

748th Supply Chain Management Group

Landing Gear Updates

F-15 WWR
Nov. 18, 2024



JASON MCBRIDE COLEMAN HANSEN
417 SCMS/GUEA

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FDO Case # WR-24-744-XX



Overview

- Landing Gear Integrity Program (LGIP)
- Wheel and Brake System Improvement (WBSI)
- C/D Main Landing Gear Upper Jury Link (UJL)
- E Nose Landing Gear (NLG) Shimmy Mass Damper
- E Nose Wheel Redesign
- C/D Nose Wheel Redesign
- Shimmy Damper Improvement
- E High-to-Low Pressure Leaking
- Upcoming Projects- E Nose Outer Cylinder Redesign
- C/D Projects



LGIP

- Develop a risk mitigation plan by component based on operational requirements, probabilities of failure, and statistical age
- Initial Risk Analysis complete
- Reliability and Maintainability Analysis (RAM) complete
 - Main Categories of Concern Identified:
 - Top Safety Drivers: C/D MLG UJL, C/D/E NLG Steering Crank, and C/D NLG Piston Assembly
 - Top Non Mission Capable Drivers: C/D NLG Gear, C/D/E NLG Shimmy Damper Assembly, and C/D MLG Gear
- Initial Finite Element Analysis (FEA) and Digital Fatigue Analysis (DFA) for both C/D and E complete



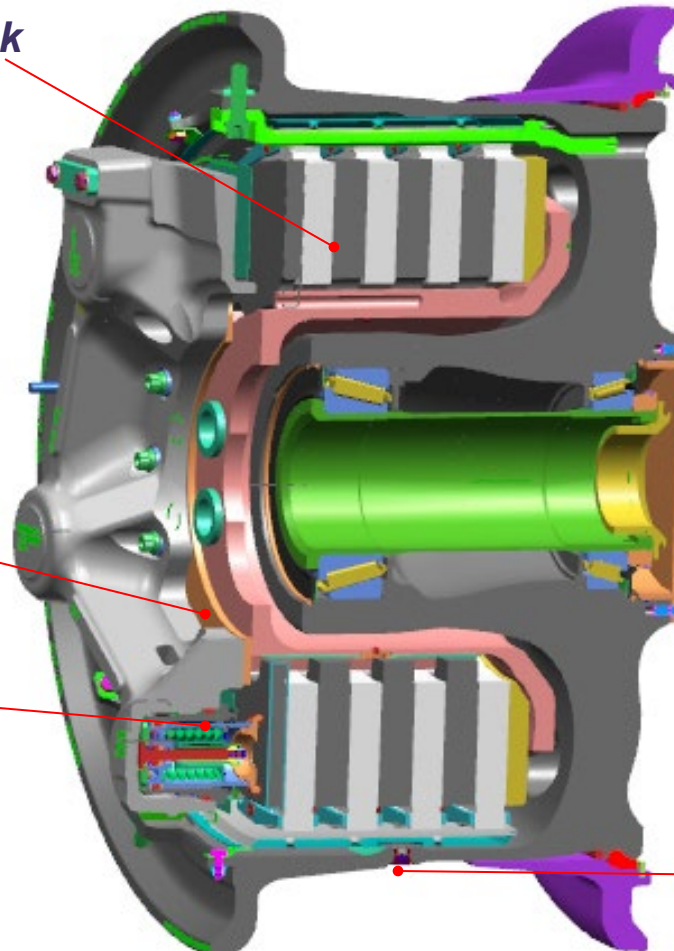
LGIP

- Loading Spectrum Validation (Flight Evaluation)
 - C/D and E flight test/load gathering has been completed
 - Operational Loads Spectrum Report has been completed
- Updating FEA and DFA based on Loading Spectrum
 - Currently under SPO contract
 - ECD FY25Q4





WBSI



Graphics courtesy of:
 Collins Aerospace

2-4-1 Refurbishable Heat Sink

Improved Bleeder Valve

Fade Resistant High Energy Brake allows for Improved Short Runway Performance

Thermal Insulator-Spacer

Dry Adjuster

Cad Plating Elimination (Wheel and Brake Parts)

