

Task Order Plan (TOP)

Contract Number: NNM05AB50C
TO Title: *Advanced Electronic Packaging*
TO Number: 37-040302 **Revision:** 09

Period of Performance: 10/02/2010 to 9/30/2011

MSFC Initiator: *Michael Selby*

(b)(4)

Emergency: *No*

Revision -09: The purpose of this revision is to extend this task into Contract Year 6 of the NNM05AB50C ESTS contract. This revision defines and estimates the work for the period October 2, 2010 through September 30, 2011. Additionally, the Schedule, Performance Plan, and Risk Assessment have been revised to reflect changes in task activities for the new period of performance.

Sub-element Mapping and WBS funding:

New Sub-element	Previous subelement	WBS	Program
01	01	724297.40.43.08	N/A
02	02	724297.40.43.08,	N/A
03	03	No Number Assigned	N/A
JA	05	401769.06.08.02.04.05	ISS
SA	06	522632.08.01.01	Shuttle
SB	07	524238.08.01.01.03	Shuttle

The subelements have been renamed to conform to the project/program naming convention that has been established for FY11.

Revision -08: The purpose of this revision is to add support for advanced electronic packaging support for the Solid Rocket Booster (SRB) and External Tank (ET) and to reflect the administrative changes to the Constellation sub-elements identified below.

Sub-element -06: this sub-element is added by this revision to provide advanced electronic packaging support for the SRB on WBS number 522632.08.01.01.

Sub-element -07: this sub-element is added by this revision to provide advanced electronic packaging support for the ET on WBS number 524238.08.01.01.03.

Sub-element -CF: was administratively closed.

Sub-element -CJ: was administratively closed and the work corresponding to this sub-element is being continued under the TO# 37-000001 sub-element -CK.

Sub-element –CU: was administratively closed.

Sub-element –CV: was administratively closed

Revision -07: The purpose of this revision is to extend this task into Contract Year 5 of the NNM05AB50C ESTS contract. This revision defines and estimates the work for the period October 3, 2009 through October 14, 2010. Additionally, the Schedule, Performance Plan, and Risk Assessment have been revised to reflect changes in task activities for the new period of performance. Sub-element -CI is identified on the schedule and in the table for visibility, but (b)(4) was estimated per the customer's direction.

This revision affects the following ARES Program Office sub-elements:

- Ares -CF (sub-element –CF)
- Ares –CI (sub-element –CI)
- Ares -CJ (sub-element –CJ)
- Ares -CU (sub-element –CU)
- Ares –CV (sub-element –CV)

Revision -06: The purpose of this revision is to more accurately reflect the effort required during this period of performance. The schedule has been revised to reflect the change in scope. The Performance Plan and Risk Assessment have not been revised since there are no expected changes in task activities for this period of performance.

Sub-element -03:

Travel in the amount of (b)(4) was added to reflect increased support for this task.

Sub-element -04:

The scope of support for sub-element –04 has been changed to end at the end of August 2009.

Sub-element -CF:

Support for this task has been reduced by (b)(4) hours to more accurately reflect the effort required during this period of performance.

Sub-element -CJ:

Support for this task has been reduced by (b)(4) hours to more accurately reflect the effort required during this period of performance.

Sub-element -CU:

Support for this task has been reduced by (b)(4) hours to more accurately reflect the effort required during this period of performance.

This revision affects the following ARES Program Office sub-elements:

- Ares -CF (sub-element –CF)
- Ares -CJ (sub-element –CJ)
- Ares -CU (sub-element –CU)

Revision -05: The purpose of this revision is to more accurately reflect the effort required during this period of performance and to add sub-element -CI. The schedule has been revised to include the new sub-element -CI for Ares I-I. The Performance Plan and Risk Assessment have not been revised since there are no expected changes in task activities for this period of performance.

Sub-element -CI:

Sub-element -CI is added to this revision to reflect increased work. Estimated labor is (b)(4) hours. Travel in the amount of (b)(4) was added in support of this task. The WBS number for sub-element -CI is 136905.10.10.80.50.20.10.

