SUCCESS STORY 2026

Metal replacement in electric axle drives

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2026

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GAPI PAI GLon™ high-performance materials for highly stressed tribological applications

Customer application

Shortly before the start of production (SOP) for a newly developed electric axle drive from a German premium automaker, significant wear was observed on the metal thrust washers within the highly loaded planetary gear set. This situation seriously jeopardized the system's service life and durability, as well as the launch of series production.

A reliable alternative to the existing metal solution was required during this time-critical phase. With many years of experience in highly stressed tribological applications, GAPI was brought in as a specialist for polymer thrust washers made of high-performance materials to implement a component solution suitable for series production at short notice.

Problem Statement

- High material removal
- Increased noise generation (NVH)
- Decreasing efficiency
- Reduced service life
- Risk of premature system failure

The goal of the project was to replace the existing metal solution with a more wear-resistant and higher-performance PAI GLon™ solution and to sustainably improve the system's operational reliability.

Challenge | The solution had to:

- Minimization of wear and friction
- Reduction of noise generation
- Availability at short notice
- Ability to withstand high surface pressures
- Capability to handle high rotational speeds and load reversals
- Reliable operation under conditions of inadequate lubrication

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Our Solution | GAPI PAI GLon™ XA55 High-Performance Thrust Washers

A thrust washer based on the GAPI PAI GLon™ material family was used for the critical installation position in the rear axle module. The solution leverages the specific advantages of a high-performance plastic and combines them with GAPI's long-standing expertise in high-load tribological applications.

Properties

- Excellent emergency running properties
- Very low coefficients of friction
- Outstanding performance under boundary lubrication conditions
- High wear resistance
- High dimensional stability
- Very good damping properties

Implementation & Validation

- Dimensionally accurate C-samples available within a few days
- Early validation and endurance testing enabled
- Extensive test bench and load tests conducted under realistic conditions
- Direct comparison with the previous metal solution
- GAPI PAI GLon™ thrust washers demonstrated more stable behavior under critical load and lubrication conditions
- Significant performance and robustness advantages over the metal washer

Results at a glance

Kriterium	GAPI PAI GLon™	Metal
Wear	Minimal wear	High material removal
Inadequate lubrication	Stable	Critical
Noise generation	Significantly reduced	Increasing
Service lifehavior	Optimized	Increased
Lifetime	Significantly increased	Limited

Customer Benefits | The use of GAPI PAI GLon™ thrust washers resulted in:

- Permanent elimination of wear issues
- Significant improvement in NVH characteristics
- Increased system operational safety and durability
- Reduced friction losses
- Increased system efficiency
- Facilitated rapid industrialization

Conclusion – From Metal to High-Performance Plastic

The successful replacement of the metal thrust washer with a GAPI GLon™ solution demonstrates once again that modern, high-performance tribological materials are often superior to conventional metal solutions, even in heavily loaded electric axle drives. **Greater efficiency. Less wear. Longer service life.**