

Weaving Capabilities to Support Woven TPS Manufacturing

NASA/ARC is hereby soliciting information about potential sources to provide the services described below.

NASA is developing a new ablative Thermal Protection System (TPS) that takes advantage of state of the art 3-D weaving technologies to place various fibers in a designed and more optimized 3D configuration. A traditional manufacturing approach would then infuse woven preforms with a resin, machine them to shape, and assemble them as a tiled solution on the entry vehicle substructure. Figure 1 presents an exploded view of a notional heatshield with the woven TPS tiles shown in green and the underlying substructure grey. The woven TPS tiles would then be joined together with an adhesive or other joining approach to make a monolithic heatshield. The purpose of this Request for Information (RFI) is to gather and assess industry availability and capability for the weaving of the TPS material segments.

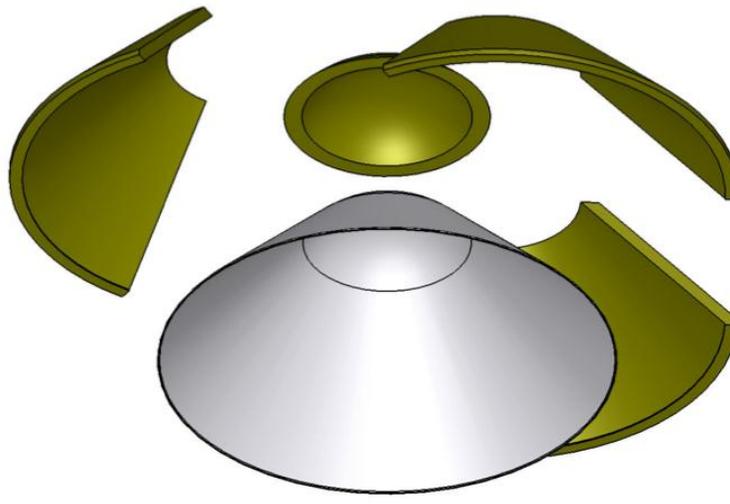


Figure 1: Exploded view of TPS gores and nose cap (Green), and underlying substructure (Grey).

Identifying the capability to weave the needed TPS material is a key element for the successful development of woven TPS. The woven TPS approach will take advantage of weaving technology to manufacture a multilayer system. For the purposes of this RFI we will limit the information needed to a dual layer system. The composition and yarn in layer 1 may differ from layer 2 as shown in Fig 2.

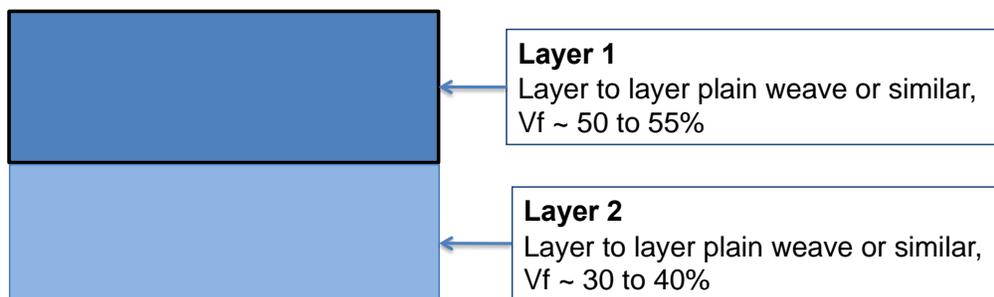


Figure 2: Dual layer architecture to focus RFI response

It is anticipated that the woven TPS material needed will vary in thickness depending on the mission requirements and the TPS location on the vehicle's heatshield. At this time we are assessing industry capabilities to determine feasible weave thickness and width capabilities for our weave architecture. It is understood that there are numerous

parameters to weaving the desired material. The weave required for this application is a plain weave layer-to-layer architecture, or similar, with the weave being primarily carbonaceous in composition. Table 1 summarizes weave information needed to assess current industry capabilities:

