



NAVIGATE Tunnelling

TUnIS Navigation Double Shield is a navigation system specially designed for Double Shield TBMs. Based on a total station and a target unit mounted inside the TBM shield the navigation system determines the actual TBM position.

TUnIS Navigation Double Shield

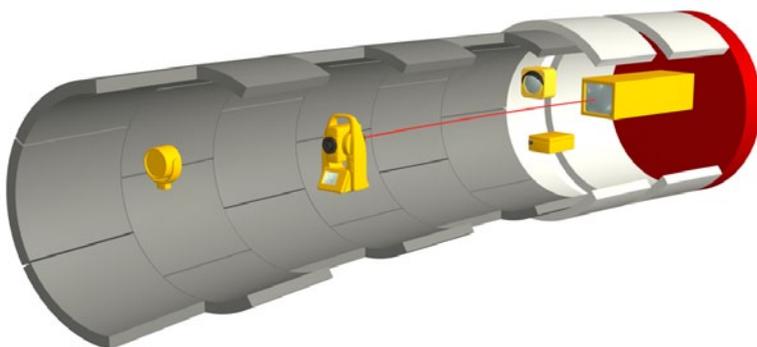
The system is equipped with additional sensors and software modules to comply with the tough conditions of hard rock tunnelling and the special geometry of Double Shield TBMs.

All hardware components are designed for the demanding use in a tunnel. A visible laser beam (Class 3R) between the total station and the target unit is used for calculation. The measurements to the shutter prism and the sensor data from the

external 2-axis inclinometer are used to calculate the gripper shield axis.

The system furthermore provides full documentation of the advance-data in a database. This database is the basis for reports, data exports (XLSX, CSV) or other analysis. The high information content of the indicated data ensures an optimal control of the machine position to guarantee an even advance with small deviations from the designed tunnel axis. The position and tendencies are continuously indicated to the shield driver. Thus control of vertical and horizontal curves is precise and simply to realize at each time. Roll differences between front shield and gripper shield will also be calculated and displayed.

*TUnIS Navigation
Double Shield schematic*



TUnIS Navigation Double Shield

It is also possible to visualize the tunnel boring machine as on a top view or a side view. The background pictures representing aerial and satellite image as well as drawings. Thereby possibilities are given to visualize the progress of the project in relation to configurable views and to realize critical project situations graphically.

Advantages

- Determination of position in real time
- Space saving installation of components because of active target unit
- Easy handling of relocating the total station minimize working time

Features

- Field of application:
Large tunneling with Double ShieldTBM
- Precise automatic calculation of TBM-position
- Control of roll differences from gripper- to front shield
- Continuous and permanent visualization of positions
- Software routine for relocating total station
- SPS connection for various types/producers

Another mode of visualization is the display as “Track Chart” which shows all calculated positions of the Gripper shield.

Options

- TUnIS Ring Sequencing
- TUnIS Navigation Office
- Information System IRIS.tunnel
- Ring Convergence Measurement System RCMS
- Ring Documentation System SDS
- Semi-automatic tail skin clearance Measurement System GAPtrix
- Automatic tail skin clearance Measurement System SluM
- Grout Pressure Sensor System GPSS
- Telecommunication System TCS

The visualization can be used to analyze the machines’ drift, which can be used to compensate the steering and in ring selection.

A significant assistance offers a TUnIS software routine for automation and reporting the relocating the total station. This procedure is of big advance especially in machines with limited or small laser windows as even at short-time interrupts of the laser beam it is possible to calculate the position and indicate it to the machine driver continuously.

