

# Total Station Navigation

## Technical specification



Optional method for precise navigation of the face drilling rig or the bolting rig in a tunnel.

## Introduction

Navigation is one of the most time-consuming and error prone activities in the tunnelling cycle. By automating this process the set-up of the rig can be done by the operator alone. The tunnelling cycle does not have to wait for the surveyor to come out and deploy the rig. With the Total Station Navigation the effectiveness of the tunnelling cycle will improve, as will the quality of the navigation.

## Features

- Navigation can be performed by the rig operator
- Navigation is confirmed on the operator's display unit
- Navigation is fast, 1–5 minutes, compared to 30 minutes with manual methods
- Navigation has better accuracy than  $\pm 1$  cm (rig origo)
- Navigation is easily verified
- Surveyors must not be present at every navigation
- Drilling, positions and logging data are navigated and reported in tunnel coordinates

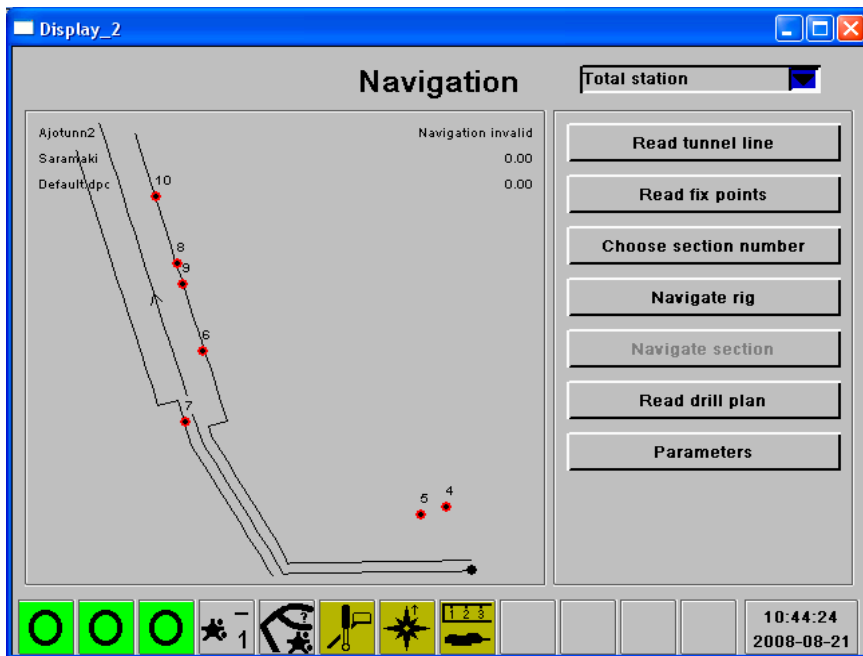
## Functions

### » Total Station Navigation usage

- Tunnel lines and fixpoints are prepared at the site office (in Tunnel Manager) and transferred to the rig
- The appropriate tunnel is selected and the tunnel geometry and available fixpoints are confirmed
- The tripod is set up behind the rig by the operator
- When the navigation is activated, the rig prisms and fixpoints prisms in the tunnel are automatically detected by the Total Station and the rig is navigated.
- The navigation is confirmed with a close-up picture of the active drill plan in the tunnel.



Communication between the Rig Control System, the Total Station, prisms mounted on fixpoints and prisms mounted on rig.



Display in the Rig Control System showing the navigation of the rig.

## Components

- Navigation sensor consisting of a Total Station (Power Tracker) on a tripod
- Two or three prisms mounted on the rig (depending on rig model)
- Two prisms to be mounted on known fixpoints in the tunnel
- RCS hardware & software upgrade for Boomer or Boltec rig

## Specifications

- General navigation accuracy (rig origo) ..... ±1 cm\*
- \*Positioning accuracy for the drill bit is dependent on the calibration of the drill rig

## Requirements

- Rig with Rig Control System of version:
  - RCS 3.6 or later for Boomer
  - RCS 3.0 or later for Boltec
- The rig should be equipped with the following optional functionality:
  - Boomer: Advanced Boom Control, ABC Regular or ABC Total
  - Boltec: Bolt Plan Navigation
- Fixpoints and tunnel line defined with correct coordinates in Tunnel Manager Pro or Tunnel Manager MWD

