

FA8650-22-S-5507

Defense Production Act (DPA) Title III Program

Request for Information (RFI) on Supplier Based Initiative for Air-Breathing Engines for Hypersonic Systems

CONTRACTING OFFICE ADDRESS

Department of the Air Force, Air Force Research Laboratory (AFRL) – Wright Research Site, Manufacturing Technology Section, AFRL/RXKMT, Area B, Bldg. 45, 2130 8th Street, Wright-Patterson AFB, OH, 45433-7541.

SCOPE

The intent of this RFI is to gather information on the domestic production capability and capacity of the supplier-base for air-breathing engines for hypersonic weapon systems. Air-breathing engines allow weapons to achieve longer ranges and increased payloads to the target. These engine systems include ramjets, scramjets, combined-cycle engines, air-augmented rockets, and rotating detonation engines. During the launch of one of these systems, a rocket booster or a conventional engine accelerates the flight vehicle to at least supersonic speeds before switching to a hypersonic propulsion capability, operating at high Mach numbers and high g-loads to the target. This flight regime induces extraordinary thermal, mechanical, and acoustic stresses in the system. These stresses are experienced by the weapon for most of its mission, whereas a traditional strategic missile would only experience this environment for the final fraction of its trajectory. Air-breathing engines, their subsystems, components, subcomponents, and their constituent materials are specifically designed and produced for the unique, harsh environment of hypersonic flight and scaling their production is critical to the success of the hypersonic missile strike strategy of the United States (U.S.) Department of Defense (DoD), which is considered essential to the national defense. Boost-cruise hypersonic missiles must endure stagnation temperatures of at least 2,000 degrees Fahrenheit for the entire mission and all sources for cooling must come from the fuel or auxiliary coolants, which are heat soaked during the trajectory. Furthermore, because these systems travel five to eight times faster than conventional systems, engine designs must be specially designed to ingest and combust air with the fuel at hypersonic velocities while maintaining consistent performance; all components of the engine must reliably survive the environment and operate with high precision in order to perform the mission. This challenging task requires specialized equipment, materials, tooling, and designs in order to build novel inlet and combustor geometries, advanced fuel injection systems, high performing fuels, effective thermal management systems, and durable engine structures such as nozzle throats, exit cones, and other supporting components. Components of these engines are frequently constructed using advanced techniques for additive manufacturing, tooling, thermal barrier coating, radiographic inspection, and electron beam welding to achieve necessary performance. To date, the DoD has supported proof of concept and prototyping efforts in this area, however the expansion of industrial base capacity is required to meet expected future demand. Further, current engine designs are classified, and the lengthy supply chain (e.g., for

heat treatment, coating, joining, and non-destructive evaluation (NDE)) is disaggregated, causing significant lead-time, cost, and security challenges.

REQUEST DETAILS

The DPA Title III Program Office, part of the Office of the Assistant Secretary of Defense (OASD) for Industrial Base Policy (IBP), is seeking information related to the domestic production capability and capacity of the supplier-base for systems, subsystems, components, subcomponents, and their constituent materials that support air-breathing hypersonic engines. Hypersonic air-breathing engine components include but are not limited to: novel inlet and combustor geometries, advanced fuel injection systems, high performing fuels, effective thermal management systems, and durable engine structures such as nozzle throats, exit cones, and other supporting components. OASD(IBP) is interested in information regarding all tiers of the supply chain (e.g., raw materials, processed materials, additive manufacturing (AM), non-destructive evaluation (NDE), post-manufacturing component processing/coatings & recycling of unused material, etc.) that would support the production of these supplier-based air-breathing engine systems, subsystems, components, subcomponents, and constituent materials designed for hypersonic air-breathing engines. The goal is for sufficient capability across the industrial base to produce the air-breathing engine constituent materials, subcomponents, components, and subsystems to support an initial integrated system production capacity of no less than 48 all-up-round (AUR) missiles (four to five units per month) and up to 72 AURs per year (six per month). Responses of any production capacity, will also be of interest.

Questions To Consider for Responses:

NOTE: All responses should address production of air-breathing engine systems, subsystems, components, subcomponents, and/or their constituent materials for DoD hypersonic systems. Hypersonic air-breathing engine components include but are not limited to: novel inlet and combustor geometries, advanced fuel injection systems, high performing fuels, effective thermal management systems, and durable engine structures such as nozzle throats, exit cones, and other supporting components.

