

Bridling Colorado Coal Mine Conveyors



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Svendborg Brakes' state-of-the-art braking system with SOBO® iQ control provides consistent, reliable performance on longwall panel conveyors.

The Deserado Mine is located approximately 15 miles northwest of Rangely, Colorado. It is owned and operated by Blue Mountain Energy Inc., which is a subsidiary of Deseret Generation and Transmission.

The mine is the sole supplier of coal to the Bonanza Power plant located near Bonanza, Utah. The power plant is also owned by DG&T, which supplies power to six different cooperatives located in the five surrounding states. The coal-fired power plant's turbine generates 457 MW of electricity daily, enough to power 500,000 homes. The facility is one of the cleanest coal-burning power plants in the US with close to zero emissions.

The Deserado Mine consists of an underground operation, a surface 750 ton/hr preparation plant, and a coal delivery system that utilizes 50,000V electric locomotives and 53 coal hopper cars. "The railroad transports the coal approximately 35 miles to the Bonanza Power plant," said BME Director of Technical Services Jeff Dubbert. "The mine is currently working the B-Seam which can vary from 7 to 16 feet in thickness. Overburden can range from 700 to 1,300 feet, with the immediate roof mostly consisting of shale and mudstone."

Syntron Material Handling, headquartered in Saltillo, Mississippi, was the OEM for the mine's underground conveyor system. Syntron provided all the necessary components, including terminal equipment, electrical VFD controls and idler structures.

Syntron had been supplying BME with downhill conveyor systems that had been in service for over 15 years. "The company that manufactured the original conveyor brakes was no longer supporting that product, so the brakes had become difficult to maintain and were not operating correctly," explained Syntron Application Engineer Adam Coward. "Our original goal was to supply BME with a new brake system that utilized the latest smart braking technology."



The Model BSFH 520 spring-applied, hydraulically-released, dual-spring caliper brakes with 160,000 N braking force, each act on a 50 in. x 1.25 in. standard steel brake disc.



The new braking solution is used on the final two downhill longwall panel conveyors. Each conveyor is approximately 14,500 ft long with 725 ft of drop from tail to head. The 54 in. wide conveyor belt is driven by two 300 HP regenerative ABB VFDs, while operating at a speed of 630 ft/min. to move 1200 -1800 tph of coal.

The 2-pulley drive was designed to fit on a standard pulley skid that the mine uses. The skid is installed near the main drive and storage unit.

The Braking Challenge

Because the conveyor length varies over time with panel development and as the longwall machine retreats, a braking control was required to maintain the stopping time regardless of the conveyor length.

The conveyor required up to 70,000 ft.lbs. of braking torque when extended to full length. The target stopping time was 35 seconds. The conveyor layout was non-traditional since it is a panel conveyor and the tail is being moved regularly.

“Typically, the brake would be installed on the tail pulley, but in this case, the mine’s preferred brake position was toward the head end of the conveyor,” according to Coward. “This configuration required a very smooth, gentle stopping ramp to minimize belt tensions during shutdown. Also, since it is an underground installation, the brake disc diameter was required to be relatively small because there was limited space to work.

“We collaborated closely with the Svendborg team, as there was quite a bit of discussion about how much torque the brake needed and what options Svendborg could provide for stopping and starting ramps,” Coward said. “We were also designing the system to fit on a standard two-pulley skid that the mine uses, so we had to consider disc size, mounting hub arrangement, caliper location and guarding requirements.” The brake skid is installed near the main drive and storage unit, and uses two 42 in. diameter x 63 in. wide ceramic lagged pulleys to apply maximum traction to the belt.



The brake disc diameter needed to be relatively small since space was very limited in the underground installation area.



The conveyor braking system consists of Model BSFH 520 caliper brakes, 50 in. steel discs, Amerigear hubs, a SOBO iQ controller, and a SOBO iQ hydraulic power unit.



All Svendborg power units are designed and manufactured in-house to ensure compatibility with other Svendborg braking system components. Units are equipped to monitor oil level and temperature, motor and pump function, and system pressure.



Amerigear FS207 hubs supplied have an 86,083 ft.lb. torque capacity. The units consist of a rigid (keyed) half that is mounted to the brake disc. The couplings were modified to accommodate a longer rigid hub engagement (length).

