



Cold Spray Landing Gear Repair

Repair, Restoration & Refurbishment




COC Aerospace has developed a repair for F-5 landing gear components

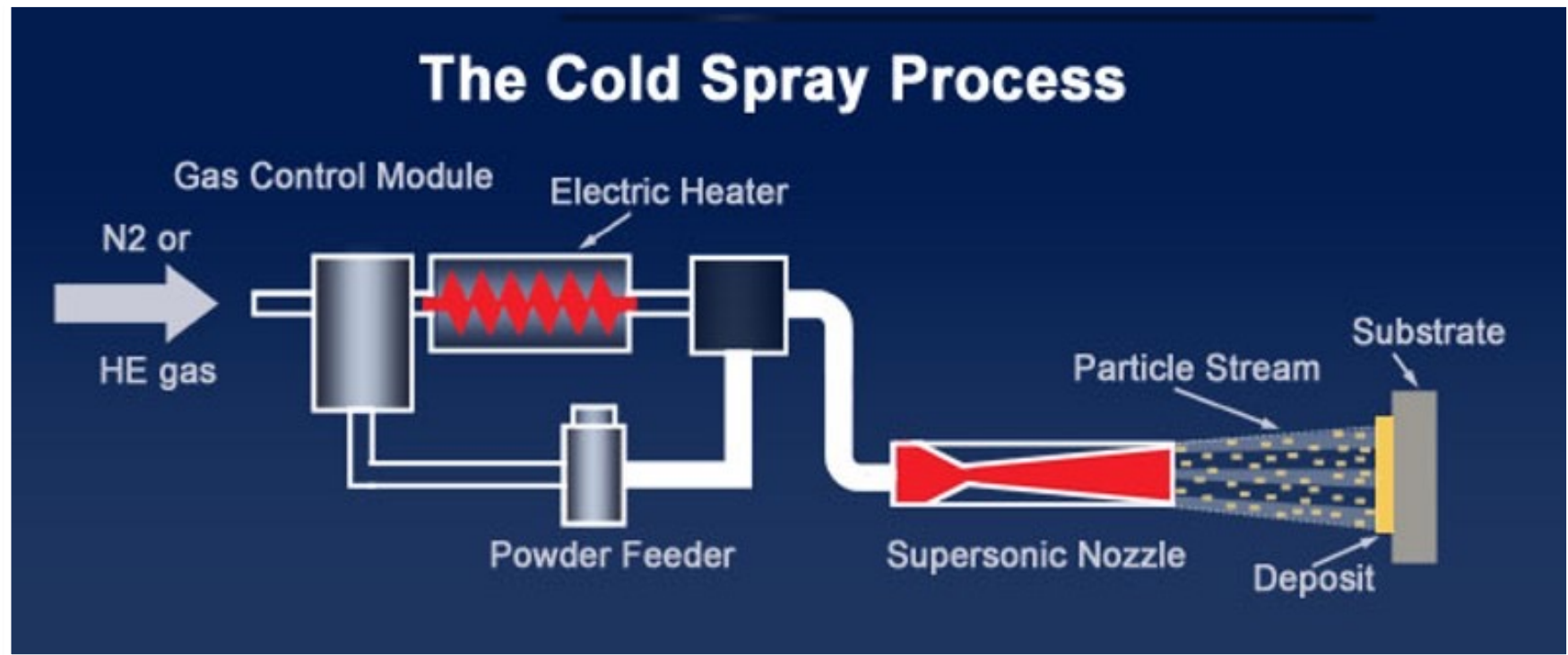
- ✈ F-5 landing gears have tight tolerances with regards to repairs.
- ✈ Example is the Main Landing Gear Cylinder and Nose Landing Gear Cylinder.
 - Tight tolerances for the main upper cylinder bore diameter are from 3.000 to 3.004.
 - Scratches and gouges need to be removed.
 - Some gouges exceed 3.004 requiring the cylinder honed until it is oversized.
 - Hard anodizing with will not provide enough build-up to achieve a bore of 3.004 or less.



