

Mr. David Pratt  
Assistant Director, Transportation Safety  
Washington Utilities & Transportation Commission  
1300 S. Evergreen Park Dr. SW  
P.O Box 47250  
Olympia, WA 98504-7250

Re: Request for reinstatement to operational status of Stretch Duck Vehicles based on remedy of NHTSA Safety Recall 16V-859; Ride the Ducks of Seattle, USDOT #1905507, Docket TE-151906

Dear Mr. Pratt:

Enclosed you will find materials in support of Ride the Ducks of Seattle's request to reinstate the authority to provide excursion services using our "Stretch Duck" vehicles following the suspension on December 22, 2015 via WA Utilities and Transportation Commission Order 05, TE-151906.

Upon concluding their investigation into the crash that occurred on September 24, 2015, the National Transportation Safety Board ("NTSB") issued the following recommendation (H-16-18) to the National Highway Traffic Safety Administration ("NHTSA"). NHTSA is an agency of the Executive Branch of the U.S. government, Department of Transportation, and is charged with writing and enforcing Federal Motor Vehicle Safety Standards:

*Require that Ride the Ducks International, as a manufacturer, issue a recall for the stretch amphibious passenger vehicle front axle safety defect to provide owners a remedy as required under the Safety Recall Campaign.*

To Ride the Ducks International (our "Stretch Duck Manufacturer"), the NTSB issued recommendations (H-16-20 & H-16-21):

*Develop a thoroughly verified and tested repair or alternative axle housing for the front axles of your stretch amphibious passenger vehicle (APV), and repair or replace the axle housings on your own stretch APV's as necessary.*

*Communicate the repair or replacement information concerning the front axle housings of your stretch amphibious passenger vehicles, developed in response to Safety Recommendation H-16-20, to your franchisees and licensees.*

On November 15, 2016, Ride the Ducks International signed a Consent Order with the National Highway Traffic Safety Administration. The Consent Order was issued for violations of the National Traffic and Motor Vehicle Safety Act ("Safety Act"). The Consent Order specifically documented that:

*"RTDI did not comply with the legal obligations imposed on vehicle manufacturers by the Safety Act" and "RTDI also did not notify NHTSA of the safety defect in its 57 Stretch Ducks in accordance with 49 C.F.R Part 573, did not provide a remedy for axle defect without charge as directed by 49 U.S.C. 30120 and admits that its communication to owners regarding a safety related defect in the 57 Stretch Duck axles did not fully comply with 49 C.F.R 577.5."*

Additionally, the Consent Order Section II. C. 1. provided guidance and timetables requirements for RTDI to remedy past Non-Compliance with the Safety Act, specifically related to the October 1, 2013 Service Bulletin (SB-00-14-13).

Per the NHTSA recall process, manufacturers of vehicle are required to notify registered owners within 60 days of notifying NHTSA of a recall decisions and manufactures should offer a proper remedy to the owner. NHTSA monitors each safety recall to make sure owners receive safe, free, and effective remedies from manufacturers according to the Safety Act and Federal regulations. Owners, once notified by the manufacturer, are to follow any safety guidance provided by the manufacturer.

On November 22, 2016 RTDI submitted Part 573 Safety Recall Report 16V-859. The Description of Remedy Program was updated on May 4, 2017 to read:

*RTDI will replace each of the front axles with one that has a coupler welded to the axle. Prior to the installation of the coupler, the axles will undergo magna particle testing. The axles will also be inspected on an annual basis.*

Ride the Ducks of Seattle has been notified by the Stretch Duck Manufacturer (RTDI) that we will receive new axles compliant with the NHTSA Part 573 Safety Recall 16V-859 on or around July 12, 2017 to remedy Part 573 Safety Recall 16V-859. We intend to install and maintain the axles to the requirements set by NHTSA Safety Recall Report 16V-859.

Ride the Ducks of Seattle currently contracts with an industry leader in Magna Particle Testing and Non-Destructive Testing Solutions to bi-annually test the spindles and axle balls of all Truck Duck axles. This procedure has been amended to include all Ducks to comply with Part 573 Safety Recall Report 16V-859.

We believe the enclosed materials demonstrate that the Stretch Duck Manufacturer has currently and sufficiently provided a remedy for Part 573 Safety Recall Report 16V-859. Furthermore, we believe that the enclosed materials demonstrate that adequate safety management controls are in place within our business to maintain and ensure acceptable Magna Particle Testing of the new axles.

**Ride the Ducks of Seattle respectfully requests that the Commission reinstate the authority to provide excursion services using our "Stretch Ducks" vehicles based upon this information and the materials submitted. Additionally, we request a timely review of the corrective actions detailed and supporting materials enclosed.**

Should you have any questions regarding the NHTSA approved Recall Remedy Description please contact:

Otto Matheke  
Senior Attorney for Defects Investigation  
Department of Transportation  
National Highway Traffic Safety Administration  
(202)-366-5253

Should you have any other questions please feel free to contact me directly.

Sincerely,

Ryan Johnson  
Director of Operations and Compliance Officer  
Ride the Ducks of Seattle

Enclosed:

1. Cover Letter
2. Request for Reinstatement
3. RTDI Consent Order with NHTSA
4. Recall Acknowledgment
5. Safety Recall Notification Letter
6. Part 573 Safety Recall Reports – 16V-859
9. ESI Engineering Study
10. Ride the Ducks of Seattle – Non-Destructive Testing Procedure



**UNITED STATES DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**  
1200 New Jersey Avenue SE  
Washington, D.C. 20590

**In re:** \_\_\_\_\_ )  
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Ride the Ducks International, LLC )  
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**CONSENT ORDER**

This Consent Order is issued pursuant to the authority of the National Highway Traffic Safety Administration (“NHTSA”), an operating administration of the U.S. Department of Transportation, administratively to resolve a NHTSA enforcement action, mitigate and control risks of harm, and promote safety. It sets forth the requirements and performance obligations of Ride the Ducks International, LLC (“RTDI”), in connection with RTDI’s violations of the National Traffic and Motor Vehicle Safety Act (“Safety Act”) and NHTSA’s regulations as detailed herein under the following terms and conditions.

**I. NATURE OF THE ACTION**

1. The Safety Act provides for regulation of motor vehicles and motor vehicle equipment by the Secretary of Transportation. 49 U.S.C. § 30111. The Secretary has delegated his authorities under the Safety Act to the NHTSA Administrator. 49 C.F.R. §§ 1.95(a), 501.2(a)(1).

2. The Safety Act applies to “manufacturers.” 49 U.S.C. § 30102(a)(6). A manufacturer is defined as a person “manufacturing or assembling motor vehicles or motor vehicle equipment.” *Id.*

3. The Safety Act applies to “motor vehicles,” defined as vehicles “driven or drawn by mechanical power and manufactured primarily for use on public streets, roads, and highways, but does not include a vehicle operated only on a rail line.” 49 U.S.C. § 30102(a)(7).

4. Under 49 C.F.R. § 571.7(e), certain vehicles built with a combination of new and used components are not considered to be new vehicles whose rebuilders must comply with the Safety Act. The “glider” exemption applies when a new cab or body is put on a truck when the engine, transmission, and axles are not new and at least two of those components are from the same vehicle. 49 C.F.R. § 571.7(e). The rule mainly applies to truck “glider” kits, as well as buses, that use new cabs with old parts.

5. Under 49 C.F.R. § 571.7(c), vehicles “manufactured for and sold directly to, the Armed Forces of the United States in conformity with contractual specifications” do not need to meet the FMVSS. This exception to the Safety Act’s applicability does not apply in instances where a military vehicle has been extensively modified or otherwise serves as a donor for what is essentially a new vehicle. In a November 30, 1987 NHTSA interpretation letter responding to an inquiry from D.F. Landers, President of Mobile Products, Inc., asking, among other things, if surplus military vehicles were subject to NHTSA’s jurisdiction, the Agency stated that surplus military “vehicles might become subject to Federal motor vehicle safety standards if there is a material change in . . . the intended or actual use, design or sale . . .” of the vehicle. *See* NHTSA Interpretation Letter to D.F. Landers, President of Mobile Products, Inc. (Nov. 30, 1987).

6. Under the Safety Act and implementing regulations, a manufacturer of motor vehicles or equipment has a duty to notify NHTSA if the manufacturer learns or determines in good faith that there is a defect related to motor vehicle safety or a noncompliance with an applicable FMVSS. 49 U.S.C. § 30118(c)(1); 49 C.F.R. Part 573. The manufacturer’s notice to NHTSA must be in the form specified by regulation, and is known as a “Defect Information Report” or “Part 573 Report.” 49 C.F.R. Part 573. NHTSA’s regulations require a manufacturer to notify NHTSA not more than five working days after a defect in a vehicle or an item of equipment has been determined to be safety-related or noncompliant with an applicable FMVSS. 49 C.F.R. § 573.6(b). However, the manufacturer’s duty to notify and remedy begins “whether it

actually determined, *or it should have determined*, that its vehicles are defective and the defect is safety-related.” *United States v. General Motors Corp.*, 656 F. Supp. 1555, 1559 n. 5 (D.D.C. 1987), *aff’d on other grounds*, 841 F.2d 400 (D.C. Cir. 1988) (emphasis added).

7. A manufacturer of motor vehicles or equipment also has a duty to notify owners, purchasers, and dealers when it determines that any motor vehicle or equipment contains a defect that relates to motor vehicle safety or a noncompliance with an applicable FMVSS. *See* 49 U.S.C. §§ 30118(c), 30119; 49 C.F.R. Part 577. The notification to owners or purchasers must have been “furnished no later than 60 days from the date the manufacturer files its defect or noncompliance information report under part 573.” *See* 49 U.S.C. § 30119; 49 C.F.R. § 577.7(a)(1). The duty to notify and remedy arises when the manufacturer determined or should have determined that there was a safety-related defect or noncompliance. *United States v. General Motors Corp.*, 656 F. Supp. 1555, 1559 n. 5 (D.C. 1987), *aff’d on other grounds*, 841 F.2d 400 (D.C. Cir. 1988).

8. When a manufacturer learns that a motor vehicle or motor vehicle equipment contains a defect and it decides in good faith that the defect is related to motor vehicle safety, the Safety Act imposes a duty to remedy the motor vehicle. *See* 49 U.S.C. § 30120; 49 C.F.R. Part 573. The manufacturer is responsible for remedying the safety-related defect within a reasonable time. *See* 49 U.S.C. § 30120; 49 C.F.R. § 573.5. According to case law, “a manufacturer incurs its duties to notify and remedy whether it actually determined, or it should have determined, that its vehicles are defective and the defect is safety-related.” *United States v. General Motors Corp.*, 656 F. Supp. 1555, 1559 n. 5 (D.C. 1987), *aff’d on other grounds*, 841 F.2d 400 (D.C. Cir. 1988). The manufacturer also has a duty to recall any motor vehicles or motor vehicle equipment that fail to comply with applicable FMVSS under these same procedures. *See* 49 U.S.C. § 30120; 49 C.F.R. Part 573.

9. As required by the Transportation, Recall Enhancement, Accountability, and Documentation (“TREAD”) Act, NHTSA requires reporting of “Early Warning Information” based on the type of manufacturer. *See* 67 Fed. Reg. 45,822 (July 10, 2002). The first group consists of larger manufacturers of motor vehicles and all manufacturers of child restraint systems and tires. *See* 49 C.F.R. §§ 579.21-579.26. These manufacturers are required to report, on a quarterly basis, production information, information on incidents involving death or injury, and data regarding property damage claims, consumer complaints, warranty claims, and field reports. *See* 49 C.F.R. §§ 579.21-579.26. The second group consists of all other manufacturers of motor vehicles and motor vehicle equipment, including manufacturers of fewer than 100 buses annually. *See* 49 C.F.R. § 579.27. This second group of manufacturers must report the same information about incidents involving deaths as the first group, but is not required to report any other “Early Warning Information.” *Id.*

10. Manufacturers of motor vehicles and motor vehicle equipment are required to submit to NHTSA copies of all notices, bulletins, and other communications, including those related to any defect in its vehicles or items of equipment, a customer satisfaction campaign, consumer advisory, recall, or other safety activity involving the repair or replacement of motor vehicles or equipment (collectively, “service bulletins”), sent to more than one manufacturer, distributor, dealer, owner or purchaser. *See* 49 U.S.C. § 30166(m)(3)(A)(ii); 49 C.F.R. §§ 579.5(a)-(b). A copy of each communication shall be submitted to NHTSA not later than five working days after the end of the month in which it was issued. 49 C.F.R. § 579.5(d). All manufacturers must also submit an index to the communications that “identifies the make, model, and model year of the affected vehicles” and “includes a concise summary of the subject matter of the communication.” 49 U.S.C. § 30166(f)(2); 49 C.F.R. § 579.5. Manufacturers are required to submit to the Agency an index for each communications to dealers, owners, or



purchasers about a defect or noncompliance they were required to submit at any time since October 1, 2012. *See* 49 U.S.C. § 30166(f)(2); 81 Fed. Reg. 16,270 (March 25, 2016).

11. In general, motor vehicles must comply with applicable FMVSS and must be certified as such at the time of delivery. 49 U.S.C. §§ 30112(a), 30115. This certification must take the form of a label certifying compliance with applicable FMVSS that is permanently affixed by the manufacturer. 49 U.S.C. § 30115; 49 C.F.R. Part 567. Manufacturers of motor vehicles are responsible for “self-certifying” that their products meet all applicable FMVSS before they are offered for sale. *See* 49 U.S.C. §§ 30112, 30115.

12. Manufacturers of motor vehicles are required to submit identifying information and a description of the items they produce to NHTSA. 49 U.S.C. § 30166(e); 49 C.F.R. Part 566. Manufacturers must report this information no later than 30 days after manufacturing begins. 49 C.F.R. § 566.6.

13. Manufacturers of motor vehicles are also required to assign Vehicle Identification Numbers (“VINs”) in accordance with 49 C.F.R. Part 565. 49 U.S.C. § 30166(e); 49 C.F.R. Part 565.

14. A person who violates the notification requirements, remedy requirements, or certification requirements of the Safety Act, or a regulation thereunder, is liable to the United States Government for a civil penalty. 49 U.S.C. § 30165(a)(1); 49 C.F.R. § 578.6(a). A separate violation occurs for each motor vehicle or item of motor vehicle equipment and for each failure or refusal to allow or perform a required act. 49 U.S.C. § 30165(a)(1); 49 C.F.R. § 578.6(a). As of December 27, 2012, the maximum penalty per violation was \$7,000. 77 Fed. Reg. 70,710, 70,713 (Nov. 27, 2012) (codified at 49 C.F.R. § 578.6). That penalty increased from \$7,000 to \$21,000 per violation effective March 17, 2016. 81 Fed. Reg. 15,413 (Mar. 22, 2016). The maximum penalty for a related series of violations is currently \$105 million. *See id.* A person who violates 49 U.S.C. § 30166, 49 C.F.R. Part 565, 49 C.F.R. Part 566, and 49 C.F.R. Part 579

is liable to the United States for a civil penalty. *See* 49 U.S.C. § 30165(a)(3). As of December 27, 2012, the maximum penalty was \$7,000 per day. 77 Fed. Reg. 70,710, 70,713 (Nov. 27, 2012) (codified at 49 C.F.R. § 578.6). Effective March 17, 2016, the maximum civil penalty was increased from \$7,000 to \$21,000 per day. *See* 81 Fed. Reg. 15,413 (Mar. 22, 2016) (codified at 49 C.F.R. § 578.6(a)(3)). The maximum penalty for a related series of daily violations is currently \$105 million. *See id.*

15. RTDI is the current owner, operator, and licensor of certain amphibious vehicles and amphibious vehicle tour bus operations. RTDI operates tour operations which run amphibious vehicles on both the public roads and the public waterways. RTDI or its predecessor corporations manufactured amphibious vehicles (either directly or through a contract manufacturer) and sold the vehicles to a limited number of independent licensees who operate similar tour services. In total, there are currently 106 amphibious vehicles produced by RTDI either in operation or ready for use in the United States.

16. According to RTDI, RTDI's predecessor corporation began to produce and operate amphibious vehicles in 1977 in Branson, Missouri. The original amphibious vehicles were reconstructed WWII-era DUKW amphibious vehicles used for transport over land and water without harbors. These amphibious vehicles were retired in 2006.

17. RTDI also states it began manufacturing "Stretch" Duck amphibious vehicles in 1996. The "Stretch" Duck construction process began by stripping down an original DUKW to its frame and then renewing and lengthening the hull, replacing the engine, transmission and axles with new components or components sourced from other vehicles, changing the number of driven wheels and upgrading the brakes to all-wheel disc brakes. There are currently 57 "Stretch" Ducks either in operation or ready for use in the United States. In 2005, RTDI introduced the "Truck" Duck with a patented RTDI design. The "Truck" Duck is based on a M-Series 2 1/2 ton military cargo vehicle and its construction also involved substantial upgrading

and replacement of original components and the complete fabrication of a hull on the existing frame. There are currently 49 "Truck" Ducks either in operation or ready for use in the United States. Both the "Stretch" and the "Truck" Ducks are under 26,000 lbs. loaded weight.

18. RTDI represents that all amphibious vehicles that it operated or produced were appropriately registered within the state or territories in which they have operated. RTDI further represents that throughout its history, RTDI worked closely with the Coast Guard to meet and/or exceed all applicable marine standards. RTDI also represents that it has sponsored industry efforts to discuss and disseminate best safety practices for the operation of amphibious tour buses.

19. On October 1, 2013, RTDI issued a Service Bulletin (SB-00-14-13) to its licensees with regard to the potential for the front axle on the Stretch Ducks to fail. RTDI represents that all affected vehicles under its control were properly repaired in accordance with the Service Bulletin, and that it repeatedly reminded its licensees of the importance of conducting the repair on the vehicles within their fleets. The Service Bulletin stated it was released to "avoid axle fractures" and further stated that the axles should be repaired as soon as it was practical to do so and prior to operating in 2014. The Service Bulletin further stated that until the axle was repaired, the axles should be inspected on a daily basis.

20. On September 24, 2015, a Stretch Duck owned and operated by Ride the Ducks of Seattle was involved in a crash with a 2009 MCI motor coach while both vehicles were traveling over the George Washington Memorial Bridge (a.k.a. the Aurora Bridge), resulting in fatalities. Although the Stretch Duck involved in the crash had a front axle with the defect addressed by the October 1, 2013 Service Bulletin, it had not been repaired as directed by that bulletin.

21. After learning of the Aurora Bridge crash, NHTSA issued an Information Request to RTDI. In April 2016, RTDI submitted a timely response, which included the October 2013 Service Bulletin and all other Service Bulletins issued by RTDI to its operations and its

licensees. RTDI's response also included a number of lawsuits filed against RTDI related to the Aurora Bridge crash, some of which were received by RTDI during 2015.

22. Review of RTDI's submissions led NHTSA to conclude that RTDI is a "manufacturer" of "motor vehicles" under the Safety Act. The RTDI Stretch Duck vehicles used the frame, some hull sections, and miscellaneous other parts from donor WWII vintage DUKWs while a new hull, new engine, new transmission, refurbished axles from donor vehicles, new brakes, and new drive configuration were incorporated into the final product. The Stretch Ducks are not rebuilt vehicles under NHTSA regulations because three requisite components (engine, transmission, and axles) were changed and no two are from the same vehicle. 49 C.F.R. § 571.7(e). RTDI does not contest that it manufactured motor vehicles under the Safety Act.

23. RTDI has provided NHTSA with confirmation that all RTDI produced amphibious vehicles affected by the October 1, 2013 Service Bulletin other than those at Ride the Ducks Seattle (which are currently out of service) have had the axle repair conducted.

24. NHTSA issues this Consent Order pursuant to its authority under the Safety Act, 49 U.S.C. § 30101, et seq., as delegated by the Secretary of Transportation, 49 C.F.R. §§ 1.95, 501.2(a)(1), to compromise the amount of civil penalties for violations of the Safety Act and regulation thereunder, 49 U.S.C. § 30165(b), to inspect and investigate, 49 U.S.C. § 30166(b)(1), to ensure that defective vehicles are recalled, 49 U.S.C. §§ 30118-30119, and to require any person to file reports or answers to specific questions, 49 U.S.C. § 30166(g). It is AGREED by RTDI and ORDERED by NHTSA as follows:

## **II. TERMS AND CONDITIONS OF CONSENT ORDER**

### **A. Admission of Safety Act Violations**

25. RTDI did not comply with the legal obligations imposed on vehicle manufacturers by the Safety Act and represents that it acted on a good faith belief that only Coast Guard marine safety regulations and state level road safety rules were applicable to the

amphibious vehicles it manufactured. Nonetheless, RTDI agrees that as a matter of law, ignorance of its legal obligations under the Safety Act is not a defense. RTDI admits that it manufactured vehicles for sale that do not comply and/or are not certified as complying with applicable FMVSS, in accordance with 49 U.S.C. § 30112. RTDI also failed to submit service bulletins and other communications to NHTSA, including its October 1, 2013 service bulletin, in accordance with 49 C.F.R. § 579.5, and did not report claims that a defect in its products caused a death, including the September 2015 crash, in accordance with 49 C.F.R. § 579.27. RTDI also did not notify NHTSA of the safety defect in its 57 Stretch Ducks in accordance with 49 C.F.R. Part 573, did not provide a remedy for axle defect without charge as directed by 49 U.S.C. § 30120 and admits that its communication to owners regarding a safety related defect in the 57 Stretch Duck axles did not fully comply with 49 C.F.R. § 577.5 (describing potential safety consequences of a defect).

**B. Civil Penalty**

26. RTDI agrees that the United States is entitled to a civil penalty of up to one million dollars (\$1,000,000) for the violations set forth above, subject to the provisions of this Consent Order and applicable law, including the Federal Claims Collection Act of 1966, as amended and codified at 31 U.S.C. § 3701, *et seq.* (hereinafter the “Debt Collection Act”) (the “Total Civil Penalty”).

27. To satisfy its obligations to pay a civil penalty, as authorized by 49 U.S.C. § 30165(b), RTDI shall pay the sum of four hundred eighty thousand dollars (\$480,000.00) in accordance with the instructions provided in Paragraph 28 below (the “Non-Deferred Amount”). RTDI shall use the remaining twenty thousand dollars (\$20,000) to ensure satisfactory completion, as determined by NHTSA, of certain performance obligations described below in Paragraphs 49 through 52 (the “Industry Outreach Amount”). In the event RTDI commits further violations of the Safety Act or this Consent Order during the term of this Consent Order,

RTDI may, in addition to any civil penalties that would otherwise accrue, be potentially obligated to pay additional sums totaling up to a maximum of five hundred thousand dollars (\$500,000), in accordance with the terms and conditions set forth below (the "Deferred Amount").

28. RTDI shall make a payment of two hundred forty thousand dollars (\$240,000) no later than May 14, 2017. The remaining two hundred forty thousand dollars (\$240,000) shall be due in three equal annual increments due not later than May 14, 2018, May 14, 2019, and May 14, 2020 respectively. At its option, RTDI may pay any remaining amounts prior to their respective due dates. RTDI expressly agrees that the obligation to pay the foregoing sums as specified above shall survive the termination of this Consent Order.

29. The Deferred Amount shall only become due and owing in accordance with and subject to the provisions set forth in Paragraph 30 below. NHTSA and RTDI expect that RTDI will comply fully with this Consent Order and the Safety Act and that the Deferred Amount accordingly will not become due and will be released at the termination of this Consent Order. In the event RTDI is required to pay any of the Deferred Amount, such payments will be made by electronic funds transfer, in accordance with the instructions provided by NHTSA, no later than thirty (30) calendar days following a determination that they are due and owing.

30. Should NHTSA receive notice or make its own determination that RTDI has materially violated the Safety Act, regulations thereunder, or the terms of this Consent Order, a lump-sum payment of fifty thousand dollars (\$50,000) of the Deferred Amount will become due and owing within thirty (30) calendar days, in accordance with instructions provided by NHTSA. Upon a second notice or determination by NHTSA that RTDI has materially violated the Safety Act, regulations thereunder, or the terms of this Consent Order, an additional lump-sum payment of one hundred fifty thousand dollars (\$150,000) of the Deferred Amount will become due and owing within thirty (30) calendar days, in accordance with instructions provided by NHTSA.

Upon a third notice or determination by NHTSA that RTDI has materially violated the Safety Act, regulations thereunder, or the terms of this Consent Order, the remaining three hundred thousand dollars (\$300,000) of the Deferred Amount will become due and owing within thirty (30) calendar days, in accordance with the instructions provided by NHTSA. RTDI will not be liable for the above amounts if RTDI demonstrates to NHTSA's reasonable satisfaction that it acted in good faith and exercised reasonable best efforts to comply.

31. If RTDI fails to make any of the payments set forth above, RTDI shall be in default of this Consent Order and the balance of the Total Civil Penalty shall become immediately due and owing. In such event: (i) RTDI agrees not to contest any collection action undertaken by NHTSA or the United States pursuant to the Debt Collection Act and the U.S. Department of Transportation's regulations, 49 C.F.R. Part 89, either administratively or in any court, and (ii) RTDI affirmatively waives any and all defenses or rights that would otherwise be available to it in any such proceeding. In addition, in such a proceeding, RTDI shall pay the United States all reasonable costs of collection and enforcement, including attorneys' fees and expenses. NHTSA in its sole discretion may waive or reduce any stipulated penalties owing under this Consent Order.

**C. Performance Obligations**

32. This Consent Order requires RTDI to execute certain performance obligations, the objectives of which are to assist NHTSA in its mission to, among other things, carry out safety programs under the Safety Act and to improve RTDI's processes and procedures for making safety-related defects and noncompliance determinations, reporting defects and noncompliances to NHTSA in a timely manner, and complying with reporting requirements. These performance obligations will be satisfied through the activities set forth in Paragraphs 34 through 54 below.

33. NHTSA will consider any and all remedial actions that RTDI has undertaken prior to the execution of this Consent Order in determining whether RTDI has carried out the performance requirements of this Consent Order.