The Complete Svendborg Braking Package Solution

To meet the application requirements, Svendborg supplied Model BSFH 520 spring-applied, hydraulically-released, dual-spring caliper brakes with 35,969 lb. braking force, each acting on a 50 in. x 1.25 in. standard steel brake disc. The twin-pulley braking system included a single SOBO iQ hydraulic power unit and a SOBO iQ control.

Manufactured in-house, Svendborg's specialized hydraulic power units are engineered to meet any mining requirement. In order to minimize downtime, the braking systems are equipped to monitor oil level and temperature, motor and pump function, and operational pressure.

Svendborg was also able to provide the necessary hubs from Ameridrives Couplings, another Regal Rexnord brand. The large, 20.75 in. diameter Amerigear FS207 hubs have an 86,083 ft.lb. torque capacity. The units consist of a 7.9375 in. (keyed) half that is mounted to the brake disc. The couplings were modified to accommodate a longer rigid hub engagement (length).

SOBO® iQ Soft Braking Control Technology

Svendborg Brakes introduced the first generation of the popular SOBO (SOft Braking Option) controller in 1998. The advanced control provided smooth braking on mining conveyors worldwide.

The innovative SOBO iQ system, introduced in 2015, represents the latest technology in braking, which includes brakes, hydraulics and the SOBO iQ controller.

Svendborg's advanced SOBO iQ soft braking control provides a range of safety and durability benefits that make it ideal for use in tough mining conveyor applications. Deceleration and stopping of heavy conveyor loads is critical, and controlled braking is essential for a significant reduction of torque peaks, preventing damage to the belt and mechanical components.

As a standalone unit, the SOBO iQ is capable of controlling up to four different hydraulic power units up to 20km or more away. The SOBO iQ is meant to be a single control unit for all of the brakes in a single mechanical chain.

"The SOBO iQ was the perfect solution to meet the demanding longwall conveyor application requirements," said Fredrik Lindner, Svendborg Application Specialist (North America). "The flexibility of the sophisticated SOBO iQ control allows us to stop a conveyor, fully loaded or empty, within the same time or distance. We were able to simply set the necessary curves with the specific desired braking profiles to accommodate the ever-changing conveyor length."

The controller has a quick-release function, built-in as standard, for fast opening of the brakes. The SOBO iQ also features multiple startup ramps in order to customize the release of the brakes in the event that it is necessary to allow drives to build up torque during brake release. When a brake command is sent, the SOBO iQ will begin a predefined braking ramp based on constant stopping time, constant stopping distance, constant braking torque or other braking ramps that can be customized to specialized requirements. Once the SOBO iQ registers a speed of artificial zero, it will begin a parking sequence that can be defined simply as a complete dump of pressure, or as sophisticated as a five-segment open-loop ramp.



The unique SOBO iQ soft-braking controller provides a range of safety and durability benefits in mining conveyor applications.



Remote access and touchscreen for setup and monitoring. The control utilizes different communication ties plus different communication protocols. Authorized users can easily access and change the parameters inside the control, such as defining a parking sequence or pre-setting a stop time.



SOBO iQ units have three-state digital modulation – never used in a braking system before. Each controller can accommodate up to 4 HPUs with defined torque sharing. Other features include full BUS-based communication with the master control system.

In case of complete power failure, the SOBO iQ is supplied with a UPS backup power source, allowing the controller to operate normally when a brake command is given. In case of a communication failure to the SOBO iQ, the unit will activate the highest priority braking ramp. In case of a controller failure, the SOBO iQ will utilize the built in electrical or mechanical two-stage backup to stop the conveyor.

“From our perspective, the smart braking SOBO control was the most important aspect of this project,” said Coward. “The ability to maintain the same stopping time regardless of load and conveyor length was critical to this conveyor system’s performance.”

With installations on most of the world’s largest incline and decline mining conveyors in Europe, Chile, Peru, Mexico, North America, South Africa and Australia, Svendborg’s SOBO brand is recognized worldwide for outstanding performance in the field.

“Another reason we chose to work with Svendborg is that we could rely on them to supply the complete braking package and take full responsibility for stopping the conveyor under all conditions,” said Coward. “Svendborg was constantly in contact with us during manufacturing and provided us with frequent updates on the scheduled shipment.”

Svendborg’s ability to design complete packaged braking solutions, including the state-of-the-art SOBO iQ controller, a wide range of long-lasting brakes, custom hydraulic power units, and other quality components makes them a leading expert in the mine conveyor industry. Extensive support provided by an unmatched global network of local service centers makes Svendborg a preferred choice for mine operators worldwide.





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