



Productivity gains at Arctic copper mine

High efficiency is a matter of survival for the Aitik copper mine in northern Sweden. The proportion of metal in the earth's surface here is so low – less than 0.3 percent – that it can only be extracted profitably if the processes are highly automated.

A three-year, \$790 million modernization of the entire operation, including new power and automation solutions from ABB, has enabled mine operator Boliden to double production capacity with just 10 percent more employees. The revamped mine was inaugurated by the King of Sweden on Aug. 31, 2010.

Located near Gällivare, in the arctic Lapland region of Sweden, the copper deposit at Aitik was discovered in the 1930s although mining only began in 1968 when technology was sufficiently advanced to profitably extract the metal. In 2006, with demand for copper running strong, Boliden decided to make the biggest investment in its history to increase output.

Caption: At full capacity the mine can process 100,000 tons of ore per day.

Aitik is Sweden's largest mine and a global industry benchmark in mine efficiency.

As a result, Boliden can mine even lower-grade ore at the site, thereby increasing Aitik's productive life until 2029.

ABB has played a pivotal role in the program,

supplying products and systems worth some \$84 million to power and automate the entire site.



The entire Boliden site process – including the concentrator plant, conveyor systems and pumping stations - are controlled by ABB's Extended Automation System 800xA

At full capacity, the mine is capable of processing about 100,000 tons of ore every day. Huge digging machines chip away at the rock face and load massive trucks – whose wheels alone are 3.4 meters high – with more than 200 tons of ore at a time. The trucks deliver the ore to a crusher inside the pit where it is reduced to boulders about 30 cm in diameter and put on underground conveyors to a storage area on the surface.



Caption: A 7 km conveyor driven by ABB motors and drives transports the ore from the mine to the concentrator.

From here, another conveyor carries the ore to the new concentrator plant several kilometers away, near the area where the waste slurry is pumped after the valuable minerals have been extracted.

Around 650 ABB high-efficiency motors, many of them equipped with variable speed drives, power the conveyors, crushers, pumps, fans, and process equipment to ensure minimal energy use and maximum process efficiency.

In the concentrator, two ABB gearless mill drives (GMDs) – the most powerful ever built – power two new mills that grind the ore to sand from which the copper can be extracted. At 22.5 megawatts, each GMD is as powerful as 280 passenger vehicles¹ and enable the mills to crush up to 2,200 tons of ore per hour each.

The entire site process – including the concentrator plant, conveyor systems and pumping stations – is controlled by ABB’s Extended Automation System 800xA. Boliden selected System 800xA as its group-wide process automation platform several years ago following extensive tests and comparisons with other automation systems.

An ABB gas-insulated substation feeds electricity from the grid to Aitik with minimal electrical losses and minimal space requirements, and a harmonics and power factor correction filter system ensures that Boliden can operate the powerful GMD system without distorting the supply network and incurring fines from the utility.

And last but not least, ABB low-voltage switchgear distributes the power across the entire site reliably and energy efficiently.

¹ The average power of passenger vehicles sold in western Europe in 2009 is 81 kW, according to the European Automobile Manufacturers’ Association (see www.acea.be >> statistics >> average power)