

# Turbine Services, Ltd. Group

[www.turbineservicesgroup.com](http://www.turbineservicesgroup.com)



Delivering Quality Anywhere In The World



Replacement Parts  
for GE Design Large Frame  
Gas Turbines

[www.turbineservices.com](http://www.turbineservices.com)



Replacement Parts  
for GE Design and Westinghouse  
Design Steam Turbines

[www.steamspecialtiesinc.com](http://www.steamspecialtiesinc.com)



Replacement Parts  
for Westinghouse Design  
Gas Turbines

[www.tuscocorp.com](http://www.tuscocorp.com)

The Turbine Services, Ltd. Group® has excelled for thirty years with the stamp of approval of Original Equipment Manufacturers such as Thomassen, Alstom and Kvaerner Energy/John Brown Eng. and through customer satisfaction to become recognized as a worldwide, full line supplier of General Electric Company and Westinghouse Corporation designed heavy duty gas and steam turbine replacement parts. We are the largest non-OEM supplier of these parts in the world

Today the Turbine Services, Ltd. Group supplies replacement parts to over six hundred customers worldwide. With hundreds of years of combined staff hands-on OEM experience, TSL has become established as a supplier to the General Electric Company's and Westinghouse Corporation's industrial, pipeline and utility customers throughout the world.

Within our facility you will find TSL's vast amount of inventory and highly experienced personnel guaranteeing accurate and immediate responses to any customer inquiry, ensuring a prompt delivery every time. We at TSL assure our customers quality parts, further reinforced by our ISO 9001:2008 certification, developed with state of the art technology, extensive OEM experience and true American pride in our work.

Customers deal with the Turbine Services, Ltd. Group for very simple reasons:

- QUALITY EQUAL TO IF NOT EXCEEDING OEM STANDARDS
- LOWER PRICES
- FASTER SERVICE

The Turbine Services, Ltd. Group sells new parts only and is not in the repair or surplus business. We are not distracted by any other business endeavor, allowing us to be focused on servicing our customers.

We thank you for your interest in Turbine Services, Ltd. Group.

Sincerely,



Ronald A. Riggi  
Chief Executive Officer



TSL is a registered trademark of Turbine Services Ltd.



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# Turbine Services, Ltd.

## Replacement Parts for GE Design Large Frame Gas Turbines

Turbine Services, Ltd. is the pioneer in supplying non OEM replacement parts for General Electric Company heavy duty gas turbines.

Over the years we have engineered hundreds of products and today TSL stands as the largest full line supplier for virtually all GE gas turbine models. Our continued effort to be at the forefront of product improvement and innovation (through new technology uprates and service life extension packages, SL+™) has put TSL in a league above the competition.

Today our product quality, low pricing, impeccable service and short delivery time, backed by our ISO 9001:2008 certification have established Turbine Services, Ltd. as a market leader. TSL has successfully supplied replacement parts to more than 600 customers worldwide, including original equipment manufacturers such as Thomassen and Alstom.

Since 1972, our purpose and mission statement remain unchanged: **To provide the highest quality product anywhere around the globe with the best service and delivery time.**



The value of Turbine Services Limited is best represented by the loyalty of our customers. We have proudly served customers from around the globe including the following:

- Shell
- Exxon
- EDF
- Chevron/Texaco
- E.ON Rhurgas
- TurboCare
- TransCanada
- Hess Oil
- Dubai Petroleum
- Thomassen

“Overall, we are very pleased with your products and services. Recently, I visited your establishment and I was very impressed with your procedures, inventory, QA/QC and the facilities. I shared my impressions with our purchasing department and requested that we continue to consider you a preferred vendor.”