Cold Spray Defined

 Is an Additive Manufacturing Process

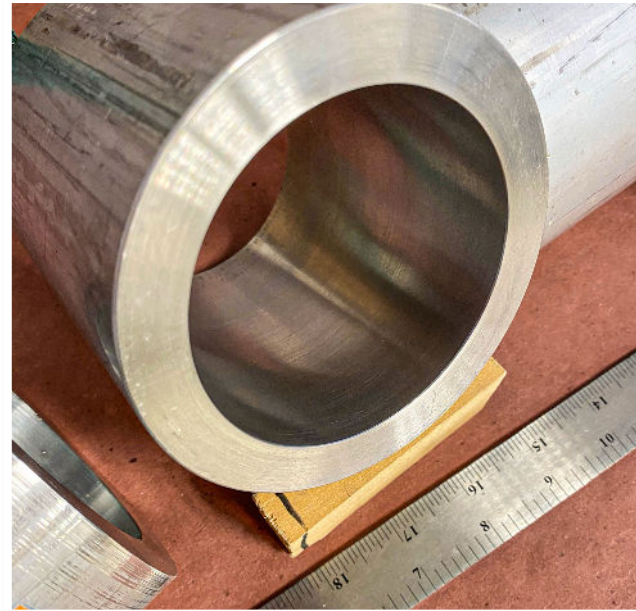
 Does not induce thermal stresses into the parent or deposited material.



Metallurgical testing the Cold Spray of Main Landing Gear Cylinder; P/N 14-40602



Test coupon of main landing gear cylinder gun-drilled, cold