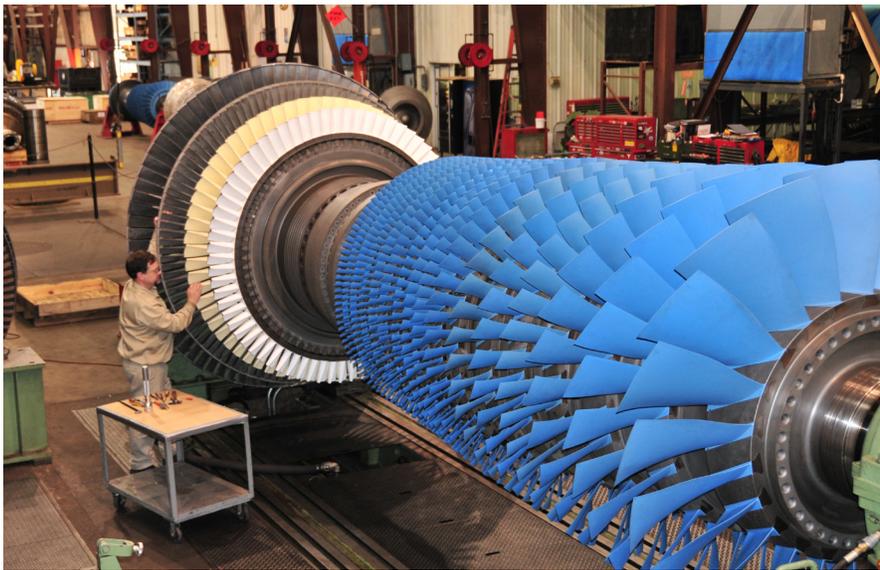


Sulzer Turbo Services

W501F / SGT6 - 5000F Repair



Turbine Section

- Vane repair and full coupon replacement
- Blade repair, including R1 modifications
- TBC and hot corrosion coatings

Manufacturing

- Compressor blades (Rotor)
- Rotor bolting

Compressor Diaphragm Repair

Outer sidewall spigot surfaces are subjected to severe fretting and premature wear due to excessive vibration in the compressor case. The worn surfaces are a result of airfoil motion being transmitted to the hook fits. Sulzer Turbo Services has developed specific procedures to repair the fretting

This 200 MW class gas turbine fleet has logged more than 3 million hours of operational time with many of the units now into their second major inspection cycles. To meet the demands of this maturing fleet, Sulzer Turbo Services has invested significant resources in capital, tooling and repair procedures with extraordinary standards.

which are then fit to 360°, heavy wall fixtures to insure correct spigot fit geometry. In all, airfoil repair, spigot fit welding, recontouring, rounding and flattening of the compressor diaphragms and coatings are all completed at Sulzer Turbo Services.

SGT6-5000F Capabilities

On-Site Work

- Combustion and hot gas path inspections
 - "In situ Belly Band" replacement
- Major inspection and overhauls

Rotor Repair

- Class IIA inspection
 - Compressor blade removal and installation
- Class IIB inspection
 - Air baffle replacement
 - Curvic clutch contact pattern analysis

Combustion System Repair

- Transition repair
- Combustor basket repair
- Fuel nozzle flow testing and repair
- TBC and hard face coatings



S1 Vane Repair, Fixture Check



R1 Vane Repair



R1 Vane Fixture Check

Vane Repair via Foil Coupon

Intricate cooling passages and complex geometries throughout the W501F vanes present significant challenges in the restoration process. With the advancement of full foil coupon replacement, Sulzer Turbo Services can now repair vane segments that would have been scrapped. This level of repair is only achieved through state-of-the-art EDM, highly specialized tooling and world class technicians. Sulzer Turbo Services facilities are equipped with the latest in technological advancements and continually train each craftsman.

Flow Test - Air and Liquid

Sulzer Turbo Services utilizes state-of-the-art sonic nozzle flow testing technology. The fuel nozzle flow bench is comprised of an air flow metering system that utilizes ten sonic nozzles housed in a common inlet and exit manifold designed to meter the flow through the fuel nozzle circuits. Each fuel nozzle assembly is visually and non-destructively tested for deviations and failures in efforts to achieve the most reliable, repeatable and accurate fuel nozzle system possible. Each flow circuit has specially designed fixtures that allow accurate flow measurements. The flow test system automatically opens and closes



Flow Testing Area

the sonic nozzles, sets the proper pressure at the circuit being tested and calculates the mass flow through the sonic nozzles.

