LAMBDA Technologies Group

Laboratory Services

www.lambdatechs.com



Lambda Technologies operates Lambda Research, a world-class laboratory facility and the pre-eminent source of residual stress measurement and analysis worldwide. Lambda delivers quality driven, reliable results in a timely manner to a wide range of industrial, government, and academic clients.

With over 150 years of combined experience and more than half a million completed measurements, Lambda is a name people trust. Certified residual stress engineers and technicians provide exact results and in-depth analysis, so we offer more than data. We provide complete solutions.

Testing Services

Improving Component Life and Performance

X-Ray Diffraction Residual Stress Measurements

- Accurate surface and subsurface measurements per SAE HS-784 and ASTM Standards
- X-Ray elastic constant library for over 300 materials
- Automated stress field mapping
- Combined mechanical and XRD measurement
- Principal residual stress determination
- High resolution SDD detectors with multiple radiations
- In-field measurement capabilities

Mechanical Residual Stress Measurements

- Ring-core technique provides principal residual stress measurements incrementally versus depth
- Center hole-drill measurements per ASTM E837 Standards
- Deep hole-drill measurements method
- Bulk sectioning residual stress measurement capabilities
- Strain gage instrumentation services

Qualitative Phase Analysis

- Graphite monochromators provide optimal detection limits
- In-situ identification of corrosion products and coatings
- Data collection system tailored to a broad array of materials
- Automated match to JCPDS data file system
- Elemental Analysis and Mapping via X-Ray Fluorescence (XRF) and Energy Dispersive Spectroscopy (EDS)

Quantitative Phase Analysis

- Retained austenite measurement per ASTM & SAE Standards
- Hydroxylapatite analysis for surgical implants per ASTM Standards
- Quantification of one or more components in a system
- Calculation of total crystallinity of a mixture

Texture Analysis

- Measurement of crystallographic texture developed by manufacturing operations like extrusion, drawing, casting, rolling, and coating processes
- Manufacturing process monitoring and quality control
- Texture measurements made per ASTM Standard
- Orientation Distribution Function (ODF) analysis



Certifications

Lambda's testing laboratory is accredited to ISO/IEC 17025 by The American Association for Laboratory Accreditation (A2LA). Where applicable, our testing meets the standards of ASTM, SAE, NACE, ECS, and API.



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Surface Integrity

Fatigue Testing

- Fatigue testing to characterize the influence of residual stress and cold work on fatigue strength
- HCF systems capable of 10,000 lb max load providing rapid assessment
- Testing to simulate damage mechanisms, including foreign object damage, corrosion, and fretting
- Sample and fixture design for application-specific testing
- 4-point bend and cantilever testing capabilities
- Servo hydraulic test frame with 50,000 lb max capability
- Crack growth monitoring

Corrosion Testing

- Evaluate the influence of manufacturing processes on corrosion properties
- Environmentally assisted cracking tests including SCC, SSC, and HE
- Alternate immersion testing
- General corrosion testing
- Polarization studies
- Pitting analysis

Support Services

- Failure analysis via optical and scanning electron microscopy
- Characterization of cracks using fluorescent dye penetrant
- Video capture of crack propagation
- Macro and micro hardness testing
- Thermal and mechanical residual stress relaxation studies









Residual Stress Design

Process Optimization

- Optimize surface enhancement treatments for maximum component performance
- Develop shot peening process for improved production throughput
- Improve machining processes for optimal residual stress distribution
- Analytical assessment of performance benefit from residual stress

Finite Element Analysis

- Design custom residual stress distribution based on applied stress
- Predict residual compensatory tension and distortion
- Rigorous layer removal correction for XRD residual stress measurement
- Optimize machining sequence for minimal distortion