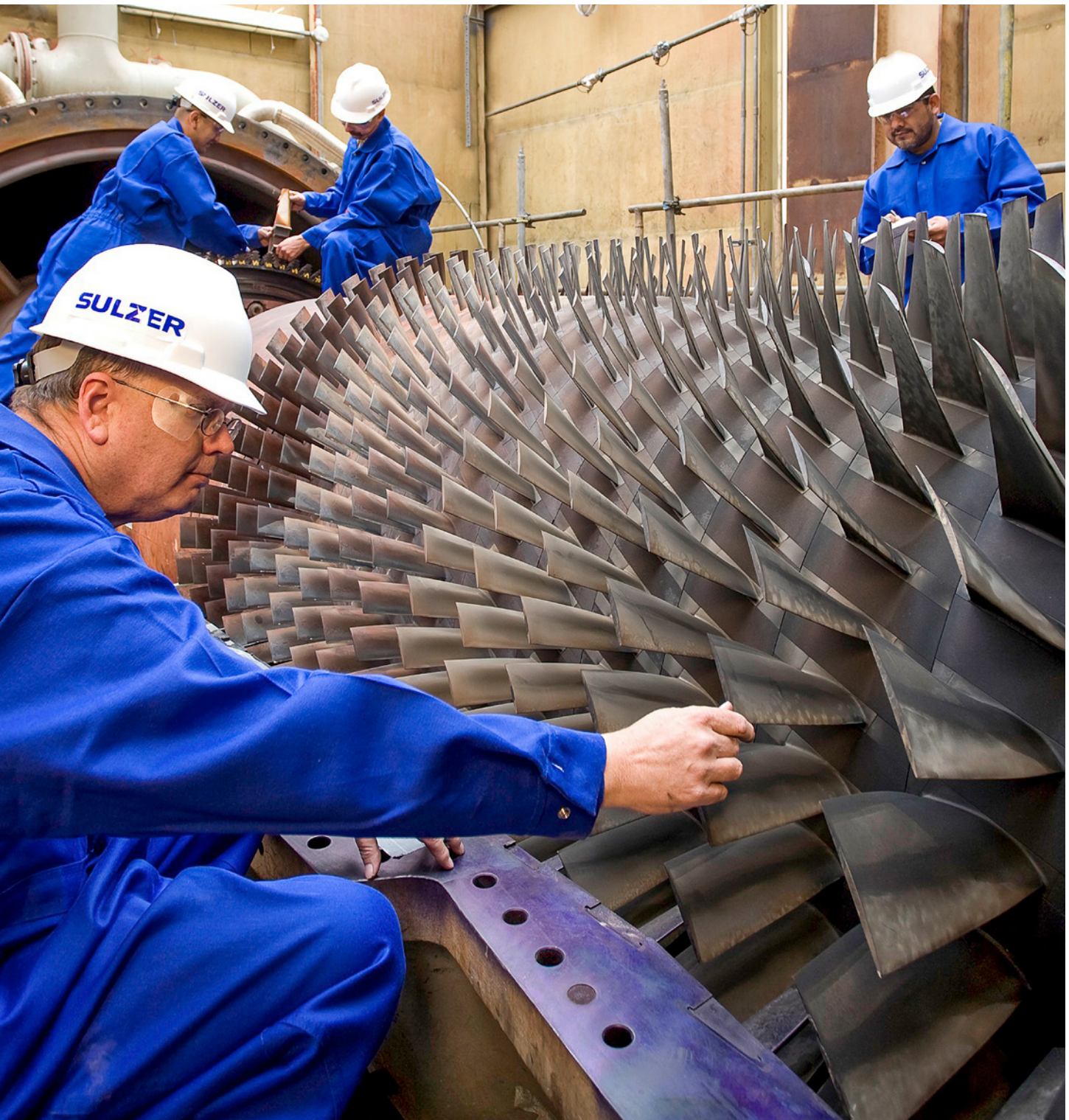


# F-class turbine capabilities and services



Performance-critical equipment needs reliable and innovative performance-critical solutions. Sulzer is the leading service provider for rotating equipment. Founded in 1834, Sulzer is a global company with over 150 locations. Our La Porte, Texas, facility specializes in high-quality, cost-effective, customized solutions for the repair and maintenance of GE and Siemens F-class industrial gas turbines. Sulzer's in-house capabilities at the La Porte facility are second to none. With world-class engineering know-how and metallurgy experts to oversee all aspects of F-class industrial gas turbine maintenance, repairs, refurbishments, specialized coatings, and flow testing, you are assured of superior-quality service. We help you keep your F-class industrial gas turbines operating at peak efficiency.



# Turnkey field services

Sulzer has a dedicated staff of technical directors, diagnostic engineers, supervisors, and skilled technicians that can provide complete machinery turnaround staffing and emergency services.

