Improved Operability and Life-cycle Maintenance Costs for 701F Gas Turbines with PSM-Technology Service Solutions

Since 1999, PSM has designed a complete 501F product line that offers robust and proven design improvements and solutions. Our product line has expanded from our flagship combustion offerings to include reliability enhanced, in-kind replacement of turbine, compressor, and rotor hardware, as well as upgrade packages that deliver performance enhancements and extended lifetimes.

Combining our technical expertise, speed to market, flexible solutions, tools, and multiple OEM cross-platform experience, we’ve become the industry leading F-class alternative products and services supplier leveraging 501F experience for the Frame 701F.

We are focused on introducing innovations for the installed F-Class power base, to support the continued viability of these assets. We continue to target the timely introduction of innovative, PSM-designed solutions for emerging fleet issues, through continuous improvement of our current offerings and expansion into new products.
PSM’s 501F/701F capabilities include the following:

- Part design and procurement: Standard Components, FlameSheet™ Combustor, Exhaust Systems, Upgrades, Next Gen Upgrades in Development
- Field Service Support with Outage Kits, Specialty Tooling, Combustion Conversion, Partnership with Advanced Turbine Support
- Repair of all manufacturers’ parts, all repaired parts re-used in LTA’s if possible, W501FC-F5, M501F3, M701F3
- Project Management through a single point of contact, standard onsite outage planning gates, configuration reviews, parts pool management, contract management
- Service Engineering supporting more than 400 dispositions a year, borescope planning including Service Bulletins, Root Cause Investigations, Engineering Assessments

Providing Solutions for 501F Gas Turbines for 15+ Years

Compressor Experience Highlights
- All stages FD3 equivalent
- Standard and CM2 design
- Fleet leader +33k hours, +550 starts

Combustor Experience Highlights
- Over 200 sets sold
- 25k demonstrated interval for all parts
- Fleet leaders on third interval of 25k
- FlameSheet™ available

Turbine Experience Highlights
- Over 500 sets sold
- Standard and Performance Upgrade configurations available
- Material and cooling improvements on all stages

Additional Products in Operations
- Rotor Exchange with Life Time Extension
- Exhaust Cylinder
- Inlet Bleed Heat System
- Exhaust Manifold

PROFITABILITY • EMISSIONS • OPTIMIZATION
PSM’s 501F/701F Platform Approach for MHI Gas Turbines

Our Platform Approach to design has enabled us to leverage our own proprietary technology solutions across multiple OEM gas turbine fleets. So the solutions we provided for 7FA users also bring value to 701F operators. By utilizing the commonality of hardware between the M501F and the M701F frames, PSM is able to provide products to M701F users that incorporate all of the successful design improvements that have been created by PSM since 1999.

Our design objectives always include reliability first. Once demonstrated, we strive to optimize both operability and life cycle costs. In the future, that knowledge base can be applied to the development of engine upgrades.

Our continuous improvement efforts draw from: customer feedback, fleet monitoring, rainbow testing, reconditioning analysis, and fleet trending including Parts Tracking Database.

TRANSITION PIECE DESIGN

<table>
<thead>
<tr>
<th>W501F</th>
<th>M501F</th>
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<tr>
<td>Over 1.8+ M hours with 95+ sets sold</td>
<td>Approaching 25K EBH; achieved 900 ES</td>
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Same part – added bypass cap

Thermally Fee Mount

Upgraded 7FA

20 Sets Sold; 20K+ hours

15+ Years of Successfully Utilizing Platform Design Approach
Example Product Improvements

**Transitions**
- Upgraded material with solid wall construction
- Modified body shape to improve durability
- Effusion cooled with full TBC coverage
- Improved thermally-free mount to stage 1 vane
- Installed since 2003

**1st Stage Vane**
- Optimized cooling design for improved durability
- Redesigned to eliminate unscheduled outages caused by ID welded pan failures
- Simplified vane insert design

**1st Stage Blade**
- Upgraded material compared to OEM designs; improved repairability in high start applications
- Features an internal cooling scheme with high efficiency and an active platform design
- Incorporates trailing & leading edge platform undercut design with cast-in tip cap design

Contact your PSM Sales Representative for more information.
Call: +886-963-765-952 or email: sales@psm.ansaldoenergia.com

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