CSIR on Non-Destructive Testing

Non-Destructive Testing (NDT) is a testing and inspection technique used to evaluate the properties of materials, components and structures, as well characterise differences and identify defects and flaws without damage.

With this capability, the Council for Scientific and Industrial Research (CSIR) can develop different materials that meet industry standards. The CSIR NDT laboratory comprises various testing techniques with which all fabricated material can be evaluated. These are:

- Conventional Ultrasound Testing (UT);
- Phase Array Ultrasound Testing (PAUT);
- X-ray Radiography Testing (RT);
- Infrared Thermography Testing
- Eddy Current Testing (ECT); and
- Liquid Penetrant Testing (LPT).

Ultrasound Testing

The CSIR offers two ultrasound techniques – conventional UT and PAUT. Conventional UT can be used to characterise the thickness of the material, internal structure, and hidden flaws in metals and composites. While the Phase Array Machine technique makes use of sound waves and the principle of echo to measure the speed of sound in metals aluminum, steel, titanium, etc. A range of composites can also be measured using a shear wave parametric probe connected to the Phase Array Machine.

X-ray Radiographic Testing

The capability of micro-focus x-ray RT, with a maximum capacity of 200 kV, is available to test a range of metals such as aluminum castings, titanium, thin steel and powder technology samples. This machine can inspect aluminum casting defects, such as cavity shrinkage, cracks, inclusions and porosity.

Infrared Thermography Testing

Using the thermography technique, CSIR researchers can test polymer composite panels and repair patches containing, but not limited to, epoxy, phenolic, poly (amide imide), polymide, carbon, glass, quartz, or silicon carbide and fibers. This technique is used to identify flaws in composite panels or at the bonded interface between layers and a supporting sandwich core or solid substrate.

Eddy Current Testing

The ECT uses the principle of electromagnetism as a basis for conducting the examination. At the CSIR, this equipment is used to categorise metals by evaluating conductivity, measuring paint thickness, surface cracks on rotor turbine blades, subsurface crack detection on the rivets bonding two aluminum skin, and identifying heat-treated metals.

Liquid Penetrant Testing

LPT can detect and locate surface-breaking flaws, such as cracks, porosity, laps, seams and other surface discontinuities. The principle of this technique uses a liquid penetrant and developer.

Apart from conducting the in-house quality checks, consultation and evaluation can be offered depending on the client's request.

For further details, contact: Maurice Maliage | E: MMaliage@csir.co.za | 012 841 3375