

INDEPENDENT REPAIR DEPOT IN SAN DIEGO TARGETS LM2500

Chromalloy is an independent supplier of advanced repairs, coatings, and Federal Aviation Administration (FAA) approved replacement parts for commercial airlines, military and industrial turbine engine applications. It supplies components, coatings and manufacturing services to OEMs such as GE, Siemens and the various GE-authorized repair depots. This includes vanes and blades for Stage 1 and 2 of the High Pressure turbine (HPT) of the LM2500.

Recently, the company entered the turbine depot business with the opening of its San Diego LM2500 repair shop. "Chromalloy does the design, casting, machining and drilling of parts," says John McKirdy, general manager of Chromalloy's San Diego facility. "We have now added the ability to tear the engine apart, analyze, fix and send it back to the user."

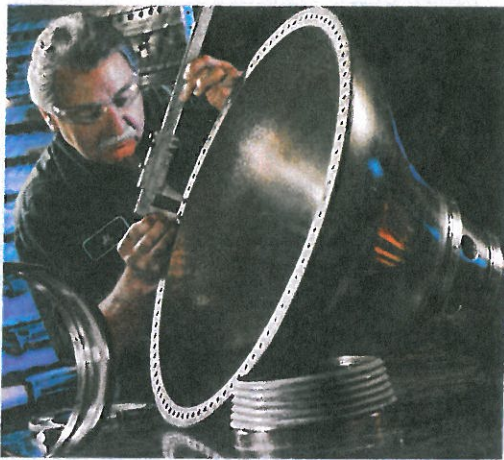
The building was originally designed and built as an engine maintenance, repair, overhaul shop. First opened in 1974 as an engine shop for PSA Airlines, it became Pacific Gas Turbine Company in 1991, a company purchased by Chromalloy in 2002. This 110,000 sq. ft. facility has a capacity of 350 engine repairs per year. This includes LM2500 and JT8D jet engine test cell capabilities rated to 100,000 lbs. of thrust.

"This is the only independent test cell in the Western U.S. for LM2500 gas turbines," said McKirdy. "Some 90% of the turbine can be repaired here."

Depot services for the LM2500 range from Level I and II (field inspection & repair) all the way to Level IV (shop overhaul, repair and testing). Chromalloy plans to conduct HPT repair and overhauls, field service (dispatch to any international location), gas generator overhaul, major case exchanges, power turbine overhaul and lease engines.

The company stresses that it can manufacture and repair almost all of the LM2500 gas generator. While it is not a GE-authorized depot, a large percentage of its repairs are OEM-approved through OEM and Chromalloy license agreements. Chromalloy sees itself as offering alternatives to OEM repairs as well as specialized repairs that avoid the need to replace certain parts.

Not everything, however, is necessarily repaired on site. Chromalloy has various centers of excellence around the country. It may send specific components to other facilities which specialize in different types of engines. Plants in Reno, San Antonio and Tampa are used where needed. McKirdy cited the case of one San Francisco area customer that had a turbine mid-frame problem. Replacement would have cost \$190,000. However, as the frame was not badly damaged and as the customer was not losing vast amounts of revenue via downtime, it was willing to



wait a couple of days for a repair which cost \$22,000.

Long experience in aviation makes the company confident it can take LM2500 repairs to a new level. The San Diego operation is an FAA-approved maintenance, repair and overhaul center. The FAA sets rigorous requirements for vendors in the aviation space. Every part has to be physically tagged and tracked as it makes its way through a depot. Replacement parts have to be equal to or better than the original. And this has to be certified as being the case by the FAA.

The highly regulated nature of FAA work means that tools have to be calibrated precisely, people have to meet

exact qualifications, and materials have to be high grade. While such rigor is not required in the industrial gas turbine sector, Chromalloy has replicated all its FAA processes at the San Diego site.

Each component, for example, is labeled as per standard aviation requirements. As a result, every action done on an engine, and every component added or replaced, can be traced right down to where it was sourced, when purchased, when and who installed it.

An independent depot creates price competitiveness in the market and users will benefit, long term. If Chromalloy comes out with a part that improves product life by 2,000 hours, the OEM is likely to eventually match or better, to stay competitive. It's up to Chromalloy at that point to surpass the OEM, and so on.

Recently an LM2500 was in the early stages of tear down. The hot gas path had been dismantled and representatives from the power producer were on site to inspect initial findings and see damage and wear first hand. McKirdy reports that in most cases, customers do not need to come on site as detailed photos are transmitted highlighting the results of the first inspection, borescope and teardown, and any noted discrepancies between it and the agreed work scope.

Next is a pre-inspection of each engine module to see which needed to be broken down further to examine the individual components. Some parts may be sent off site for repair. Those remaining onsite in San Diego go for cleaning before receiving further visual, dimensional and Non Destructive Testing (NDT) inspection.

At that stage, the supply chain is activated to rapidly bring every part needed to the depot to rebuild each module, complete the final build of the engine, ensure it meets or exceeds all OEM specs and send it to the test cell. When all testing is concluded, it is ready to ship back to the user. "The LM2500 tolerances are about a thousandth of an inch, so it takes a lot of care to get it right," adds McKirdy.