VEHICLE FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

Vehicle Attachment 5 – Peterbilt Truck Tractor

TRW Steering Gear Inspection Report

MULTIPLE VEHICLE ACCIDENT
Chattanooga, TN

HWY15MH009

(9 pages)

Steering Gear Teardown review
TRW – COMMERCIAL STEERING DIVISION

SETA	**DATE**	9-1-2015	**LAB TECHNICIAN**	Patrick Scott Jones
TASK	**GDPIM**	None	**PRODUCT ENGINEERS**	Bob Johnson Mark Cartwright

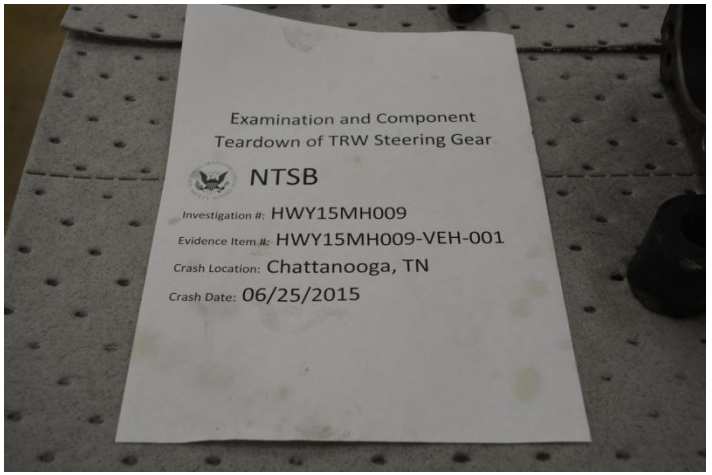
DISTRIBUTION: Non TRW attendees: Steven Prouty-NTSB, Jerome Cantrell-NTSB

PART DESCRIPTION: Steering Gear TAS65024A Date Code 13006C43P36

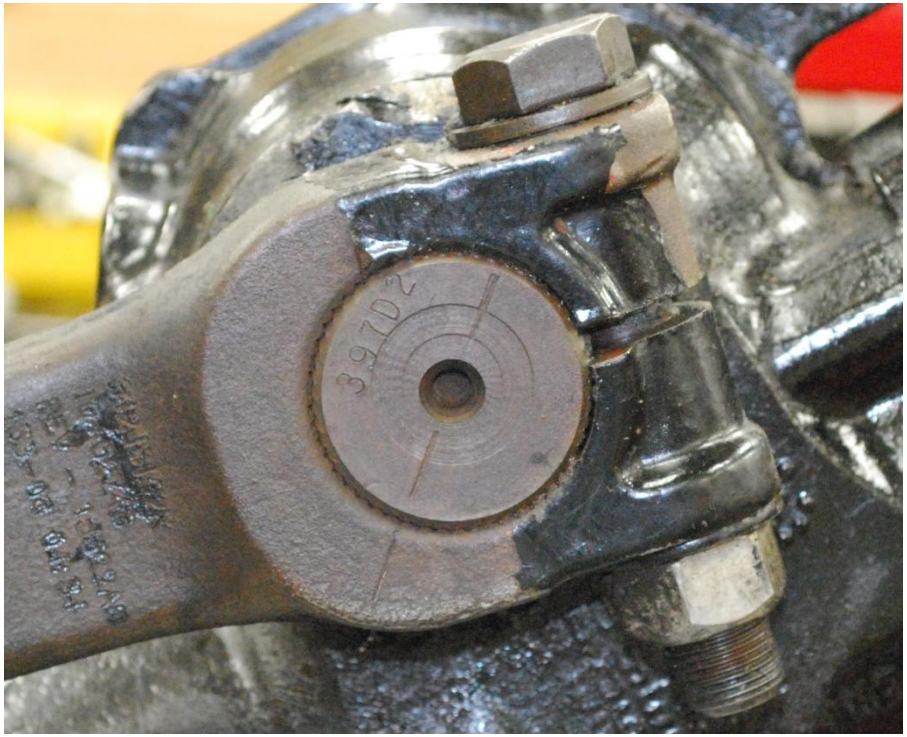
PURPOSE AND DATE OF TEST: Evaluate steering gear internal condition after the accident. Parts evaluated on 9-1-2015

OVERVIEW: Peterbilt involved in an accident on 6-25-2015. No claim against steering, but the NTSB requested a gear teardown to help confirm steering position at time of impact.

