



## SURVEYING & ROUTING

### Provides a solid foundation for further design activities

#### Description

Track surveying carried out by track and turnout experts provides the as-built geometry of the horizontal and vertical alignment of track and turnouts for comparison with the design values.

Based on this information, rail and turnout optimization can be carried out in the following design processes, which leads to major improvements of track and turnout driving dynamics and to a significant reduction in turnout costs.

Setting out the track and turnout design immediately before installation also leads to major benefits regarding accuracy and installation time.

#### Benefits to the customer

- » Accurate and complete survey of track and turnouts by track and turnout experts
- » All required information for the later design process is collected during the survey process on site
- » Surveying, alignment planning and production from a single source
- » Elimination of interface problems in communication and data transmission



## SERVICE DESCRIPTION

### **Railtrack and topographical survey**

The complete railtracks and the adjacent topography are surveyed through a well-defined procedure.

- » Link to project or national coordinate reference systems
- » Survey of railtracks by using track gauges and adapters
- » Survey of catenary masts and lines, track marking bolts
- » Survey of milestones and kilometer plates
- » Survey of power and signal lines, switch boxes, manholes
- » Survey of walls, fences and surface points
- » Survey of property boundaries
- » Survey of additional points relevant to planning

### **Survey equipment**

State-of-the-art, high-end equipment and special tools for rail track surveying are used.

- » Fully automatic total station
- » Remote control surveying (one-person robotic) functionality for single person survey
- » 3-D Laser scanning functionality for recording catenary lines, tunnel geometries, structures, buildings and for checking clearance
- » Track gauge for 3D track survey
- » Special prism system for track marking bolts
- » Magnetic track measuring angle for 3D track survey
- » Mini-prism pole with reflector
- » Platform edge adapter

### **Automated data flow**

All records are digitally stored and transferred automatically to the survey software center without manual interaction.

Since every surveyed point in the field is measured for high redundancy, the measurements are ...are determined well over safety limits and reliable.

### **Processing**

The survey data is processed in the survey software. Special averaging and adjustment processes (least square adjustment algorithms) provide highly accurate and reliable results and an optimal link of the survey results to the coordinate reference systems.

The resulting coordinates are then available for transfer to the design or alignment planning software.

### **Setting out**

After finalizing the alignment planning and design work, selected points of the newly designed railtracks and turnouts are set out on site immediately before beginning the installation work.

By using the abovementioned special survey equipment and by choosing a proper setup for