

HARDLOCK[®]
Solution

**Ball & Rod Mill
Applications**

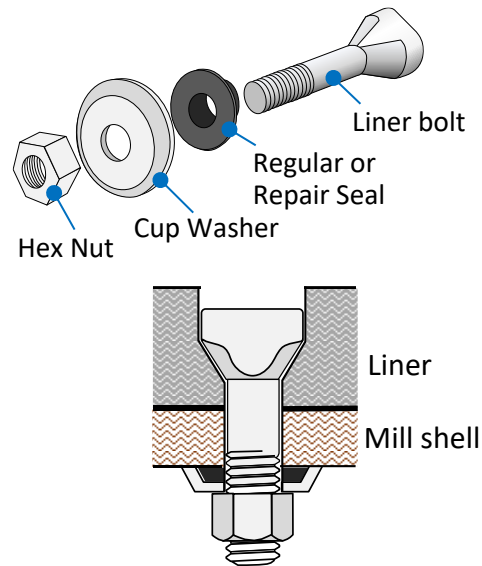
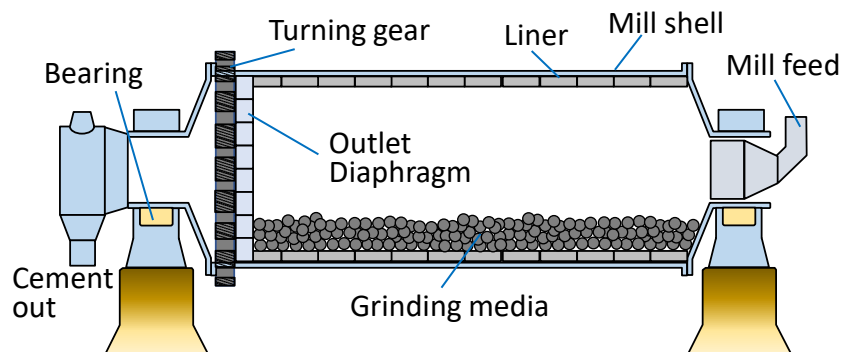
Use of HARDLOCK Nuts in Ball/Rod Mill (1)

Grinding mill liner bolts are installed by inserting the liner bolts through the liner and then the shell of the mill, this is done from the inside out.

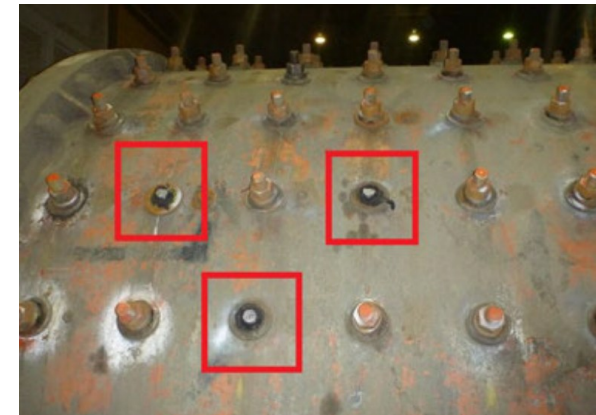
Slurry leakage (Weeping joints) and Bolt failures can occur over time due to drop in clamping force (tensile force). Intermittent drop in clamping force occurs more frequently in discharge liner bolts than feed end liner bolts, this is thought to be influenced by shifting of material and grinding media to one side of the ball mill, leading to heavier impacts to the liners.

The drop in clamping force may allow liners to become slack, generating further bending force inducing bolt failures and loose bolts.

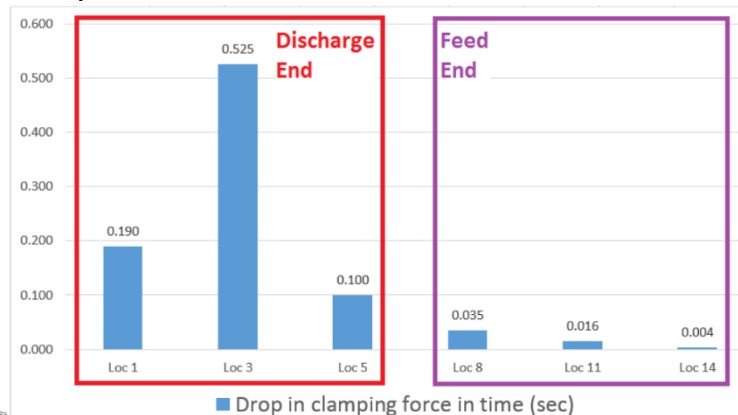
Outline of ball mill



Rod mill bolt breakage



Early failure detection



Weeping joints and broken bolts will cause:

- Unexpected interruption to operation
- Metallurgical losses and production downtime
- Multiple bolt failures may lead to liner loss

Minimizing liner movement and reducing its bending forces are a key issue to prevent bolt failures.

