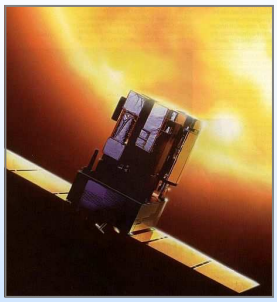
HIGH PERFORMANCE SPACE STRUCTURE SYSTEMS GMBH

Ultralight EMI-tight CFRP Electronic Housing

Since 2005 HPS is investigating the electromagnetic influence in the presence of CFRP (e.g. under contract to ESA) in collaboration with several German and European entities. Extensive material tests using waveguide measurements and other techniques have been conducted. The materials included different carbon fibre types, CFRP/AL-honeycomb sandwich structures as well as conductive matrices achieved by Carbon Nanotubes (CNT). Analytical models of the electrical behaviour of CFRP structures have been developed. New promising insert concepts with reduced manufacturing costs and excellent bonding values have been designed. Common mode impedance measurement of different grounding rail configurations as well as numerical calculations on typical flat S/C CFRP honeycomb panels have been carried out.
With all that knowledge on the EMI aspects of CFRP an electronic housing was created, which achieved comparable shielding performance with significantly less mass (20-30%) compared to typical bench marks, e.g. an ultralight aluminum electronic box orbiting the sun on the SOHO satellite. Beside the application for planetary spacecraft missions the „EMI-Box“ provides benefits on lightweight or long duration aircrafts.



Current Specification (for a bi-modular config.):
- dimensions: 243mm x 275mm x 255mm
- mass: 610 g (excl. electronic boards)
- Possible number of boards: 10 (7,5 kg)
- loads: 20g RMS

Qualification Status:
- material sample tests (fracture, shielding, NDI, REM)
- EMC testing (30 MHz – 1 GHz)
- thermal cycling (planned for 11/2007)
- vibration testing (planned for 12/2007)

HPS
High Performance Space Structure Systems GmbH

HPS GmbH
Christian-Pommer-Str. 34
38112 Braunschweig
www.hps-gmbh.com

Dr.-Ing. Ernst K. Pfeiffer
Tel: +49-531-24466-90
Fax: +49-531-24466-99
pfeiffer@hps-gmbh.com

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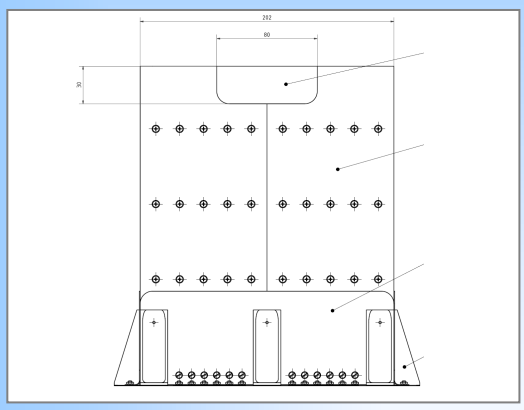
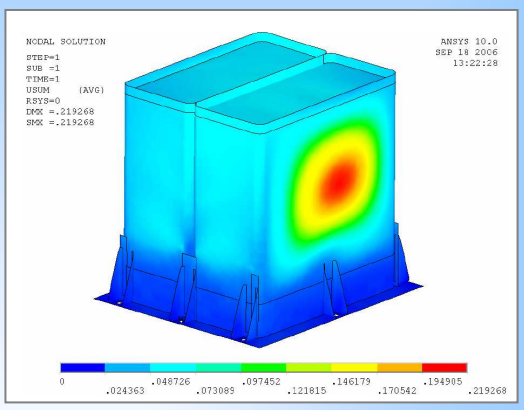
Detailed Design, Structural & Thermal Analysis





PCB Accomodation and Interfaces

EMC Testing