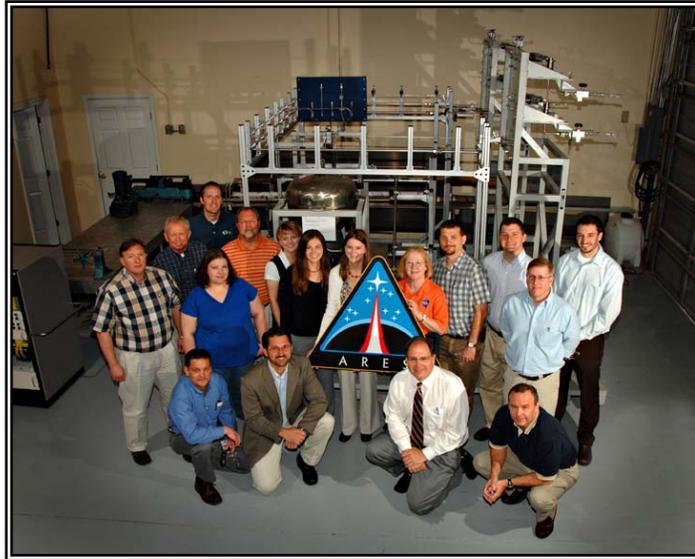




Upper Stage (US) Reaction Control Systems (ReCS) Subsystem: After a thorough and successful hardware acceptance and pre-ship review by Marshall Space Flight Center (MSFC) and Boeing Engineering and Quality, MSFC accepted delivery of the Ares I US ReCS Development Test Article (ReCS SDTA) on April 27.

This important US Element subsystem milestone marked the first hardware delivery from Boeing to NASA under the Upper Stage Production Contract (USPC), and the first "build-to-print" implementation of NASA engineering under the USPC model. The hardware was built at the Orion Propulsion, Incorporated (OPI), production facility in Madison, Alabama.

This is also an important milestone for OPI as the company develops its Mentor-Protégé relationship with Boeing, a relationship which was formalized last year as the first such relationship under NASA's overarching Mentor-Protégé Program.



Ares I US Team Members from NASA MSFC, Boeing, and OPI

The US ReCS SDTA is a test article consisting of flight-similar tankage, plumbing simulating flight geometries, flight-similar system valves, and flight-similar thruster valves. The test results of the US ReCS SDTA are essential in validating the performance and interaction of the ReCS and associated analysis tools and results for Critical Design Review (CDR) fidelity.

The objectives of this development test program are to obtain fluid system performance data for a flight representative configuration, evaluate integrated system-level performance characteristics, and verify analytical models as a part of the critical design activities. The propellant and pressurization system dynamics will be demonstrated over the range of operational temperatures, pressures, and simulated Mission Duty Cycles (MDCs). Additionally, system loading and unloading tests will be conducted to mature the procedures/methodology for the ground-based servicing functions.



Deceleration Subsystem (DSS) Ares I-X Drogue Parachute: USA completed the packing this week of the 68-foot Ares I-X drogue parachute. The Ares I-X drogue, an Ares I development parachute, was fabricated by United Space Alliance (USA) at the Parachute Refurbishment Facility at Kennedy Space Center (KSC). All of the basic performance drop tests have been completed for the current



configuration of the Ares I-X drogue parachute and the drag areas of the drogue at its various reefing positions; all are well-characterized. The Ares I-X pilot pack will be integrated into the completed drogue pack early next week, followed by delivery to the Assembly and Refurbishment Facility (ARF) for installation into the Ares I-X forward assembly.

Ares I-X Drogue Parachute Canopy Packed with Suspension Lines Being Installed in Pack

Recent activities specific to the Elements include:

Upper Stage (US)

- US Manufacturing and Assembly Subsystem:*** The Common Bulkhead (CB) External Tank (ET) gore-gore bonding demonstration, performed in March at MSFC, was successfully honeycomb machined on a Computer Numerically Controlled (CNC) machine at Michoud Assembly Facility (MAF) on April 21. The first bonded honeycomb consisted of several core density sections: perforated core, splice joint adhesive, and elliptical surface of gores. The top gore was re-scanned at MAF and the data entered into the CNC machine. Following machining, the machined surface contact-to-upper gore was checked by a verifilm process, which showed 100% contact where it was intended. The next step will be to bond the second gore to honeycomb at MSFC.

