Warner Electric

Boston Gear

TB Wood's

Formsprag Clutch

Wichita Clutch

Marland Clutch

Industrial Clutch

Nuttall Gear

Warner Linear

Delroyd Worm Gear

Stieber Clutch

Ameridrives Couplings

Inertia Dynamics

Matrix International

Huco Dynatork

Bibby Transmissions

Twiflex Limited

Kilian Manufacturing

Ameridrives Power Transmission

Excerpted from

On the Main Drag

Key Components on Draglines

As seen in
Mining Magazine
July/August, 2009

Twiflex® Limited

Industrial® Clutch

On the Main Drag

Key Components on Draglines

by Carly Lovejoy
Assistant Editor, Mining Magazine

Braking Systems

Draglines use both multi-disc and caliper brakes. Both perform the same function – to stop the load from moving as quickly as possible, and bring it to rest in a controlled manner to avoid shocking the drive train and machine frame – but they offer different benefits. The brakes must be able to handle the high energy associated with stopping these massive loads. Brakes that are not appropriate for the application, or are supplied with untested materials, may overheat or suffer component failure, which can result in machine damage or premature wear.

Bucyrus recently introduced the direct-drive hoist-and-drag motion, which eliminates the need for a gearbox and high-speed brake, and incorporates large, hydraulic, caliper brakes mounted around the main hoist and drag spool.

Many factors influence brake wear, including: the number of stops performed; speed of the stops; proper lining adjustment and operator performance. Wear on multi-disc brakes tends to occur in the friction material on the disc assemblies. If high-speed stops have been frequent or the wear adjustment has not been properly maintained, this can result in wear and heat checking of the opposing iron plates.

Twiflex GMR-SD Caliper Brake

On caliper brakes, wear factors include disc condition, pad material, and caliper set-up and maintenance. The areas most susceptible to wear are the pads, pivot pins and thruster push rods.

Twiflex, part of the Heavy Duty Clutch Brake division of US group Altra Industrial Motion, is the global leader in braking systems for draglines. The company works with OEMs, such as Bucyrus, to supply brakes for new builds, and also sells retrofit and rebuild equipment via its global distributor network. The use of caliper-disc brakes on draglines boosts safety, brake efficiency and reliability due to their increased thermal capacity, and lower maintenance costs. Twiflex has had many requests to replace old, multi-disc friction brakes, which are characterized by high wear rates and offer limited adjustment. The company has also found a large after-sales market for dragline caliper brake spares and pads.

Twiflex's **GMR-SD caliper** is its most popular model for draglines and consists of a cast frame with two pivot-mounted arms. At one end, the arms straddle the disc, sandwiching it with friction pads. At the other end, a spring-applied, air released thruster is mounted to exert force between the arms. The design makes it simple to achieve the precise braking torque required for the different types of machine and motions performed, such as drag, hoist, swing and propel.

A combination of factors can be altered to customize each set of brakes to client requirements, including: the size of the brake disc; number of brakes: size of the thruster; number and size of springs required; and fine-tuning during installation. Twiflex commonly uses brakes with ratings of 10.5-30 kN. Depending on the peak disc temperature calculated, the calipers can be fitted with either organic or sintered pads, which are manufactured from low-carbon steel to perform high-energy stops.

GMR-SD caliper brakes are low maintenance. Caliper arms, knuckle joints and pivot pins require greasing at monthly intervals, and full inspections every six months. If necessary, pins and thruster-push rods are replaced at this stage, although friction pads may need replacing more often. Friction pads are fitted with visual wear indicators and a monitoring unit, which includes inductive proximity sensors to detect when brakes are fully retracted, need adjusting or are out of alignment. Twiflex recommends that

the thruster stroke be maintained at 20mm to avoid loss of braking force, which can be as significant as 7% for every 10mm misalignment.

