



ID contributo: 204

Tipo: Presentazione orale

## Design of grips for combined tensile and torsion tests on cylindrical CFRP tubes

venerdì 5 settembre 2025 14:30 (15 minuti)

This study presents a case analysis on the design of an experimental test for cylindrical tubes made of CFRP, with a specific focus on optimizing the bonding of metal end fittings. Such tubes are commonly employed in applications such as steering arms in the automotive industry and articulated quadrilateral mechanisms in industrial handling systems. Rather than investigating the mechanical properties of the tubes themselves, this work centers on the bonding aspects.

To assess the reliability and accuracy of the finite element model in predicting shear distribution along the bond line, numerical simulations were performed and compared with results obtained using Volkersen's formula. The analysis considered both flat overlap bonding, where adhesive distribution follows a parallelepiped volume, and cylindrical bonding, characterized by a cylindrical adhesive volume.

After the analytical and numerical analysis, laboratory validation was carried out through experimental testing. Given that these tubes typically experience combined tensile and torsional stresses in operation, the final tests replicated this loading condition.

This work contributes to the development of an innovative bonding technology that holds potential for further investigation and future applications in various engineering fields.

**Autori principali:** ZANDRI, Giacomo (Università Politecnica delle Marche); Prof. CHIAPPINI, Gianluca (Università eCampus); Prof. SASSO, Marco (Università Politecnica delle Marche); Dr. MARCO, Pillon (Università Politecnica delle Marche)

Relatore: ZANDRI, Giacomo (Università Politecnica delle Marche)

Classifica Sessioni: Compositi

Classificazione della track: Materiali Compositi