

ATTACHMENT J-1
Statement of Work
For
MSFC Material Labs Research and Development Support

1.0 Scope

The Contractor shall provide specialized engineering and project support to the Marshall Space Flight Center (MSFC) Engineering Directorate, Engineering Material Labs. The Contractor shall provide support including but not limited to, scheduling, management assistance, and Non-Destructive Evaluation (NDE).

The Contractor shall provide the research and development, market research, analyses, quality support, manufacturing support, tooling, assembly, in-process testing, maintenance and sustaining engineering for the prototypes and engineering development units (EDU) developed by MSFC Engineering Material Labs. . This shall include systems engineering support such as, but not limited to, developing systems engineering plans, developing manufacturing and assembly operational flow processes, tracking verification and validation compliance, and supporting interface requirements and control activities.

2.0 Task Order Management and Reporting

A. Contractor Management

The Contractor shall provide the planning, coordination, technical direction, and surveillance of the activities necessary to assure disciplined performance of work and timely application of resources for the accomplishment of all sub elements under the task order. The Contractor shall be responsible for maintaining communication with each supported organization and alerting the Task Order Monitor and/or the Contracting Officer immediately of any problems that would prevent meeting established milestones.

B. Data Requirements Descriptions (DRDs)

The contractor shall report and document this work and fulfill the requirements of associated Data Requirement Descriptions (DRD's) as outlined in Data Procurement Document (DPD) 1305 (Attachment J-2).The contractor shall determine the data restriction that applies to each data deliverable and mark or transmit the data restriction in accordance with section 2.3.3 of the Data Procurement Document.

The Contractor shall prepare and submit a Monthly Status Report in accordance with DRD1305MA-001. Any presentation, reports, analyses or technical memorandum that is developed during the execution shall be pre-coordinated with the Task Order Monitor and final copies provided to the Task Order Monitor.

The Contractor shall provide NASA with necessary information on project progress to allow the Government to monitor product assurance, identify significant problems, and implement corrective action as applicable based on the Contractor's performance.

The Contractor shall develop and maintain a Work Breakdown Structure (WBS) defining all task elements contained in this Task Order and in accordance with established task order rates per hours worked.

The Contractor shall prepare and deliver Badged Employee and Remote IT User Listing in accordance with DRD1305MA-002.

The Contractor shall prepare and deliver Contractor Employee Clearance Document in accordance with DRD1305MA-003.

The Contractor shall prepare and deliver Position Risk Designation for Non-NASA Employees in accordance with DRD 1305MA-004.

The contractor shall establish and implement an industrial safety, occupational health, and environmental program that (1) prevent employee fatalities, (2) reduce the number of incidents, (3) reduce the severity of employee injuries and illnesses, and (4) protects the environment through the ongoing planning, implementation, integration and management control of these programs in accordance with DRD 1305SA-001. The SHE Plan shall address each of the following MSFC SHE core program requirements in detail that are applicable to the contracted effort:

- a. Management leadership and employee involvement.
- b. System and worksite analysis.
- c. Hazard prevention and control.
- d. Safety, health and environmental training.
- e. Environmental compliance.

The contractor shall report mishaps and safety statistics to the MSFC Industrial Safety Office in accordance with DRD 1305SA-002. The contractor shall submit direct to the NASA Incident Reporting Information System (IRIS) or shall use the forms listed in section 15.4 of DRD 1305SA-002 or electronic equivalent to report mishaps and related information required to produce the safety metrics.

3.0 Technical Requirements

The contractor shall be responsible for information and information technology (IT) security when physical or electronic access to NASA's computer systems, networks, or IT infrastructure is required or when NASA information is stored, processed, generated or exchanged with NASA or on behalf of NASA, regardless of where the information resides.

All data files and reports electronically delivered shall comply with Technical Standard 1194.21 of the Rehabilitation Act of 1973, Section 508.

Tasks shall be defined as follows:

3.1 Manufacturing and Assembly Research and Technology Support

Project Manager Support

The contractor shall perform Project Management Support under the following areas:

1. Project oversight and review of schedule/cost and monthly deliverables for this Task Order.
2. Coordination between contractor and NASA/MSFC personnel. Task Management and oversight to ensure the required procedures and supporting processing data is accurate and complete.