sprayed, cut into sections and tested every 2-3 inches for molecular adhesion, hardness, macro-micro inspections.



METALLURGICAL REPORT

RESPECTFULLY SUBMITTED


Michael Giboney

LABORATORY NUMBER: 081-467

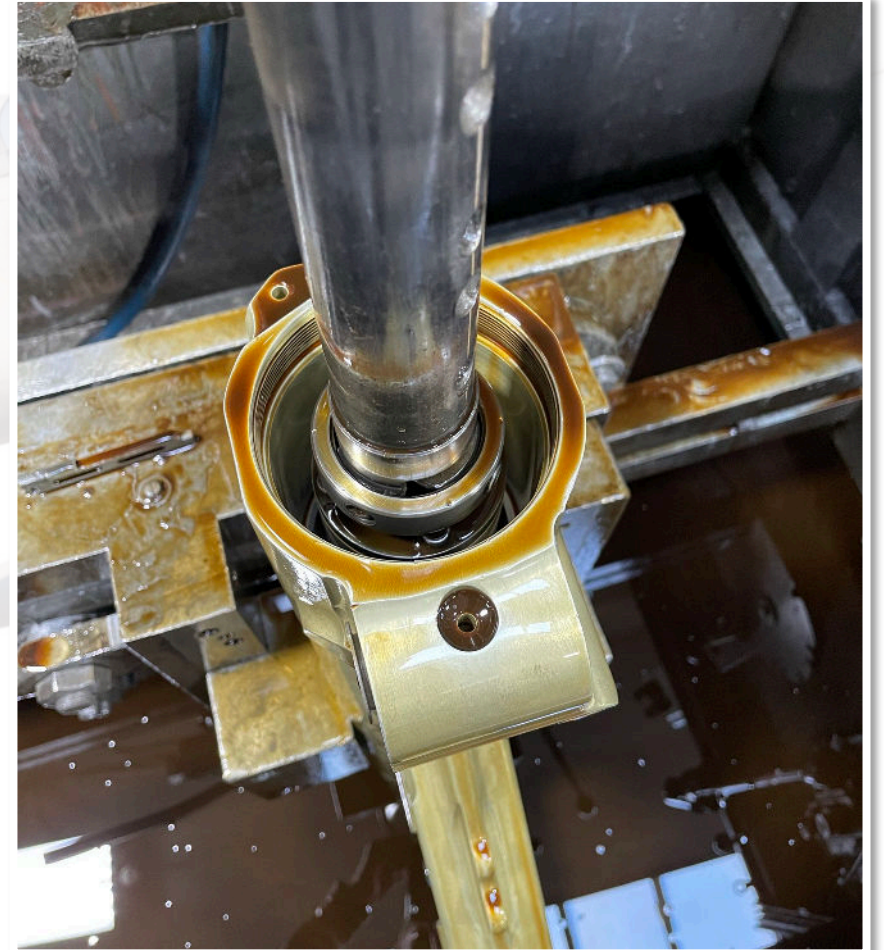
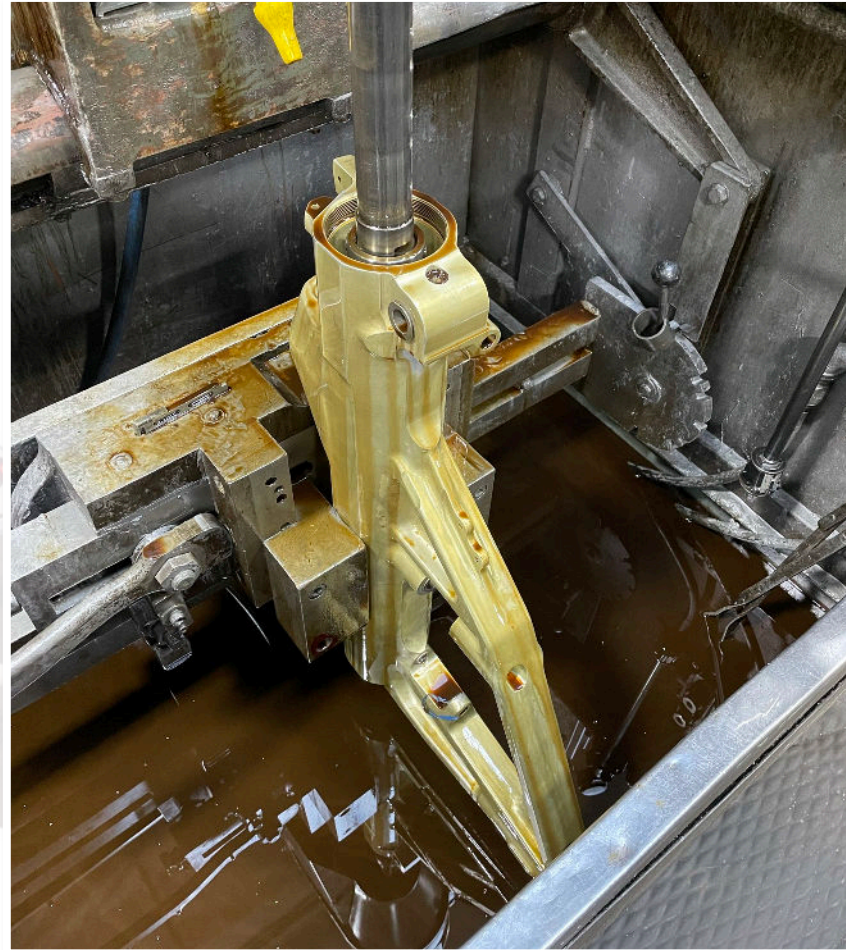
DATE: September 9th, 2021

