

ABB Underpins Boliden's Aitik Expansion

By Simon Walker, European Editor



A key element of Boliden's ambitious expansion program for its Aitik copper operation is the new concentrator. Shown here, at rear, is one of the plant's 2,200-mt/h autogenous mills, the largest of their type in the world. The concentrator's two AG mills, supplied by Metso, are powered by 22.5-megawatt ABB gearless drives.

In 2007, the Swedish mining company, Boliden, decided to double throughput capacity at its Aitik copper mine from 18 million mt/y to 36 million mt/y of ore. Undertaken at a cost of SEK6.1 billion (\$865 million at today's exchange rates), the project has encompassed the installation of new crushing and conveying systems, the construction of a completely new concentrator and the purchase of new mining equipment. Underpinning the whole ore transport, milling and copper-recovery process is an automation and control system provided by Switzerland-based ABB.

Speaking during a presentation on the project in September, Jan Moström, president of Boliden's mining operations

explained how Aitik had been developed through the past 40 years since mining began there in 1968. Since that time, he said, the original 2-million-mt/y ore capacity was doubled on successive occasions during the 1970s and 1980s, with the concentrator having been expanded several times. However, he said, studies undertaken in 2005 on a further increase to 28 million mt/y showed this would not be viable, so Boliden was faced with two choices: either to end production as then scheduled in 2016, or to "begin again" with a completely new concentrator and its associated infrastructure.

The bold decision to rebuild was announced in October 2006, at which time it was envisaged the project would cost

SEK5.2 billion (\$708 million) between 2007 and 2011. Key features of the new infrastructure included the use of semi-mobile in-pit crushers, with belt conveyors to transport run-of-mine ore to the new plant. This, as Moström noted, has been located as close as possible to the existing tailings-disposal area since it is more expensive to pump tailings than it is to convey ore. ABB was awarded its first \$27 million contract for the project in 2007, covering the supply of gearless drives for the two autogenous grinding (AG) mills in the new plant.

With the expansion commissioned on schedule (Sweden's King Carl XVI Gustaf having performed the official opening at the end of August), the total value of ABB's input eventually came to \$84 million. As well as the 22.5-megawatt gearless drives for the two AG mills—the world's largest, each with a capacity of 2,200 mt/h—the company has supplied two sets of 2x5-megawatt drives for the plant's secondary mills, some 650 electric motors, 230 motor drives, transformers for Aitik's updated power supply (the mine takes about 1.5% of Sweden's total electricity demand), gas-insulated high-voltage switchgear, over 200 low-voltage switchgear units, and a harmonic filter system for the whole plant to minimize its impact on the stability of the local grid. Overseeing the plant and materials-handling infrastructure is an ABB 800xA-type automation system, with the company having recently been awarded contracts that cover 24-hour support, spares and regular preventive maintenance for its equipment throughout the plant.

Supplied by Metso, Aitik's two AG mills are fed minus 400-mm run-of-mine ore from a 200,000-mt-capacity stockpile. This in turn takes ore from the 7-km-long conveyor system, 3.5 km of which runs underground through the pit wall from the old in-pit crusher and a new semi-mobile unit that has been built on the 285 m level within the mine. The second semi-mobile crushing station has been established on surface, mid-way between the Aitik pit and the Salmijärvi satellite pit, where waste stripping is now in progress. Part of Boliden's investment has been targeted at a new P&H 4100C mining shovel and a fleet of nine Cat 795 haulers, with the trucks



ABB installed a large array of harmonic filters, shown here, to lessen the impact of the mine and mill's high power demands on the local electrical grid.

being due on site later this year. All ore is trucked to the crushers, while waste rock currently totaling around 100,000 mt/d is hauled up the ramp either for containment if it is pyrite-bearing or, in part, for use as a source of construction material.

Power for the main overland conveyor comes from four ABB drives, two of which are 2.7-megawatt medium-voltage while the others are 1.8-megawatt low-voltage units. The control system automatically reduces the belt speed if the belt is running empty, thereby cutting the power demand while doing away with the need for power-hungry restarts once ore starts to flow again.

Autogenous grinding produces 3–5 mm feed for secondary milling, with chalcopyrite concentrate being recovered in 160-m³ and 40/50-m³ Outotec cells. With a diameter of 11.6 m (38 ft) and 13.7-m (45-ft) long, the rubber-lined AG mills are the world's largest in volume terms, while the 22.5-megawatt gearless drives rank as the most powerful yet installed—until the 28-megawatt drive on the SAG mill at Chinalco's Toromocho copper project in Peru, also on ABB's order book, is installed, that is.

The 800xA automation and control system, has been designed to avoid what

ABB describes as “islands of automation”—situations where separate parts of a process are controlled individually and where interconnecting communications may be a problem. From the central control room, Aitik's operators work with a system that tracks both material and energy flows. An additional advantage comes from its asset optimization integration function, ABB notes, which provides both operators and maintenance staff with information on the condition of individual items of equipment so that preventive maintenance can be prioritized.

Aitik takes ore grading 0.27% copper, 2 g/t silver and 0.1 g/t gold, and recovers around 500 mt/d of concentrate that is transported by rail to Boliden's Rönnskär smelter, 400 km away on the Baltic Sea coast. A dedicated rail terminal has been built as part of the expansion, allowing for direct loading of concentrates and the receipt of materials for the mine and plant without having to truck-haul through the nearby town of Gällivare. With ore reserves having been increased substantially to the current 747-million-mt proven and probable, the mine life has been extended to at least 2029. Moström described the plant as “the world's most efficient concentrator,” and at the heart of the plant, electrical and control expertise from ABB.

For additional Aitik coverage, see this issue's special report on Scandinavian mining technology beginning on p. 76.

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