This revision affects the following ARES Program Office sub-elements:

- Ares I-I (sub-element -CI)

Revision -04: The purpose of this revision is to more accurately reflect the effort required during this period of performance. The labor estimate for sub-element -04 was reduced by (b)(4) hours with a corresponding reduction in cost of (b)(4). The labor estimate for sub-element -05 was reduced by (b)(4) hours with a corresponding reduction in cost of (b)(4). The labor estimate for sub-element -CF was reduced by (b)(4) hours with a corresponding reduction in cost of (b)(4). The labor estimate for sub-element -CU was reduced by (b) hours with a corresponding reduction in cost of (b)(4). The labor estimate for sub-element -CV was reduced by (b) hours with a corresponding reduction in cost of (b)(4). Additionally, travel in support of sub-element -01 was increased by (b)(4) and travel in support of sub-element -02 was increased by (b)(4). In addition, the estimate for Other Direct Charges (ODC) was increased to reflect meetings attended during this period of performance for sub-element -01 (b)(4) and sub-element -02 (b)(4). The Performance Plan and Risk Assessment have not been revised since there are no expected changes in task activities for this period of performance.

Revision -03: The purpose of this revision is to extend this task into Contract Year 4 of NNM05AB50C ESTS contract. This revision defines and estimates work for the period September 27, 2008 through October 2, 2009. Additionally, the Schedule, Performance Plan and Risk Assessment have been revised to reflect changes in task activities for the period of performance. This revision affects the following ARES Program Office elements, First Stage (sub-element -CF), Upper Stage Engine J2X (sub-element -CJ), Upper Stage (sub-element -CU), and Vehicle Integration (sub-element -CV).

Revision -02: The purpose of this revision is to more accurately reflect the effort required during this period of performance, and add sub-element -05 ECLSS 2010 Spares as new work. The effort estimated for sub-element -05 is (b) hours to be funded by WBS number 401769.06.08.02.04.05. (b)(4) estimate on sub-element -02 was reduced by (b)(4) hours with a corresponding reduction in cost of (b)(4). sub-element -04 was reduced by (b) hours with a corresponding reduction in cost of (b)(4). sub-element -CF was reduced by (b)(4) hours with a corresponding reduction in cost of (b)(4) and sub-element -CJ was reduced by (b) hours with a corresponding reduction in cost of (b)(4). The Performance Plan and Risk Assessment have not been revised since there are no expected changes in task activities for this period of performance.

Revision -01: The purpose of this Task Order (TO) revision is to add subelement -04 for an additional resource to support the Electronic Packaging team. The effort estimated for Sub-element -04 is (b)(4) hours to be funded by WBS number 939904.11.08. For sub-element -02, the labor category was changed from a (b)(4) with no change to estimated hours. The labor for this sub-element will be estimated as a (b)(4) beginning in the next contract year. The schedule was revised to reflect the new sub-element. (b)(4)
(b)(4)

Revision -00: This Task Order (TO) is a continuation of work being performed on TO 31-040202 of the NNM05AB50C ESTS contract. This TO realigns work performed previously in EI42, and now supports ES43 within the new ED organizational structure. In addition sub-element -03, to support Miscellaneous Project Tasks has

been added in order to provide support to various project offices for small programs, and added additional travel to Sub-element -01. This TO defines and estimates work for the period 1 March 2008 through 26 September 2008. For Subcontracted efforts, this TO authorizes work for the same period. TO 31-040202 will be revised for closure in March with an effective date of 29 February 2008.

1.0 Task Order Description & Objectives

Sub-element -01: Advanced Electronics Packaging for Harsh Environments

This Sub-element provides electronic packaging research support to the MSFC Electronic Packaging & Assembly Team, ES43. Engineering expertise is provided to evaluate past, current and future electronic packaging techniques in order to develop lessons learned, evaluate electronics suppliers, conduct reliability assessments and assist in emerging technologies. Support will also be provided for NASA workmanship and Electronic Parts and Packaging programs and provide technical advice and direction for NASA/MSFC electronics packaging. Support will also be provided for development of manufacturing processes for advanced manufacturing and wiring processes.

Sub-element -02: Support for Parts, Packaging and Processes Lead Free Initiative

This Sub-element provides support for the review, evaluation and development of manufacturing and acceptance standards and the processes used with electrical, electronic and electromechanical hardware built for NASA/MSFC and NASA/MSFC contractors, including the Missile Defense Agency and other entities. Process training will be developed and conducted as part of this sub-element. Support will also be provided to industry standard committees responsible for development/maintenance of electrical process standards, such as the Institute of Printed Circuits (IPC) and related IPC activities. In addition, this sub-element will also monitor and oversee testing performed in ES43 to evaluate advanced packaging concepts and provide support to assess evaluation methods and new technologies to determine wiring integrity on space vehicles.

