



**Materials Testing**  
**Nondestructive Testing**  
**Failure Analysis**  
**Calibration**

**Meeting your expectations**  
with quality, service and delivery



**LABORATORY  
TESTING INC.**

[www.labtesting.com](http://www.labtesting.com)

## ONE-STOP CONVENIENCE

***Testing, specimen machining, failure analysis and calibration services are performed at our convenient one-stop facility. All orders are centrally coordinated to ensure timely turnaround and economical service.***

Laboratory Testing Inc. (LTI) has been in business since 1984 specializing in the inspection and certification of materials found in fasteners, tubular products, bar stock, plates, castings and more. Our mechanical, chemical, metallurgical and nondestructive testing services provide the answers you need about material properties, characteristics, composition, defects or discontinuities.

For your convenience, we offer value-added services to meet a wide-range of needs including rush services, special packaging and handling, and free pick-up and delivery within sixty miles of our facility. In addition, our machinists prepare test specimens and samples. Our engineers can support your business with materials engineering and failure analysis services. LTI Metrology, our calibration laboratory, will provide tool and instrument calibration, field service, instrument repairs, replacement parts and new instruments.

## QUALITY ASSURANCE

You can count on reliable results and detailed reporting of all work in your certification. Laboratory Testing Inc. is accredited to ISO/IEC 17025 by PRI/Nadcap in materials and nondestructive testing, and by A2LA for calibration services and dimensional inspection. This accreditation also meets the requirements of ISO 9001 and ISO 13485.

Our inspection and quality control system is in accordance with MIL-I-45208A, ASME Section III NCA-3800, 10 CFR 50 Appendix B, ISO-9001, ISO/IEC 17025, ISO-10012-1, ANSI/NCSL Z 540-1 and MIL-STD-45662A. Our procedures conform to ASTM, AMS, ASME, ANSI and MIL specifications. We welcome audits of our quality assurance program and provide our quality system program manual upon request and on our website.

**For more information on our capabilities, accreditations and quality program, we invite you to visit our website, [www.labtesting.com](http://www.labtesting.com) or to contact our Sales/Customer Service Department at 800-219-9095.**

“Customer satisfaction is always our priority. Our customers’ needs come first. Many have challenging deadlines and requirements and it’s our job to meet them with quality, service and delivery.”

— Mike McVaugh, President of LTI



## MEETING CUSTOMER EXPECTATIONS

Our priority is ensuring that your expectations and requirements will be met with each order. At times, customers have unique service or technological needs that we try to accommodate. LTI employees are committed to getting the job done to our customers’ satisfaction.



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# MATERIALS TESTING & NONDESTRUCTIVE TESTING

Many industries require routine testing to specified standards to ensure materials and products will perform for their intended use and endure for their expected life. Many other businesses choose to have testing performed to verify materials, to meet customer requirements or to research the failure of a material or product. Whatever your needs, LTI is ready and able to handle your orders.

Jobs of almost any size can be safely and efficiently processed at LTI. The size of our building and layout of the delivery area allow for easy maneuvering and storage of materials. The capacity of our testing machines, cranes, and forklifts allows us to handle large materials. The wide-range of services at our facility makes it convenient for customers with multiple jobs or orders requiring more than one service.

Laboratory Testing is an approved vendor for many major companies, including Honeywell Aerospace, General Dynamics-Electric Boat Division, Lockheed Martin, Northrup Gruman Electronics, Sikorsky Aircraft, Rolls-Royce, Boeing, Bell Helicopter, Pratt & Whitney and more.



Digital imaging system magnifies to 1000X



Classical wet chemistry analysis for nontraditional samples



ICP determines the type and amount of elements in samples

## MECHANICAL TESTING

Mechanical testing measures the strength and ductility of materials under various conditions, such as temperature, tension, compression and load. Parts and specimens of all sizes are tested on tensile machines ranging in capacity from 10 lbs. to 400,000 lbs. Stress rupture testing is performed at temperatures up to 1850°F by fully computer-controlled machines that automatically load at various time intervals. Impact tests are performed routinely using Charpy V-notch specimens.

- Bend
- Flattening
- Cone Strip
- Proof Load
- Yield Strength (Full-size bolts)
- Stress Rupture
- Tensile/Ductility
- Flaring/Expansion
- Conductivity
- Magnetic Permeability
- Wedge & Axial Tensile (Full size)
- Charpy V-Notch Impact
- Elevated Temperature Tensile
- Hydrogen Embrittlement/Stress Durability
- Hardness Test - Rockwell, Brinell & Superficial
- Welder & Procedure Qualifications (per ASME, ASTM, MIL Specifications & AWS)



