

TAUROS TBM Guidance System

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HIGHLIGHTS

- Ongoing calibration of the TBM and thereby the opportunity for corrections during the stroke
- Continuous documentation of the drive process by recording each individual measurement in the form of a machine position diagram
- Wireless modem link to the total station
- Remote control of the system via network interfacing
- Fully automated laser launching procedure



Motorised totalstation on console

Field of Application

The system serves to determine the position of tunnel boring machines using automatic calibration of pre-defined reference points with known positions in the machine coordinate system. Signalling is by means of optical targets (motor targets) which can be covered. The flexibility of the system renders it particularly useful as a retrofit to existing TBM's.

System description

The heading control has a positional accuracy of 1 - 2 cm. Two to six targets are used to determine the machine position. The targets are covered to avoid target confusion, i.e. to ensure automatic target recognition and are only uncovered during the measurement period.

An inclinometer is used to measure the machine roll in systems with two targets. Consoles are used for instrument positioning and these positions can, if necessary, be re-determined or checked in the course of the measurement, using the free stationing principle. Communication with the total station can be via cable or radio connection.



Covered targets on TBM

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The EUPALINOS software package is the software-related part of the TAUROS system and contains all the calculation and management functions necessary to control the heading. Various options are available to display the machine position diagrammatically. The heading measurements can be immediately analysed on site using a strict net adjustment.

Procedure

The measurement procedure comprises the following steps:

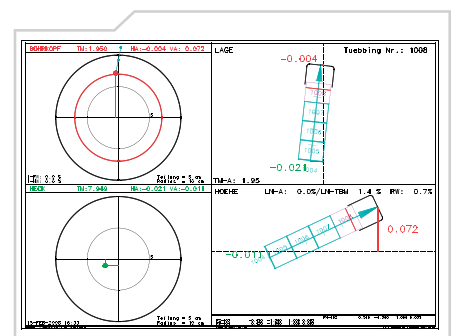
- Checking communication between total station and PC
- Setting all the necessary parameters in the total station (addition constant, compensator status, etc.)
- Checking and recording the inclination of the vertical axis
- Connection measurement and determination of the position parameters (orientation constant and, if applicable, coordinates and height of the position)
- Calibrating the TBM reference points
- Recording all the measurement and analysis results
- Graphic representation of the axis files for the cutting head and gripper level
- Extrapolation of the machine position for the following strokes

The time required for a calibration and analysis is between 12 and 45 sec., depending on measuring mode. In continuous measuring mode, the measuring interval can be shortened to 12 – 15 seconds.

Online deformation measurements as well as automatic or manual profile checks can, in addition, be executed and analysed.



Control computer in driver's cab of a TBM



Visualisation of position of cutter head and gripper



Documentation of cutter head position

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System components

- Leica total station TPS1000, TPS1100 or TPS1200
- Control computer with Touchscreen + SPS
- Motor targets
- Wireless modems
- Inclinometer (optional)
- Power supply unit for total station and wireless modem
- Software EUPALINOS

The following other data sheets are associated with this data sheet:

Services: *Heading Survey*
Software: *EUPALINOS Surveying Software*