ANNEX
BETWEEN
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER
AND LOCKHEED MARTIN
UNDER SPACE ACT UMBRELLA AGREEMENT
NO. SAA8-2439487, DATED _____ (ANNEX NUMBER 1).

ARTICLE 1. PURPOSE

The purpose of this annex is to perform joining process modeling, characterization of joining demonstration coupons and subcomponents, and thermal vacuum chamber testing of the Verstile On-Orbit Dual Use (VOODU) joining module per the Statement of Work (SOW) entitled "NASA MSFC Statement of Work for LM Joining Demonstrations In-Space (JOINS) Project Revision: V2" dated 12/18/2023.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the Space Act, Other Transactions Authority (OTA), 51 U.S.C. § 20113(e).

ARTICLE 2. RESPONSIBILITIES

NASA will use reasonable efforts to:

1. Support testing/investigations of processes with materials provided by LM, as mutually agreed upon and participate in regular technical interchange meetings (TIMs) at mutually agreed locations.
2. Fabricate, test, and characterize up to a) 16 initial development joint coupons and b) 16 final development joint coupons and 8 joint subcomponents as described in Section 2.1 of the SOW.
3. Complete Integrated Computational Materials Engineering (ICME) and process modeling tasks on joining development trials in an ambient environment according to Section 2.2 of the SOW.
4. Fabricate, test, and characterize up to 16 initial development joint coupons and 8 joint subcomponents as described in Section 4.1 of the SOW.
5. Apply Integrated Computational Materials Engineering (ICME) and process modeling to the analysis of joining processes and material combinations as described in Section 4.2 of the SOW.
6. MSFC will perform the thermal vacuum chamber exposure as described in Section 5.1 of the SOW.
7. Fabricate, test, and joint characterize up to 8 VOODU TVAC joint coupons and 4 joint subcomponents as described in Section 5.2 of the SOW.
8. Apply Integrated Computational Materials Engineering (ICME) and process modeling to the analysis of joining processes and material combinations in VOODU TVAC testing as described in Section 5.3 of the SOW.

9. Fabricate, test, and characterize up to 8 microgravity joint coupons and 4 joint subcomponents as described in Section 6.1 of the SOW.
10. Apply Integrated Computational Materials Engineering (ICME) and process modeling to the analysis of joining processes and material combinations in microgravity environment as described in Section 6.2 of the SOW.
11. Complete fabrication, testing, and joint characterization of 8 joint coupons and 4 joint subcomponents produced on ISS flight according to Section 7.1 of the SOW.
12. Apply Integrated Computational Materials Engineering (ICME) and process modeling to the analysis of joining processes and material combinations in ISS environment as described in Section 7.2 of the SOW.
13. Support additional testing/investigations of processes with materials provided by LM, as mutually agreed upon.

LOCKHEED MARTIN will use reasonable efforts to:

1. Support testing/investigations of processes, as mutually agreed upon and participate in regular technical interchange meetings (TIMs) at mutually agreed locations.
2. Provide up to a) 16 initial coupons and b) 16 final coupons and 8 joint subcomponents as described in Section 2.1 of the SOW.
3. Provide NASA with appropriate process variables and data necessary to perform joining process modeling as described in Section 2.2 of the SOW.
4. Provide 16 joining development coupons and 8 joint subcomponents made during module checkout to NASA MSFC according to Section 4.1 of the SOW.
5. Provide NASA with appropriate process variables and data necessary to perform joining process modeling as described in Section 4.2 of the SOW.
6. Provide NASA MSFC with VOODU joining module and ancillary hardware necessary for the completion of TVAC testing as described in Section 5.1 of the SOW.
7. Provide NASA MSFC with up to 8 joint coupons and 4 joint subcomponents produced during VOODU TVAC testing as described in Section 5.2 of the SOW.
8. Provide NASA with appropriate process variables and data necessary to perform joining process modeling in VOODU TVAC testing as described in Section 5.3 of the SOW.
9. Provide NASA MSFC with up to 8 joint coupons and 4 joint subcomponents produced in microgravity environment for testing as described in Section 6.1 of the SOW.
10. Provide NASA with appropriate process variables and data necessary to perform joining process modeling in microgravity environment as described in Section 6.2 of the SOW.
11. Provide NASA MSFC with up to 8 joint coupons and 4 joint subcomponents produced in ISS environment for testing as described in Section 7.1 of the SOW.
12. Provide NASA with appropriate process variables and data necessary to perform joining process modeling in ISS environment as described in Section 7.2 of the SOW.