Sub-element -03: Advanced Electronics Packaging Support to Miscellaneous Jobs

This Sub-element provides advanced electronics packaging engineering support described above to ES43 and to project offices for small programs requiring immediate support.

Sub-element -04: Support for Electronics Packaging

This Sub-element provides electronics packaging engineering support to the MSFC Electronic Packaging and Assembly Team, ES43. This support will provide assessing mature technologies against newer technologies, functional circuit design and printed circuit board layout, dynamic analysis of board design, and interest in packaging research applications at the board and box level.

Sub-element -JA: Advanced Electronics Packaging Support to ECLSS Spares

This Sub-element provides advanced electronics packaging engineering support described above to ES43 and to the Environmentally Controlled Life Support System (ECLSS) Spares program.

Sub-element -CF Ares First Stage

This subelement was administratively closed on July 3, 2010.

Sub-element -CI Ares I-1 Program

This subelement was administratively closed on July 3, 2010.

Sub-element -CJ Ares Upper Stage Engine

This Sub-element was administratively closed and the work corresponding to this sub-element is being continued under the TO# 37-000001 sub-element -CK..

Sub-element -CU Ares Upper Stage

This subelement was administratively closed on July 3, 2010.

Sub-element -CV Ares Vehicle Integration

This subelement was administratively closed on July 3, 2010.

Sub-element -SA: Advanced Electronics Packaging Support to Solid Rocket Booster (SRB)

This Sub-element provides advanced electronics packaging engineering support described above to ES43 and to the Solid Rocket Booster program.

Sub-element -SB: Advanced Electronics Packaging Support to External Tank (ET)

This Sub-element provides advanced electronics packaging engineering support described above to ES43 and to the External Tank program.

2.0 Technical Approach (Including required input, guidelines & assumptions)

The Jacobs ESTS Group will perform the work described above using standard office automation software including Microsoft Project, Excel, Word and PowerPoint. The Internet will be used to obtain NASA standards, military standards, and contractor documents as appropriate.

The Jacobs ESTS Group will support meetings, teleconferences, Technical Interchange Meetings, (TIMs), etc., as required by the MSFC Electronic Packaging & Assembly Team. The Jacobs ESTS Group will also support travel as necessary to support electronic packaging tasks and IPC related and other standards related activities.

3.0 Discussion of Skills Required

Sub-element -01: Advanced Electronic Packaging Support for Harsh Environments

Personnel performing the advanced packaging and workmanship work must have a (b)(4)

Personnel supporting this subelement must exhibit a high level knowledge of solder alloy testing, packaging reliability testing, advanced packaging and the history of electronics packaging for aerospace applications. Knowledge of NASA standards and current state-of-the-art packaging technologies is required.

Sub-element -02: Support for NASA Electronic Parts and Packaging Lead Free Initiative.

Personnel performing this Sub-element must have extensive experience in manufacturing processes, acceptability, and reliability of low volume, high reliability electronic hardware. Personnel performing this Sub-element must have (b)(4)

Sub-element -03: Advanced Electronics Packaging Support to Miscellaneous Jobs

Personnel performing these Sub-elements should have the same skills as described above in Sub-elements -01 and -02.

Sub-element -04: Support for Electronics Packaging

Personnel performing these Sub-elements must have (b)(4)

(b)(4) Personnel supporting this task must exhibit a high level knowledge of circuit design, printed circuit board layout and the analysis of board design.

Sub-element -JA: Advanced Electronics Packaging Support to ECLSS Spares

Personnel performing this Sub-element must have extensive experience in manufacturing processes, acceptability, and reliability of low volume, high reliability electronic hardware. Personnel performing this Sub-element must have a (b)(4)

(b)(4)

Sub-element -SA: Advanced Electronics Packaging Support to Solid Rocket Booster (SRB)
Personnel performing these Sub-elements should have the same skills as described above in Sub-elements -01 and -02.

Sub-element -SB: Advanced Electronics Packaging Support to External Tank (ET)
Personnel performing these Sub-elements should have the same skills as described above in Sub-elements -01 and -02.

