Upper Stage (US) Structures and Thermal (S&T) Subsystem: The US S&T Subsystem recently began PD01 Instrument Unit (IU) Purge Duct/Pressure Drop Testing at Glenn Research Center (GRC). This ongoing testing will simulate both the IU and Aft Skirt/Thrust Cone purge duct size and configurations. The Applied Flow Technology (AFT) Software (S/W) flow analysis program is used to predict and evaluate the purge system pressure losses. The test article flow rate and pressure drop are measured and this test data is used to validate the modeling methods of the AFT flow analysis program. A validated AFT program modeling method will allow the system designer to accurately predict the actual purge system flow losses and characteristics.

Assembled US IU 18-ft diameter purge ring

Flow visualization using yarn tufts attached to ¾-inch orifices spaced every foot along the length of the tube

Recent activities specific to the Elements include:

- **Upper Stage (US)**

  - ***US Integrated Test Subsystem Technical Interchange Meeting (TIM):*** A TIM was held May 6–7 at Marshall Space Flight Center (MSFC) with team representatives from MSFC and GRC to review roles, responsibilities, and team operating processes related to the Ares I US Structures and Thermal test program. This was a productive 2-day event and will allow the various MSFC and GRC organizations to work together better. Some decisions were made with respect to assigning responsibilities for the design, analysis, and fabrication of Special Test Equipment (STE) and structural test simulators. Additional lower-level detailed assignments will be made during subsequent engineering team meetings led by EV83 for each major test activity. A follow-up TIM is being considered for later this month.

- **Upper Stage Engine (USE)**

  - ***J–2X Oxygen Turbopump (OTP) Subscale Inducer Testing:*** The J–2X OTP subscale inducer testing continues at Pratt Whitney Rocketdyne (PWR) this week. While the results of the two-bladed, unshrouded inducer are being analyzed, the three-bladed, unshrouded inducer is now in test at the Canoga Park facility. These water flow tests are being conducted to obtain adequate data to assess each inducer's design performance regarding, not only suction performance and pressure rise but also, the amount of backflow sent into the engine inlet ducts, level of alternating pressure fluctuations imparting loads into other turbopump components, and level of pressure fluctuations being sent into the Main Propulsion System (MPS). The same data has been collected for the shrouded heritage design previously at MSFC. Once all three data sets are collected, a down select will be performed. This down select is currently planned for the end of the May.

- **First Stage (FS)**

  - ***Deceleration Subsystem (DSS) Air Force Integrated Test Team (ITT) Executive Review:*** The Air Force conducts an annual ITT review where all organizations that are utilizing Air Force Flight Test Center resources have the opportunity to present a summary status of their test projects to Air Force senior management. This year, both Ares I FS DSS and Orion were invited to attend and give a presentation of the respective parachute drop test programs. Ares I DSS is using the Flight Test Center to conduct parachute heavy drop tests of 60,000 pounds and larger. The DSS project was well received by the Air Force management with a resultant better understanding of the test requirements. This will equate into enhanced overall support from the various Air Force test support organizations.

  - ***FS Design Requirements Compliance Matrix (DRCM) TIM:*** The FS compliance inputs to the Ares I System Requirements Document (SRD) Revision C DRCM were presented during the FS DRCM TIM, held on May 8. The purpose of the TIM was to gain concurrence from the Level III Sponsoring Technical Representatives (TREPs) to the inputs provided by the FS Enabling TREPs. The Ares I SRD Revision C DRCM will be a RIDable document at the Ares I Preliminary Design Review (PDR).

  - ***Ares 1–X Integrated Stage, Aft Assembly, and Forward Assembly 60% Integrated Product and Process Development (IPPD):*** ATK led 60% reviews of Ares 1–X Integrated Stage, Aft Assembly, and Forward Assembly designs, drawings, and assembly sequences at Kennedy Space Center (KSC) from May 5–9. The meeting integrated design, assembly, ground operations, safety and quality, and schedule activities. Disconnects were identified and mitigation plans were developed. The delay in finalized requirements and drawings is a standing schedule concern. The Integrated Stage and Aft Assembly have projected 90% IPPD in early June, and the Forward Assembly has projected a 100% IPPD in mid-June.

