Procurement and Contracting Services

Request for Proposals for an Internal Balance and Model Positioning System for a Polysonic Wind Tunnel

ADDENDUM #1

Please mark all proposal submission Envelopes with the following information

Sealed RFP # L192501
Due on August 27, 2024 no later than 2:00 PM, MST

The following questions were received prior to the close of the Technical Question Period close on May 14, 2024:

1. *What is the plan area of model (for the purpose of calculating maximum start/unstart loads)?*

   A planform area of approximately 32 $inch^2$ has been used for a reference model for current sizing. This is a revolved-type model to which we are anticipating approximately 15 psi loading during the starting process.

2. *Was there a concept/preliminary design study for the MPS, and if so, may this be provided?*

   Yes, a preliminary design study has been completed and used to direct this RFP. Due to contractual limitations, it is unclear at this time whether this can be circulated.

3. *Has any firm been excluded as a bidder?*

   No

4. *Would the Buyer be receptive to a FFP for the engineering and design and a ROM for the fabrication and install? The fabrication and install would be priced during the design phase and proposed as a follow-on phase.*

   Our preference would be for a FFP for both engineering, design, fabrication and install. However, we would be open to this phased approach, if necessary and that the ROM was well-estimated. A two-phase approach should not significantly affect the overall schedule of the project. It would be requested that a final quote be supplied before the end of the design phase to minimize any pause in progress between phases.

5. *Regarding §5.2.6 Diffuser transition, there appears to be omissions of aerodynamic performance requirements with respect to the desired APWT performance at higher Mach numbers indicated in Attachment A.*

   a. *Ensuring that adequate plenum evacuation capacity is available for operation up to Mach 1.2. This requirement may be at odds with keeping a minimum cross section at the downstream interface to the variable diffuser. The minimum diffuser inlet cross-section that permits the desired transonic operation must be identified and incorporated into the MPS airline design or the variable diffuser performance will be significantly degraded.*

      An effort to design the diffuser is currently underway and is, as yet, undefined. Hence, it is not possible to prescribe the exact interface with the diffuser at this time. Instead, it is the intent of this effort to recommend an appropriate minimum exit area of the transition piece to be installed between the test sections and the diffuser inlet that will support MPS presence at transonic conditions (i.e. transition piece should be sufficiently sized to avoid choking of flow around MPS). The selected proposal will be required to communicate with the diffuser design team to ensure compatibility at the transition/diffuser interface.

b. *Ensuring the transition piece can be adjusted to match the outlet dimensions of the supersonic test section without backward-facing steps. The worst case would be if the MPS section airline is a fixed 17" x 22" piece resulting in a sudden expansion/detached jet flow during supersonic operation.*

   We understand this restriction and would be open to a proposed solution with inserts and/or moveable panels to match the test section exit areas if the detached jet is deemed to have a significant effect on performance.

c. *Either or both of too large of a cross-section area or detached jet flow within the MPS will severely limit the potential performance of the variable diffuser. This will result in higher minimum start and operating pressures than would be achieved if the MPS design requirements included the above aerodynamic performance considerations.*

   As stated in the response to 5.b above, we are open to alternative recommendations that would seek to address this, if deemed significant and necessary.

6. 5.2 Requirements. 5.2.1 General. 5.2.1.1 Loads. All loads are defined to be acting around the balance moment center and are listed as requirements of the balance and sting. Preliminary assessment of requirements suggests reasonable limits as follows.

   5.2.1.1.1 Normal force. 500 lb
   5.2.1.1.2 Side force. 500 lb
   5.2.1.1.3 Axial force. 100 lb
   5.2.1.1.4 Pitch moment. 750 in.lb
   5.2.1.1.5 Yaw moment. 750 in.lb
   5.2.1.1.6 Roll moment. 250 in.lb

   Based on our experience and preliminary calculations, a 0.75 diameter balance is too small and will not be sufficient to measure these loads. Please advise.

   The maximum diameter could extend to 0.875" at a limit, but designs at 0.75" or lower would be preferred. If absolutely unable to meet required loads, design solutions for lower loads will be considered. It would be preferred to maintain these limits in the normal/pitch plane while reducing in the side/yaw plane, if accommodation is required.

