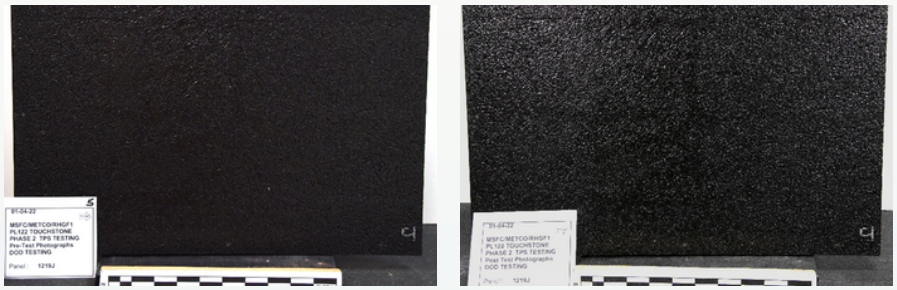
FARADAY™

FARADAY THERMAL PROTECTION SYSTEMS

WWW.FARADAYTPS.COM
FARADAYTPS@TRL.COM



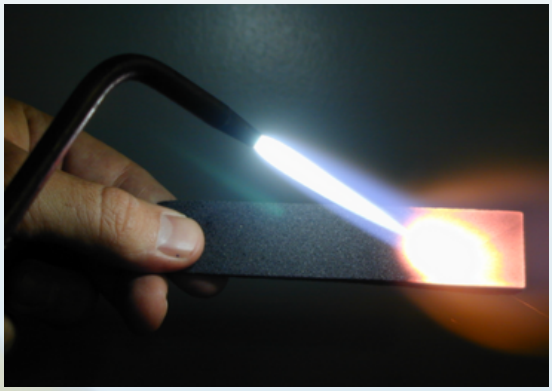
THERMAL PROTECTION PANEL BEFORE AND AFTER EXPOSURE TO SUPERSONIC AIRFLOW AT 2000°F FOR 75 SECONDS

Thermal Protection (TPS)

Faraday utilizes a coal-based carbon foam as the primary thermal protection of the system. The low thermal conductivity of the carbon foam, as demonstrated in the photo below, limits heat transfer to the substructure. Additionally, the carbon foam is both thermally and environmentally stable to provide reliable thermal protection with a long shelf life. This layer could be used as a stand-alone TPS for applications that do not require additional threat mitigation.

Radiation Protection (RPS)

Radiation protection is an optional addition to the system. Faraday implements a Tungsten-loaded material on the innermost surface of the carbon foam. The thickness and loading of the High-Z material in this layer can be optimized for weight, cost, and performance. The base offering provides shielding equivalent to approximately 5mils of Tantalum.



CARBON FOAM TPS WITH ACETYLENE TORCH

Laser Protection

Laser protection is another system addition option that Touchstone has tested and formulated. The test shown in photos below resulted in only superficial damage to the system despite excessive temperatures. Thus, it was declared that our TPS material could be used as a stand-alone system for laser threat mitigation.

3X3" LASER SAMPLE MAXIMUM TEMPERATURE: 799°C

Lightning Protection (LPS)

The outermost layer of this system is also carbon-based and provides a flow path for both electrical charge and thermal loads to dissipate across its surface. This prevents localized heating, and therefore damage, caused by a lightning strike. The high in-plane conductivity of this layer also provides protection from a variety of electromagnetic threats.

TOUCHSTONE RESEARCH LABORATORY, LTD.
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Summary

Touchstone's thermal and lightning protection system, Faraday, provides a distinct approach to shielding technologies. As a composite system, it can be easily optimized for unique applications to provide protection from a variety of threats – including thermal, lighting, and radiation. Faraday uses materials that are both thermally and environmentally stable, ensuring robust shelf-life and reliability upon deployment.

MANUFACTURING DEMO ARTICLE
54-INCH (1.4-METER) DIAMETER, 60-INCH (1.5-METER) HEIGHT

Properties

PROPERTY/TEST	STANDARD	VALUE/DESCRIPTION
WEIGHT †	N/A	TPS ONLY: 0.52 LB/FT ^{2} WITH LPS: 0.87 LB/FT ^{2}
PROLONGED OPERATING TEMPERATURE †	N/A	700ºF
VALIDATED FOR FLYOUT*	N/A	TEMP: 2000ºF SPEED: MACH 4 TIME: 76 SECONDS
EMI†	*MIL-STD-461G*	-21DB ATTENUATION
LIGHTNING STRIKE	*MIL-STD-464C*	PASS AT FULL 200KA STRIKE
ENVIRONMENTAL STABILITY	*MIL-STD-810H* *501.7, 502.7, 503.7, 506.6, 506.8, 507.6, 509.7, 513.8, 514.8, 517.3, 524.1*	PASS
OUTGASSING	*ASTM E-595*	PASS

* MAX THAT HAS BEEN TESTED; NO DEGRADATION TO PANELS OBSERVED.

† PROPERTIES TO BE USED FOR ESTIMATION ONLY. FARADAY CAN BE CUSTOMIZED FOR APPLICATION REQUIREMENTS.