

# Survey of the Gotthard base tunnel (57 km)

## Highest precision measurements for the world's longest railway tunnel



📍 Region Gotthard,  
Switzerland  
👤 AlpTransit Gotthard AG  
🕒 1995 - 2016

### Expertise

Engineering Surveying

### Realized by consortium VI-GBT:

- ◆ BSF Swissphoto AG
- ◆ Grünenfelder und Partner AG
- ◆ Studio Meier SA
- ◆ Bernasconi e Forrer SA

### Contact

[www.bsf-swissphoto.com](http://www.bsf-swissphoto.com)

The construction of the 57 km long Gotthard base tunnel crossing the Swiss Alps was a uniquely challenging engineering feat, led by AlpTransit Gotthard AG (ATG). On behalf of ATG, the consortium VI-GBT under BSF Swissphoto leadership was responsible for providing the geodetic reference measurements to ensure precise position and direction information for the tunneling advance. The required maximum error tolerances of no more than 25 cm across the tunnel axis vector and 12.5 cm in elevation were met for each of the for break-throughs.

### Our services

- ◆ Planning and surveying of the geodetic base network
- ◆ Master concept for the entire tunnel survey
- ◆ Regular check surveys of the tunneling progress between Erstfeld and Bodio
- ◆ Optical and bob plumbing in the 800 m deep vertical shaft at Sedrun
- ◆ Continuous deformation monitoring
- ◆ Expert assessments for risk mitigation
- ◆ Surveying gyroscope and specialized geodetic missions
- ◆ Break-through prediction
- ◆ Checks of the final rail track alignment.
- ◆ As-built documentation of the entire tunnel using mobile laser scanning

### Recent publications:

Weshalb sind die „besten“ Koordinaten nicht immer die „richtigen“?  
Krummenacher/Schätti; 2017 Lienhart (Hrsg.): Ingenieurvermessung '17.  
Wichmann Verlag, Berlin/Offenbach

The surveyor in the longest tunnel of the world  
Special edition of different articles concerning the surveying tasks during the construction of the Gotthard base tunnel, Ingenieur Geometer Schweiz