1. Do you currently produce systems, subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems, or have you done so in the past?
 - a) If “yes,” which DoD hypersonic program(s), what systems, subsystems, components, subcomponents, and/or constituent materials have been or are produced annually, and with what type(s) of manufacturing equipment?
 - i. What contracted work do you currently have related to hypersonics or anticipate receiving? How do you prioritize support to multiple DoD programs?
 - ii. What is the current and future predicted production capacity in units per month?
 - iii. What are your current and future predicted equipment and production line utilization rates?
 - iv. What is the Technology Readiness Level (TRL) and Manufacturing Readiness Level (MRL) of your current production?

- v. What level of Commercial Off the Shelf (COTS) components are used in production? Are these COTS components capable of operating in the full range of the hypersonic environments?
 - vi. Any current or future obsolescence concerns?
 - vii. Is the design a modular design?
 - viii. Please provide technical requirements regarding the current production of air-breathing engine systems, subsystems, components, subcomponents or constituent materials you are or have done for DoD hypersonic systems. ***(DO NOT INCLUDE ANY CLASSIFIED INFORMATION.)***
 - a) Specification(s) may be referenced and/or attached to your RFI response. Specifications that are attached will not be included as part of the page count.
 - b) Can you share production resources among two or more contracted efforts (to include non-DoD work)?
 - ix. Do you anticipate losing key workforce members due to lack of workload in the next 24 months?
 - x. What are the capacity limitations of the supply chain? A production location may be able to increase capacity, but overall capacity may be limited by a single source, smaller capacity sub-tier supplier. If dependent upon sub-tier supplier(s) limitations, elaborate on their capabilities-limitations.
 - xi. Does your current distributed supply chain pose challenges (e.g., lead time, cost, security, etc.), and if so, what mitigations are you considering or taking (e.g., do you plan on establishing an internal production capability to accomplish powder removal, heat treating, thermal barrier coatings (TBC), NDE (non-destructive evaluation), surface finish, machining, welding, or other processes)?
- b) If “no - your company currently does not produce systems, subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems or has not done so in the past,” - do you currently have the capability (e.g., equipment, personnel with the required skills, etc.) to produce systems, subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems?
- i. If your answer to question 1b is “yes, we currently have the capability,” please provide what systems, subsystems, components, subcomponents, and/or constituent materials could be produced and an estimate of the quantity that could be produced annually.
 - ii. If your answer to question 1b is “no, we currently do not have the capability,” describe what would be needed for you to produce systems, subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems. Identify what equipment, process development, scale up plans, etc. would be required, as well as a targeted maximum capacity output.

- a) What market barriers to entry exist to your establishing that capability?
 - b) What actions and schedule would be required to address the market barriers to entry to establish your capability (if any)?
 - iii. If your answer to question 1b is “no, we currently do not have the capability, but there was production in the past,” what is the status of that production line and capability?
 - a) What would be required to bring this production line back up and are there any risks in long term production with this line?
 - b) What was the capacity when the production capability existed?
 - c) What were your equipment and production line utilization rates?
 - d) What was the TRL and MRL of the systems, subsystems, components, subcomponents, or constituent materials that were produced?
 - e) Was the design a modular design?
 - iv. If you are not currently investing in this area, why not, and what type of incentive would be required for you to invest?
- 2. Provide a Rough Order of Magnitude (ROM) estimate to create, expand, or operate to support an initial production capacity of no less than 48 AURs per year (four to five units per month) and a ROM to support up to 72 AURs per year (six per month). If a capacity that falls outside of the given range can be achieved, identify the estimated quantity and adjust the ROM to reflect the identified quantity. State whether production approach would utilize traditional or AM technologies/equipment. At what quantities do you achieve economies of scale?
- 3. Identify an estimate of the time required to achieve the capability to support an initial AUR production capacity of 48 AURs (four to five units per month), and what, if any, additional time would be required to support a production capacity of up to 72 AURs per year (six per month). If your projected capacity target is below the minimum range (48 AURs), identify the capacity you can support per year and estimated time required to reach that capacity.
 - a) Identify limiting factors to reach minimum capacity (i.e., equipment lead time, permits, construction, trained workforce, classified capable workspace/storage, etc.).
 - b) Provide the location(s) of your production facility or facilities where systems, subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems will be produced.
- 4. Provide recommended types of investments required (e.g., research and development, production/scale up, engineering/plant design, equipment acquisitions, business development, process optimization, etc.). What factor does investment play into cost structure if any?
- 5. Provide information of origin of the raw materials and components you are currently using or would use to manufacture subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems.
 - a) What are the long lead raw materials and components?
 - b) Are there any single source suppliers? Are any of these sources Outside of the Continental United States (OCONUS)? If so, where are the suppliers located?