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

Milestone	Schedule
1. Lockheed Martin provides NASA with initial 16 development joint coupons as described in Section 2.1 of the SOW. (LM Responsibility 2.)	Effective Date + 1 month
2. Lockheed Martin provides NASA with appropriate process variables and data necessary to perform joining process modeling as described in Section 2.2 of the SOW. (LM Responsibility 3.)	Milestone 1 + 1 month
3. Lockheed Martin provides NASA with final 16 development joint coupons and 8 joint subcomponents as described in Section 2.1 of the SOW. (LM Responsibility 2.)	Effective Date + 3 months
4. NASA MSFC fabricates, tests, and characterizes initial 16 development joint coupons as described in Section 2.1 of the SOW. (NASA Responsibility 2.)	Milestone 2 + 2 months
5. NASA MSFC fabricates, tests, and characterizes final 16 development joint coupons and 8 joint subcomponents as described in Section 2.1 of the SOW. (NASA Responsibility 2.)	Milestone 3 + 2 months
6. NASA MSFC completes ICME and process modeling tasks on joining development trials in an ambient environment according to Section 2.2 of the SOW. (NASA Responsibility 3.)	Milestone 2 + 6 months
7. Lockheed Martin provides NASA with appropriate process variables and data necessary to perform joining process modeling as described in Section 4.2 of the SOW (LM Responsibility 5.)	Effective Date + 16 months
8. Lockheed Martin provides 16 joining development coupons and 8 joint subcomponents made during module checkout to NASA MSFC according to Section 4.1 of the SOW. (LM Responsibility 4.)	Effective Date + 18 months
9. NASA MSFC completes fabrication, testing, and joint characterization of 16 development joint coupons and 8 joint subcomponents made during module checkout according to Section 4.1 of the SOW. (NASA Responsibility 4.)	Milestone 8 + 2 months

10. NASA MSFC completes ICME and process modeling to the analysis of joining processes and material combinations as described in Section 4.2 of the SOW. (NASA Responsibility 5.)	Milestone 7 + 4 months
11. Lockheed Martin provides NASA with VOODU joining module and ancillary hardware necessary for the completion of TVAC testing as described in Section 5.1 of the SOW. (LM Responsibility 6.)	Effective Date + 20 months
12. NASA MSFC completes thermal vacuum chamber exposure as described in Section 5.1 of the SOW. (NASA Responsibility 6.)	Milestone 11 + 2 months
13. Lockheed Martin provides 8 joint coupons and 4 joint subcomponents produced during VOODU TVAC testing to NASA MSFC according to Section 5.2 of the SOW. (LM Responsibility 7.)	Upon Completion of Milestone 12.
14. Lockheed Martin provides NASA with appropriate process variables and data necessary to perform joining process modeling in VOODU TVAC testing as described in Section 5.3 of the SOW. (LM Responsibility 8.)	Upon Completion of Milestone 12.
15. NASA MSFC completes fabrication, testing, and joint characterization of 8 joint coupons and 4 joint subcomponents produced during VOODU TVAC testing according to Section 5.2. (NASA Responsibility 7.)	Milestone 13 + 2 months
16. NASA MSFC completes ICME and process modeling to the analysis of joining processes and material combinations in VOODU TVAC testing as described in Section 5.3 of the SOW. (NASA Responsibility 8.)	Milestone 14 + 2 months
17. Lockheed Martin provides NASA with 8 joint coupons and 4 joint subcomponents produced in microgravity environment for testing to NASA MSFC according to Section 6.1 of the SOW. (LM Responsibility 9.)	Effective Date + 24 months
18. Lockheed Martin provides NASA with appropriate process variables and data necessary to perform joining process modeling in microgravity environment as described in Section 6.2 of the SOW. (LM Responsibility 10.)	Effective Date + 24 months
19. NASA MSFC completes fabrication, testing, and joint characterization of 8 microgravity joint coupons and 4 joint subcomponents as described in Section 6.1 of the SOW. (NASA Responsibility 9.)	Milestone 17 + 2 months
20. NASA MSFC completes (ICME) and process modeling	Milestone 18 + 2 months