4.0 Special Tools Required

No special tools identified.

5.0 Participating Subcontractors

None.

6.0 Milestones & Deliverables

Monthly Activity Reports will be delivered in accordance with the resource plan. Inputs to lessons learned database and reports, and inputs to presentations and reports on emerging technologies and technology evaluations will be informal deliveries.

7.0 Special Considerations (Recruiting, Special Equipment / Material, Safety, etc.)

Travel is estimated in sub-elements -01, -02, and -03 for technical meetings and support of industry standard committee meetings.

ODC is estimated for sub-elements -01, -02, to cover the cost of the registration fee for the industry standard committee meetings.

8.0 Work Shelf

The following activities could be accomplished as part of the Task Order performance by personnel that are temporarily available due to program or funding delays on other Tasks. Specific assignments will be coordinated with the Task Initiator to ensure appropriate skills and experience.

TO/Sub-element	Description	Due Date	Skill
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9.0 Schedule

ESTS Contract Task Order Request Performance Plan

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Category	Weighting Technical %	End of Period Technical Score
Technical Objectives	65%	X <u>65%</u> = Justification
<p>Subelement -01:</p> <ul style="list-style-type: none"> (a) Assist MSFC in development of proposals for new technologies. (b) Provide technical support to the lead free test program being conducted by the Joint Group on Pollution Prevention and by Auburn University. (c) Assist MSFC in performing process evaluations of present and potential electronics suppliers. (d) Assist MSFC in conducting reliability assessments of new/emerging packaging technologies (i.e., BGA's, CSP's, MEMS, COTS+). (e) Support the NASA Workmanship Technical Committee and the NASA Electronic Parts and Packaging program. (f) Provide Electronic Packaging technical advice and direction in accordance with NASA/MSFC space flight requirements. (g) Perform technician support for ES43 testing. <p>Subelement -02:</p> <ul style="list-style-type: none"> (a) Monitor and oversee testing performed in ES43 to evaluate advanced packaging concepts. (b) Provide support to industry standard committees responsible for development/maintenance of electrical process standards, e.g., IPC. (c) Provide support to develop new manufacturing processes including equipment selection and training development. (d) Support the NASA Workmanship Technical Committee and the NASA Electronic Parts and Packaging program. <p>Subelement CF, CJ, CU, CV:</p> <ul style="list-style-type: none"> (a) Assist MSFC in performing process evaluations of present and potential electronics suppliers. (b) Provide Electronic Packaging technical advice and direction in 		

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<p>accordance with NASA/MSFC space flight requirements. (c) Provide support to develop new manufacturing processes including equipment selection and training development.</p>		
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Schedule Objectives (Milestones)

<p>-Monthly Status Reports. - Activities in support of project milestones.</p>		
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Weighting
Schedule %
10%
(min 10%)

Schedule Score

X 10% =

Justification

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Cost (actual vs. negotiated)

Weighting
Cost%
25%
(min.25%)

Cost Score

X 25% =

Justification

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Weighting
Total %
100.00%

Total Score

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Technical, Schedule, and Cost Grading Scale

Score	Description
9.0-10.0	Exceeded TO Performance Plan objectives resulting in major benefit(s)
8.0-8.9	Exceeded TO Performance Plan objectives resulting in modest benefit(s)
7.0-7.9	Met TO Performance Plan objectives
3.0-6.9	Did not meet all TO Performance Plan objectives resulting in minimal impact or requiring additional agency funds
0.0-2.9	Did not meet TO Performance Plan objectives resulting in substantial impact and/or requiring additional agency funds

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Comments:

Risk Assessment

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MSFC Initiator: Michael Selby

(b)(4)

Task Order Risk Assessment to Cost, Technical, and Schedule

List identified risk associated with Task Order performance as related to task cost, technical, and schedule. Classify the risk(s) according to probability of occurrence and impact as defined below and enter the risk into risk matrix.

Risk	Risk Type	Probability (1-4)	Impact (1-4)	Risk Description
Risk C1	Cost			No cost risk identified.
Risk C2	Cost			
Risk T1	Technical			No technical risk identified.
Risk T2	Technical			
Risk S1	Schedule			No schedule risk identified.
Risk S2	Schedule			

*Note: See page 2 for risk mitigation plan for those risks which are Primary Risk Drivers.



