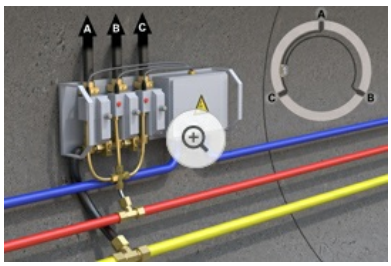
Bentonite lubrication system

More effectiveness in pipe jacking thanks to direct bentonite control

The volume-controlled bentonite lubrication system makes it possible to introduce the bentonite into the annular space in a very precise and targeted manner. The tunnelling route is supplied with defined injection volumes exactly to the meter. Wasted excess injections and dangerous under-supplies are this excluded. Providing a targeted primary supply to the tunnelling machine prevents the lubricating film from being interrupted. In this way, the pipe string lubrication can be optimized and tunnelling carried out more efficiently.

Controlled bentonite lubrication without excess or under-supply

One important factor for securing successful tunnelling is to reduce the pipe skin friction using bentonite. In order to create a continuous lubricating film in the annular space, the annular space has to be filled as early as possible with the correct quantity of bentonite.



Improvement: The bentonite lubrication is no longer a matter of manual control but is regulated atomatically and precise.

Furthermore, it is also important to maintain and keep up the supply of bentonite lubricant along the entire pipe string. With the previous bentonite lubricating system, this could only be done manually by skillfully setting the "automatic cycles" and under continuous monitoring. The new volume-controlled bentonite lubricating system does this automatically.

Depending on the tunnelling advance rate and the geology, the volume-controlled bentonite lubricating system injects the bentonite in the required quantities to the corresponding places in the pipe string. The automatic release of defined quantities of bentonite for the individual sections thus avoids an over- and under-supply and secures efficient lubrication.

In addition, the system offers additional functions, such as the interactive pipe sequence plan, the calculation and presentation of the specific skin friction as well as the option of controlling four lubrication cycles at the same time. Because of the additional pressure sensor for every bentonite line, the operator receives more information about the bentonite pressures in the lines in the tunnel and therefore has a better overview of the injection pressure at the bentonite outlets. The pipe sequence plan and the route plan with the bentonite quantity distribution can be printed out at the press of a button.

More benefits: More data, more controls, more options.

Another advantage of the volume-controlled bentonite lubrication system is its compatibility with the components of the previous bentonite lubrication system. Already existing data cables, flow meters and bentonite pumps can be used by the new system without problem. The tried and tested control of each bentonite valve per bentonite line also enables the direct allocation of the individual injection quantities that are determined by the flow sensor.

Quality through defined quantity

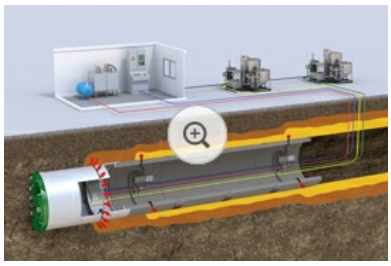
For the volume control, the tunnel is first of all sub-divided into sections. Every section is allocated a specific volume of bentonite to be injected. A difference is made between:

- the initial injection directly next to the machine in order to fill the annular space, provide support and lubricate the pipe, and
- the subsequent injection into every third to fifth pipe in order to maintain and keep up the lubricant film that has been established.

As soon as a bentonite station is moved into a route section for which a target value has been entered into the system, the respective volume is injected automatically. A priority calculation sets the order in which the valves are to be supplied. All injected volumes are registered at their specific location so that you can trace how much bentonite has been introduced at what point along the route.

Flexibility for optimizing and expanding the application range

The feature of allocating certain injection volumes per route section makes it possible to adjust the bentonite lubrication precisely to the underground conditions, even in different ground types, e.g. gravel, sand or clay. By blocking partial areas of the route or horizontal areas (e.g. tunnel roofs) allows you to react to special circumstances such as traveling through intermediate shafts or minimizing blowouts at critical positions.



Overview Bentonite lubrication system.

The new system allows for the supply of up to four lubrication cycles and/or bentonite lines at the same time. This option extends the application range on extremely long tunnel stretches, very large diameters and in very special underground conditions. As such, on long tunnelling stretches, the optimum supply to individual sub-sections can be guaranteed by using several bentonite supply lines, as it is possible to open several valves simultaneously. When tunnelling with very large diameters, the advantage here is that several bentonite stations can be installed at one position which act functionally like one single bentonite station. This makes it possible to use more than three usual bentonite outlets per pipe cross-section. By using a lubrication ring on the shield, bentonite can be injected around the entire circumference, which allows to create a highly effective lubricant film.

ADVANTAGES OF THE SYSTEM AT A GLANCE

- automatic volume-controlled distribution of the bentonite along the route
- quantities can be set for different underground conditions
- up to 4 bentonite supply lines and pumps can be controlled simultaneously

- all data saved (injection quantities, pressures, distribution, etc.)
- additional pressure sensor in the tunnel
- functional pipe sequence plan
- skin friction is displayed
- simple printout of the route plan with bentonite quantity distribution

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