Aeroderivative Gas Turbine Engine Capabilities
LM2500/LM2500+/LM5000/LM6000

Long live your engine.

CHROMALLOY
ENERGY
Chromalloy provides repairs as well as coatings, parts and materials and depot services that extend engine life and reduce operating expenses.

We support the full range of LM2500, LM2500+, LM5000 and LM6000 gas turbine engines used in both power generation and marine applications.

Why choose Chromalloy?
To extend engine life, aeroderivative gas turbine owners and operators turn to Chromalloy for three key reasons.

First, we are the only independent company in the world that provides a full spectrum of services—from design engineering of parts, castings and core development, to machining, coatings, repairs and field services for LM series engines. By providing OEM-caliber expertise in every phase, our customers can feel confident and benefit from the simplicity of working with one partner.

Second, we can dramatically reduce your costs. On average, Chromalloy repairs cost 80-percent less than a newly manufactured part. Chromalloy coatings increase the durability of components and extend the time between overhauls. In addition, Chromalloy’s fast turnaround times and rotatable spares reduce the length of outages.

Third, Chromalloy provides outstanding customer service. We work with our customers to develop solutions that meet their specific needs. Throughout our engagement, we provide a single point of contact and detailed reports. We conduct workscoping and analysis in a collaborative, transparent manner. We guarantee workmanship and materials, and we provide comprehensive warranty coverage for the engines we service.
Innovation forms the core of the Chromalloy value chain and influences each of our capabilities. From design, test and systems engineering, castings and core development, to machining, repair technology, joining, thermal capabilities, tooling and coatings—every discipline benefits from our global knowledge base.

**Engineering**
Chromalloy’s Engineering Center of Excellence is the epicenter of our vast engineering capabilities. Supported by a number of labs located around the globe, we provide expertise in every area related to the design, creation and manufacturing of make-ready parts. Years of expertise combined with the world’s leading technologies provide our Power customers with cost-effective solutions.

**Castings**
Chromalloy operates state-of-the-art castings centers, including a facility in Tampa, Florida, that is one of the most technologically advanced in the world. This facility features the latest in technology—from shell lines that fine-tune process control to furnaces that enable the production of the entire range of complex engine components for the Power industry.

**Machining**
Machining plays an integral role in the Chromalloy value chain. Chromalloy’s advanced machining capabilities allow us to design, manufacture and produce even the most sophisticated gas turbine engine components with utmost precision. Chromalloy partners with OEMs to machine parts that are of the highest quality, ensuring fast turnaround times and scalable production schedules to meet the most aggressive of timetables.
Coatings
Chromalloy was the first company to develop commercially viable aluminide coatings, and continues to provide these coatings and their derivatives in support of heavy industry and aeroderivative gas turbine components around the globe.

Joining Technology
Chromalloy’s expertise in joining technologies allows us to save precious weight by welding structures in the most efficient way possible. Methods such as friction stir welding and laser beam welding allow us to eliminate the use of overlapping aluminum skins—as well as hundreds of thousands of rivets—resulting in lightweight solutions for newly manufactured engine components for gas turbine engines.

Thermal Processing
Chromalloy facilities have a depth of thermal processing capabilities and equipment, including coating furnaces, braze furnaces, HIP furnaces, and vacuum and gas purge furnaces. We offer a range of repair techniques that utilize thermal spray processes to return damaged or worn parts found in gas turbine engines to their original form, fit and function.

Repairs
The output of the Chromalloy value chain is what is most important—your parts. Over the years, Chromalloy has invested millions of dollars in the research and development of technological advancements and patented and proprietary repair processes that enable us to extend the life of gas turbine engines and significantly reduce operating expense in a way that no other company can. Each piece of the value chain contributes to our identity as an integrated solutions provider for gas turbine engines of all sizes.
Chromalloy repairs extend aeroderivative engine life and provide a reliable, cost-effective alternative to new parts. Over the last several decades, Chromalloy has invested hundreds of millions of dollars in the research and development of innovative repair processes that return components to their original form, fit and function.

Our in-house capabilities include:

**Repair**
- Cleaning/Preparation
  - Grit Blasting
  - Chemical Stripping/Cleaning
  - Water Jet Stripping
  - Hydrogen Fluoride Ion Cleaning
  - Aqueous Degreasing
  - Hand & Robotic Blending and Finishing

**Machining**
- CNC and Manual Milling
- Turning
- Grinding
- Laser Cutting
- EDM
- Viper Grinding (OEM)
- EDM Sinker (OEM)
- EDM Fast Hole Drill (OEM)

**Heat Treatment**
- Vacuum
- Air Furnace
- Argon Purged

**Finishing**
- Super Polishing
- Glass/Ceramic Bead Peening
- Shot Peening
- Moment Weighing
Repair
Capabilities (cont.)