CONCLUSION: The steering gear was still mechanically functional as received. There were clear signs of impact since the mounting bosses showed fracture and damage. The output shaft showed brinell imprints from the needle bearings and the worm screw showed brinell imprints from the recirculating ball bearings. The position of the ball bearings indicate the steering gear was near straight ahead at the time of impact.

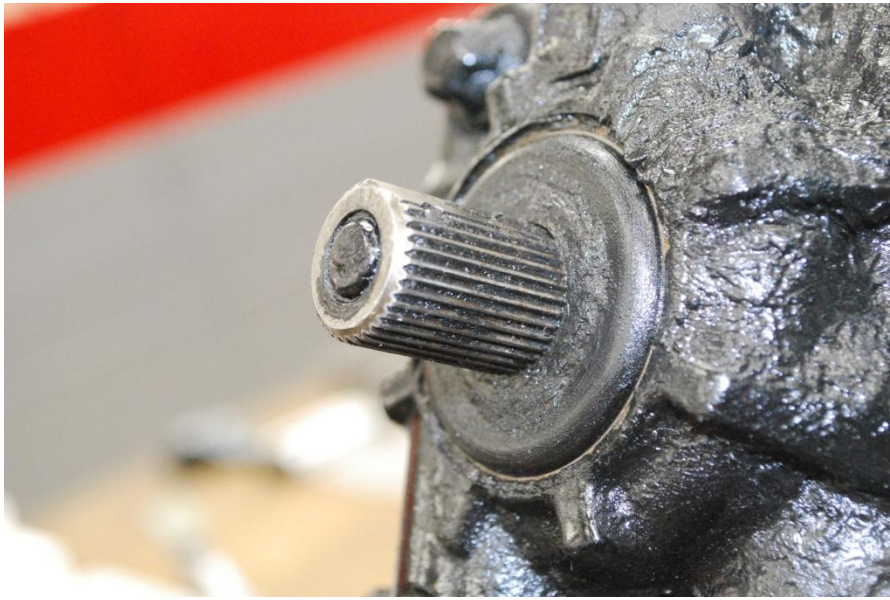


Gear as received

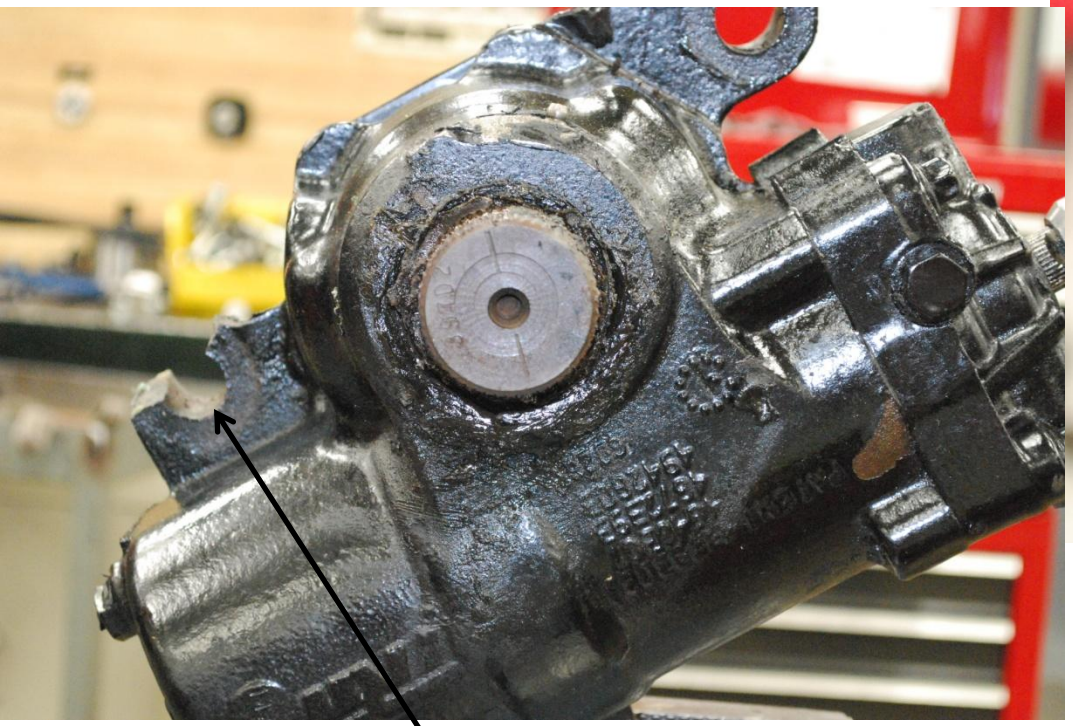


