

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
New Materials and Structural Concepts (4)

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CERAMIC MATRIX COMPOSITE (CMC) THERMAL PROTECTION SYSTEM OF THE IXV
EUROPEAN ATMOSPHERIC RE-ENTRY DEMONSTRATOR. DEVELOPMENT PROGRESS
STATUS AND ON-GOING ACTIVITIES

Abstract

The IXV program aims at developing a demonstration vehicle that will give Europe a unique opportunity to increase its know-how in the field of advanced atmospheric re-entry technologies, such as Thermal Protection Systems (TPS), Aero-ThermoDynamics (ATD) environment, and Guidance, Navigation and Control (GNC).

Ceramic Matrix Composite (CMC) TPS typically belong to the group of key technologies that will enable the IXV flight, by providing a high temperature resistant non ablative outer mould line for enhanced aerodynamic control. They have been developed in Europe for more than 20 years, and have reached a high Technology Readiness Level. Their maturity can now only be improved through an actual flight, which will precisely be made by the IXV.

Snecma Propulsion Solide has already performed preliminary design activities all along phase B2/C1, which contributed to the successful completion of the system PDR, and in the demonstration that CMC TPS are well suited for the IXV mission. These activities have also highlighted the remaining points that will need to be solved within the development of this ambitious demonstration vehicle. These points include in particular : - the convergence on the specifications, for instance on the sizing thermal load cases (heat fluxes, taking into account catalytic effects and margin policy), in order to achieve a significant demonstration without degrading the optimisation of the design, - the convergence on the interfaces (type and location of the interfaces with structure, adjacent TPS sub-systems, and instrumentation), - and the verification of specific feature of the design such as sneak-flows, and steps and gaps.

The paper will describe the current progress status of the development of the Windward Assembly TPS and Nose Assembly, and the activities that are initiated and planned for the qualification and the delivery of the flight hardware.