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Boston Gear

TB Wood's

Formsprag Clutch

Wichita Clutch

Marland Clutch

Industrial Clutch

Nuttall Gear

Warner Linear

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Stieber Clutch

Ameridrives Couplings

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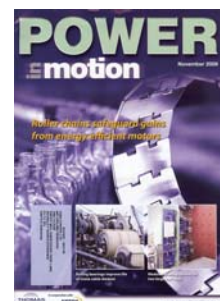
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## Braking the World's Largest Ball Mills



As seen in  
**Power in Motion**  
November, 2009



 **Twiflex**<sup>®</sup>  
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# Braking the World's Largest Ball Mills

*Twiflex provides modular braking system for two ball mills at PPRust mine in South Africa.*

Twiflex modular brakes are providing up to 35 MNm of total braking torque on two 8 meter ball mills, which are part of South Africa's and probably the world's biggest platinum concentrator, at Anglo Platinum's Mogalakwena (previously PPRust) mine near Mokopane. The new concentrator expands milling capacity by 600,000 tons per month, producing an additional 230,000 ounces of platinum per annum and bringing total platinum production at the mine to 430,000 ounces per year.

The crushing and milling equipment selected for the PPRust North Plant is notable for its sheer size. In addition to the primary gyratory crusher, which is believed to be the biggest anywhere in the world, two 8m diameter by 11.7m long gearless ball mills, both rated at 17.5 MW have also been supplied. These are the biggest ball mills yet supplied for a platinum mining industry application in South Africa and are also among the biggest anywhere in the world.

With each ball mill drum having a monumental total inertia of 14,195,400 kgm<sup>2</sup>, controlling the drums (i.e. stopping, holding and positioning them) presented its own unique problems. Periodically they have to be stopped and brought into an equilibrium position while new liners are inserted or essential maintenance is performed. In addition, there is the requirement for emergency stop should a power outage occur, or a problem develop with the hydraulics serving the drum.

The company brought in to engineer the solution is one of the top global suppliers of feeder sizing, crushing and screening equipment to the worldwide minerals handling and minerals processing sector. It had recently employed the world's most powerful disc brakes from Twiflex of the UK, for the world's largest winders. The success of application meant that Twiflex was asked to get involved with the PPRust project.

The unique nature and demands of the application necessitated a special type of brake, one that Twiflex was able to supply with its robust VMSDP units. These are spring applied, hydraulically released safety brakes designed to operate in the most arduous conditions, where reliable operation all year round is expected. The VMSDP brakes are a compact, modular mine-ready design that, unlike caliper brakes, does not need guarding. Moreover, they are about one-third smaller than caliper units, providing a more compact assembly, and one that reduces cost, both in terms of the size of hydraulic power pack – and the volume of oil required – to release the brakes.

Each of the 8m ball mills utilizes six of the VMSDP brakes, providing a total braking force of 4.4 MN or 737 KN per brake. What this means in operational terms is that even with a full process charge (1.29 Mg) the braking system could stop the mill in a staggering



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0.5 seconds. This stopping time assumes that the charge mass assists the braking; it is based on the brakes coming 'hard' on and the coefficient of friction ( $\mu$ ) being 0.4. However, in practice the customer wanted the braking to be controlled to avoid damage to his equipment. To facilitate this, the Twiflex hydraulic powerpack is set to stop the mill between 6 and 10 seconds using a fast approach, soft braking option: (i.e. brake pads come onto the disc quickly with zero force and then the amount of force is controlled to give the desired stopping time).

The Twiflex system is designed to provide both static and dynamic braking functions. In static operation the braking system is used to hold the mill during liner replacement and general mill maintenance. For dynamic operation the system can operate in two modes, stopping the mill from full speed in an emergency, or giving inching/creeping operations in the event of bearing lubrication problems or power failures. For the first, a controlled application of the brakes is required, and for the second, the brakes are actuated quickly giving the accurate stops required by the mill operator.



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## 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](http://www.AltraMotion.com) or call 815-389-3771.



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