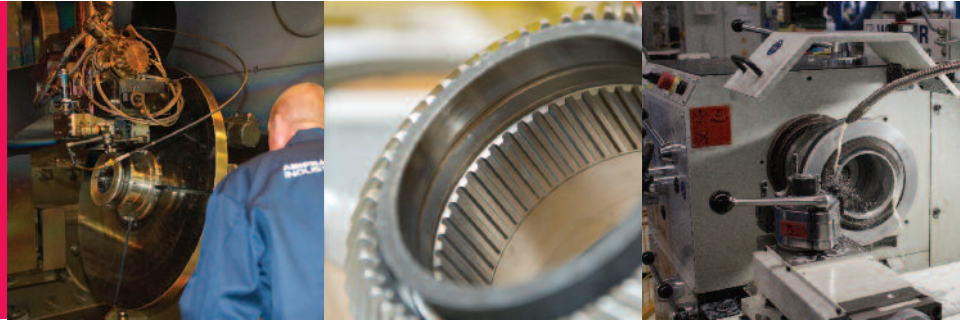


CFM56 BEVEL GEAR SHAFT FORWARD THREAD REPLACEMENT-REPAIR 005 AFI KLM E&M SINGLE REPAIR SOURCE

The MRO Lab
Adaptive Innovations



AFI KLM E&M has developed an innovative solution under which the Bevel Gear Shaft Forward Thread can be repaired instead of being replaced. Repair 005 involves Electronic Beam Welding technology (eBeam). Development and implementation of this repair makes AFI KLM E&M the sole engine MRO with full in-house repair capability able to offer the full range of repairs for the Bevel Gear Shaft part.

The issue

The Bevel Gear Shaft is part of the Accessory Gearbox. When the gearbox is disassembled, the Bevel Gear Shaft Forward Thread is regularly damaged. The only previous solution was to scrap the part and to replace it by a new one, as no repair existed at that time.

The adaptive solution developed by AFI KLM E&M

AFI KLM E&M continually aims to lower total cost of engine ownership. As a result, AFI KLM E&M has developed an alternative procedure to repair and save the part. Under Repair 005, the Bevel Gear Shaft Forward Thread EM 72-61-02 repair uses electron beam welding (EBW) technology, which allows welding with no addition of material.

Repair 005 consists of the following steps:

- Cut the damaged thread from the gear shaft
- Machine an LMS (Locally Manufactured SpaD) that perfectly fits the gear shaft
- Weld the two pieces using EBW technology
- Machine the thread
- Machine the location holes for the pins

The innovation consists in using EBW in a critical area. This has never been achieved previously due to difficulty of access.

Throughout the entire process, Repair 005 calls for highly skilled operation and extreme precision at every step, including setting the welding parameters.

The repair has been approved by GE and introduced into the repair shop manuals as repair EM 72-61-02 R005. It is now available for the most widespread CFM56 engines types: 5A, 5B, 5C and 7B.



Key benefits

- Repair rather than replace: no scrap
- Repair cost: less than half of the new part
- No impact on TAT when performed during engine shop visit (part repaired in closed loop within the repair process window)
- Full capability on Bevel Gear Shaft: all repairs available
- Lower Cost of ownership
- Meets customer and lessor expectations as this repair is now an OEM-approved repair



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Other examples of repair development using EB welding technology:

- Turbine Rear Frame (TRF) patch repair (CF6-80C2/80E)
- Compressor Discharge Pressure (CDP) Seal F1 land replacement (CF6-80C2/80E)
- Combustor Inner Liner Aft Flange replacement (CFM56)
- Tang Replacement Fan Mid-shaft (CF6-80C2/80E)

“Cut total cost of engine ownership”



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This solution has been developed by the **AFI KLM E&M Powerplant Parts Repair Engineering Department** within the Engine Division, through our Part Repair Program aimed at generating improvements and cost savings. For further information please contact your Sales Manager.

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