

Morgoil bearing upgrades increase mill utilization

Get Your Bearings Right

Since the 1930s, the tapered-neck Morgoil bearing has been the premier load-carrying bearing used in the metals industry. These have been installed in more than 1,500 mills on six continents. Improved design solutions provide even greater benefits for operators.

The Morgoil bearing is a hydrodynamic oil-film unit with an integrated design. It consists of load-carrying elements that provide precise vertical, horizontal and axial positioning, and is characterized by its unique sealing and mounting designs. These features have all proven to function well with high rolling loads and speeds. Its high capacity, long life, easy maintenance and low cost have made it ideally adapted to all rolling-mill applications, both for ferrous and non-ferrous metals as well as for hot and cold rolling.

“Rolling mills have long lives, but their technology becomes outdated,” notes Gabriel Royo, Vice President, Morgoil and Long Rolling Services. Advances in newer mills with contemporary bearing technology make it difficult for older mills to match their costs, quality and production levels. The Morgoil Group of Siemens VAI works with mill operators to economically upgrade these older mills with the latest Morgoil bearing technology, bringing mills up to date to compete more effectively. In the 1990s, Morgan purchased the trade name and designs for Mesta oil-film bearings, further expanding the Morgoil product line.

“We continue to refine the Morgoil bearing to meet the demanding conditions of today’s market,” says Royo. Engineers have introduced advancements in strength, durability, accuracy, seal design and lubrication to ensure they are the most reliable in the industry, and easy to quickly mount and dismount. For

example, the latest KLX design, an advanced keyless-bearing technology, improves strip quality, reduces mill capital-investment and operational costs and absorbs 25 percent to 29 percent more load in the same space. It allows mills to roll with higher loads to produce harder materials. With appropriate back-up roll-bearing upgrades, mills can increase load capacity and produce materials that could not be produced with outdated bearings.

Advancements in Morgoil bearing strength, durability, accuracy, seal design and lubrication ensure the greatest reliability.

“Upgrades allow mills to roll products and obtain cost efficiencies unimaginable decades ago,” continues Royo. “Every solution is customized to the customer’s equipment and goals. Our job is to clearly articulate to our customers the potential opportunities for their particular situation. Typical questions are ‘Can I improve strip quality?’, ‘Can I roll tougher materials?’, ‘How do we connect an existing mill to a slower-running processing line?’ and ‘How do we reduce operating costs of bearing and lube systems?’, among others.”



Proven reliability of Morgoil bearings since the 1930s in more than 1,500 mill installations worldwide

Both older oil-film bearings and roller-bearing mills have been successfully upgraded while reusing existing chocks. To extend roll life, mill owners can upgrade back-up roll seals. Upgrades to back-up roll-bearing locking ensure more consistent and safer

operation. In many cases, mills have paid for the upgrade within a year through increased productivity and more efficient equipment utilization. Many factors drive the decision to upgrade bearings, including:

- equipment that has just become too old and worn to produce a quality product;
- the desire to produce tougher grades requiring higher stand capacities;
- demand for increased rolling speed and production capacity; and
- accommodation for an additional processing line.



Morgoil bearings in a continuous hot-strip mill

Upgrade examples and benefits

Sleeve upgrades: The original Morgoil 1960s-vintage bearing can be converted to a so-called KTRT (key-type, thrust roller thrust) bearing with a short-key design. This common conversion significantly reduces the size of the keyway effect along with allowing an 18 percent increase in the load rating of the bearing and a significant improvement of strip-gauge quality (Figure 1).

Bushing upgrades: Bearing loads can be upgraded significantly by means of a short key-sleeve conversion combined with the use of High-Strength Babbitt (HSB) bushings. Upgrading an old TRT bearing to special short-key sleeves and HSB bushings can increase the rating by 33 percent. The ratings of relatively modern KL (key-less) bearings can be increased by 12.5 percent with the use of HSB bushings.



