

Bradken® Load Monitoring Fastener Plus

DRAFT

Reduce unplanned downtime with millions saved on your SAG, Rod and Ball machines. Don't guess your reline! Make informed decisions during assembly, retorque and operation.

Achieve and maintain precise liner bolt assembly tensions

Using 4 plates including liner bolts outfitted with LMF+ technology, you can do the following:

- Calibrate torquing tools on the mill rather than using an external load cell such as a Skidmore.
- Eliminate the external inaccuracies of nut factor calibrations and set the torque guns to the desired tension.
- Monitor the inherent relaxation, and adjust target so the bolts relax to the desired tension.
- Adjust and verify torque patterns to better account for the "bolt-crosstalk" across a plate.
- Radjust procedures to address interactions such as the grate installation on pulp lifter bolts.

Optimized retorque. Why wait 24, 36, 48 hours before retorque?

- Make data based determination of the optimal time to retorque.
- Eliminate guessing and tribal knowledge on when to retorque.
- Too early and bolts may continue to relax leading to breakage.
- Too late and material may flow between mating surfaces leading to relaxation and breakage.

Significantly reduced downtime while in service

- Troubleshoot problem areas with unprecedented information.
- Quantitatively monitor and compare different procedures.
- Digitally document correct assembly and hold assembly teams accountable for correct installations.
- Integrate bolt data with other sensors for improved condition monitoring and predictive maintenance.

The LMF+ Paradigm Shift:

An important change that happens when the usual way of thinking about or doing something is replaced by a new and different way.



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Reline strategy: develop optimal procedures with 4 plates per section

Plate 1

Calibrate torque wrench: adjust torque tool levels to produce optimal tension without needing to estimate the nut factors or guess on relaxation dynamics.

Plate 3

Verify torque levels and pattern: Verify final tensions and adjust torque levels and/or patterns as needed.

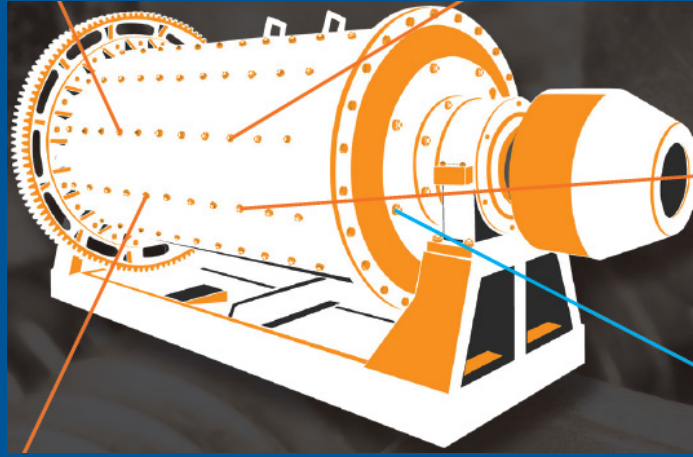


Plate 2

Establish optimal torquing pattern: modify torquing patterns to compensate for bolt cross-talk. Investigate patterns such as Middle-Inner-Outer-Inner.

Plate 4

Second Verification: Based on data from first 3 plates, decide if there needs to be any small changes and finalize procedures for the rest of the mill.

Discharge end additional step: Evaluate need to retighten pulp lifter bolts after grate is torqued.

Accuracy

LMF+ fasteners adhere to ASTM F2482 5% accuracy requirement, but they commonly achieve 2%.

Battery Life

3-4 years depending upon the transmission interval.

Installation Tools

Any conventional tools including hydraulic torque wrench, tensioners, pneumatic torque multipliers, and many impact wrenches.

Tool Calibration

The LMF+ effectively allows you to verify the performance of your installation tools

Sizes and Grades

The LMF+ solution can be installed in any grade bolt (A449, B7, 8.8, 10.9, etc). The diameter ranges are m20-m124 (3/4" - 4 3/4").

Relaxation happens in seconds...

Reline technicians have been astounded to see grate bolts relax 30% just seconds after removing torque tools. Relaxation is commonly due to embedment of surfaces and creep as a grate seats the pulp lifter onto the rubber backing.



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