*1. Remediating Past Noncompliance with the Safety Act*

34. No later than 5 working days after the execution of this Consent Order, RTDI shall submit to NHTSA a copy of its October 1, 2013 service bulletin, a Part 573 Report for the safety-related defect, and a report of a claim alleging that a death resulted from a safety defect related to the September 2015 crash involving deaths as referenced in Paragraph 20 above.

35. No later than 30 calendar days after the execution of the Consent Order, RTDI will send owners of the 57 Stretch Ducks formal customer notification as directed by 49 C.F.R. Part 577 and shall notify the owners that they are entitled to reimbursement for costs incurred in having remedied the vehicles or, in the case of the Seattle licensor, that a remedy remains available and that it is free of charge.

36. RTDI has consulted with NHTSA regarding which FMVSS applied to the vehicles when they were manufactured. RTDI acknowledges that NHTSA does not “approve” or endorse manufacturer certifications and that the duty to determine which FMVSS apply to RTDI’s vehicles remains with RTDI. Not later than 60 calendar days after the appointment of the Consultant, as set forth below, RTDI will submit a FMVSS compliance plan to NHTSA. The plan will identify those FMVSS for which RTDI has made a good faith determination are applicable to the vehicles it has manufactured. For each such FMVSS, RTDI shall state when and how RTDI intends to bring the vehicles into compliance with a particular standard by following the statutory recall process or filing a petition for inconsequential noncompliance under 49 C.F.R. Part 556 or a petition for exemption under 49 C.F.R. Part 555. No later than 120 days after the submission of the compliance plan, RTDI will submit a confirmation to NHTSA affirming that all such vehicles owned or operated by RTDI or RTDI licensees obligated by



contract to perform repairs as directed by RTDI comply with all applicable FMVSS (other than those for which petitions for inconsequentiality or exemption have or are to be filed pursuant to RTDI's plan or are subject to ongoing design and/or engineering efforts which, subject to NHTSA's consent, require further extension of the 120 day deadline) and have been certified as such by the application of certification labels. If NHTSA should not grant any part of RTDI's inconsequentiality petition or exemption petition, the parties agree to consult in good faith with regard to determining next steps to address the issue.

37. RTDI shall submit all manufacturer identification information required by 49 C.F.R. Part 566 within 90 calendar days of the execution of this Consent Order.

38. RTDI shall submit VIN information required in 49 C.F.R. Part 565 within 90 calendar days of the execution of this Consent Order. If vehicles have been assigned VINs that are not in compliance with the requirements of 49 C.F.R. Part 565, RTDI will provide a detailed report to NHTSA no later than 90 days after the execution of this Consent Order, with each vehicle's assigned VIN and a description of why the VIN does not conform to the requirements of Part 565.

39. No later than 90 calendar days after the execution of this Consent Order, RTDI shall submit in accordance with 49 U.S.C. §30166(f) and 49 C.F.R. § 579.5 any notices, bulletins, and communications (collectively, "service bulletins") from the past five (5) years that would have been subject to 49 C.F.R. § 579.5, regardless of whether RTDI has already provided those service bulletins in response to NHTSA's Information Request. RTDI shall also include indexes for each document that was issued since October 1, 2012.

40. No later than 90 calendar days after the execution of this Consent Order, RTDI shall establish an early warning account with NHTSA. No later than 180 calendar days after execution of this Consent Order, RTDI shall submit any and all reports required by 49 C.F.R. § 579.27 for the five years preceding the aforementioned date of execution.

## 2. *Retention of Outside Consultant*

41. No later than 60 calendar days after the execution of this Consent Order, RTDI shall retain an outside consultant ("Consultant") with experience and expertise in motor vehicle safety and the requirements of the Safety Act and regulations thereunder. The Consultant position shall be held by a separate individual from the individual(s) representing RTDI in connection with this Consent Order. The Consultant shall advise and assist RTDI in developing a Compliance Plan and the Training Plan as referenced in Paragraphs 46 and 47. The Consultant shall review for sufficiency technical service bulletins ("TSBs"), other communications, and all reports required under the terms of the Consent Order, that RTDI is required to submit to NHTSA and/or owners during the term of the Consent Order. The Consultant shall advise and assist RTDI on all aspects of RTDI's compliance with the Safety Act and regulations thereunder.

42. Within 30 days calendar days after the execution of this Consent Order and prior to retaining the Consultant as referenced in Paragraph 41, RTDI shall submit the name and detailed resume of the individual whom RTDI intends to retain to NHTSA for approval, which will not be unreasonably withheld. RTDI agrees to ensure NHTSA has the ability to interview the individual prior to granting or denying approval. NHTSA will notify RTDI within 10 working days if it does not accept the proposed Consultant. RTDI will then have an additional 15 working days to submit a second proposed Consultant to NHTSA. The same procedures will apply to NHTSA's review of the name and resume of RTDI's subsequent proposed Consultant.

43. RTDI will report to NHTSA in writing when it has retained the Consultant, including the identity of the Consultant and the date upon which the individual was officially retained. RTDI shall retain the Consultant at its sole expense as needed during the term of the Consent Order.

### 3. *General Performance Obligations*

44. No later than 90 calendar days after the execution of this Consent Order, RTDI shall also submit a report to NHTSA, notifying the agency of all potential safety-related defects or noncompliances with applicable FMVSS that are currently under review by RTDI, for which notice has not previously been given to NHTSA.

45. No later than 30 calendar days after the execution of this Consent Order, RTDI shall perform an engineering analysis of the Stretch Duck axle to determine if the remedy included in the October 1, 2013 Service Bulletin is effective and report the results to NHTSA.

46. RTDI shall develop new written procedures for: (a) making safety-related defect and noncompliance determinations and notifying NHTSA of such safety-related defects or noncompliances with FMVSS in accordance with 49 C.F.R. Part 573; (b) notifying vehicle owners, licensees, and purchasers of safety-related defects and noncompliances in accordance with 49 C.F.R. Part 577; (c) reporting in compliance with those sections of 49 C.F.R. Part 579 applicable to RTDI; and (d) ensuring vehicles manufactured by RTDI in the future comply with applicable FMVSS and other statutory and regulatory requirements administered by NHTSA (collectively, "Compliance Plan"). If NHTSA reasonably determines that any changes to the written procedures are warranted, RTDI shall revise its written procedures to incorporate NHTSA's feedback. RTDI shall provide a revised copy of the Compliance Plan to NHTSA no later than 30 calendar days after receiving any such feedback from NHTSA. RTDI agrees that the Compliance Plan required in the Paragraph shall be publicly available.

47. RTDI shall train appropriate personnel on its Safety Act reporting requirements and Compliance Plan. RTDI's training shall be recurrent on at least an annual basis. No later than 120 calendar days after the execution date of this Consent Order, RTDI shall submit a report describing RTDI's training plan, including details on the subjects to be taught and individuals to

be trained (the "Training Plan"). NHTSA may, at its option, accept, reject or revise any part of the proposed Training Plan and may submit it back to RTDI for further revision, if necessary.

48. No later than 180 calendar days after the execution of this Consent Order, RTDI shall submit a report detailing its efforts to implement the Compliance Plan specified in Paragraph 46 and the Training Plan specified in Paragraph 47.

#### **4. *The Industry Outreach Performance Obligations***

49. In addition to RTDI's performance obligations described above, this Consent Order requires RTDI to execute certain performance obligations directed at industry education and outreach, the objectives of which are to further the goals of the Safety Act, particularly with regard to educating manufacturers building vehicles using combinations of donor and new components to produce complete vehicles, including other amphibious vehicle manufacturers and small, independent manufacturers of heavy trucks, of their obligations under the Safety Act and regulations thereunder for reporting information to NHTSA, manufacturing vehicles that comply with applicable FMVSS, and making safety-related defect determinations. The industry outreach performance obligations will be satisfied through the activities as set forth in Paragraph 50 through 52 below.

50. The parties agree that RTDI will expend not less than \$20,000 in execution of the industry outreach. Not less than 120 days after execution of this Consent Order, RTDI shall provide NHTSA with a plan for industry and consumer outreach, which NHTSA, at its option, may accept, reject, or revise and submit it back to RTDI for further revision, if necessary. The proposed plan shall include the following and which are to be completed over the next year:

- a. Educate manufacturers building vehicles using combinations of donor and new components to produce complete vehicles, including other amphibious vehicle manufacturers and small, independent manufacturers of heavy trucks, on the importance of meeting their Safety Act obligations, such as early warning and

other reporting requirements under 49 C.F.R. Part 579 and recall requirements under 49 C.F.R. Parts 30118 through 30120 and 49 C.F.R. Parts 573 and 577.

- b. Develop Safety Act educational materials for distribution to manufacturers.
- c. Offer to assist other manufacturers and, if requested, help these manufacturers in developing their own safety outreach programs.
- d. Educate licensees and other manufacturers on the importance of reporting potential defects directly to NHTSA, through VOQ complaints and otherwise.
- e. Work with licensees to enhance recall effectiveness and mitigate the impact of recalls on consumers.

The outreach plan shall include metrics of success for the foregoing targeted performance obligations. The targeted performance obligations may be carried out, at RTDI's discretion, with the assistance and participation of other designers, engineers and manufacturers of amphibious vehicles, specialty vehicles, and tourism markets. At RTDI's discretion, the targeted performance obligations may also be carried out with the assistance and participation of industry trade associations. Any non-RTDI assistance and participation shall be done in a manner consistent with antitrust guidelines.

51. RTDI shall expend its best efforts to complete the targeted performance obligations not less than one year after NHTSA gives its approval of the industry outreach plan. No later than 360 calendar days after the execution of this Consent Order, RTDI will submit a report to NHTSA detailing the amount of dollars that RTDI actually expended during the prior year in furtherance of its obligations. In the event of a dispute as to whether RTDI has expended any part or all of twenty thousand dollars (\$20,000), NHTSA shall advise RTDI of such in writing, to which RTDI shall have 15 working days to respond.

52. RTDI is responsible for the satisfactory completion of the targeted performance obligations described above. Subject to the provisions for extending the term of this Consent

Order in Paragraph 57, if RTDI has reasonably achieved all of the targeted performance obligations on or before 365 calendar days after the execution date of this Consent Order, RTDI will be released from any and all obligations to pay the Industry Outreach Amount, or any remaining portion thereof, to NHTSA. If, however, RTDI has not reasonably achieved the requirements of the performance obligations set out above by the end of the term of the Consent Order, the balance of the Industry Outreach amount shall become immediately due and owing. Should NHTSA extend the term of this Consent Order as set forth in Paragraph 57, RTDI's responsibility for the satisfactory completion of the targeted performance obligations shall also be extended for the term of one year.

**5. *Completion of Performance***

53. RTDI will meet with NHTSA one year after the execution of the Consent Order to review the current status of RTDI's obligations under the Consent Order and to discuss any open items. Neither RTDI nor NHTSA anticipate open items as of that juncture, with the exception of the payment of the additional non-deferred payments as set forth above.

54. If there are unfulfilled items as of that meeting, RTDI will provide a plan for completing those items within a reasonable time, which is to be determined in consultation with NHTSA.

**D. Compliance**

55. RTDI shall comply with its obligations under the Safety Act and regulations thereunder to take all actions necessary to comply with this Consent Order and to cooperate with NHTSA in carrying out the requirements of this Consent Order. RTDI's reasonable best efforts shall include, but shall not be limited to: (i) providing prompt notice to NHTSA in the event any requirement of this Consent Order cannot be met or timely met, and (ii) ensuring that employees involved with implementation of the performance requirements of this Consent Order are kept well-informed and are allocated sufficient time during their working hours to enable them to

thoroughly and effectively perform actions to carry out or implement the performance requirements of this Consent Order.

56. RTDI shall provide written notice of each required submission under this Consent Order by electronic mail to NHTSA's Medium & Heavy Duty Vehicle Division Chief (currently Bruce York, Bruce.York@dot.gov), and with copies to NHTSA's Associate Administrator for Enforcement (currently Jeffrey Giuseppe, Jeffrey.Giuseppe@dot.gov) and NHTSA's Assistant Chief Counsel for Litigation and Enforcement (currently Kerry Kolodziej, Kerry.Kolodziej@dot.gov).

### **III. TERM OF CONSENT ORDER**

57. Unless otherwise specified, the term of this Consent Order and RTDI's performance obligations thereunder is one year from the date of execution, provided, however, that the commitments in Paragraph 28 and Paragraphs 34 through 54 shall survive the term of this Consent Order until the Non-Deferred Amount is paid in full and the performance obligations with respect to the Deferred Amount and Industry Outreach Amount are reasonably satisfied. NHTSA may, at its option, extend the period for one year.

### **IV. AMENDMENT**

58. This Consent Order cannot be modified, amended, or waived except by an instrument in writing signed by all parties, and no provision may be modified, amended, or waived other than by a writing setting forth such modification, amendment, or waiver and signed by the party making the modification, amendment, or waiver.

### **V. MISCELLANEOUS**

59. Nothing in this Consent Order shall be interpreted or construed in a manner inconsistent with, or contravening, any federal law, rule, or regulation at the time of the execution of this Consent Order, or as amended thereafter.

60. Upon receipt of the Non-Deferred Amount set forth in Paragraphs 27 and 28, and NHTSA's determination that RTDI has reasonably achieved all of the performance obligations, set forth in Paragraphs 34 through 54, at a date agreed upon by the parties, but at no time before the first anniversary of this Consent Order, RTDI, including its current and former directors, officers, employees, agents, parents, subsidiaries, affiliates, successors, and assigns will be released from liability for civil penalties pursuant to 49 U.S.C. § 30165 in connection with any and all violations of RTDI's Safety Act reporting obligations, including those expressly identified in this Consent Order, from the inception of the Safety Act through the execution date of this Consent Order. Additionally, the Secretary of Transportation, by and through the Administrator of NHTSA, hereby waives any and all enforcement action or claims against RTDI (including its current and former directors, officers, employees, agents, parents, subsidiaries, affiliates, successors, and assigns) for civil penalties solely with respect to potential violations of the Safety Act or its implementing regulations that are disclosed pursuant to the Terms and Conditions of the Consent Order included in Paragraph 39, and subject to RTDI's satisfactory fulfillment of its other obligations under this Consent Order. Should RTDI fail to satisfactorily disclose the service bulletins, incidents involving death, or safety-related defects it is required to report under Paragraph 39, NHTSA may pursue any and all enforcement action or claims for civil penalties with respect to potential violations of the Safety Act or its implementing regulations that are disclosed.

61. This Consent Order does not release RTDI from civil or criminal liabilities, if any, that may be asserted by the United States, the Department of Transportation, NHTSA, or any other governmental entity, other than its civil penalty liabilities under 49 U.S.C. §§ 30165 and 30166 as described in this Consent Order.



62. None of the specific reporting obligations described in this Consent Order relieve RTDI of its obligation to submit any other reports required by the Safety Act or its corresponding regulations.

63. The parties shall each bear their own respective attorneys' fees, costs, and expenses, except as provided in Paragraph 31 above.

64. This Consent Order shall be effective following its execution. Any breach of the obligations under this Consent Order may, at NHTSA's option, be immediately enforceable in any United States District Court. RTDI agrees that it will not raise any objection as to venue.

65. In the event of RTDI's breach of, or failure to perform, any term of this Consent Order NHTSA reserves the right to pursue any and all appropriate administrative and/or judicial remedies, including, but not limited to, assessing interest for untimely payments and/or commencing litigation to enforce this Consent Order in any United States District Court.

66. The parties who are the signatories to this Consent Order have the legal authority to enter into this Consent Order, and each party has authorized its undersigned to execute this Consent Order on its behalf.

67. RTDI expressly waives any and all defenses and agrees not to plead, argue, or otherwise raise any defenses other than (i) that the payment of the Non-Deferred Amount, set forth in Paragraphs 27 and 28, was made to NHTSA, if applicable, and (ii) that RTDI has substantially complied with the terms of this Consent Order.

68. This Consent Order shall be binding upon, and inure to the benefit of, RTDI and its current and former directors, officers, employees, agents, parents, subsidiaries, affiliates, successors, and assigns. RTDI agrees to waive any and all defenses that may exist or arise in connection with any person or entity succeeding to the interests or obligations herein, including as a result of any changes to the corporate structure or relationships among or between RTDI and any of its parents, subsidiaries, or affiliates.

69. Should any condition or other provision contained herein be held invalid, void, or illegal by any court of competent jurisdiction, it shall be deemed severable from the remainder of this Consent Order and shall in no way affect, impair, or invalidate any other provision of this Consent Order.

70. This Consent Order shall not be construed to create rights in, or grant any cause of action to, any third party not party to this Consent Order.

71. This Consent Order may be executed in counterparts, each of which shall be considered effective as an original signature.

72. This Consent Order is a fully integrated agreement and shall in all respects be interpreted, enforced, and governed under the federal law of the United States. This Consent Order which are fully incorporated by reference, sets forth the entire agreement between the parties with regard to the subject matter hereof. There are no promises, agreements, or conditions, express or implied, other than those set forth in this Consent Order.

APPROVED AND SO ORDERED:

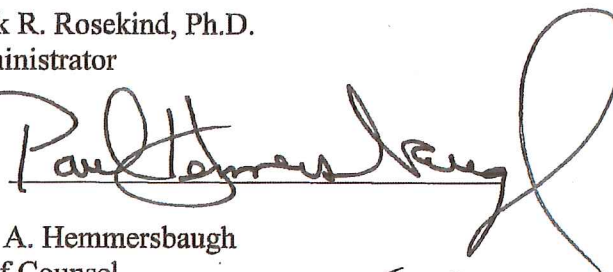
NATIONAL HIGHWAY TRAFFIC SAFETY  
ADMINISTRATION,  
U.S. DEPARTMENT OF TRANSPORTATION

Dated: November 15, 2016

By: 


Mark R. Rosekind, Ph.D.  
Administrator

Dated: November 15, 2016

By: 


Paul A. Hemmersbaugh  
Chief Counsel

Dated: November 15, 2016

By: 

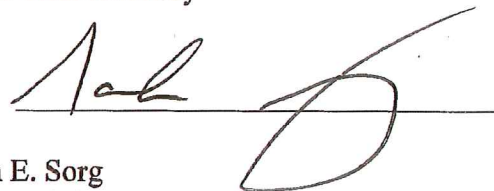
Kerry E. Kolodziej  
Acting Assistant Chief Counsel  
for Litigation and Enforcement

Dated: November 15, 2016

By: 

Otto G. Matheke, III  
Senior Trial Attorney

Dated: November 15, 2016

By: 

Sarah E. Sorg  
Senior Trial Attorney

Dated: November 15, 2016

By: 

Jordan E. Stephens  
Trial Attorney

AGREED:

RIDE THE DUCKS INTERNATIONAL, LLC

Dated: \_\_, 2016 11 / 15 / 2016

By: 

Chris Herschend  
President

Dated: \_\_, 2016 11/15/2016

By: 

Robby Hultz  
Managing Partner

Dated: \_\_, 2016

By: \_\_\_\_\_

Jacqueline S. Glassman  
King & Spalding  
Counsel for Ride the Ducks International, LLC

AGREED:

RIDE THE DUCKS INTERNATIONAL, LLC

Dated: \_\_, 2016

By: \_\_\_\_\_

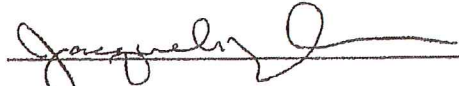
Chris Herschend  
President

Dated: \_\_, 2016

By: \_\_\_\_\_

Robby Hultz  
Managing Partner

*November*  
Dated: 15, 2016

By:  \_\_\_\_\_

Jacqueline S. Glassman  
King & Spalding  
Counsel for Ride the Ducks International, LLC



# IMPORTANT SAFETY RECALL

NHTSA Recall: 16V-859

12/14/2016

This notice applies to your vehicle, Duck No. SD-36, SD-37, SD-39, SD-40, SD-41, SD-42, SD-43, SD-45, SD-47, SD-50

Dear RTDI Stretch Duck Operator:

This notice is sent to you in accordance with the National Traffic and Motor Vehicle Safety Act.

Ride the Ducks International (RTDI) has decided that a defect relating to motor vehicle safety exists or existed in certain "Stretch" Amphibious Passenger Vehicles ("Stretch Ducks"). As a result, RTDI is conducting a safety recall.

RTDI is conducting a recall because of the possibility that over time the axle housing can fracture at the connection point between the knuckle ball and the housing due to excessive fatigue. If the axle housing fractures, this condition could cause a driver to lose control of the vehicle, increasing the risk of a crash.

In October 2013, RTDI issued a Service Bulletin (SB-00-14-13) instructing vehicle operators and licensees to repair and reinforce the connection where the knuckle housing ball connects to the axle housing. If you have already performed this repair on your vehicles, you are entitled to reimbursement for the costs associated with having done so. If you have not yet performed this repair on your vehicles, you must do so expeditiously and the service will be performed for you at **no charge**.

Pursuant to a recent agreement with the National Highway Traffic Safety Administration, RTDI is conducting an independent engineering analysis of the repair procedures in SB-00-14-13. If any further action is required, we will notify you promptly.

If after contacting RTDI, you are not satisfied we have done our best to remedy this condition without charge and within a reasonable time, you may wish to write to the following:

Administrator  
National Highway Traffic Safety Administration,  
1200 New Jersey Avenue, SE.,  
Washington, DC 20590

You may also call the toll-free Vehicle Safety Hotline at 1.888.327.4236 (TTY 1.800.424.9153), or go to <http://www.safercar.gov>.

The National Highway Traffic Safety Administration Campaign ID Number for this recall is 16V-859.







U.S. Department of Transportation  
**National Highway Traffic Safety  
Administration**

1200 New Jersey Avenue SE  
Washington, DC 20590

December 1, 2016

Mr. Brian Deckard  
Director of Fleet Operations  
Ride The Ducks International LLC  
PO Box 1837  
Branson, MO 65615

NEF-150MR  
16V-859

**Subject:** Axle Housing may Fracture due to Fatigue

Dear Mr. Deckard:

This letter serves to acknowledge Ride The Ducks International LLC's notification to the National Highway Traffic Safety Administration (NHTSA) of a safety recall which will be conducted pursuant to Federal law for the product(s) listed below. Please review the following information to ensure that it conforms to your records as this information is being made available to the public. If the information does not agree with your records, please contact us immediately to discuss your concerns.

**Makes/Models/Model Years:**

RIDE THE DUCKS/AMPHIBIOUS VEHICLE/1996-2005

**Mfr's Report Date:** November 22, 2016

**NHTSA Campaign Number:** 16V-859

**Components:**

POWER TRAIN:AXLE ASSEMBLY

**Potential Number of Units Affected:** 57

**Problem Description:**

Ride the Ducks International LLC (RTDI) is recalling certain model year 1996-2005 "Stretch" Amphibious Passenger Vehicles. Due to excessive fatigue, the axle housing on the affected vehicles may fracture at the connection point between the knuckle ball and the housing, possibly resulting in a loss of vehicle control.

**Consequence:**

A loss of vehicle control can increase the risk of a crash.

**Remedy:**

RTDI will notify the company-owned operators and licensors and will strengthen the connection at the knuckle housing ball and the axle housing, free of charge. The manufacturer has not yet provided a notification schedule. RTDI customer service can be contacted at 1-417-266-7600.

**Notes:**

Owners may also contact the National Highway Traffic Safety Administration Vehicle Safety Hotline at 1-888-327-4236 (TTY 1-800-424-9153), or go to [www.safercar.gov](http://www.safercar.gov).



We have received RTDI's proposed owner notification letter and it is currently under review. You will be notified of any changes or concerns once our review is complete.


Please be reminded of the following requirements:

Copies of all notices, bulletins, dealer notifications, and other communications that relate to this recall, including a copy of the final owner notification letter and any subsequent owner follow-up notification letter(s), are required to be submitted to this office no later than 5 days after they are originally sent (if they are sent to more than one manufacturer, distributor, dealer, or purchaser/owner).

As stated in Part 573.7, submission of the first of six consecutive quarterly status reports is required within one month after the close of the calendar quarter in which notification to purchasers occurs. Therefore, the first quarterly report will be due on, or before, 30 days after the close of the calendar quarter.

Your contact for this recall will be Michelle Rice who may be reached by phone at 202-366-1060, or by email at [michelle.rice@dot.gov](mailto:michelle.rice@dot.gov) or through the office email at [rmd.odi@dot.gov](mailto:rmd.odi@dot.gov). We look forward to working with you.

Sincerely,



Jennifer Timian  
Chief, Recall Management Division  
Office of Defects Investigations  
Enforcement

**Part 573 Safety Recall Report****16V-859****Manufacturer Name :** Ride The Ducks International LLC**Submission Date :** NOV 22, 2016**NHTSA Recall No. :** 16V-859**Manufacturer Recall No. :** NR**Manufacturer Information :**

Manufacturer Name : Ride The Ducks International LLC  
 Address : 2320 W Highway 76  
 PO BOX 1837 BRANSON MO 65616  
 Company phone : 417 266 7600

**Population :**

Number of potentially involved : 57  
 Estimated percentage with defect : 100 %

**Vehicle Information :**

Vehicle 1 : 1996-2005 RTDI "Stretch" Amphibious Passenger Vehicles

Vehicle Type :

Body Style :

Power Train : NR

Descriptive Information : Amphibious Passenger Vehicle

Production Dates : JAN 01, 1996 - DEC 31, 2005

VIN Range 1 : Begin :

NR

End : NR

 Not sequential**Description of Defect :**

Description of the Defect : The axle housing can fracture at the connection point between the knuckle ball and the housing due to excessive fatigue.

FMVSS 1 : NR

FMVSS 2 : NR

Description of the Safety Risk : If the axle housing fractures, the driver may lose control of the vehicle and increase the risk of a crash.

Description of the Cause : The axle housing can fracture due to excessive fatigue.

Identification of Any Warning NR  
 that can Occur :

**Supplier Identification :****Component Manufacturer**

Name : NR  
Address : NR  
NR  
Country : NR

**Chronology :**

See attached document

**Description of Remedy :**

Description of Remedy Program : The remedy program applied was set forth in the Service Bulletin issued on October 1, 2013. The remedy involved strengthening the connection where the knuckle housing ball connects to the axle housing.