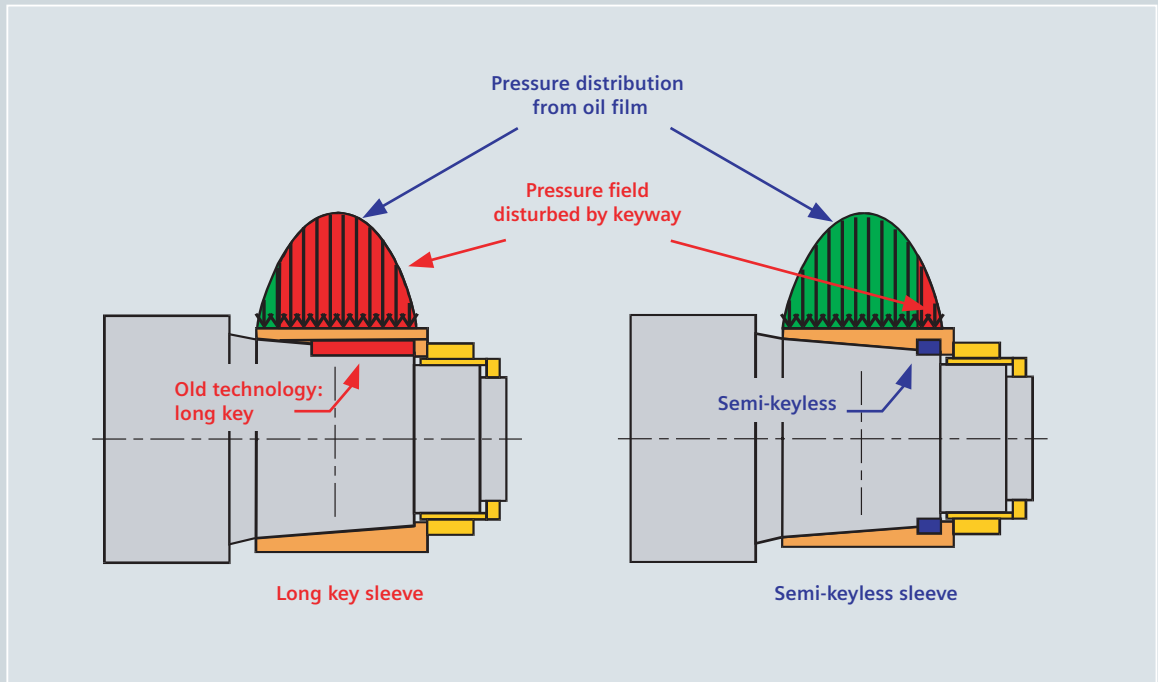


Fig. 1: Conversion of keyed technology to semi-keyless technology for strip-gauge improvements

