



LABORATORY TESTING INC.

2331 Topaz Drive, Hatfield, PA 19440

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A Publication from *Laboratory Testing Inc.*

Expanding Dimensional Metrology Capabilities

The OGP Inc. SmartScope Flash 500 is proving to be new technology with a real advantage at LTI. The video/optical/touch probe measuring system is programmable for automated measurement and reliable accuracy. Orders for contract inspections or multi-piece first-article inspections can be processed efficiently. The SmartScope has increased our optical measurement capabilities to handle your parts up to 20" x 18" x 8".



Watch for Our New Look!



We recently updated our "look" with a new tradeshow display and company brochure. Look for them at these tradeshows in 2007:

- MD&M East
- Mid-Atlantic Machine Tool
- Power-Gen

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LAB NEWS

Magnetic Particle Inspection

Magnetic particle inspection successfully detects surface and near surface defects in ferromagnetic materials such as steel and iron. This is just one type of nondestructive testing (NDT) performed at Laboratory Testing Inc. NDT methods allow materials and products to be tested or inspected without damage. LTI also provides liquid penetrant, ultrasonic, radiographic (X-ray) and visual inspection, as well as hydrostatic pressure testing. These NDT methods will be discussed in the next few issues of *LabNews*.

The Process

Magnetic particle inspection is performed by spreading fine magnetic particles over the surface of a specimen as it is being magnetized, causing a buildup of particles at a discontinuity such as a crack, lap, inclusion or seam. These particles have high magnetic permeability, so they are easily magnetized and attracted to small magnetic leakage fields from discontinuities. A trained and experienced technician will interpret the indications that might be observed during the inspection.

The magnetic particles can be applied dry as a powder or wet as a suspension in a petroleum-based or water-based carrier. Dry particles are most commonly used for inspections in the field. Wet inspection is considered best for detecting very small discontinuities because it uses much smaller particles and the liquid carrier allows these particles to flow easily to small leakage fields to form indications.

A wet inspection has an advantage over a dry inspection because the equipment used in this process can quickly and easily spray a uniform layer of particles over the surface of the material or part to be inspected. The magnetic field can be produced

by the use of direct current (DC) circuits or by alternating current (AC) circuits. AC circuits produce fields that are confined to the near surface of the test sample and are useful in finding surface cracks. DC circuits



Horizontal magnetic particle wet fluorescent units

provide magnetic fields that penetrate a shallow distance into the test sample and are useful for also finding discontinuities below the surface.

Magnetic particle inspection can be applied to raw materials, parts or products during various stages in the manufacturing process. It is also applied during equipment or machinery maintenance and overhaul to find fatigue cracks.

Inspections at LTI

At LTI, the most common method used for magnetic particle inspection is the fluorescent wet continuous method using full wave direct current (FWDC). The part is placed into one of our three wet fluorescent horizontal units and then the magnetic field is applied while the suspension of magnetic particles is sprayed or poured over the test sample. Our horizontal units range in size from 6 ft. to 12 ft. long. Larger size parts are inspected using cables, yokes and portable equipment.

Advantages and Limitations

There is relatively no limit to the size of parts that can be inspected using the magnetic particle method, except for limitations due to the

capacity of the test equipment. High currents are usually needed to inspect large parts. Inspections need to be performed in two directions to insure detection of discontinuities in the longitudinal and circumferential directions.

No extensive or elaborate pre-cleaning of parts is required before inspection, usually only solvent degreasing is needed to remove oils. Paint, heat-treat scale, grease, etc. should be removed to provide the most accurate test results. Inspections can be performed before and after plating. It is standard practice to demagnetize parts following inspection and post-clean the parts to remove magnetic particles.

Standards and Specifications

A variety of standards and specifications are used as the basis for performing magnetic particle inspection. These include sections of American Society of Materials Engineers (ASME) Codes, Aerospace Material Specifications (AMS), Society of Automotive Engineers (SAE) Specifications, American Society for Testing and Materials

(ASTM) Standards, various military standards, and the American Society for Nondestructive Testing (ASNT) Recommendations.

For more information on magnetic particle inspection at LTI, please contact Mark Tierney, NDT manager, at mtierney@labtesting.com or 800-219-9095, ext. 125.

NDT Terminology

A **discontinuity** is an intentional or unintentional interruption in the physical structure or configuration of the material or component.

A **defect** is any discontinuity that does not meet the specified acceptance criteria.

An **interpretation** is a determination of whether indications are relevant, non-relevant or false.

An **indication** is the response or evidence from a nondestructive examination.

A **relevant indication** is an NDT indication that is caused by a condition or type of discontinuity that requires evaluation.

A **non-relevant indication** is an NDT indication that is caused by a condition or type of discontinuity that is not rejectable.

False indications are NDT indications caused by conditions such as part geometry (blind holes, keyways), magnetic writing, localized hardening and scratches. They are considered non-relevant.

Leakage field is the magnetic field that leaves or enters the surface of a part as a result of a discontinuity or change of section.

Reference: ASTM E1316

Keeping Up With Customer Needs

Our customers are growing, their orders are increasing and many have tight turnaround requirements to meet their own business needs. To keep pace with our customers' testing and calibration needs, LTI has added a 2nd shift in many departments, including calibration, chemistry, mechanical testing, ultrasonic testing, X-ray, the machine shop and certifications.

LTI's next project is a 12,000 sq. ft. building addition to provide the capacity to process more orders on both shifts. An additional parking lot with 55 more spaces for employees and visitors also will be constructed. Plans are to begin construction in the next month or two and have the addition and parking lot completed before year-end.

A2LA Accreditation Expanded

A2LA has reapproved our accreditation in calibration services and dimensional inspection. Our scope of accreditation was also expanded to include force measurement and calibration of CMMs, dead weight testers and supermicrometers.

The new certificates are valid through March 31, 2009 and are available at the Literature & Quote link on our website, www.labtesting.com, or from Frank Peszka, QA Mgr., at ext. 105.

Holiday Closings

LTI will close for the following holidays during the next few months. Please notify us in advance, if you expect to have rush orders near these dates.

Memorial Day Mon., May 28th
Independence Day Wed., July 4th

LAB NEWS

Employees Recognized



Sherri Scheifele Named ASQ-Certified Quality Auditor

Sherri Scheifele, Q.A. Specialist, has been named a Certified Quality Auditor (CQA) by the Certification Board of the American Society for Quality (ASQ). This recognition indicates a proficiency in and a comprehension of quality auditing tools and techniques. Sherri achieved this recognition by meeting employment experience requirements and by passing the CQA examination.



Glenn Derstine Receives ASTM Award of Appreciation

The American Society for Testing and Materials (ASTM) presented an Award of Appreciation to Glenn Derstine, LTI's Destructive Test Manager. The award is presented to committee members for active participation and contribution to an ASTM standard. Glenn is currently a member of Committee E28 and was recognized for his assistance in keeping this standard up-to-date.

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