Pitman Arm was tight and aligned with timing mark

No signs of recent adjustment

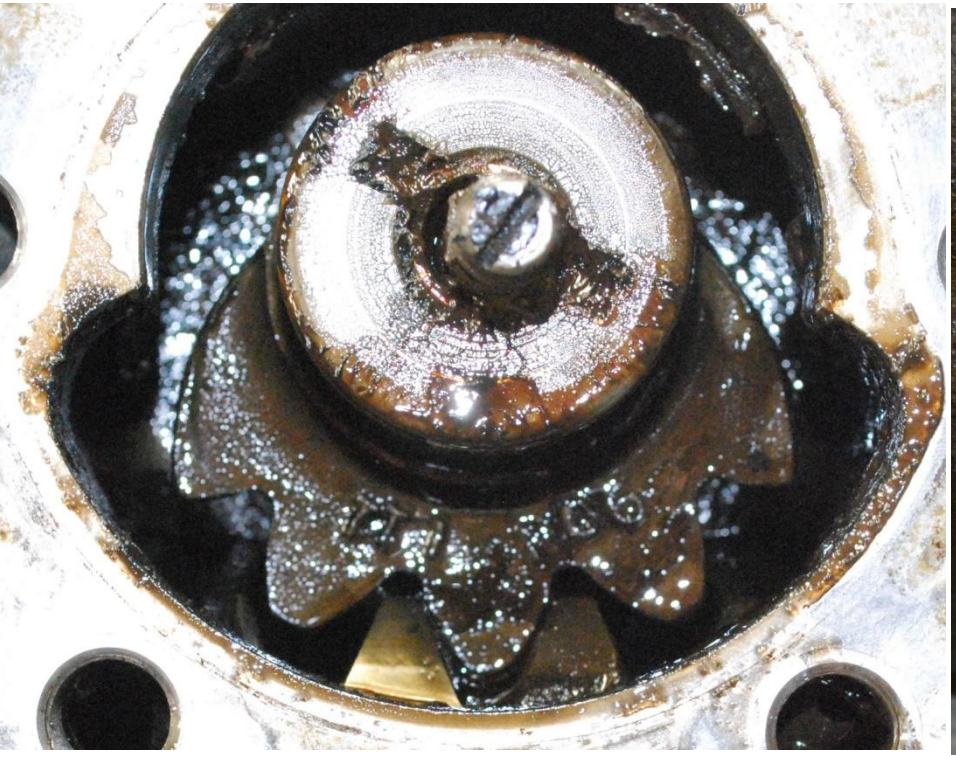


Input shaft splines in good condition

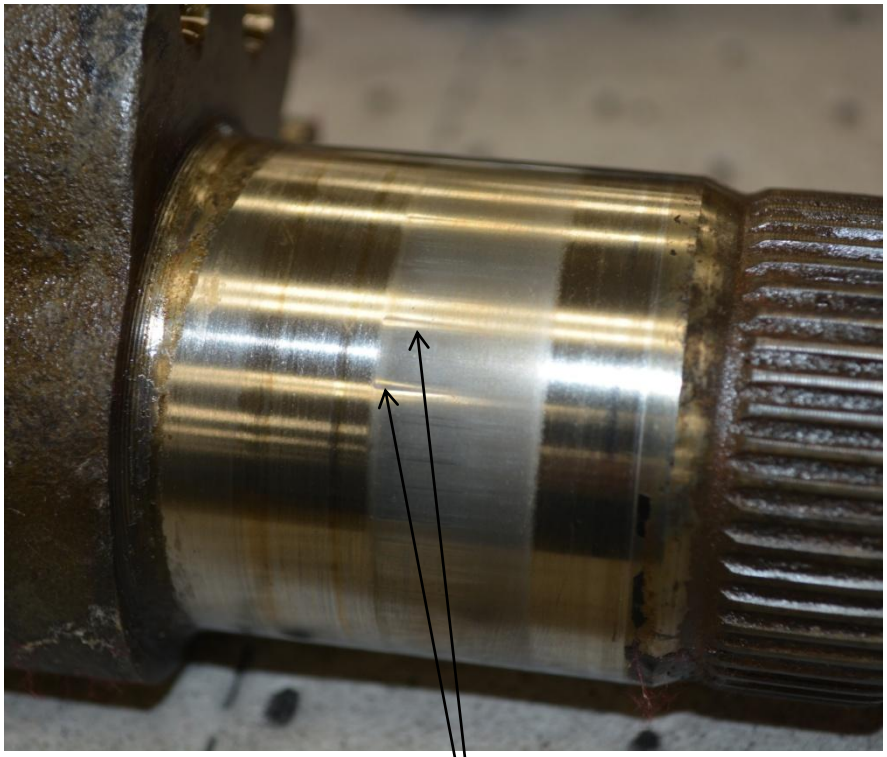


Gear was very greasy and dirty, broken mounting boss shown.