Tensile testing on 60,000 lb. capacity machine

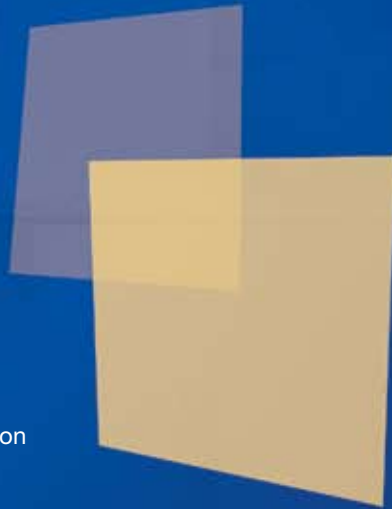


Liquid penetrant inspection has capacity for materials up to 40 ft. long

## METALLOGRAPHY

Metallography looks for internal and surface defects on test specimens. Specimens are prepared and analyzed at LTI for a wide variety of criteria, including corrosion, surface finish, case depth and more. Optical magnification from 7X to 1000X is used to obtain information relating to grain size, coating and plating thickness, decarburization and microhardness. Digital imaging is available to document and preserve the findings of visual examinations. Our materials engineers also assist with failure analysis, materials engineering, materials selection and lifetime prediction services.

- Microhardness – Knoop & Vickers indenters (weight range 100 grams to 10 kilograms)
- Corrosion Practice A (ASTM A-262)
- Case Depth
- Delta Ferrite (ASTM E-562)
- Surface Finish
- Alpha Case
- Decarburization/Carburization
- Grain Size & Grain Flow
- Plating/Coating Thickness
- Eutectic Melting
- Macroetch (ASTM E-381)
- Micro Examination
- Microstructural Features
- High Temperature Oxidation
- Surface Contamination & Condition
- Accelerated Intergranular Attack
- Digital Imaging
- Metallurgical Mounting & Polishing
- Serial Sectioning
- Inclusion/Cleanliness Rating (ASTM E-45)
- Recast Layer Determinations



## CHEMICAL ANALYSIS

Chemical analysis determines the composition of materials and is performed at LTI using classical wet chemistry and instrumental analysis. Our chemists analyze a wide range of samples including powdered metals, ores, ferroalloys, composites, ceramics, aerospace materials and nuclear materials. We welcome the challenge to process orders with limited sample weight or specialized chemical analysis requirements.

Trace analysis is performed using spectrometers with detection limits in the parts per million range for many metals. Gravimetric, volumetric, colorimetric and potentiometric procedures are used for analysis in our wet lab. RoHS compliance testing is performed using wet analysis and spectroscopy. Corrosion and passivation testing are performed in accordance with ASTM practices.

- Atomic Absorption Spectroscopy (AA) - flame & graphite furnace
- Optical Emissions Spectroscopy (OES)
- Inductively-Coupled Plasma Analysis (ICP)
- Accelerated Intergranular Corrosion
- Carbon/Sulfur/Nitrogen/Oxygen/Hydrogen – combustion & inert gas fusion methods
- Sieve Analysis
- Soxhlet Extraction
- Plating Identification
- Classical Wet Chemical Analysis
- Density, Porosity & Oil Content
- Metals, Powdered Metals, FerroAlloys, Ores & Ceramics
- Salt Spray {Salt Fog (ASTM B-117)}
- Positive Material Identification (PMI)
- Passivation Testing
- Humidity Testing

## NONDESTRUCTIVE TESTING

Testing by nondestructive methods can detect surface and sub-surface defects or verify dimensional characteristics without harming your material or product. Our technicians are certified to meet your industry requirements to ASNT SNT-TC-1A, NAS410/MIL-STD-410, MIL-STD-2132 and Pratt & Whitney PWA-NDTQ.

Ultrasonic inspection is performed by high-speed immersion for round stock between 1/8 in. and 6 5/8 in. diameter and lengths up to 75 ft. Larger sizes and other product forms are inspected by the contact method. Tubing, pipe and fittings are tested to pressures up to 10,000 PSI using hydrostatic pressure. Magnetic particle inspection is performed by the fluorescent wet method on parts up to 12 ft. long using bench units with a maximum output of 6,300 amps. The visible dry method is also available. Liquid penetrant inspection is performed on pipe, tubing, bar stock and other products up to 40 ft. long using fluorescent or visible dye. Fluorescent dyes are available in sensitivity levels 2, 3 or 4 with the water-washable or post-emulsifiable methods. SNT-TC-1A certified visual inspection is also available. X-ray inspection is performed in our 20 ft. x 20 ft. radiography room on large and small parts, such as weld plates, castings, and electronic assemblies. Receipt and final inspection are provided upon request.

