

Description

ACFM is used for detecting and sizing surface breaking flaws. Technical Software Consultants (TSC) developed ACFM as an extension of the successful Alternating Current Potential Drop (ACPD) technique. It was initially conceived for use under water to detect flaws in offshore structures and to overcome the fact that ACPD was unsuitable for such applications because of the need for good electrical contact between probes and the structure's surface. Now, however, ACFM is also applied to structures both in and out of the water. (It has the advantage over some other techniques that the structure requires minimal cleaning and that it can be applied over paint and other coatings up to several millimetres in thickness.)

ACFM is an electromagnetic technique. A sensor probe is placed on the surface to be inspected and an alternating current is induced into the surface. When no defects are present the alternating current produces a uniform magnetic field above the surface. Any defect present will perturb the current forcing it to flow around and underneath the defect; this causes

the magnetic field to become non-uniform and sensors in the ACFM probe measure these field variations.

Two components of this magnetic field are measured - one provides information about the depth or aspect ratio of the defect(s), and the other shows the positions of the defects' ends. The two signals are used to confirm the presence of a defect and, together with a sizing algorithm, measure its length and depth.

The advantages of ACFM are that it:

- Works equally well on parent material or welds, ferritic or non-ferritic metals.
- Can be used on hot surfaces, underwater, or in irradiated environments.
- Provides both depth and length information. Accurate sizing of defects up to 25mm (1") in depth.

TWI owns the state-of-the-art Amigo ACFM system supplied by TSC.

Selected clients and applications

ACFM is particularly suited to the detection and sizing of fatigue cracks at the toes of welds, including all butt, fillet, node and nozzle welds. TWI has applied its AMIGO system in this role for inspection of fillet welds under the orthotropic decks of several highway bridges. These have a paint coating so that ACFM was particularly suitable. In some cases inspections are made to a routine schedule to determine whether crack growth is occurring. TWI has also used ACFM to inspect fillet welds in Mobile Offshore Drilling Units (MODUs) to detect any possible original fabrication hydrogen cracking present at weld toes. It has also been successfully deployed in the laboratory in a joint industry project to detect stress corrosion cracking in duplex stainless steel pipe welds.

For more information on the services offered in this leaflet, contact:

NDT Technology Group

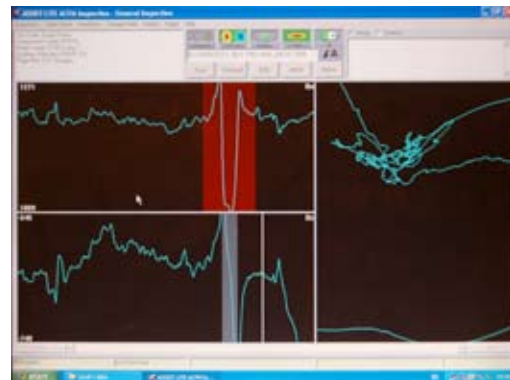
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ACFM probe and AMIGO instrument in operation



ACFM screen output from Amigo unit, showing large flaw in region identified in red