RFP#422442
PR – Fabrication of Internal Bore Support Components (MPEX-02-PKG-002)

Title: Fabrication of Internal Bore Support Components for the MPEX Helicon Magnet
Response Due Date: 11/17/2025
Primary Point of Contact: Genna Pence – Procurement Officer
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Synopsis:

The Oak Ridge National Laboratory (ORNL), under the Department of Energy's Material Plasma Exposure Experiment (MPEX) project, seeks qualified vendors to fabricate precision mechanical components that comprise the Internal Bore Support Assembly for the MPEX Helicon Magnets. This assembly provides structural alignment and support for magnet internals, ensuring positional accuracy and dimensional stability during operation under cryogenic and vacuum conditions.

Scope of Work:

The contractor shall provide all materials, fabrication, machining, inspection, and documentation necessary to produce components in accordance with the engineering drawings and model data provided in package MPEX-02-PKG-002.

Components include, but are not limited to:

- Internal support rails and tooling machined from aluminum or stainless steel, designed to maintain the radial alignment of internal magnet structures.
- Bore guide rails and end supports with tight tolerances on flatness and parallelism to ensure fit within cryostat assemblies.
- Interface flanges and mounting hardware required for alignment and fixation within the magnet bore.
- Machined subcomponents incorporating tapped holes, counterbores, and precision surfaces for assembly integration.

All components shall be cleaned, deburred, and inspected to verify dimensional conformity

prior to shipment.

Fabrication shall be performed in accordance with Quality Level 3 requirements from the MPEX Quality Assurance Program Plan (MPEX-12-PLAN-001), which defines documentation, inspection, and verification controls for low-risk mechanical hardware.

Technical Requirements and Quality Factors:

1. Dimensional Tolerance:
Machining tolerances shall meet or exceed those specified in the provided engineering drawings, typically ±0.05 mm (±0.002 in) for critical dimensions unless otherwise noted.

2. Surface Finish:
Functional surfaces shall meet finish requirements of Ra ≤ 1.6 μm (63 μin) unless otherwise specified.

3. Material Certification:
All materials must include traceable certificates of conformance and match specified grades (e.g., 6061-T6 and Mic 6 aluminum, 304/316 stainless steel, or equivalent).

4. Integration Requirement:
The fabricated components must interface and integrate precisely with existing Helicon magnets. Vendors shall confirm dimensional and mechanical compatibility in their technical response.

5. Inspection and Verification:
- Dimensional inspection reports required for all features.
- ORNL reserves the right to witness inspection or review inspection data before shipment.
- General conformance inspection will occur upon receipt at ORNL.

6. Final assembly versification:

The components shall be assembled for final inspection and verification as shown on MPEX-02-DES-02-A021, A022 and A023.

Evaluation Criteria:

Proposals will be evaluated based on the following factors:
1. Technical compliance and adherence to drawing tolerances
2. Demonstrated experience with precision machining of vacuum or cryogenic assemblies
3. Quality program alignment with MPEX QAPP Level 3
4. Delivery schedule and fabrication lead time

5. Price and overall value to the government

Deliverables:

- Fabricated hardware in accordance with MPEX-02-PKG-002 drawing package
- Dimensional inspection reports
- Material certificates of conformance
- As-built and packaging documentation
- Delivery to ORNL, Oak Ridge, TN

Attachments:

- Drawing Package: MPEX-02-PKG-002 – Internal Bore Support for Helicon Magnet
- Quality Assurance Program Plan – MPEX-12-PLAN-001 (Rev. 1)