

#### Industries & Market

- Automotive
- Aerospace
- Power Generation

#### Typical Parts

- Honeycomb Structure
- Panel
- Blade
- Frame

#### Technical Inspection

- Phased Array
- L-Scan (Linear Scan)
- Automated or Manual
- Immersion

### Brief Description

Nowadays, composite material is being used widely, namely because of its unique characteristics. QA of parts and laminates made of composite is a challenge. Nevertheless, using UT techniques to perform NDT inspection of such parts provides equally reliable and repeatable results for both in-line and maintenance examination.

Many components may be composed of a specific fibre.

An 0-degree inspection is highly recommended as transverse wave velocity varies with the beam angle, making angular scans

inappropriate. Remember that composites are an anisotropic material that has different strength properties depending on the fibre pattern.

*This application proposes pulse-echo inspection using plastic rexolite, rubber or water delay line.*



### Features and Benefits

- Higher productivity
- Reduce probe swapping
- 100% coverage to increase Probability of Detection
- Flaw Characterisation and Causes
- Full Data Recording
- Wideband filters up to 27MHz (veo+)
- Non Metallic Inspection-Eddy current and MFL not suitable
- Portable and safe (comparable to X-Ray)

#### RECOMMENDED TOOL PACKAGE

- Sonatest veo+ Wheelprobe2 from 2.25 to 10MHz depending on the thickness and attenuation
- Prisma 16:64 T5 64 elements at 5MHz with encoder or 2-10 MHz Stringer Probe 64-112 elements



# Practical Outlines

## Characteristics of the Flaws

Defects may originate from mishandling or abuse, but are often unintentionally created at the time of production. Lack of detection at time of manufacturing may lead to a much shorter part lifespan.

## Type of Imperfections:

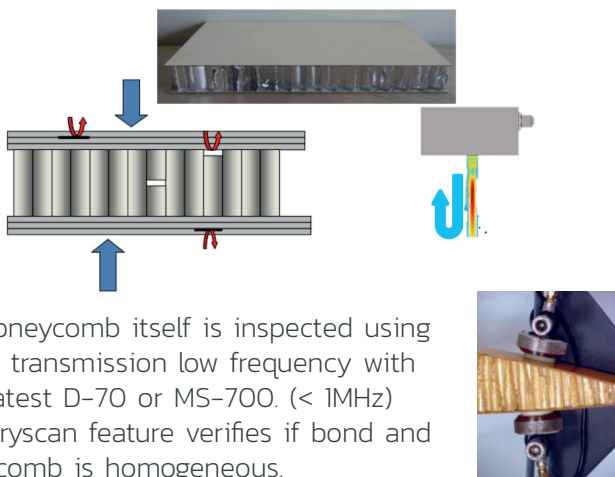
- Insertion of unknown material between 2 plies
- Poor bonding (lack of adhesive)
- Layers overlapping
- Porosities
- De-laminations (Caused by human manipulation or machining)

## External causes to be identified by inspection:

- Stress, Fatigue and Shearing
- Impacts
- Heat
- Abrasion
- Chemical Reaction

## Pulse-Echo Inspection:

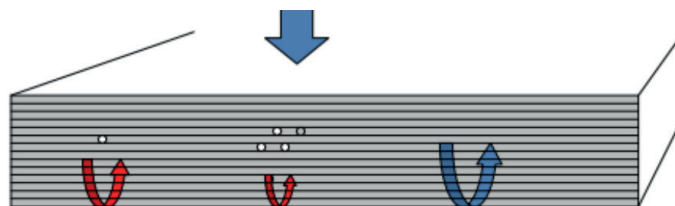
In the *Recommended Packages*, the transducers involved suggest that defects produce echoes or lack of back wall echo. Honeycomb structures can be inspected from the top layers to confirm the adequate bonding.



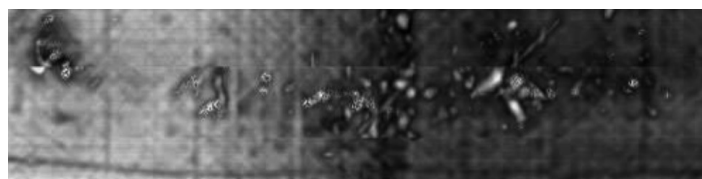
The honeycomb itself is inspected using trough transmission low frequency with a Sonatest D-70 or MS-700. (< 1MHz) This Dryscan feature verifies if bond and honeycomb is homogeneous.

## Mapping

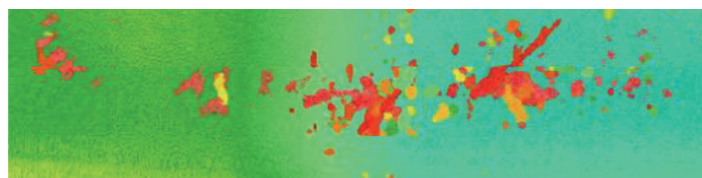
Porosities scatter signal and, as a result, BWE amplitude is reduced.



Mapping of BWE at the same time as the thickness is a complimentary solution that augments probability of detection.



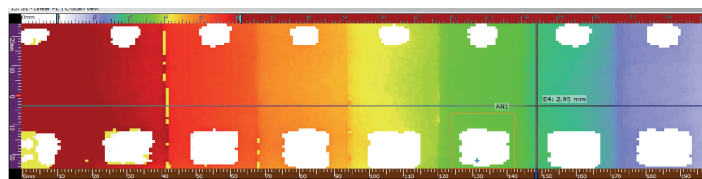
Amplitude C-Scan of composite material



Depth C-Scan of composite material

## Sizing Defects

Establishing location and size of defects will help decide if a part should be rejected or repaired. Reports can be done directly on the instrument or using annotation sizing in UTStudio. Annotation defines defects using thickness, amplitude and bonding ratio reject threshold.



Any UT Data can be exported in PDF or CSV



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