



Ares I-X Avionics First Stage Avionics Module (FSAM) Pre-ship Review (PSR): The Ares I-X Avionics Integrated Product Team (IPT) held a PSR for the FSAM hardware on January 8, with participation from Marshall Space Flight Center (MSFC) Engineering, Avionics IPT prime and support contractors, Ares I-X System Engineering and Integration (SE&I), MSFC Safety and Mission Assurance (S&MA), and Ares I-X First Stage (FS) IPT. The purpose of this review was to determine if the hardware was ready to be shipped from Lockheed Martin Denver to Kennedy Space Center (KSC) for further integration into the FS fifth segment by the FS IPT. The FSAM represents a large portion of the flight avionics hardware and mounting structure that holds the various boxes and cables. A thorough walk-through of the status, including a list of outstanding items, was provided. (There are several boxes that will not be available for installation in Denver but will be installed at KSC.) The status also identified outstanding tasks that are constraints to ship, which are planned to be completed prior to the ship date, planned to be on-dock at KSC on February 2. No non-conformances with open work and no waivers/deviations were identified as shipping constraints. FS/ATK presented the plan to receive the FSAM and the post-receipt processing plan; no issues were identified. The Avionics Lead System Engineer (LSE) presented comments received; all were closed or had a closure plan that will be completed prior to the ship date. After completion of the review, the review team was polled and the determination was to ship per the schedule.



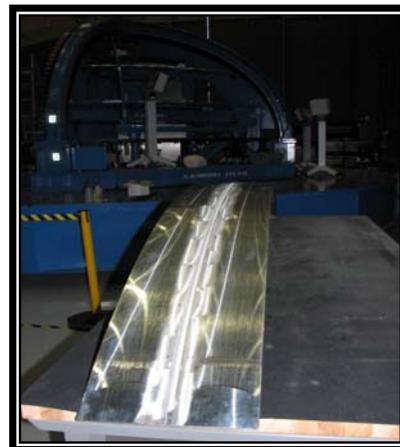
FSAM at Denver's Design to Produce Facility (DPF)



US Manufacturing and Assembly (M&A) Subsystem: The Ares I US Element conducted a successful friction stir weld of a gore-gore aluminum-lithium (Al-Li) confidence panel on January 8, in MSFC Building 4755. In this test, which is a pre-cursor to the upcoming full gore-gore weld of the actual US Manufacturing Demonstration Article (MDA) dome gores, workers from the EM30/Metal Materials Branch demonstrated future Ares I US friction stir welding tasks by fusing the Al-Li panels together



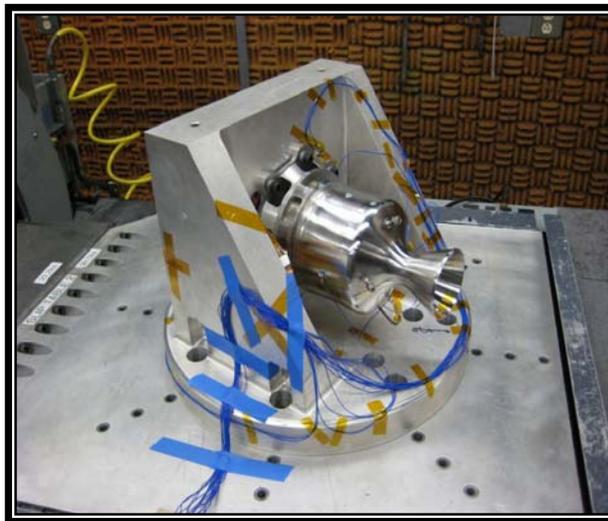
using MSFC's robotic weld tool. The upcoming gore-gore weld will continue to lay the ground work for future work on the Ares I US. The robotic weld tool, the largest welder of its kind in the United States, will be used to develop the manufacturing techniques required to fabricate the tanks of the Ares I Upper Stage. The tool is critical for manufacturing the Integrated Stage Test Article (ISTA), which will demonstrate the functionality of the US. Friction stir welding transforms the Al-Li alloy from a solid state into a "plastic-like" state, and then methodically stirs the materials together under pressure to form a welded joint.



Welded Gore-Gore Confidence Panel

Recent activities specific to the Elements include:

- **Upper Stage (US)**
 - **US Reaction Control Systems (ReCS) Subsystem:** The Ares I US Element conducted development random vibration testing of an FS Advanced Development Contract (ADC) thruster on-site at the Aerojet facilities in Redmond, WA, on January 5-9. Aerojet project engineers, test engineers, and technicians, in addition to ReCS engineers from MSFC, participated in the testing. Following a successful Test Readiness Review (TRR), the ADC Thruster was installed and instrumented, carefully identifying locations of interest indicated by Aerojet's dynamic analyst. A highlight of this activity was the installation of an accelerometer on the center of the end of the catalyst bed inside of the nozzle. After removal of the test fixture with thruster, a test was conducted to validate/verify the accelerometer wax-mounting methodology as required by NASA. Detailed response data is expected to be available to NASA soon. The US ReCS Subsystem manages both the US ReCS and FS Roll Control System (RoCS) for the Ares I.
- **First Stage (FS)**
 - **FS Contract End Item (CEI) Specification Baseline (FS SE&I):** The FS CEI Specification, Revision A, Engineering Change Package (ECP) for baseline was delivered by ATK to the FS Element on November 15. The ECP was reviewed across the engineering disciplines and



