



GSDO
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PROGRAM HIGHLIGHTS • AUGUST 2014

At NASA's Kennedy Space Center in Florida, the Ground Systems Development and Operations (GSDO) Program Office is leading the center's transformation from a historically government-only launch complex to a spaceport bustling with activity involving government and commercial vehicles alike. GSDO is tasked with developing and using the complex equipment required to safely handle a variety of rockets and spacecraft during assembly, transport and launch. For more information about GSDO accomplishments happening around the center, visit <http://go.nasa.gov/groundsystems>.

NASA Completes Second Orion Underway Recovery Test

NASA and Orion prime contractor Lockheed Martin teamed up with the U.S. Navy and Department of Defense's Human Space Flight Support Detachment 3 to test techniques for recovering Orion from the water during Underway Recovery Test 2 (URT 2), Aug. 1-4, from the USS Anchorage, off the coast of San Diego.

"We learned a lot about our hardware, gathered good data, and the test objectives were achieved," said Mike Generale, NASA recovery operations manager in the Ground Systems Development and Operations Program. "We were able to put Orion out to sea and safely bring it back multiple times. We are ready to move on to the next step of our testing with a full dress rehearsal landing simulation on the next test."

New hardware tested during URT 2 included an air

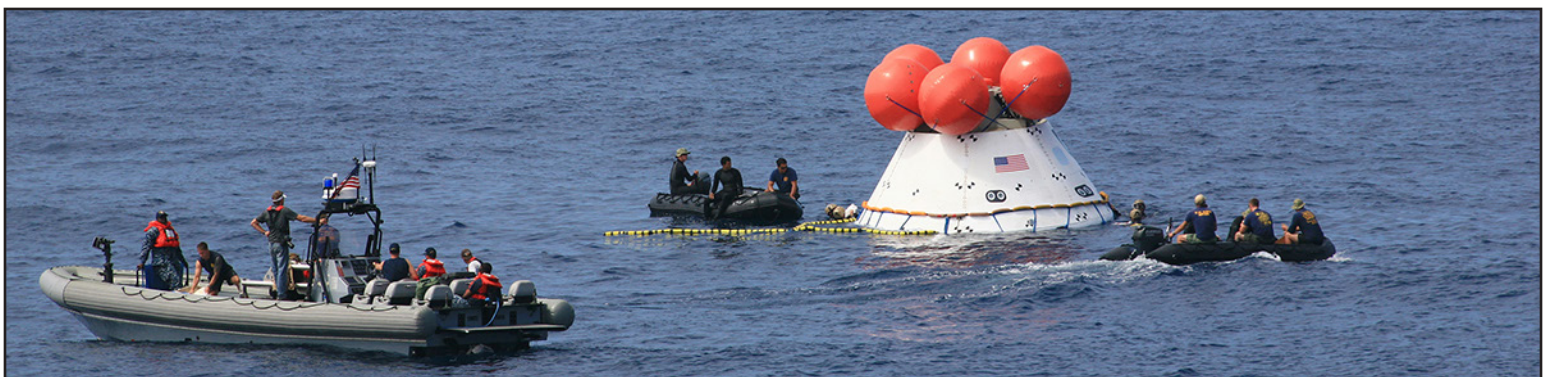
bag system for the Crew Module Recovery Cradle and a load-distributing collar for placement around the crew module.

The Prototype Laboratory at Kennedy Space Center designed a new device called the Line Load Attenuation Mechanical Assembly that limited the tending-line forces for the Navy line handlers as Orion was guided into the ship's well deck.

During a segment of the recovery test, a lifting sling was attached to Orion and the test vehicle was lifted by crane to test the procedure.

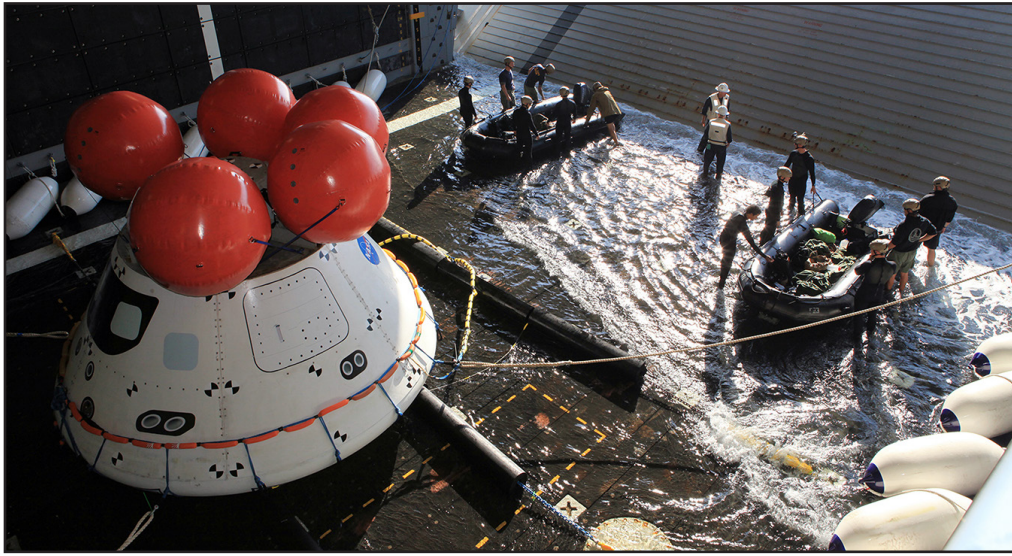
"Each of the new pieces of hardware was evaluated for its relative merits, and the best solutions will be tested during URT 3 in September," Generale said.