– Geoff McDonough, Texas Gas

“The professionalism of the employees is head and shoulders above any other company that I deal with, and I do deal with many. From the time I initiate my phone call I am greeted, very warmly, yet very professionally, to the time I speak to your sales people, I get that same feeling. The knowledge that your sales people, especially Warren Peck and Gordon Ray astound me. How they can know part numbers off of the top of their heads is awesome. Please convey my heartfelt thanks to your entire staff for making the task of doing business a pleasure”

– Tony Tesoriero, Astoria



# Turbine Services, Ltd.

Replacement Parts for GE Design Large Frame Gas Turbines

## FRAME SIZES

- MS3002
- MS5002
- MS5001
- MS5001 HI-TECH
- MS6001
- MS7001
- MS9001

## COMPRESSOR

- Rotor Blades
- Stator Blades
- Inlet Guide Vanes

## COMBUSTION

- Fuel Nozzles
- Transition Piece
- Combustion Liner
- Cross fire tubes
- Fuel Nozzles
- Elbows

## SL+™ COMBUSTION

- Fuel Nozzle Cap
- Transition Piece
- Combustion Liners
- Cross fire tubes

## TURBINE

### Buckets

- 1st Stage
- 2nd Stage
- 3rd Stage
- Cover Plates
- Bucket hardware

### Nozzles

- 1st Stage
- 2nd Stage
- 3rd Stage
- Nozzle hardware

### Shrouds

- 1st Stage
- 2nd Stage
- Inner
- Outer
- Shroud hardware

### Support Pin

## ACCESSORIES

- Bearings
- Deflectors
- Seals
- Valves
- Flame detectors
- Ignition transformers/Igniters
- Thermocouples
- Fuel pumps
- Flow dividers
- Control cards
- Accessory gear couplings
- Load couplings
- Hardware



MS6001 Stage 3 Nozzle



MS9001 Buckets



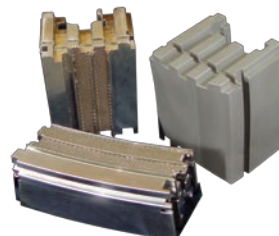
MS6001 & MS9001  
Inlet Guide Vane



MS3002 Support Pin



Gaskets



Shrouds



Fuel Pumps & Flow Dividers

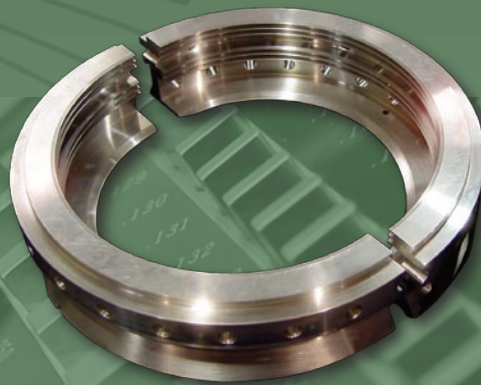
Turbine Services, Ltd. offers a truly comprehensive range of products for G.E heavy duty gas turbines. Our product lines cater directly to the latest style parts for both generator drive and mechanical drive turbines.



