Your all in one
Railway Service Provider

ABOUT US
Founded in 1993, the Swiss company terra international surveys ltd. is one of the leading service providers for railway projects. We deliver accurate information fast and reliable. In Switzerland, Europe and aboard, our customers appreciate our quality, experience and know-how in railway surveying.

Our combined expertise in surveying and monitoring allows us to deliver fully integrated services for every requirement and project phase.

YOUR GOAL
Smooth, reliable and cost-efficient railway operation during the entire railway infrastructure lifecycle.

YOUR REQUIREMENTS

Service
Real-time data
Interface to infrastructure maintenance software
Data documentation & inventory

Time
Short lead time
Mobile & customized solutions
Surveys during full rail operation
Track closures not required
Easy data import

Cost Efficiency
Cost reduction through sensor combination
Modern surveying approach

Quality
High reliability
High accuracy & precision

YOUR GOAL
Smooth, reliable and cost-efficient railway operation during the entire railway infrastructure lifecycle.

YOUR REQUIREMENTS

Service
Real-time data
Interface to infrastructure maintenance software
Data documentation & inventory

Time
Short lead time
Mobile & customized solutions
Surveys during full rail operation
Track closures not required
Easy data import

Cost Efficiency
Cost reduction through sensor combination
Modern surveying approach

Quality
High reliability
High accuracy & precision
# Railway Data Acquisition and Monitoring Services

<table>
<thead>
<tr>
<th>SERVICES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobile Mapping</strong></td>
<td>Complete survey</td>
</tr>
<tr>
<td>Broad selection of sensors &amp; data capturing methods</td>
<td>Optimised site specific solutions</td>
</tr>
<tr>
<td>Mobile data acquisition with project specific sensors:</td>
<td>Improved data quality</td>
</tr>
<tr>
<td>- Railhead scanners</td>
<td>Project cost &amp; time savings</td>
</tr>
<tr>
<td>- 3D-Laserscanner</td>
<td>Quick mobilisation</td>
</tr>
<tr>
<td>- 360° camera</td>
<td>Short assembly time</td>
</tr>
<tr>
<td>- Cameras</td>
<td></td>
</tr>
<tr>
<td>- Georadar</td>
<td></td>
</tr>
<tr>
<td><strong>Track Condition</strong></td>
<td>Dynamic Track measurements without Stop &amp; Go</td>
</tr>
<tr>
<td>Measurements</td>
<td>For all gauge widths</td>
</tr>
<tr>
<td>Track gauge</td>
<td>Track positioning in absolute or relative coordinates</td>
</tr>
<tr>
<td>Cant</td>
<td>Multi sensor platforms</td>
</tr>
<tr>
<td>Twist</td>
<td></td>
</tr>
<tr>
<td>Rail Profile</td>
<td></td>
</tr>
<tr>
<td>Alignment</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Level</td>
<td></td>
</tr>
<tr>
<td><strong>Rail Wear &amp; Defects</strong></td>
<td>Significant limitation of defects through early recognition of faults</td>
</tr>
<tr>
<td>Documentation of rail condition</td>
<td>Systematic monitoring of faults</td>
</tr>
<tr>
<td>Detection and classification of defects on rails, sleepers and rail fasteners</td>
<td>Increased inspection quality gives better trend extrapolations and better life cycle management</td>
</tr>
<tr>
<td>Reduced inspection costs</td>
<td></td>
</tr>
</tbody>
</table>

### Surveying Services
- Geodetic control networks
- Mobile mapping
- Clearance Gauge Surveys
  - Clearance gauge of tunnels
  - Clearance gauge of railway structures
- Train collision tests

### Quality Assurance
- High data density & accuracy
- Cost efficient through sensor combination
- 3D-surface model of ballast
- Short lead time
- Surveys during full railway operation
- Time saving based on sensor combination

### Georadar for surveying your railway infrastructure and subsoil conditions
- Fast data acquisition of entire overhead wire network
- High data density & quality
- Surveys during railway operation
- Permanent real-time data access via web-interface
- Automatic alarm
- Hardware & supplier independent
- High system flexibility

