CASE NOTE

ACS1000 variable speed drive increases output and performance of SAG mill

The LaRonde mine in Canada is Agnico-Eagle's flagship operation producing about 260,000 ounces of gold annually.

In order to run the motor and the SAG mill at the required load output the existing drive was replaced with ABB's ACS1000 variable speed drive. The replacement enabled Agnico-Eagle to expand the milling facility, increasing its output, and to achieve the expected performance and stability.

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LaRonde is Agnico Eagle's flagship mine, located in the Abitibi region of northwestern Quebec.

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View of the SAG mill (3,360 kW) at Agnico-Eagle's LaRonde mine.

LaRonde mine
Agnico-Eagle's LaRonde mine has a large gold-silver-base metal deposit and contains the largest reserve resource base of any mine in Canada. Its assumed resource of about eight million ounces is enough to sustain the mine life for 20 years at a production of 7,000 tons per day. Agnico-Eagle produces 260,000 ounces of gold from the LaRonde mine.

The LaRonde mine is located in northeastern Quebec, about 600 km north of Montreal.

SAG mill
In addition to the eight million ounces of gold, the LaRonde mine contains almost 30 million tons of ore. At LaRonde's processing plant the precious metal is extracted from the ore.

As part of the recovery process, the ore, with lime and water, is fed into the semi-autogenous grinding (SAG) mill. In the grinding process the rock is reduced to fine particles which are then processed further.

Highlights
Reliable operation
Reduced maintenance costs
Improved process control
Longer lifetime of equipment
Payback on investment period: 1 year

Challenge
The power of the existing drive, which was supplied by another vendor, did not match that of the motor. Consequently it was not possible to operate the SAG mill at the required power, resulting in production losses. In addition, the mismatch caused a number of unscheduled plant shutdowns.

Additionally, the ventilation system of control room was limited, due the high cooling requirement of existing air-cooled drive.

Solution
The problem was solved by replacing the existing drive with a water-cooled ACS1000 medium voltage drive. ABB's ACS1000 soft starts the motor, allowing a smooth ramp up, and allowing the motor and the SAG mill to run at the required load output.

By installing a water-cooled ACS1000 the ventilation in the control room was sufficient and allowed a better cooling of the other equipment.

Benefits of VSDs

Increased SAG mill output
Installing the ACS 1000 provided Agnico-Eagle with the flexibility to expand the milling facility, increasing the output from originally 2,000 tpd to almost 8,000 tpd. The process control was improved and the expected performance and stability was achieved.

Use of existing motor
Due to the sinusoidal output voltage of the drive, the existing motor could be used without derating.

High starting torque
The drive provides a high starting torque, i.e. nominal torque at zero speed. Its motor control platform is based on Direct Torque Control (DTC) which achieves ultimate torque and speed performance. DTC allows the speed of any standard squirrel cage induction motor to be controlled without the need for expensive and fragile encoders or tachogenerator feedback devices.

By starting the SAG mill with the ACS1000 medium voltage drive, a motor with a higher starting torque can be used since there are no incrush currents.

Increased lifetime of equipment
The smooth speed ramp up protects the mechanical equipment, thus prolonging its lifetime and reducing maintenance costs.

Low impact of power supply disturbances
Due to its RideThrough function, the drive system is able to withstand disturbances in power supply.

Small footprint
The use of IGCT semiconductors contributes to the small footprint of the variable speed drive and has proved to be beneficial to Agnico-Eagle because of the restricted space in the processing plant.

Dependable support and service
Due to ABB's prompt and efficient support, Agnico-Eagle was able to exchange the drives quickly and to minimize downtime.

As the SAG mill's operation depends greatly on the variable speed drive, Agnico-Eagle requires around the clock access to drives specialists and spare parts. ABB, the largest drives supplier worldwide, has a global support network, providing assistance and spare parts 24 hours/day, 365 days/year.

Customer satisfaction

Agnico-Eagle Mines Ltd. states:
"Thanks to ABB's ACS1000 variable speed drive we are able to run the motor and the SAG mill at the required speed. We no longer have to deal with plant shutdowns and are able to expand the milling facility, increasing the output from originally 2,000 tpd to almost 8,000 tpd. The ACS1000 fully meets our expectations."

ACS1000 key data	
Inverter type	Three-level Voltage Source Inverter (VSI)
Power range	Air-cooled: 315 kW - 2 MW Water-cooled: 1.8 MW - 5 MW
Output voltage	2.3 kV, 3.3 kV, 4.0 kV, 4.16 kV
Maximum output frequency	0 to 82.5 Hz (higher on request)
Converter efficiency	>98%, external transformer >96%, integrated transformer
Type of motor	Induction motor

For more information please contact:
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