Output shaft very greasy and dirty, but splines in good condition

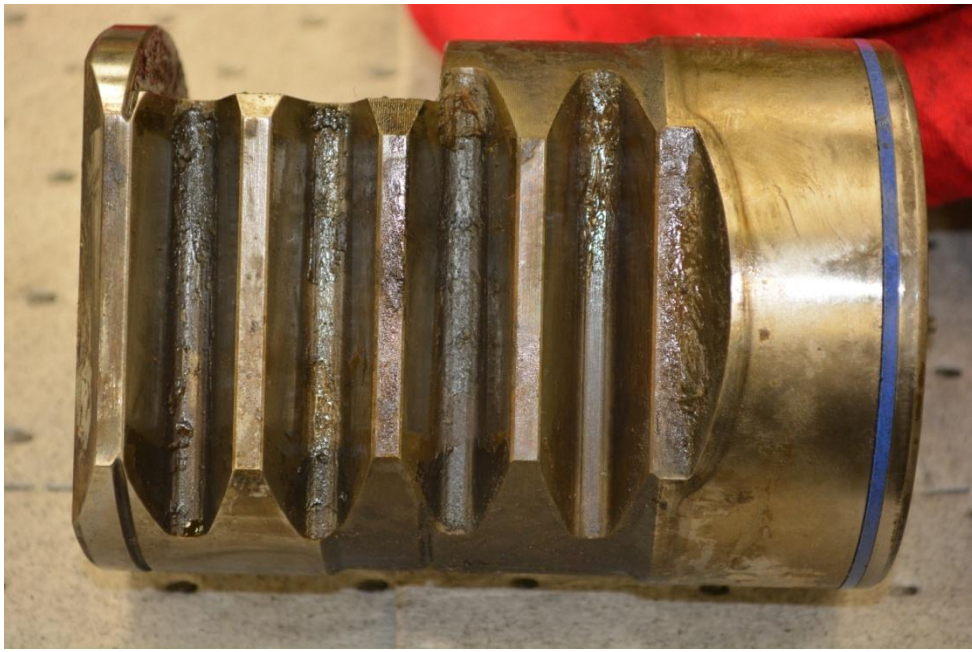


Gear teeth engaged, no damage evident.



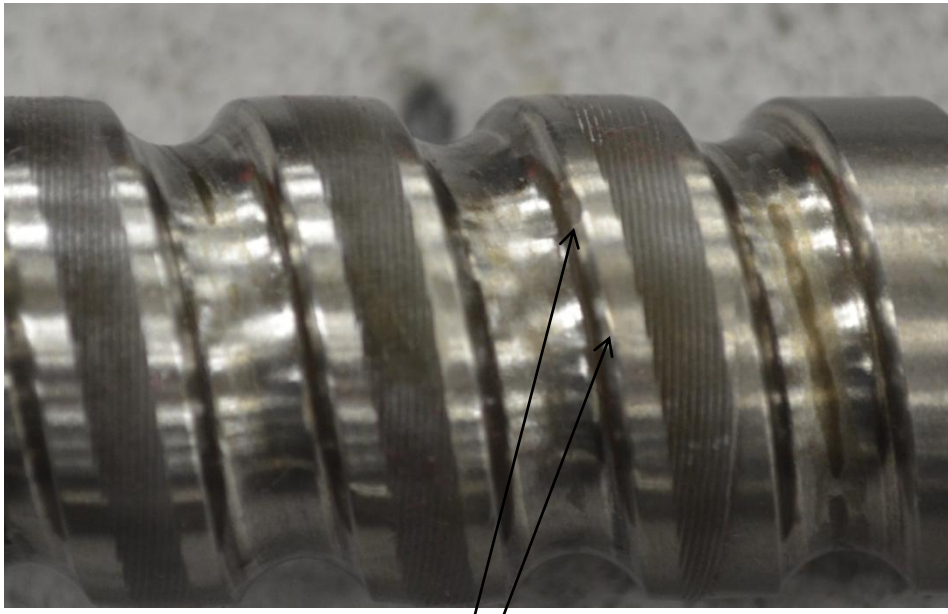
Output shaft showing brinell marks from needle bearing due to impact.

Sector teeth, dirty but no damage



Rack Piston, dirty, but no damage

Worm and Valve assembly, no apparent damage



Worm showing light brinell impacts from recirculating ball bearings

Teardown Inspection

Steering Gear

Power steering fluid was present. The fluid appeared to have not been changed recently.

The input shaft and splines were in good condition. The steering gear output shaft turns when the input shaft is rotated indicating a correct mechanical connection of the internal components.

The gear teeth on the rack piston and sector shaft showed signs of use, but were not broken or fractured.

The output shaft was in good condition with evidence of impact load coming through the pitman arm and reacted from the shaft into the needle bearing. Brinell marks are evident on a portion of the output shaft. The splines are in good condition.

All of the recirculating ball bearings (32) were present and still within the rack piston assembly.

The recirculating ball bearings generated brinell marks (indents) on the worm helix indicating the rack piston was being driven toward the bottom of the gear, putting the worm in tension. The worm helix exhibits brinell marks matching a singular ball position indicating a single gear position during the impact. The brinell marks were not severe and the impact load was not severe enough to cause a fracture within the steering gear.

The recirculating ball impact locations are concentrated near the center of the worm shaft helix. This indicates the output shaft was near center, and thus the steering was near straight ahead.