CADFEM Consulting

Simulation of Debonding CFRP Laminates in ANSYS®

Determination of Fracture Energy Release Rates
and Progressivee Debonding Threshold

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Task

Sandwich structures of compression resistant porous core material laminated by tensile resistant CFRP allow structures for very low weight at extremely high stiffness. But regions with bonding failures tend to grow progressive if a threshold of the structural load is reached: The whole structure collapses and often causes further irreversible problems.

Needs:

- A reliable method to simulate the behaviour of debonded regions and its impact on the affected structure.
- A prediction of the limit load at which the progressive debonding starts.

Solution

By fitting on experimental data parameters the debonding toughness of laminate and core will be determined. A routine was written to generate debonded regions in a sandwich model and set up the cohesive zone element definition. A continuous damage criterion was developed to predict the progressive debonding load threshold.

A load step control was established to minimize the solution time. Enhanced post processing was developed to generate contour plots of all relevant cohesive results, mainly the Fracture Energy Release Rate distribution and a damage growth rate.

Benefit for the customer

Practicable FE model set up and solution times for simulation of problems covering very complex physics.

The limit load at which the progressive debonding and collapsing of the sandwich structure starts can be predicted for arbitrary debonded region shapes and structural load.