- c) Identify how you monitor your supply chain for risks and vulnerabilities (e.g. financial risks, foreign influence risks, cyber vulnerabilities, etc.).
6. Identify the minimum number of units per month, (for a per system/ subsystem/ component/ subcomponent to be produced), and identify the minimum capacity required to make production economical. Are there any industrial base challenges driving cost or any price trends we should be aware of?
 7. Describe any site challenges (e.g., space, environmental compliance, access to workforce talent, access to raw materials, etc.) that would need to be overcome to expand or establish production capability.
 8. Describe any advantages of expanding or establishing your company as a source of subsystems, components, subcomponents, or constituent materials that support air-breathing engines for DoD hypersonic systems.
 9. Do you have in-house testing facilities and capabilities to test components at the extreme temperature, vibration, and acoustic ranges envisioned for the environment the components will need to operate?
 - a) If yes, describe your current capabilities.
 - i. Describe tests performed to ensure that the system, subsystem, component, subcomponent, and/or constituent material conform to the set specifications.
 - ii. Do you have the ability to test the integrated system (Hardware-in-the-Loop (HIL) testing) in relevant hypersonic environments?
 - iii. Can your subsystems, components, subcomponents, or constituent materials that support air-breathing engines solution be made available for testing as part of small-scale testing such as High Operational Tempo for Hypersonics (H4H or HOT 4 Hypersonics) sounding rocket tests and pod tests?
 - iv. What is the earliest opportunity that this solution could be made available for testing?
 - b) If no in-house testing capabilities, describe how you will accomplish the testing and where it will be accomplished.
 - c) If the system, subsystem, components, subcomponents, or constituent materials are not tested, do you believe your solution is capable of withstanding environments associated with hypersonic flight?
 - i. Can your subsystems, components, subcomponents, or constituent materials that support air-breathing engines solution be made available for testing as part of small-scale testing such as H4H sounding rocket tests and pod tests?
 - ii. What is the earliest opportunity that this solution could be made available for testing?
 10. Do you currently have the security infrastructure and capability to handle classified software and component(s) storage? Do you currently have the appropriate security clearances for personnel and infrastructure to enable manufacturing of classified parts?
 - a) If yes, describe the security measures currently in place and the capabilities to handle and store classified software, as well as components once classified software is installed in the components.

- b) If no, what actions are necessary to achieve the capability to handle classified software and components.
11. Have you previously been awarded or completed DoD Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), or Independent Research and Development (IRAD), work with air-breathing engines? If so, please describe the work and accomplishments.
 12. Describe technology innovation in the area of subsystems, components, subcomponents, or constituent materials that support air-breathing engines utilized in your company that separates you from competitors.
 - a) If available, include technology readiness levels associated with aforementioned technology innovation.
 - b) What advanced technologies are you pursuing in the realm of air-breathing engine systems, subsystems, components, subcomponents, or constituent materials for utilization in the next three to five years?
 - c) What prohibits utilization of those technologies today?
 - d) What Research and Development (R&D) investments might bridge that gap?
 - e) Describe the critical parts infrastructure associated with your particular product. How many vendors are you reliant on for producing an asset(s)?
 - f) Are parts used in your systems, subsystems, components, subcomponents, or constituent materials that support air-breathing engine solutions sourced internationally?
 13. Does your company utilize Digital Engineering?
 - a) Describe Digital Engineering aspects performed to ensure that the system, subsystem, component, subcomponent, and/or constituent material will conform to the set specifications, will be manufacturable with the chosen equipment and facilities, that production quantities will be met, etc.
 - b) Describe Digital Engineering aspects that are not currently performed but that you find necessary and are interested to pursue.
 - c) What would be the required investments to be successful in that pursuit?
 14. Do you anticipate any obstacles or events that would prohibit you from achieving/maintaining operations in the next 24 months?

GENERAL INTENT

DESCRIPTION

The Air Force, as the DoD Executive Agent for the DPA Title III Program, provides this RFI inviting Industry to provide information on the technology of interest for the DPA Title III Program. Industry responses to the RFI will be assessed and may assist in potential future Title III actions.