METL

METALS ENGINEERING & TESTING LABORATORIES
2040 WEST QUAIL AVENUE, PHOENIX, ARIZONA 85027
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Preparing cylinder for Cold Spray.

 Cylinder is gun drilled (honed) .005 – 008” to remove all damage to inside walls.



Cold Spraying inside of MLG Cylinder

- ✈ Using COC developed long-reach nozzle and 'turntable' that rotates the cylinder at the correct speed for the Cold Spray application.
- ✈ The powder has a bond strength of 6,000 psi (ASTM-C633). Porosity >1% (MIL-STD-3021, Hardness: 91 HR-15Y, AlO₂ content 8-16%).

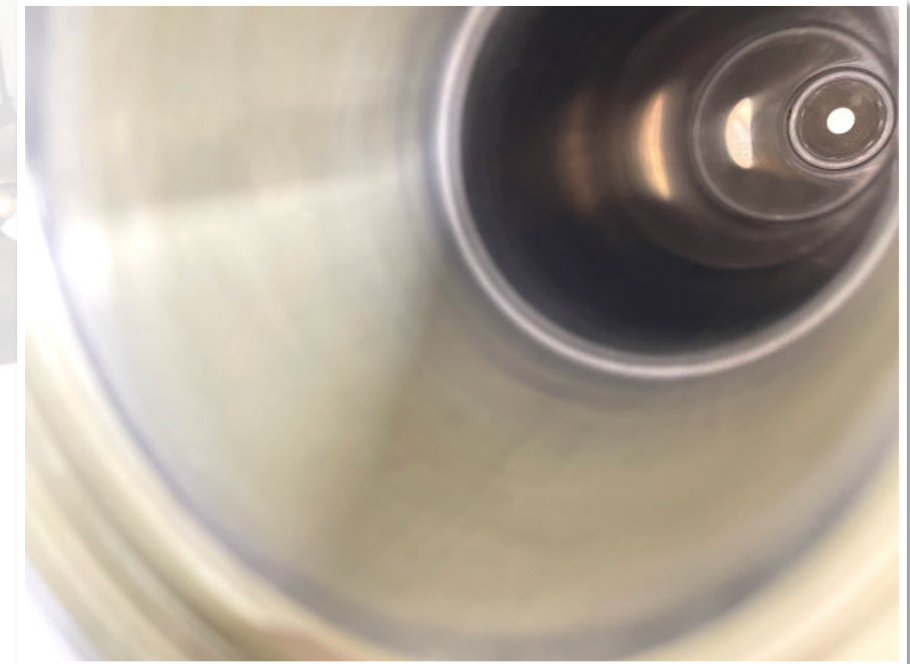
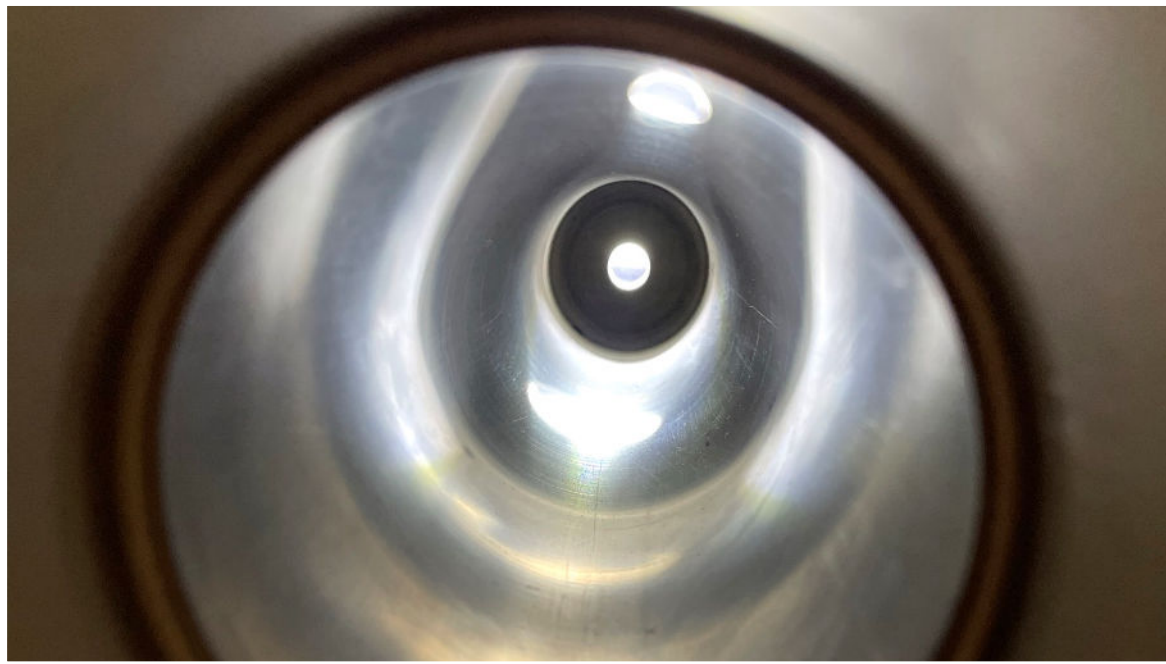


Inner bore of MLG Cylinder is then re-honed back to the newly manufactured tolerances