Source:

"Application of Wireless Load Cell to Investigate Rod Mill Liner Bolt breakage" XPS Consulting & Testwork Service, 13 Nov 2015



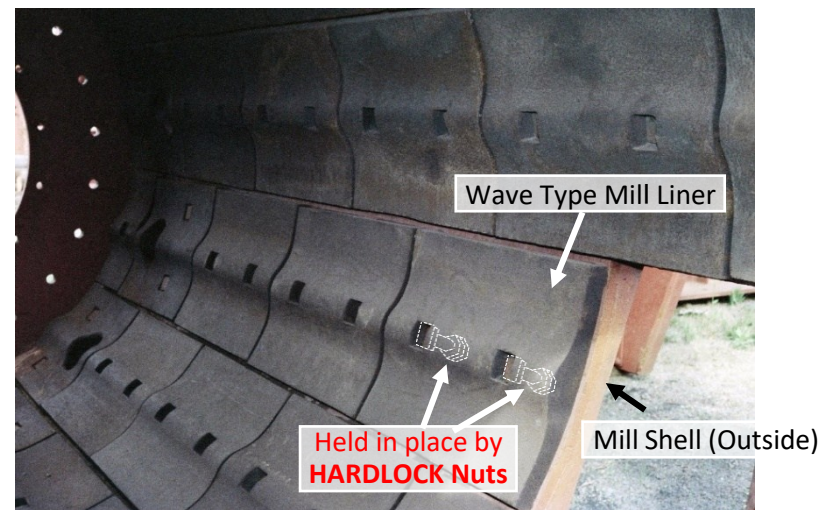
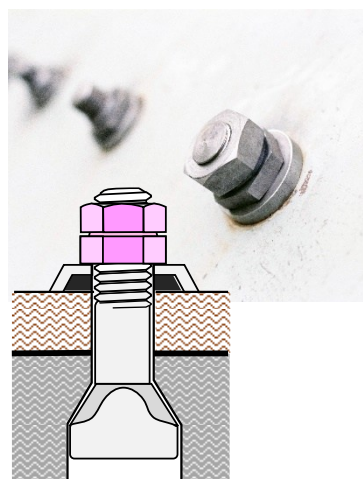
Safety is power!

HARDLOCK®

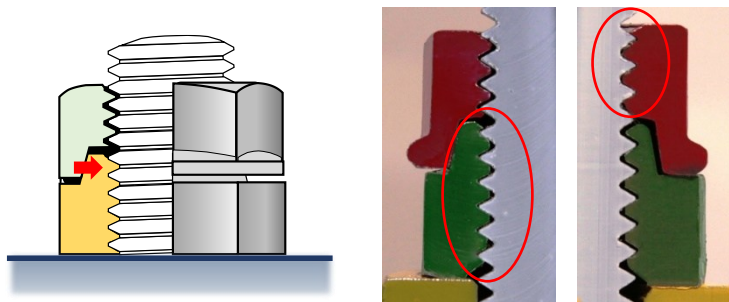
Use of HARDLOCK Nuts in Ball/Rod Mill (2)



HARDLOCK Nuts are used along with liner bolts to prevent leaking joints and broken bolts. Longer Lifetime of joints leads to increased time until next Retorque.



HARDLOCK Nuts withstand heavy impact to the liners



The picture shows the engagement between the threads of bolt and HLN Convex Nut.

When the nut is fixed to the bolt without play (gap) between the threads, very strong friction is generated in the contact areas, which prevents any external forces or vibrations from making the nut rotate.

HARDLOCK Nuts maintain clamp force even for badly damaged shells



Liner bolts are removed by hammering the end of the bolt pushing the bolt inside the mill, allowing removal of the liner. Hammering is required because big heavy liners apply weight on the bolt increasing the friction as well as dried up slurry filling the hole. Sledge hammers, Jack Hammers, sometimes even the Thunderbolt hammer are used to hammer. The process of knocking the bolt in can cause damage to the shell hole. Damage to the shell can be a cause of reduced friction on the fastened nut, provoking further loosening in fasteners.

The locking effect of HARDLOCK Nuts do not rely on the friction of bearing surfaces and can prevent liner movement.



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