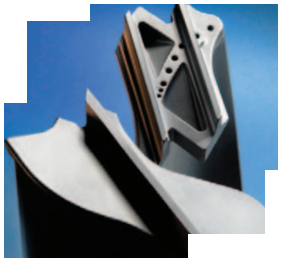
The **Proven** Alternative

PSM 7FA SERIES Compatible Turbine Airfoils



PSM's complete line of airfoils, compatible with the General Electric 7FA series gas turbines, has been redesigned to address the life-limiting elements of existing designs. The parts are designed to deliver 24,000 Factored Fired Hours (FFH) and 900 Factored Starts (FS) operational intervals or longer before requiring reconditioning/repair, and to have lower fall-out (scrap) rates during reconditioning. Total life of each component is designed to be equal to or greater than the OEM part it replaces.

Thermodynamic performance of all parts is equal to the OEM parts they replace — thereby assuring true interchangeability and maintaining engine output, efficiency, and emissions.

Scope of Supply for GE7FA Series Turbine Section

PSM parts are interchangeable with OEM parts in 7FA engine models 7221 (7FA), 7231 (7FA+), and 7241 (7FA+e) as indicated in the table.

GE 7FA Series Compatible Parts	Buckets	Nozzles	Shroud Blocks
Turbine Stage 1	7231, 7241	7231, 7241	7231, 7241
Turbine Stage 2	7221, 7231, 7241	7221, 7231, 7241	7221, 7231, 7241
Turbine Stage 3	7221, 7231, 7241	7221, 7231, 7241	7221, 7231, 7241

INCREASED DURABILITY

The Proven Alternative

PSM's turbine airfoils are made using advanced materials, coatings, cooling schemes, and design features to maximize durability and reliability of our components in your engines. **To accomplish this we:**

+ Identify the issues and failure modes in current OEM replacement 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 engine testing

SUMMARY OF FEATURES

PSM 7FA Compatible 1st Stage Nozzles

Flow has been redistributed to reduce stresses in identified regions on OEM platforms

+ ID platform cooling modified to mitigate distressed regions with ID inter-segment erosion and cracking and airfoil ID pressure-side cracking
+ Utilization of full thermal barrier coating (TBC) reduces airfoil stresses by 28%
+ ID rail scallop cut improves platform flexibility and reduces airfoil stress by 30%

PSM 7FA Compatible 2nd & 3rd Stage Nozzles

Part life was increased by incorporating an improved nickel-based weldable IN939 developed in conjunction with a leading alloy supplier to provide both higher creep strength and higher tensile strength

PSM 7FA Compatible 1st Stage Buckets

+ Added platform cooling incorporated to reduce strain by 15% at the leading edge and 20% at the trailing edge platform locations. Total part cooling flow was maintained
+ Improvements to the pressure side tip cooling have reduced the average tip surface (not bulk average) temperature by 70ºF

PSM 7FA Compatible 2nd & 3rd Stage Buckets

Row 2 Buckets:

+ Bucket alloy was changed to a creep resistant equiax nickel alloy to reduce shroud lift
+ An improved shroud design with cast-in cutter tooth design was used
+ Airfoil cooling was optimized with a new 11-hole design
+ Thermal barrier coating for added oxidation protection

Row 3 Buckets:

+ Bucket alloy was changed to a creep-resistant nickel alloy
+ Improved airfoil coating

PSM 7FA Compatible 1st, 2nd, & 3rd Stage Shroud Blocks

+ On 1st stage shrouds, PSM has corrected the Thermal Mechanical Fatigue (TMF) caused by inflowing hot gas between shroud segments that have led to observed failures of the part
+ 1st stage shrouds also feature increased tile cooling and DVC TBC coating
+ Blocks and tiles are sealed using PSM's patented flexible seals
+ PSM offers equivalent honeycomb design shroud block sets for second and third stage shroud blocks

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