Lock Ring Rim Retention

Wheel Designed for Bias and Conventional Radial Tire Compatibility

25,000 Mile Wheel Life

1400 Landings/Overhaul

Improved Grease Dams

362°F Fuse Plugs

This document contains no EAR technology or ITAR technical data



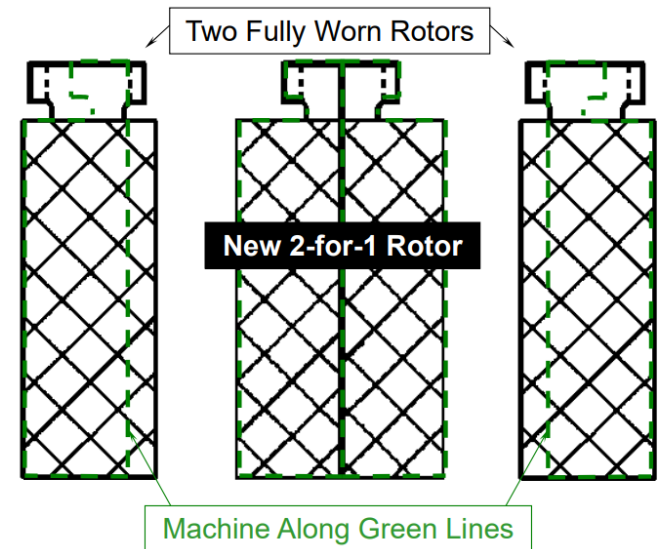
WBSI

- USAF finished installation May 2019
 - Performance tracking program complete
 - Sustainment and TO support for old configuration ended
 - Old configuration suggested source of repair: Honeywell or Boeing
- Shuddering Issue
 - TCTO corrected to include Dual Brake Control Valve check prior to WBSI installation
 - New Oxidation Protection System (OPS) showed shudder severity was less severe or comparable to current shudder
 - Shudder occurs at low speed 3-5 knots, not a SOF (Safety of Flight)
 - Provides better oxidation protection – three component system that functions as a barrier against oxygen and chemicals
 - Operational Testing and CCB Completed



WBSI

- F-15E Brake Assembly 2-for-1 refurbished carbon configuration approved
 - Rotors and Stators reused (end plates and pressure plate carbon disks are not reusable)
 - 2-for-1 Heatsink PN 537-214-3
 - Brake Assembly PN unchanged
 - Qualification testing completed





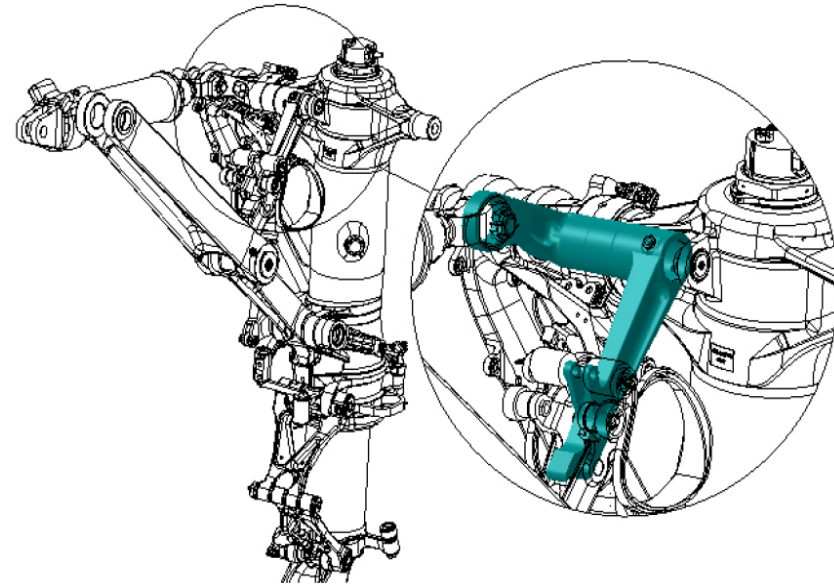
WBSI

- Method for acquiring new wheels and brakes
 - Currently direct commercial sale from Collins
 - Working on path to order through USAF



