Case note
ACS 1000 variable speed drive improves process control at mining plant

ABB's ACS 1000 variable speed drive was retrofitted to a conveyor belt at the Mine Los Colorados in Chile.

With the existing gearbox, the nominal motor speed was not high enough in order to reach the required speed for the conveyor.

By installing the ACS 1000 variable speed drive, the existing gearbox did not need to be replaced and the speed could be increased by almost 25 percent.

View of the conveyor driven by an ACS 1000 retrofitted to an existing induction motor of 400 kW located on a platform at the top end of the conveyor.

Background

The Mine Los Colorados is situated 700 km north of Santiago/Chile. It belongs to the mining company CAP Mineria – Compañia Minera del Pacifico S.A. (CMP). Operation started in 1995. The actual reserve of iron ore with 46.3 percent iron content is 223 million tons, which corresponds to a resource of more than 30 years.

After crushing up the material it flows to a deagglomerator and through a magnetic concentrator which finally separates the material in rejection and product material. The product material is loaded on trains and then transported to the pelletizing plant.

The ACS 1000 drives a conveyor belt which takes material from the stockpile and lifts it to the platform from where the train is loaded.

Challenge

With the existing gearbox, the nominal motor speed was not high enough to reach the nominal throughput of the conveyor belt which takes material from the stockpile and lifts it to the train platform. The motor needed to operate over 50 Hz in order to reach the required speed for the conveyor. This speed was achieved at a frequency of 63 Hz.

Highlights

- Improved process control
- Motor problems eliminated
- Longer lifetime of conveyor equipment
- Minimized downtime
- Lower impact on electrical network

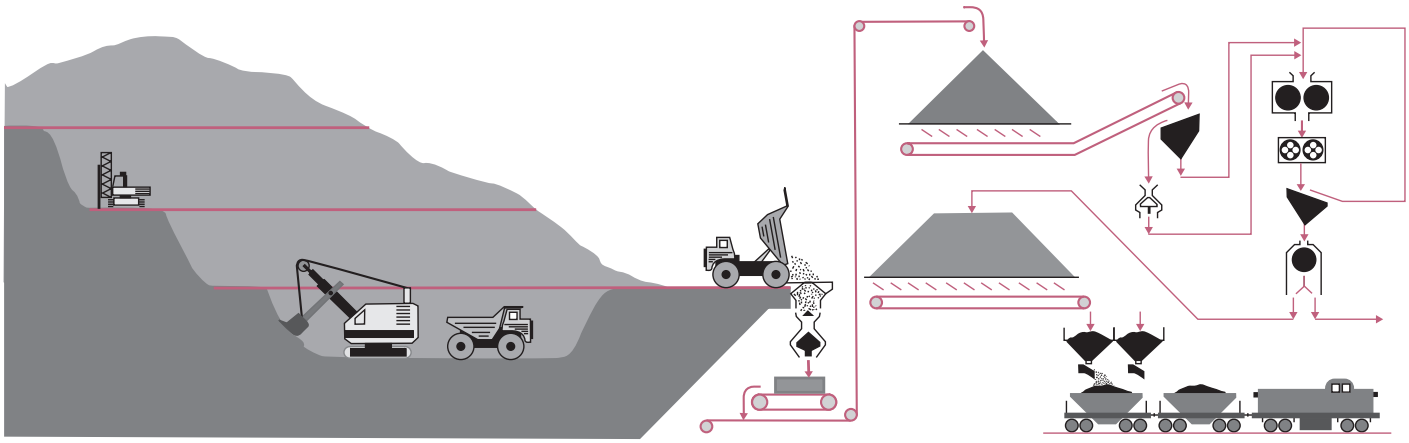

Diagram of the plant showing the different conveyors.

Solution

The problem was solved by installing ABB's ACS 1000 medium voltage drive to soft start the motor allowing a smooth ramp up, and allowing the motor to run at 63 Hz thereby increasing the conveyor speed.

By installing the ACS 1000, the existing gearbox did not need to be replaced and the speed could be increased by almost 25 percent.

Benefits

Increased conveyor speed

By installing the ACS 1000 the speed could be increased by almost 25 percent (from 50 Hz to 63 Hz).

Use of existing motor

Due to the sinusoidal output voltage of the drive, the existing motor could be used without derating. The cable length between motor and drive of more than 100 meters was therefore no problem.

High starting torque

The drive provides a high starting torque, i.e. nominal torque at zero speed. No tachometer is needed to control the speed due to the specific motor control feature DTC (Direct Torque Control). In case of a trip the conveyor belt does not have to be unloaded as is the case for belts without a drive. The high starting torque enables the start of the conveyor, even when fully loaded.

Simplification of mechanical system

Due to the variable speed drive, the hydraulic coupling was not necessary, simplifying the mechanical layout, improving availability and system efficiency.

Protection of mechanical parts

The smooth speed ramp up protects the mechanical equipment, thus prolonging its lifetime.

Small footprint

The drive is located in a pressurized container where space is very costly. The transformer is located outside the electrical room, saving space and improving cooling requirements in the control room.

ACS 1000 key data	
Inverter type	Three-level Voltage Source Inverter (VSI)
Power range	Air cooling: 315 kW - 2 MW
	Water cooling: 1.8 MW - 5 MW
Output voltage	2.3 kV, 3.3 kV, 4.0 kV, 4.16 kV (optional: 6.0 kV - 6.6 kV with step-up transformer)
Maximum output frequency	66 Hz (optional: 82.5 Hz)
Converter efficiency	Typically > 98%
Type of motor	Induction motor

For more information please contact:

www.abb.com/drives

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