Top of Switzerland – Opportunities, Threats and Challenges of mountain rail- and cableways systems

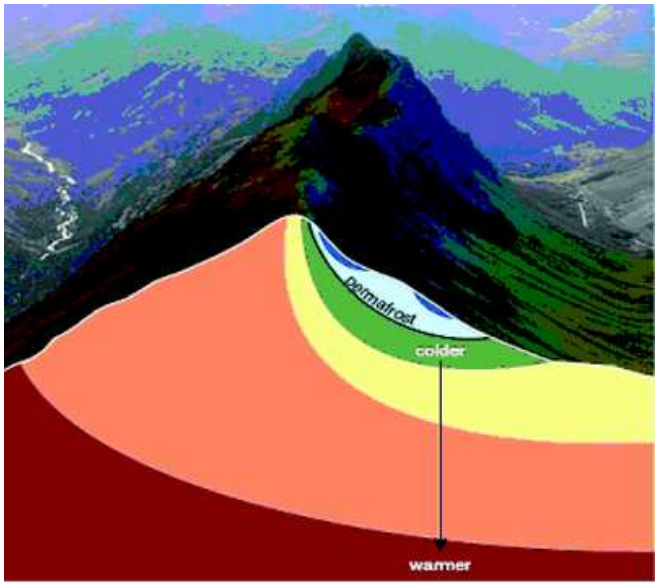
A couple of hundred years ago, the enjoying of the mountain world was the privilege of some specialists and the affluent people. A lot of mountain regions were inaccessible without technical installations. Thanks to the technical development during the last few decades, the mountains have been accessible for almost everybody – get closer to the peak of the mountain and discover the fantastic world around you on Top of Switzerland! The developing of the alpine tourism lead to the construction of many tourist facilities including different methods of transport in the mountains. The first cable car in Switzerland was built in 1866 on the Falls of the River Rhine close to Schaffhausen. Today more than 1700 cableways and funicular railways are in operation in Switzerland.

Schilthorn – Piz Gloria: Best view of Eiger, Mönch and Jungfrau!

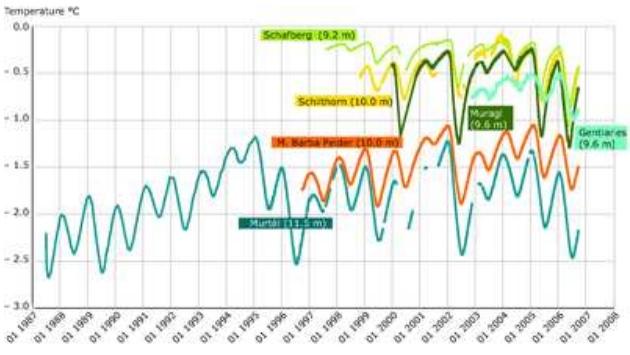
One of the most famous places for tourists in Switzerland is “Schilthorn” in the Bernese Oberland area. In 1967 Schilthorn was made accessible to tourists by a cableway from Stechelberg via Mürren and Birg to the summit. And not only this: The first turning restaurant in the world at 3’000 meter attitude called "Piz Gloria" was opened offering spectacular views on the Eiger, Mönch and Jungfrau (UNESCO world heritage) which are situated opposite of the Schilthorn. It was made famous in 1969 when used as a filming location for the “On Her Majesty's Secret Service” of the James Bond 007 movie. The cableway to the planned Schilthorn restaurant had run out of money when the Bond film was being planned. The designated film company agreed to finance the completion of the cableway in exchange for exclusive filming.

Cableways consisting of massif support structures, backstays, main cable, anchors and other equipment are subject to damage and deterioration by temperature fluctuations, windstorms, moisture and vandalism. The integrity of the structure also may be affected by erosion as a result of landslides, avalanches or by flash flooding. Another problem which has substantial consequences for high-altitude tourism infrastructure is melting of the mountain permafrost. Steel piles on concrete foundations are used to support most cableways structures built on ice-rich permafrost. Many pile foundations in high mountain regions, which are anchored in the ground, are subject to seasonal freezing and, therefore, possibly subject to the damaging effect of frost lifting, which tends to displace the pile upward and thus to disturb the foundation of the structure. Landslides are becoming more and more common in the Alps as whole sections threaten to slide down into the valleys below, causing death, destruction and taking with them the future of the hugely lucrative Alpine skiing and tourism industry. Mountain-top restaurants and cableways are already starting to shift on their foundations. As far as the popular Schilthorn is concerned, around CHF 7 millions (EUR 5,4 millions) every year are invested to maintain its stability.