How Remedy Component Differs NR  
from Recalled Component :

Identify How/When Recall Condition RTDI is not currently building or having built new amphibious passenger  
was Corrected in Production : vehicles.

**Recall Schedule :**

Description of Recall Schedule : RTDI will send formal customer notification letters to its company-owned operators and licensors as set forth in the Consent Order with NHTSA. To the extent that Ride the Ducks Seattle requests parts to conduct the repair, they are available. Ride the Ducks International will offer reimbursement to any licensor that has already conducted the repairs.

Planned Dealer Notification Date : NR - NR

Planned Owner Notification Date : NR - NR

\* NR - Not Reported



## Non-Destructive Testing Criteria

NDT Inspection Procedures

RTD Seattle Fleet Operations

**Memorandum for Record**

**January 17<sup>th</sup> 2017**

**To:** MISTRAS Group Inc.

**From:** Joe M. Hatten, Maintenance Manager, Ride the Ducks of Seattle

**Subject:** NDT Standard Operating Procedures

**Purpose:**

This document provides testing criteria for the Non-Destructive Testing of Truck Duck steer axles, steer axle spindles, and drive axles owned by Ride the Ducks of Seattle. A copy of this document shall be provided to the testing agency contracted to perform the Non-Destructive Testing. The original version of this SOP will be maintained by the Maintenance Manager for Ride the Ducks of Seattle.

**Overview:**

Ride the Ducks of Seattle is committed to providing the safest amphibious tours in the country. This commitment requires verification that current equipment and replacement parts are in proper operating condition at all times. To ensure this commitment is met, Ride the Ducks of Seattle has enlisted the service of Mistras Group Inc. to provide Non-Destructive Testing of several suspension and drivetrain components. The purpose for this memorandum packet is to establish parameters for quality testing of the vehicles as specified herein utilizing Nondestructive Inspection Methods.

**Criteria:**

Ride the Ducks of Seattle intends to employ the services of Mistra Group Inc. for nondestructive testing services on preventative inspections and for inspection of newly acquired Duck components. Ride the Ducks begins annual DOT preventative maintenance inspections every September. During these inspections, various components and/or systems of the Ducks will be disassembled and inspected. It is during this period that the Non-Destructive services as defined in this memorandum shall take place. Additionally, Ride the Ducks of Seattle intends to utilize Non-Destructive testing for newly purchased or acquisitions of replacement steer axle housings, drive axle housings and steer axle spindles. It is mandatory that newly purchased or acquired parts be tested for serviceability prior to being entered into the parts supply inventory for Ride the Ducks of Seattle.

**Tracking and Record Keeping:**

Ride the Ducks of Seattle has implemented a tracking system, including permanent component serial numbers, to define each component and to maintain location and status of all steer axle housings, drive axle housings, and steer spindles. Identification for each component are as follows:

**Truck Duck Axle/s Data**

- TD Steer axle housings
  - o Part #7521744
  - o Permanent serial number identification will begin with TDS (Truck Duck Steer). This will be followed by a numeric designator.
- TD Rear/Drive Axle housings
  - o Part #7521728
  - o Permanent serial number identification will begin with TDR (Truck Duck Rear). This will be followed by a numeric designator.
- TD Steer axle spindles
  - o Original Part number #7521680, replacement part #4316SP.
  - o Permanent serial number identification is designated by three numbers beginning with 001.

## Stretch Duck Axle/s Data

- SD Steer axle housings
  - o Part #7411366
  - o Permanent serial number identification will begin with SDS (Stretch Duck Steer). This will be followed by a numeric designator.
- SD Drive Axle housings
  - o Part #7411297
  - o Permanent serial number identification will begin with SDR (Stretch Duck Rear). This will be followed by a numeric designator.
- SD Tag Axle housings
  - o Part #7411298
  - o Permanent serial number identification will begin with SDR (Stretch Duck Rear). This will be followed by a numeric designator.
- SD Steer axle spindles
  - o Original Part number #7521680, replacement part #4316SP.
  - o Permanent serial number identification is designated by three numbers beginning with SD001.

The standards and procedures set forth in this memorandum will be utilized and maintained by Ride the Ducks of Seattle. The specifications contained in this SOP will be subject to amending by Ride the Ducks of Seattle when or if the industry standards change, vendor requirements need to be modified or we, the requesting customer, need to adjust our criteria.

## Field Testing for In-Service Vehicles

### Appointments:

All request for NDT appointments shall be made in advance and will include relevant information for component test area, part numbers and permanent serial numbers. On the date and time of the requested appointment, a Nondestructive inspector will arrive at the Ride the Ducks of Seattle maintenance facility, 4203 9<sup>th</sup> Ave. NW, Seattle, WA 98107, with all require tools and equipment to conduct Non-Destructive Testing of all specified and pre-staged equipment.

### Testing Process:

The standard testing procedure shall be in accordance with **ASTM E709** Standard Guide for Magnetic Particle Testing (MT) which is Mistras procedure 100-MT-001 for material and welds. The criteria of acceptance will be **No Cracks**. This standard will remain in place for all inspections. Any changes to the requested ASTM-E709 criteria will be made in writing by the Director of Operations or Maintenance Manager for Ride the Ducks of Seattle.

Preparation of the areas to be tested will be done by Ride the Ducks of Seattle. Inspection areas shall be clean and free of all foreign debris. Paint, slag, rust, grease, oil or dirt should be removed by applying a cleaning solvent, the use of a steam cleaner, or a wire wheel.

The axle and spindle testing will be conducted in accordance with all regulatory guidelines. Ride the Ducks of Seattle has determined, and the following pages will define, the primary and secondary areas that are to be tested on each component.

**Primary Inspections** require Magnetic Particle Inspection by a certified Inspector per the requirements of SNT-TC-1A.

**Secondary Inspections** require Visual Inspection (VT) by Ride the Ducks of Seattle. Should for any reason Ride the Ducks determine there are issues with these areas, Magnetic Particle Inspection by a certified NDT Inspector per the requirements of SNT-TC-1A may be requested. If Secondary Inspections are requested, all surfaces to be inspected will be prepared in accordance with the requirements of ASTM E709 and this document.

During the testing, any and all indications during the screening test will be brought to the attention of the on-duty maintenance supervisor. The maintenance supervisor will visually confirm and address any indication with an emery cloth or wire wheel, thus ensuring that the indication is not a result of surface marring. The area of indication will be tested again for confirmation. If the indication is still present the tester will mark the location of the indication for reference and/or further examination.

Parts that continue to show indications, following the confirmation test, will be removed for possible repair or disposal. Replacement parts that have been previously verified as indication or crack free will be drawn from the Ride the Ducks of Seattle parts inventory and will be installed as replacement.

### **In-House Testing for restock and replacement components**

All request for Non-Destructive testing of restock components will take place at the Mistras Group Inc. facility at 7820 S. 210<sup>th</sup> St. #110, Kent, WA 98032. Components for testing will include a detailed work order request and be accompanied by all relevant identification numbers.

### **Testing Process:**

The standard criteria of acceptance will be, **No Cracks**. This standard will remain in place for all inspections. Any changes to the criteria will be made in writing by the Director of Operations or Maintenance Manager for Ride the Ducks of Seattle.

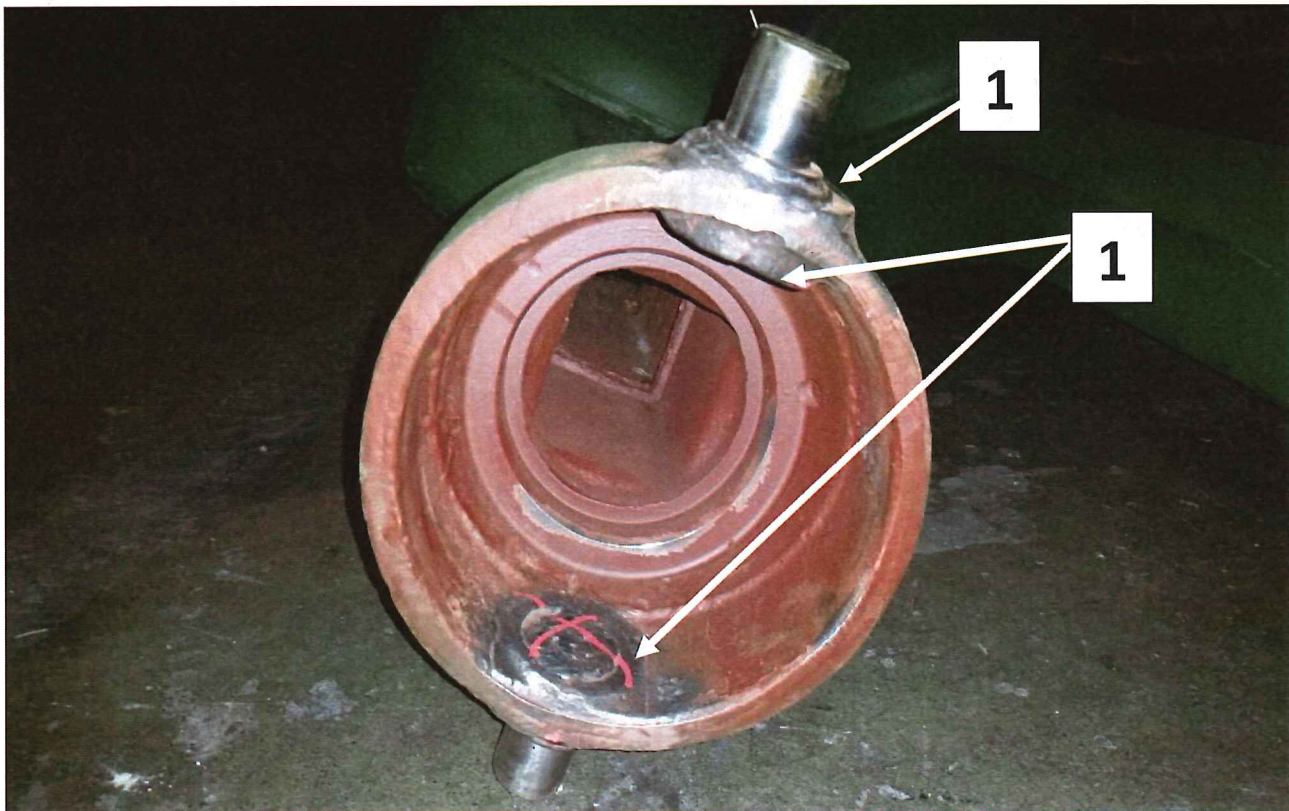
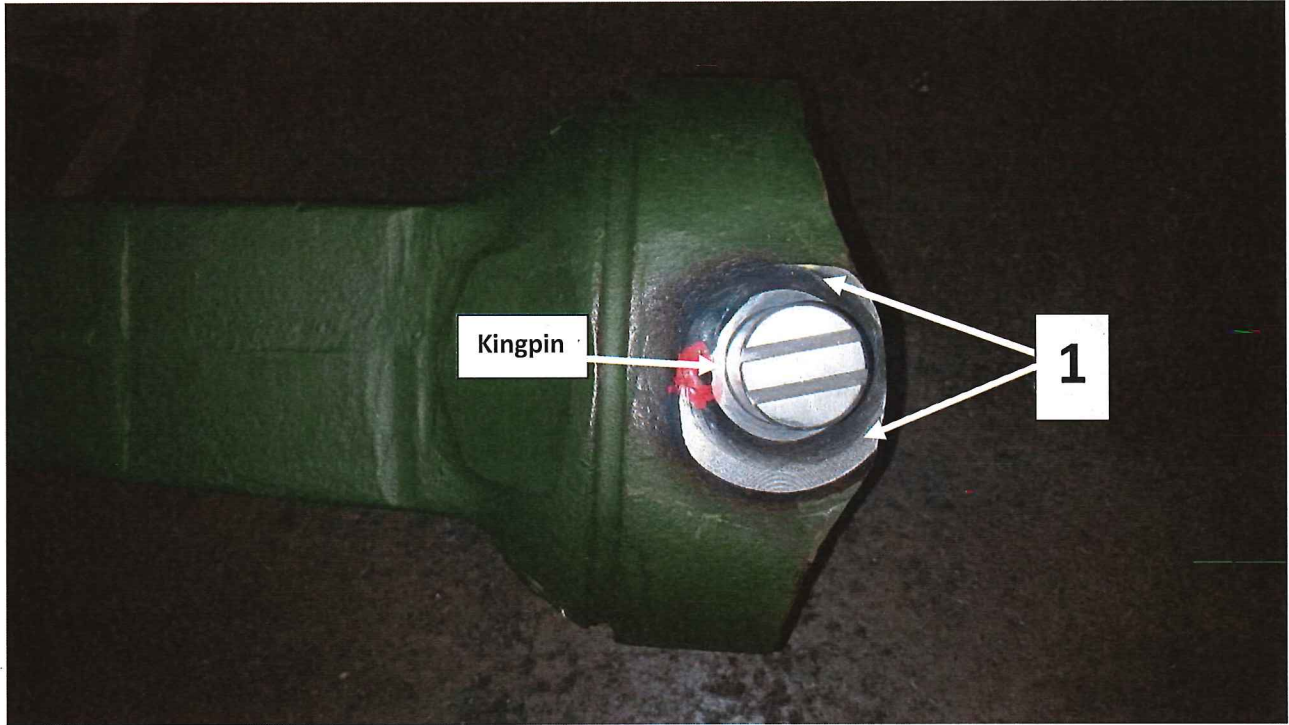
Preparation of the areas to be tested will be in accordance with ASTM E709. The surface of the part to be examined should be essentially clean, dry, and free of contaminants such as dirt, oil, grease, loose rust, loose mill sand, loose mill scale, lint, thick paint, welding flux/slag, and weld splatter that might restrict particle movement. When examining a local area, such as a weld, the areas adjacent to the surface to be examined, must also be cleaned to the extent necessary to permit detection of indications. Paint, slag, rust, grease, oil or dirt should be removed by applying a cleaning solvent, the use of a steam cleaner, or a wire wheel or other method which will not smear the metal surface.

After all testing has been completed, the testing facility will provide Ride the Ducks of Seattle with a packet containing a copy of all items tested and the individual test results sheet per component. The completed paperwork will be filed and retained at the Ride the Ducks of Seattle Maintenance Facility for the entire life cycle of the component and for historical references.



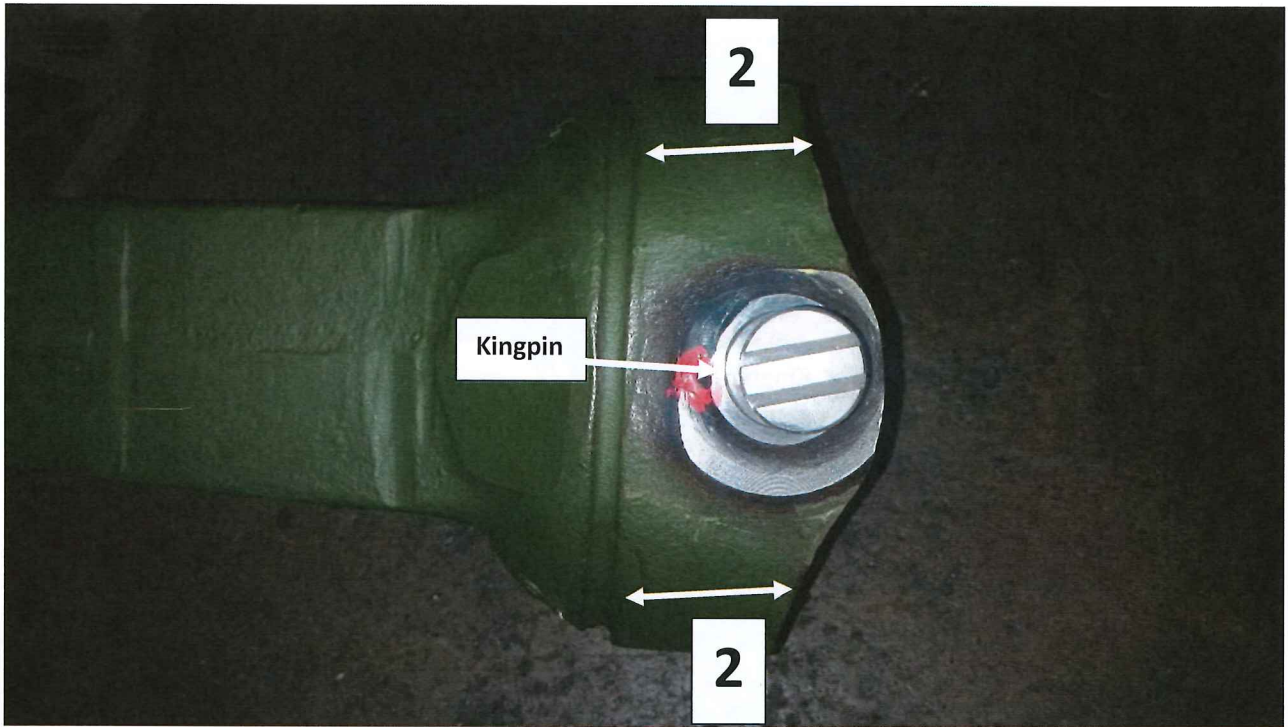
**Truck Steer Axle Primary Inspection Area:**

1. **Primary inspection** (Magnetic Particle Inspection Required) of the external welds surrounding the Kingpin and internal welds securing the Kingpin to the housing



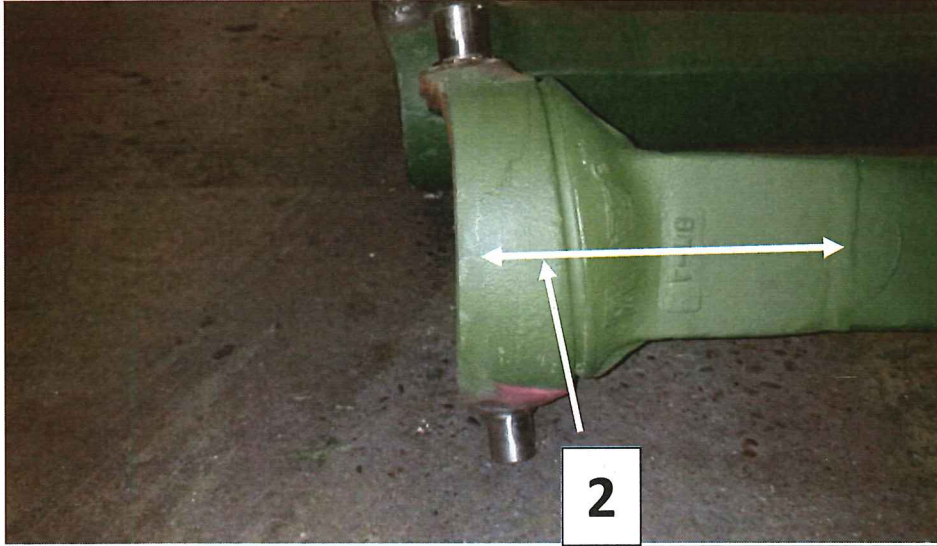
Truck Steer Axle Secondary Inspection Area:

2. **Secondary Inspection** (Visual Inspection unless requested for Magnetic Particle Inspection) of the entire width of the steer cup and around the circumference

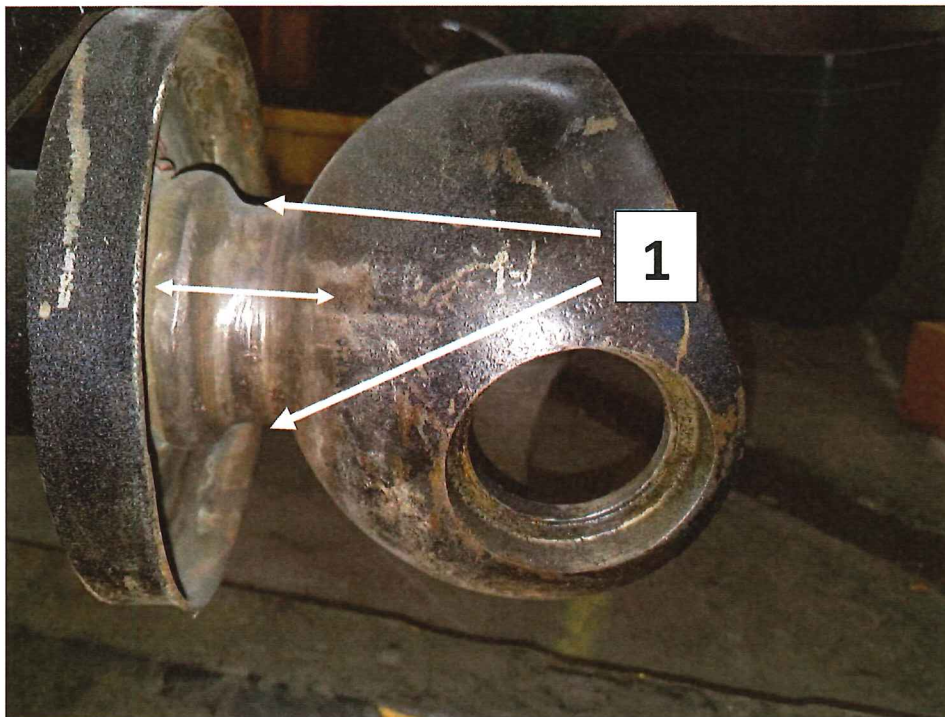


**Truck Steer Axle Secondary Inspection Area (cont.):**

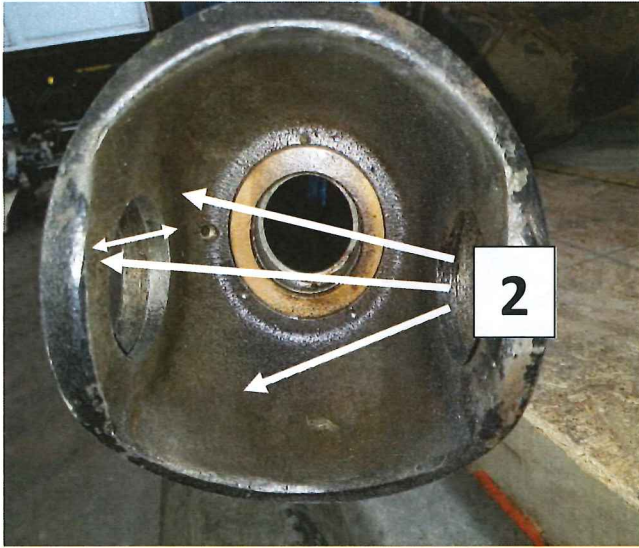
2. **Secondary Inspection** (Visual Inspection unless requested for Magnetic Particle Inspection) Steer cup ring to the butt-weld on square axle housing shaft



**Stretch Duck Steer Axle Primary Inspection Area:**

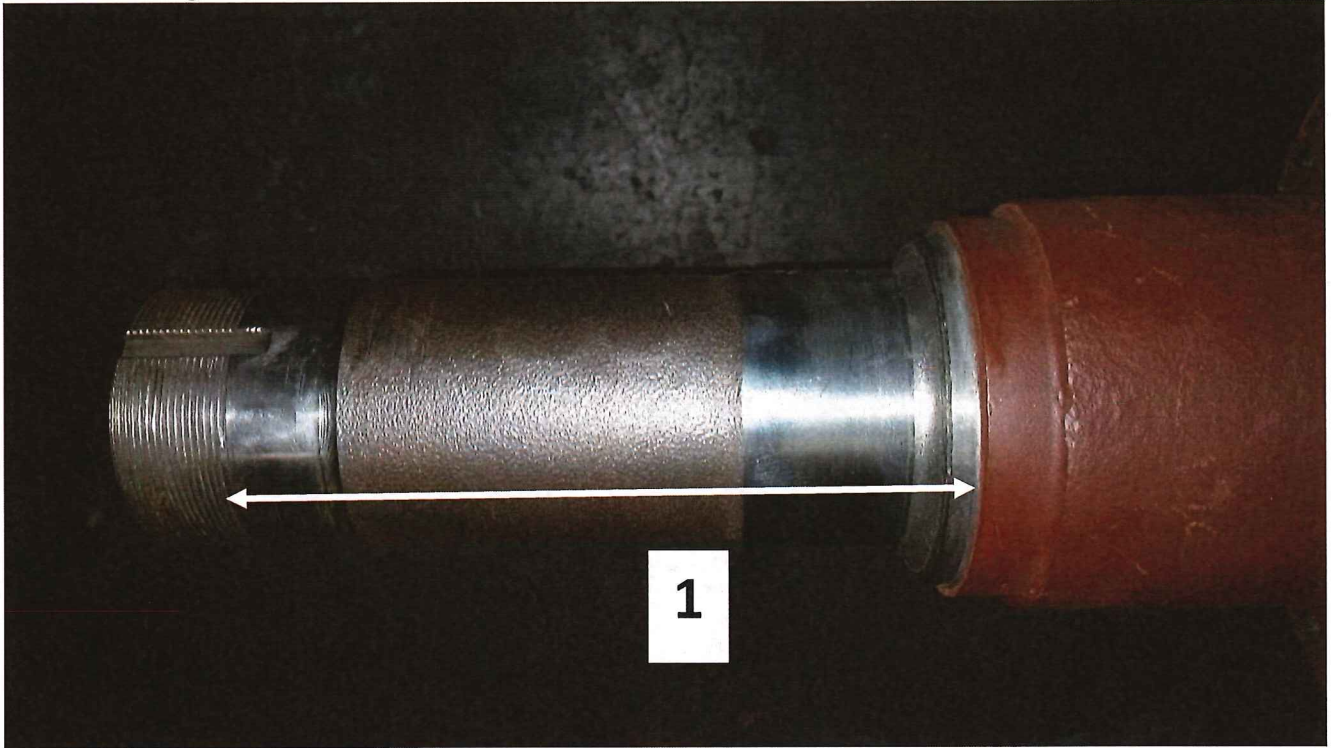


Stretch Duck Steer Axle Secondary Inspection Area:



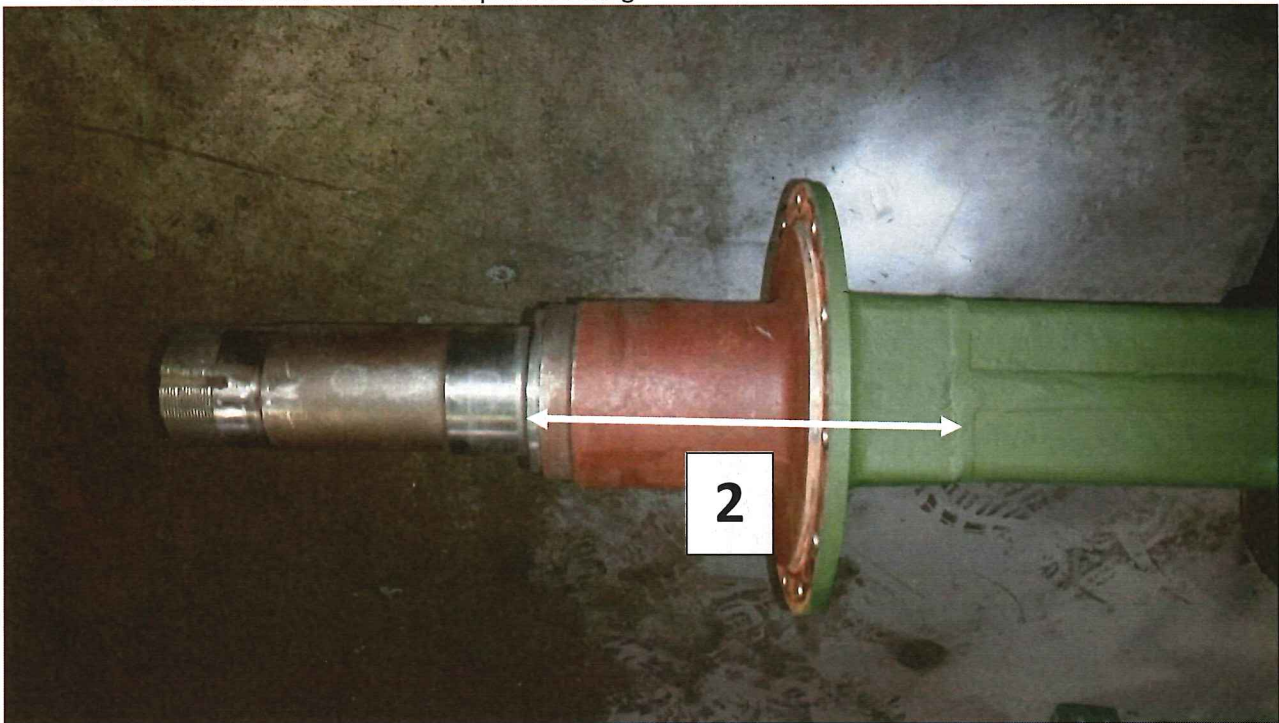
**Rear Axle Primary Inspection Area:**

1. **Primary inspection** (Magnetic Particle Inspection Required) of Spindle end to the weld at the union point with the housing.



