



## 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

### KNOW-HOW

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### 00 Your Selected Files

 Erector simulator

 Erector simulator data sheet

## Erector simulator

### Quicker and safer ring building with optimally trained personnel

The Herrenknecht [erector](#) simulator is used to train the operators in handling the erector and optimizes tunnel construction processes while personnel safety is improved and costs and time are saved. This Herrenknecht innovation makes it possible to train the operators at any time outside of actual [tunnelling](#). The virtual environment is adapted to the jobsite situation and the control elements are identical to those on the real control panel on the [TBM](#).

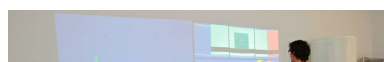
### Ring building without a TBM

Being able to use the erector's control panel with skill makes it easier to position the segments, which weigh tons, to their planned destination. Work safety during ring building is greatly increased if the delicate erector movements can be coordinated by shouting instructions while the operator keeps his eye on the segment.

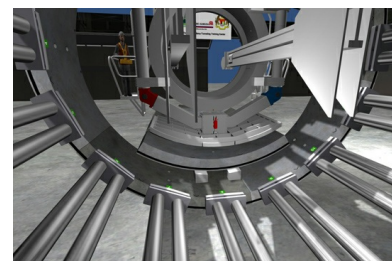
If no simulation was available, working in the control panel in the segment erector could only be trained during real tunnelling. With simulation, considerable savings in time and money are achieved, as the TBM no longer has tunnelling downtimes due to training. Herrenknecht erector simulation provides a solution here, as new personnel can be trained or their skills tested independently of tunnelling operations.

The Herrenknecht erector simulator is already in use on the Crossrail project in London (UK, 8 TBMs). It is being implemented to instruct the segment erector personnel.

### Training center ensures skilled use of the erector



It is much easier to instruct the segment erector personnel as real jobsite conditions can be



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**Training** enhances safety and reduces costs.

simulated in line with specific projects. Away from the tunnel jobsite, a specially designed training center teaches the ring building team and the segment erector personnel basic knowledge about the ring building process and the movements of the segment erector. Skillfully operating and controlling several degrees of freedom (3D movements, speed) improves fine motor skills when handling the joystick on the

control panel. In addition, during simulation, the operating personnel train their handling of degrees of freedom (proportionally and digitally), the jacking cylinders, segment feeder and the erector's vacuum suction plate.

The control elements and the displays on the simulation control panel are adapted to the specific project and are absolutely identical to the original control panels on Herrenknecht tunnel boring machines. Basic knowledge about the ring building process is taught by experienced trainers on site to give trainees an understanding of the interplay between the actual segment position, the directional position of the tunnel boring machine and the target tunnel route.

FUNCTIONALITY	ADVANTAGES
<ul style="list-style-type: none"> <li>› onsite electricity and/or voltage supply is sufficient</li> <li>› original control panels from different manufacturers are used</li> <li>› the control panel can be used on the real tunnel boring machine without adjustment</li> <li>› project-specific display of the virtual environment (machine layout, segment division, segment design)</li> <li>› specially-equipped and respectively configured PC including simulation software</li> <li>› onsite installation of all components in the simulation environment</li> <li>› control of ring building quality by visual display of every single actual to target segment position</li> <li>› the operating personnel can move freely within the virtual environment</li> </ul>	<ul style="list-style-type: none"> <li>› personnel are trained on the erector control panels</li> <li>› training can be done independent of tunnelling operations without time limits</li> <li>› work safety is improved due to skilled operation of the control panel</li> <li>› project-specific instruction of the operating personnel prior to the start of tunnelling</li> <li>› quick familiarization with work cycles and short ring-building times at start of tunnelling</li> <li>› digital records of the ring-building process enable a subsequent analysis of training results</li> </ul>

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