

# TURBINE



## MEETING THE CHALLENGE

Companies in the turbine component manufacture and repair markets are constantly seeking out opportunities to invest in innovative and predictable manufacturing technologies, processes and systems to help them meet growing demands for lower costs, higher quality and shorter turn-around time. Those companies with the vision to recognize and invest in those opportunities not only survive, they thrive.

Huffman, LLC offers an extensive portfolio of innovative technologies delivered as proven, reliable systems and processes for the manufacture and repair of flight and power generation turbine components. Whether high speed grinding, laser powder fusion welding, or abrasive waterjet machining, these advanced technologies deliver exceptional technical and commercial benefits to our customers.

Common to all three product lines are high precision, process-capable, multi-axis motion and control systems. But it is our emphasis on the total process, not just the machine hardware, that sets Huffman apart. We promote a Collaborate Process Development approach wherein we, along with the end user and appropriate experts, consider all aspects of the manufacturing process. This disciplined approach, coupled with our versatile, reliable machines, delivers exceptional results.



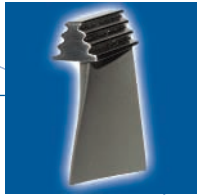
A Contour Precision Group Company

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[www.huffman-llc.com](http://www.huffman-llc.com)

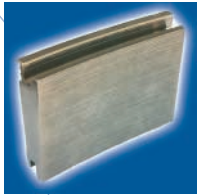
# We face turbine engine component challenges like these every day!

OTHER APPLICATIONS Our systems are capable of a wide variety of applications.



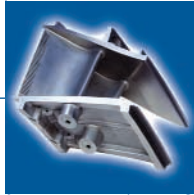
**BLADE ROOT FORM**  
Root form grinding of different geometries on HPT, LPT or compressor blades.

- FIR TREE
- DOVE TAIL
- RADIAL ROOT



**SHROUD GRINDING**  
Typical features ground:

- RUB SURFACES
- RADIAL SURFACES
- STRAIGHT SURFACES
- GROOVES/HOOKS
- MATE FACES
- SEAL SLOTS

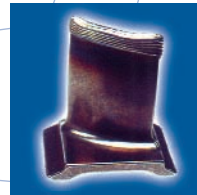


**NOZZLE GUIDE VANE**  
Grinding nozzle guide vane features with Huffman Multi-Axis Grinding System, such as:

- RADIAL SURFACES
- STRAIGHT SURFACES
- SEAL SLOTS



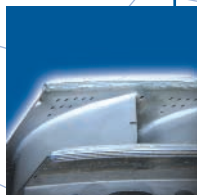
**BLADE TIP REPAIR**  
After welding, the blade tip is automatically blended back to the existing airfoil profile using adaptive techniques. The blade is ground to the proper length as well as adding the "squealer tip", without damaging the parent material.



**BLADE TIP REPAIR**  
Laser Powder Fusion of leading edges, trailing edges and tips of turbine or compressor blades. Powdered metal is built up over surface of area to be repaired. Adaptive vision system accommodates incoming part variation.



**NOZZLE GUIDE VANE REPAIR**  
Nozzle guide vane repair with Huffman Laser Powder Fusion Systems.



**COMPRESSOR RINGS**  
Abrasive waterjet cutting of ring slots requires no starting hole, makes no heat-affected zones and cuts in axial & radial directions.

**BLISK ROUGHING**  
Abrasive waterjet removal of 70% of blank material. Applications up to 48" diameter (1219 mm) titanium, 10" (254 mm) thick.



**Z-NOTCH WELDING**  
Precision application of hardface material (Stellite, coastmetal 64, T800) to the Z interlock area. Knife edge seal and mate face repairs are possible in same operation. Adaptive vision system accommodates incoming part variation.



Please contact us to discuss any other turbine applications that are not shown here.



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