On February 24, 2021, President Joseph R. Biden signed Executive Order (EO) 14017 on America's Supply Chains. The EO directed the Secretary of Defense to conduct a comprehensive review of supply chains in critical sectors, including the defense industrial base (DIB). The review was delivered as a report Securing Defense-Critical Supply Chains. The report identifies four areas in which critical vulnerabilities pose the most pressing threat to national security: kinetic capabilities, energy storage and batteries, castings and forgings, and microelectronics.

Kinetic capabilities include current missile systems and advanced and developing missile capabilities, including hypersonic weapons technology, as well as directed energy weapons.

Note: There is no guarantee that this topic area will become a Title III project, and responders to this RFI will have no competitive advantage in receiving awards related to the submitted topic area. The information submitted in all responses may be utilized to help the Government further define all the requirements, including but not limited to, business and technical. If the Government develops a Title III project that addresses any submitted or similar topic, the resulting procurement will address technology and business specific requirements as defined by the Government to achieve Title III program objectives.

DPA TITLE III BACKGROUND

Title III of the Defense Production Act of 1950 (50 U.S.C. App. § 4501 et seq.) grants the President of the United States the authority to provide appropriate incentives to develop, maintain, modernize, restore, and expand the productive capacities of domestic sources for critical components, critical technology items, and industrial resources essential for the execution of the national security strategy of the United States and securing the defense industrial base.

These authorities enable DPA Title III in making purchases to create or expand (scale-up) production capacity; improving quality and yield; purchasing test quantities for process validation and qualification testing; developing and implementing business and marketing plans, purchasing, and installing production equipment, and providing purchase commitments to incentivize companies to establish production capability.

The DPA itself contains three criteria that every Title III project must meet before any funds may be obligated on a Title III activity. The DPA stipulates that the President must certify to the Congress that the activity satisfies the criteria. The statutory criteria state that: (1) The industrial resource, material, or critical technology item is essential to the national defense; (2) Without Presidential action under the DPA Title III, United States Industry cannot reasonably be expected to provide the capability for the needed industrial resource, material, or critical technology item in a timely manner; and (3) Actions under Title III are the most cost-effective, expedient, and practical alternative for meeting the need. The problem/issue should be amenable to Title III business solutions. Title III authorities and funding are not intended to be used as supplemental to the normal DoD material acquisition or R&D programs.

Note that DPA Title III is concerned with only domestic sources. Foreign capabilities will not be considered. Title III cannot be used to create or expand a foreign source, regardless of the essentiality of the technology to U.S. defense requirements. The DPA defines domestic source to be a business concern that performs in the United States or Canada *substantially all* of the research and development, engineering, manufacturing, and production activities required of such business concern under a contract with the United States relating to a critical component or a critical technology item and that procures from such concerns substantially all of any components and assemblies required under a contract with the United States relating to a critical component or critical technology item. Territories and possessions of the United States, and the District of Columbia are considered part of the domestic United States.

Title III investments are most appropriate to address pervasive (benefiting more than just a single service, agency, or program office) industrial base manufacturing shortfalls that can be typically remedied within a 5-year timeframe. Government investments usually range from \$5-20M with matching cost share anticipated from the Responder/Recipient. Title III investments are not intended for basic or applied research or for technologies with limited or no DoD advocacy. Typical Title III tasks include the procurement, installation, and qualification of production equipment; modernization of manufacturing capabilities and capital upgrades to the plant; manufacturing line prove-out; production of samples for customer and/or Government evaluations; implementation of quality systems and practices; manufacturing cost reduction and yield improvement activities; and the implementation of business and marketing plans. Title III investments typically have a broad, enterprise-wide impact on a sub-tier defense supplier. The overall goal is to secure and assure a viable, domestic supplier for the long-term.

ADDITIONAL GENERAL INFORMATION

This is a RFI only as defined in FAR 15.201(e) to obtain information about U.S. national security industrial base shortcomings, risks, and opportunities which may be addressed by investments made under provisions in Title III of the Defense Production Act (DPA). Of particular interest are the technical, manufacturing and market barriers to establishing a viable business for the technology of interest. This RFI is not a request for competitive proposals; therefore, responses to this notice are not considered offers and cannot be accepted by the Government to form a binding contract. Companies that respond will not be paid for the information submitted except as an allowable cost under other contracts as provided in FAR 31.205-18, "Bid and Proposal Costs." The Government will be utilizing non-government personnel under this RFI. The role of these non-government personnel is to function as technical advisors to the Government reviewers. These non-government personnel will have access to the information submitted in response to the RFI and will provide technical expertise and/or advice as required. All non-government personnel have Non-Disclosure Agreements on file with the Government.

