

Technology/Process:

Non-destructive inspection on the Door Demonstrator

Responsible:

Exova

Partners:

Saab

Work package:

4.0 - "Closure in performed non-destructive testing inspections"



Description of Technology/Process:

Inspection was undertaken on the Door Demonstrator by phased arrays and single probes in tight areas. Wheel probe, sliding probe array, linear probe of 84 elements, linear probe of 64 elements, radius array and flexible array were used.

Latest developed arrays from the manufacturers were employed in the inspection.

Before:

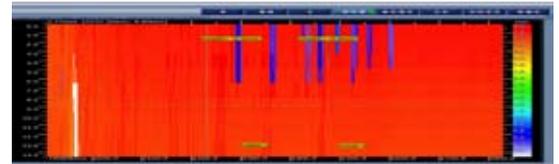
Before the manufacturing of the physical door demonstrator, the TRL level was 3.

Superficial irregularities were brought up by the tooling shaping the structure of the door demonstrator.

Illustration:



C-scan picture of 'hats' section



C-scan picture of the 8 defects in the left-side frame

Keywords:

Door demonstrator,
phased arrays,
NW1,
radius array,
flexible array,
frame,
stringers,
defect detectability,
C-scan

Benefits:

- Exova's capabilities were challenged.
- Latest developed arrays were benchmarked.
- Weak spots from design and conception of the door demonstrator were proved.
- Radius array and Flexible array were proven useful after their conception in the work package 4.3 Streamlining of ultrasound inspection in the Bulk Cargo Door.

Work performed:

Double layer PTFE laminates were inserted in between layers on the door demonstrator on representative areas. The simulated defect's layout complies with Boeings standards. They were laid at one layer from the top, in the centre and at one layer from the bottom. All defects remained in its position after the deposition of the upcoming layers.

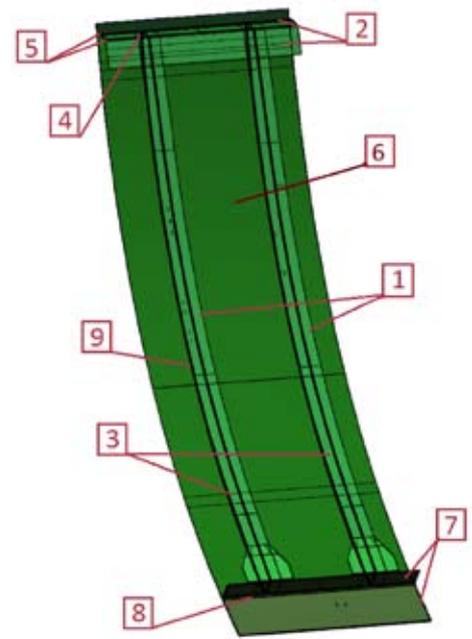
The Door Demonstrator was divided in nine areas for its inspection.

43/44 defects have been detected by C-scan equipment. A-scan was needed for the 44th defect due to the geometry's indisposition.

Lack of correlation between the real defect's size and its visualisation on the C-scan is caused by the poor resolution and open curvature of the surfaces.

The limitations to the current inspection methods have been evidenced by lack of visualisation of the totality of defects.

Technology readiness level is now considered to be TRL7.



Future developments & exploitation:

Research should be prioritized upon streamlining the manufacturing process of reference panels.

Closer collaboration between manufacturing of composites and NDT throughout all stages of the process.
Qualification of radius array and flexible array to Boeing and Airbus standards.