### Catenary Positioning Measurement and control of overhead wire positions
- Real-time survey during construction phase
- 4D-Monitoring
  - Automatic, remote, real-time monitoring of geodetic and geotechnical conditions
  - Distinguish old & new track ballast
  - Detection of layers of the underground
  - Detection of zones with increased moisture or wet parts
  - Fast data acquisition of entire overhead wire network
  - High data density & quality
  - Surveys during railway operation
  - Permanent real-time data access via web-interface
  - Automatic alarm
  - Hardware & supplier independent
  - High system flexibility
SERVICES

Surveying Services
Geodetic control networks
Mobile mapping

Clearance Gauge Surveys
Clearance gauge of tunnels
Clearance gauge of railway structures
Train collision tests

BENEFITS

High data density & accuracy
Cost efficient through sensor combination
3D-surface model of ballast

Short lead time
Surveys during full railway operation
Time saving based on sensor combination
### SERVICES

<table>
<thead>
<tr>
<th>Surveys of Subsoil Condition</th>
<th>BENEFITS</th>
</tr>
</thead>
</table>
| Georadar for surveying your railway infrastructure and subsoil conditions | Distinguish old & new track ballast  
Detection of layers of the underground  
Detection of zones with increased moisture or wet parts |

<table>
<thead>
<tr>
<th>Catenary Positioning</th>
<th>BENEFITS</th>
</tr>
</thead>
</table>
| Measurement and control of overhead wire positions  
Real-time survey during construction phase | Fast data acquisition of entire overhead wire network  
High data density & quality  
Surveys during railway operation |

<table>
<thead>
<tr>
<th>4D-Monitoring</th>
<th>BENEFITS</th>
</tr>
</thead>
</table>
| Automatic, remote, real-time monitoring of geodetic and geotechnical conditions | Permanent real-time data access via web-interface  
Automatic alarm  
Hardware & supplier independent  
High system flexibility |
FEASIBILITY ANALYSIS
Data for forward-looking decisions
Good feasibility analyses depend on reliable data. Therefore we provide comprehensive data showing all information you need. We survey the subsoil conditions of your railway infrastructure, clearance gauges, as well as the railway alignment and conditions. Based on these data you can make the right decisions. Or you can use them as bare information for asset and maintenance planning. You will be able to balance construction costs with ongoing operating expenses, or identify alignments with the lowest total cost of ownership.

PLANNING & DESIGN
Highest Level of Data Precision
Successful long-term operation relies on accurate information, therefore planning and designing railway projects require the highest levels of data precision and reliability.

Our surveying services enhance your productivity, improve your data reliability and optimise your railway network.

CONSTRUCTION
For every construction phase we offer surveying and monitoring services that fit from a technical and financial point of view in your project schedule.

OPERATION & MAINTENANCE
Railway facilities require constant inspection to identify needs for maintenance and improvements.

Our fast and flexible data acquisition causes minimal disruption to your normal train operations.

Accurate information on track location and geometry are essential components. We offer a variety of solutions for data capture, as
- documentation of track location
- visual inspection of track and object condition
- overhead wire inspection
- railway and infrastructure monitoring

SAFETY
Ensure the safe operation of your railway infrastructure with our short- and longterm 4D-monitoring solution: swissMon.

Our monitoring solution provides real-time information on the condition of your infrastructures.

In addition we monitor slope stabilities or deformations of the subsoil along tracks.
Do you think that moving pictures are worth more than 1000 words?
Take a look at the videos at www.terra-international.com to learn more about our services.

Simon Rickenbacher
Mobile Mapping
+41 43 500 10 75
rickenbacher@terra.ch

Urs Müller
Senior Consultant
+41 43 255 20 32
mueller@terra.ch

Christian Meyer
Monitoring
+41 43 500 10 72
meyer@terra.ch

YOUR CONTACT
Simply call us. We will be glad to answer your questions.