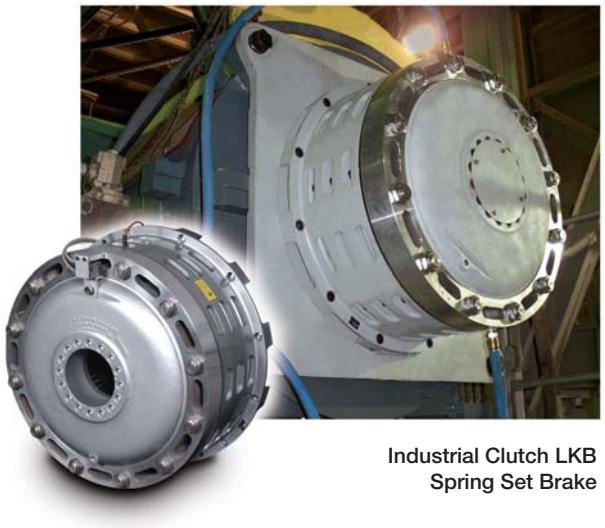
Twiflex recently supplied caliper brakes for retrofits on Marion and Bucyrus 1370, 8050 and 8200 drag-and-hoist, 8250 drag, swing-and-propel, 8750 swing-and-propel, and 2750 hoist-and-drag machines. Over the last 12 months, Twiflex has supplied caliper brakes for the Bucyrus AC dragline delivery to Lake Lindsay (Australia), and is currently working on delivery of a Bucyrus dragline for BMA's Peak Downs mine (Australia). Twiflex will supply caliper brakes to Bucyrus for the hoist, drag, swing-and-propel motions on the dragline, which will be delivered to BMA later this year and will be in service by late 2010.

Another player in the dragline brakes market is Industrial Clutch, also a member of Altra Industrial Motion. The firm has been selling brakes to Bucyrus and P&H since the 1980s, and has a global distribution network that services, supplies and retrofits dragline brakes for mines. Chief Engineer and Product Manager, Brent Bluhm comments: "The majority of our sales are for retrofits, service and fleet expansion. However, recent surges in the sales of new draglines have increased demand for brakes on new-builds."

Industrial Clutch supplies a version of its **LKB Spring Set** air or hydraulic release brakes for the dragline market. This model is designed to cope with high-energy emergency stops and is sized to OEM specifications. The firm has found that, on average, a properly-sized dragline brake will last four to five years before requiring a rebuild or lining replacement.

The nature of dragline braking requirements can vary widely, and Industrial Clutch prefers to select friction materials that meet the performance criteria for both torque and heat absorption over the length of a stop, and offer the best possible lifespan. Over the past 20 years, Industrial Clutch has converted more than 40 draglines to caliper brake systems, many featuring older "clamshell"-style brakes. Its current brakes incorporate wear and release-indication systems and induction-hardened splines on the hub.

Industrial Clutch is working alongside Twiflex to provide brake components for the new Bucyrus BMA dragline delivery, and supplied brakes for the swing-and-propel components of the Bucyrus gearless AC dragline working at the Zhungeer mine in China. Industrial Clutch brakes will also be featured on the motions of the new P&H 9000C dragline series. The firms are working closely to select brakes of the right size and determine features to improve performance.



Industrial Clutch LKB Spring Set Brake

About Altra Industrial Motion

Altra Industrial Motion (NASDAQ:AMIC) is a leading multi-national designer, producer and marketer of a wide range of electromechanical power transmission products. The company brings together strong brands covering over 40 product lines with production facilities in nine countries.

Altra's leading brands include Boston Gear, Warner Electric, TB Wood's, Formsprag Clutch, Wichita Clutch, Industrial Clutch, Ameridrives Couplings, Kilian Manufacturing, Marland Clutch, Nuttall Gear, Stieber Clutch, Twiflex Limited, Bibby Transmissions, Matrix International, Inertia Dynamics, Huco Dynatork, Ameridrives Power Transmission, Delroyd Worm Gear and Warner Linear. For information on any of these technology leaders, visit www.AltraMotion.com or call 815-389-3771.

CHECK OUT

www.AltraMining.com

to view a full array of power transmission solutions available from the brands of Altra Industrial Motion.

Twiflex®
Limited

An Altra Industrial Motion Company

+44 (0) 20 8894 1161
www.twiflex.com

Industrial®
Clutch

An Altra Industrial Motion Company

262-547-3357
www.indclutch.com

Asia Pacific

For a list of our AP sales offices:
www.AltraMotion.com/ContactUs

P-1897-C 12/09 Printed in USA