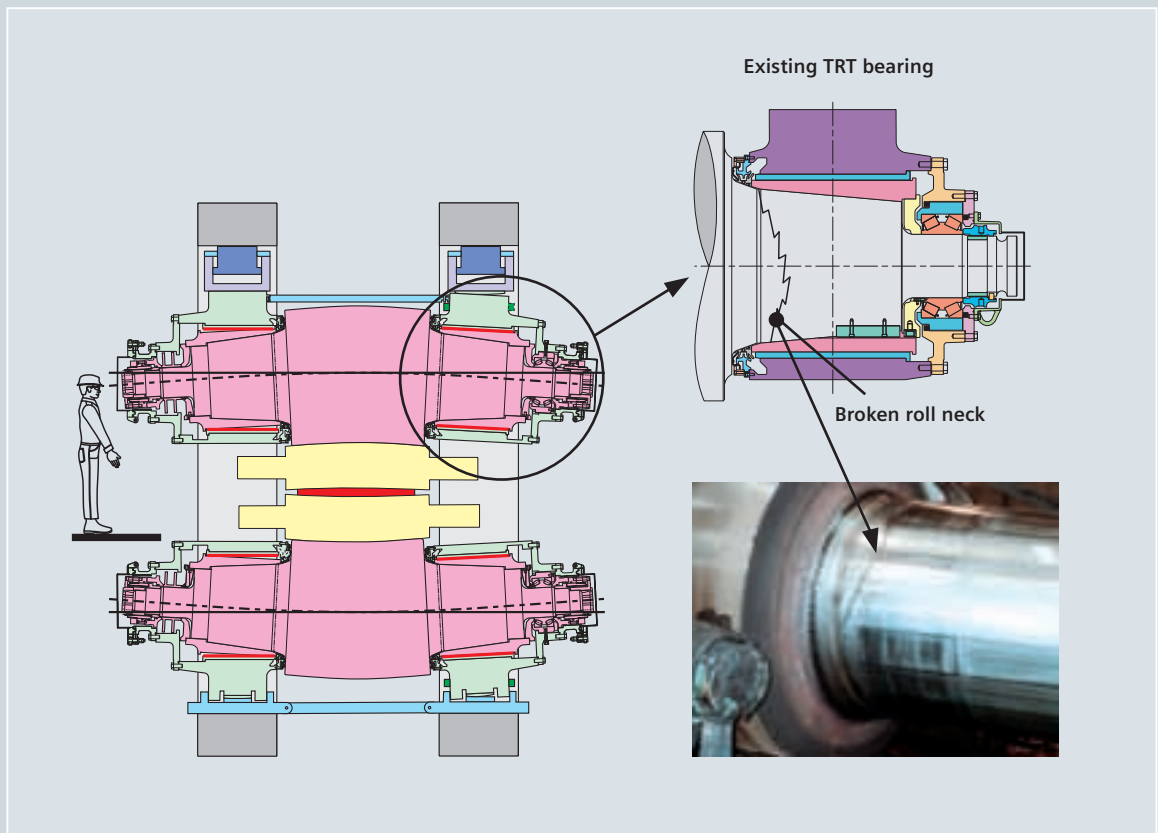


Fig. 2: Hot-strip-mill case study shows need to replace bearing



Morgoil KLX bearing at Shagang 5 m Plate Mill, China

>> **Seal upgrades:** Morgoil and Mesta bearings can have their sealing systems converted to more modern designs to reduce maintenance time and increase effectiveness. These conversions can be done individually or during complete bearing upgrades. For a certain type of Mesta plate-mill bearings, the existing sealing system limits the diameter that a roll can grind down to before it must be discarded. Changing to a more modern neck-seal design allows smaller diameters to be reached, thus extending the life of these million-dollar plate-mill back-up rolls. In the case of one 5 m plate mill, this seal conversion resulted in operational savings in the range of millions of euros.

Locking upgrades: Bearing locks have advanced significantly over the evolution of the Morgoil bearing. The original mechanical threaded-ring design and later quick-change design have been replaced by more modern hydraulic concepts. On new mills, one of three types is now standard: hydraulic bayonet, removable mount or compact bayonet. Older mills with mechanical locks can often be converted to hydraulic mount and LD Locks, increasing the repeatability and safety of the mounting process and eliminating the need to use an overhead crane to tighten the locks.

Case study: Hot-strip mill (HSM) upgrade

An HSM with older-style Morgoil 42"-90 TRT bearings began experiencing bearing failures and serious roll neck-breakage problems (Figure 2). Analysis found that modern material requirements had driven the total separating force well above the rating of the bearing. After

close study, Morgoil recommended a complete bearing replacement based on a load analysis. It was clear that the failures were occurring because the bearing loads had exceeded original bearing rating. With very few modifications, a 42"-86 KLX bearing could be fit into the existing chocks. The updated bearing would have a higher load capacity and larger roll neck, reducing the stress in the neck at the new, higher loads.

Many mills pay for upgrades within a year through increased productivity and more efficient equipment utilization.

Concluding remarks

Through the constant development of new technology, which can be applied to older mills, Morgoil remains a market innovator. The KLX developments increase bearing capacity with smaller bearings. Continuing improvements in sealing, locking and lube-system components are other examples of Morgoil market leadership. ■

Authors

Gabriel Royo, Peter Osgood, Thomas Wojtkowski

Contact

morgoil.metals@siemens.com