to the analysis of joining processes and material combinations in microgravity environment as described in Section 6.2 of the SOW. (NASA Responsibility 10.)	
21. Lockheed Martin provides NASA MSFC with up to 8 joint coupons and 4 joint subcomponents produced in ISS environment for testing as described in Section 7.1 of the SOW. (LM Responsibility 11.)	Effective Date + 32 months
22. Lockheed Martin provides NASA with appropriate process variables and data necessary to perform joining process modeling in ISS environment as described in Section 7.2 of the SOW. (LM Responsibility 12.)	Effective Date + 32 months
23. NASA MSFC completes fabrication, testing, and joint characterization of 8 joint coupons and 4 joint subcomponents produced on ISS flight according to Section 7.1 of the SOW. (NASA Responsibility 11.)	Milestone 21 + 2 months
24. NASA MSFC completes ICME and process modeling to the analysis of joining processes and material combinations in ISS environment as described in Section 7.2 of the SOW. (NASA Responsibility 12.)	Milestone 22 + 2 months

ARTICLE 4. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA an estimated cost of $1,598,197 for NASA to carry out its responsibilities under this Annex.

Each payment shall be marked with MSFC SAA8-2439487 Annex 1.

B. NASA will not provide services or incur costs beyond the current funding. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Annex will be accomplished for the estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as possible. Partner shall pay all costs incurred and have the option of canceling the remaining effort, or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Annex be terminated, or the effort completed at a cost less than the agreed-to estimated cost, NASA shall account for any unspent funds within one year after completion of all effort under this Annex, and promptly thereafter, at Partner's option return any unspent funds to Partner or apply any such unspent funds to other activities under the Umbrella Agreement. Return of unspent funds will be processed via Electronic Funds Transfer (EFT) in accordance with 31 C.F.R. Part 208 and, upon request by NASA, Partner agrees to complete the Automated Clearing House (ACH) Vendor/Miscellaneous Payment Enrollment Form (SF 3881).

ARTICLE 5. LIABILITY

For the responsibilities and activities conducted under this Annex, and any claims arising thereunder, the following sentence shall be added to the end of Paragraph C, Article 8 (titled "Liability") of the Umbrella Agreement:

Prior to issuing such direction, NASA will consider input from Partner and other factors such as the extent to which damage was attributable to the activity and the respective responsibilities of each Party as described in the Agreement.

ARTICLE 6. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of five years.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.
1. Background Data:
None
2. Third Party Proprietary Data:
None
3. Controlled Government Data:
None
4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:
None

ARTICLE 7. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or five years from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

ARTICLE 8. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

ARTICLE 9. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

Technical Points of Contact

NASA George C. Marshall Space Flight Center
Jeffrey Sowards
Asst. Div. Chief, Metallic Materials & Processes
Mail Stop: EM30
Marshall Space Flight Center, AL 35812
Phone: 256-975-8336
jeffrey.w.sowards@nasa.gov

LOCKHEED MARTIN
Robert Biggs
Manager, Advanced Materials, Structures & Manufacturing
13800 Old Gentilly Rd.
New Orleans, LA 70129
Phone: 504-235-1461
robert.w.biggs@lmco.com

ARTICLE 10. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

ARTICLE 11. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GEORGE C. MARSHALL SPACE FLIGHT CENTER

BY: LISA BATES Digitally signed by LISA BATES Date: 2024.03.18 13:41:46 -05'00'
Larry Leopard
Associate Director, Technical

DATE:

LOCKHEED MARTIN
N/A

BY: Brittany Stone Digitally signed by Brittany Stone Date: 2024.03.18 14:00:41 -04'00'
Brittany Stone
Subcontract Management Staff

DATE: