ENHANCED PERFORMANCE OF SANDWICH STRUCTURES BY IMPROVED DAMAGE TOLERANCE

G. Martakos[1]*, J.H. Andreasen[1], O.T. Thomsen[2,1]
[1] Mechanical and Manufacturing Engineering, Aalborg University, Aalborg, Denmark,
[2] Faculty of Engineering and Environment, University of Southampton, Highfield Campus Southampton, SO17 ABJ, UK
* Corresponding author (gm@m-tech.aau.dk)

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Abstract: Sandwich structures exhibit high stiffness and strength to weight ratios, and they are used extensively for multiple applications for this reason. However they are very sensitive to localized stress concentrations occurring at load introductions and discontinuities between the face sheet and core, which may lead to the development of interface debonds and cracks. A new concept for a crack stopping device is proposed as a means to induce a damage tolerant design approach to sandwich structures. The new concept is based on a Polyurethane crack stopper, reinforced with Glass fibres. The new crack stopper approach is tested in static and fatigue loading conditions in order to prove it capable of achieving crack deflection away from the face-core interface, crack arrest and also preventing the crack from kinking back into the face-core interface and continue propagating. Numerical modeling and fracture mechanics are used to simulate and predict interface crack propagation and kinking as a result of the crack stopper in a sandwich structures. A feedback link between the experimental and the numerical work is to be established to complement progress on both sides. Results from the numerical modeling are to provide insight for the experimental investigation, while experimental results should afterwards provide feedback for the most advanced numerical tools to be used for full crack propagation analyses. The outcome of the study will be an extensive methodology for applying damage tolerance in sandwich structures by including crack stoppers.