

TAUROS Roadheader Guidance System

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HIGHLIGHTS

- Calibration of the roadheader from the driver's, after each position change
- Updating the cutting head position several times per second
- Controlling the heading with a profile accuracy of 2 - 3 cm
- Configuring the system for arbitrary machine and cutting head geometries
- Optional limitation of the cutting head movement
- Full documentation of the machine calibration



Steering of a roadheader at the CERN project

Field of Application

The system controls roadheaders, using automatic calibration of pre-defined reference points with known positions in the machine coordinate system. Signalling is by means of targets (motor targets) which can be covered. The flexibility of the system makes it adaptable to machines of any type and from any manufacturer.

System description

The reference points are measured by means of 3 – 4 special covered targets (motor targets) which are only uncovered during the measuring interval. In this way, target confusion can be prevented, ensuring automatic target recognition. Consoles are used for instrument positioning and these positions can be determined or checked using the free stationing principle.

The local position of the cutting head is determined in accordance with the kinematic relationships established from displacement transducers and transformed into the project coordinate system. The stability of the position can optionally be monitored with a 2-axis inclinometer.



Roadheader with TAUROS guidance system during construction of the Achrain-tunnel, Austria

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All measurement and evaluation options are controlled by an industrial PC on the machine, which is in turn linked to a PLC or to the total station via serial link or wireless modem. The TAUROS roadheader control software is part of the EUPALINOS software package and contains all the calculation and management functions necessary to control the heading. The heading measurements can, among other, also be analysed immediately on site, using a strict net adjustment calculation.

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 roadheader reference points
- Recording all the measurement and analysis results
- Determination of local cutter-head position from measurements with displacement transducers
- Colour-coded presentation of cutter-head position in the profile

The lead time for one measurement with evaluation after changing the machine position is approximately 45 sec. The subsequent indication of the cutter-head position happens several times per second.

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



Control computer and motortarget on driver's cab

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System components

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



Robust system components for reliable operation under rough site conditions

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

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