



Press Release

HERRENKNECHT Winning in the long run

Faster and more efficient progress with continuous tunnelling

August 26, 2022

Herrenknecht AG is implementing a next innovation boost for the mechanized production of high-performance tunnel infrastructure in all common soft ground constellations (soft ground formations with or without water-bearing layers). Using the latest high technology the continuous tunnelling process leads to a significant reduction in construction times for longer tunnel sections. This new development, which is being used in a high-impact mobility project in Europe, has been nominated for the bauma Innovation Award 2022 in the "Machine Technology" category.

Up to now mechanized tunnelling with shield machines in soft ground has always been a stop-and-go sequential process. Each excavation stroke is followed by the ring building sequence, so that the excavation has to pause and the subsequent driving cycle be only started when the next segmental ring has been completely installed. The interruptions to tunnel advance in soft ground formations caused by these sequential operations costs time when viewed over longer distances. In contrast, a continuous tunnelling process in which the machine can continue excavation while the lining rings are being installed can contribute to considerable savings in construction time. For this purpose, Herrenknecht engineers designed a process based on the latest technologies and engineering.

It is a significant step forward. The new continuous tunnelling system, developed by the engineers at the Schwanau tunnelling machine manufacturer, achieves a notable increase in efficiency during tunnel construction. Particularly in the case of longer tunnel sections, continuously organized tunnelling leads to measurable savings in construction time.

Basic principles of continuous tunnelling

With regard to tunnelling, the innovation facilitates the following process sequence: In continuous tunnelling, those thrust cylinders that push the machine forward during advance take over the force share of those cylinders that are retracted for ring building.

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To ensure that the machine reliably maintains on course under these conditions the center of thrust resulting from the combined driving forces of the applied thrust cylinders must remain unchanged in its position. At the heart of continuous tunnelling is therefore a powerful computer system and process-specific software programs that can precisely calculate the necessary pressures in the thrust cylinders. It ensures that the machine operator can reliably control the tunnel boring machine along the specified alignment as before.

Safe control in continuous tunnelling

In continuous advance, the machine operator no longer controls the pressures in the thrust cylinders manually using rotary controls (potentiometers) on the control panel. For this purpose, Herrenknecht has newly developed the Center of Thrust (CoT) system, which helps the shield operator to precisely control the machine. It consists of a display panel that shows the operator the current position of the center of pressure and on which he selects the desired position of the center of thrust. The corresponding control of the thrust cylinders is handled by the algorithms in the computer system. Compared to manual control by potentiometers, the CoT offers the prospect of maintaining the specified alignment more efficiently and effectively. The CoT system can thus make a sustainable contribution to the economic efficiency of the construction project in addition to the quality of the underground structure.

Faster thanks to advanced Herrenknecht technology

With continuous tunnelling, an increase in total tunnelling performance of up to a factor of 1.6 can be achieved compared to the previous discontinuous method. This can lead to a significant reduction in construction time for long tunnels. The unique feature of Herrenknecht's solution is that continuous tunnelling can be used on all machine types in soft ground.

The continuous tunnelling method is being used in the major High Speed 2 project – a new rail link between London and Birmingham. Herrenknecht will present continuous tunnelling at bauma in Munich (October 24 to October 30, 2022, booth C3.447).

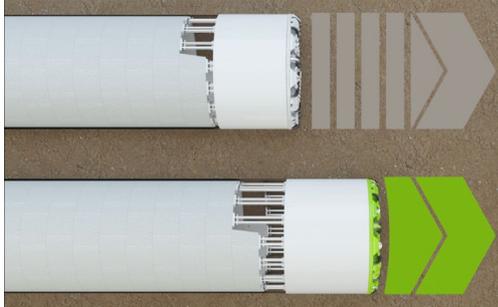
Pictures

Continuous tunnelling

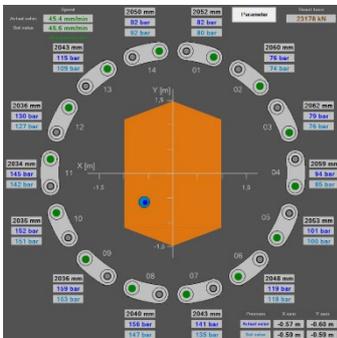
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**Picture 1**

With the functional principle of continuous tunnelling, an increase in the total tunneling performance by a factor of up to 1.6 can be achieved compared to the previous discontinuous method.

**Picture 2**

The shield operator controls the tunnel boring machine by setting the center of pressure on the new type of control panel. (example presentation)

For further information: Contact us.

Herrenknecht AG

Herrenknecht AG is the only company worldwide to deliver tunnel boring machines for all geologies and in all diameters – ranging from 0.10 to 19 meters. The product range comprises tailor-made machines for traffic, supply and disposal tunnels, technologies for pipeline installation as well as additional equipment and service packages. Herrenknecht also manufactures drilling equipment for vertical and inclined shafts as well as deep drilling rigs.

In 2021 the Herrenknecht Group achieved total output of 1,185 million euros. The independent family business employs about 5,000 people worldwide, including approximately 200 apprentices and trainees. With around 70 domestic and overseas subsidiaries and associated companies working in related fields, Herrenknecht provides comprehensive, fast and targeted services close to each project and contractor.

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