MS9001 Combustion Liner



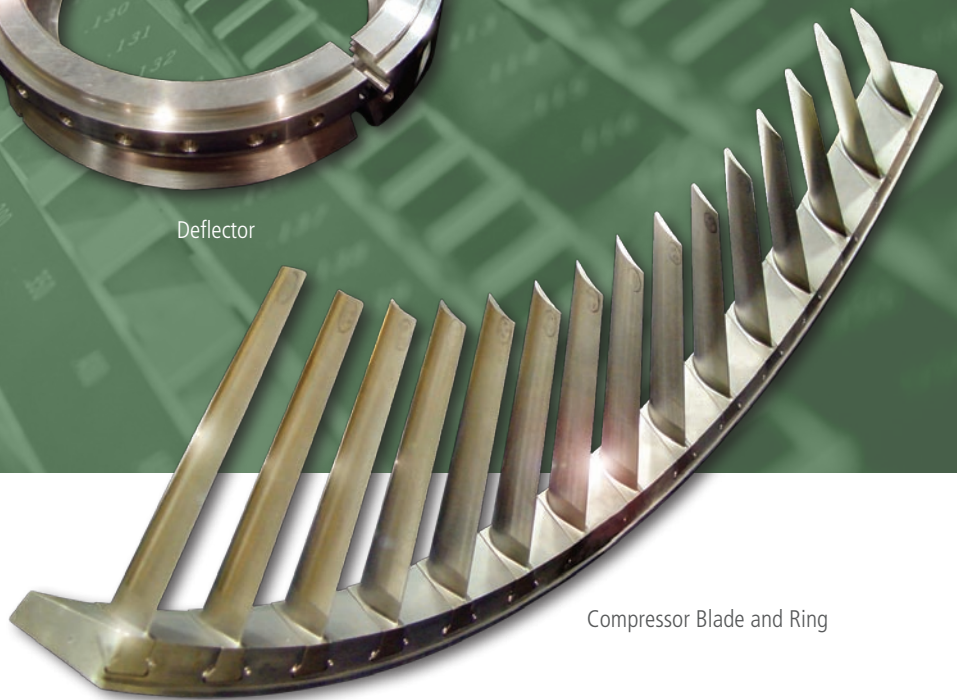
MS3002 Buckets



Deflector



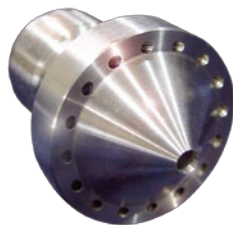
Electronic Accessories



Compressor Blade and Ring



Nozzles



Fuel Nozzle Accessories



Transition Piece



Hardware



# Steam Specialties, Inc.

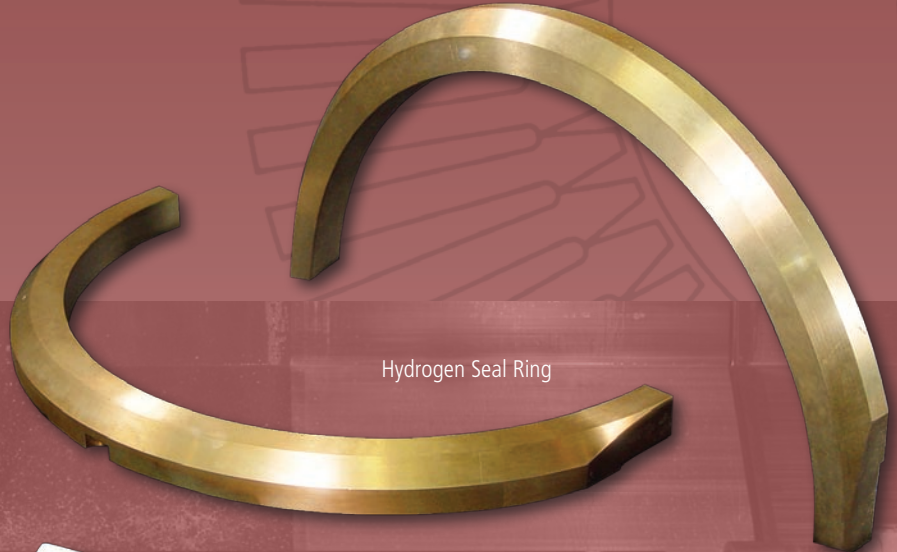
Replacement Parts for GE Design  
and Westinghouse Design Steam Turbines

[www.steamspecialtiesinc.com](http://www.steamspecialtiesinc.com)

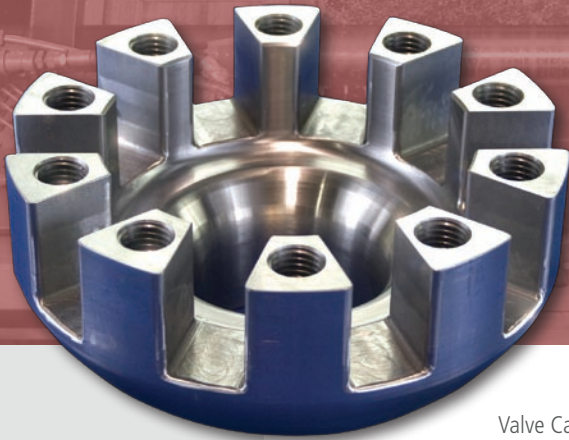
Steam Specialties, Inc. was incorporated in 1983 and is a worldwide supplier of replacement parts to owners of General Electric and Westinghouse small, medium and large steam turbines. Today, Steam Specialties, Inc. is a leader in the aftermarket business and is a supplier to almost every USA based utility. SSI's highly experienced service sales force and engineers ensure that the highest quality product is delivered to the customer with the shortest delivery time.