Systems Engineering Support

The contractor shall perform systems engineering management tasks, including insuring that all contractor activities are compliant with all applicable NASA policies, requirements, and standards. The contractor shall support NASA's Ares Upper Stage Office with activities associated with developing systems engineering plans, developing manufacturing and assembly operational flow processes, tracking verification and validation compliance, and supporting interface requirements and control activities.

Research and Technology Development

The Contractor shall develop, review, and assess the following items:

- Program Risks and Mitigation.
- Project Plans.
- Schedule Inputs.
- Development and Design Review Plans.
- Concepts and Drawings.
- Manufacturing and Test Facilities.
- Use "Windchill" and "SharePoint" -based Integrated Collaborative Engineering systems along with other resources to evaluate documentation relevant to the definition, production, test, and operation of the CLV.
- Support the development of the NASA Upper Stage Manufacturing Plan template for use by the major components of the Ares Upper Stage.
- Research, describe, and identify manufacturing processes that are required to produce Ares components.
- Identify relationships among Ares components, facilities, handling equipment and manufacturing processes.
- Support the development of strategies to economize implementation of the manufacturing processes.

The Contractor shall support NASA's Upper Stage Manufacturing & Assembly (M&A) sub-system Integrated Project Teams.

The Contractor shall support NASA's Upper Stage Tooling and Design Group in the development and design of prototype tooling and ground support equipment needed for development of the Ares I Launch Vehicle.

The Contractor shall support the development of nondestructive evaluation (NDE) testing processes and techniques and procedures for inspection of friction stir welds including phased array ultrasonic testing.

- Support development of a survey of Friction Stir Weld inspection methods and provide recommendations as to preferred NDE methods for Friction Stir Welds of Upper Stage tanks.
- Support development of a process specification for inspection of Friction Stir Welds both conventional and self reacting.
- Support development of specific procedures for inspection of Upper Stage Tank Friction Stir Welds.
- Provide inputs of NDE interfaces to Universal Tool design concept.
- Support development of NDE Schedules for development of Friction Stir Weld inspection processes.
- Support the development of guidelines for scanning software. (functional requirements of the software)
- Support the NDE inputs to the Friction Stir Weld fracture control plan and Friction Stir Weld process specification
- Support the development of reference standards and reliability demonstration specimens in support of certification of NDE processes activities.

The contractor shall support the Ares US MPS Modeling, Requirements, and Verification planning efforts. The contractor shall perform tasks as follows:

- Map the current analytical roadmap and schedule into Project and link with the MPS integrated master schedule.
- Utilize analysis roadmap to support the development of Analysis Plan deliverable(s).
- Support the implementation of the analysis plan for near-term analysis activities by aiding in the development of system models, identifying capability gaps and mitigation strategies, etc.
- Support the compilation of historical data references for analytical model development.
- Support the definition and planning of risk reduction activities aimed at enhancing MSFC's MPS analysis capabilities.
- Provide analysis expertise/training in support of MPS model development.
- Provide support for special analysis tasks in support of MPS and Upper Stage trade studies, design cycles, and configuration definition and optimization.

The contractor shall support NASA's Upper Stage Manufacturing and Assembly Integrated Project Team to purchase components from various vendors that shall be used in support of NASA's Manufacturing Demonstration Article (MDA) and material "Allowable" development and welding evaluation.

Specifically, the contractor shall provide the following support for the MDA and "Allowable" component/hardware:

- Acquisition strategy for each component (includes all processing steps, who does each step, how the vendor will control and certify these processing steps).
- Market research, competitive bidding, or sole source justification of vendors that can manufacture the desired prototypes and EDUs.
- Coordinate with the NASA Designers, changes in engineering drawings as the component design matures.
- Develop component specifications by working with NASA Engineers and Designers.
- Determine raw material requirements for each product form to support development and production. Provide acquisition strategy for procurement of raw material of desired product form, for material not currently available in inventory.
- Determine vendor and component source availability (lead times, capacity, schedule, and cost) and develop schedules for development work and production. Coordinate with NASA Engineers to integrate the component manufacturing schedule(s) within the NASA's Integrated Master Schedule.
- Ensure each prototype and EDU meets its specification, drawing tolerances, and certification requirements through quality checks. The prototype and EDU requirements include, but are not limited to, material property testing, chemistry, non-destructive inspection, and first article cut-up. Perform validation and verification processes to ensure vendors deliver a fully developed and certified product. The contractor shall maintain all quality and traceability records for each prototype and EDU. All records shall be made available as part of deliverables with each prototype and EDU delivered to NASA/MSFC.
- Establish and maintain a Material Review Board to assess any non-conformances that might be generated in manufacturing of each prototype and EDU. Contractor shall coordinate findings and corrective actions with NASA Engineering.
- Maintain all records associated with, but not limited to market surveys, product conformance, vendor selection, validation & verification activities, plans, and process developments. Records shall be made available to NASA upon request.
- Identify and coordinate periodic meetings to status program progress, manufacturing issues, schedule, costs, and other technical issues deemed pertinent. The Contractor shall also generate reports to document the outcome