- Ultrasonic Inspection - contact or immersion
- Magnetic Particle Inspection - wet & dry methods
- Liquid Penetrant Inspection - visible & fluorescent
- Hydrostatic Pressure Testing - tubing, pipe & fittings
- X-ray Inspection / Radiography
- Visual Examination

### ADDITIONAL SERVICES:

- Cutting, trimming and deburring
- Material identification
- Line marking in a wide variety of font styles and sizes. Black ink is LTI certified to meet all nuclear and military requirements.
- Stenciling
- Electrochemical etching
- Packaging and shipping in accordance with ANSI N45.2.2 or customer specifications

## FAILURE ANALYSIS

Most failure investigations performed at LTI pertain to metal components and concentrate on the metallurgical aspects of the failure. The process begins with a review of background information on the failure and the service history of the failed component. The steps performed in our investigations vary depending on the type of failure, but may include any of the following inspection methods: nondestructive testing, visual examination, macroscopic or metallographic examination, chemical analysis, testing for mechanical properties or simulation tests.

Once a thorough investigation is complete, our engineers summarize the data that has been collected and interpret the results in a comprehensive report. The Failure Report discusses the cause of failure, contributing factors or environmental conditions, recommendations for improving future service from the process or material, and suggestions for preventing future failures with similar parts.

## CALIBRATION

Calibration provides assurance that an instrument is capable of measuring to its performance specification by comparing performance to a measurement standard. Our calibration laboratory, LTI Metrology, provides a wide-range of A2LA-accredited and NIST-traceable calibration services at our facility and in the field. Dimensional, mechanical, pressure, force, torque, mass and vacuum calibration services are available for one-stop convenience. We are happy to coordinate the calibration of flow meters and instruments requiring electrical, temperature and humidity services with our audited and approved vendors. Our field service team will calibrate surface plates, CMMs, hardness testers, optical comparators, balances, testing machines and hand tools at your facility to minimize your downtime.

To provide the precision measurement and efficient turnaround you require, our technicians and inspectors perform most calibrations in a climate-controlled laboratory using state-of-the-art, computer-assisted equipment. Our extensive calibration capabilities include:

- Torque from 0 to 2,000 ft. lbs.
- Pressure up to 40,000 PSI
- Length standards up to 120 in.
- Gage blocks up to 20 in.
- Surface plates up to 14 ft. diagonal
- CMMs with volumetric cubes up to 1600 mm.

When repair work is required, we provide cost and delivery estimates for your approval. We can supply new instruments and replacement parts from Mitutoyo, Starrett, Glastonbury Southern Gage (GSG), Boston Centerless and Vermont Gage at the manufacturers' prices.

## DIMENSIONAL INSPECTION

LTI Metrology offers A2LA-accredited dimensional inspection of machined products, parts and fasteners for first-article and third-party inspections. Our contact CMM can measure parts up to 18" x 20" x 16". Our video measuring capacity is 20" x 18" x 8".

## SPECIMEN MACHINING

Many tests are performed on specimens, which we can machine from your materials to required specifications. Our machinists work with computerized numerical control (CNC) equipment to prepare high-quality, economical test specimens from metals, many plastics, and some exotic materials such as metal matrix composites, hardened steels and nickel-base alloys. The machine shop also performs specialty services like low-stress grinding and EDM.

All machining is done in accordance with ASTM A-370, ASTM E-8, ASTM E-23 and customer specifications. LTI is on the National Institute of Standards and Technology (NIST) Qualified Manufacturers List to machine Charpy V-Notch Impact verification specimens.



**CNC turning center cuts cylindrical specimens for testing**

- Flat Tensile
- Round Tensile - Threaded or unthreaded
- Flat Fatigue
- Izod Impact
- Charpy V-Notch Impact - Notched by grinding
- Stress Rupture - Notched by turning or grinding
- Stress Corrosion
- Gleeble
- Jominy
- Round Compression
- Dynamic Tear
- Compact Tension
- Fracture Toughness - Notched by EDM
- Hydrogen Embrittlement
- Face, Root & Side Bend
- Rotating Beam & Low Cycle Fatigue - Low stress ground & polished longitudinally



**CMM calibration with a ball bar and step gauge**



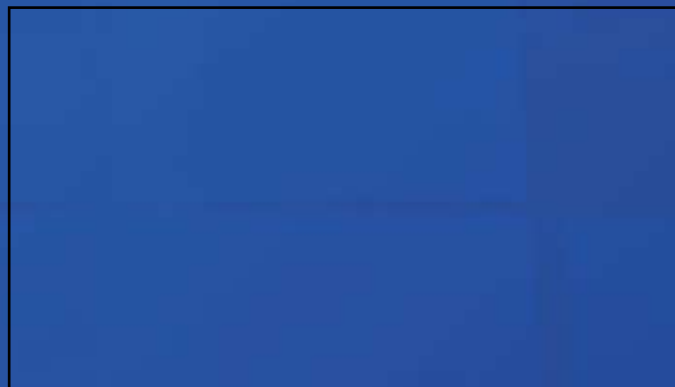


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