Sandwich Panel for Thermal Protection Systems (TPS).

KEYWORDS

- ❑ THERMAL PROTECTION SYSTEMS
- ❑ SANDWICH STRUCTURES
- ❑ RE-ENTRY
- ❑ COMPOSITE MATERIALS
- ❑ CERAMIC FOAMS

AREA

- ❑ CIVIL ENGINEERING, CONSTRUCTION & MECHANICAL ENGINEERING

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Patent Type
Patent for invention.

Co-Ownership
Sapienza University of Rome 50%,
Italian Space Agency 50%.

Inventors
Marta Albano, Andrea Delfini, Mario Marchetti, Carlo Vassalli.

Industrial & Commercial Reference

Space and aeronautic applications with particular address to hypersonic vehicles, automotive, rail, naval applications and application in nuclear and energetic sector (structure for high strength and high temperature).

Time to Market
Structure manufactured and assembled (prototypes, qualification and flight models). Validated at laboratory level. For space applications, mechanical and thermal plasma testing are required. The qualification campaign lasts a few months, at the end of which the product is ready for the flight. Time to market in about one year.

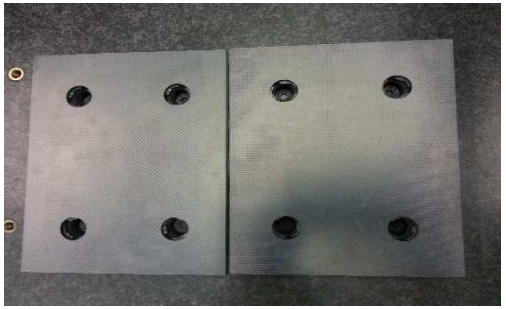

Fig. 1 Thermal protection system, qualification model.

Fig. 2 Image of the structure, qualification model.

Fig. 3 Bending on the structure / Bending on sandwich.

Availability
Cession, Licensing, Spin-off and Start-up.

Abstract
Thermal protection system for high temperature applications that can lower the temperature of about 1000° C in less than 4 cm.
Its resistance to high mechanical loads makes it suitable for use as a thermal protection system with structural functions.

Publications

- ❖ M. Albano, S. Ianelli, C. Vassalli, A. Delfini, D. Francesconi, R. Viotto, M. Marchetti, *Carbon Thermal Protection System for Hypersonic Vehicles*, 4th International Carbon Composites Conference Arcachon 12-14 May 2014.
- ❖ S. Iannelli, M. Albano, A. Delfini, R. Viotto, M. Marchetti, *A New Advanced Structural Panel Sandwich for reentry System*, International Conf. AIDAA 2015, Torino.

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Technical Description

Sandwich structure in composite ceramic materials resistant to very high thermal and structural loads.

The structure allows access from the outside of the vehicle where it is installed allowing easy maintenance.

The good thermal properties limit the creation of mechanical loads even at very high temperatures.

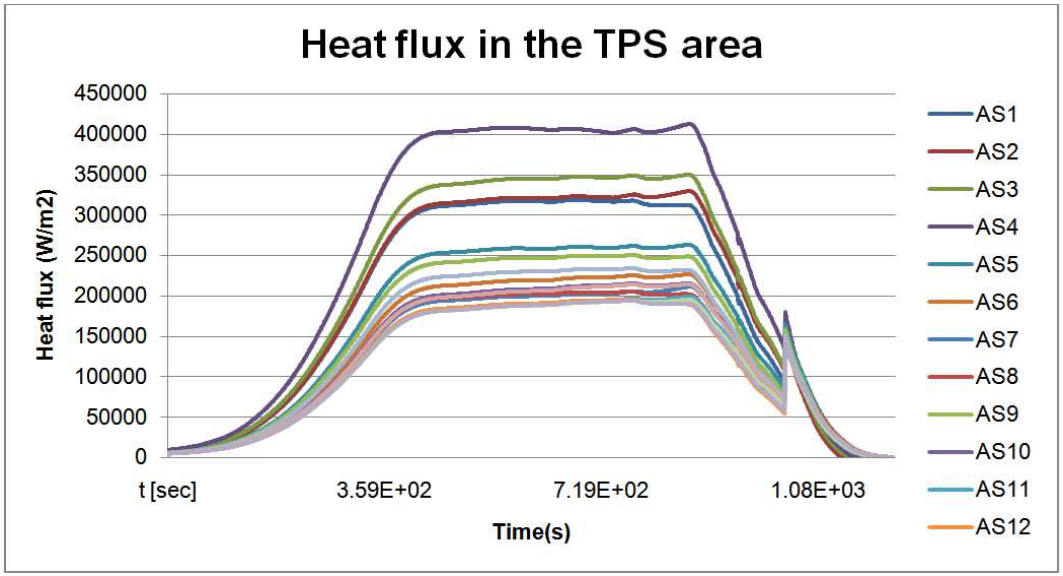
Technologies & Advantages

Temperature drop of about 1000 ° C in less than 4 cm, very high thermal stability, very high resistance to mechanical loads up to temperatures of over 1300° C, exceptional flexural strength, easy assembly on the supporting structure, accessibility from the outside to allow easy maintenance.

Applications

Space applications for re-entry vehicles and aerospace applications for hypersonic vehicles, applications in nuclear power plants and energy plants such as high temperature resistant structures and electromagnetic shielding features.

Fig. 4 Design loads / Thermal loads used for sizing.



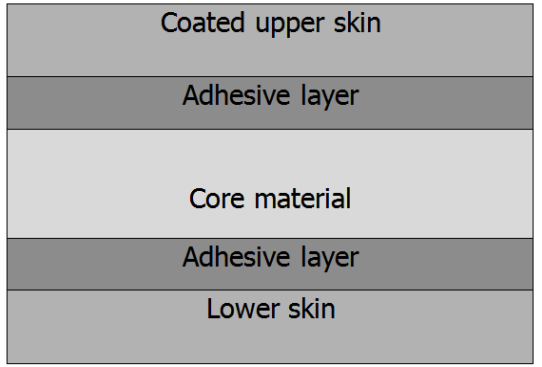


Fig. 5 Sandwich Structure.

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