

Nondestructive Testing offered by AAC

AAC offers different ultrasonic based non-destructive testing methods such as scanning ultrasonic inspection and ultrasonic phased array inspection as well as on-line acoustic emission monitoring of structures under load in combination with our equipment for mechanical testing.

Ultrasonic Inspection

Two different ultrasonic inspection system are available:

- 4 axis scanning ultrasonic inspection system from Panametrics (now Olympus) for the automated scanning of planar and cylindrical parts up to sample dimensions of around 0.5 x 0.5 m.
- A portable ultrasonic phased array system Omniscan MX from Olympus with a decoder wheel for linear scanning and a portable 2 axis scanner for manual scanning of slightly curves structures, available for on-sight ultrasonic inspection



Figure 1: 4-axis ultrasonic scanner from Panametrics (left) and portable Ultrasonic phased array system Omniscan MX from Olympus (right)

The OmniScan MX2 (ultrasonic phased array) provides the ability to detect hidden corrosion, cracks and delaminations in multilayer structures. The 0-degree testing measures time-of-flight and amplitude of ultrasonic echoes reflecting from the part into gates in order to detect and measure defects.

Phased array technology generates an ultrasonic beam with the capability of setting beam parameters such as angle, focal distance, and focal point size through software.

Furthermore, this beam can be multiplexed over a large array. These capabilities open a series of new possibilities. For instance, it is possible to quickly vary the angle of the beam to scan a part without moving the probe itself. Inspecting a part with a variable-angle beam also maximizes detection regardless of the defect orientation, while optimizing signal-to-noise ratio.

Both Ultrasonic inspection devices are used in combination with the mechanical testing facilities – drop tower and quasistatic testing machine for standard tests such as “Compression after Impact” of composite panels.

Acoustic Emission Analyses

In addition to the mechanical testing, an acoustic emission apparatus will characterize the rupture process of composites or multiphase alloys before the ultimate failure. Acoustic Emission analysis is a non-destructive testing method capable of detecting and locating faults in mechanically loaded structures, components and specimens. AEA provides comprehensive information on the origin of faults in a loaded object and the development of the fault when subjected to continuous or repetitive stress. Acoustic Emission is the term used when defects in metals, plastics and other materials release energy when subjected to mechanical loading. The energy propagates in form of high frequency stress waves. These types of oscillations are then recorded as AE signals on the surface of the specimen. The AE analysis is the characterization of the signals according to intensity and frequency content, and also entails locating the release mechanisms by comparing signal travel times in a measurement procedure using several sensors.

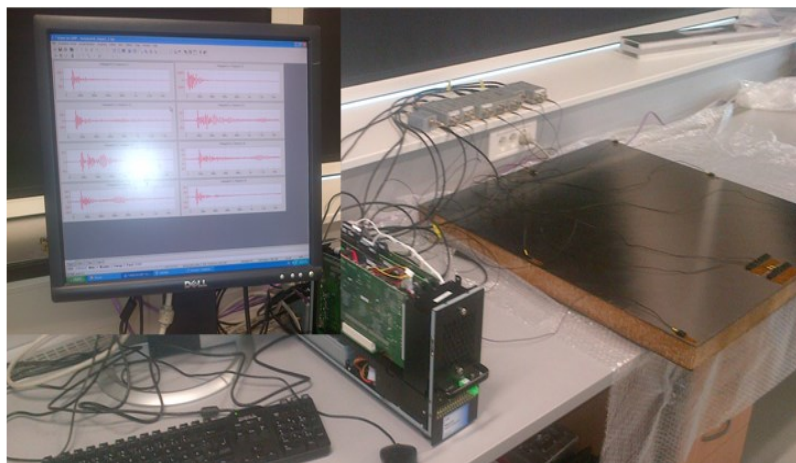


Figure 2: 8-Channel Acoustic Emission device from Physical Acoustics (Mistras) during inspection of a honeycomb panel

The following data acquisition systems are available at AAC

NDT Equipment @ AAC	
Ultrasonic Scanner	4-axis ultrasonic scanning from Panametrics (now Olympus) with water coupled immersion sensors (from 1MHz to 100 MHz),
Ultrasonic Phased Array	US Phased Array System Olympus Omniscan MX with two axis manipulator and different Phased Array Probes from 2.5 MHz to 10 MHz
Acoustic Emission	Acoustic Emission system from Physical Acoustics (8 AE channels / 4 multiplexed signal generation channels / 8 parametric channels)

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