



Project

- Expansion of the Linth-Limmern pumped storage power plant, Lot A2
- Complex tunnel system between 1,700 and 2,500 metres above sea level
- Excavation of three rock caverns up to 150 m long, 25 m wide and 56 m high
- Construction of the longest concrete dam wall in Switzerland (1 km)
- Power plant output: 1,450 MW (corresponds to Leibstadt/CH nuclear power station)
- Total investment around 2.2 billion Swiss Franc

Challenges

- Difficult geological conditions
- Logistically challenging (transportation via cable car)
- Limited space
- Time and cost constraints due to weather conditions

Tasks

- Setting out the tunnel axis
- Laying out and verifying the cross section profile
- Setting out rockbolts
- Positioning formwork carriages
- Controlling the HD6200 scanner
- Evaluating scanner data (including volume calculations)
- Compiling project reports

Fast, full-coverage solution for profile verification

Efficient Tunnel Engineering Surveying

The ARGE Kraftwerk Limmern consortium is responsible for Lot 2 of the Linth-Limmern pumped storage power plant in Switzerland. The consortium is carrying out the excavation and construction work for the cavern station, the headrace system and a dam at Muttsee.

The largest building site of the project is located 600 metres deep in the rock: One cavern is designed for the pump turbine, the second for the transformers and a third for the valves. However, the space available for the excavation work is very limited. In order to meet the challenges posed by this project in a professional manner, the ARGE Kraftwerk Limmern consortium relied on Amberg Technologies as an experienced technology partner. Using the applications TMS Profile, TMS Setout and TMS Tunnelscan from the Amberg TMS Solution tunnel surveying system it was possible for the consortium to quickly and comprehensively verify the profile and efficiently set out the rockbolts.

“Using TMS Solution we can evaluate the data directly at the tachymeter. This puts us in a position where we are able to quickly react to profile discrepancies, thereby avoiding construction delays and saving costs. The TMS Setout surveying application also simplifies the setting out of rockbolts.” Bertrand Jeanguenat, surveyor for ARGE Kraftwerk Limmern, outlines his work with the products and goes on: “I am also very satisfied with the service provided by Amberg Technologies: My contacts are always helpful and open for both suggestions and new requirements.”



"Thanks to TMS Solution we can react immediately to any profile discrepancies – that saves time and money."

Bertrand Jeanguenat
Surveyor at
Marti Holding AG
ARGE Kraftwerk Limmern

Contractor

ARGE Kraftwerk Limmern, www.argekwl.ch

Construction period (planned)

Late summer 2008 until 2015

Product advantages for the ARGE Kraftwerk Limmern consortium

- Profile verification with direct evaluation at the tachymeter
- Setting out rockbolts in a radial system
- High reliability in terms of geological risks
- Short interruption times

Amberg Technologies products used – Amberg TMS Solution tunnel surveying system applications:

- TMS Setout
- TMS Profile
- TMS Tunnelscan with HDS6200

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The development of the Linth-Limmern power station will make a major contribution to the power supply of Switzerland. The barely accessible sites in this key project are located between 1,700 and 2,500 metres above sea level. When the project is completed a network of tunnels and caverns will connect the two lakes Muttsee and Limmernsee. This will increase the installed capacity of the power station from around 480 MW to 1,480 MW – this corresponds approximately to the capacity of the Swiss Leibstadt nuclear power station.

Large-scale project Lot A2

The ARGE Kraftwerk Limmern is working at the very heart of the project: The experts are building the machine and transformer caverns at 1,700m above sea level and 600m deep into the interior of the rock. "The development of the power station not only secures Switzerland's power supply, but is also one of Marti AG's largest projects. The extreme elevations and the limited space are a daily challenge. For example, for a total of nine kilometres of tunnels more than 100 TMS operations were necessary and more than 800 cross section profiles were required. This is why we need to be able to rely on a competent technology partner", surveyor Bertrand Jeanguenat explains.

Profile verification and evaluation at the tachymeter

"The TMS Solution surveying solution allows us to work with a linear coordinate system. This means that we get data which provides us with information on the longitudinal, transverse and height deviations along the tunnel axis – regardless of whether the axis is straight or curved. Thanks to the option of evaluating the data directly at the tachymeter, we can quickly react to any profile discrepancies. This avoids construction delays and saves costs", summarises Bertrand Jeanguenat. TMS Setout allows work to be carried out using a radial system when setting out rockbolts – regardless of the deviation from the theoretical profile.

Open for new solutions

Many innovative ideas are born during project execution. "The definition and verification of tunnels with a gradient of more than 80% proved to be a great challenge – the stations and tunnel metering were previously always defined horizontally. My contacts at Amberg Technologies always receive my suggestions very openly", reports Bertrand Jeanguenat.

Marti Tunnelbau AG has been cooperating with Amberg Technologies for years now. Bertrand Jeanguenat's experience with profile verification and rockbolts surveying has been excellent: "The surveying solution is essential to my daily routine – it simplifies it considerably", summarises the surveyor.