

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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A COMPOSITE INTERSTAGE FOR THE VEGA EVOLUTION

Abstract

The weight saving of structural parts of space launch vehicles is still a crucial topic in view of the payload maximization and cost reduction. Significant weight reduction can be obtained in the upper stages (fairings, adapters, and interstage shell structures) through the use of fully composite design. The Italian Aerospace Research Center (CIRA) has recently developed a research study, funded by the Italian Space Agency, to design, manufacture and test a full composite structural model (scale factor 1:1.5) representative - in terms of the main design requirements, geometry and loads - of the I/S 2/3 of the Vega launcher evolution. A carbon fiber lattice design concept has been optimised in conjunction with an advanced automated manufacturing process, based on dry winding, resin infusion and out-of-autoclave cure. The mechanical tests under combined compression, bending and shear loads have confirmed the expected high performance and the possibility to reach substantial weight saving in comparison with the aluminium benchmark. Other tests have been conducted at level of sub-components to address some manufacturing peculiarities. The paper concerns with the dissemination of the main design, manufacturing and tests results of the research study which demonstrate a rather solid know-how consistent with the need of near future applications.