

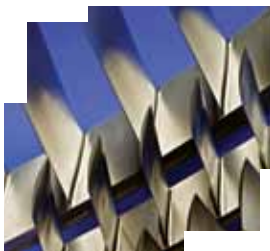


www.psm.com

PSM 7FA Series S0-S4 Compressor Stators

PSM Stage 0 through Stage 4 Compressor Stators compatible with General Electric Frame 7FA+e gas turbine are now commercially available for the “Flared” compressor design. The stators have been field validated under normal commercial service.

OEM components for the S0-S4 application are difficult to remove from the engine. Engine removal is hindered by the physical size of the stator carrier rings and the material. The material corrodes in the engine and locks up in the compressor case. Engine operators have, on occasion, resorted to using torches, jackhammers and cut-off saws to destructively remove the stators from the engine. PSM has mitigated these issues by making smaller carrier segments, adding a groove in the carrier for attaching tooling to ease disassembly, and most importantly changing the material to a higher grade alloy which is significantly more resistant to corroding and locking-up.



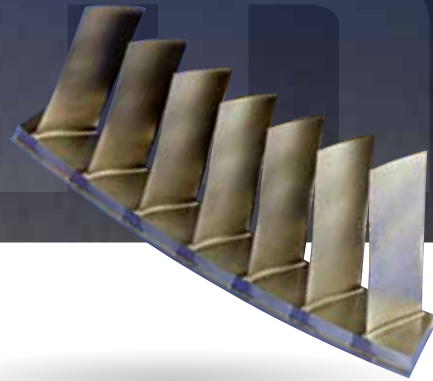
In addition to the maintenance issue associated with corroded, locked up vane carriers, several in-service engine failures have been reported to result from high cycle fatigue (HCF) failures of stator components. PSM instrumented the OEM vanes with strain gauges and determined HCF failure mechanisms are related to the locked up stators. For S0, S1, S2 and S4, potential HCF issues are mitigated by changing the carrier material to eliminate corrosion and prevent lock up. The PSM design vane carrier also addresses the shim migration issue by closing down the tolerances on the vane carriers to eliminate the need for shims.

The engine test with OEM vanes instrumented by PSM also revealed that the S3 airfoil has an HCF crossing at 3600 rpm. The PSM S3 vane has been redesigned to eliminate this HCF crossing. In an effort to reduce the vibratory response of rotor blade 0 and 1, PSM has incorporated non-uniform spacing on the S0 and S1 stators.

IMPROVED RELIABILITY & AVAILABILITY

PSM's gas turbine compressor blades are made using advanced materials and design features to maximize durability and reliability of our components in your engines. **To accomplish this we:**

- + Identify the issues and failure mode in current OEM products
- + Use state-of-the-art analytical tools to model the issues
- + Use the same analytical tools to design and fabricate new hardware with longer life
- + Validate the product in real-world testing



The PSM S0-S4 stators are fully interchangeable as sets and require no other machine modification. Due to the complexity of removing the OEM equipment, the PSM parts are best installed during a major outage.

Example of Design Improvements Incorporated in the S0-S4 Design

- + Changed Carrier Material to Non Corrosive High Grade Alloy
- + Made Carrier Segments Smaller to Add Damping and Ease Disassembly
- + Added a Groove to Attach Tooling to Ease Disassembly
- + Close Down Tolerances to Eliminate the Need for Shims
- + Redesigned Stator 3 Vane to Eliminate HCF Failures
- + Non-Uniform Vane Spacing to Reduce Rotor Blade 0 and 1 Vibratory Response

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