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TB Wood's

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Wichita Clutch

Marland Clutch

Industrial Clutch

Bauer Gear Motor

Nuttall Gear

Warner Linear

Delroyd Worm Gear

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An Altra Industrial Motion Company

Twiflex on Mine Hoist Brakes

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Editor, Mining Magazine

Over the past 20-30 years, the main technological development in brakes for mine hoists has been the replacement of less efficient drum brakes with hydraulic disc brakes.

These offer many advantages and, along with the introduction of AC motors for soft starting/stopping plus advances in control systems, brake components have become smaller (due to reduced stresses) with longer life cycles. As a result, there are significant cost savings associated with brake design, installation and maintenance.

Brake Selection

When selecting brakes for mine hoists, it is important to consider factors such as the depth of the shaft, number of levels, stopping profile, drum design and payload in order to calculate the braking torque required for each application.

Twiflex, which produces braking systems for mine hoists, is part of the Heavy Duty Overrunning Clutch Brake division of Altra Industrial Motion. Steve Powell, product manager for Twiflex, explains: "Our selection is based on providing enough braking torque to deal with the static out-of-balance load, in addition to considering the dynamic stopping duty. Modern control systems offer lower hoisting cycle times and high production levels, all of which affect the brake selection. The limitation for brake manufacturers is the friction material and the brake-pad swept area, which needs to be carefully chosen for the operating cycle."

The Twiflex VKSD and VMS modular brake ranges are typically used in mine hoisting. These are spring-applied, hydraulic-release fail-safe brakes, which have a 'parked off' feature, meaning they can be adjusted to remove all stored energy. With zero spring-load and no hydraulic pressure, Twiflex says that the brakes are 100% safe for pad replacement and maintenance.

The modular design comprises two off-spring modules that are mounted each side of a plate. Mono-spring or 'floating' versions are also available.

For mine hoisting, brakes are typically rated between 62kN and 320kN braking force, at a nominal 0.4 coefficient of friction with a 2mm gap between brake pad face and brake disc.

At this rating the Twiflex modular range is designed for over 2 million braking cycles to meet exacting hoist requirements.

In addition to testing the braking torque at the start of each shift, hoist operators carry out visual checks for oil leaks and condition of the disc surface. To assist with maintenance, Twiflex brakes incorporate a monitoring system to signal brake-pad wear and loss of braking force.

"All Twiflex modular brakes are subject to a cycling test and pressure test before leaving the factory," explains Powell. "For mine hoists, all critical brake components undergo non-destructive testing."

New Products/Installations

Powell says: "The main limitation for brake manufacturers is the friction material and the brake pad swept area, which needs to be carefully selected for the operating cycle." With this in mind, Twiflex is continually investigating new materials to address this problem, and has installed new test equipment at its plant in Bedford, UK.

Twiflex VMS3/SPS hoist brakes have recently been selected for use at a gold mine in northern Canada. The mine is projected to produce 600,000 oz/y of gold over a 15-year lifecycle.

The order was for VMS3/SPS calipers for use on a 6.1m diameter, double-drum, single-clutch mine hoist that has two brake discs; one positioned on the fixed drum and one on the clutched drum. Each brake produces 240kN of braking force with a 2.5mm air gap.

The VMS3/SPS design also integrates small pistons for quicker reaction times, coupled with an improved drainage system and a reduced retraction pressure of 160 bar (depending on rating).



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