Bypass Valve



Hydrogen Seal Ring



Valve Cap



Worm Gear

The value of Steam Specialties, Inc. is best represented by the loyalty of our customers. We have proudly served customers from around the globe including the following:

- Florida Power & Light Co
- Florida Power Corp.
- Carolina Power & Light
- Reliant Energy Mid-Atlantic
- R.G Engineering
- Enelven

"Shane and all of the people around him have in all cases provided me with an outstanding service. Second to none. I utilize their services at every opportunity. Shane and his people go above and beyond the call when the need is there."

– Jay Satterfield, Progress Energy

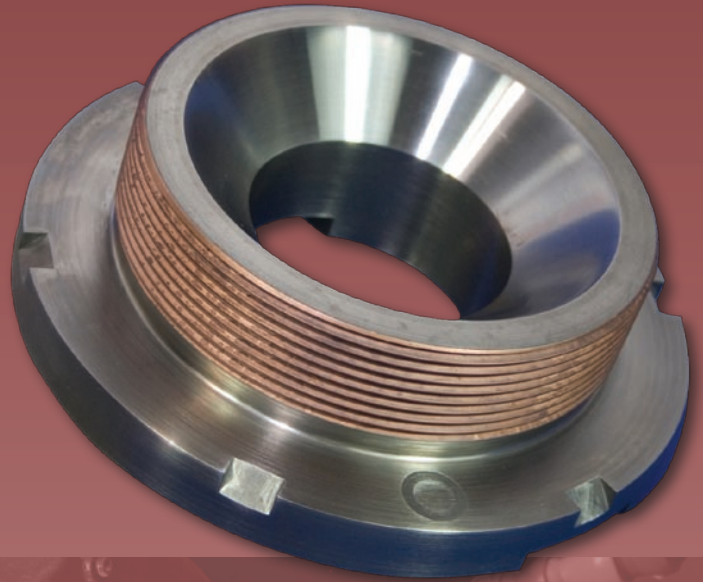
"I am completely satisfied with your company, personnel and service."

– Davene Cole, Public New Mexico

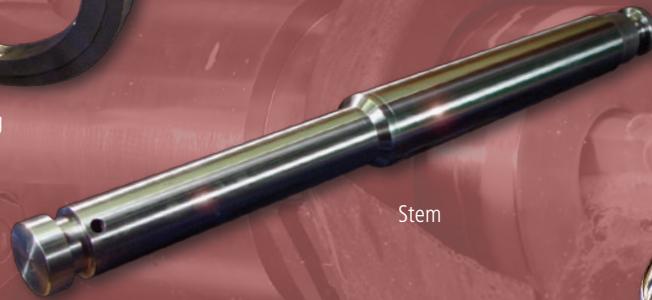
- Packing and Seal Rings
- Valve Assemblies
- Thrust and Journal Bearings
- Hardware
- Packing Rings
- Valves Stems
- Bushings
- Spill Strips
- Retaining Bands
- Hydraulic Cylinders
- Quill & Cam Shafts
- Thermocouples
- Seal Rings
- Oil Deflectors
- Sleeves
- Carbon Brushes
- Hydrogen Seal Rings
- Stems
- Caulking Strips
- Solenoids
- Impellers
- Piston Rings
- Retainers
- Spray Nozzles
- Gaskets & O Rings
- Atmospheric Diaphragms
- Collars
- Crossheads