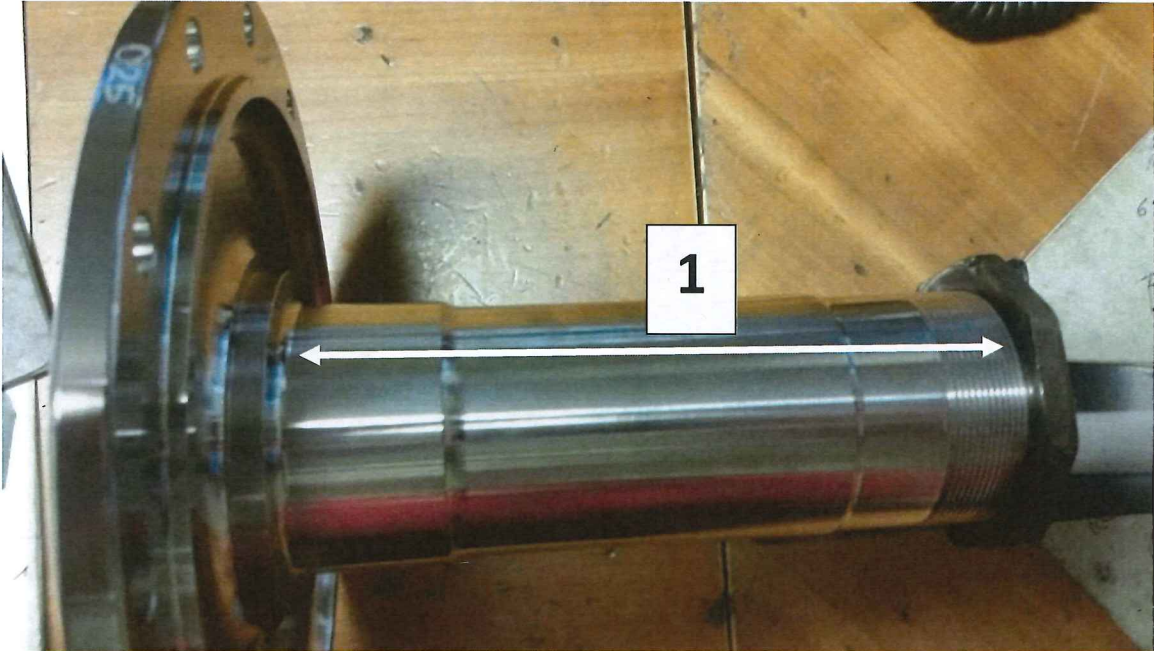
**Rear Axle Secondary Inspection Area:**

2. **Secondary Inspection** (Visual Inspection unless requested for Magnetic Particle Inspection) of Spindle union weld to the axle butt-weld on the square housing

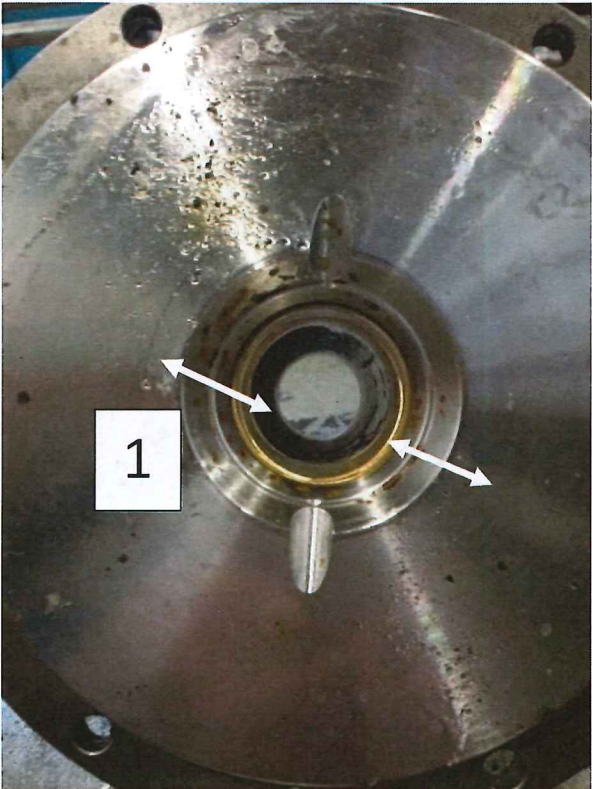
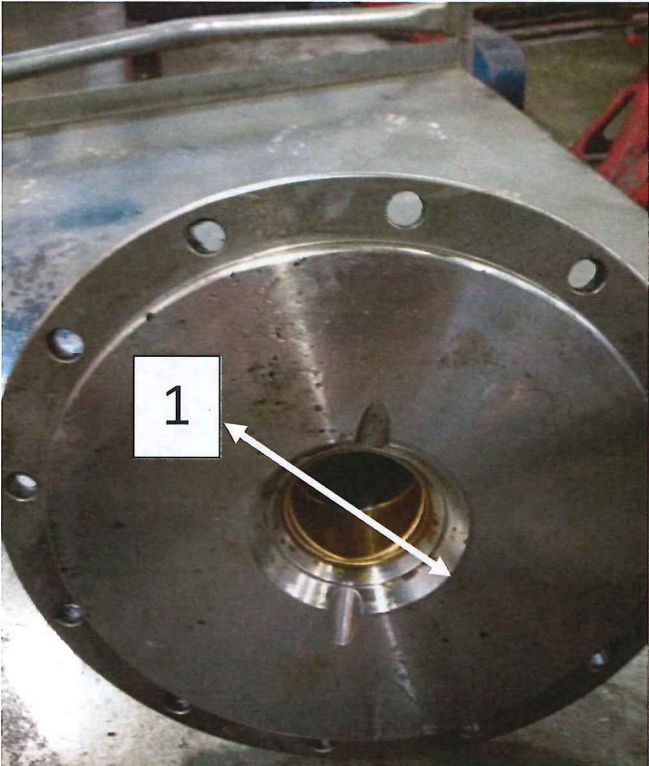


**Steer Axle Spindle Primary Insp Area:**

- 1. Primary inspection (Magnetic Particle Inspection Required) Spindle shaft to flange union.



**Steer Axle Spindle Secondary Insp Area:**

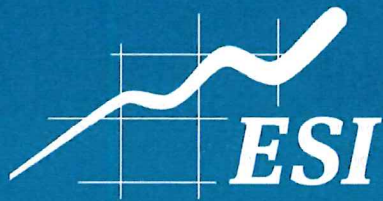


**Conclusion**

The procedures that have been adopted in this memorandum are in pursuant to our ever evolving safety standards. If there is a need for modifications or re-assessment of the process all parties involved will be notified appropriately in writing providing any and all modifications. If there are any questions or concerns regarding this memorandum, they should be addressed to Ride the Ducks of Seattle, at 516<sup>th</sup> Broad St, Seattle, WA 98109, phone number 206-441 4647.

Ryan Johnson  
Director of Operations

Joe M. Hatten  
Maintenance Manager

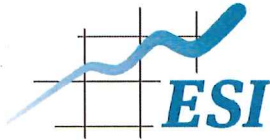


# Engineering Investigation

R&C VEHICLE DESIGN FOR RIDE THE DUCKS

ESI Project: 55440G





4215 Campus Drive  
Aurora, IL 60504

# Engineering Investigation

R&C VEHICLE DESIGN FOR RIDE THE DUCKS

ESI Project: 55440G

## Report Prepared for:

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Illinois P.E. | Expires: 11/30/17



12/15/16

Date

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Date

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12/15/16

Date

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## Introduction

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This report presents the findings of the engineering analysis performed on the front axles used in the Stretch Duck (Duck) manufactured by Ride the Ducks International (RTDI). Specifically, Engineering Systems Inc (ESI) was requested by RTDI to perform a mechanical and metallurgical analysis of the front axle in the area of the knuckle ball housing where isolated failures have occurred. Additionally, ESI was to evaluate the reinforcement of the knuckle ball housing designed by RTDI and described in their service bulletin SB-00-14-13. This engineering analysis is based upon the information reviewed, work performed and the education, training and experience of the authors. The resulting conclusions are stated to a reasonable degree of engineering certainty.

## Background

---

Ride the Ducks International is one of the largest operators of amphibious tours in the nation. As part of its operation the company refurbishes and modifies existing WWII DUKW vehicles for their use. Over the past 13 years there have been three failures of the front axle housing in the area where it transitions into the steering knuckle ball housing. Additionally, there have been three instances where a fracture in the same area was discovered prior to any actual failure. In response to this, RTDI devised a reinforcement intended to increase the section properties in the area of the failures, thereby reducing the stresses. This modification is detailed in RTDI service bulletin SB-00-14-13 which was sent out to all of the operators of their vehicles who were instructed to perform the modification prior to the start of operations of the 2014 season. This same modification is applied to replacement axles produced at the RTDI facility in Branson, Missouri. Since the service bulletin was issued, there have been no reported failures of any axle which has been reinforced.

## Material Reviewed

---

The following material was reviewed and relied upon as part of the engineering analysis.

- NTSB Docket material for accident ID: HWY15MH011
- RTDI Service Bulletin SB-00-14-13
- RTDI Service Bulletin SB-00-01-16
- RTDI Stretch Duck Front Axle Weight Survey
- RTDI MT103 Magnetic Particle Examination Procedure
- Department of the Army Technical Manual TM 9-8024
- Data plate for a M-135 Cargo Truck
- The First Century of GMC Truck History, Donald E. Meyer
- Notes on the GMC M-Series, <http://www3.bc.sympatico.ca/deuce/NOTES.HTML>

Additionally, two axles from RTDI were supplied for examination.



## DISCUSSION AND ANALYSIS

---

Part of the RTDI fleet of amphibious vehicles consists of modified World War II vehicles commonly known as "Ducks". These vehicles were originally based on the 2½ ton cargo and troop carrier used during WWII, designated as the CCKW and manufactured by GMC. A specifically designed boat hull was installed resulting in the vehicle designated as the DUKW. Many thousands of these specialized vehicles were manufactured with a large number continuing to be used today by tour operators and enthusiasts.

One of the modifications performed by RTDI is the replacement of the front axle with one from the M-135 or its sister vehicle, the M-211, both of which are GMC 2½ ton trucks manufactured in the early 1950's and designated with the internal model number of G-749. Structurally, this axle is generally similar to the original front axle of the CCKW/DUKW. Aside from the removal of some of the suspension components, the addition of disc brakes and water proofing measures, these axles are little changed from their original design when RTDI uses them on their stretch Ducks.

Besides operating in the Korean conflict, the G-749 family of trucks saw continued use with the Canadian armed forces as well as multiple civilian applications with no apparent issues involving systemic failures of the front axle. During the time that RTDI has used the stretch Duck there have been very few failures of the front axle. Some of these failures are known to be from damage incurred during an accident or similar incident. The majority of Ducks have operated for over a decade under conditions less severe than the original application using the front axle from the G-749 series truck with no known failures.

An important aspect of the engineering analysis was determining the stresses in the area of the fractures under the maximum allowable load. Ordinarily, the manufacturer specifies a Gross Axle Weight Rating (GAWR) for this parameter. Research for data regarding the front axle design of G-749 based trucks found no information regarding the GAWR for the front axle. However, data plates for the M-135 provide some insight as to the load carrying capacity of the front axle (Appendix A). At the fully loaded highway capacity for the M-135 truck with a winch, the total vehicle weight is 23,090 lbs of which 6,420 lbs are carried by the front axle. This compares to the 7,280 lbs at the front axle measured by RTDI with an empty stretch duck (report attached). In the fully loaded condition the RTDI duck has a total weight of 26,480 lbs with the front axle load measured at 6,800 lbs. Even during the infrequent times that the RTDI duck is operated empty, the front axle load is only 13% greater than the maximum load stated by the US Army. This minor increase of the loading on the front axle more than likely would be within the factor of safety for the axle design.

The rim used for the RTDI Duck is made of steel with dimensions of 7.50" wide and 20" diameter. Further the rim has a negative offset of 5¾". This places the location of the reaction force to the axle loads inboard from the hub mounting surface for the wheel. Use of rim sizes different from the RTDI supplied rim might change the location of this reaction force and thus change the stresses on the front axle.

As part of the engineering analysis two complete axle housings were provided to ESI by RTDI. One of these was an axle that had not been modified with the collar reinforcement. Another was an axle from a Duck that was being repaired for a small leak in the area of the spring saddle. This axle, RTDI No. SD-170, had the collar reinforcement installed prior to the 2014 operating season and had been in use since then. The right side end of

SD-170 was cut off and sectioned for dimensional and metallurgical analysis. It is important to note that no cracking was observed in any of the cross sections from this axle.

Hand calculations using the section properties of the reduced area on the knuckle ball housing were performed to estimate the stresses from bending in the area where previous failures had occurred. These calculations also considered the stress concentration factor created by the radius of the fillet at the transition from the reduced section to the ball of the housing. These calculations estimated that at the maximum axle load the stresses in the fillet would be approximately 24,550 psi. These same hand calculations were performed using the increased section properties provided by the addition of the reinforcing collar. These calculations found that the stresses in the critical area of the fillet are approximately 56% of the stresses determined for the unreinforced section.

## Finite Element Analysis

To investigate stresses at the fracture location when the axle housing assembly is subjected to a maximum axle weight load, and to determine the efficacy of the reinforcing collar, a small Finite Element Analysis (FEA) was performed using Abaqus, a world-class commercial finite element program. Using the Method of Sections from Statics and relying on St. Venant's Principle, only the outboard section of one side of the axle housing assembly needed to be modeled (approximately 11.7 inches long from the centerline of the kingpin to the "stub" end of the model). This approach minimized the size of the FEA models while providing a conservative stress solution.

The solid geometries of the axle housing and the reinforcing collar were meshed using Abaqus C3D10HS solid elements, which are 10-node general purpose tetrahedrons that use a hybrid formulation with improved surface stress visualization. Linear elastic material properties were assumed for the steel axle housing and steel knuckle ball housing. In addition, the knuckle ball housing and the axle housing were assumed to be perfectly fused at their interfacing surfaces by modeling the two components as one solid part.

Two models of the axle housing assembly were created: one without the reinforcing collar and one with the collar. When the reinforcing collar was added to model, the contacting faces between the collar and the outer surfaces of the knuckle ball housing and axle housing were also assumed to be perfectly fused, but in this case the bond was created between two separate parts using the Tie Constraint feature in Abaqus. No representation of the weld bead was included in the collar geometry.

With respect to loads and boundary conditions, the stub end of the axle housing was assumed to be fully fixed and a vertical force of 3,640 pounds (1/2 of the assumed 7,280 maximum axle load) was applied at a reference point located on the centerline of the axle housing assembly 2.75" outboard of the vertical centerline (axis) of the kingpin. This location accounted for the inboard offset of the centerline of the wheel and tire assembly from the mounting face of the hub. The Kinematic Constraint feature of Abaqus was used to properly transmit the resulting force and moment to the surfaces of the knuckle ball adapter which mate with the outer races of the kingpin bearings.

In terms of results, the finite element solution for the model without the collar indicated that the Maximum Principal Stress at the fracture location (located where the radius on the outer surface of the knuckle ball housing meets the necked-down section adjacent to the end of the axle housing) was 28,486 psi. When the reinforcing collar was added to the second model, the Maximum Principal Stress at the fracture location was reduced to 15,420 psi, a 46% reduction in stress.



Details of the finite element models and the stress results can be found in Appendix B to this report.

## Metallurgical Evaluation

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Cross sectional samples were made of axle SD-170 in the area of the collar reinforcement in order to evaluate the construction and metallurgy of the knuckle ball housing and the collar reinforcement. The housing is a forging using a medium carbon steel with a microstructure consisting of ferrite in a pearlitic matrix. After forging, the part is machined into its final shape including the reduced section at the base of the knuckle ball. Hardness testing of this material found that it averaged 84 Rockwell B. This would equate to an ultimate tensile strength of approximately 81 ksi (per ATM A370, table 3).

The design of the collar reinforcement uses a short section of low carbon steel pipe cut in half in order to fit around the reduced section of the knuckle ball housing. Additionally, a bevel is ground around the inside diameter of the collar to aid in fitting to the knuckle ball housing. This is then welded around the entire circumference. This joint configuration of the weld prevents the full thickness of the collar from being properly fused to the knuckle ball housing. It also creates a sharp transition at the root of the weld between the collar and the housing leading to elevated stresses. The geometry at the weld root acts as a stress concentrator.

The welding of the collar to the knuckle ball housing is done with no pre or post weld heat treatment. This results in rapid cooling of the weld and heat affected zone which produces a martensitic microstructure in the medium carbon steel of the knuckle ball housing. This type of microstructure can be susceptible to fatigue cracking and growth in the presence of elevated stress concentration factors as are present given the joint geometry of the welded collar reinforcement.

Details of the metallurgical evaluation are presented in Appendix C.

## CONCLUSIONS

---

The engineering investigation outlined above has resulted in the following conclusions:

1. The infrequent occurrence of failures in the front axle of the RTDI Stretch Duck indicates that the underlying cause of these failures is not systemic but related to individual circumstances such as a pre-existing crack caused by a loading event beyond the normal intended use.
2. The collar reinforcement provided for in RTDI service bulletin SB-00-14-13 significantly reduces the stresses in the critical area of the fillet section in the knuckle ball housing. To date there have been no failures of an axle that has received the collar reinforcement.
3. The design and installation of the collar may eventually be subject to failure over a long period of time due to the improper weld joint geometry and the creation of an unfavorable microstructure within the heat affected zone of the weld. If the structural integrity of the collar is lost, the axle would revert back to its original strength prior to the application of the collar.

4. The collar reinforcement prevents the inspection of the underlying section of the knuckle ball housing for the presence of any fatigue cracking that may have been present prior to the installation of the collar. While the collar would significantly inhibit the progression of any pre-existing crack it may not be adequate to entirely arrest the growth.
5. The front axle from the G-749 series GMC 2½ ton trucks as originally designed and manufactured provide adequate strength for the RTDI application in their Stretch Ducks. This is supported by the history of the front axle design prior to the RTDI application and its performance in the Stretch Duck. Furthermore, the hand calculations and Finite Element Analyses described above provide additional support for this.

## **RECOMMENDATIONS**

---

Based upon the foregoing analysis, the following recommendations are made:

1. All of the axles that have received the collar modification of SB-00-14-13 should be removed from service and replaced with unmodified axles that have undergone the inspection outlined below. Removed axles should be inspected and reworked back to the original condition. Since the collar significantly increases the strength of the reduced section in the knuckle ball housing and there have been no reported failures, the timing of this replacement is not of immediate urgency.
2. Inspection of new axle housings:

Upon receipt of any salvaged axle housing the part should be thoroughly cleaned and the reduced area at the base of the knuckle ball housing smoothed to a surface finish of 20 to 25  $\mu\text{in}$  RMS using 180 grit sandpaper. After this surface preparation, the entire reduced area should be inspected using magnetic particle according to RTDI MT103.
3. Annual inspection of the knuckle ball housing using the magnetic particle inspection procedure described in RTDI MT103 should be performed. If a vehicle is involved in an accident or other incident that could potentially impact the front axle, the inspection should be performed prior to returning the vehicle to service.

⌘ End of Report Text ⌘





ESI No. 55440G

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General Discussion – Axle Housing Assembly

