Metro Moscow, Russia

Back-up system for inclined shaft

About the Project
The Moscow subway expansion will require numerous new subway stations. In this context, the Lovat company has supplied a special tunnel heading system with a Rowa back-up, which was developed for the sole purpose for accessing these subway station entries. This system allows for very short installation time and is used in repetitious operations. Its first deployment takes place in the North of Moscow, in the Mar’in Roshcha station, the extension of the Lyublinskaya-line.

Project data
- Country: Russia
- Execution period: 2007-2012
- Builder-owner: Moskau Metro, Russia
- Customer: Lovat, Canada
- Project: Metro Moskau
- TBM: EPB Shield-TBM Lovat, Canada
- First application: 2008
- Tunnel length: appr. 100 bis 150 m
- Excavation diameter: 11.0 m
- Descent: 30°
- Ground: Soft ground
- Rock Safety: Segment Lining
- Heading time: appr. 4 Weeks

Rowa’s order
On March 16, 2007, the Canadian TBM manufacturer Lovat had given Rowa the order to develop and deliver a custom-made back-up installation for their TBM within 6 months. Rowa was responsible for the development, the manufacturing, the assembly and start-up monitoring of the back-up.

Specific Guidelines
Main focus points in the development were the modular construction for rapid assembly and disassembly as well as for ease of transportation, additional requirements for improved work safety due to the shaft gradient, and a simple operating system.

Experience
For many years, Rowa has been developing back-up installations for a diversity of tunnels and inclined shafts. In each case, these installations were developed in close cooperation with the client and finally manufactured according to the latest technical standards.
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The Concept

Heading
EPB shield-TBM heading

Removal
The muck material is prepared with ground conditioner and pumped from the TBM to a transloading device by means of a screw conveyor. Thence, the material is pumped above ground with a further pump.

Lining segment handling: cars, cranes, magazine
At the portal, the lining segments are loaded onto the feeder wagon with a crane and transported to the back-up installation. There, they are transferred onto the lining segment handling crane and stored in the lining segment intermediate storage facility. From the storage facility, they are reloaded by crane into the erector feeder and finally placed by the erector into a 60 min/ring.

Supply
Back filling and ground conditioner are pumped. Fat barrels and material for the TBM are transported by feeder wagon to the back-up, and on the material car in the back-up to the TBM. Handling cranes are installed at both, the rear and the front end of the back-up.

Forward Movement
The back-up installation slides with skids on slide consoles which are bolted into the displaced lining segments. At the rear, the free consoles are continuously removed again, transported through the back-up via the material car and re-installed again in front of the back-up with the handling crane.

Scope of delivery

Back-up car - supporting structure
The back-up supporting structure is designed for the components of lining, and the energy-, storage- and powered components of the TBM in a 30° incline condition.

Trailing
Supporting cylinder 2 pcs.

Feeder car
Total load capacity max. 20 tons
Driving speed 60 m/min

Lining segment crane
Load 8 tons
Roadway 16 m
Driving speed max. 40 m/min
Operation remote control

Lining segment magazine
Capacity 1 ring with 6 segments

Slewing crane rear
Lift moment 8 mtons

Material car in the back-up
Load 2 tons
Length roadway 16 m
Driving speed 20 m/min

Handling crane front
Moveable handling crane
Load 3.2 tons

Additional installations
Pipe installation for electrical supply, industrial- and dirty water, mortar, compressed air, ground conditioning and ventilation.