

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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VERIFICATION WITH QUASI-STATIC TESTS OF COMPOSITE STRUCTURES FOR LAUNCHERS,
SATELLITE AND RE-ENTRY VEHICLES

Abstract

DTM is an engineering group working since 1994 in the aerospace field. The most interesting activities in the frame of structures verification has been the qualification and acceptance of mechanical structures by means of quasi-static test jigs including all necessary correlations between theoretical and experimental results. These activities have been performed for rocket launchers, re-entry vehicles and satellites structures.

The most recent achievement has been the acceptance of the composite thrust structure and shear panels for IXV experimental spaceplane (Thales Alenia Space Turin prime contractor). IXV has been successfully launched and tested in February 2015.

The overall success of IXV flight started, from DTM perspective, already 10 years ago when it was designed and built the test jig for the interstage 2/3 qualification of the Vega launcher vehicle, which has been used to lift-off IXV. For the Vega interstage the key factor for the design of the quasi static test jig facility has been to take into consideration the loads transferred from the test jig facility to the interstage in order to perfectly simulate the real loads on the Vega rocket structure.

A further activity which involved correlation between theoretical and real results obtained with a dedicated test bench, has been the design and verification of the carbon fiber-titanium Tank Support Structure (TSS) for Sentinel-1 satellite (prime contractor Thales Alenia Space Rome). The first TSS satellite was successfully launched on the 3rd of April 2014. Each verification of the aforementioned space structures included non destructive inspections (NDI - ultrasonic or acoustic tests) on composite parts. NDI have been performed before and after the quasi-static tests both on solid laminates composites as well as sandwich structures.

An insight of the verification strategies used by DTM will be described as well as the test and acquisition equipments which have been used to verify the correlation between the theoretical and experimental results which contributed to the success of the Vega, Sentinel 1 and IXV missions.