# APPENDIX A



## General Discussion – Axle Housing Assembly

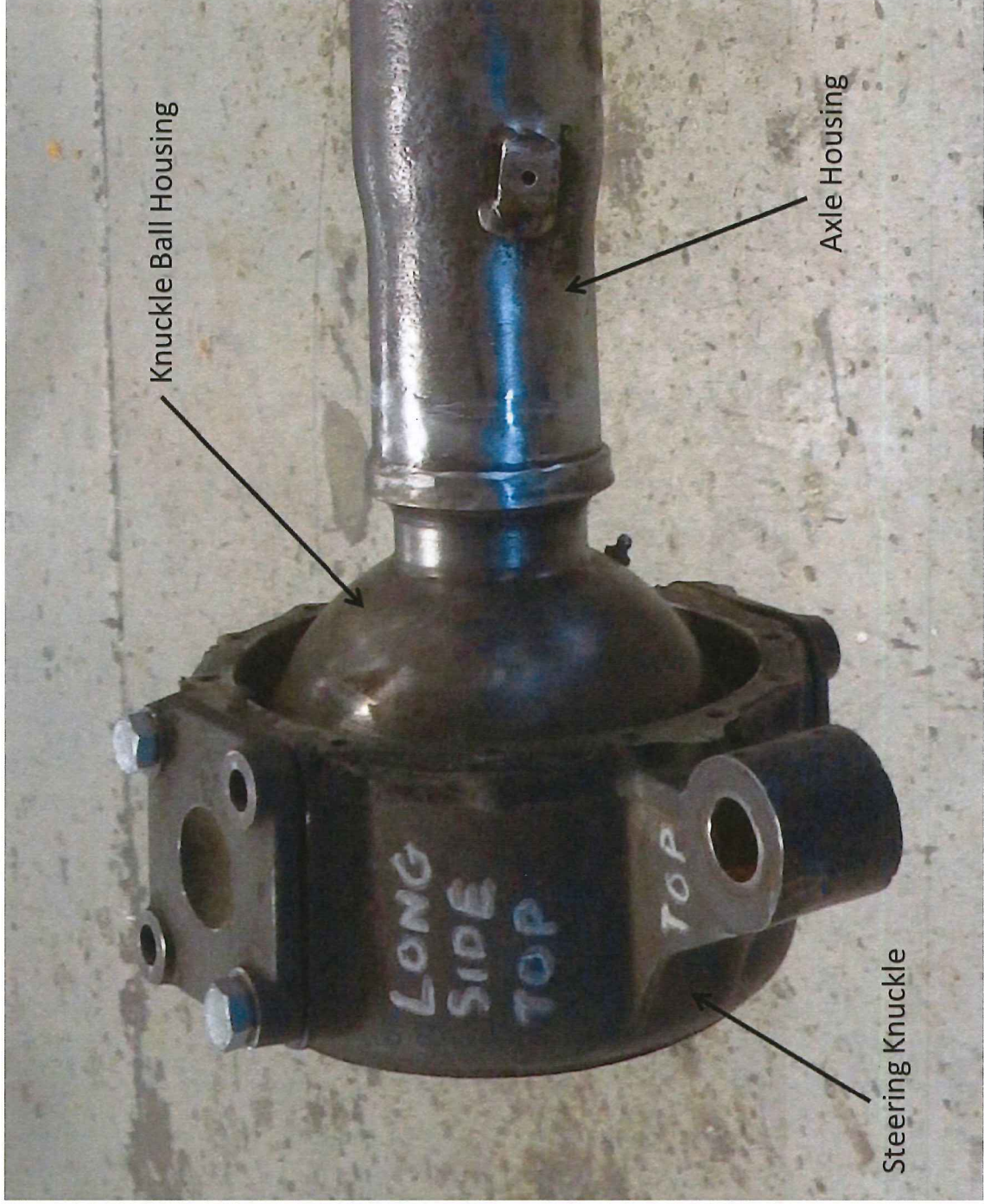
ESI No. 55440G



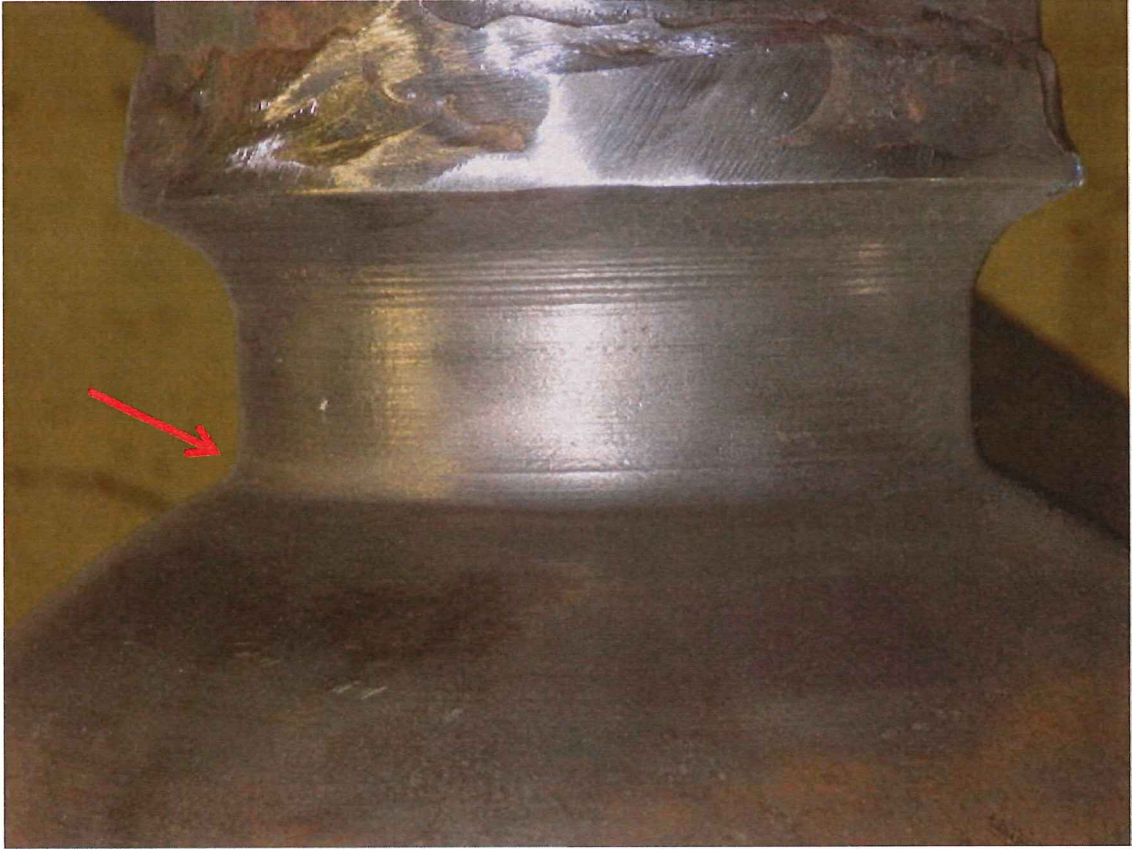
Axle Housing Assembly



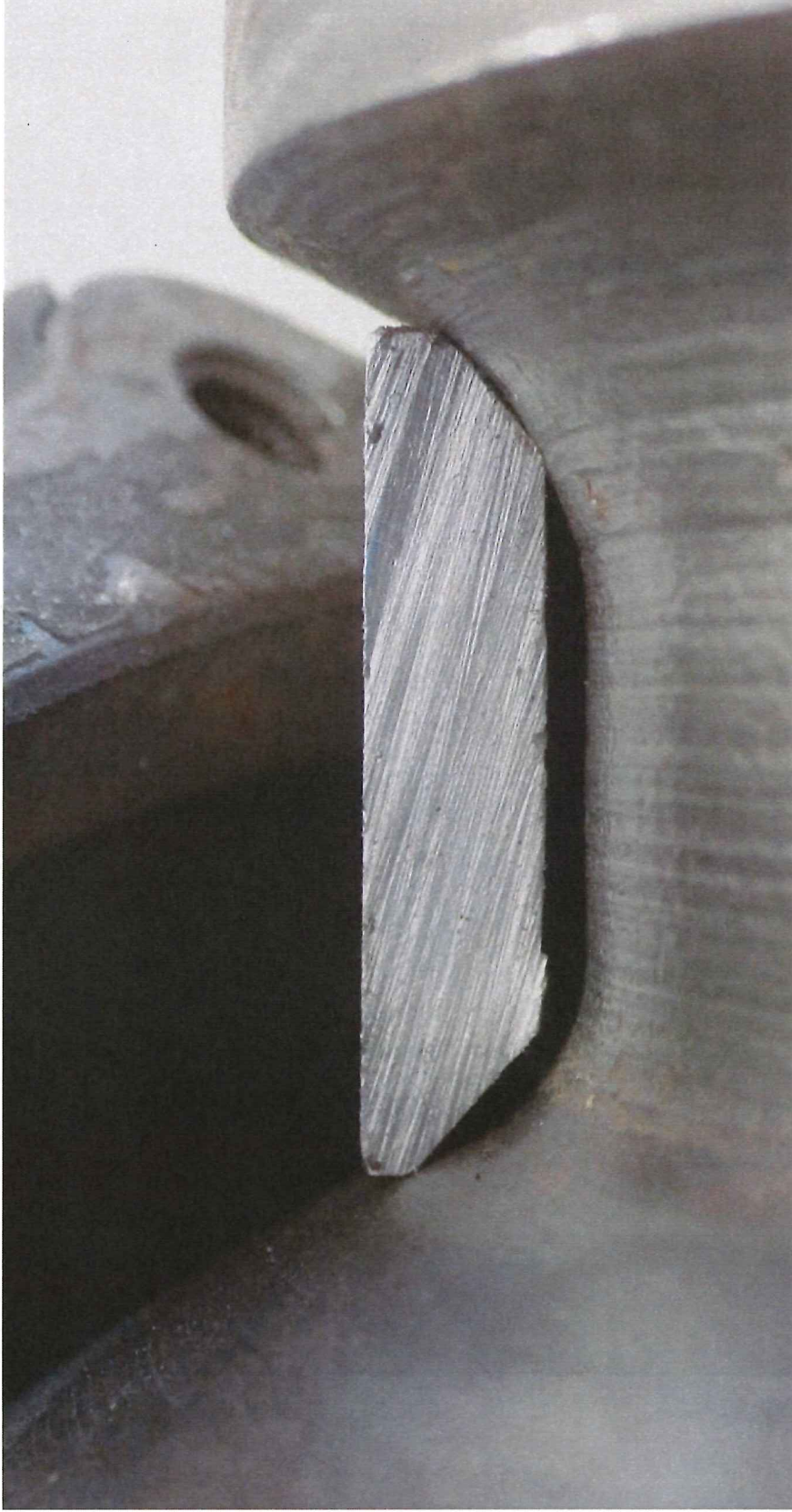
# General Discussion – Axle Housing Assembly



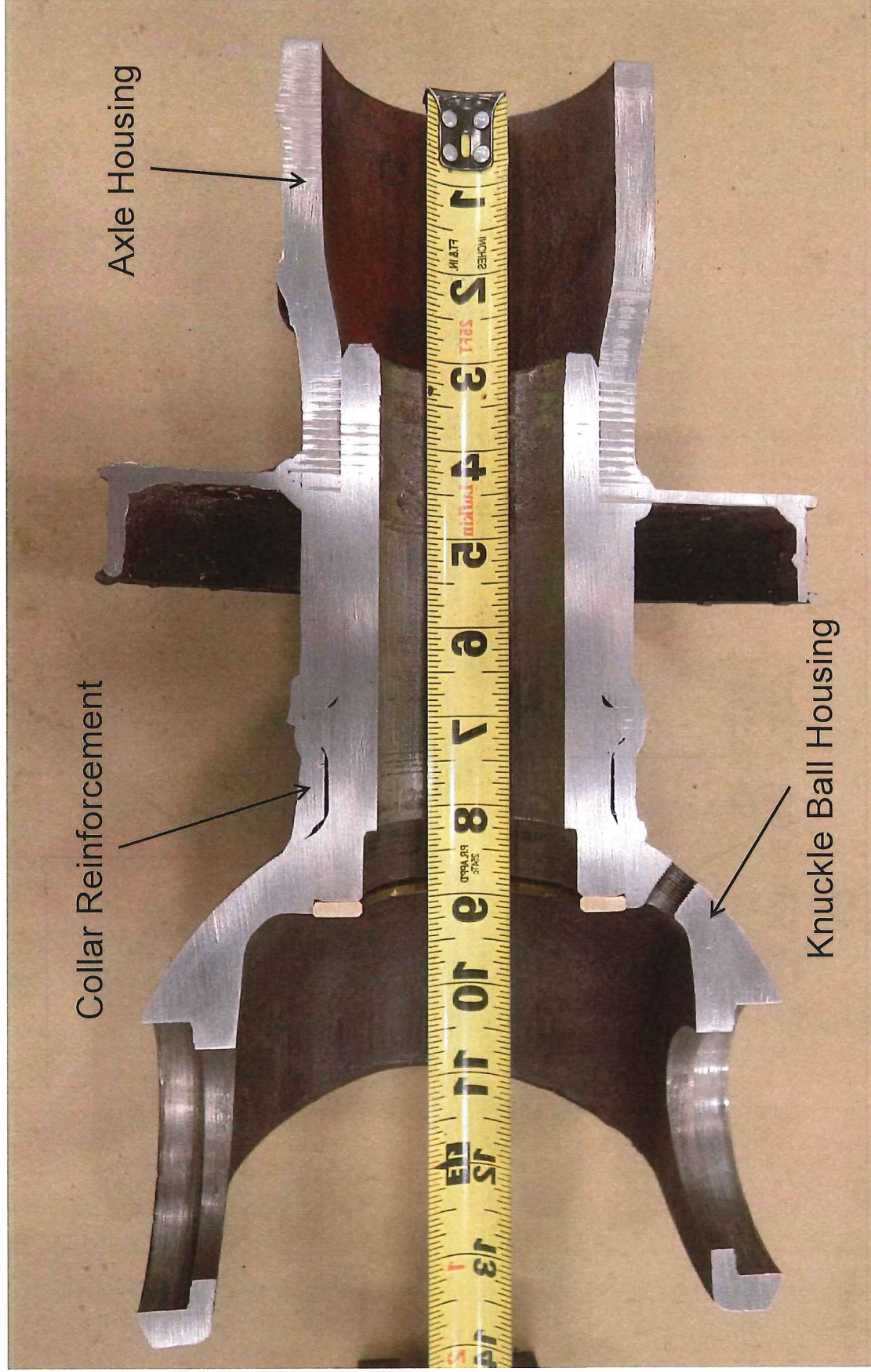
## General Discussion – Axle Housing Assembly



Reduced area at transition to knuckle ball. Arrow indicates area where fractures occur.

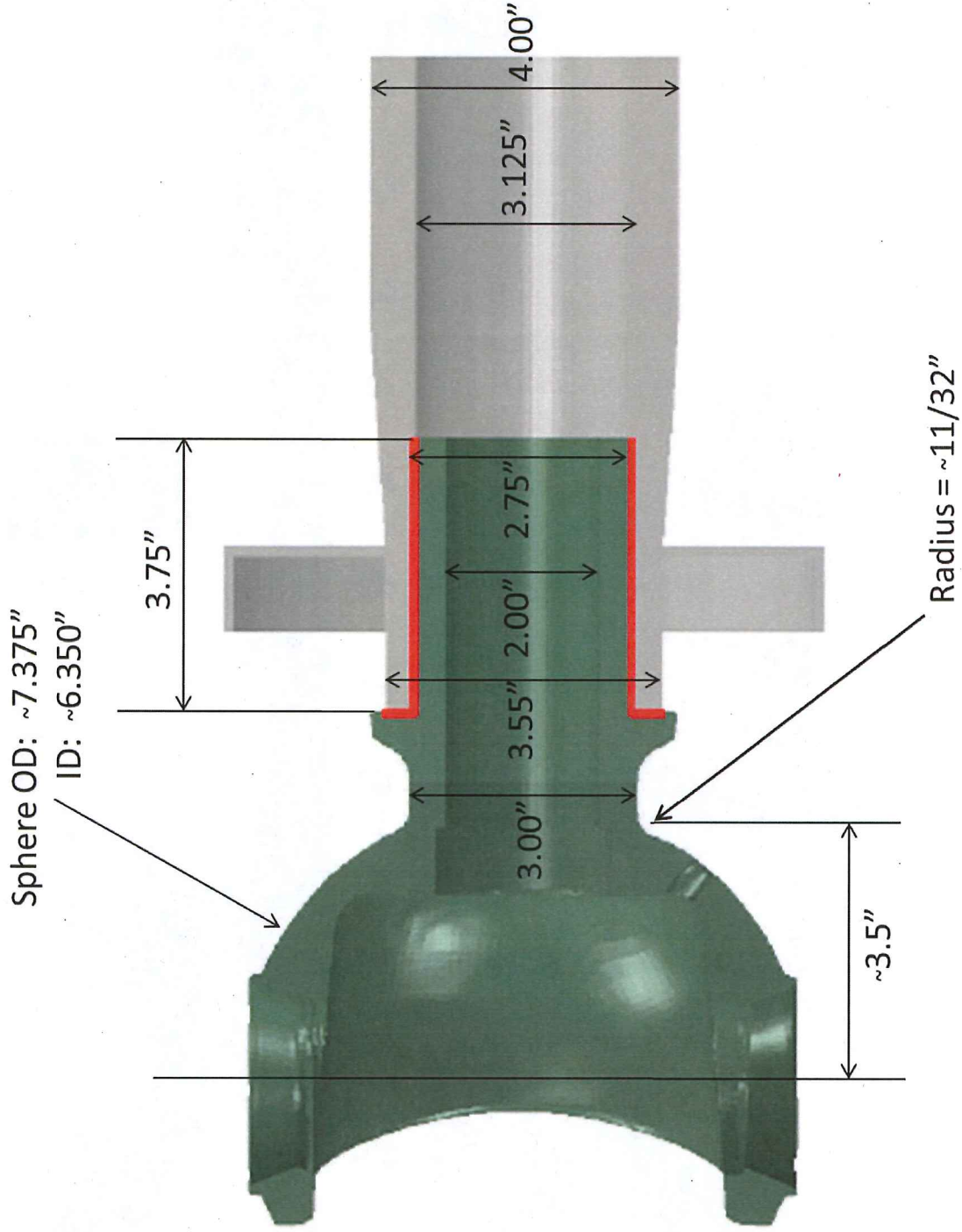


Reduced area at transition to knuckle ball with collar reinforcement placed in position.



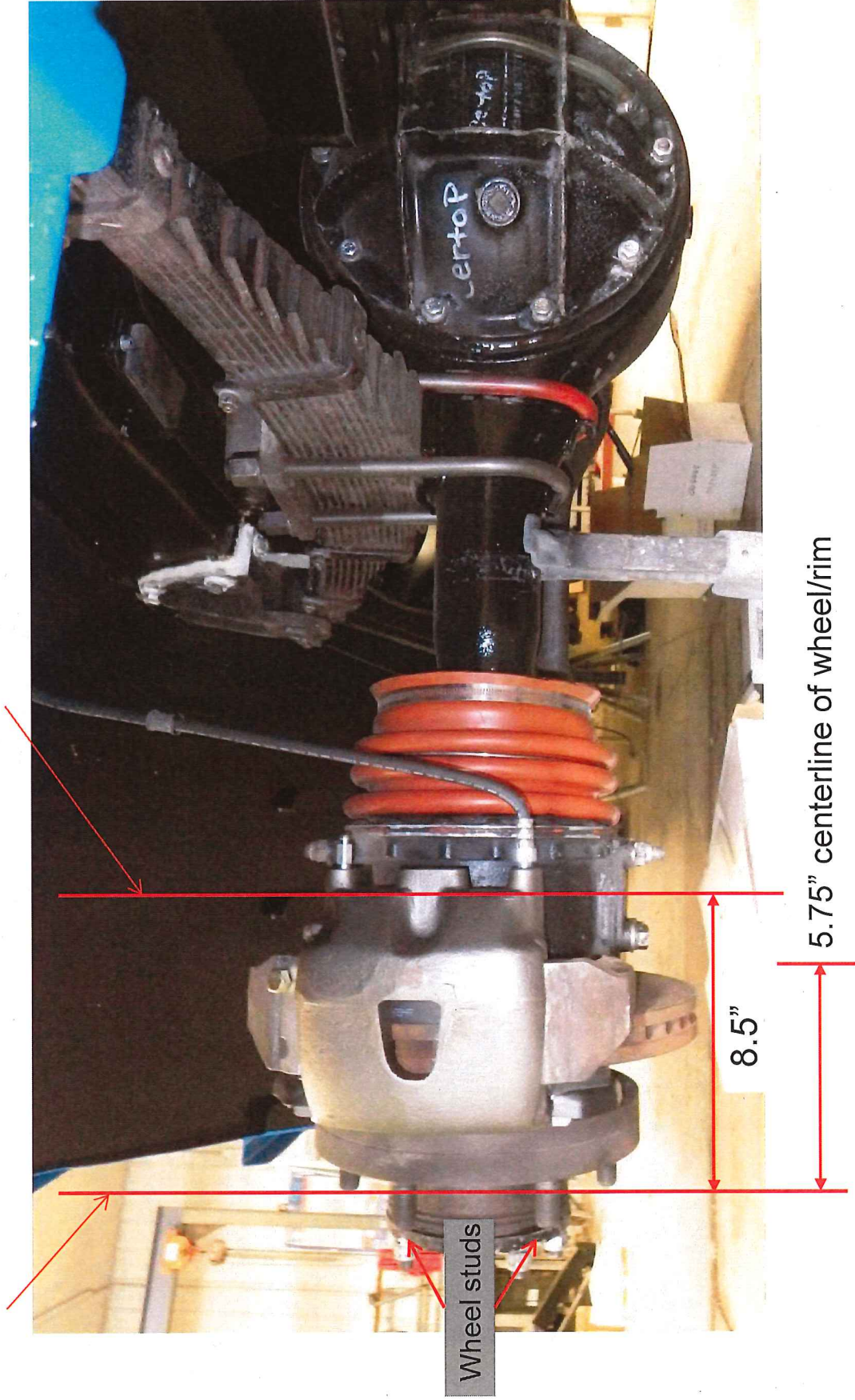
Cross sectional view of axle housing with collar reinforcement.

# General Discussion – Axle Housing Assembly



Wheel attachment plane (hub)

Centerline of knuckle rotation/attachment “Kingpin”



ESI No. 55440G

# TRUCK CARGO, 2 1/2 TON 6X6, M-135 W/ WINCH

MFD BY: GMC TRUCK & COACH DIV PONTIAC, MICHIGAN  
INSPECTOR

ORD STOCK NO. [REDACTED]

ORD. CONTRACT NO. [REDACTED]

MFRS. SERIAL NO. [REDACTED]

DATE OF DELIVERY [REDACTED]

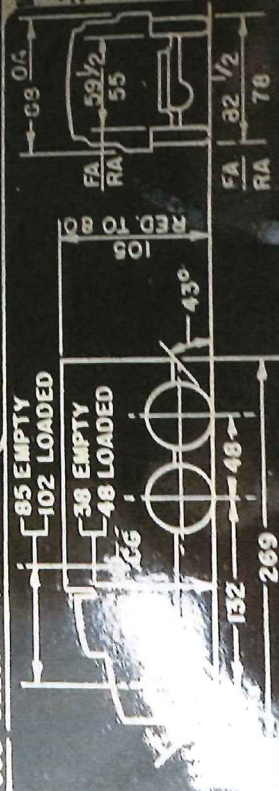
VEHICLE	UNLOADED	CROSS COUNTRY MAX.	HIGHWAY MAX.	PAYLOAD	FRONT AXLE	INTER AXLE	REAR AXLE	TOTAL
	5,790	5,000	10,000	6,420	3,495	5,955	8,314	12,740
	6,220							18,090
	6,420							23,090

MAX. TOWED LOAD: CROSS COUNTRY 6,000 LBS. HIGHWAY 10,000 LBS.

SHIPPING CURBAGE: AT REDUCED HEIGHT 1,100 CU. FT.

OCTANE RATING OF GASOLINE-72 GASOLINE TANK CAPACITY - 56 GAL.  
 ENGINE INC. FILTER - OIL CAPACITY - 11 QTS. COOLING SYSTEM CAPACITY - 2.2 QTS.  
 SAE GRADE OF OIL - ENGINE OE 30 ABOVE 32°F. OE 10 BELOW 32°F.  
 SAE GRADE OF OIL - TRANSMISSION OE 30 ABOVE 32°F. OE 10 BELOW 32°F.  
 SAE GRADE OF GEAR OIL - AXLES AND TRANSFER CASE:

60 90 ABOVE 40°F. TIRE 70 LBS. FOR HIGHWAY OR CROSS COUNTRY  
 60 75 + 40° TO -10°F. PRESSURE: 35 LBS. FOR MUD, SAND OR SNOW.  
 60 5 BELOW -10°F.



CG LOCATION BASED ON 5,000 LB. PAYLOAD W/O CREW.  
 LOADED CG BASED ON LOAD OF UNIFORM DENSITY  
 COMPLETELY FILLING BODY.

U.S. PROPERTY

CAUTION  
 BUZZER OPERATION IS AN INDICATION THAT AIR SYSTEM PRESSURE IS BELOW SAFE OPERATING PRESSURE. THE CAUSE OF AIR LOSS SHOULD BE IMMEDIATELY CORRECTED

Data plate from a M-135 truck listing the axle loads at various weight configurations

Reduced Area (Dimensions from NTSB photos of fracture)

$$OD = 3.00" \quad ID = 2.22" \quad t = 0.39"$$

$$I = \frac{\pi}{64} (d_o^4 - d_i^4) = \frac{\pi}{64} (3.0^4 - 2.22^4) = 2.78 \text{ in}^4$$

$$c = \frac{3.00}{2} = 1.5"$$

Collar

$$OD = 3.5" \quad ID = 3.08" \quad t = 0.21"$$

$$I = \frac{\pi}{64} (3.5^4 - 3.08^4) = 2.95 \text{ in}^4$$

$$c = \frac{3.5}{2} = 1.75"$$

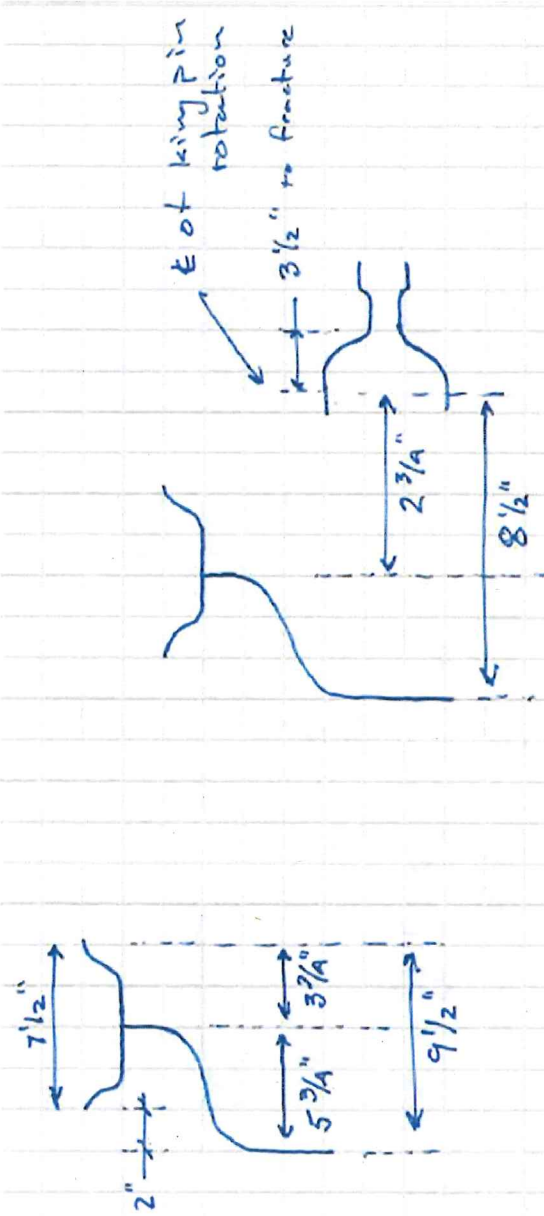
$$I_{\text{combined}} = 2.78 + 2.95 = 5.73 \text{ in}^4$$

$$c = 1.75"$$

## Stress Calculations



## Stress Calculations



$$\phi \text{ of tire to fracture: } 2 \frac{3}{4} + 3 \frac{1}{2} = 6 \frac{1}{4}''$$

$$\text{Moment} = \left[ \frac{7280}{2} \right] (6.25) = 22,750 \text{ in. lbs}$$

$$\text{No Collar } \sigma = \frac{Mc}{I} = \frac{(22,750)(1.5)}{2.78} = 12,275 \text{ psi}$$

$$\text{Use } K_t = \sim 2.0$$

$$(2)(12,275) = 24,550 \text{ psi}$$



# General Discussion – Axle Housing Assembly

## Stress Calculations

with collar

$$V = \frac{(22750)(1.75)}{5.73} = 6948 \text{ psi}$$

$$K_c = 2$$

$$(2)(6948) = 13,896 \text{ psi}$$

$$\frac{13,896}{24,550} = 56.6\%$$



ESI No. 55440G

# APPENDIX B

## CAE FILES

*Axle\_Housing\_Models.cae* – Models of axle housing assemblies. Solid geometries created by ESI based measurements obtained by sectioning exemplar axle housings.

## INPUT FILES

*AH\_Tets.inp* – Model of axle housing assembly without a reinforcing collar. Abaqus C3D10HS tetrahedral mesh.  
*AH+Collar\_Tets.inp* – Model of axle housing assembly with a reinforcing collar. Abaqus C3D10HS tetrahedral mesh.

