

**MONTHLY
ACCOMPLISHMENTS**
April 2012

orion

Wrapping up at Michoud



The Michoud Assembly Facility team recently completed welding operations on the Orion Exploration Flight Test (EFT-1) crew module barrel-to-aft-bulkhead, aft bulkhead cap and the tunnel-to-forward bulkhead using the Self-Reacting Friction Stir Weld operation, which continues to prove efficient while yielding extraordinary high quality welds. The remaining welds include the forward bulkhead-to-cone and the final closeout weld joining the cone to the barrel, which are scheduled to be completed in mid-May.

The crew module will be delivered to the Operations & Checkout (O&C) facility at Kennedy Space Center this summer for final integration, outfitting and testing.

Fabrication of the composite service module panels also showed significant progress. The team completed work on the shear panels, inboard and forward walls. Several of the panels completed fiber placement, non-destructive evaluation and trim testing.

Successful Parachute Test

The Orion parachute team successfully completed their latest airdrop test on April 17, which utilized the dart-shaped Parachute Compartment Drop Test Vehicle that includes a representative parachute compartment for the Orion spacecraft. This particular drop test determined how the entire system would respond if one of the three main parachutes inflated too quickly and helped to validate the drogue parachute design by testing at a high dynamic pressure that closely mimicked the environment expected for the EFT-1 vehicle.

The test hardware was dropped from a C-130 aircraft at an altitude of 25,000 feet above the U.S. Army's Yuma Proving Grounds. All sequences and parachute deployments performed nominally and according to the timeline. The following weeks will include disassembly of the test hardware followed by post test inspections, repairs, and preparation for the subsequent use of hardware in another airdrop test.

The next test in the series will be a Parachute Test Vehicle airdrop, scheduled for July 17, which will perform objectives of one skipped first stage drogue, and one skipped first stage main parachute.





Orion GTA arrives at KSC

The Orion Ground Test Article (GTA) arrived at NASA's Kennedy Space Center Operations & Checkout Facility on April 21. The GTA will be used for pathfinding operations at the O&C in preparation for the Orion Exploration Flight Test arrival this summer. After pathfinding operations are completed, new backshell panels will be installed on the vehicle prior to it being shipped to Langley Research Center in Virginia for splash down testing at NASA's Hydro Impact Basin.



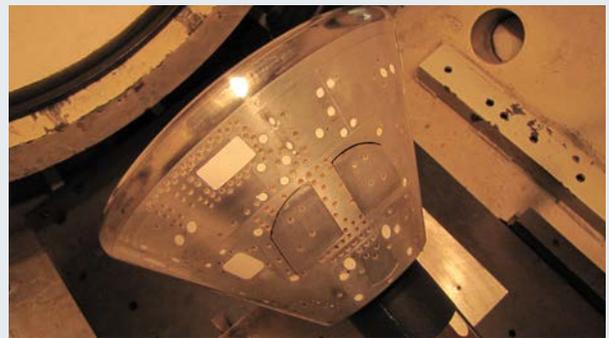
Simulation testing of Orion ascent and entry

Honeywell completed integration of Orion navigation sensors into the Navigation Test Lab (NTL) in Clearwater, Florida. The lab was able to demonstrate Orion ascent and entry simulations using navigation sensors, flight computers and flight software. The NTL is now an operational Orion resource that will be used for hardware and software testing.



Orion model testing

Orion Aerospace personnel recently completed an aerodynamics wind tunnel test at NASA Langley Research Center's National Transonic Facility. The stainless steel model included windows, thrusters, significant elements of the forward bay, and modeled the recession effects on the heat shield after re-entry. Data obtained included aerodynamic forces and moments, surface pressures, unsteady pressures and flow visualization of the wake flow. The results will be used to generate the aerodynamic database and set the parachute load conditions for Orion Exploration Flight Test verification. (pictured above)



The team also recently concluded an Orion crew module backshell / reaction control system (RCS) heating test at the Calspan-University of Buffalo Research Center Large Energy National Shock facility high energy shock tunnel. The test program measured crew module backshell aeroheating augmentation due to reaction control system jet firings. This data is used to construct aeroheating environment models for design and verification of hardware such as backshell tiles, vents, windows, launch assembly vehicle attach wells, seals, and the RCS pods. (pictured above)



STORRM and GTA teams receive RNASA awards

The 2012 Rotary National Award for Space Achievement (RNASA) Stellar Award winners were announced on April 27 in Houston. Two Orion teams were recognized and received Stellar awards presented by Astronauts Megan McArthur and Robert Behnken.

The NASA Johnson Space Center Sensor Test for Orion Relative Navigation Risk Mitigation (STORRM) Team was recognized for outstanding technical excellence in the development and demonstration of Orion relative navigation sensor technologies

for use in future crewed and un-crewed rendezvous, proximity operations, and docking capabilities. Howard Hu accepted for the team (third from left).

The Lockheed Martin Orion Multi-Purpose Crew Vehicle Ground Test Vehicle Production and Integrated Testing Team was recognized for production of the Orion crew module and successful integrated testing with the launch abort system. Brian Sompayrac accepted for the team (second from right).



TOMCCAT receives JSC group achievement award

The Orion Mission Control Center A-Team, or TOMCCAT, recently received a JSC Group Achievement award for their exemplary work with the development, configuration and successful execution of the first Orion Exploration Flight Test (EFT-1) Mission Control Center (MCC) data flow tests this past winter. TOMCCAT is a facility working group that has been given the responsibility of preparing the MCC for the EFT-1 mission.

As a result of their outstanding work, the MCC successfully received and processed data from the Engineering Data Lab Houston (EDL-H) on November 15 and then again from the Houston Orion Test Hardware (HOTH) rig located at the EDL-H on December 15. This was a great first step in preparing the MCC facility to support the EFT-1 pre-mission testing and roll through mission execution.

Orion PA-1 Crew Module on tour

The Orion Pad Abort-1 (PA-1) crew module recently was showcased at the Smithsonian National Air and Space Museum Udvar-Hazy Center during the Welcome Shuttle Discovery events April 19-22 in Washington, D.C. Approximately 50,000 people turned out for the weekend events and NASA and Lockheed Martin personnel were on hand to answer questions about America's next spacecraft.



The following weekend, the Orion PA-1 was featured in the Lockheed Martin Experience exhibit at the USA Science & Engineering Festival April 27-29 in Washington, D.C. A record crowd of more than 150,000 people attended the event at the Walter E. Washington Convention Center to celebrate the importance of Science, Technology, Engineering and Math (STEM) studies.



For the summer, Orion PA-1 will be housed at the Virginia Air & Space Center, where it will be on display as an exhibit focusing on the future of space exploration.

