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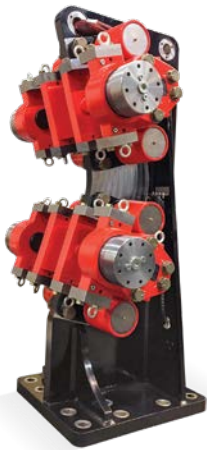
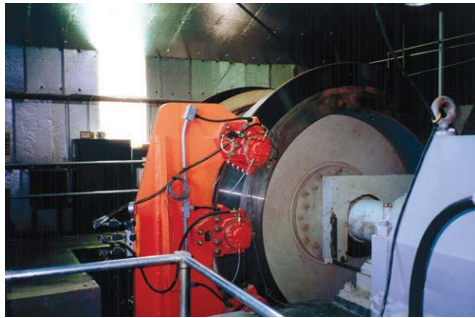
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Braking Systems Improve Safety at Mine Hoists



As seen in
Dry Cargo International

Braking Systems Improve Safety at Mine Hoists



Svendborg Brakes of Denmark, a specialist in advanced braking technology for industrial applications, commissioned two challenging installations to improve the safety and reliability of mine hoists at the Cayuga Mine, owned by Cargill Deicing Technology in central New York State, USA. Svendborg Brakes' units had been fitted to Cargill's hoists over 20 years ago and had gained such a reputation for reliability, performance and safety that it was only natural to turn to the same supplier for the new installations and upgrades.

The mine produces halite for the road deicing industry of the northeastern United States, and has two vertical shafts to access the underground workings. One shaft is used for hoisting the salt product up 635 metres from the mine, and the other is used for raising and lowering personnel and supplies 700 metres to or from the mine. Each shaft is fitted with a hoist to raise and lower the 'skips' that carry salt, personnel or supplies. As many as 130 miners will ride into and out of the mine on the personnel skip each day. Because both shafts are used as emergency escapeways, both hoists have to be fail-safe.

"We were in the process of upgrading the braking system of the service hoist so that the rope drum would have two independent disc brakes, and we wanted the caliper units to be Svendborg type BSFG 408 springapplied, hydraulic released units, because the existing disc was fitted with them in 1981 and they had proven to be trouble-free for over 20 years," stated Dave Plumeau, senior engineer at Cargill Deicing Technology.

The existing hydraulic control was also to be replaced by a new system with independent hydraulic pumps and controls, and speed-regulated braking capability. This arrangement would ensure that one brake would be fully functional if the other failed in any way, and that the emergency stopping would always be gentle (softbraking) so personnel would not be injured, regardless of the load on board.

The mine was also installing a production hoist to replace the 70-year-old hoist that had become outmoded. The new hoist had been manufactured in 1980 but had never been assembled or operated. It was equipped with separate brakes for each rope drum as well as disc brakes for both the driving motors, the calipers for which were also Svendborg BSFG 408 units, but the hydraulic operating system for them had become lost. The mine needed two hydraulic brake operating systems — one for each hoist — with common components for both systems.

SOBO Solution

Svendborg Brakes was able to offer its SOBO (Soft Braking Option) integrated braking system as an ideal solution. The SOBO system consists of microprocessorbased industrial controllers, custom-designed for each application to provide precise braking, regardless of load or configuration. Typical applications include mining gear, conveyor systems and wind turbines. Svendborg Brakes has found rapidly growing demand for its intelligent braking solutions.

Said Plumeau, “Svendborg offered brake operating systems to the mine that were attractive for several reasons. Because they are a ‘packaged’ design, they could be manufactured and delivered quickly. The control systems could be optimized for each hoist to meet their specific requirements and Svendborg’s workmanship is absolutely first rate. The control systems were designed with speed-regulated braking as a normal function, with several different deceleration ramps available, including ‘programmable’ ramps that we could adjust as conditions changed. For increased levels of personnel safety, the brake controls were designed to be redundant so that if one system failed, the other would take over completely and seamlessly during a braking event.”

For the service hoist, Svendborg Brakes tailored its SOBO system so both brakes are applied to follow the same deceleration ramp, but with one delayed by one second. If the first brake cannot achieve the prescribed deceleration, then the second will modulate more force to achieve the deceleration. When this occurs, the brake control recognizes that the second brake is actively applying braking force, and alerts the operator that there is a fault in the first brake. There is no chance that both brakes can fail simultaneously which was a requirement for using the hoist to raise or lower personnel.

The production hoist motor brakes are in fact a second level of redundancy since there are already two independent brakes on the hoist drum. For this reason, the two motor brakes did not need to operate independently of each other. The company’s system incorporates a redundant brake control system so that if the first system fails to achieve a stop within the prescribed time, it automatically switches to the second control unit to achieve the stop. In a sense, this gives a third level of redundancy to the hoist brakes — and because the hydraulic brake systems of both hoists are made up of common, identical components, relatively few spare items are needed for future repairs. The SOBO solution proved ideal, as all SOBO-controlled braking sequences are soft, avoiding shock and jolts, as only the exact amount of braking force necessary will be applied. Although the brake pads make contact with the brake disc immediately when they are applied, braking force will be applied in a controlled manner, bringing the machine to a smooth but effective standstill in a matter of seconds or even milliseconds.

To ensure that there were no possible ways for the hoist brake systems to endanger personnel safety, a ‘failure mode analysis’ was conducted on both systems. Plumeau says “Several unacceptable failure modes were identified [specific to the Cayuga Mine application]. Svendborg developed excellent corrective measures for them, and assisted the mine in implementing them. After the initial period of start-up, very few ‘bugs’ had to be corrected and the brakes have performed as specified.”

About Altra Motion

Altra is a leading global designer and producer of a wide range of electromechanical power transmission and motion control components and systems. Providing the essential control of equipment speed, torque, positioning, and other functions, Altra products can be used in nearly any machine, process or application involving motion. From engine braking systems for heavy duty trucks to precision motors embedded in medical robots to brakes used on offshore wind turbines, Altra has been serving customers around the world for decades.

Altra's leading brands include Ameridrives, Bauer Gear Motor, Bibby Turboflex, Boston Gear, Delevan, Delroyd Worm Gear, Deltran, Formsprag Clutch, Guardian Couplings, Huco, Jacobs Vehicle Systems, Industrial, Kilian, Kollmorgen, Lamiflex Couplings, Marland Clutch, Matrix, Nuttall Gear, Portescap, Stieber, Stromag, Svendborg Brakes, TB Wood's, Thomson, Twiflex, Warner Electric, Warner Linear and Wichita Clutch.



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