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AFTERMARKET WHEEL BEARING CASE SETTLES IN FAVOR OF PLAINTIFF

A replacement wheel bearing with significant design differences from the original equipment manufacturer fails and causes permanent injury.

SITUATION

The plaintiff was returning from a hunting trip in a 2007 Ford E-350 camper van when the left rear axle fractured, and the wheel suddenly separated from the vehicle. A loss of control rollover accident followed, leaving the passenger with a fractured cervical spine injury and permanent paralysis.

Prior to the accident, the van was serviced at several repair shops. While out of state, the original axle was replaced with an axle kit containing an aftermarket axle and aftermarket wheel bearing. The replacement wheel bearing had less than 2500 miles of use at the time of the accident. Prior to the accident trip, the vehicle was taken to a repair shop for noises emitting from the rear wheels. Brake repairs were performed, and the vehicle was returned to service.

ESi was initially retained to disassemble the rear axle from the damaged van. The scope of the work expanded significantly after the consultant detected questionable aftermarket replacement components. The case expanded to include additional metallurgical and technical exploration and investigation.

Practice: Automotive

Location: California

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Services Utilized:

- Technical Disassembly of Vehicle
- Visualization Services
- Computer Modeling & Simulation
- Bearing Failure Analysis

About ESi

For over 30 years, ESi has leveraged its multidisciplinary team of engineers, scientists, and professional technical staff to investigate many major accidents and disasters. Our technical expertise, hands-on experience and state-of-the-art facilities, combined with diagnostic, analytical and physical testing capabilities create an ideal environment for quickly identifying and interpreting the facts of a case.

Contact ESi

For more information visit our website or call us toll free at 866.596.3994

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SOLUTION

ESi performed a comparative analysis with the original equipment manufacturer (OEM) wheel bearing and axle shaft using exemplar aftermarket bearings and shafts.

Metallurgical examinations independently determined that the aftermarket axle shaft was a compatible replacement for the OEM axle shaft.

During the inspection, ESi noted that the wheel bearing from the failed axle shaft was an aftermarket design and had completely disintegrated. Upon further examination, it was discovered that there were significant differences in the physical characteristics of the aftermarket replacement wheel bearing compared to the OEM original. These differences included one less roller, shorter and smaller diameter rollers, and a caged roller design.

Additionally, the replacement bearing was not designed with adequate crowning or curvature of the cylindrical rollers and raceway. These attributes of the bearing design are invisible to the naked eye. They decrease edge stresses on the rolling elements and the bearing raceways and improve the bearings load carrying capability. With proper crowning, the rolling elements and raceways have reduced edge stresses and substantial increase in mean time between failures.

RESULTS

ESi determined that the aftermarket wheel bearing was an incorrect component for the application. The replacement bearings were shown to have 48% more contact stress under load even when the effect of the inadequate crowning was not included.

In preparation for trial a demonstrative video was developed illustrating the differences between the OEM bearing and the aftermarket bearing and a simulation of the bearing failure that resulted in the loss of the left rear wheel of the subject vehicle.

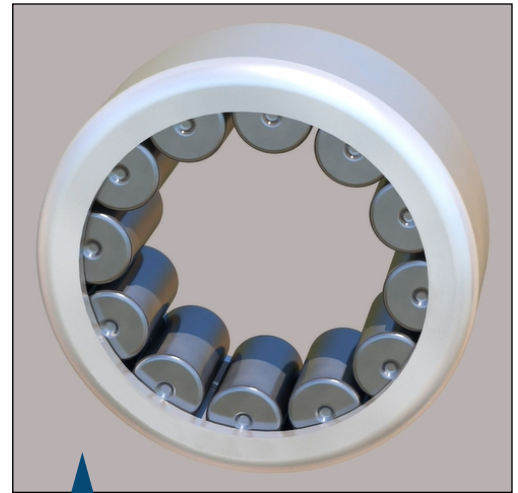
Ultimately, three U.S. companies were implicated in the chain of commerce for the aftermarket component sold by national retail auto parts stores for use on a 2007 Ford E-350. These companies had substituted the OEM bearing for an aftermarket bearing of a different design, without testing whether the fit, form and function of the aftermarket bearing was appropriate for use in the selected application.

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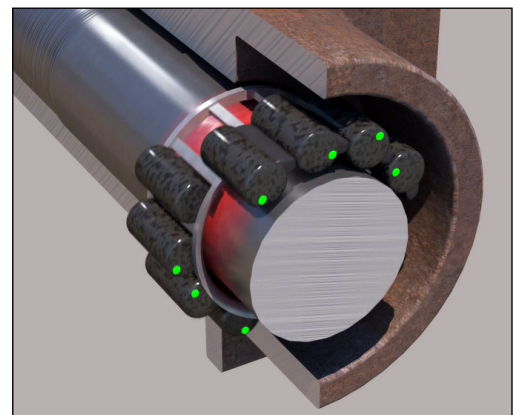
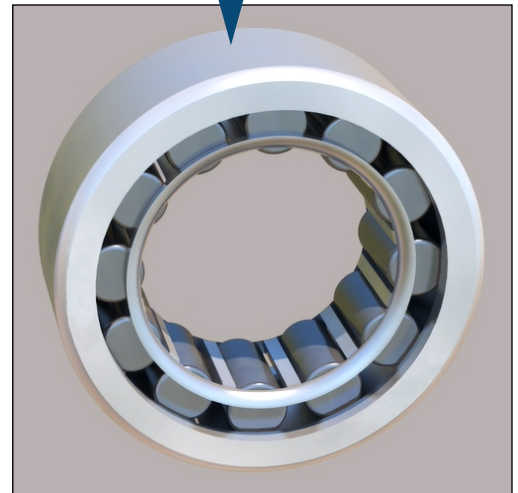
WHY ESi.

The automotive practice group is comprised of consultants with backgrounds in:

- Maintenance Standard of Care
- Injury Causation Analysis
- Materials Failure Analysis
- Vehicle Performance Analysis
- Manufacturing Technology
- Human Factors
- Vehicle Systems Analysis
- Reliability Modeling & Simulation
- Design Optimization
- Regulatory & Compliance



OEM vs. aftermarket wheel bearing



Bearing disintegration



Engineering Consulting
and Forensic Investigation

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