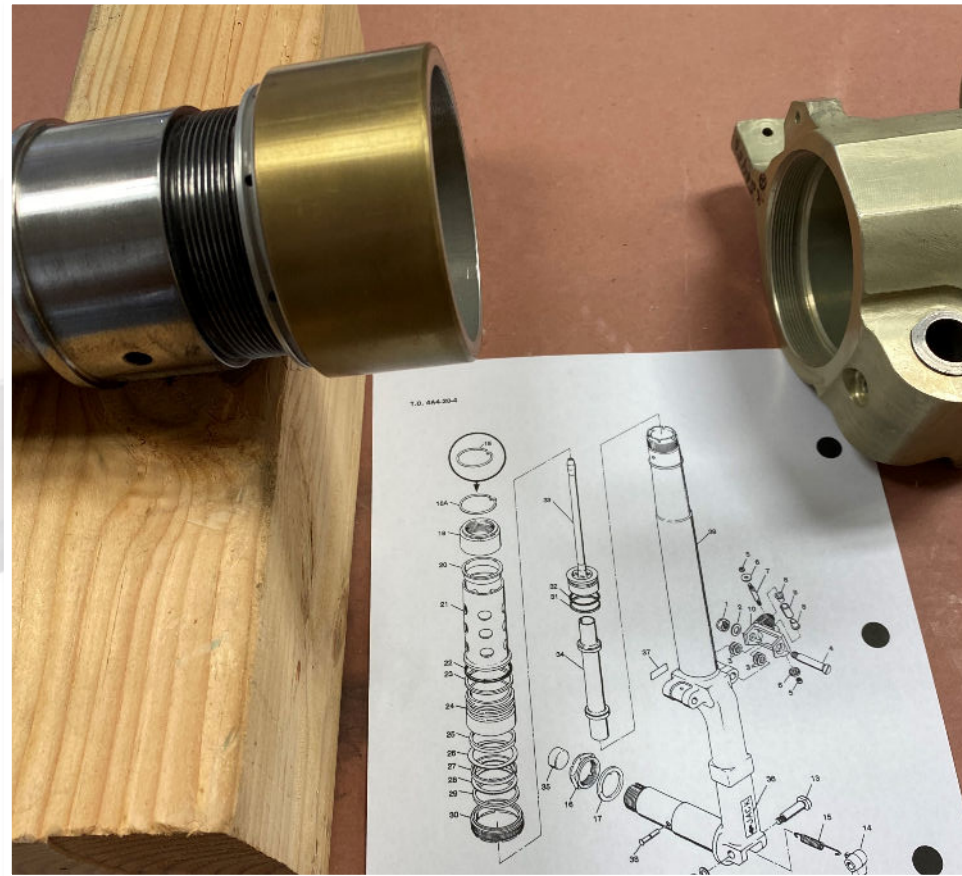
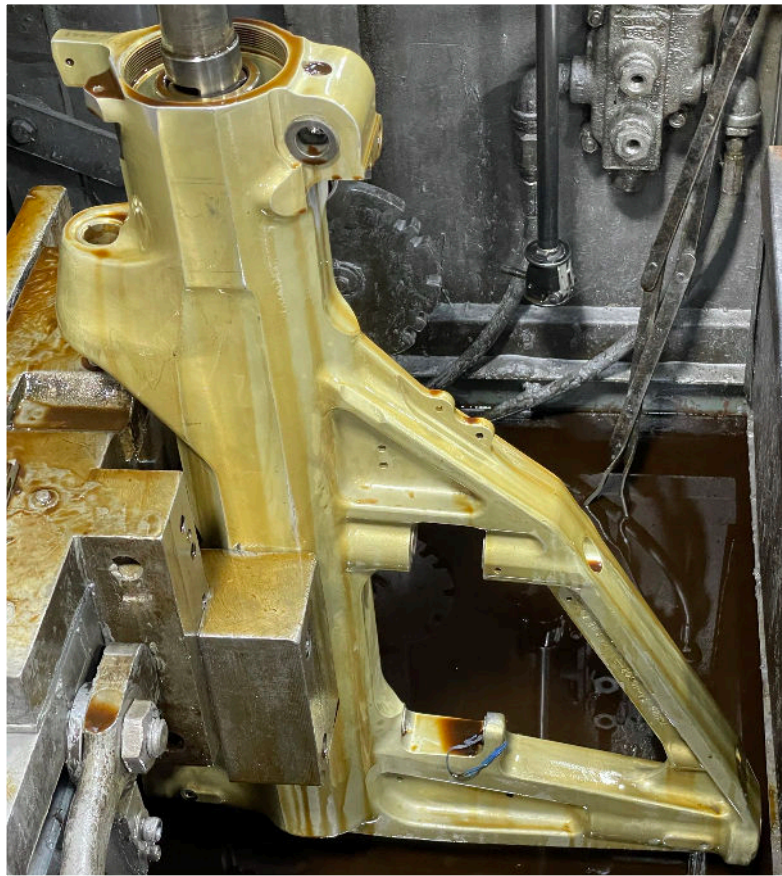


Nickel-based Spraying

-  Cylinders are sprayed with a nickel-based material that is more durable than the 7075 aluminum.
-  Surface finish of the cylinder walls are 12-14, twice as smooth as T.O. requirement of 32.