Additionally, the system monitors the airflow conditions to insure the sonic nozzles are in a "choked" state and that flow is stable within +/- 0.1% of the set pressure ratio.

Liquid System

The System Controller handles the operation of the prime movers, sets the proper pressure at the Unit Under Test (UUT) and calculates the flow number through the UUT. The controller also monitors the liquid flow conditions to insure that the flow is stable within +/- 0.1% of the pressure ratio set point.

Blade Repair and TBC Coating

Sulzer Turbo Services has developed and qualified repair procedures to fully repair R1 – R4 turbine blades. All coating removal, heat treatment repairs and new coatings are completed at Sulzer Turbo Services, which are strictly monitored by on-site lab analysis.

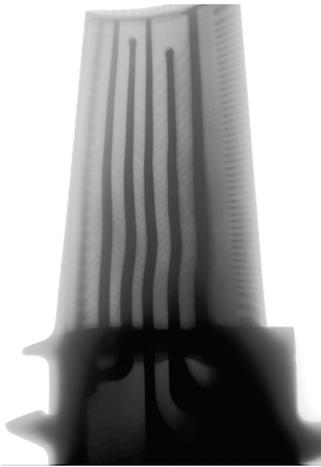
Solving the R1 problem with severe "pressure side" platform cracking, Sulzer Turbo Services developed a patented procedure, where the cracking is excavated and fully repaired.



W501F R1 Turbine Blade



W501F R1 Blade, Fully Reconditioned and Coated with Advanced TBC

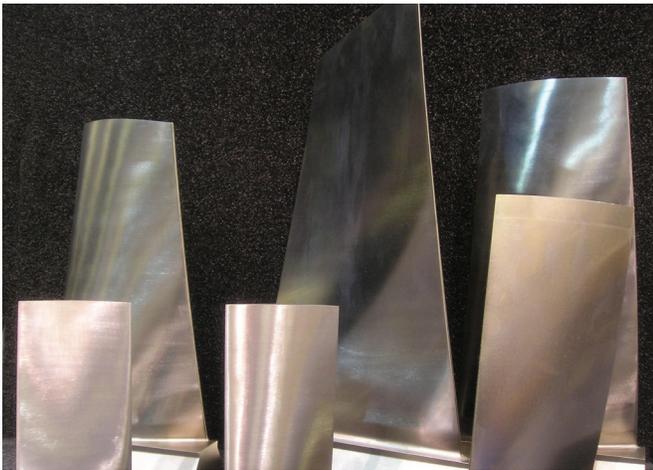


Digital X-Ray of R1 Blade Cavity

Precision manipulation of the components while digitally enhancing the image allows the operator to pin-point previously undetected irregularities.

Blade Manufacturing

Sulzer Turbo Services manufactures and stocks W501FD rotor compressor blades. Via precision air foil machine with advanced CNC mills, all blades are manufactured and coated at the La Porte facility. Strict QC inspections verify machining accuracy.



Compressor Blades Manufactured by Sulzer Turbo Services



W501F Rotor

Digital X-Ray

Digital X-Ray has opened a window into the most vulnerable areas of gas turbine components. Turbine blades, vanes, fuel nozzle components, transitions and inlet guide vane shafts are regularly inspected for plugged cooling holes and indications in cooling passages. Real-time, digital imagery enables Sulzer Turbo Services to view and document indications and irregularities well into the cooling cavities and across the length of the material



Digital X-Ray

501F Transition Repair

Sulzer Turbo Services repairs the original design transitions, as well as the PSM design transitions. Full 360° fixtures are utilized to check all critical fit up and picture frame dimensions. Routine repairs include picture frame replacement, panel replacement, vacuum heat treatment and where necessary, full digital X-Ray of the cooling hole passages.



W501F Transition Repair in Full 360° Simulator Fixture

501F Rotor Repair

For the last 25 years, Sulzer Turbo Services has lead the 3rd party repair facilities in gas turbine rotor repair. Specialized tooling, engineering, heavy balancing and machining capabilities have allowed for a smooth transition from mature frame W501 rotors to the advanced 501F rotors. Sulzer Turbo Services has successfully repaired 501F rotors, including machining, turbine and compressor deblading / reblading, air baffle replacement and precision dynamic balancing. All rotor coatings, including compressor coating and turbine blade coatings are completed on-site in the Sulzer Turbo Services coating facility.

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