

POWDER METALLURGY BEARINGS FOR ADVANCED  
ROCKET ENGINES

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Traditional ingot metallurgy has been pushed to the limit for many demanding applications including antifriction bearings. New systems require corrosion resistance, better fatigue resistance, and higher toughness. With conventional processing, increasing the alloying level to achieve corrosion resistance results in a decrease in other properties such as toughness.

Advanced powder metallurgy affords a viable solution to this problem. During powder manufacture, the individual particle solidifies very rapidly; as a consequence, the primary carbides are very small and uniformly distributed. When properly consolidated, this uniform structure is preserved while generating a fully dense product. Element tests including rolling contact fatigue, hot hardness, wear, fracture toughness, and corrosion resistance are underway on eleven candidate P/M bearing alloys and results are compared with those for wrought 440C steel, the current SSME bearing material.

Several materials which offer the promise of a significant improvement in performance have been identified.