MD&A has added important solutions to an already exemplary offering of services, parts and repairs. With our consistent tradition of over 35 years of unmatched customer service, MD&A has extended its scope of capabilities with the introduction of the Frame 7FA Parts Solution, another alternative in the power generation space that gives the customer more while costing less.

The MD&A San Antonio Service Center, our gas turbine parts service facility in Texas, is an industry leader in 7FA gas parts, repair, and manufacturing. The deep experience in aviation engineering and technology, repair techniques and equipment, and proven expertise on multiple frame gas components, creates a facility that epitomizes the best in service and value.

Our enhanced Frame 7FA parts solution expands energy output while reducing customer cost. Extensive testing on existing OEM components culminates in an improved version and new design. The Frame 7FA parts solution has greater flexibility, extended service life, and customized maintenance intervals. It comes complete with the same proficiency and service the world has come to expect from MD&A.

**PRODUCT FACTS FOR COMBUSTION AND TURBINE HARDWARE**

Operation in accordance with GER-3620

- **Maximum firing temperature:** 2420 °F
- **Fuel:** natural gas
- **Operation mode:** base or cyclic load
  - 24,000 hours/900 starts
  - Repairability guarantee: 48,000 hours/1,800 starts
  - Repairability guarantee: 72,000 hours/2,700 starts

**Technical review**

Subject to MD&A’s standard terms and conditions.

**PRODUCT FACTS FOR COMPRESSOR HARDWARE**

Operation in accordance with GER-3620

- **144,000 hours/5,000 starts**
- **Design life**
- **Installation hardware:** included

Visit www.mdaturbines.com for more information.
7FA.03 1ST STAGE BUCKET DESIGN ADVANTAGES:
• Trailing edge undercut to alleviate trailing edge cooling hole cracking
• Cooled platform to resolve platform burn and cracking (leading cause of scrapping 1st stage buckets)
• Improved cooling distribution to reduce peak metal temperature
• Proprietary directionally solidified alloy and thermal barrier coating (TBC) system to provide improved creep and oxidation life

7FA.03 2ND STAGE BUCKET DESIGN ADVANTAGES:
• Significant creep life improvement for the tip shroud
• Cutter tooth is replaced with an abrasive rail coating
• Proprietary equiaxed alloy and TBC system to provide improved creep and oxidation life
• Improved fillet design to reduce stress

7FA.03 3RD STAGE BUCKET DESIGN ADVANTAGES:
• Significant creep life improvement for the tip shroud
• Cutter tooth is replaced with an abrasive rail coating
• Proprietary equiaxed alloy and a chromide coating system provide improved creep and corrosion life

7FA.03 1ST STAGE NOZZLE DESIGN ADVANTAGES:
• Full gas path TBC to improve oxidation life, reduce airfoil metal temperature, and reduce thermal gradients
• Improved airfoil to sidewall fillets to improve cracking resistance
• Proprietary alloy improves creep, oxidation life, and maintains ability to weld repair
• Inner diaphragm material is changed to 310SS for improved oxidation and Ni-Resist main spouncer friendly during repair weld schemes

7FA.03 2ND STAGE SHROUD BLOCK ADVANTAGES:
• Made of commercially available 310 stainless steel alloy
• Should block shoes are manufactured from a proprietary nickel alloy
• Shroud liner coated with a proprietary coating specially formulated to provide durability and wettability for improved tip clearance control with the 1st stage bucket

7FA.03 2ND STAGE NOZZLE DESIGN ADVANTAGES:
• Full gas path TBC provides reduced airfoil metal temperature and eliminates fatigue debit from external aluminum casting
• Improved airfoil to sidewall fillets to improve cracking resistance
• Proprietary alloy improves creep, oxidation life, and maintains ability to weld repair
• Inner diaphragm material is changed to 310SS for improved oxidation over Ni-Resist; non-operator friendly during repair weld schemes

7FA.03 2ND STAGE NOZZLE DESIGN ADVANTAGES:
• Full gas path TBC provides reduced airfoil metal temperature and eliminates fatigue debit from external aluminum casting
• Improved airfoil to sidewall fillets to improve cracking resistance
• Proprietary alloy improves creep, oxidation life, and maintains ability to weld repair
• Inner diaphragm material is changed to 310SS for improved oxidation over Ni-Resist; non-operator friendly during repair weld schemes

7FA.03 3RD STAGE NOZZLE DESIGN ADVANTAGES:
• Made of commercially available 310 stainless steel alloy

7FA.03 1ST STAGE SHROUD BLOCK ADVANTAGES:
• Made of commercially available 310 stainless steel alloy
• Shroud block shoes are manufactured from a proprietary nickel alloy
• Shroud tiles are coated with a proprietary coating specially formulated to provide durability with abradability for improved tip clearance control with the 1st stage bucket

7FA.03 2ND STAGE SHROUD BLOCK ADVANTAGES:
• Made of commercially available Haynes 188/187/186
• Made of commercially available 318 stainless steel alloy

7FA.03 TRANSITION PIECES DESIGN ADVANTAGES:
• Improved impingement cooling and hardface coatings
• Proprietary gas path TBC for demonstrable improvement in oxidation life

7FA.03 COMBUSTION FLOW SLEEVE DESIGN ADVANTAGES:
• 316 stainless steel alloy for better corrosion and pitting associated with wet service parts and improve oxidation life

7FA.03 COMBUSTION LINER CAP ASSEMBLY PIECES DESIGN ADVANTAGES:
• TBC coated ejection plate to improve component life

7FA.03 COMBUSTION LINER PIECES DESIGN ADVANTAGES:
• Proprietary gas path TBC for demonstrable improvement in oxidation life
• Proprietary water coating system for improved oxidation life

MD&A ALSO OFFERS GAS TURBINE SERVICES OF:
• COMPRESSOR VANE PINNING
• OUTAGE PLANNING
• TURNAROUND INSPECTIONS
• GAS TURBINE ALIGNMENT
• END OF LIFE EVALUATIONS
• FIELD MACHINING
• BALANCING AND VIBRATION ANALYSIS
• CONTROLS AND EXCITATION FIELD ENGINEERING, CONSULTING AND TRAINING
• ROOT CAUSE ANALYSIS
• ENGINEERING SUPPORT
• PERFORMANCE TESTING AND ANALYSIS
• LONG-TERM SERVICE AGREEMENTS

COMPRESSION PARTS

BUCKETS

NOZZLES AND SHROUDS

COMPRESSOR HARDWARE

R0 COMPRESSOR BLADE
The R0 blade has been redesigned to address ongoing field issues with this component. The design is made from a higher strength alloy with superior corrosion and cavitation erosion resistance. Design enhancements include: dovetail relief cut, compacted fiber/edge transitions, and airfoil having to provide superior blade design life.

S0 – S4 COMPRESSOR VANE ASSEMBLIES
The S0 – S4 compressor stator vanes have been redesigned to address ongoing field issues. Design enhancements include: the fabrication of the shorter vane carrier in a non-corrosive alloy, relief slot in the vane carrier for ease of removal, elimination of shims, curved squealer tips to decrease leakage and non-uniform S0 and S1 vane spacing to mitigate R0 and S1 vibratory response.

S5 – S17, EXIT GUIDE VANES (EGV) STATOR VANES
The design for all compressor vanes have arched (radius) bases to conform to the compressor case. This radius base configuration provides less wear on the components. We increased the widths of the vane platforms at the horizontal joint. These vane platforms will be machined during the outage in the case, negating the need for shims.