

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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PROTOTYPE OF THE PHASE CHANGE HEAT STORAGE SYSTEM OF FUTURE ARIANE
LAUNCHER EQUIPMENT BAY

Abstract

In the frame of ESA's Future Launchers Preparatory Programme (FLPP), attention has been paid to the use of Phase Change Materials (PCM) for thermal control of Launchers, and especially some electronic units of the Equipment Bay. After a detailed trade-off between a thermal spreader and various designs for an advanced Phase Change Material Device, two prototypes have been built and tested in the relevant environment. One prototype is dedicated to a LEO insertion trajectory and the other one to a GEO cycling mission. Attention has been paid to the easy adaptation of the prototypes to various electronic units. Corrosion tests with inorganic hydrate salts have shown the inadequacy of this category of PCM for this application. Finally, organic PCM have been selected. Vibration and vacuum thermal testing has been performed and shows that the proposed prototypes have reached high technology maturity, which is TRL 6. The potential cost saving is estimated to more than 350 000 per launch. The future of PCM Heat Storage Thermal Control is then presented for the future European missions. Use of such PCM device is also adequate for satellite mission with a cycling thermal load.