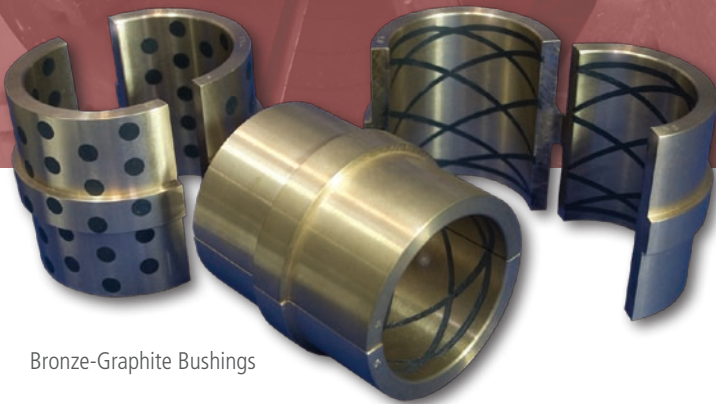
Pump Seal Ring



Cap



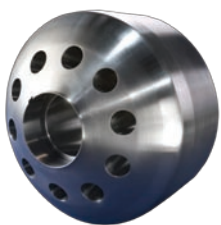
Stem



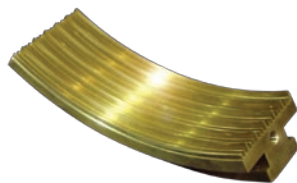
Bronze-Graphite Bushings



Control Valve



Valve Seat



Packing Ring



Bushing



Hex Nuts



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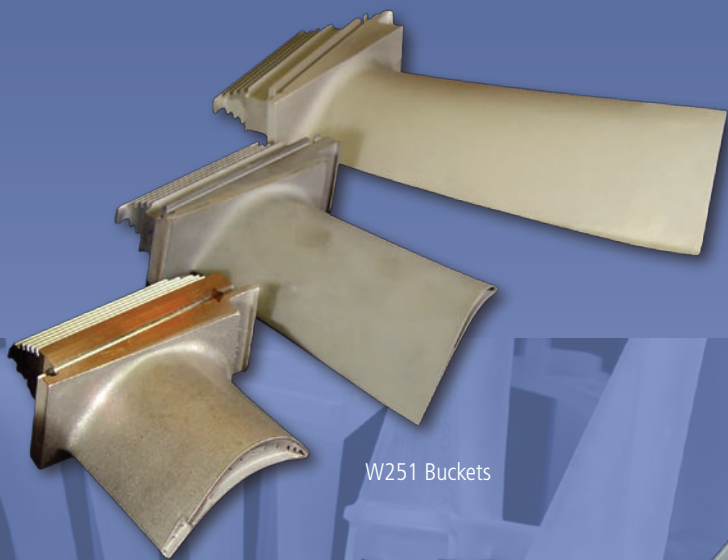
# Tusco Corporation

## Replacement Parts for Westinghouse Design Gas Turbines

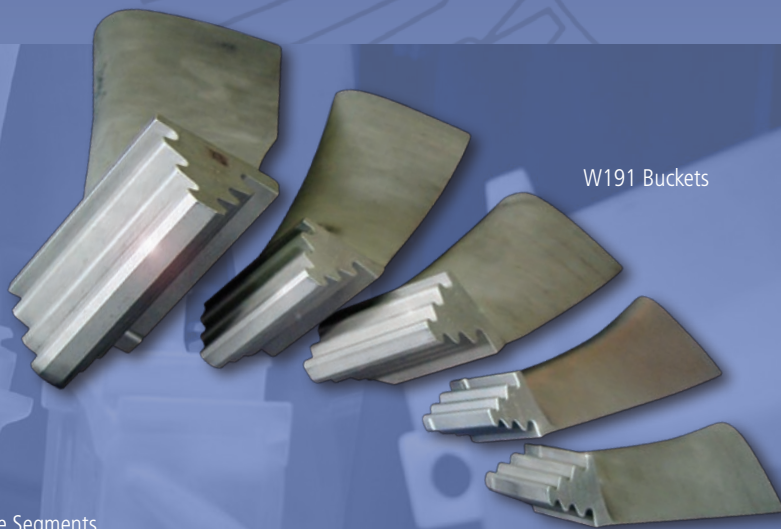
Tusco Corporation was established in 1978 and is a worldwide distributor and supplier of parts and accessories for the gas turbines of Westinghouse design and their respective licensees, including the gas turbine manufacture RS Fiat, ACEC, and Mitsubishi. We pride ourselves on customer satisfaction and competitive lead times. Our experienced sales force looks forward to answering all of your questions and providing you with the highest quality service.

### MACHINES WE SUPPORT

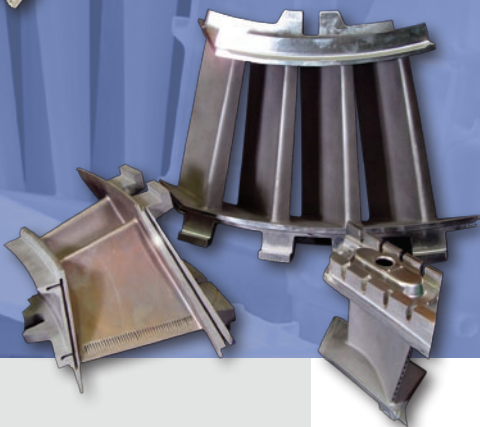
- W191
- W251 AA, B2-B8
- W501 AA, B, D, D5, D5A
- Turbine Blades
- Nozzles
- Ring Segments
- Compressor Rotor / Stator
- Combustion
- Bearings
- Fuel System Components
- Deflectors and Seals
- Igniters, Transformers, Leads
- Hardware