- CI's, HGP's and major overhauls
- Eddy current inspection of turbine disks
- Diagnostics
- Upgrades

GE 7FA turbine onsite inspection



# Rotor overhaul services

Sulzer is a world-class leader in the development of repair procedures and tooling for F-class turbines, including the rotor assemblies. The F-class rotor is much larger than the Frame 7EA (3-bearing style) rotors and it has a 2-bearing design, with compressor and turbine combined thus requiring special tooling and fixtures to lift and/or maneuver the rotor. Sulzer has made large investments in special tooling and handling equipment to make repairs efficient and safe. F-class industrial gas turbine rotor overhaul services include:

- Incoming visual and dimensional inspections
- Rotor unstacking and deblading
- NDE inspection including Eddy current turbine disks
- New blading manufacture
- Reblading and inserting centering fits
- Replacement of thru bolts and marriage bolts
- Reblading and tip grinding new blades
- 2-plane balancing of each disc
- Rotor restacking and stretching thru bolts
- Moment balancing of turbine buckets
- Computer charting
- Balancing and reassembling rotors
- Dynamic balancing assembled rotor

# Component inspections and testing services

All F-class industrial gas turbine repairs and services begin with a thorough inspection by our highly-skilled staff. Our engineers and technical experts perform comprehensive inspections and offer a variety of specialized testing services to ensure the best solutions for all repairs. Sulzer also offers industrial fuel nozzle inspections, repairs and flow testing services. Inspection and testing services include:

## Inspection and testing services

- In-house NDT-Zygo®, dye penetrant, digital x-ray
- Destructive testing
- All measurement tools are tracked and calibrated on a scheduling/tracking software throughout the company
- Eddy current inspection for flaw detections
- UT Inspection for wall thickness evaluations
- All inspections are reviewed by our staff engineers
- Visual dimensional inspections
- Mag particle inspection

## Metallurgy services

- Fully-staffed, in-house laboratory
- Scanning electron microscope
- Life assessment analysis (IGT component)
- Gas turbine rotor life assessment
- Automatic specimen prepping and evaluation equipment
- Material sample report provided before each repair



Metallurgical lab

## Digital x-ray analysis

Digital x-ray has opened a window into the most vulnerable areas of gas turbine components. Turbine blades, vanes, fuel nozzle components, transitions, and shafts are regularly inspected for plugged cooling holes and indications in cooling passages. Real-time, digital imagery enables Sulzer to view and document indications and irregularities well into the cooling cavities and across the length of the material wall. Precision manipulation of the components while digitally enhancing the image allows the operator to pin-point previously undetected irregularities.



GE 7FA 1st stage bucket



Digital x-ray of fuel nozzles

# Comprehensive hot section component repairs and services

Sulzer offers a wide spectrum of F-class industrial gas turbine hot section component repairs and services that are state-of-the-art and keep your equipment running at optimal performance. With quick turnaround times, F-class industrial gas turbine hot section components repairs and services include combustion liners, transition pieces, nozzles, shrouds, and buckets are expertly serviced to improve equipment reliability and minimize downtime. Component repairs and services include:

## Combustion liners

- Body panel replacement
- Flow testing and x-ray inspection
- Complete hardware manufacturing
- Weld repair and CNC machining
- Vacuum furnace heat treatment
- Assembly and installation

## Transition pieces

- Inspection and 360° simulation fixture
- Picture frame replacement
- Complete hardware manufacturing
- Weld repair
- Anti-wear hard-face coating
- Advanced TBCs

## Blades

- Tip welding restoration with micro-plasma method in inert chamber
- Turbine simulation fixturing for dimensional checks
- Vacuum furnace heat treatment
- Upgrades and modifications
- Flow testing and x-ray inspection

## Fuel nozzle inspections, repairs and flow testing services

- DLN 2.0 and 2.6
- Incoming inspections
- Repairs and hardware replacement
- Field inspection including on-site equipment inspections utilizing a borescope

Flow testing with state-of-the-art sonic nozzle technology with the below capabilities:

## Liquid and gas flow circuit testing

### Parts test parameters

- Determines the mass flow and flow parameters at specified test pressure ratios
- Sets an upper and lower acceptance limit based upon a defined tolerance

### Auto tuning routine

- Automatically determines the testing parameters to optimize testing time

### Parts master routine

- Measures the repeatability, average and percent difference of a series of flow tests through a master part

### Pressure probing

- Allows the operator to measure the pressure ratio of a single hole

### Leak testing

- System leak checks for ensuring integrity of the entire system

## Nozzles

- Coupon airfoil repairs
- 360° slide thru fixturing
- Flow testing and x-ray inspection
- Vacuum furnace heat treatment
- Weld and braze rebuild
- CNC EDM for the cooling holes after weld repairs



501F vane final assembly

# Specialized coatings

Our specialized coatings protect your industrial gas turbine components from corrosion and provide extra protection to equipment. Specialized coatings include:

- Class C plasma TBC
- Class B plasma TBC
- Abradable TBC
- XTR F-class coating
- Aluminide coating
- HVOF chrome carbide coating
- Vacuum diffusion of coating
- All with 8-axis robotic application

## Additional component services

In addition to industrial gas turbine component repairs, Sulzer offers the following additional services to better service our customers:

- Inspection of new components and qualifying components for pre-service
- Incoming and post-repair inspections
- Failure analysis
- New parts manufacturing (casting and forging)
- Reverse engineering



Fully robotic coating application



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