7. 5.2.1.1.7 Starting loads. In addition to the loads above, the entire assembly shall be designed to survive typical start-up loads for a conventional blowdown to atmosphere tunnel between Mach 0.8 and 5.0.

   Starting Loads in excess of the balance loads in section 5.2.1 must be explicitly defined by the wind tunnel operator in order to be considered during the balance design. Please Advise.

   It is the intention that the balance loads provided include those to be experience during unstart events. The use of 'typical' start-up loads refer to the dynamic nature of these loads for which we do not have data to share for this facility.

8. 5.2.2 Internal balance. 5.2.2.1 Overview. Internal balance to measure forces/moments acting upon a give model.

   5.2.2.2 Diameter. Maximum diameter of the balance shall be 0.750"; however, 0.500" to 0.625" is preferable.

   In reference to the Balance Loads listed in 5.2.1.1-5.2.1.6 the maximum balance diameter of 0.75" is too small for the given loads. What is the max allowable diameter for the internal balance?

   The maximum diameter could extend to 0.875" at a limit, but designs at 0.75" or lower would be preferred. If absolutely unable to meet required loads, design solutions for lower loads will be considered.

9. 5.2.2.3 Length. The entire length of the balance & sting interface should be within internal model cavity.

   What is the length of the internal model cavity?

   This will likely be model dependent. A total cavity of length 12" has been used in prior sizing estimates, but can be somewhat tailored to support positioning balance moment center in appropriate location.

10. 5.2.4.5 Manual. For manual roll, increments of maximum 45° are requested between -180° and +180° roll angles. This may be changed in between tests, with partial disassembly of the model assembly.

    How many roll increments are desired? Are there any specific roll angles that need to be met?

Minimum required angles are 45° increments. Secondary prioritized increments would be at 22.5° spacing, tertiary prioritized increments at 7.5° spacing.

11. 5.2.4.6 Automated. For the automated roll system, the sting should be able to be rolled mid-test and under load. The range of shall be between -180° and +180°. The roll rate should be at least 30°/s.

    How did you determine the minimum roll rate?

    The roll rate is an approximation that has been made to be able to reasonably articulate the model during testing.

12. 5.2.5.5 Maneuvers. The system shall be able to execute the following maneuvers albeit with future mitigation of geometric interference. 5.2.5.5.1 Centerline (pure pitch). Angle of attack range shall be capable of covering at least -15° < α < +15° (± 30° preferred) when BMC is located on/near the centerline. In practice, this shall likely be limited by the tunnel geometry, but future modification could address this (i.e., by installing a future cutout in the tunnel wall to facilitate).

    Are alternate angle ranges acceptable as long as they equate to ± 30° total?

    Alternative angle ranges would be acceptable, providing the required angular offset is included in the proposed sting.

13. 5.2.5.5.2 Wall-normal traverse (pure heave). The BMC should be able to be traversed across the test section via heave alone at zero angle of attack and get reasonably close to the all, approximately y = ±6" (e.g., for a pitot probe traverse).

    Please confirm that you are intending to have a horizontal movement left and right in the test section for the probe, aka Sway not heave.

    Negative, here we are referring to a vertical translation in the same plane as the pitch angle.

14. 5.2.6.3 Transonic operation. When testing the transonic test section, preliminary assessment by UArizona suggests that the MPS would likely protrude through this liner, hence it should be designed to allow starting of the test section between Mach 0.8 and 1.2 considering blockage limitations.

    What is the max blockage area / ratio allowed in each test section?

    No firm limits are in place for each test section, instead consideration of whether usable 'started' flow is obtained. This varies considerably across the Mach number range and is also model shape/attitude dependent.

15. Our MPS and balance systems include integrated Motion Control and Data Aquistion software. Should our proposal include the appropriate DAQ hardware for recording balance output data?

    The facility has sufficient input/output DAQ capabilities, supplemental hardware should not be necessary.

16. What are the typical test durations or run times for the polysonic tunnel?

    Maximum test durations are provided in the facility datasheet. Typical test durations vary considerably depending on the test. For the MPS and balance, the emphasis is on gathering data during extended tests that may extend up to the maximum available.

End of addendum, all else remains the same.