W251 Buckets



W191 Buckets



Nozzle Segments



Diaphragm

The value of Tusco Corporation is best represented by the loyalty of our customers. We have proudly served customers from around the globe including the following:

- Wood Group
- Chevron/ Texaco
- Sulzer
- Enelven
- EDF
- Dubai Petroleum
- El Paso Natural Gas
- Valero Refining



# Design and Manufacturing

Turbine Services, Ltd. parts are designed and manufactured using TSL's unique combination of turbine specific engineering, manufacturing and testing, ensuring the highest quality product to our customers. With 36 years of supplying parts which represent millions of aggregate turbine operating hours, TSL's engineering vast experience and expertise has established a reputation of a reliable source for the manufacturing of gas turbine replacement parts.

**DESIGN:** TSL engineering only uses state-of-the-art equipment and technology to analyze and design turbine components. These include:

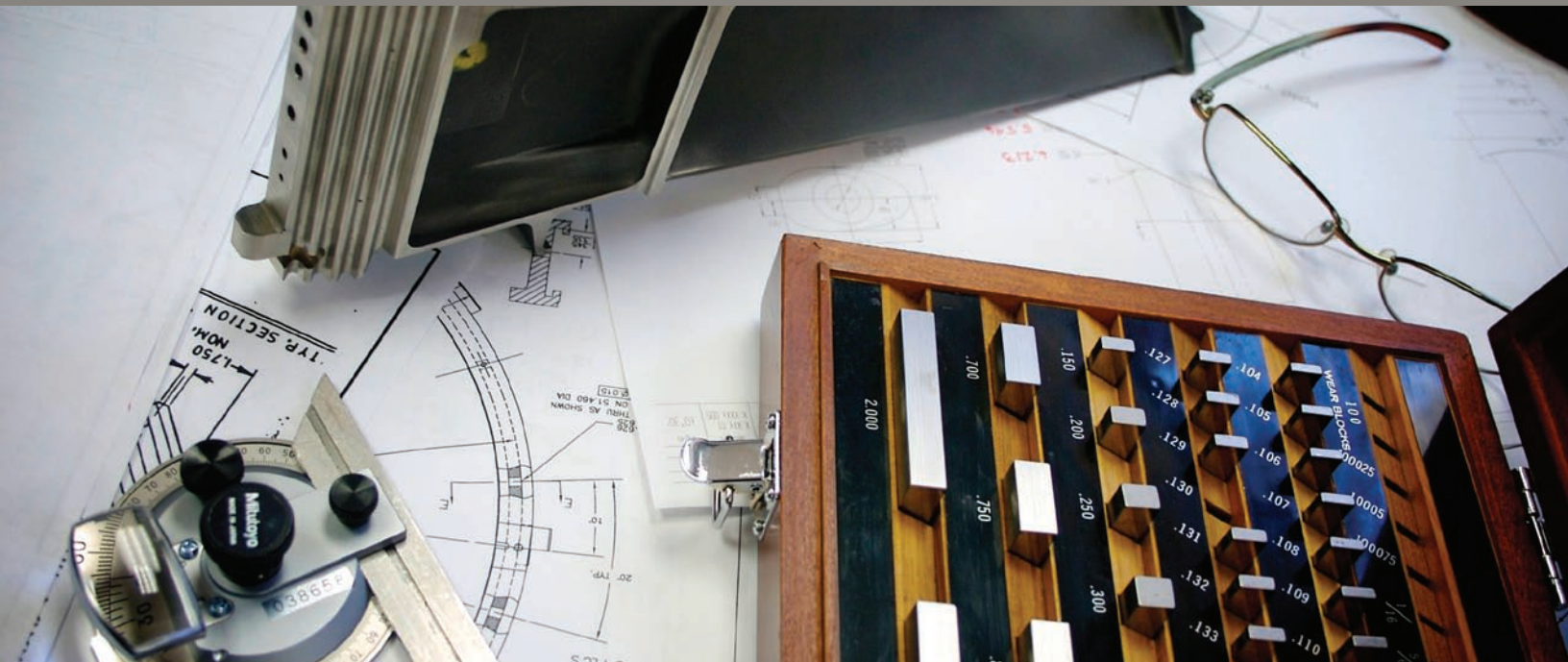
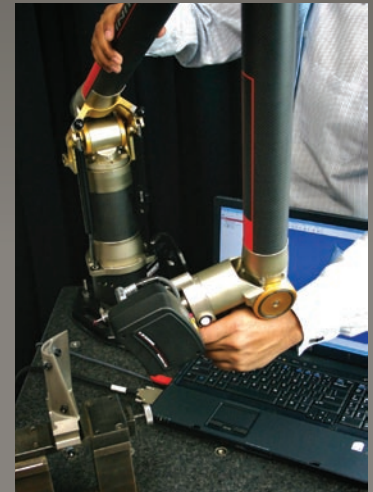
- NVision and GOM - ATOS for laser and white light 3D scanning of components
- PTC® Pro/Engineer and Kubotek® KeyCreator for 3D modeling and design
- Algor®, finite element analysis for structural, vibration and heat transfer analysis
- Stereo lithography prototyping for verification of design