**Inspection Capabilities**
- Coordinate Measuring Machine
- Eddy Current Inspection
- Fluorescent Penetrant Inspection
- Magnetic Particle Inspection
- Laser Holography
- Borescope Inspection
- Full Engineering Analysis
- Metallurgical Analysis
- Optical Contour Inspection
- Radiographic Inspection
- Ultrasonic Inspection
- Video Microscopy
- X-ray Inspection
- White and Blue Light Scanning
- Visual and Standard Dimensional Techniques
- Hardness Inspection
- Sieve Analysis

**Coatings**
- LPPS
- HVOF
- APS
- Pack Cementation
- Gas Phase Aluminizing and Chromizing
- EBPVD
- Slurry Coatings
- Diffusion Coatings
- Aluminum Ceramic Coatings
- CBN Plated Tips
- Chemical Plating
- Vapor & Pack Aluminide
- Platinum Plating
- TBC & MCrAlY
- Vapor Phase Chromize
- Air Plasma Thermal Spray
- Low Pressure Plasma Spray
- Electron Beam Physical Vapor Disposition
- High Velocity Oxy Fuel Coating
Chromalloy has been a leader in developing aluminide coatings for decades. Today, we continue to provide these coatings and their derivatives to all the major OEMs, as well as owners and operators around the world.

We invest substantially in the research and development of ceramic thermal barrier coatings, diffused precious metal/aluminide coatings, vacuum plasma coatings and other innovative coating processes. We are the world’s largest provider of Low Pressure Plasma Spray Overlay and Electron Beam Physical Vapor Deposition (EBPVD) coatings.

These capabilities protect gas turbine components and increase their efficiency and reliability at higher operating temperatures and under severe environmental conditions.
Chromalloy incorporates years of advanced coating and repair technology into the redesign, casting and manufacturing of parts for the LM2500, LM2500+ and LM6000. We utilize single crystal technology. And we use leading-edge manufacturing tools and processes to produce the most sophisticated components with utmost precision.

Technology
- Turbine Aerodynamic Design and Analysis
- Engine Performance Analysis
- Secondary Air System Design and Analysis
- Blade/Vane Cooling Design and Analysis
- CFD Analysis
- 3D Thermal Design and Analysis
- 3D Structural Design and Analysis
- Vibration/Modal Analysis
- Mechanical Design and Analysis
- Engine Instrumentation and Testing
- Engine Tuning and Optimization
- Hardware Characteristics
Chromalloy’s capital parts development technology enables us to provide a fully integrated supply chain.

New Part Development Process

Redesign part using largest repair database in the industry to inform improvements.

Cast components
- Single Crystal
- Equiax
- DS

Onsite core development

Machine component drill

Apply industry leading protective barrier coatings.

Flow
NDT
X-ray
FPI

Deliver the part
Install the part
Monitor performance
Provide life evaluations
Chromalloy LM2500 depot services provide comprehensive, cost-effective and customer-focused support.

For more than 20 years, Chromalloy has performed advanced repairs for the LM2500. We currently provide full tip-to-tail salvage repairs through a wide variety of OEM-licensed and third-party repairs.

In addition, we were the first to manufacture and offer single crystal High Pressure Turbine blades and vanes for the LM2500. Today, we leverage this experience with our world-class casting capabilities to provide a wide range of newly manufactured LM2500 replacement parts.

Chromalloy’s 111,000-square-foot San Diego facility features an on-site LM2500 test cell—the only independent LM2500 test cell in the western United States providing core engine testing and troubleshooting. When we finish servicing an engine, we rigorously test the engine in real-world conditions before delivering it to our customers.

Depot Services for the LM2500 range from Level I and II (Field Inspection & Repair) to Level IV (Shop Overhaul, Repair and Test Cell Capability).

**Services and Capabilities**

- HPT module repairs and overhauls
- HPT module exchange
- Gas generator overhaul
- Power turbine overhaul
- Blades and vanes—newly manufactured
- Lease engines
- Field Services including engine troubleshooting, borescope inspection, HPT/top case repairs, combustor and TMF replacement
- TIGER® diagnostic analysis for trend monitoring, heat rate performance and other performance-related reports
Chromalloy repairs help LM5000 owners and operators extend the life of their engines and reduce operating expenses. We currently provide full tip-to-tail salvage repairs as well as OEM-licensed repairs for LM5000 gas turbine engines.
Chromalloy works with LM6000 owners and operators around the world to extend engine life and reduce operating costs. Through our state-of-the-art castings and manufacturing facility in Tampa, Florida, we provide newly manufactured HPT blades, vanes and shrouds. In addition, we provide complete tip-to-tail repairs that restore LM6000 components to their original form, fit and function.
Global Service & Support Locations

Bangkok, Thailand
Carson City, Nevada, USA
Crewe, U.K.
Derbyshire, U.K.
Ft. Lauderdale, Florida, USA
Glasgow, Scotland
Guaymas, Mexico
Mexicali, Mexico
Midwest City, Oklahoma, USA
Newnan, Georgia, USA
Oldsmar, Florida, USA
Orangeburg, New York, USA
Palm Beach Gardens, Florida, USA
Phoenix, Arizona, USA
Rochefort, France
San Antonio, Texas, USA
San Diego, California, USA
Singapore
Tampa, Florida, USA
Tilburg, Netherlands
Windsor, Connecticut, USA
We are Chromalloy.
We are innovators.
And we are working today—and every day—to meet the needs of our customers, to extend the life of gas turbine engines and to reduce their operating expenses.
Long live your engine.