## SOFTWARE

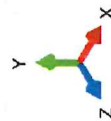
ABAQUS 3DEXPERIENCE R2016x





ESI No. 55440G

Axle Housing Geometry Without Reinforcing Collar

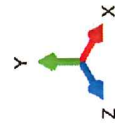
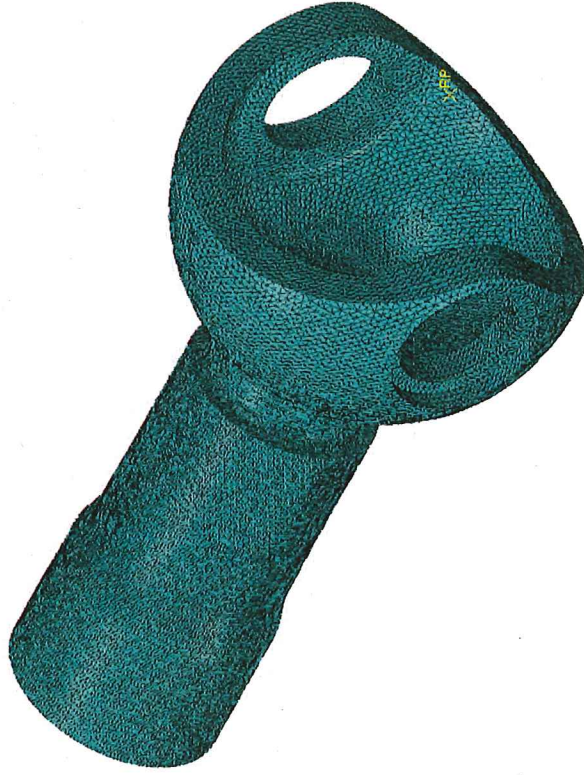




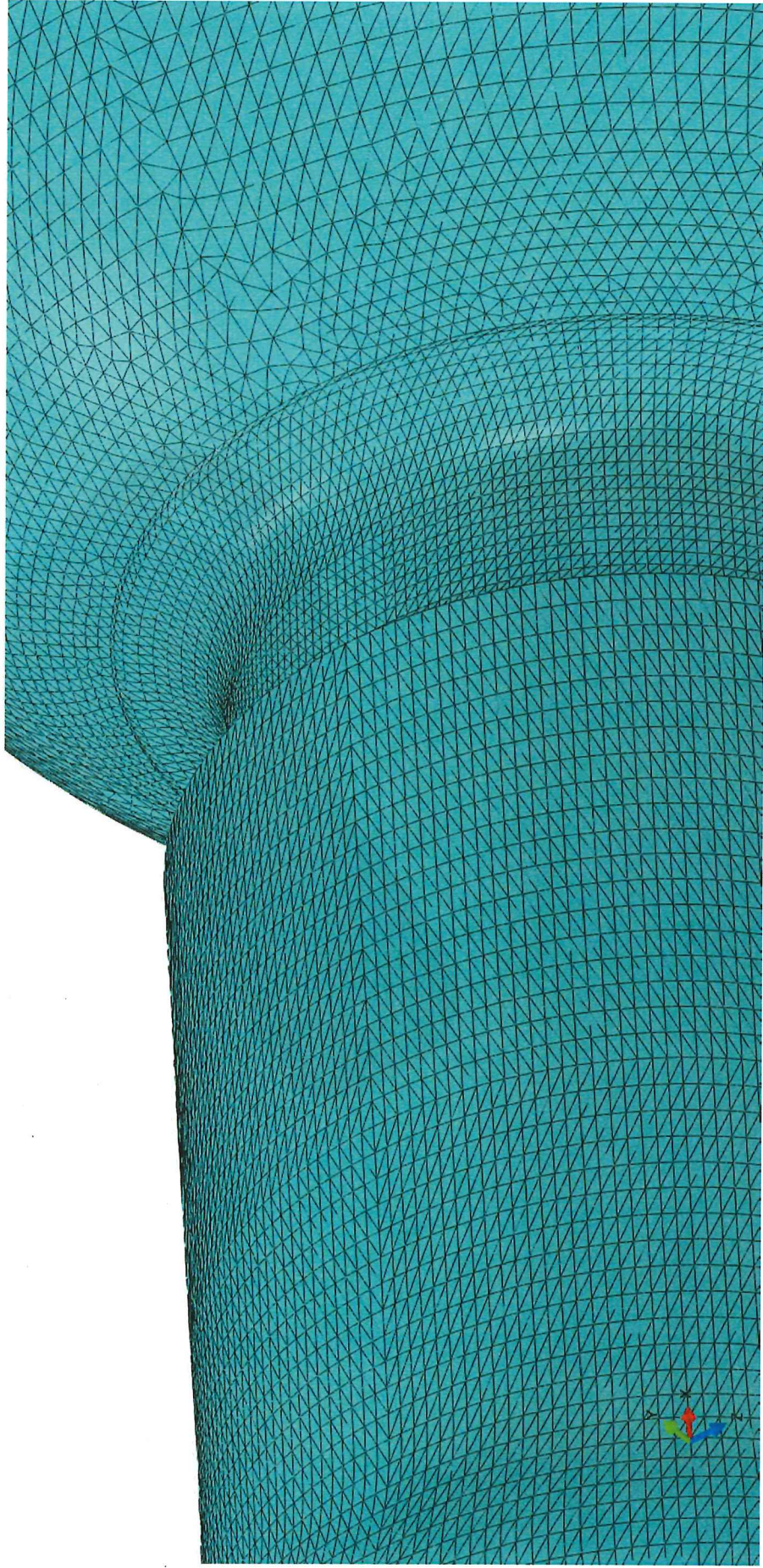
ESI No. 5544DG

Axle Housing Mesh

Material: Steel  
E = 29e6 psi  
ν = 0.3

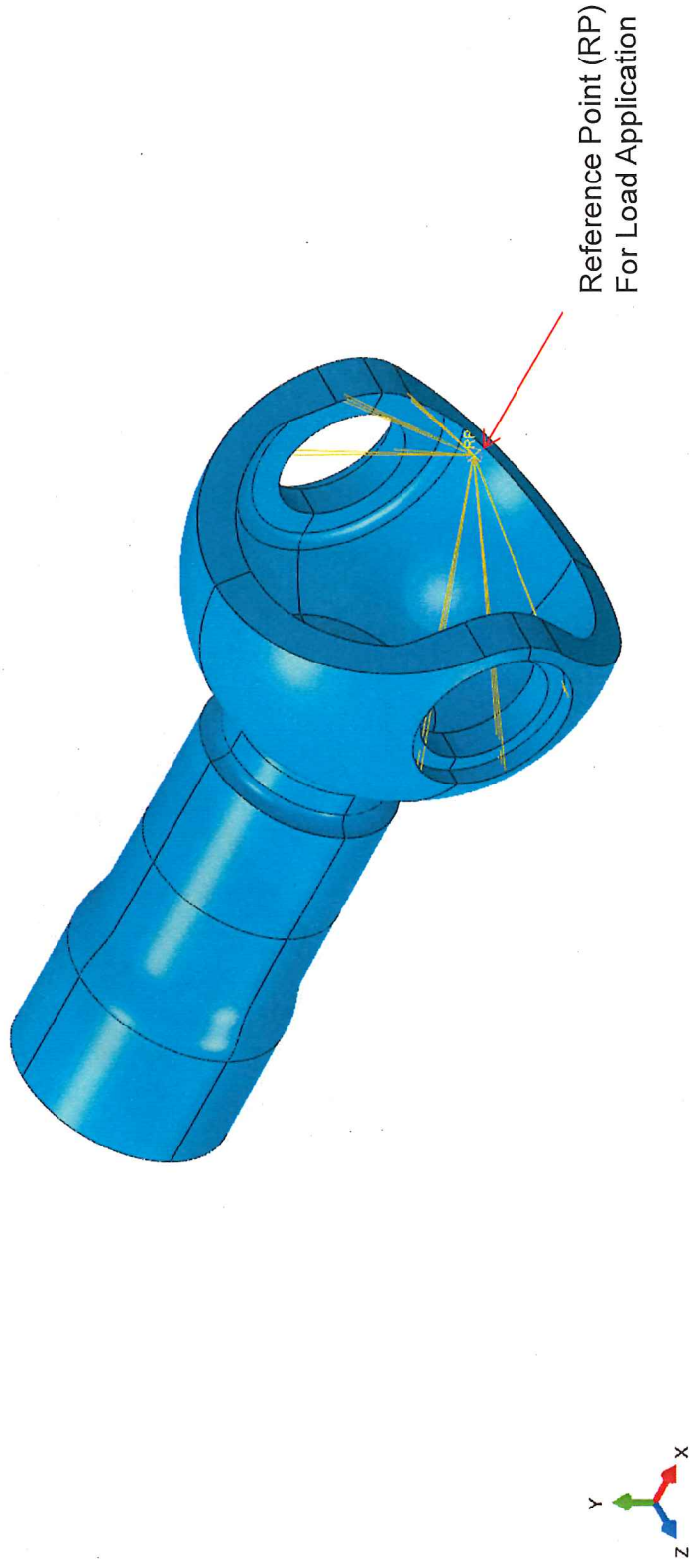


### Axle Housing Mesh



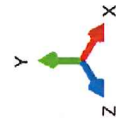


Axle Housing – Kinematic Coupling to Transfer Loads from Reference Point to Bearing Outer Race Locations

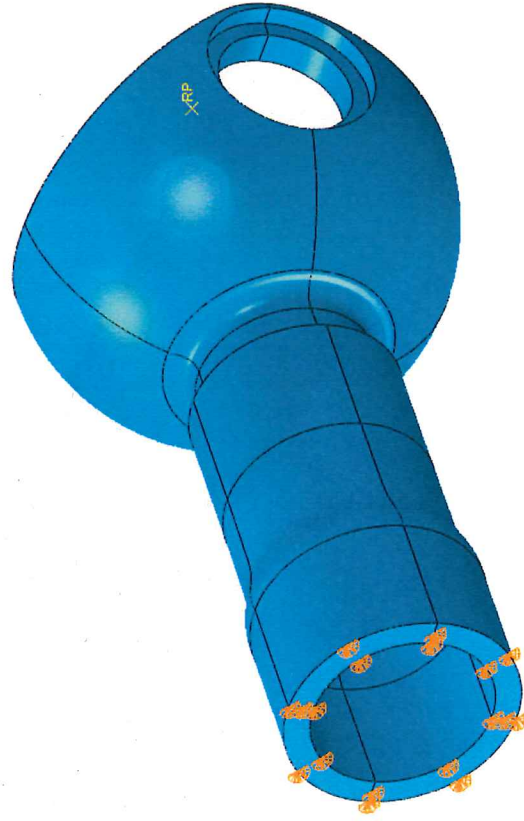




### Axle Housing – Loads and Boundary Conditions



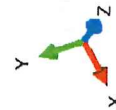
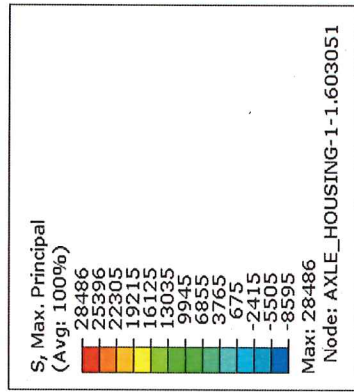
Axle Housing – Loads and Boundary Conditions (continued)





ESI No. 55440G

Axle Housing – Maximum Principal Stresses



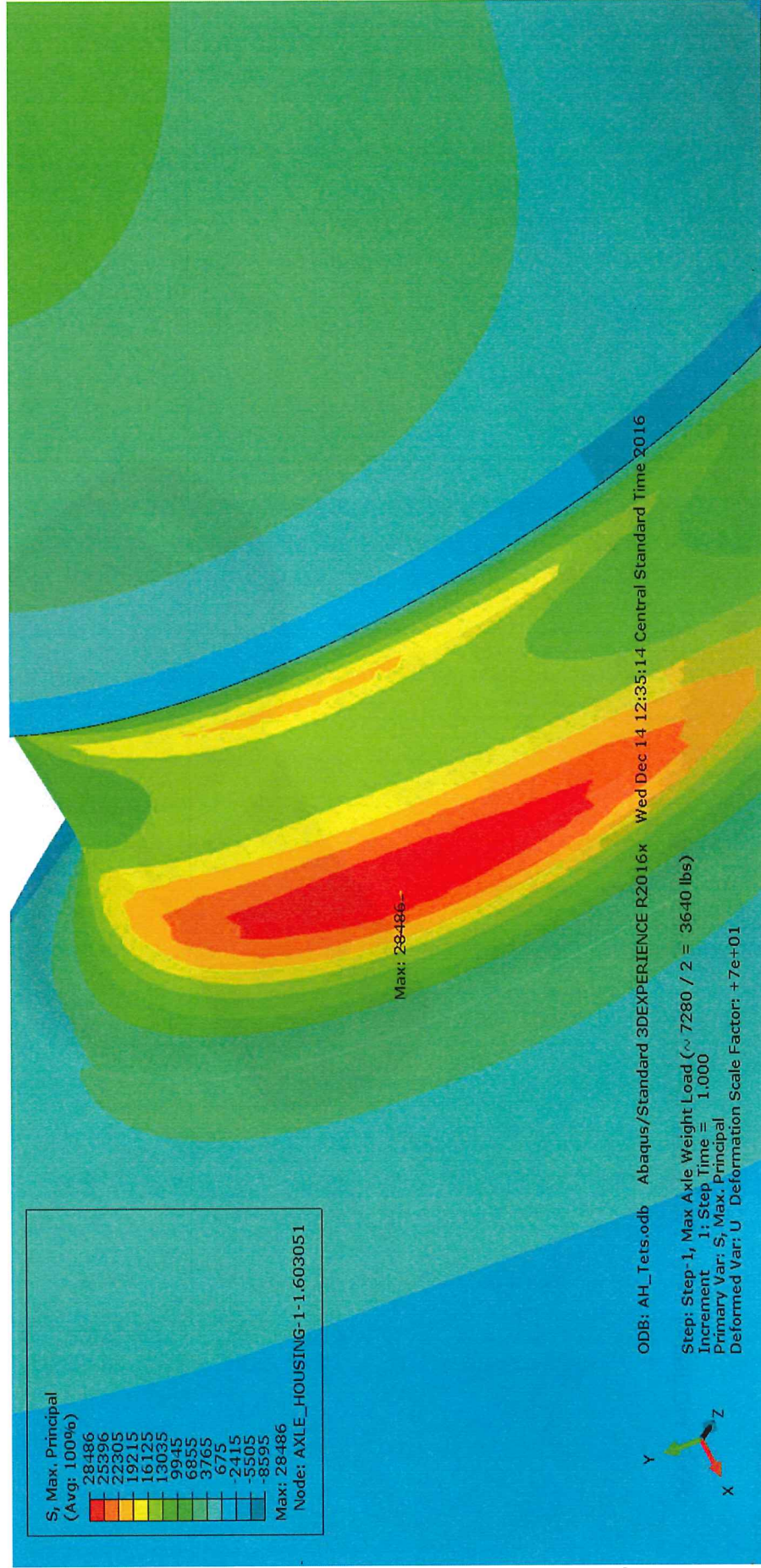
ODB: AH\_Tets.odb Abaqus/Standard 3DEXPERIENCE R2016x Wed Dec 14 12:35:14 Central Standard Time 2016

Step: Step-1, Max Axle Weight Load (~ 7280 / 2 = 3640 lbs)  
Increment 1: Step Time = 1.000  
Primary Var: S<sub>1</sub> Max. Principal  
Deformed Var: U Deformation Scale Factor: +7e+01

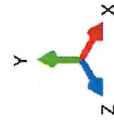
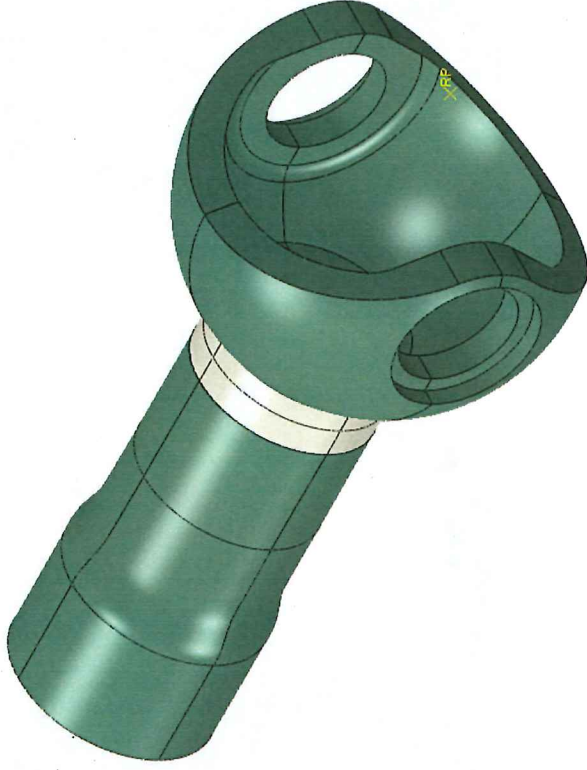


ESI No. 55440G

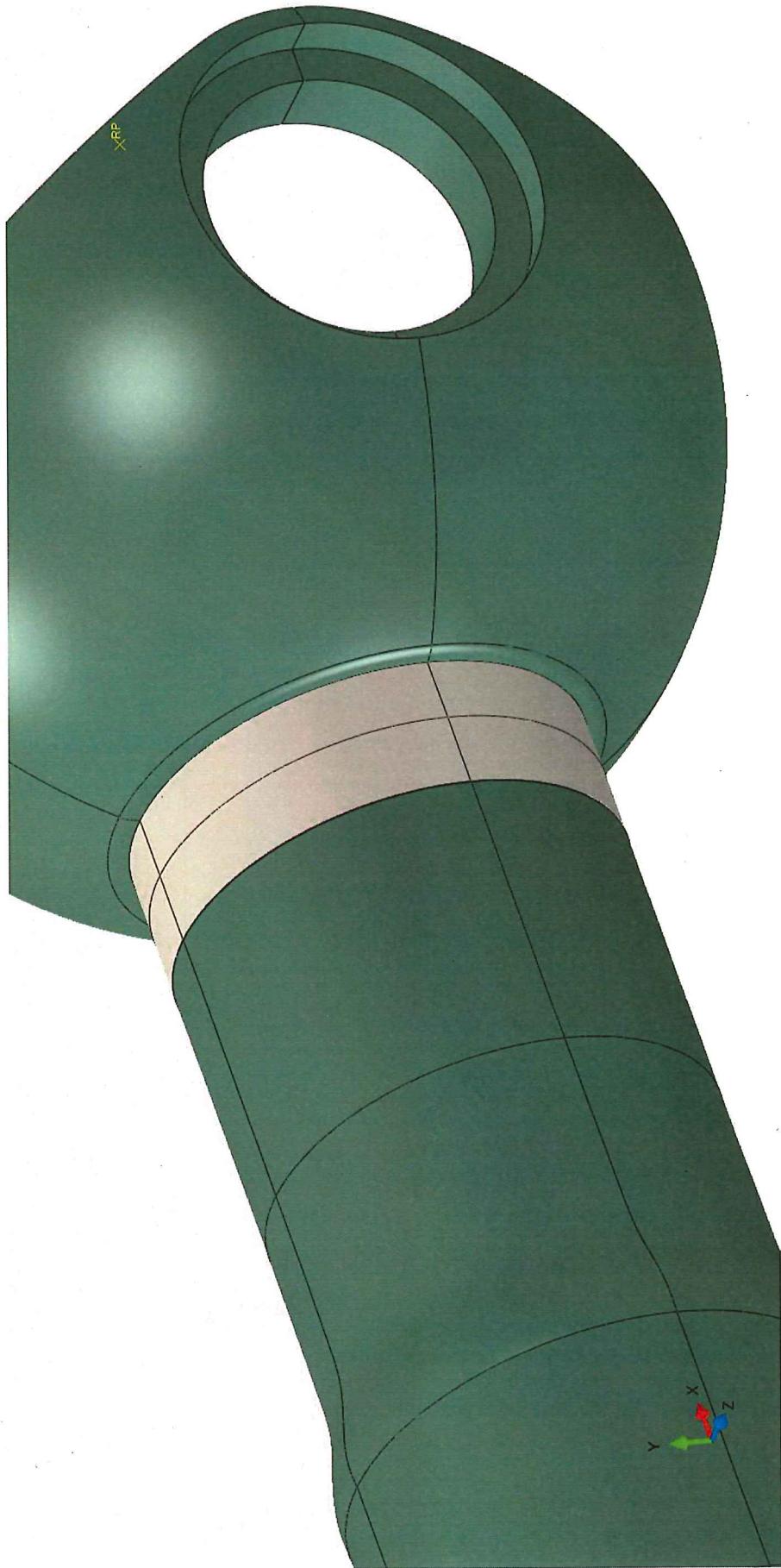
Axle Housing – Maximum Principal Stresses (continued)



Axle Housing With Reinforcing Collar - Geometry

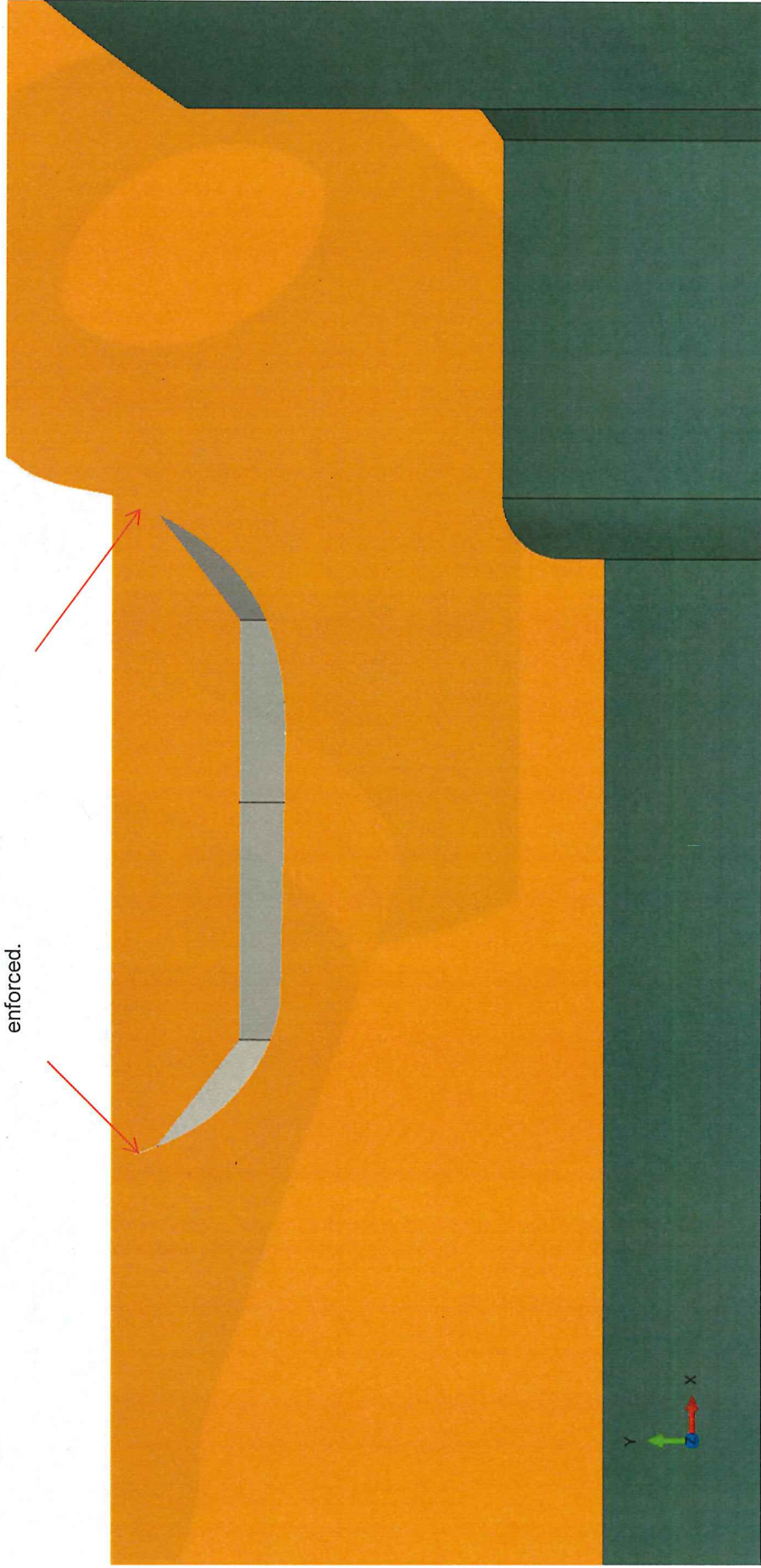


Axle Housing With Reinforcing Collar – Geometry (continued)

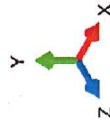
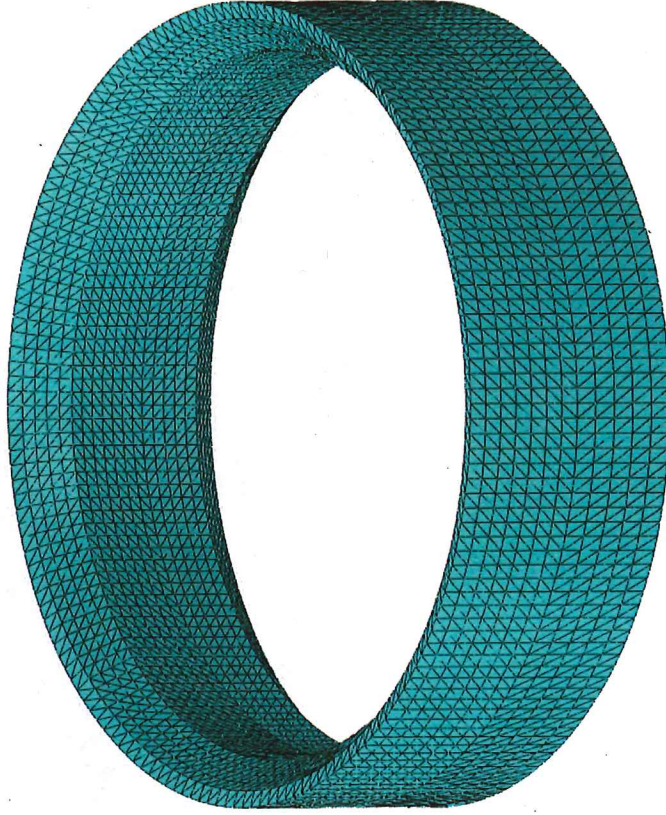


Axle Housing With Reinforcing Collar – Geometry (continued)

Collar slave nodes on interface surfaces adjusted to match slope of axle housing master surfaces when Tie Constraint is enforced.