NOTE: Responses to this RFI are due 11 August 2022, 12:00 PM (Eastern Time). If late information is received, it may be considered by the Government reviewers, depending on the agency time constraints.

SUBMISSION OF DOCUMENTATION

Documentation shall be delivered to the Contracting Office via e-mail to the following:

AFRL/RXKMT
Ms. Felicia Bibbs
Contract Negotiator
Telephone: (937) 713-9901
E-mail: felicia.bibbs@us.af.mil

AFRL/RXKMT (Alternate Point of Contact)
Ms. Whitney Foxbower
Contracting Officer
Telephone: (937) 713-9877
Email: whitney.foxbower@us.af.mil

E-mail responses are preferred but if you have large files or information that is proprietary in nature to send, you may provide your submission using the DoD SAFE site

(<https://safe.apps.mil/>). You must request a submission email for the DoD SAFE site via the listed Contracting POCs. You will then receive an email from DoD SAFE with a secure link and password to upload and submit your documents via the DoD SAFE site.

The cover material shall include the following at a minimum:

- Interested Party Name, mailing address, overnight delivery address (if different from the mailing address), phone number, and fax number;
- North American Industry Classification System (NAICS) code under which the company traditionally does business and the Business type (e.g., large business, small business) based upon that NAICS code;
- A designated point of contact of the Interested Party, including that contact's name, title, direct phone number, and e-mail address.

Responses shall be submitted **no later than 11 August 2022, 12:00 PM (Eastern Time)**. If late information is received, it may be considered by the Government reviewers, depending on agency time constraints.

Please note: the Government is not required to provide feedback to RFI Responders.

FORMAT & PAGE LIMITATION

RFI responses shall be provided on standard letter size 8-1/2 by 11-inch paper, limited to a maximum of **20 single-sided, double-spaced pages**. The font for text should be Times New Roman 12-point or larger. Respondents may use oversize pages (including "foldouts") where appropriate to contain graphic presentations. Oversize pages do not count as extra pages within the page limitations. Responses shall be submitted electronically in Microsoft Word (Office 2010 compatible) or Adobe Acrobat format. Existing commercial documentation, technical specifications, and product literature can also be submitted and are not subject to a page limitation. Note: **Responses must be unclassified. Responses may contain proprietary information but must be appropriately marked.**

INFORMATION APPROACH

The DPA Title III Program Office may or may not select any of the listed technology areas for use as a Title III project. Projects developed from these topics, as with all Title III projects, may be competed in a full and open competition. The Air Force, as the DoD Executive Agent for the DPA Title III Program, is not required to provide feedback to responders. The Air Force may respond directly to obtain additional or clarifying information.

DISCLAIMER

This RFI is not a request for competitive proposals; therefore, responses to this notice are not considered offers and cannot be accepted by the Government to form a binding contract.

Companies that respond will not be paid for the information submitted except as an allowable cost under other contracts as provided in FAR 31.205-18, "Independent Research and Development and Bid and Proposal Costs."

No telephone calls will be accepted requesting a bid package or solicitation. There is no bid package or solicitation at this time.

All information received shall be safeguarded from unauthorized disclosure. Responses to this RFI may constitute proprietary information, Controlled Unclassified Information (CUI), or export-controlled information. Respondents are directed to contact the Contracting Office POCs for supplemental instructions related to the submission of proprietary information, CUI, or export-controlled data.

OPERATIONS SECURITY (OPSEC) REQUIREMENTS:

The contractor shall participate in all activities associated with the disciplines of the organization's Industrial Security, Information Security, Personnel Security, Operations Security (OPSEC), and Antiterrorism programs, following appropriate measures in each program as required for this particular request. Security measures are required to reduce program vulnerability from successful adversary collection, exploitation of critical information, and violations of export control requirements. The prime contractor shall ensure all subcontractors, if applicable, conform to these requirements as required by the prime contractor.

PROGRAM PROTECTION PLAN (PPP) REQUIREMENTS:

Any potential critical program information (CPI) generated as part of this response will be reviewed to determine the need for a PPP or to be included as part of an existing PPP.

ADDITIONAL INFORMATION

Additional Title III information is available on the DPA Title III website:
<https://www.businessdefense.gov/ai/dpat3/index.html>

Direct all inquiries to the Contracting POCs listed in the Submission of Documentation paragraph above.