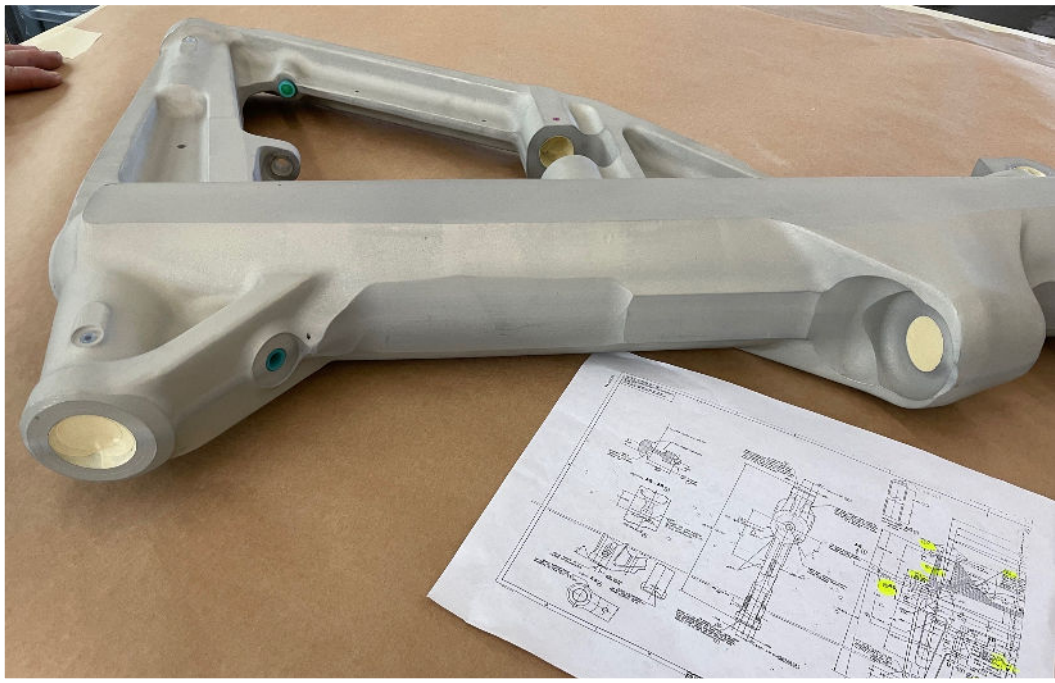


Cylinders are honed after cold spray to 3.000-3.001",
back to original specifications



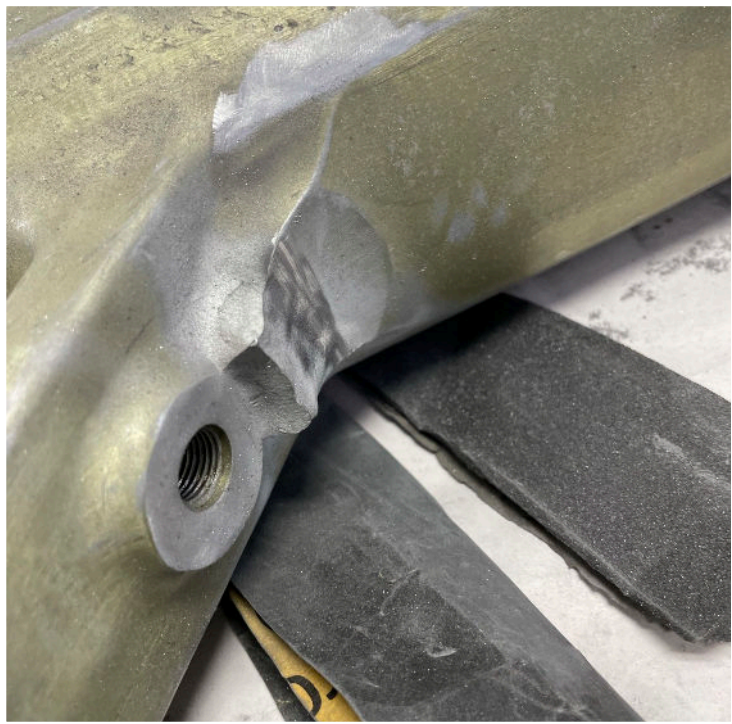
Inspection and Preparation

- ✈️ Cylinders are penetrant inspected, anodized and prepared for painting.
- ✈️ Dimensions are checked with digital bore gauge.

