Expanding LM2500 field and shop service to depot repair & overhaul

By Robert Farmer

Independent service provider offering depot-level maintenance, repair and overhaul to industrial and marine LM2500 engine owner operators—as ‘cost effective’ alternative to OEM supply.

Long-time aeroderivative and aircraft engine parts and service supplier Chromalloy Corp. has entered the industrial and marine LM2500 field and shop maintenance, repair and overhaul market with expansion of its dedicated repair facility in San Diego, California:

- **Depot service.** Range from onsite field inspection and repair to Level IV-shop overhaul, repair, and test. Power turbine overhaul and lease engines available.

- **Field services.** Send parts and technicians to any international location for engine troubleshooting, case repairs, combustor and main frame replacements.

- **Test cell.** Core engine test facility for full-speed, no-load gas generator testing on liquid or natural gas fuel with capacity up to 100,000 pounds of thrust.

Company says it is offering LM2500 gas turbine engine operators a comprehensive range of depot maintenance, repair and overhaul (MRO) services at ‘value’ price levels compared to OEM and other service shops.

Schedule calls for the depot to be fully operational by early next year. The last pieces in place will be start-up of its test cell in San Diego in late 2009 with the lease engine program also in place at that time.

Primary market driver for expanded depot services, say company executives, is to reduce LM2500 users’ total cost of ownership.

One way this will be accomplished is by providing end users, owner operators and third party overhaul providers with faster turnaround times for engines and modules.

For example, the LM2500 rotatable high pressure turbine (HPT) module exchange program is being quoted with 3 to 4-day turnarounds.

**Models**

Currently, the San Diego depot can perform overhauls on the LM2000/2500 base single annular combustor (SAC) engine configuration.

In addition, they will be overhauling LM2500 high-pressure turbine modules as well as power turbines.

The scope of engines will be expanded to include the LM2500+, LM2500 DLE and the +G4 family. Initially, they will repair the standard six-stage power turbine, but will add the Nuovo Pignone two-stage power turbine in the future.

The first project completed (customer not named) has been to perform an LM2500 high pressure turbine module exchange. The second project is the overhaul of an LM2500 gas generator.

**Facilities**

The San Diego depot houses 110,000 square feet of shop space that includes all tooling and equipment needed to perform LM2500 HPT module overhauls and gas generator overhauls.

According to Joe Lesch, vice president for aeroderivative gas turbines, the test cell (located onsite) is the only independent facility in the western U.S. for LM2500 gas turbine core engine performance testing and troubleshooting.

“Our test cell will be fully in operation in December 2009,” says Lesch, “and will meet or exceed all required performance, vibration and operational serviceability requirements.”

Test runs on natural gas or distillate will allow emissions measuring capabilities for test of the standard SAC combustion system and, later, of dry low emissions (DLE) units.

HP Case. Top half can be removed to repair and replace blades and vanes.
Testing capabilities also allow for combustor-mapping.

**Turnaround**

Target engine turnaround, including test cell performance validation, is less than 70 days in-shop, using a combination of rotables and module spares as appropriate.

Full-speed, no-load test results include a digital data recording of all relevant gas turbine operating conditions and performance parameters.

This is designed to provide owner operators with a complete engine log for later system analysis and comparative evaluation.

Customers will also have internet access to remotely witness engine test performance without having to send a company representative to the depot test facility.

**Scope**

Scope of specialized depot support includes complete dynamic balancing of low and high pressure spools, full non-destructive inspection and testing capabilities, and spectrum analysis for vibration measurement.

This is in addition to conventional disassembly, cleaning, visual and dimensional checking, bearing inspection clean room, custom repairs, machining, welding and assembly facilities.

For onsite support, a portable inventory ‘kit’ of field service tooling can be dispatched in hours to any global location via Los Angeles International Airport.

Field services include engine troubleshooting, borescope inspection, HPT/HPC top case repairs, combustor and turbine mid frame replacement.

**Features**

Lesch explains, “the top half of the HP compressor case can be removed at the power plant site to replace or repair blades and vanes.

This avoids having to ship the gas generator to a depot for blade and vane overhaul, thus saving operators both time and money.”

As plant operators point out, the ability to provide 24/7 real-time remote monitoring can significantly reduce the time and work to fix unscheduled maintenance events.

Tiger software diagnostic analysis for trend monitoring, heat rate, and other performance-related reports is also available.

**Repairs**

Chromalloy will continue to operate its worldwide facilities (separate from the overhaul depot) to repair and overhaul a wide range of gas turbine components “from the inlet guide vanes to the turbine exhaust case”.

Specific repair scope includes the compressor inlet case through the low pressure and high pressure compressors, all the compressor frames, the combustor, high pressure turbine and low pressure turbine shafts, disks, shrouds, seals and turbine frames.

Historically, the company says it has been supplying advanced repairs and coatings on LM2500 engine components for more than 20 years.

“We were the first to manufacture and offer single crystal high-pressure turbine blades and vanes for the LM2500,” says Lesch, “and provided advanced blade tip weld repairs using patented laser powder welding techniques.

For damaged blades and vanes, they offer a 100% yield program for “advanced replacement repairs” to restore damaged airfoil components and return them to service rather than scrap them.

Case flange replacement repairs are another specialty, as a low cost alternative to casing replacements.

**SC for less**

It was in 2003, at the Western Turbine Users’ conference in Anaheim, that Chromalloy announced it had engineered and was manufacturing single crystal vanes and blades.

Specifically (at that time) for LM2500 and LM6000 gas turbine high pressure turbine vanes and blades for stages 1 and 2 that were introduced “as an alternative to high priced OEM parts”.

Unofficially, the blades and vanes are reported to be competitively priced with the OEM’s equiaxed non-single crystal material.

In addition to being less expensive, the higher temperature-resistance of the single crystal nickel alloy components contribute to improved performance and durability.

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Vapor deposition facility. Headquarters for electron beam vapor deposition work is this facility at company plant in Orangeburg, New York.