C/D MLG UJL

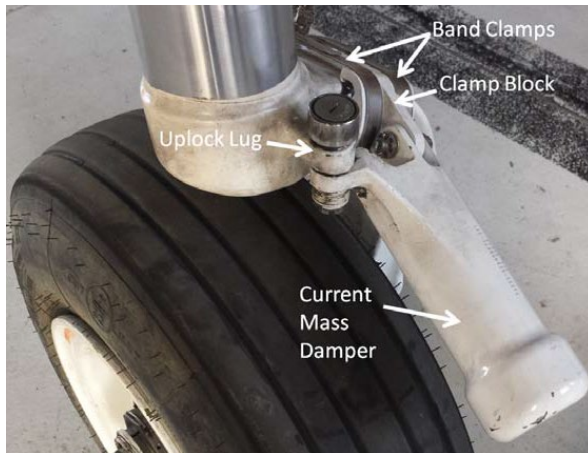
- Six USAF in service failures to date, left-hand only
- Redesign qualification tested using flight load data to 4x fatigue life requirement, 13x improvement from legacy UJL
 - Fleet-wide TCTO issued to replace fleet with current UJL design
 - New UJL fielding is underway with PN 20157113-10/-20 NSN 1620-01-669-1350/-1348
 - LH implementation through TCTO
 - PDM replacement will be used for retrofit (RH).
 - New UJL will not be time changed





E NLG Tuned Mass Damper

- PDR, CDR and Qualification complete
- Utilizes active instead of passive dampening
- OUE completed. Pilot indicated significantly fewer shimmy events with less shimmy force.
- Fielding to begin 2025
 - Implementation through TCTO





E Nose Wheel Redesign

- Redesign for cost savings and improved safety
 - Designed to reduce tie bolt hole stresses
 - Implementation of over-inflation plug (OIP)
 - Improved grease seal
 - USAF owned design with competitive procurement
- CCB Approved
- Flight Test Completed and FSE Completed
- Fielding to begin 2026 through normal attribution





C/D Nose Wheel Redesign

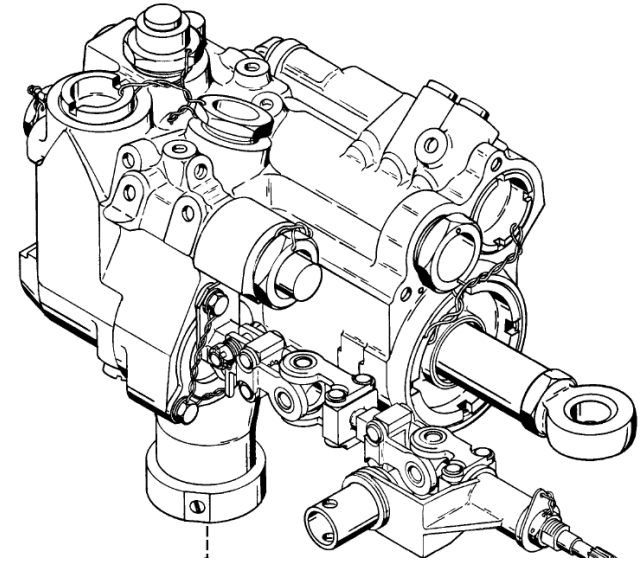
- Redesign for cost savings and improved safety
 - Designed to reduce tie bolt hole stresses
 - Implementation of over-inflation plug (OIP)
 - Improved grease seal
 - USAF owned design with competitive procurement
- Qualification Completed and CCB Approved
 - Flight test by similarity with F-15E NWR
- Field Service Evaluation Completed
- Fielding to begin 2026 through normal attribution



Shimmy Damper Improvement



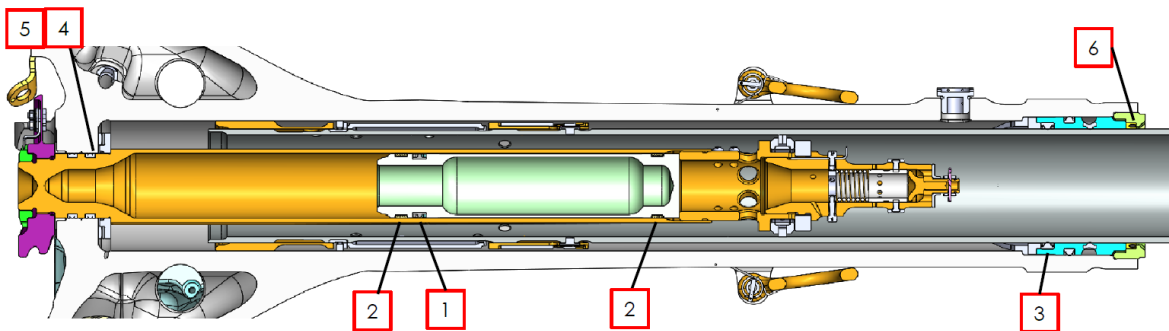
- Improve reliability, availability, and maintainability
- Technical Order updates
 - Troubleshooting tree
 - Test stand drawings/data
- Improvements to repair and procurement processes
- PDR and CDR completed
- Qualification underway