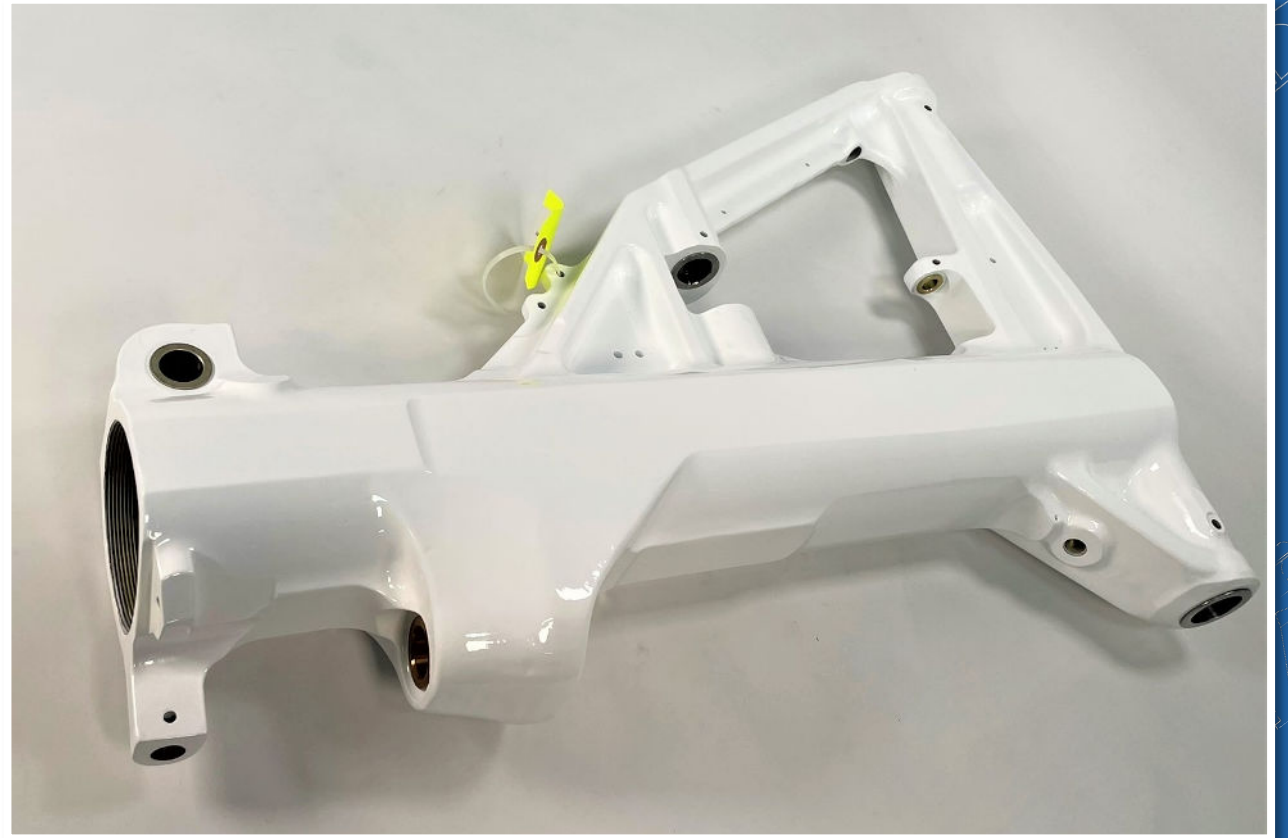


Outer Surface Finish

- ✈ Outer cylinder Cold Spray is used to repair damage to outer surfaces of MLG Cylinder.
- ✈ The areas are blended back to original dimensions.



COC's Cold Spray MLG Cylinder Repair saves over 70% of new production and turn-around is as short as 90 days.





The COC F-5 Team - www.coc-aerospace.com



EXPERIENCE - OVER 5 DECADES YEARS SUPPORTING LEGACY AIRCRAFT
CUSTOMER SERVICE - OVER 50 YEARSSUPPORTING THE SAME CUSTOMERS
TRUST - ABOVE ALL, WE ALWAYS DO THE RIGHT THING



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