backup

rowa TUNNELLING LOGISTICS

Low-level tunnel Mitholz, Lot 45.3

Editorial

Dear Reader

In this issue of „Back-up!“ (the 5th) we are happy to give you some information about the project „Low-level tunnel Mitholz, lot 45.3“, which is an important part of the new Lötschberg railway line of the Alp-Transit Project.

The present and long-term objective of Rowa to thoroughly mechanize conventional tunnel heading installations is clearly illustrated by the Mitholz project. The present Back-up! Issue will show you how Rowa succeeded in developing and realizing an innovation, which can be considered a landmark in the mechanization of conventional advances by blasting. The decision to invest time, money and manpower into the development of a new attempt to mechanize conventional tunnel headings has proven to be correct and profitable. The customer as well is satisfied and convinced to have chosen the correct partner.

Your Rowa Team

Project and Objectives

The 35 km long low-level Lötschberg tunnel is the key element of the new Lötschberg railway line which unites Frutigen in the Kander valley with Raron in the Rhône valley.

The lot Mitholz is essential for the completion in time of the whole low-level tunnel. In May 2000, ARGE SATCO Mitholz (Joint Venture Illbau, Rothpletz/Lienhard, Walo Bertschinger, Dumez, Skanska International) placed an order with Rowa for the supply of 3 high-performance heading installations with integrated continuous conveyors (18.5 km). These conveyor installations have to remove the excavated muck from the heading area. The high expectations in the increase in efficiency of conventional headings as well as the important investment into a new and unknown logistic concept gave cause for a lot of interest among people connected with tunnel construction.

The customer’s opinion

Dipl.Ing. Oskar Roittner, Strabag AG: „The system developed by Rowa is a real innovation in the area of conventional heading by blasting. With this new complete system the mechanization achieves a level, which allows the contractor to reach the pre-determined performance.
After an initial period during which the staff had to get used to the innovations and some technical improvements had to be realized, the system functions perfectly with a high degree of availability. The performances achieved by the installation confirm that the decision to entrust Rowa with the supply of the system was correct, technically as well as economically.“

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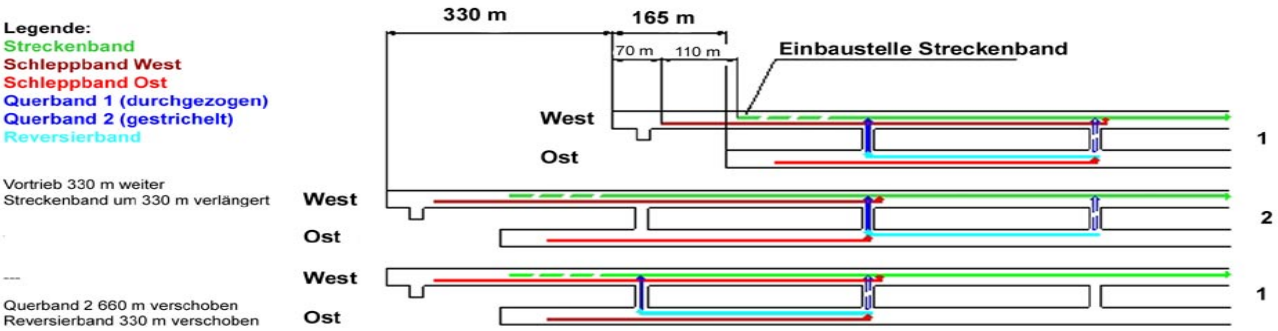
Rear end of the back-up system with airduct storage for fresh air supply and extraction of detonation gases

Project idea and Assessment of the profitability

Mechanizing conventional headings has been for some time one of Rowa's main objectives. Experiences gained in the Vereina tunnel and in other tunnels supplied the basic ideas for the conception of the project. Already at the stage when the project was put to tenders, Rowa suggested to the customers a solution with a highly mechanized heading installation. In order to realize this idea, the customer had to take into consideration a very high investment. A „Return on Investment" (ROI) could only be achieved by higher performances – and Rowa had to prove that this was possible.