Axle Housing With Reinforcing Collar – Collar Geometry/Mesh

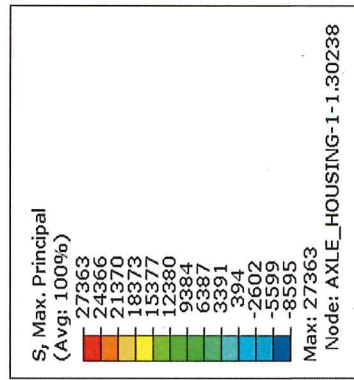






ESI No. 55440G

Axle Housing With Reinforcing Collar – Maximum Principal Stresses



ODB: AH+Collar\_Tets.odt Abaqus/Standard 3DEXPERIENCE R2016x Wed Dec 14 13:53:31 Central Standard Time 2016

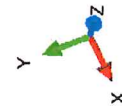
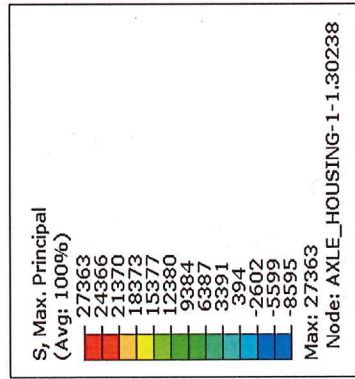
Step: Step-1, Max Axle Weight Load (~ 7280 / 2 = 3640 lbs)  
Increment 1: Step Time = 1.000  
Primary Var: S1, Max. Principal  
Deformed Var: U Deformation Scale Factor: +8e+01





ESI No. 55440G

Axle Housing With Reinforcing Collar – Maximum Principal Stresses (continued)



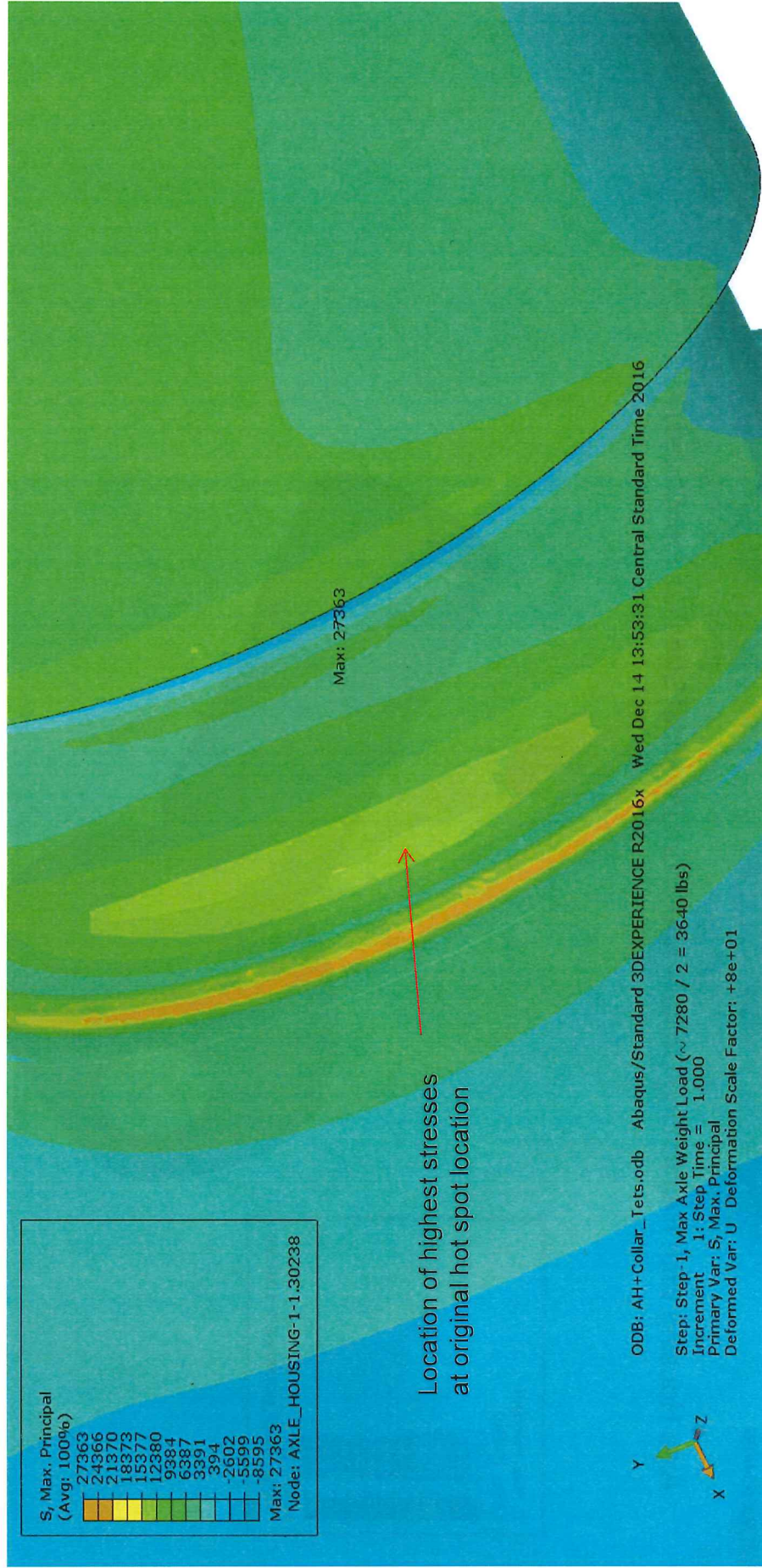
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Step: Step-1, Max Axle Weight Load (~ 7280 / 2 = 3640 lbs)  
Increment 1: Step Time = 1.000  
Primary Var: S, Max. Principal  
Deformed Var: U Deformation Scale Factor: +8e+01



ESI No. 55440G

Axle Housing With Reinforcing Collar – Maximum Principal Stresses (continued)





# Finite Element Analysis (FEA) – Axle Housing Assembly

ESI No. 55440G

## Axle Housing With Reinforcing Collar – Maximum Principal Stresses Interrogation of Highest Nodal Stresses at Location of Original Hot Spot

\*\*\*\*\*

Probe Values Report, written on Wed Dec 14 15:33:50 2016

Source  
-----

ODB: C:/Scratch/55440/AH+Collar\_Tets.odb  
Step: Step-1  
Frame: Increment 1: Step Time = 1.000  
Variable: S, Max. Principal (Avg: 100)

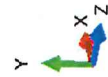
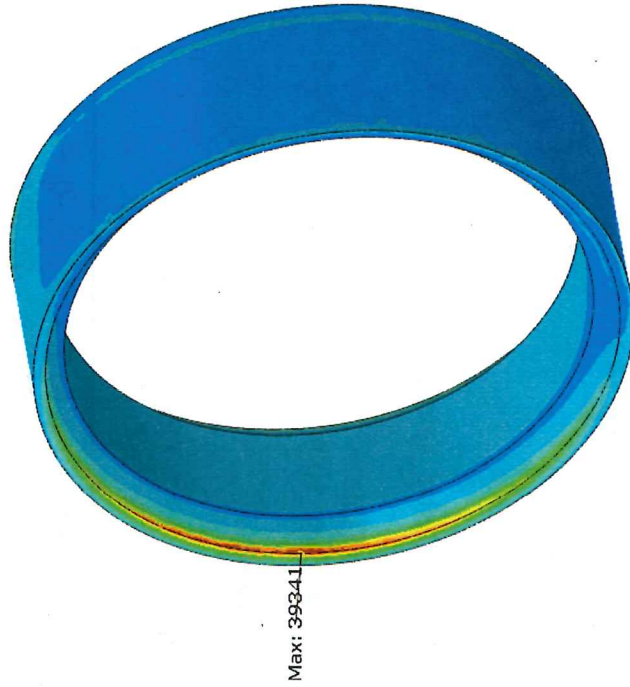
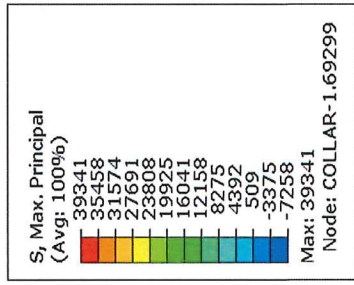
Probe values reported at nodes

Part Instance	Node ID			Orig. Coords			Def. Coords		
	X	Y	Z	X	Y	Z	X	Y	Z
AXLE_HOUSING-1-1	603051		8.51074	0.	-3.95284	8.51302	95.2471E-09	-3.94572	
AXLE_HOUSING-1-1	806494		8.51073	-25.9349E-03	-3.95262	8.51301	-25.9368E-03	-3.94555	

Part Instance Node ID Attached elements S, Max. Principal

AXLE_HOUSING-1-1	603051	279396	15.422E+03
AXLE_HOUSING-1-1	603051	454403	15.422E+03
AXLE_HOUSING-1-1	806494	454403	15.4182E+03
AXLE_HOUSING-1-1	806494	461542	15.4182E+03
AXLE_HOUSING-1-1	806494	521514	15.4182E+03

Axle Housing With Reinforcing Collar – Maximum Principal Stresses (continued)

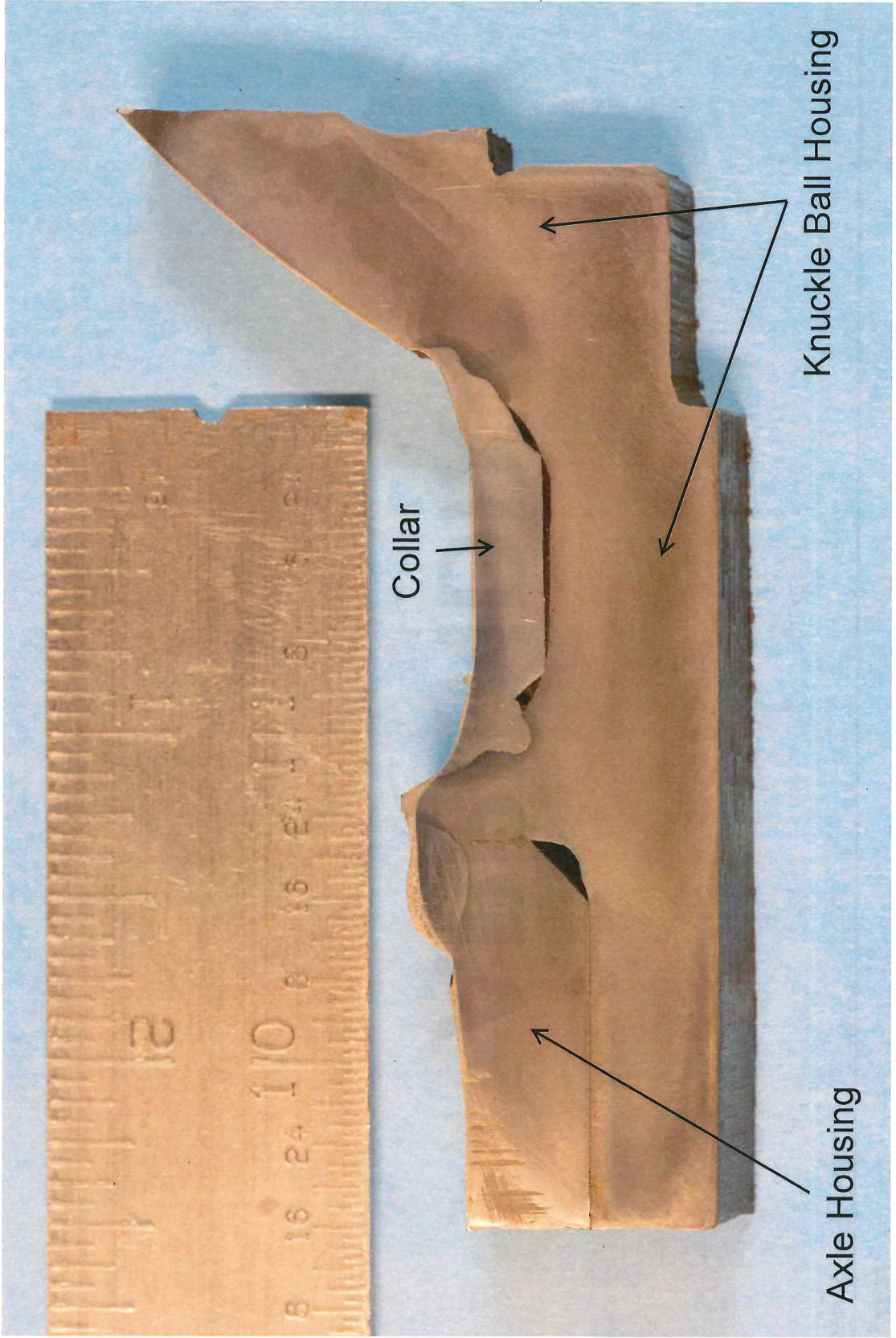


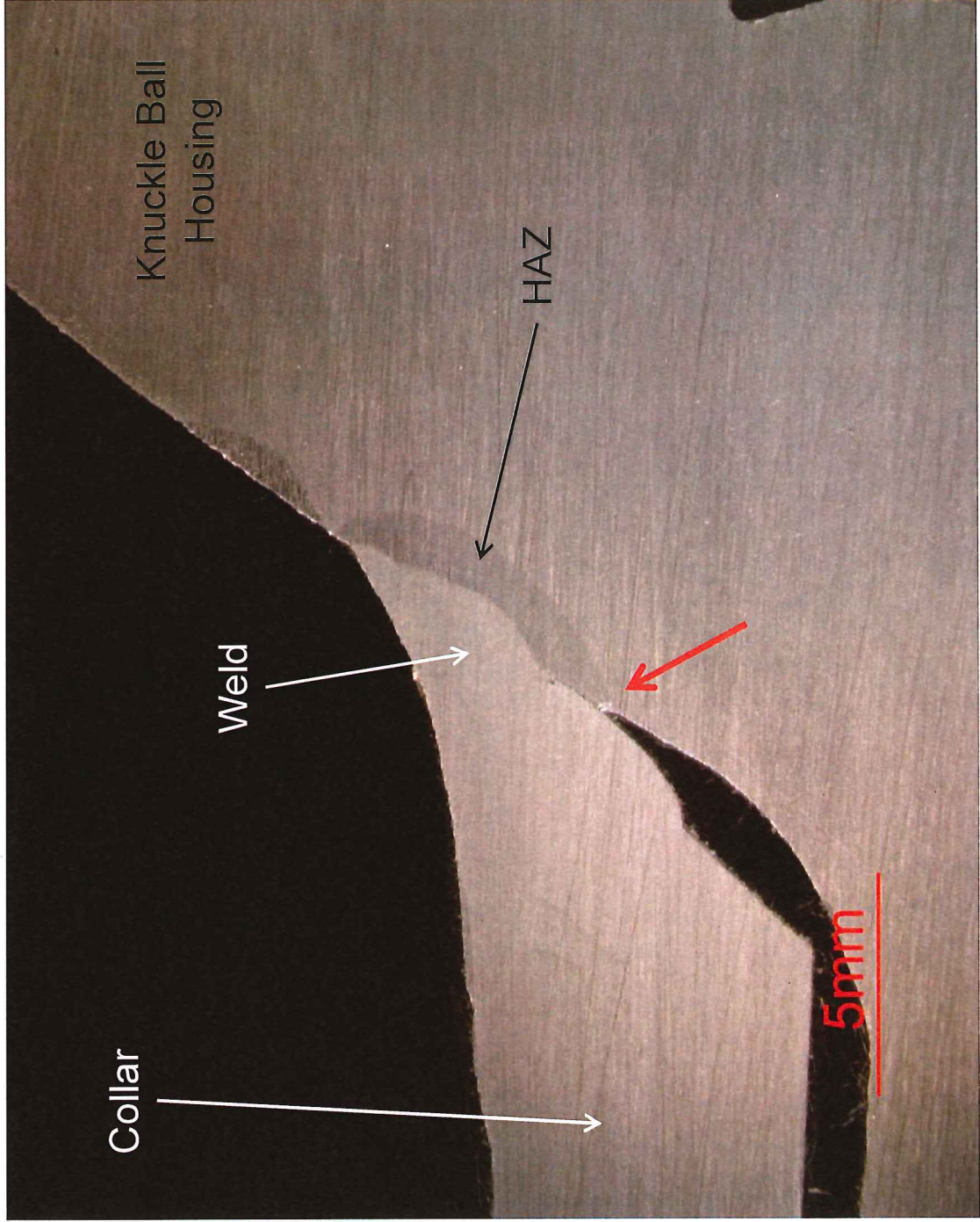
ODB: AH+Collar\_Tets.odb Abaqus/Standard 3DEXPERIENCE R2016x Wed Dec 14 13:53:31 Central Standard Time 2016

Step: Step-1, Max Axle Weight Load (~ 7280 / 2 = 3640 lbs)  
Increment 1: Step Time = 1.000  
Primary Var: S, Max. Principal  
Deformed Var: U Deformation Scale Factor: +8e+01



# APPENDIX C



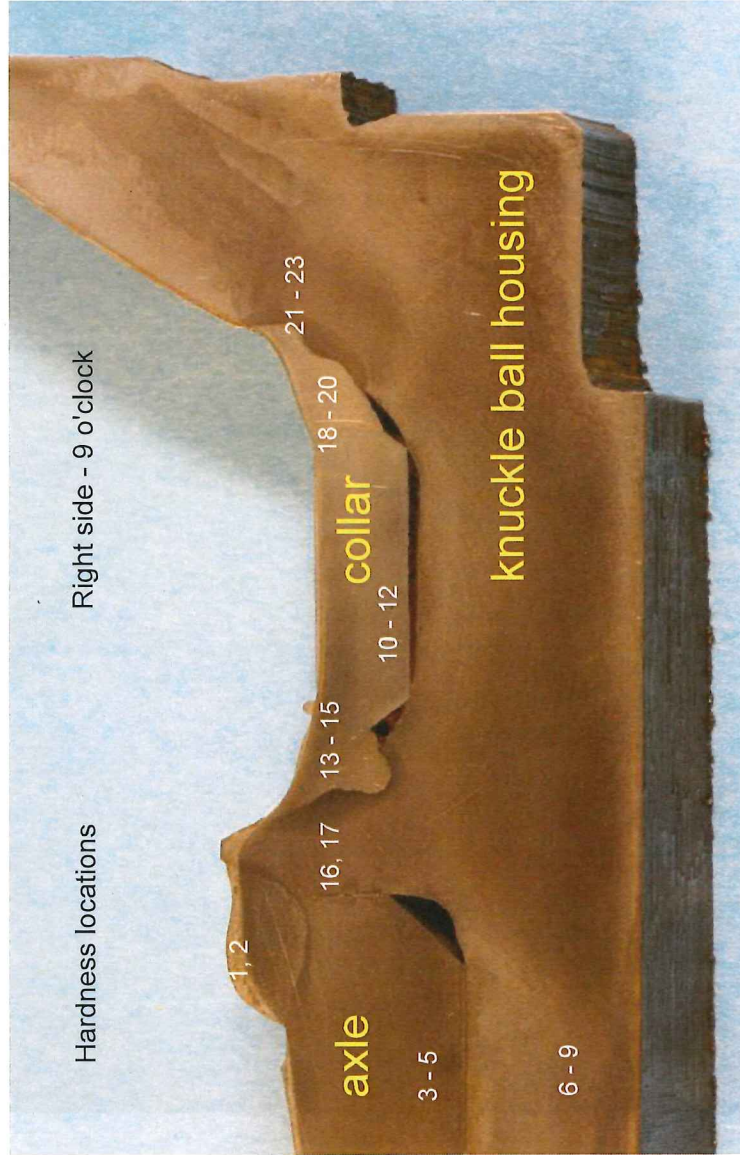


Collar weld with sharp transition at weld root (red arrow)



### Hardness test results

<u>Location</u>	<u>Zone</u>	<u>Hard, HRB</u>
1	weld	96
2	weld	91
3	axle housing	80
4	axle housing	78
5	axle housing	79
	Knuckle ball	
6	housing	84
	Knuckle ball	
7	housing	84
	Knuckle ball	
8	housing	--
	Knuckle ball	
9	housing	84
10	collar	59
11	collar	66
12	collar	60
13	weld	86
14	weld	87
15	weld	89
16	HAZ	25 HRC
17	HAZ	95
18	weld	85
19	weld	86
20	weld	81
21	HAZ	88
22	HAZ	94
23	HAZ	89



## **RTDI Stretch Duck Front Axle Weight Survey**

APV: Stretch Duck 56

Full Load Condition - 25,390 LBS

Empty Condition - 19,840 LBS

### Enclosed References:

1. Weight simulation chart
2. Weight location drawing
3. Scaled weight ticket (front/rear and overall weight) - (Full Load Condition)
4. Scaled weight ticket (front/rear and overall weight) - (Empty Condition)
5. Photos of testing

### Survey Summary,

The APV utilized for this survey was Stretch Duck 56, the latest version Stretch Duck refurbished by RTDI, a sistered vessel/vehicle to RTDS Duck 6 / RTDI production # 47. To establish passenger weight seats were removed and 55 gallon drums were set in place of seats. Each barrel was filled with water to simulate passenger and seat weight. The driver seat, crew seat and the very rear seats were not removed. The drum for the driver and crew was located centered between seats and only filled to simulate personnel weight. The bottom portion of the rear sets were flipped upward and the drums located inline where seats would normally rest when flipped down. The barrel weight for the rear seats were filled to simulate passenger weight only.

To simulate a heavy scenario, the weight ratio for passenger/crew weight for this survey was increased to 185 lbs per person. When the required weight assumptions are utilized, the full load condition is under 26000 lbs or equal to 25,390 lbs.

Prior to weighing the APV, all fluids, including fuel tank were pressed full. All appliances that are normally onboard during tours were located as normal.

The scale utilized to conduct this survey was located at TRAC Materials in Branson MO. The TRAC scale is a certified scale which is generally used to weigh gravel trucks. This same scale is utilized regularly by RTDI for the purposes of verifying vessel weight for USCG stability testing. The Duck was also subject to a wheel pad scale, where each wheel was weighed individually. The results of the wheel pad scale matched the results of the TRAC scale.

After weighing the Duck in full load condition the water barrels were then removed, seats re-installed then re-weighed to establish empty weight. The variance in weight between full load and empty weight was 6640 LBS. A difference of 205 lbs that can not be accounted for.

