

Technology/Process: **Streamlining ultrasound inspection of Bulk Cargo Door**  
Responsible: **Exova**  
Partners: **Saab**  
Work package: **4.3 "Ultrasound testing using arrays"**



### Description of Technology/Process:

By using phased arrays customized for inspecting inner and outer radii on the bulk cargo door, it is possible to streamline its inspection process with ultrasound. Initial tests show that the time for ultrasound inspection can be decreased by approximately 20%.

### Before:

The inspection of radii is performed with a wedge holding four single probes orientated in different angles at the same time. Defects were hard to be differentiated when they were found together. The technique is highly operator-dependent.

### Illustration:



*Inspection of inner radius using equipment consisting of four single probes*

### Keywords:

NDT,  
phased array,  
ultrasound,  
cargo door,  
radius array,  
flexible array,  
carbon fibre,  
efficiency

### Benefits:

- The resolution of the data in C-scan is improved with phased arrays, thus the risk of errors when interpreting inspection data is minimized.
- The inspection with the four-single-probe equipment is operator-dependent. With this method, the need of manual inspection with single probes is eliminated.
- The radius array only needs the participation of one operator, instead of the previous method needing two.
- The total spare in inspection time is estimated to be 50 minutes.

### Work performed:

The complete inspection process of the bulk cargo door was analysed to identify areas of opportunity in time reduction.

The inspection process on flat surfaces, undertaken by wheel probe and sliding probe array, remains unchanged.

A substitution to the single probe wedge equipment has been evaluated. Radius array has proven a reduction in inspection time of 25 minutes compared to the previous method. The usage of the flexible array has proven a reduction in 20 minutes in comparison to the previous method. The comprehension of the results was hastened by 5 minutes. The equipment was used in an environment resembling actual manufacturing surroundings. Technology readiness level is now considered to be TRL5.



*Radius array*



*Flexible array*

### Future developments & exploitation:

Further work includes qualification of the phased arrays for use in production line and improve software functionality. The support for the radius array providing a more stable water column should be studied furthermore as well.