

Leica Geosystems **TruStory**

Zeno GIS collects precise GIS data on Stubai Glacier



■ Company

Wintersport Tirol AG & CO Stubai
Bergbahnen KG, Mutterberg 26167
Neustift, Austria [http://www.stubai-
gletscher.com](http://www.stubai-
gletscher.com)

■ Challenge

Management of Austria's largest glacier
ski area, including line management,
slope planning and monitoring and
glacier thickness checking on Stubai
Glacier.

■ Objectives

- Cost reduction through precise knowl-
edge of the location of lines and shafts
- Precise slope surface invoicing
- Scientific observation of the glacier
thickness

■ Project time-frame

Began in 2004, technology updated
starting in 2014

■ Location

Neustift in the Stubai Valley



■ Project

Instruments and software Hardware

CS25 GNSS, Touch Tablet PC, AS10 GPS
Antenna for precise data acquisition

Software

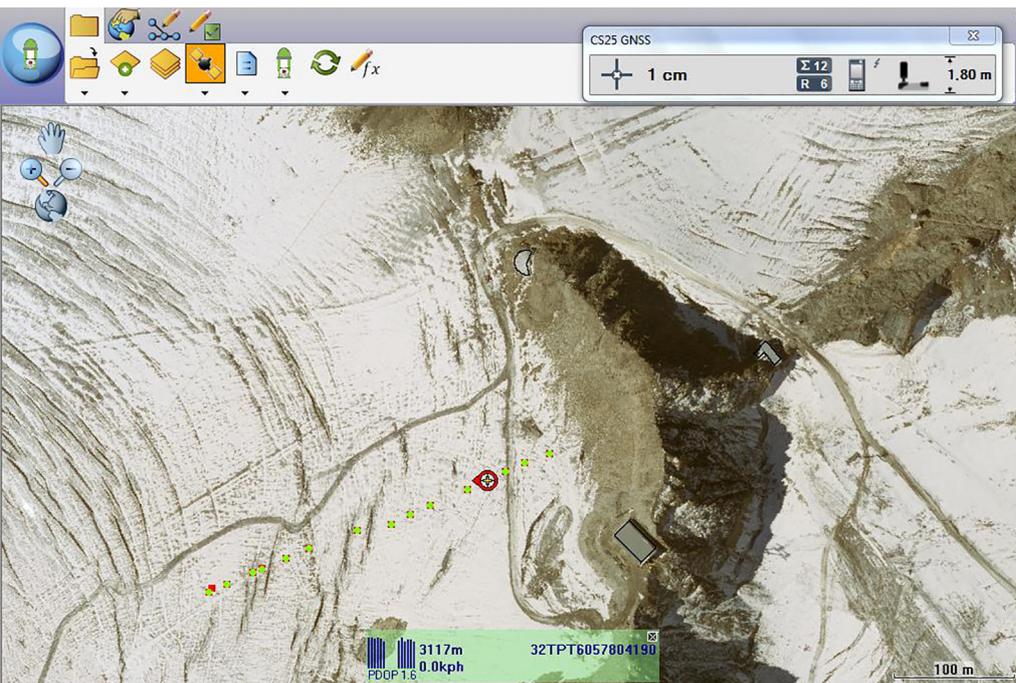
Leica Zeno Field and Zeno Connect

Stubai Bergbahnen KG operations manager Sepp Rauter carrying out work in the field. His goal is precise measurement on the mountain using the Leica CS25 Tablet.

With an overall size of 1,450 hectares and a total of roughly 200 hectares of prepared ski slopes, the ski area of Stubai Bergbahnen KG is the largest glacier ski area in Austria. 26 cable car and ski lift installations transport close to 36,000 people uphill every hour. Around 104 kilometres of red, blue and black ski slopes wind their way down to the valley below the 3,333 metre high "Schaufelspitze" peak. The ski season is long, beginning in mid-September and serving ski and snow enthusiasts all the way to June. Around 300 employees of Stubai Bergbahnen KG and a number of additional seasonal workers ensure that skiers are able to ski safely and enjoy their stay. The foundation for this is laid by Sepp Rauter, operations manager of Stubai Bergbahnen KG, together with his team. Day

in and day out, he keeps an eye on the slopes and glaciers with his rugged field companion: The CS25 GNSS Tablet PC from Leica Geosystems with the Zeno GIS Field software.

In 2004, Rauter had had enough. Time and again, excavation work on the slopes of Stubai Bergbahnen KG resulted in costly damage to underground cables, lines and shafts. The operations manager explored the market to find technology with which Austria's largest glacier ski area operator could avoid these expenses. He decided on the handheld GS20 GPS from Leica Geosystems. In April of 2014, the company acquired the rugged and even more precise CS25 GNSS Tablet with the external AS10 antenna, both by Leica Geosystems. Today, each and every pipe for drinking water, waste water and snow-making systems, as well as all



Advantages

- Extremely rugged hardware
- Centimetre-precise data acquisition of all installations
- Output to third-party software via Zero Connect
- Precise volume determination for accurate lease fee invoicing
- Direct output of data to the office software after measurement on site
- Tracing of cable car and T-bar lift support pillar movement
- Visualization of glacier loss
- Financial applications
- Large reduction in data-management and maintenance expenses for the installations

the cables and ducts, are surveyed with precision, displayed cartographically and can be called up at any time in the Esri ArcGIS linked directly to it. As a result, costly damage has been avoided ever since.

Since then, Rauter has also precisely surveyed the ski slope surfaces, because as the operator and owner of the Stubaier Bergbahnen KG cable car lines, Rauter has to pay leasing fees to the Austrian Federal Forestry Office. "Today, this technology makes precisely calculated billing possible," said Rauter. Excavated dirt from site work has to be invoiced as well, which is why Stubaier Bergbahnen AG relies on precise volume measurement here as well.

Thanks to his newly acquired GNSS Tablet, Sepp Rauter always has his tract of glacier region in view. Professor Dr.-Ing. Wolf-Ulrich Böttinger, former member of the surveying, informatics and mathematics faculty at Stuttgart University of Applied Sciences (HFT) in Stuttgart, Germany, recently developed software which

enables Rauter to measure the ice thickness of Stubai Glacier with the CS25 tablet. This is possible with the Windows 7 operating system and Zeno Connect, which provides software solutions from third-party companies with high precision GNSS positions. Glacier movement is particularly important to Rauter, as the foundations of some of the cable cars and T-bar lifts are secured in ice. In other words, they move along with the glacier. "The location of the supports changes continuously, with some of them moving up to three metres a year," said the operations manager.

The people responsible for this monitoring at Stubaier Bergbahnen AG need to know the precise positions of the pillars so that they can respond to these movements. Thanks to technology from Leica Geosystems, Rauter is now able to manage his many tasks more easily. He finds measurement with the CS25 tablet to be very convenient, as the device can be operated like any conventional tablet. While carrying out



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The ski slopes are surveyed regularly and longitudinal cuts are made to obtain information on the thickness of the ice and movement of the glacier.

surveying work, Rauter can communicate via e-mail and forward the data directly on site. Position determination with centimetre precision is possible with the CS25 GNSS and Zeno Field or Zeno Connect software. While still in the field, Rauter is able to forward the data to the ArcGIS software in the office, leaving him enough time to thoroughly test the freshly groomed slopes.