### Weight Simulation Chart

Water Barrel Quantity	Per Water Barrel Weight	Overall Water Barrel Weight	Simulation
15	399 LBS	5985 LBS	2 Passengers 1 seat (General Seating)
1	370 LBS	370 LBS	2 Crew (Driver / Narrator)
2	462.5 LBS	925 LBS	5 Passengers (Rear Seats)

Passengers	Crew	Total Persons Onboard	Total Weight
35	2	37	6845 lbs

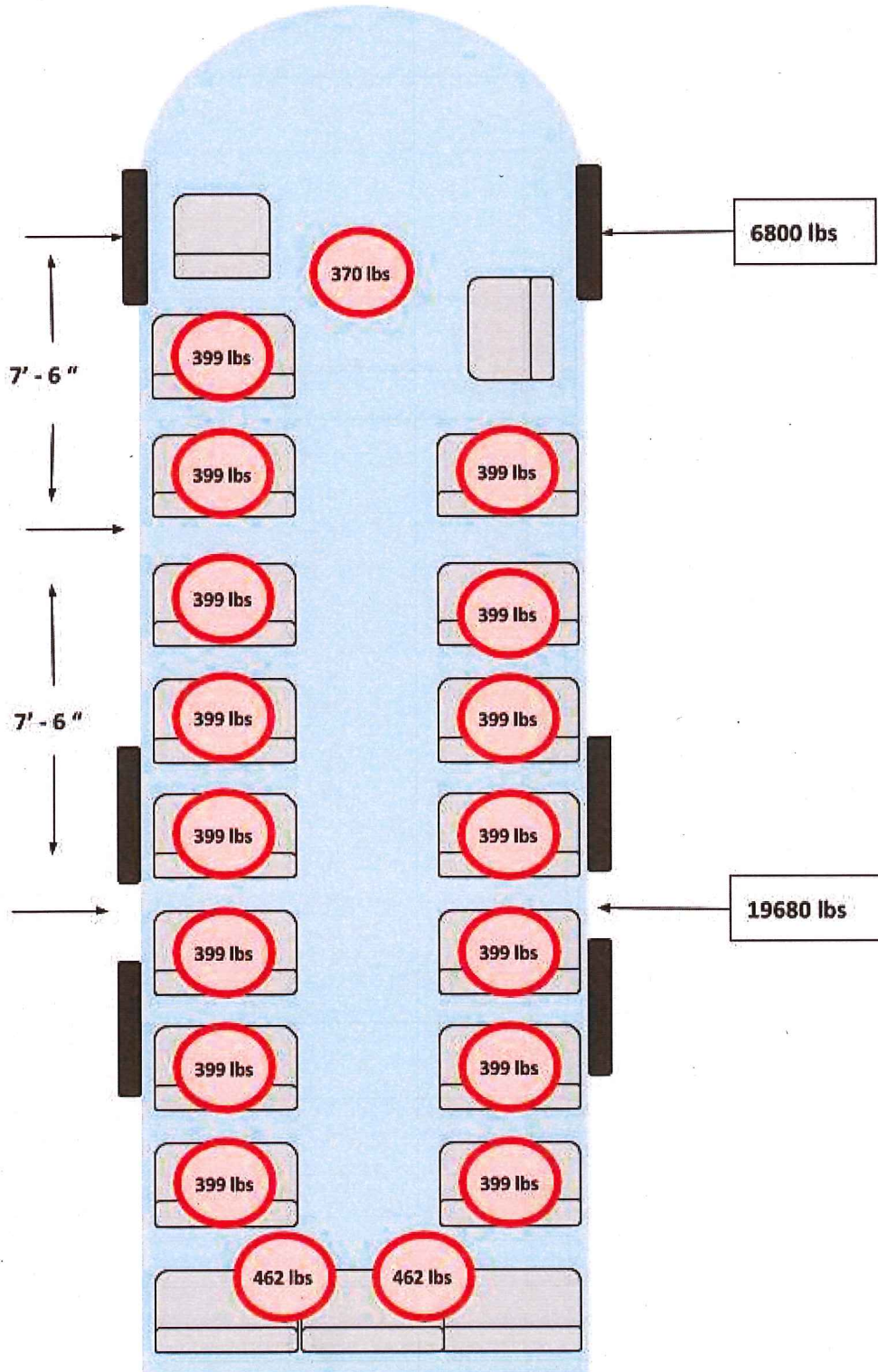
Quantity of Seats	Weight per seat	Seat weight total
15	29 LBS	435 LBS

Overall Seat Weight	Overall Passenger and Crew Weight	Combined Weight
435 LBS	6845	7280 LBS

TRAC Certified Scale (Full load condition)	
Overall Weight	26,480 LBS
Front Axle Weight	6,800 LBS
Rear Axle Weight	19,680 LBS

TRAC Certified Scale (Empty)	
Overall Weight	19,840 LBS
Front Axle Weight	7,340 LBS
Rear Axle Weight	12,660 LBS

Weight Location Drawing





No. 545757

Phone: Branson 417-334-2127  
Kimberling City 417-739-2684

P.O. Box 1165  
Branson, Missouri 65616

READY MIX CONCRETE  
ASPHALT PAVING  
LIMESTONE PRODUCTS  
WASHED RIVER GRAVEL

DIRECTIONS  
Total Weight 26480  
FF Order Weight 22000

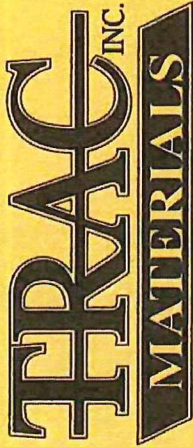
SOLD TO  
PIRE THE DUDES  
PO BOX 1837  
BRANSON MO 65615

DATE	TIME	ZONE #	DRIVER	TRUCK #	TONS ORDERED	TONS DELIVERED	TICKET #
					0.00	1.00	545757

QUANTITY	DESCRIPTION	PRICE
1.00	WEIGHT	

NOTICE TO OWNER  
FAILURE OF THIS CONTRACTOR TO PAY THOSE PERSONS SUPPLYING MATERIAL OR SERVICES TO COMPLETE THIS CONTRACT CAN RESULT IN THE FILING OF A MECHANIC'S LIEN ON THE PROPERTY WHICH IS THE SUBJECT OF THIS CONTRACT PURSUANT TO CHAPTER 429.RSMO. TO AVOID THIS RESULT YOU MAY ASK THIS CONTRACTOR FOR "LIEN WAIVERS" FROM ALL PERSONS SUPPLYING MATERIAL OR SERVICES FOR THE WORK DESCRIBED IN THIS CONTRACT. FAILURE TO SECURE LIEN

No. 545818



P.O. Box 1165  
Branson, Missouri 65616

Phone: Branson 417-334-2127  
Kimberling City 417-739-2684

READY MIX CONCRETE  
ASPHALT PAVING  
LIMESTONE PRODUCTS  
WASHED RIVER GRAVEL

SOLD TO

DIRECTIONS  
Total Weight 19940  
Total Order Weight 18640

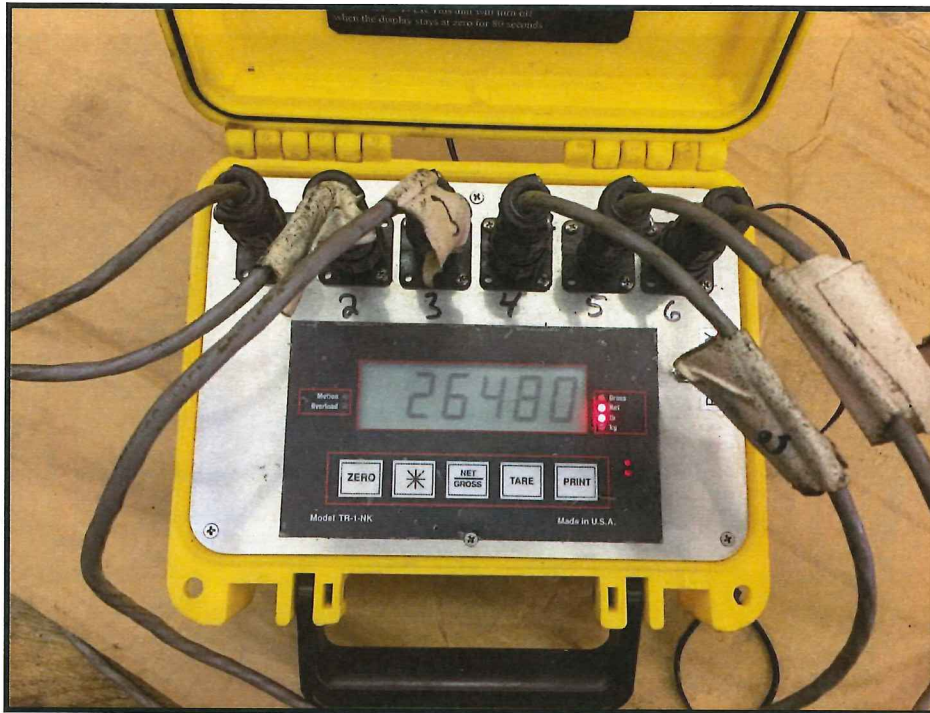
DATE	TIME	ZONE #	DRIVER	TRUCK #	TONS ORDERED	TONS DELIVERED	TICKET #
11/30/16	9:07			50	0.00	2.00	545818

QUANTITY	DESCRIPTION	PRICE
1.00	EA WEIGH FEE	

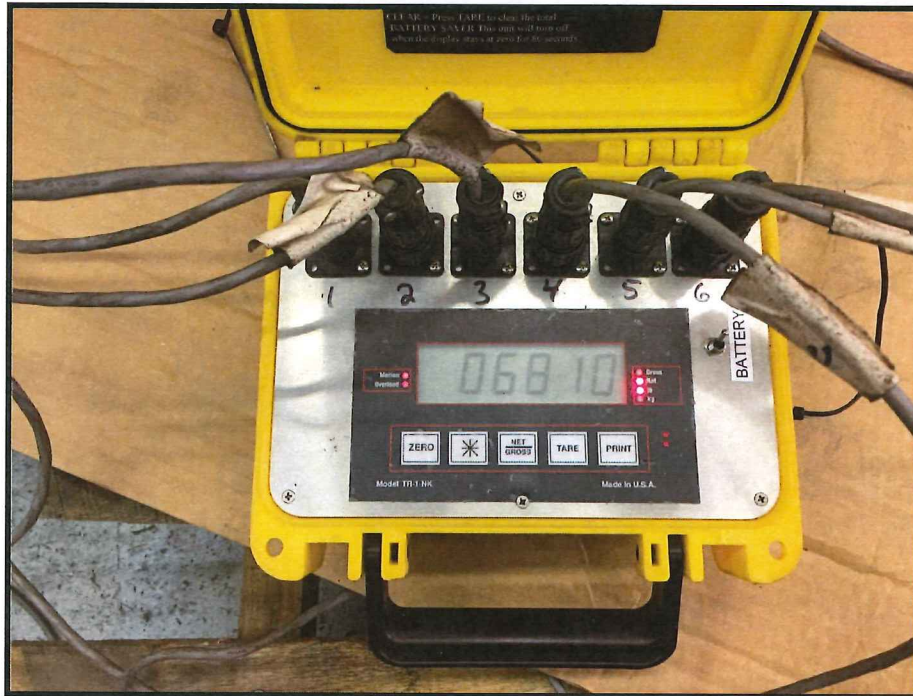








Wheel Pad Scale - All Wheels - GVRW



Wheel Pad Scale - Front Axle - GVRW

Ride The Ducks International

# RTDI - TECHNICAL SERVICE BULLETIN

<b>TSB TITLE:</b> Steer Axle Strength Enhancement	<b>DATE:</b> 7/12/17
---	----------------------

<b>RTDI BULLETIN NO:</b> TSB-01-17 <b>NHTSA RECALL NO.</b> 16V-859	<b>MODEL:</b> All STRETCH DUCKS
---	---------------------------------

**REASON:** Steer axle enhancement, to increase the strength of the connection point between the knuckleball and the housing.

**ACTION:** RTDI will reinforce the strength of the connection point between the knuckleball and the axle housing and will ship reinforced steer axle housings to all affected locations for installation. The parts needed to perform this repair will be provided free of charge.

PART NUMBER	DESCRIPTION	QUANTITY per unit	TOTAL SERVICING LABOR HRS- \$45.00 Per Hour
007474	Steer Axle Housing	1	
NA	NDT/MPT testing	2	
007342	Collars	2	
NA	Remove and replace existing steer axle housing	1	30hrs

**SERVICE PROCEDURE:**

**Before Delivering the Reinforced Steer Axle Housings RTDI Will:**

1. Conduct non-destructive testing at the connection point between the knuckleball and the housing..
2. Install the reinforcement collars.
3. Conduct non-destructive testing of the reinforcement collar welds.
4. Stamp numbering sequence on each axle housing.
5. Prep and paint the axle housings.
6. Ship completed axle housings to all affected locations.

**RTD Licensee Will:**

1. Receive one (1) reinforced steer axle per vehicle operated.
2. Transfer the drive components from existing steer axle into the reinforced axle.
3. Ship the existing (core) steer axle back to RTDI.
4. Notify RTDI when each vehicle has completed this TSB. Complete form on pg. 2.

**NOTE:** The reinforced steer axle housings will be delivered as bare housings (no drive gears). You will be required to remove the drive components from the existing housings and transfer them into the reinforced housings. All steer axle cores must be returned to RTDI. Contact RTDI to make shipping arrangements. Notify RTDI when this repair procedure has been completed. You will be reimbursed a 30 hour servicing fee per vehicle for the labor involved in replacing the front axle after RTDI receives the returned cores and the Notification of Completion Form.

<b>TSB COMPLETION IS DUE BY:</b>	Upon receiving reinforced steer axles
----------------------------------	---------------------------------------

The information in Technical Service Bulletins is intended for use by trained technicians with the knowledge, tools and equipment to do the job properly and safely. It informs technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The information in this Technical Service Bulletin (TSB) was current at the time of printing. Ride The Duck International reserves the right to supercede this information with updates.

# RTDI - TECHNICAL SERVICE BULLETIN

## Notification of Completion Form

**DIRECTIONS:** After the repair procedure described above has been fully completed, complete the form below, scan and email the completed form back to RTDI at the following email address.

[fleetoperations@ridetheducks.com](mailto:fleetoperations@ridetheducks.com)

**RTDI TSB No.** 01-17 STEER AXLE SAFETY ENHANCEMENT

**NHTSA RECALL NO:** 16V-859

**RTD LICENSEE NAME:**

**DUCK VIN#:**

**DUCK LOCAL NUMBER/NAME:**

My signature certifies that I have followed all required Service Procedures and that the RTDI Technical Service Bulletin No. TSB-01-17 has been completed on the vehicle listed above.

**PRINT NAME:**

**SIGNATURE:**

**REPAIR COMPLETION DATE :**



# APPLIED TECHNICAL SERVICES, INCORPORATED

1049 Triad Court, Marietta, Georgia 30062 • (770) 423-1400 Fax (770) 424-6415

## CHEMICAL TEST REPORT

Ref. DC274422-1      Date May 31, 2017      Page 1 of 1

Customer: Ride The Ducks International LLC, P.O. Box 1837, Branson, MO 65616

Attention: Frank English

Purchase Order #: Verbal – Frank English      Part #/Name: Knuckle Assembly

Material Designation: 1045 Carbon Steel

Special Requirement: N/A

Lab Comment: Analyzed using ASTM E415-15 as a guide.


### Test Results

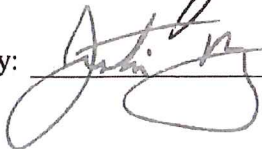
Composition: Weight %

Identification	C	Mn	P	S	Si	Cr	Ni	Mo	Cu
Alloy or Spec. Req. (1)	0.43 0.50	0.60 0.90	0.040 Max.	0.050 Max.	—	—	—	—	—
Sample	0.47	0.72	0.011	0.037	0.24	0.02	0.03	<0.01	0.11

(1) ASTM A29/A29M-16, 1045 carbon steel



Prepared by:  R. Byrd  
Chemist

Approved by:  J. Burmeister  
Manager

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# APPLIED TECHNICAL SERVICES, INCORPORATED

1049 Triad Court, Marietta, Georgia 30062 • (770) 423-1400 Fax (770) 424-6415

## TENSILE TEST REPORT

Ref. D274422      Date May 30, 2017      Page 1 of 1

Customer: Ride The Ducks International LLC, P.O. BOX 1837, Branson, MO 65616

Attention: Frank English

Purchase Order #: Verbal- Frank English Part #/Name: Knuckle Ball Housing

Material Designation: 1045 Carbon Steel Specimen Type: Round Reduced Section

Tensile Test Equipment: Tinius Olsen ATS #: 02246 Cal. Due: 11/3/17

Extensometer: Tinius Olsen ATS #: 02248 Cal. Due: 11/11/17

Lab Comment: Tested per ASTM A370-17. <sup>1</sup>Upper Yield, <sup>2</sup>Lower Yield

### Test Results

Specimen Identification	Thickness, in.	Diameter or Width in.	Area, in. <sup>2</sup>	Ultimate Load, lbs.	0.2% Offset Load, lbs.	Tensile Strength, psi	Yield Strength, psi	Elong. % in 1.4"	Red. in Area, %
Sample	-	0.162	0.0206	2,310	<sup>1</sup> 1,561 <sup>2</sup> 1,485	112,000	<sup>1</sup> 76,000 <sup>2</sup> 72,000	33	62



Prepared by:  Larry Davis  
Materials Testing

Approved by:  Jason Loy, C.W.I.  
Group Supervisor

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**Procedure Qualification Record (PQR) # GMAW-A513-Knuckle-5.18a**  
**Test Results**

**TENSILE TEST**

Specimen No.	Width (in)	Thickness (in)	Area (in <sup>2</sup> )	Ultimate Tensile Load (lbs)	Ultimate Unit Stress (psi)	Character of Failure and Location
A	0.504	0.240	0.122	10,335	84,500	Ductile/A513
B	0.504	0.249	0.126	10,569	84,000	Ductile/A513

**GUIDED BEND TEST**

Specimen No.	Type of Bend	Results	Remarks
1	Face	Acceptable	
2	Face	Acceptable	
3	Root	Acceptable	
4	Root	Acceptable	

**VISUAL INSPECTION**

Appearance Acceptable  
 Undercut Acceptable  
 Piping Porosity Acceptable  
 Convexity Acceptable  
 Test Date June 27, 2017  
 Witnessed by Frank English  
 Other Tests N/A

**Radiographic-Ultrasonic Examination**

RT Report No: DT274422-2 Result Acceptable  
 UT Report No: \_\_\_\_\_ Result \_\_\_\_\_

**FILLET WELD TEST RESULTS N/A**

Minimum size multiple pass \_\_\_\_\_ Maximum size single pass \_\_\_\_\_  
 Macroetch \_\_\_\_\_ Macroetch \_\_\_\_\_  
 1. \_\_\_\_\_ 3. \_\_\_\_\_ 1. \_\_\_\_\_ 3. \_\_\_\_\_  
 2. \_\_\_\_\_ 2. \_\_\_\_\_

All-Weld-Metal Tension Test N/A

Tensile Strength, psi \_\_\_\_\_  
 Yield Strength, psi \_\_\_\_\_  
 Elongation in 2 in., % \_\_\_\_\_

Welder's Name Frank English Clock No. \_\_\_\_\_ Stamp No. \_\_\_\_\_  
 Tests conducted by Jeremy Winkler, C.W.I. *Jeremy Winkler* Test No. D274422

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section 4 of ANSI/AWS D1.1/D1.1M, (2015) Structural Welding Code – Steel



Jeremy Winkler  
 CWI 16030651  
 QC1 EXP. 3/1/2019

Signed \_\_\_\_\_  
 Manufacturer or Contractor  
 By Robby Hultz  
 Title Managing Partner  
 Date 6/29/17





**APPLIED TECHNICAL SERVICES, INCORPORATED**

1049 Triad Court, Marietta, Georgia 30062 • (770)423-1400

WELDING PROCEDURE SPECIFICATION (WPS) Yes   
 PREQUALIFIED \_\_\_\_\_ QUALIFIED BY TESTING   
 or PROCEDURE QUALIFICATION RECORD (PQR) Yes



David M Mock Jr  
 CWI 07070101  
 QC1 EXP. 7/1/2019

ATS Reference Number: D274422

Company Name Ride the Ducks International, LLC  
 Welding Process(es) GMAW  
 Supporting PQR No.(s) GMAW-A513-Knuckle-5.18a

Identification # GMAW-A513-Knuckle-5.18 *D.M.S. 1/18*  
 Revision 0 Date 06/27/17 By D. Mock, C.W.I.  
 Authorized by Frank English Date 06/05/17  
 Type Manual  Semi-Automatic   
 Mechanized  Automatic

**JOINT DESIGN USED**

Type: Single V-Groove  
 Single  Double Weld   
 Backing Yes  No   
 Backing Material ASTM A513 1026  
 Root Opening 1/16" +1/8"/-0 Root Face Dimension None  
 Groove Angle 45° +10°/-0° Radius (J-U) N/A  
 Back Gouging: Yes  No  Method None

**POSITION**

Position of Groove 1G Fillet N/A  
 Vertical Progression: Up  Down

**BASE METALS**

Material Spec. ASTM A513 to 1045 Carbon Steel - Knuckle  
 Type or Grade 1026 to 1045 (Similar)  
 Thickness Groove 0.125" to 0.552" Fillet N/A  
 Diameter (Pipe) 2.75" to Unlimited

**ELECTRICAL CHARACTERISTICS**

Transfer Mode (GMAW) Short-Circuiting   
 Globular  Spray   
 Current: AC  DCEP  DCEN  Pulsed   
 Power Source: CC  CV   
 Other \_\_\_\_\_  
 Tungsten Electrode (GTAW)  
 Size: N/A  
 Type: N/A

**FILLER METALS**

AWS Specification ER70S-6  
 AWS Classification 5.18

**TECHNIQUE**

Stringer or Weave Bead String or Weave  
 Multi-pass or Single Pass (per side) Multi-Pass  
 Number of Electrodes Single  
 Electrode Spacing Longitudinal N/A  
 Lateral N/A  
 Angle N/A  
 Contact Tube to Work Distance 5/8"-3/4"  
 Peening None  
 Interpass Cleaning Brushing and/or Grinding

**SHIELDING**

Flux N/A Gas Argon/CO<sub>2</sub>  
 Composition 90%/10%  
 Electrode-Flux (Class) N/A Flow Rate 40-45 cfh  
 Gas Cup Size 1/2" Min.

**PREHEAT**

Preheat Temp., Min. 350°F  
 Interpass Temp., Min. 350°F Max. 550°F

**POSTWELD HEAT TREATMENT**

Temp. N/A  
 Time N/A

**WELDING PROCEDURE**

Pass or Weld Layer(s)	Filler Metals			Current		Volts	Travel Speed	Joint Details
	Process	Class	Diam.	Type & Polarity	Amps or Wire Feed Speed			
All	GMAW	ER70S-6	0.035"	DCEP	230-275 A 500-600 ipm	28-31	10-15 ipm	Single V-Groove





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WELDING PROCEDURE SPECIFICATION (WPS) Yes   
 PREQUALIFIED \_\_\_\_\_ QUALIFIED BY TESTING \_\_\_\_\_  
 or PROCEDURE QUALIFICATION RECORD (PQR) Yes

ATS Reference Number: D274422  
 Company Name Ride the Ducks International LLC  
 Welding Process(es) GMAW  
 Supporting PQR No.(s) N/A

Identification # GMAW-A513-Knuckle-5.18a  
 Revision 0 Date 06/27/17 By J. Winkler, C.W.I.  
 Authorized by Frank English Date 06/05/17  
 Type Manual  Semi-Automatic   
 Mechanized  Automatic

### JOINT DESIGN USED

Type: Single V-Groove  
 Single  Double Weld   
 Backing Yes  No   
 Backing Material ASTM A513 1026  
 Root Opening 1/8" Root Face Dimension N/A  
 Groove Angle 45° Radius (J-U) N/A  
 Back Gouging: Yes  No  Method None

### POSITION

Position of Groove 1G Fillet N/A  
 Vertical Progression: Up  Down

### BASE METALS

Material Spec. ASTM A513 to 1045 Carbon Steel - Knuckle  
 Type or Grade 1026 to 1045 (Similar)  
 Thickness Groove 0.276" Fillet N/A  
 Diameter (Pipe) 2.75"

### ELECTRICAL CHARACTERISTICS

Transfer Mode (GMAW) Short-Circuiting   
 Globular  Spray   
 Current: AC  DCEP  DCEN  Pulsed   
 Power Source: CC  CV   
 Other N/A  
 Tungsten Electrode (GTAW)  
 Size: N/A  
 Type: N/A

### FILLER METALS

AWS Specification ER70S-6  
 AWS Classification 5.18

### TECHNIQUE

Stringer or Weave Bead Stringer  
 Multi-pass or Single Pass (per side) Multi-Pass  
 Number of Electrodes Single  
 Electrode Spacing Longitudinal N/A  
 Lateral N/A  
 Angle N/A  
 Contact Tube to Work Distance 5/8" - 3/4"  
 Peening None  
 Interpass Cleaning Brushing and/or Grinding

### SHIELDING

Flux N/A Gas Argon/CO<sub>2</sub>  
 Composition 90%/10%  
 Electrode-Flux (Class) N/A Flow Rate 40-45 cfh  
 Gas Cup Size 1/2"

### POSTWELD HEAT TREATMENT

Temp. N/A  
 Time N/A

### WELDING PROCEDURE

Pass or Weld Layer(s)	Filler Metals			Current		Volts	Travel Speed	Joint Details
	Process	Class	Diam.	Type & Polarity	Amps or Wire Feed Speed			
All	GMAW	ER70S-6	0.035"	DCEP	230-275A 500-600 ipm	28-31	10-15	Single V-Groove



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WELDER OR TACK WELDER QUALIFICATION

Name Frank English S.S. No. - Identification No. -
Welding Procedure Specification No. GMAW-A513-Knuckle-5.18 Rev. 0 Date 06/27/17

Table with 3 columns: VARIABLES, RECORD ACTUAL VALUES USED IN QUALIFICATION, and QUALIFICATION RANGE. Rows include Process/Type, Electrode, Current/Polarity, Position, Weld Progression, Backing, Material/Spec., Base Metal (Thickness, Groove, Fillet), Diameter, Filler Metal, and Gas/Flux Type.

VISUAL INSPECTION (4.9.1)
Acceptable YES or NO Yes
Guided Bend Test Results (4.31.5)
Fillet Test Results (4.31.2.3 and 4.31.4.1) N/A
Appearance:
Fracture Test Root Penetration:
(Describe the location, nature and size of any crack or tearing of the specimen)

Inspected by David Mock, C.W.I. [Signature] Test Number D274422
Organization Applied Technical Services, Inc. Date June 27, 2017 [Signature] David M Mock Jr
AWS CWI 07070101
QC1 EXP. 7/1/2019

RADIOGRAPHIC TEST RESULTS (4.31.3.2) N/A
Table with 6 columns: Film Identification Number, Results, Remarks, Film Identification Number, Results, Remarks.

Interpreted by N/A Test Number -
Organization N/A Date -

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section 4, of ANSI/AWS D1.1/D1.1M, (2015) Structural Welding Code - Steel.

Manufacturer or Contractor Ride the Ducks International LLC Authorized By [Signature]
Date 6/29/17



APPLIED TECHNICAL SERVICES, INCORPORATED



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WELDER OR TACK WELDER QUALIFICATION

Name John Frans S.S. No. - Identification No. -
Welding Procedure Specification No. GMAW-A513-Knuckle-5.18 Rev. 0 Date 06/27/17

Table with 3 columns: VARIABLES, RECORD ACTUAL VALUES USED IN QUALIFICATION, and QUALIFICATION RANGE. Rows include Process/Type, Electrode, Current/Polarity, Position, Weld Progression, Backing, Material/Spec., Base Metal (Thickness, Groove, Fillet), Diameter, Filler Metal, and Gas/Flux Type.

VISUAL INSPECTION (4.9.1) Acceptable YES or NO Yes
Guided Bend Test Results (4.31.5)
Type Result Type Result
Face Acceptable Root Acceptable
Fillet Test Results (4.31.2.3 and 4.31.4.1) N/A
Appearance: Fillet Size:
Fracture Test Root Penetration: Macroetch:

Inspected by David Mock, C.W.I. [Signature] Test Number D274422
Organization Applied Technical Services, Inc. Date June 28, 2017 [Signature]
David M Mock Jr
CWI 07070101
QC1 EXP. 7/1/2019

RADIOGRAPHIC TEST RESULTS (4.31.3.2) N/A
Table with 6 columns: Film Identification Number, Results, Remarks, Film Identification Number, Results, Remarks

Interpreted by N/A Test Number -
Organization N/A Date -

We, the undersigned, certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section 4, of ANSI/AWS D1.1/D1.1M, (2015) Structural Welding Code - Steel.

Manufacturer or Contractor Ride the Ducks International LLC Authorized By [Signature]
Date 6/29/17