ALIVA AT WORK
HYDROPOWER STATION
STANZERTAL, AUSTRIA
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STANZERTAL, REGION TIROL, AUSTRIA

TO START OFF WITH, IT IS REMARKABLE THAT THREE DIFFERENT TUNNEL BORING METHODS ARE BEING USED: EXCAVATOR, DRILL AND BLAST AND TBM ADVANCEMENT

In addition to the normal horizontal tunnel, a vertical shaft is also being built.

In all tunnel building methods, Aliva machines and Sika concrete products, like the rotary machine Aliva® 257 Top, the telescopic spraying arm Aliva® 302, the Aliva® 400 Spraying robot, and the Sika PM 407 concrete pump are being put to the test. The new Aliva spraying device for robotic concrete spraying, the Aliva® Converto RoboSpray, is also in operation for shotcrete application.

THE FOLLOWING SIKA CHEMICALS ARE ALSO BEING USED:

- Sigunit®-49 AF (25kg bags) and Sigunit® L-93 AF liquid accelerator
- Shotcrete, mainly for wet concrete spraying, has been produced directly on the construction site in a separate concrete mixer.

The project aims to combine the utilisation of water from the local mountain river, and additionally that of cleaned waste water, which would then be collected together into a buffer tunnel and collectively fed into the new hydropower station.

LOCATION AND PREPARATORY WORK

The construction site of this new hydropower station is located in the western part of Austria in the Tirol area. Due to its alpine location as well as its confining proximity to the nearby water basin and power station, not to mention the crossing of two existing tunnels, construction work has been very complex and to a certain extent only done under extremely difficult conditions. Consequently, flexibility and the reliability of the operating team’s skills, as well as those of various subcontractors, have continually been in demand. The building site facilities, which includes the construction infrastructure and the logistics area is found on the west portal of the site. That is also where the entrance of the tunnel and the disposal area for approximately 100,000 m³ of excavated material can be found.

PROJECT DATA

- Construction time 03/2013 – 09/2014
- ca. 1.700 m conventional drill and blast, excavator
- ca. 3.800 m machine advancement
- ca. 130 m ALIMAK-advancement
- 3.81 m TBM – diameter

PROJECT EXECUTION

The project consists of a main and a secondary tunnel, and a vertical shaft which upon completion will all be connected. In addition there are other buildings on site for energy production and administrative work. All operations, such as the construction of the main and secondary tunnels, as well as the vertical shaft and the exit tunnel, were planned and adjusted to a fixed project time schedule. The length of the secondary tunnel is around 1,000 m, with the main tunnel measuring approximately 4,000 meters. The vertical shaft is 123 m and the exit tunnel 416 meters long.
Because the crossing of the road tunnel has just a 4 meter overlay, the last 100 m had to be built on a smaller scale. Additionally, three caverns were planned for tunnel crossings and machinery disassembly.

EXCAVATING AND DRIVING THE TUNNEL

Approximately the first 100m of each portal were driven using a normal excavator because of the loose stones and sand on the mountain’s slopes. Using the same procedure, the secondary tunnel was also constructed. The entire secondary and exit tunnels were driven by drill and blast due to the geological configuration and other marginal conditions such as the nearby road and train tunnels.

For both tasks a Putzmeister PM4D7 with an Aliva telescopic arm Aliva®302.1 in combination with the new Aliva® Converto RoboSpray were used for the application of the shotcrete. Aliva® Converto RoboSpray’s spraying device was ideal for this application and has exhibited outstanding spraying results. Thanks to the easy and quick handling of the Aliva spraying arm, the critical part of the tunnel could be completed without a hitch. An automatic measurement system was installed into the road tunnel in order to detect any potential settlements at an early stage.

MECHANICAL TBM DRIVE

During a driving break in the tunnel, an open TBM from Robbins was assembled. The Robbins TBM bored the main tunnel without any considerable break downs. An Aliva®-257 top was mounted on the TBM. The machine was charged with a train and a shotcrete carrier. The shotcrete carrier was offloaded from a discharging belt on to a steep belt, which loaded the Aliva®-257.

VERTICAL SHAFT

The main tunnel ends in a cavern, which was ideal for the assembly of the ALIMAK machine that dug the 123 m deep shaft. It was comprised of three segments, the 90.00 m main shaft, a 33 m high water lock, and the transfer into the ventilation tunnel. The disassembly cavern for the TBM was built at the crossing of the main to the vertical shaft.

The vertical shaft was also built using an Aliva®-257. This was done together with a conveyor belt and its powder dosing machine right at the bottom of the vertical shaft. The material was conveyed on a mobile batcher to the portal, and from there it was further transported to the spraying machine by a dumper. The air supply provided was ideal, such that the complete shaft up to 123 meters could be sprayed without any problems.

On this construction site the Aliva machines Aliva®-257 provided the best solution thanks to their easy handling, low maintenance and high reliability as well as the availability of the machines. The smooth execution however was essentially the work of the highly skilled operating team on site.

FINISHING UP AND PROJECT CONCLUSION

After completion of the tunnel advancement, a fibre reinforced shotcrete lining will be applied in the entire main tunnel. The Putzmeister 407 and the Aliva spraying arm Aliva®-302.1 will once again be on hand to get the job done. The finishing touches to the inner lining are made of a steel pipe, which runs throughout the entire tunnel.

This project has proceeded without problems, and on schedule, thanks to vast experience and extensive knowledge in tunnel and shaft construction as well as the reliable performance provided by Aliva machinery.
WHO WE ARE
For over half a century Aliva Equipment is specialist in the field of shotcrete as a manufacturer of rotary machines, dosing and concrete spraying systems, telescopic arms, special injection systems for TBMs and laboratory special equipment. Aliva Equipment is well known for superior quality and functionality and has also taken in each segment a leading position by its technical expertise and customer-oriented solutions.

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