

F-15

Honeywell



**F-15 Cooling Turbine Ceramic
Hybrid Bearing Upgrade**

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Part Number: 571545-8-1

NSN: 1660-01-394-2481

Ceramic Hybrid Bearings

Ceramic hybrid bearings combine silicone nitride (Si₃N₄) ceramic rolling elements with polished steel inner and outer races to provide exceptional bearing performance and extended service life over conventional all-steel component bearings.

Technical Innovations of Ceramic Hybrid Bearings

- **Lower Coefficient of Thermal Expansion** – greater bearing stability and reliability under variable temperature operating conditions
- **High Tolerance to Interrupted Oil Supply** – Ceramic material can tolerate interrupted oil supply up to 10x longer than steel rolling elements
- **Eliminates Microweld** – common failure of conventional steel bearings, caused by metal-to-metal contact is eliminated by the incorporation of dissimilar materials - ceramic rolling elements and steel races
- **Non-Magnetic/High Hardness** – silicone nitride is non-magnetic so metal wear does not adhere to metallic races and has double the Rockwell hardness of steel, promoting increased protection from hard particle contamination
- **Ceramic Rolling Elements are Sixty Percent Lighter, Fifty Percent Less Deflection and Thirty Percent Lower Friction** – so they operate with less centrifugal forces, ball skidding and heat build-up - significantly extending the bearing's service life

Benefits

- Increased reliability and lower life cycle costs
- Drop-in replacement for PN 571545-7-1 – no aircraft modifications required
- Upgrade is accomplished during overhaul – no additional labor required
- Upgrade can be accomplished at Honeywell or customer overhaul facility

Qualified and Approved for Installation

- USAF and international fleets are upgrading cooling turbines during overhaul
 - Technical Orders updated to reflect ceramic bearing as 'preferred bearing'

Research & Development - Hybrid Ceramic Bearing

- Development and Testing of the ceramic hybrid bearing for cooling turbine applications was part of the Advanced Ceramics Technology Insertion Program conducted by the Defense Advanced Research Projects Agency (DARPA) of the United States Department of Defense in 1993-1994
 - Bearings found to be in "like new" condition after 50 hours of laboratory testing at maximum design conditions
 - During the oil starvation test steel ball bearings failed in less than 2 hours while the ceramic-ball bearings ran over 22 hours with no failures



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