

LIA®

3D snow depth

Wyssen Tower

avalanche control

Wyssen Tower

avalanche control

Wyssen Tower

avalanche control

Wyssen Tower

avalanche control

GINA®

avalanche detection

Wyssen Reference Project

# Breitzug Davos - Integration of Multiple Solutions

Safety through innovation





## Breizzug Davos - Integration of Multiple Solutions

<b>Project:</b>	Breizzug Davos - Integration of Multiple Solutions
<b>Place:</b>	Davos
<b>Country:</b>	Switzerland
<b>Year:</b>	2018 / 2019
<b>Customer:</b>	Community of Davos, Rhaetian Railway (RhB), Canton Civil Engineering office (Tiefbauamt)
<b>Protected Object:</b>	Road, Railway
<b>Installed systems:</b>	<ul style="list-style-type: none"><li>- 4 Wyssen Avalanche Towers 12 shots</li><li>- 1 LIA® Laser Scanner</li><li>- 6 GINA® Geophones in Avalanches</li><li>- 1 Webcam</li><li>- WAC.3®</li></ul>



### Initial Situation

Davos is widely known as a city of international importance in the middle of the Swiss Alps. In addition to the numerous tourists who visit the town every year, Davos is also a venue for international events, such as the World Economic Forum. Therefore a reliable road and railway connection that operates all year, independent of time of day and weather conditions, is imperative. Yet, Davos can only be accessed from two sides which are threatened by numerous avalanche paths. One such path is the Breizzug path (literally translated as “wide path”), which affects the cantonal road as well as the railway line of the Rhaetian Railway. Even though a snow shed was constructed in the runout, very large avalanches have historically covered both entrances to the shed. Therefore, the aim is to release the snow in the release area in “small portions” to minimize the risk of large avalanches. This concept has been applied for a long time by implementing artillery weapons and helicopters for avalanche control. Yet, due to the south facing slopes of the Breizzug usually the snow cover experiences fast settlement and stabilization and often these measures could not be applied in time (due to visibility or flying conditions).



*Historic picture of an avalanche at Breizzug from January 1968*

## Our Solution: Integration of Multiple Solutions

### Wyssen avalanche towers control the hazard

Four Wyssen Avalanche towers were installed in the release areas of Breitzug in the summer of 2018. They have been used with great success in the winter of 2018/19 and have already allowed the local avalanche control team to release avalanches in a controlled way during the intense snow fall periods.

### LIA® Laser Scanner creates a better analysis of the hazard in the release area

As an additional decision-making tool a LIA® Laser scanner was installed on one of the Wyssen towers. Every hour LIA® creates a 3D scan of the snow height (radius of 40 m / 130 ft around the tower) and provides detailed and valuable information to the control team from exactly where it is needed – the avalanche release area. After a detonation, LIA® measures the extent and depth of the released slab.

### GINA® provides continuous monitoring of avalanche activity

To monitor the avalanche activity day and night six GINA®'s were installed in the upper and lower parts of the avalanche path. GINA® detects the ground vibrations an avalanche creates when moving downslope and can detect natural as well as controlled avalanches.

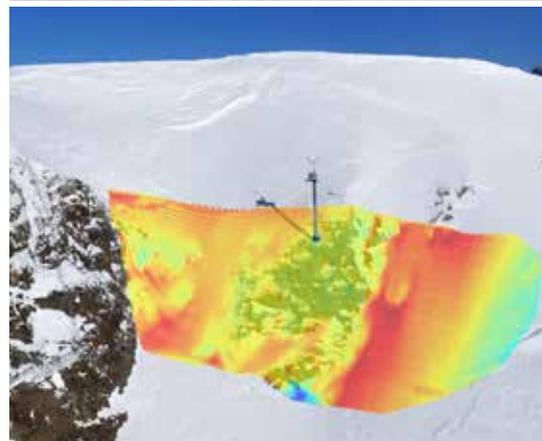
### Webcam at the counter slope

A web-based camera was installed at the counter slope and allows for visual confirmation of avalanche control and the conditions in the release area.

### Everything on one platform – User interface WAC.3®

All information is combined on a single platform – the web-based Wyssen Avalanche Control Center WAC.3® - and are visualized in a simple and efficient way for the operator.

The project at Breitzug represents a successful example for the operational integration of multiple technical solutions.



## Thanks to

The community of Davos

The Cantonal Civil Engineering Office

The Forestry and Natural Hazards Office

The Engineering office TUR

The Rhaetian Railway

The construction company Vetsch



## A project of:

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**Safety** through **innovation**

**WYSSSEN** switzerland **avalanche control**