High-to-Low Pressure Leaking

- Impacts C/D/E NLG/MLG
 - Seals, scrapers, lower bearings, axial bearings, gland nuts, and high pressure pistons improved to modern sealing technology
- High-to-low shock strut pressure leakage and contamination as a leading landing gear NMC driver
- E NLG passed testing with Green Tween and Trelleborg
- C/D MLG passed testing with Trelleborg
- Due to contractual issues a new contract will likely be needed
 - Currently working other options for on aircraft test/evaluation due to funding constraints for the E NLG and MLG.

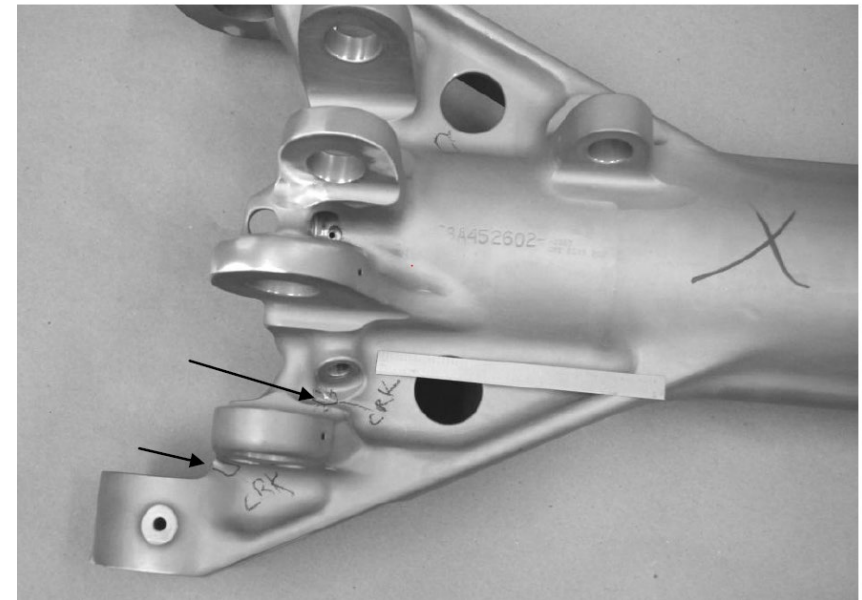
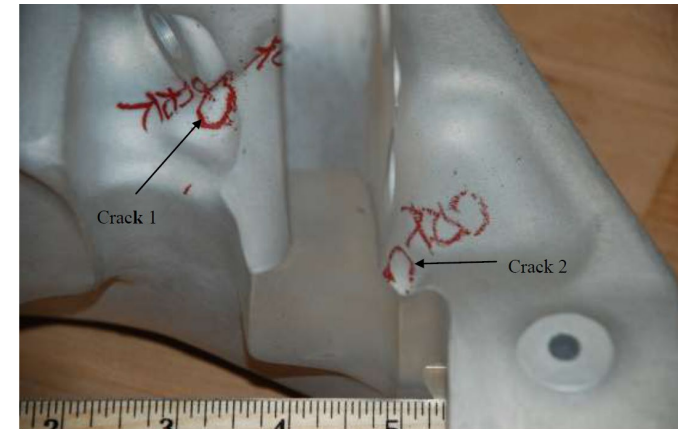


Upcoming Project- E Nose Outer Cylinder Redesign



E Nose Outer Cylinder Redesign

- Fatigue cracking found during Overhaul
- To date no known in-service failures
- 13 Cylinders found with crack indications over last 4 years
- Currently in Analysis of Alternatives, currently working on modeling the failure condition.





C/D Projects

- Because of C/D fleet retirement changes, the following projects have been paused.
 - C/D MLG Shock Strut Redesign
 - C/D High-to-Low
 - C/D NLG Piston

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