New electrical equipment for a crusher and a belt conveyor system for an open-pit copper mine in Collahuasi, Chile
Chile is one of the leading industrialized nations in South America and has the world's largest known copper deposits. In this Andean country, the metal often has to be mined under extreme climatic conditions. The demands on the electrical equipment are correspondingly high.

The open-pit copper mine in Collahuasi is located in the middle of the Andes in an historical mining area in the north of the country about 290 km east of the port of Iquique. At an altitude of between 4,200 m and 4,700 m, the hostile desert climate places exacting demands on both people and machinery.

The extreme temperatures and the oxygen-deficient air put the electrical equipment of the mining machinery to the test every day. The operator of the mine, the Compañía Minera Doña Ines de Collahuasi SCM (CMDIC), took this factor into account when placing the order for the electrical equipment of a crusher and a belt conveyor system: the company decided on an extremely rugged solution with ACS 6000 water-cooled medium-voltage frequency converters from ABB and the time-tested control system AC800M and Operate IT (initially redundant), also from ABB.

A complete solution from one source of supply
In open-pit copper mining, crushers are used to break up the mined material. ABB received the contract for the electrical equipment of a crusher with a delivery conveyor, intermediate bunker and a feed conveyor for Collahuasi in July 2002 and assumed the responsibility for a complete service package.

In addition to the engineering, programming and configuration, the ABB experts prepared the complete documentation in English and partly in Spanish. ABB also carried out the entire production, shipment, all the tests as well as the supervision of the installation, the commissioning and the quality assurance. The successful final inspection of the finished plant took place at the beginning of this year.

A large-scale belt-conveyor system at an altitude of 4,700 m
A belt conveyor system for the transport of the mined material within the open-pit mine was also installed in collaboration with ABB Canada. This commenced operation in May 2004. The system consists of two rising belts, a falling belt as well as a stockpile, an intermediate bunker and three feed conveyors.

Owing to the high power requirement and the altitude of the mine, medium-voltage frequency converters of the type ACS6000 with new low-power modules were used. These are especially designed for use under extreme environmental conditions. A total of five 2 MW motors with ACS6000 medium-voltage frequency converters are used in the two rising belts, and the falling belt is driven by three ACS6000s with regenerative feedback to the supply.

The plant is controlled via redundant field controllers of the type Control IT AC800M in conjunction with an Operate IT Server, which is also redundant.
This is the first large-scale belt-conveyor system project for ABB with medium-voltage frequency converters of the 5 and 7 MVA class. In addition to this, the plant in the Chilean open-pit mine was constructed in accordance with the American NEMA standard and not to the DIN VDE standards – a new challenge for the German experts in the team, which they met successfully.

FACTS
Copper mining in Collahuasi goes back to the Incas, whose tools and crucibles have been found in the area of present-day mine. In 2003 the Compañía Minera Dona Ines de Collahuasi produced about 383,100 t of concentrated copper as well as a further 63,400 t of cathode copper.