

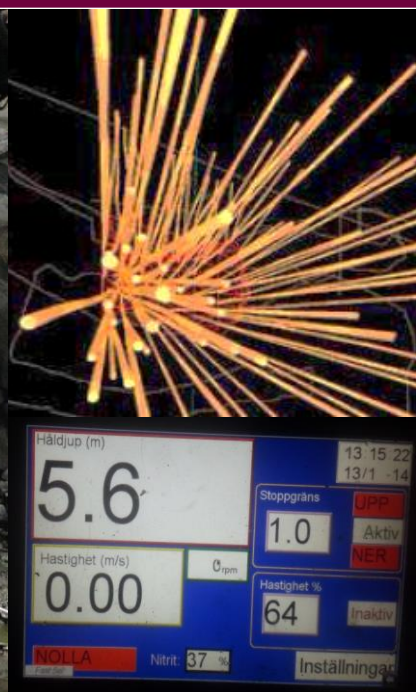
UNIQUE UP-HOLE CHARGING TECHNOLOGY COMBINED WITH TAILORED SERVICES PROVES TO BE A SAFE & PROFITABLE FOR SWEDISH UG GOLD MINE

CLIENT MANDALAY RESOURCES CORP.

SITE BJÖRKDAL MINE

PLACE SKELLEFTEÅ, SWEDEN

DATE 2013-PRESENT



OBJECTIVES & CONSTRAINTS

- The Björkdal Gold Mine, owned by Mandalay Resources Corp., is located in northern Sweden, 28 km northwest of the town of Skellefteå, near the Boliden mining district which has been mined for a century
- About 60% of the mill feed is generated by the underground operation and 40% from the open pit. Underground mining is accomplished by long hole stoping.
- Harsh climatic conditions combined with a complex and unusual geology required the development and customisation of a specific software tool, teamed with a dedicated explosives formula and unique loading equipment (one unit for drifting and one for up-holes), delivered by a highly experienced, committed and versatile team of engineers.
- Embracing Bjorkdal's blasting objectives, turning these challenges into opportunities. Through partnership, service, know-how and technology, EPC-Sverige delivered a safe, valuable and efficient approach, in alignment with the EPC values and vision.

KEY FIGURES

- Producing some 800,000 tonnes ore/year
- 345m deep, dual ramps
- On vein open stoping
- UG feeds 60% of the mill
- Drill drifts 3,7*5.5 & 5*5,5 ramps
- Drifts drilled 4,5m with 48mm bits
- 64mm diameter up-holes 10-30m deep
- Max. temperature range: - 25 to +25°C
- All blastholes filled with pumped emulsion
- Using some 60 tonnes emulsion/month





CONTINUOUS IMPROVEMENT OF SAFETY

- Technical support to improve vehicles safety, vehicle safety, (unique design detonator box for the safe underground transportation of initiating material)

ADRESSING EMULSION CHARGING CHALLENGE

- The Challenge: 30m up-hole charging during a continuous mining process, in addition to standard horizontal hole charging, to be carried out with a reliable, user-friendly system adapted to local temperatures and weather conditions.
- EPC developed an innovate safe, robust, easy to use, reliable, fully automated remote control up-hole pumping technology.
- Offering accurate control feed and smart retraction of the charging hose.
- Clear & visible PLC control of hydraulic functions makes calibration easier.
- Custom emulsion formula (viscosity and density)

A TAILORED D&B SERVICE PACK

- Unique hole depth measurement of up-holes deviation to optimize blast pattern outputs
- Specific development of EPC's design software EXPERTIR to address Bjorkdäl's needs
- Partnership for new technology integration (GPS based devices to track muck pile movement and ore dilution)

RELIABILITY

- In-house designed & built loading systems using standard components for timely and cost effective maintenance
- Integration on an existing carrier and energy source (Volvo wheel-loader)

