

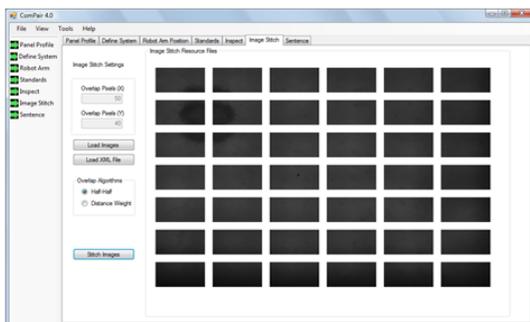


## Continuous health monitoring and non-destructive assessment of composites and composite repairs on surface transport applications

- **Project budget: £2.8m**
- **End Users: ENEA, Hexcel Composites**

Fuel economy has become a priority for transport operators and car manufacturers around the globe. One way to meet CO2 regulations and comply with government directives, is to lighten vehicular weight by using composite materials. Used for a range of applications across the surface transport sector over the last two decades, composite use is expected to grow throughout the next decade.

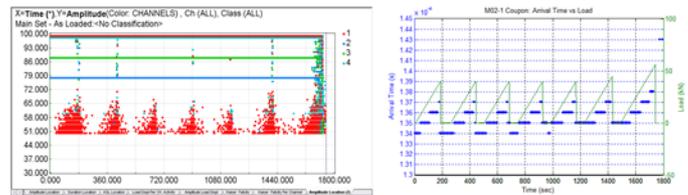
The objective of the ComPair project is to build a new and novel system for continuous health monitoring and non-destructive assessment of composites and composite repairs on surface transport applications including rail, bus, heavy good vehicles and cars.



ComPair software showing defect detection and image stitching

The technical objectives are two-fold:

1. In-situ inspection of composite panels using transient thermography and Near IR techniques mounted on a manoeuvrable robotic scanner
2. In-service NDT monitoring using a combined algorithm system of Acoustic Emission (AE) and Long Range Guided wave ultrasonics (LRU)



AE (left) and LRU Guided wave (right) response to tensile loading

In summary, the ComPair Inspection System is able to detect on GFRP using NIR imaging:

- countersunk holes down to 12mm
- burned drilled holes down to 6mm
- impact damage (20J) down to 4.5mm diameter
- delamination down to 5mm

On CFRP, using pulsed transient thermography, the system is able to detect:

- countersunk holes down to 12mm
- burned drilled holes down to 6mm
- impact damage (60J) down to 6.5mm diameter
- delamination down to 10mm

The ComPair NDT Monitoring System is able to detect:

- growing defects over a distance of 1m (typical size of most surface transport panels),
- intrusive-damage down to a thickness of 2mm (detection of fibre-breakage)
- Impact damage up to a distance of 1m.

Signal processing techniques were able to successfully locate the area of defect growth.

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