

SOLVING COMPLEX BEARING
CHALLENGES ACROSS INDUSTRIES

Industrial Bearing Solutions

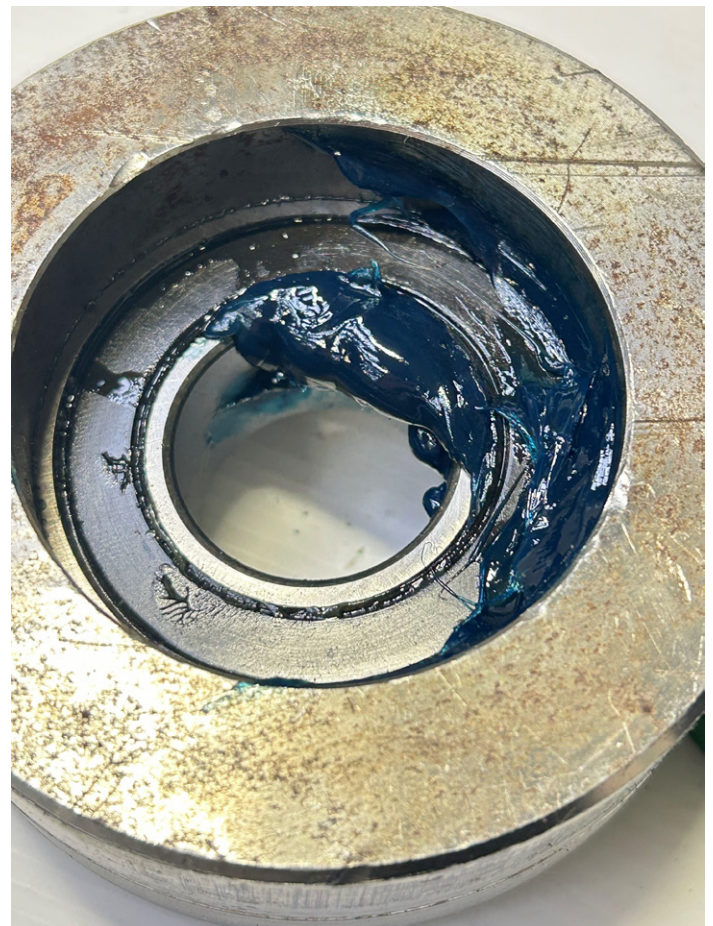
Agricultural Equipment Seal Enhancement

Executive Summary

An OEM in the agriculture industry faced recurring issues with bearing seal popping out, resulting in grease leakage and seal displacement. BMI's engineering team, in collaboration with a seal vendor partner, developed an enhanced sealing solution with improved contact mechanics that effectively contained the grease while preventing seal failure. The new design significantly improved field performance and equipment reliability by more than 50%.

Problem Statement

The customer reported a recurring issue where grease was escaping from both the inner and outer ring lips of their bearings, eventually causing the seals to dislodge completely. This failure mode compromised bearing lubrication and allowed contaminant ingress, leading to premature bearing failure and unplanned equipment downtime during critical operational periods.



Bearing with grease leakage and damaged seal

Investigation Process

BMI's engineering team conducted a thorough failure analysis of the returned bearing samples.

Key findings included:

- 1 Pressure Analysis:** Excessive internal pressure was building up during operation
- 2 Seal Contact Examination:** Insufficient contact pressure between seal and bearing surfaces
- 3 Material Assessment:** Seal material properties under application conditions
- 4 Operating Environment Review:** Understanding of typical duty cycles and environmental exposures

The investigation identified that the standard sealing solution was inadequate for the specific combination of operational conditions, resulting in grease migration past both inner and outer ring lips.

Solution Development

BMI's engineering team collaborated with our specialized seal vendor to design a customized sealing solution with the following enhancements:

- 1 Improved Contact Geometry:** Modified lip profile to maintain consistent contact pressure across operating conditions
- 2 Pressure Relief Path:** Engineered controlled pathways for excess grease to escape without displacing the seal
- 3 Material Optimization:** Selected seal compound with appropriate flexibility and durability for the application
- 4 Retention Features:** Enhanced seal retention mechanism to prevent displacement under pressure

The new seal design specifically addressed the failure mode by ensuring that any excess grease would be directed to escape through the inner ring lip area in a controlled manner, preserving the overall seal integrity.

Conclusion

This case demonstrates how targeted seal design and vendor collaboration solved a complex grease management issue, delivering a solution that addressed the root cause rather than symptoms, highlighting BMI's engineering team's expertise in developing customized bearing solutions for specialized applications.

Results & Benefits

After implementing the enhanced seal design:

- 1 Elimination of Seal Failures:**
No further incidents of seals popping off under pressure
- 2 Controlled Grease Management:**
Excess grease was properly channeled without compromising seal function
- 3 Extended Maintenance Intervals:**
Reduced need for regreasing and maintenance attention
- 4 Improved Equipment Uptime:**
Elimination of unplanned downtime due to bearing seal failures
- 5 Enhanced Contamination Protection:**
Better sealing performance kept contaminants out of the bearing



BMI provides comprehensive bearing analysis and application-specific solutions across industrial sectors. Contact our engineering team for consultation on your challenging applications.