  - ***Ares I-X Structures Major Design Review (MDR)–4:*** The Ares I-X Structures MDR–4 was held last week at KSC with Alliant Techsystems, Inc. (ATK) and United Space Alliance (USA) presenting the material. The purpose of the review was to establish

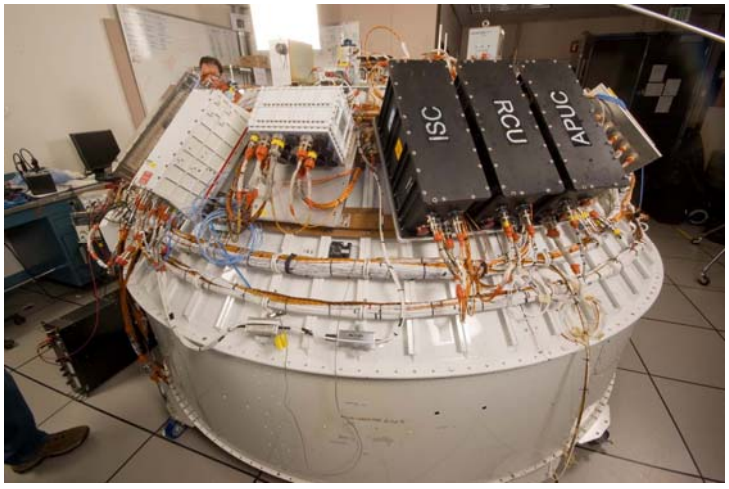
that sufficient design, analysis, and manufacturing process development has occurred to start fabrication or utilization of the following Ares I-X Structures:

- Aft skirt roll out and on-pad stay analysis
- Booster Deceleration Motor (BDM)/Booster Tumble Motor (BTM) bracket analysis
- Redundant Rate Gyro Unit (RRGU) bracket analysis.
- Auxiliary Power Unit Controller (APUC) bracket analysis
- Faux Systems Tunnel on 5th Segment Simulator Analysis

Sixteen actions were assigned in the review with only one being constraining in nature. The review showed that the designs selected meet the requirements, the interfaces have been identified, and verification methods have been outlined.

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

  - ***Ares I–X Avionics Integrated Product Team (IPT) Delivers Two Wire Harnesses to Contractor:*** The Ares I–X Avionics IPT delivered two Developmental Flight Instrumentation (DFI) wire harnesses to the Ares I–X First Stage (FS) contractor. The harness design process involves (1) models provided by the element IPT to Lockheed Martin, (2) models returned with harness routing and requirements added, and (3) model returned to element IPT for Table Top Review (TRR). After the successful TTR, and prior to the procurement of cable harnesses, Lockheed Martin holds a harness production TTR with participation from MSFC Engineering. Upper Stage (US) harness designs are on schedule and Crew Module/Launch Abort System (CM/LAS) harnesses are complete.



Ares I–X System Integration Laboratory (SIL) with FS-provided Shuttle-Derived Avionics (SDA) boxes. All avionics system cable runs are reproduced in the SIL

- ***Ares I–X Roll Control System (RoCS) Element:*** Members of the RoCS team attended an Ares I–X-sponsored Lessons Learned Class. Team members also supported a KSC-sponsored Anomaly TIM. The cold flow unit ordnance has been received at Teledyne from the vendor, as well as extra propellant tank covers coming from Hill Air Force Base. Floor placement for RoCS assembly stands and kitting of parts has started. At the request of the Ares I–X Mission Manager, Teledyne presented the RoCS Hazards Analysis summary to date. Unfinalized RoCS-to-Interstage interface loads and fastener agreements have forced a stop-work on RoCS panel fabrication and bolt procurement. A "what-if" schedule exercise is in work to determine potential impacts.

The Ares Project looks forward to the STS–124 Shuttle Discovery launch set for May 31.

…and as of this Ares Project Weekly Summary, there are only 334 days until the first Ares I test flight, Ares I–X!!!