USING REMOTE AVALANCHE CONTROL SYSTEMS FOR SNOW COVER MANAGEMENT – A BEST PRACTICE EXAMPLE FROM SAMNAUN (SWITZERLAND)

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ABSTRACT: Due to climate change and decreasing amounts of natural snow the Samnaun Bergbahnen AG faced increasing problems to keep one of its major ski pists from the upper resort back to the valley open. Thanks to the idea of one of the workers large investments for snow making infrastructure, construction work for the ski path, fall protection nets etc. could be saved by moving the needed snow mass by avalanche control.

KEYWORDS: snow management, climate change, avalanche control

1. INTRODUCTION

As most ski resorts the Samnaun Bergbahnen make significant efforts to offer an excellent ski experience to their guests. This includes top-notch cableways, comfortable restaurants, and of course, perfectly prepared ski slopes (Figure 1). In addition, the master planning of a ski resort is crucial for customer satisfaction. It is important to allow skiers to get around in the area easily and how attractive the ski slopes are. Not less important are the mitigation (safety) measures against risks to cableways and ski slopes that might be caused by alpine natural hazards such as snow avalanches.

In order to optimize the way skiers get back from the ski resort to one of the villages in the Samnaun valley, the decision was made to reopen an old ski run that had to be closed some years ago due to less snowfall, caused by global warming. This ski run leads through a very narrow side valley just directly above the river in the valley bottom. In the past, there was always enough natural snowfall to cover all the large rocks in the riverbed allowing the snow groomers to prepare a ski slope.

Figure 1: Overview Skiresort Ischgl-Samnaun with the ski piste discussed indicated in orange circle

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2. METHODS

The most obvious way for building a ski slope in such a narrow valley in between very steep mountain slopes if the valley bottom is covered by large rocks (several m^3) from the river requires the following works:

- Widen up an existing narow path in the mountain slope on one side of the valley
- Build a snow making facility
- Install avalanche control equipment
- Build fall protection fences for the skiers (somehow removable during avalanche control)

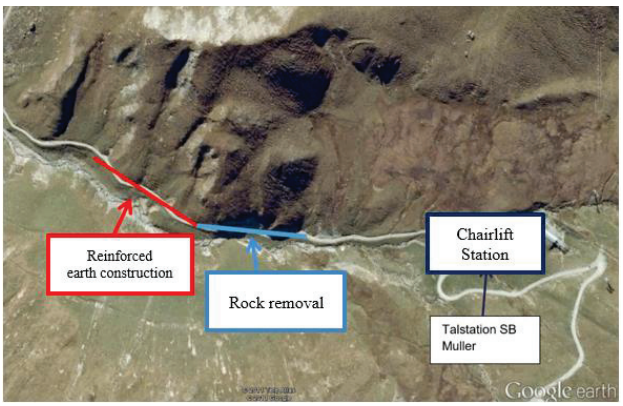

Figure 2: Planned construction measures to widen the existing path.

The project planning of all this works (Figure 2) lead to construction costs of CHF 950'000 (appr. USD 1 Mio.). For ths snow making installation and fall protections nets another CHF 800'000 were estimated. In addition, the operating (snow making etc.) and maintenance costs (fences) was expected to be significant. Whether this project would have been able to get a building permit is according to Mario Jenal, CEO of the ski resort, more than questionable due to the strict environmental constraints in Switzerland.

As in many cases sometimes the solution lies in a much less complicated approach than originally anticipated. Fortunately, one of the employees from the Samnaun ski resort had the courage to present an idea which was not very common but so simple that the management agreed to give it a try.

The idea was to just install remote avalanche control systems RACS, which would have been needed in any case, to move enough snow to the river bed and cover the large rocks allowing with enough snow allowing snow groomers to prepare the run on its original path (Figure 3).

3. RESULTS

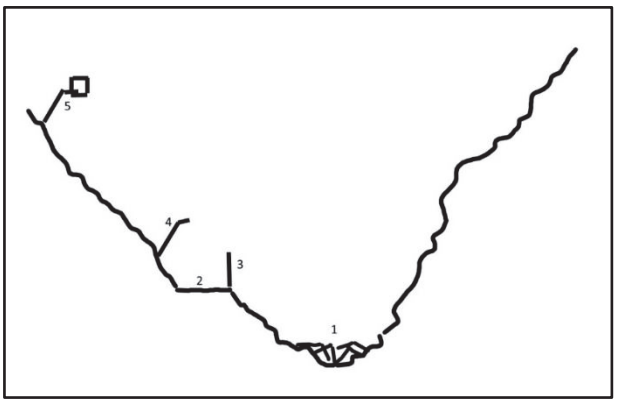

Figure 3: Cross section of the side valley with river bed and big rocks (1), widened path (2) to be built with fall protection (3), snow making (4) and RACS (5)

Using avalanche control to release the snow on the slopes above by using RACS to accumulate enough snow in the river bed was of course an experiment because it was not possible to foresee whether this approach would work out or not. However, it was worth a try because remote avalanche control systems had to be installed anyway to guarantee the safety of the skiers. In the end the concept has proven to work very reliable with much less investment costs.

Even though there was less than average snow fall at the beginning of the past winters the new strategy worked out fine. Thanks to the great effect of the installed Wyssen Avalanche Towers all the necessary snow was released and brought down to the place where it was needed. In addition, obviously the avalanche danger was mitigated too.

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