Valley station of Schilthorn cableway



Temperature distribution within a mountain range containing permafrost
(source: http://www.eea.europa.eu)



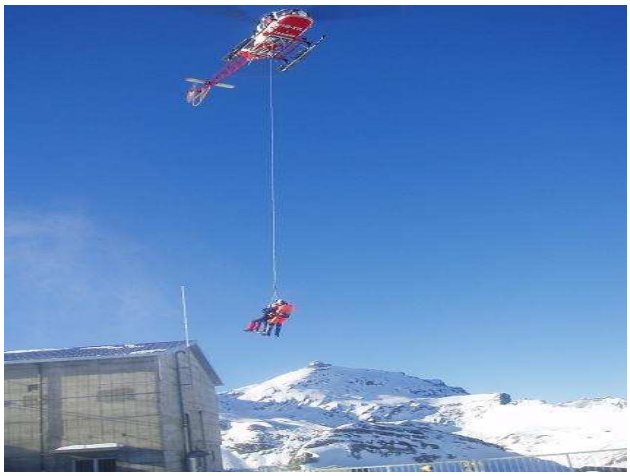
Temperature measured in different boreholes in mountain permafrost in Switzerland 1987-2007
(source: http://www.eea.europa.eu)

The mountain regions within the Swiss Alps are largely dependent on the income generated from tourism. Extreme weather and climate events present real costs to local and regional governments and their residents. Proper insurance can help in reducing these costs. Insurance companies provide incentives, including information, to encourage the implementation of loss prevention strategies. And in case of loss or damage it is essential to have a competent and reliable partner, providing prompt and efficient claims services and delivering industrial know- how and technical expertise.

Having been established more than 125 years ago, Nationale Suisse enjoys a prominent reputation – not only in the domestic market - as one of the leading companies providing engineering insurances. Specially on the Swiss market, Nationale Suisse has more than 50 years of experience engineering insurance products for cableway systems such as Erection and Contractors' All Risks, Machinery Breakdown and Business Interruption. Nationale Suisse is proud to count Schilthorn Cableway Ltd. among their most truly customers since the beginning of the construction works in 1965. Besides them, Nationale Suisse maintains excellent relationships with other cableways companies like Säntis, Pizol, Davos and Klosters.

The Schilthorn accident on 29th of December 2004 confirmed that cableway operating companies are advised to be concerned with insurance. What happened? One cabin of the cableway was traveling uphill with 53 persons on board. Around 150 m below the summit, the cableway was urgently stopped after staff heard an ear-splitting bang and saw that one of the track cable wires had come out. All passengers were safely rescued by helicopter. Due to rapid and correct response of the staff, no one was hurt.

Damage on the track cable wire



Recovery by helicopter

What was the cause of this accident? By the first cable movement in 1979, an abrasion took place between the track cable and the deflecting piece of the top terminal. The abrasions were not discovered by the stipulated visual controls. In the course of time microscopic cracks occurred in the area of the abrasion from hydrogen-assisted stress-corrosion cracking (HSCC). The progressive damage of the wires could not be detected by the last magnet-inductive test in 2003, due to the fact that at that time, most likely, no wire had broken yet. With time some cracks had reached a critical size which led to the spontaneous break of the affected profile wires. There appeared a concentration of cracks, consisting of approx. three to four adjoining spontaneous breaks. The broken profile wires came out of the main cable. Other profile wires were overstrained and have also broken. The released energy of the cable lead to a chain reaction with which all profile wires broke. The amount of loss added up to approx. CHF 3 million (including Business Interruption).

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