of market surveys, vendor capabilities and/or limitations, vendor selection, product conformance, lessons learned, etc.

3.2 Manufacturing Schedule Support

(Authorization to proceed with this subtask will be provided by the Contracting Officer in written direction.)

The contractor shall provide Microsoft Project support for manufacturing, development, materials, and process tasks. These tasks include, but are not limited to:

- a. Provide development and maintenance of the manufacturing, development, and process schedule.
- b. Provide status on the schedule and advise manufacturing and materials management on schedule progress.
- c. Provide Earned Value Management (EVM) data analysis and reporting to manufacturing and materials management.
- d. Provide assistance for resource planning activities.

3.3 Management Assistant Support

(Authorization to proceed with this subtask will be provided by the Contracting Officer in written direction.)

The contractor shall provide manufacturing and materials management assistance support. These tasks include, but are not limited to:

- a. Provide support to manufacturing and materials to organize meetings, prepare presentation charts, take and compile technical minutes from meetings, organize and enter data in the information technology systems, and general administration of manufacturing and materials management activities.
- b. Provide support to review documents, track changes, and release requirement and process documents.

3.4 Non-Destructive Evaluation (NDE) Support

(Authorization to proceed with this subtask will be provided by the Contracting Officer in written direction.)

The contractor shall provide research and technology development support for NDE methods, including but not limited to; radiography, ultrasound, and eddy current inspections. These tasks include, but are not limited to:

- a. Provide support for functional and performance requirements development.
- b. Provide support for identification and assessment of development, cost, schedule, and safety risks,
- c. Provide support for cost, schedule and technical approach activities.
- d. Provide support for manpower estimates of work.

- e. Provide support for facilities requirements definition.
- f. Provide support for major structure test development.
- g. Provide support for problem resolution.
- h. Provide support for design change activities.
- i. Provide NDE planning and inspections
- j. Attend integrated product team meetings
- k. Support manufacturing planning and producibility assessments
- l. Procure materials, hardware, service, and documentation (not otherwise provided by the government) necessary to accomplish the required analysis and perform nondestructive evaluations

3.5 MSFC Materials Lab Research and Development Support
(Authorization to proceed with this subtask will be provided by the Contracting Officer in written direction.)

The contractor shall provide specialized engineering and project support to MSFC Materials & Processes Laboratory including, but not limited to, science, technology, and engineering support in materials, processes, and products to be used in space vehicle applications, including related ground facilities, test articles, and support equipment.

4.0 Travel

The contractor shall travel as requested to accomplish each technical requirement. Any travel must be approved by the Contractor Officer's Technical Representative (COTR) or task order technical monitor, prior to travel.

The contractor's monthly report shall contain travel detail to include travel destination, dates of travel, number of people who traveled, and purpose of the travel.

5.0 Materials

The Contractor shall manage, store, and control Government Furnished Material (GFM) inventories used in support of NASA's Manufacturing Demonstration Article (MDA), material "Allowable" development, and welding evaluation. The contractor shall store raw material in accordance to NASA specification and audit the storage facility periodically to ensure that the storage is prepared and maintained in accordance to the specification and inventories. At the direction of NASA, the contractor shall issue raw material to other NASA groups and/or contractor(s) specified by the Task Order Monitor. Issuance of raw materials shall be accomplished in accordance with approved MSFC Property Management Procedures.

No materials are currently required for this order. However, this may change based on the customer's requirements as directed by the Contractor Officer's Technical Representative (COTR) or task order technical monitor. Any materials being purchased must be approved by the Contracting Officer prior to purchase.

6.0 Reserved

7.0 Personnel Skill Levels

The Contractor shall provide skills at a level to perform the subtasks in this order.

8.0 Technical Milestones and Deliverables

Specified under Section 2.B of the SOW; any additional deliverables for specific subtasks are specified under Section 3.0..