Removal system lot south



Projekt data

	North	South
Tunnel length	7'394 m	8'500 m
Profile (Area of cross selection)	63,33 – 69,85 m²	like North
Max. advance rate with 3 turns (3x8 h) during 7 working days		16 m/AT

The contract between Arge SATCO and Rowa was therefore dependent on a very extensive and detailed analysis of the profitability of the system.

In order to convince Arge SATCO of the profitability of the additional investment, Rowa had to compile an extensive study with detailed sequences of operations and performance objectives, which had to be coordinated with Arge SATCO's preferences.

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Ascent from the bottom to the heading installation

Innovation

The chosen logistic conception with such a high degree of mechanization has never been realized before, and it is therefore a genuine innovation, which represents a landmark in the continuous increase of the degree of mechanization of conventional heading installations.

The conception

Heading installations

The heading installation contains a 120 m long suspension platform for the infrastructure and one of the same length for the ventilation fans. Below the suspension bridge there is a 180 m long parking area for mobile construction equipment. In the rear part of the heading installation the bottom - staggered lengthwise – is covered by a concrete layer to serve as a roadway during the heading. The drainage ditches are added later. An area crane below the suspension platform can be used for transloading and maintenance work. The height of passage is max. 4.2 m.

Conveyor installation

Conveyor installations

The three high-performance heading installations for the mechanized advance by blasting in the low-level tunnel Mitholz contain continuous conveyor installations of a total length of over 18 km for the removal of the excavated muck from the rock face to the tip Mitholz. The continuous conveyor is extended under the last element of the suspension platform after every 330 m of advance. Transverse conveyors are installed in the cross passages which transport the excavated muck from the parallel eastern tunnel to the main continuous conveyor in the western tunnel.

Technical data of the conveyor installation

	North	South
Max. capacity	300 t/h	600 t/h
Max. belt length	7'394 m	8'500 m
Belt width	800 mm	800 mm
Belt speed	2.75 m/s	2.75 m/s
Ø Grain size (max.)	200 mm	200 mm

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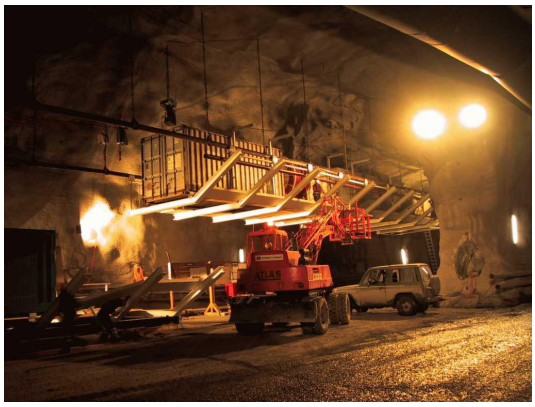

Installation of the suspension platform South-East

Discharging area of the tunnel conveyor South

Initial difficulties

Supply and installation could be realized within the given time frame. However, the many interdependencies created some initial difficulties which delayed reaching full performance operation.

One such problem was the control system, which was mounted and put into operation simultaneously with the advance work. Owing to these problems and to the necessity of muck handling by trucks the planned objectives could initially not be reached.

Thanks to joint efforts by SATCO and Rowa these start-up problems could be overcome. After elimination of the technical and organisational frictions the experiences with the chosen system of heading and back-up installation were satisfactory and the expected performances could be constantly achieved. The continuous high-performance operation was possible after July 2001.

Experiences from the high-performance operation

The system for the removal of the excavated material by rock crusher, suspension platform and conveyor installations, with integrated muck transport from the rock face to the recycling area is a genuine innovation. It distinguishes itself by a substantial increase of the degree of mechanization, in connection with numerous technical and organisational prerequisites. The chosen system for the heading and muck handling operation has proven a success, and the expected high performances are continuously achieved.

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