

Aerothermal Testing of Woven TPS Ablative Materials

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Woven Thermal Protection Systems (WTPS) is a new TPS concept that is funded by NASA's Office of the Chief Technologist (OCT) Game Changing Division. The WTPS project demonstrates the potential for manufacturing a variety of TPS materials capable of wide ranging performances demanded by a spectrum of solar system exploration missions. Currently, missions anticipated to encounter heat fluxes in the range of 1500 – 4000 W/cm² are limited to using one proven material – fully dense Carbon Phenolic. However, fully dense carbon phenolic is only mass efficient at heat fluxes greater than 4000 W/cm², and current mission designs suffer this mass inefficiency for lack of an alternative mid-density TPS. WTPS not only bridges this gap but also offers a replacement for carbon phenolic, which itself requires a significant and costly redevelopment effort to re-establish its capability for use in the high heat flux missions recently prioritized in the NRC Decadal survey, including probe missions to Venus, Saturn and Neptune. This poster will summarize some recent arc jet testing to evaluate the performance of WTPS. Both mid density and fully dense WTPS test results will be presented and results compared to heritage carbon phenolic where applicable.