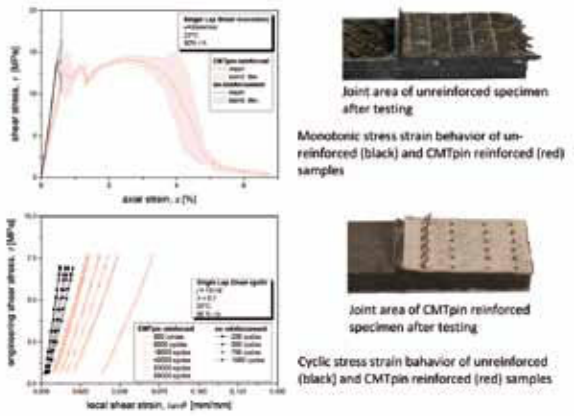
Composite-Composite Joining with Enhanced Damage Tolerance (CoJEC)

A novel joining technology which combines the joining mechanisms form-fit and adhesive-bonding with an integrative, metallic joint approch is presented.

At present a mainstream trend towards structural components made of fiber reinforced polymers (FRPs) can be detected in new aeronautic developments. Goal of CoJEC is to develop a joint between structural components made of Carbon FRP which establishes an optimized specific joining strength and an enhanced damage tolerance at a minimum of introduced weight. Thin metal sheets with arrays of CMT-produced metal pins on top provide a fiber friendly load transfer between two CFRP laps with increased damage tolerance due to the plastic deformation of the metal pins.

Several different arrangements of pins in the joint area and various pin shapes were investigated in this project. It was managed to increase the failure stresses of the joints up to 6% compared to co-cured and up to 96% compared to adhesively bonded joints. The strains at failure were increased significantly by the use of CMTpins as a joining reinforcement. Unreinforced samples yielded strains at failure of below 1%, whereas CMTpin reinforced samples reached local joint strains at shear strength between 2.5 and 4.0%. Thus the damage tolerance could be increased significantly by the use of CMTpins as joining reinforcement.



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Research Focus:
Damage tolerance of fibre reinforced polymers
Metal-FRP hybrid structure