

Frame 6001B Nozzles



Turbine Services offers turbine nozzles for all three stages of the Frame 6B gas turbine.

All stages of Nozzles are designed within the Turbine Services group of companies. Our experience in servicing turbine nozzles throughout their life cycle has provided a unique insight into designing a high quality product that is compatible with the original equipment.

1st Stage Nozzle

The first stage nozzle is manufactured through an investment casting process utilizing an advanced Cobalt-based super alloy. We have incorporated design features in the airfoil to help reduce life limiting conditions such as segment partition and sidewall cracking, cooling hole cracking, sidewall erosion and oxidation. Utilizing our Life Cycle Extension technologies, we apply a thermal barrier coating (TBC) for improved durability and longer life. In addition, we have incorporated an enhanced cooling circuit consisting of improved side wall cooling and increased trailing edge cooling hole sizes, as well as an up-rated core plug to allow the nozzle to operate at up-rated firing temperatures 2055 to 2084 °F (1124 to 1140 °C). The nozzle includes an improved nozzle support ring sealing feature (chordal hinge) to improve efficiency of the gas turbine.

2nd and 3rd Stage Nozzles

Second and third stage nozzle segments are also manufactured through an investment casting process but utilize an advanced Nickel-based superalloy IN939. IN939 was selected to meet customer expectations of service life, and repairability.

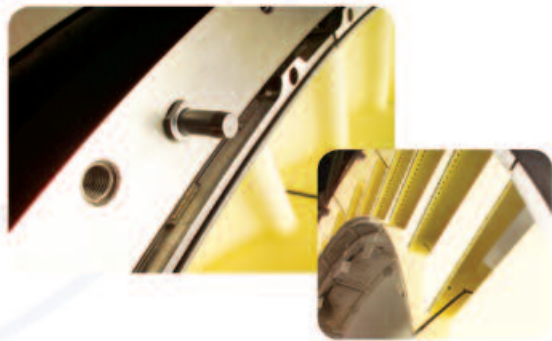
IN939 is similar to material being used by the OEM, it offers improved creep strength over the original Cobalt-based material FSX-414 and is weld repairable.

In addition, we have included a reduced cooling air flow design (improved from the older Cobalt-based alloy nozzle) that incorporates an improved core plug and internal impingement cooling pattern for the second stage nozzle. This reduction in cooling air to the nozzle can result in performance benefits. We have used a non-pressurized diaphragm cooling circuit to optimize cooling flow to the wheel spaces. The third stage nozzle is not air cooled. We also apply an aluminide coating to the nozzle airfoil surface to provide added oxidation resistance to the second stage nozzle. Both second and third stage nozzles are capable of operating at up-rated 2055 to 2084°F (1124 to 1140°C) firing temperature.



Stage 1 Nozzle (S1N)

Firing Temp	Suitable for all firing temperatures
Design	Two Vane Segments mounted in a retaining ring.
Material	FSX414 - A Cobalt based super alloy which is the same as used by OEM. Coating TBC applied to airfoil section and inner and outer sidewalls
Coating	TBC applied to airfoil section and inner and outer sidewalls
Cooling	Improved trailing edge film cooling. Addition of side wall cooling. Improved core plug cooling.
Sealing	Improved sealing to reduce leakage at Nozzle support ring (chordal hinge).



Stage 2 Nozzle (S2N)

Firing Temp	Suitable for all firing temperatures
Design	Three Vane Segments
Material	IN939 - A Nickel based super alloy. This is much more creep resistant than the original design made from FSX414 and is similar in properties to the OEM's.
Coating	Aluminide coating to improve Oxidation resistance.
Cooling	Improved core plug and internal airfoil impingement cooling
Sealing	"Q-tip" shaped inter-segment seals for improved sealing and durability.

Stage 3 Nozzle (S3N)

Firing Temp	Suitable for all firing temperatures
Design	Four Vane Segments
Material	IN939 - A Nickel based super alloy. This is much more creep resistant than the original design made from FSX414 and is similar in properties to the OEM's.
Cooling	Not cooled
Sealing	"Q-tip" shaped inter-segment seals for improved sealing and durability.



TURBINE SERVICES is a global provider to owners and operators of industrial gas turbines, offering an employee skill-base in excess of 2,000 man-years of experience in gas turbine maintenance solutions. With our heritage in John Brown Engineering, our primary specialization is in the heavy duty frame range of GE designed gas turbines.

Our business is founded on the strength of our technical and engineering capability, reinforced by our commitment to quality and customer satisfaction that is demonstrated by our accreditations (ISO 9001:2000) and registrations (Achilles, Supply Line, FPAL and Repro).

In addition to our extensive experience, our customers also benefit from the high-tech capabilities of our parent company, Chromalloy. Leading the industry in advanced technology derived from 60 years of aero and industrial gas turbine component experience, we offer state-of-the-art component, repair, coating and manufacturing technologies.

Turbine Services is a division of Chromalloy Gas Turbine Corporation with interests in the global Aero & Industrial Gas Turbine market sector.

Services include:

- Plant operation & maintenance
- Field & engineering support
- Component refurbishment
- Replacement spare parts
- Turbine control systems
- Plant operator training
- Rotor Overhaul
- Condition Monitoring
- Long Term Service Agreements
- Turbine Refurbishment



Gas Turbine | Maintenance | Repairs | Spares | Parts

Turbine Services

Ground Floor, Venture Building, Kelvin Campus
West of Scotland Science Park, Glasgow G20 0SP, Scotland, UK
Office: +44 141 945 7000, Fax: +44 141 945 7001
info@turbineserviceslimited.com | www.turbineserviceslimited.com
www.chromalloy.com