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Tunnel Boring Machine (TBM) slurry pumping plant

Webinar: AC500 PLC in real applications
Agenda

- Who is the customer and what is the project about?
- Short description of the application.
- Challenges in a slurry pumping plant
- ABB-Motion package solution overview
- Safety & Protection
- Live login into TBM slurry pumping plant
- Q&A
Who is the customer and what is the project about?
380-kV diagonal power link in Berlin

**ABB Value**

Trusted safety and security for critical infrastructure.

Extensive experience in pumping applications and specialized pump solutions.

380-kV Berlin diagonal power link (50hertz.com)

**Which Motion Products?**

- AC500 Safety PLC
- ACQ580 drives
- ABB Motors
- CP6610 HMI panel

ABBs direct customer is a Water & Wastewater global OEM that specializes in energy-efficient pumping for fluids of all types.
Short description of the application.
Importance of slurry pumping in tunnel drilling

**Face Support**: The slurry provides counter-pressure at the tunnel face, which is essential for stabilizing the excavation front against groundwater pressure and preventing collapses.

**Material Transport**: Slurry pumping facilitates the hydraulic transportation of excavated debris from the cutterhead back to the separation plant on the surface.

**Recycling**: After separating the solids from the liquid at the surface plant, the cleaned slurry can be recycled back into the system, enhancing efficiency and reducing waste.

Further details:
Slurry Shield - About Tunnelling - ITA-AITES
Challenges in a slurry pumping plant
500 Tons of material circulated inside the tunnel per hour

The system must deliver the requested feeding pressure at the tunnel face at all times but during the entire drilling process, the following parameters change:

- Pipeline length
- Number of pumps (Autoconfiguration of pumps to save time)
- Viscosity of the bentonite-water mixture
- Static head of delivery

Pipe diameter: 200mm
Feeding Pipe length: 7km
Transport pipe length: 7km
Material density: 1300 kg/m³
ABB-Motion package solution overview
Complete solution from a single source
Safety & Protection

Safety of People

- There are Safe Emergency Stop Mushroom Buttons alongside the tunnel. If pressed, the system must shutdown in a safe manner.

Asset/Pump protection built-In ACQ580

- Dry Pump protection
- Pump cleaning
- Pump inlet and outlet protection
- Inlet PID-Pressure control

Cavitation detection is performed by Customer Smart Sensor and Control is done via AC500.
1. Log-in to VPN Fiber Optic Network of the tunnel builder in Berlin.

2. Go online to the AC500 using Automation Builder

3. Go online to ACQ580 using Drive Composer Pro

4. Access CP600 visualization via Web browser
1 Minute Recording