These tools allow our engineering team to analyze, design, verify and validate parts that equal or exceed OEM standards, while substantially reducing our product-to-market development cycle. Since 1972 TSL has engineered more than 600 turbine components including more than 50 rotating blades and 30 different varieties of stationary vanes and diaphragms. The volume of engineered parts coupled with irreproachable customer satisfaction is vibrant proof of TSL engineering expertise and reliability.

**MANUFACTURING:** Turbine Services, Ltd. parts are manufactured by an array of qualified suppliers. Our suppliers all work to detailed TSL specifications which ensure the highest level of product uniformity and quality. Moreover our onsite audit and technical support programs allow our engineers to control and monitor all areas of manufacture.



The qualification and selection of TSL suppliers has also been key to the quality of our components. Backed by our ISO 9001:2008 programs we have developed stringent vendor approval qualifications with first article qualification on all turbine replacement parts. All of our suppliers use modern manufacturing technologies to continuously improve product quality and reduce development cycles. They also have rigorous process plans which ensure the highest integrity of production parts.



# Research and Development

**BRUSH SEAL:** Our latest Research and Development product is the Brush Seal engineered by TSL. The brush seal's application to nozzle diaphragms or inner barrel offer increased sealing effect during the steady state operation of the turbine by substantial reduction in clearances. The reduction in leakage improves the efficiency of the turbine which will transpose to increased power outputs and fuel costs savings to end users.



Brush Seals are an improvement to the labyrinth seal. The fixed teeth can be damaged by transients and contact between tooth and rotor. Thus, when clearances are compromised, the efficiency of the turbine drops. The TSL brush seal provides a solution to this as it provides an improved seal that can handle transients and can spring back to design clearance.

**SERVICE LIFE PLUS:** TSL engineering has developed the SL+™ package of improved gas turbine combustion parts. SL+™ combustion components increase unit availability by extending the gas turbine combustion inspection interval beyond industry standards. This is achieved by improved clearances, addition of wear resistant materials and addition of thermal barrier coatings. More specifically, SL+™ is applied to the following combustion components:



## Combustion Liner

Hard face coating on hula skirt, liner stops, cross fire tube collars and fuel nozzle collar ensures better positioning of the liner in the sleeve eliminating the possibility of axial interference and increases wear resistance of the liner.

## Cross Fire Tube

Hard face coating on the mating surface reduces clearance and increases wear resistance.



## Transition Piece

- **Guide Block / Bull Horn:** Hardened inserts on H-blocks and mating bull horn surface;
- **Picture Frame / Floating Seals:** Improved seal design and picture frame clearance;
- **Thermal Barrier Coating:** Reduces metal temperatures.

## Fuel Nozzle Tip

HVOF (High Velocity Oxy-Fuel) hard face coating increases wear resistance and reduces radial interference (causing the liner stop to support the liner, not the fuel nozzle).





## Turbine Services, Ltd. Group

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### **TSL Company Headquarters**

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