ADC Thruster



- by the FS Element to ensure a comprehensive review. A total of 261 comments was submitted and presented to the FS Engineering Review Board (ERB) on December 18-19. The FS ERB assigned 64 action items during its review; 41 of which were closed and presented to the FS ERB January 7. The remaining action items were identified as forward work. The FS ERB approved the complete review package, which included 319 comments, on January 7. The updated review package to baseline the FS CEI Specification, Revision A, was presented to and approved by the FS Engineering Control Board (ECB) on January 12.
- **Storage of Ares FS I/V Hardware/Tooling at KSC:** Progress has been made on the Reusable Solid Rocket Booster (RSRB) request for additional storage for hardware that will be transferred to the FS Element. An agreement may be reached on Hangar 0 (4,000 ft²) in the next several weeks. Additional progress has been made for 20,000 ft² of space in Hangar S. This request has been in work for over 1 year now with KSC and the Cape Canaveral Air Station. Solid Rocket Booster (SRB) and Ground Operations (GO) identified the need for 30,000 ft² for the storage of heritage hardware and ground support equipment that will be used by Ares I/V. Storage is not currently available and the hardware and tooling is outside and exposed to the elements.
 - **Deceleration Subsystem (DSS) Heavy Air Drop Extraction System Tow Tests:** The Air Force Flight Test Center at Edwards Air Force Base (AFB) successfully completed the tow tests last week of the new C-17 air drop extraction system to be used for the heavy Jumbo Drop Test Vehicle (JDTV) parachute drop tests. A new extraction system is required since the standard extraction system utilized by the Air Force has a 60,000-lb extraction limit. The new extraction system uses Vectran rope, along with modified standard Army 15-ft drogue, and 28-ft extraction parachutes that have been structurally reinforced with Kevlar radials. The test consisted of towing the modified drogue and extraction chutes with the Vectran rope behind a C-17. The test objectives were to measure and record the tow forces of the parachutes at various air speeds and parachute reefing positions and visually record their proper deployment. The Air Force will use the recorded tow forces to analyze and qualify this new extraction system for heavy drop tests.
 - **Full Scale Ares I-X Recovery Separation Ring Pyrotechnics Functional Test:** The FS Pyrotechnic and Separation Subsystems will conduct the first full-scale separation/pyrotechnic functional test with 100% Ares I-X flight ordnance on January 28. This demonstration will be conducted using the Ares I-X Forward Skirt Extension (FSE) Separation Ring. Key test objectives include: demonstrating that the separation event severs the FSE recovery ring; measuring the body separation dynamics for this event; and measuring the pyrotechnic shock near-field environment created by the linear shaped charge used for severance of the ring. The instrumentation suite includes linear transducers, make wires, accelerometers, temperature sensors, and high-speed video.
 - **Ares I-X Fifth Segment Simulator Assembly, Revision A, Drawing Review and Release:** A revision to the Ares I-X Fifth Segment Simulator Aft Assembly and the Ares I-X Fifth Segment Simulator Full Assembly drawings was reviewed on January 6, via telecommunication. This revision added the assembly and attachment of cabling and sensors to the hardware. Participation included representatives from the Avionics, Structures, and



SE&I IPTs, as well as supporting contractors within each of those teams. The revised drawings are to be received by NASA in an ECP on February 4.

- **Flight and Integrated Test Office (FITO) and Ares I-X**

- **Ares I-X RoCS Element:** Activities specific to the RoCS Element include:

- The RoCS Team conducted a PSR on January 7. Helium test delays over the holidays resulted in a shipping delay of approximately 2 weeks. The Review Board approved a proposal to split module shipment to expedite the start of KSC fit checks in the Interstage. The current plan is to ship Module B no later than January 30 and Module A no later than February 5.
- Module B propellant feedline installation was completed, as was the thruster mapping test.
- Both fairings have had final fit checks and have been painted and returned to the clean room.
- The re-cleaning and re-build of the helium test rig for Regulator and Relief Valve testing was completed after concern was raised on filtration and cleaning specification requirements. Also, this work allowed for the incorporation of Engineering-requested instrumentation.
- The Development Flight Instrumentation (DFI) cable modification (unique to Module A to allow a post-integration fairing removal option) was completed and the cable was installed.

- Updated RoCS component vibration levels were released on December 24. The vibration test vendor's test capabilities may be exceeded by these levels. Teledyne is expecting an assessment of these capabilities this week of before trying to

negotiate a possible expedited test schedule.

New (unofficial) fairing aero loads exceed the current fairing design. SE&I are evaluating the validity of these loads. In the meantime, the PSR Board and Mission Manager have directed RoCS shipment to occur with the current design. RoCS will



Module Outer Panel/Engines Installed



Fairing Fit Checks



Painted Fairings



ship fairings torqued short of the locking feature so as to allow later removal for re-work, if necessary.

- **Project Integration (PI)**

- **National Conference of State Legislatures (NCSL) on Education Committees:** The Ares Projects outreach team supported an Ares presentation to attendees of the NCSL on Education Committees on January 9. The group of 34 included state representative and senators, as well as other groups such as the Brookings Institution and the NASA Associate Administrator for Education. NCSL is a bipartisan organization that provides a source for research, publications, consulting assistance, meetings, and seminars, and represents their interests to the executive and legislative branches in Washington, DC.

The Ares Projects looks forward to the FS FSE separator test and the US Ullage Settling Motor Subsystem igniter open air tests beginning in January.

...and as of this Ares Projects Weekly Summary, there are only 176 days until the first Ares I test flight, Ares I-X!!!