Table 1: Description of woven materials needed

Weave Needed	Denier for Layer 1	Denier for Layer 2	Layer 1 - Fiber volume fraction anticipated	Layer 2 - Fiber volume fraction anticipated
Carbon based weave	1900 - 2000	2750-3250	50 – 55%	30 – 40%

Information on weaving capabilities sought includes:

1. Current capability to weave material described in Table 1
 - a. Provide information on width and thickness capabilities for dual layer material described in Table 1. Provide the achievable thickness ratio's of Layer 1 to Layer 2 at a given overall weave thickness.
2. Provide current capabilities (width and thickness) for a 2000 denier carbon yarn, assuming a layer to layer plain weave architecture and a fiber volume fraction of ~ 55 vol%.
3. Provide current capabilities (width and thickness) for a 3250 denier carbon yarn, assuming a layer to layer plain weave architecture and a fiber volume fraction of ~ 40 vol%.
4. Provide information on yarns (provide chemical composition, denier etc if available) that you have worked with previously.
5. Provide information on evaluation capabilities of woven substrate for quality, location of damage or flaws post weaving (Non-Destructive Evaluation [NDE] or other)
6. Other proposed weaving or similar approaches (different than outlined above) that you believe suitable for this application to achieve the required dual layer concept with the required fiber volume fractions and yarn deniers as outlined in Table 1. Also, provide an explanation as to why the alternative approach will be more suitable than the route currently being considered.

Additional Information

If available, provide any study results or current capabilities you have but are not mentioned in the RFI description data that you think pertinent to advancing Weaving Capabilities to Support Woven TPS Manufacturing.

In addition to the information requested above, describe the extent to which existing proven manufacturing approaches can be leveraged to minimize technical and schedule risk to a space program.

NASA/ARC is seeking capability statements from all interested parties, including Small, Small Disadvantaged (SDB), 8(a), Woman-owned (WOSB), Veteran Owned (VOSB), Service Disabled Veteran Owned (SD-VOSB), Historically Underutilized Business Zone (HUBZone) businesses, and Historically Black Colleges and Universities (HBCU)/Minority Institutions (MI) for the purposes of determining the appropriate level of competition. The Government reserves the right to consider a Small, 8(a), Woman-owned (WOSB), Service Disabled Veteran (SD-VOSB), or HUBZone business set-aside based on responses hereto.

NASA Ames Research Center – Request for Information
Ref. # NNA13-3DWEAVETPS

No solicitation exists; therefore, do not request a copy of the solicitation. If a solicitation is released it will be synopsisized in FedBizOpps and on the NASA Acquisition Internet Service. It is the potential offeror's responsibility to monitor these sites for the release of any solicitation or synopsis.

Vendors having the capabilities necessary to meet or exceed the stated requirements are invited to submit appropriate documentation, literature, photographs/ brochures, and references.

Please provide a description of your company's manufacturing facilities and personnel, website address, number of years in business, and/or examples of previous work performed for Government or private customers that is similar to this current NASA requirement. Please advise if the requirement is considered to be a commercial or commercial-type product. A commercial item is defined in FAR 2.101.

Following this initial feedback, NASA may conduct one-on-one meetings with potential contractors. These meetings will allow for exchange of information and will provide an opportunity for potential offerors to provide feedback on the Government's requirements and its acquisition approach.

All information received in response to this RFI that is marked "Proprietary" will be handled and protected accordingly. As applicable, NASA may provide Proprietary information to its support service contractors who are under an obligation to keep third-party Proprietary information in confidence. By submitting a response to this RFI, the responder is deemed to have consented to release of Proprietary information to such NASA support service contractors.

This synopsis is for information and planning purposes and is not to be construed as a commitment by the Government nor will the Government pay for information solicited. Respondents will not be notified of the results of the evaluation. Respondents deemed fully qualified will be considered in any resultant solicitation for the requirement.

All responses shall be submitted to Marianne Shelley (Marianne.Shelley@nasa.gov) no later than **4:00 PM Pacific Time, October 3, 2013**. Please reference "**NNA13-3DWEAVETPS**" in any response.