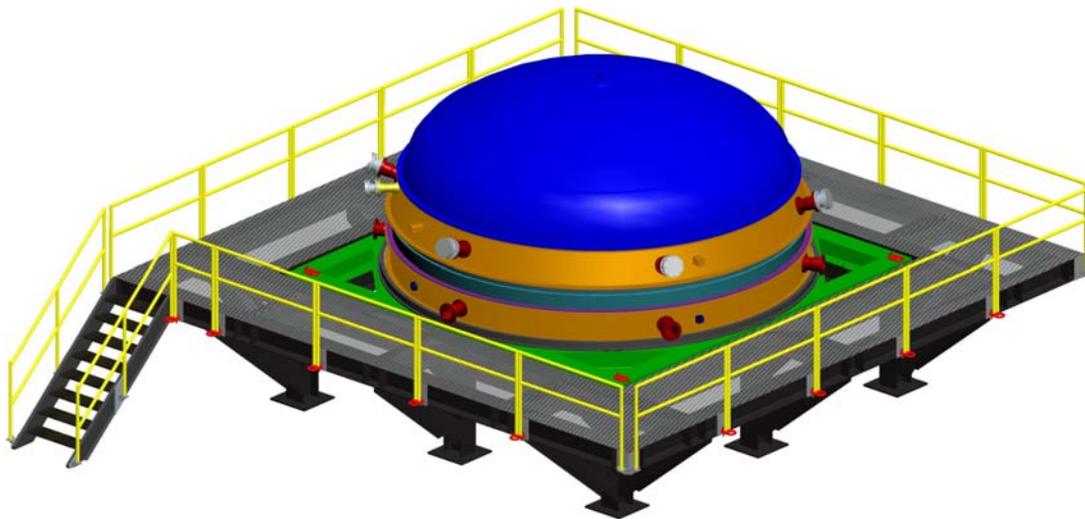


Common Bulkhead ET Gore-Gore Bonding Demonstration

- US Integrated Test Subsystem:*** Design and analysis efforts are nearing completion for the Ares I US CB proof pressure test fixture. The CB proof pressure test fixture is a complicated set of tooling that will be capable of testing the 18-foot diameter metallic and composite structure of the CB with pressurized cryogenic fluids (liquid hydrogen or liquid nitrogen) on the forward (top) side and hot nitrogen gas on the aft side. The US engineering team recently adjusted the design of the fixture to enhance manufacturability. The size of the large aluminum domes was changed so



that heat treatment and quenching operations could be more easily completed. Recent analysis results of the latest design changes showed that positive structural margins of safety were maintained. A Computational Fluid Dynamics (CFD) analysis conducted by Glenn Research Center (GRC) showed that the diameter of the aft hot gas ducts could be reduced. This will reduce flow requirements and cut operating costs. Other actions on Non-Destructive Evaluation (NDE) accessibility, instrumentation routing, and transportation logistics are also being addressed. The team hopes to complete the design on May 7. Initial fabrication/procurement activities are already underway. Below is the latest depiction of the CB fixture in the Test Stand.



CB Test Fixture in Test Stand

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

- **Test Stand 4550 – Special Test Equipment (STE):** The Hydrodynamic Support (HDS) system’s hydraulic power unit has been delivered and its components have been installed inside the enclosure just outside of Building 4619 at MSFC. Edgewater, the vendor, is scheduled to be here during the week of April 27 for Start-Up and Testing of the HDS unit. This skid-mounted hydraulic power system will be used at Test Stand 4550 for the Ares Integrated Vehicle Ground Vibration Test (IVGVT) test article’s “free-free boundary condition” suspension system. Presently, this unit is being used to test the fabrication and assembly of the HDS inside of Building 4619.
- **Ares I-X Roll Control System (RoCS) Element:** Activities specific to the RoCS Element include:
 - RoCS supported the Fairing A Development Flight Instrumentation (DFI) repair per DFI Control Board directive and installation of the fairing on module. Transfer and installation of Module A to the Vehicle Assembly Building (VAB) was completed on April 29.
 - Three more end item specification verifications were delivered to MSFC Engineering for closure, and seven remain.



- Change requests and presentations have been prepared for Technical Review Board briefing of draft engineering change orders for changing out tank mount non-locking fasteners and call out on running torque on inner bond strap fastener.
- Pressurization system vibration testing is complete with no anomalies.
- The revised Structural Strength and Fatigue Report was released by Teledyne, which includes the new fairing analysis.
- Cold flow test pre-ops are underway, including pyro installation, leak testing, bond testing, re-location of the engineering unit to the Test Area, and receipt and start of integration of the MSFC Data Acquisition System.
- The data drop for the Final Acceptance Review is planned for May 8, with the review to be held at KSC on May 27.

Project Integration (PI)



An Ares team member, right, discusses Ares V with visitors to the UAHuntsville Mechanical and Aerospace Engineering Department Senior Design Class Open House.

- ***University of Alabama in Huntsville (UAHuntsville) Integrated Product/Project Team Open House:*** The Ares Projects outreach team displayed the 1:100 Ares model set and launch animation and spoke with students at the UAHuntsville Mechanical and Aerospace Engineering Department Senior Design Class Open House in the Shelby Center on campus on April 24. The Ares Projects provided assistance and insight to students designing a satellite servicing spacecraft that would be launched by Ares V.

The Ares Projects look forward to the STS-125 launch of Space Shuttle Atlantis on May 11 and the FS Cluster Drop Test in May.

...and as of this Ares Projects Weekly Summary, there are only 121 days until the first Ares I test flight, Ares I-X!!!