All of this testing ensures NASA can retrieve the Orion capsule safely after its first flight test in December.



NASA's Orion boilerplate test vehicle floated in the Pacific Ocean off the coast of San Diego, California, on Aug. 4, during Underway Recovery Test 2. U.S. Navy divers in Zodiac boats surrounded the test vehicle, while other Navy personnel in a rigid hull inflatable boat, at left, prepare for their part in the test. Photo credit: NASA/Kim Shiflett

Orion Underway Recovery Test Activities



Tending lines were attached to the Orion boilerplate test vehicle as the well deck of the USS Anchorage filled with water Aug. 4 during a portion of Orion Underway Recovery Test 2 in the Pacific Ocean off the coast of San Diego. Photo credit: NASA/Kim Shiflett



NASA astronaut Nicole Stott poses for photographs in the well deck of the USS Anchorage on Aug. 6, during the Science, Technology, Engineering and Mathematics (STEM) Expo for L.A. Navy Days at the Port of Los Angeles. With her is Commanding Officer Joel G. Stewart, USS Anchorage. Photo credit: NASA/Kim Shiflett



The Orion boilerplate test vehicle was lifted by crane from the water to test the proof-of-concept basket lift method Aug. 3 during a portion of Underway Recovery Test 2. Photo credit: NASA/Kim Shiflett



Mike Bolger, GSDO Program manager, talked with members of the media in the well deck of the USS Anchorage on Aug. 6, after completion of Underway Recovery Test 2. Photo credit: NASA/Kim Shiflett



Tim Goddard, Neutral Buoyancy Laboratory Orion flight lead, answers questions about the Orion boilerplate test vehicle from visitors touring the well deck of the USS Anchorage on Aug. 10, during the STEM Expo for L.A. Navy Days at the Port of Los Angeles. Photo credit: NASA/Kim Shiflett

Citric Acid Tests Underway at Kennedy Facilities

Who would have thought that oranges and other citrus fruit would be good for more than eating? Now, the citric acid that these fruits contain also could be used to protect stainless steel equipment and structures at Kennedy Space Center.

The Technology Evaluation for Environmental Risk Mitigation (TEERM) Principal Center in NASA's Environmental Management Division has partnered with the Ground Systems Development and Operations (GSDO) program at Kennedy to investigate citric acid as an alternative to nitric acid for protecting a specific set of stainless steel alloys currently used in ground support equipment and structures, including pipes, at the center.

When compared to nitric acid, citric acid is safer to apply to metal surfaces, environmentally friendly, bio-based and can be a cost saver.

"Citric acid does not remove the beneficial heavy metals from the surface of stainless steel like nitric acid can," said Pattie Lewis, an engineer with ITB Inc. and manager of the TEERM coatings project. "These beneficial heavy metals are what give stainless steel its desirable qualities so we want to preserve them while creating an oxide layer to further inhibit corrosion."

Phase I testing began in late 2012 and concluded in April 2014. Several different tests were completed on stainless steel samples in the Corrosion Technology Laboratory in the Operations and Checkout Building and the Beachside Atmospheric Test Facility at Kennedy.



Teddy Beck, a corrosion technician with EASI, prepared bent samples of stainless steel in July 2013 for the stress corrosion cracking test in the Corrosion Technology Lab at the Operations and Checkout Building at NASA's Kennedy Space Center in Florida. Photo credit: QinetiQ/Mark Kolody



During Phase I testing, sets of stainless steel alloy samples were treated with citric acid and nitric acid and placed at the Beachside Atmospheric Test Facility at NASA's Kennedy Space Center in Florida. Photo credit: QinetiQ/Mark Kolody

Phase II testing began in May 2013. The same four alloys used in Phase I were subjected to additional tests. Wet tape adhesion tests were completed in May 2014. The treated panels were scribed so that the coating was damaged all the way to the substrate. An adhesive tape was applied and a weight was used to ensure that it was fully adhered. Then the tape was pulled up to see if any of the coating came up with it. Currently, the samples are being tested in a salt-spray chamber in the corrosion lab.

Phase III will focus on the remaining six alloys, which will undergo the same testing as those performed on the first four alloys. Samples treated with citric acid were placed at the beachside facility in January 2014 for the atmospheric exposure test.

Read the complete story at <http://go.nasa.gov/1qFD9Yt>.

Employee Spotlight -- Cliff Lanham



Cliff Lanham is the Vehicle Integration and Launch Integrated Product Team operations manager for GSDO at Kennedy Space Center. Lanham has been at Kennedy since 2007.

His daily activities include coordinating the planning for the assembly and integration of NASA's Space

Launch System and Orion spacecraft, how they will be tested and how the vehicle will be launched.

"I decided to work for GSDO when I realized that, with human spaceflight, this was the next big opportunity and the possibilities of working on what would be the world's largest rocket and having an integral part of launching, that was just very appealing," Lanham said.

He is most looking forward to liftoff for Exploration Mission-1, when the first launch of the SLS and Orion occurs.

"It's the culmination of a lot of work that we put in every single day," Lanham said. "I'm part of a team that will launch the largest rocket ever built."

Lanham's hometown is Glen Burnie, Maryland. He earned a bachelor's degree in mechanical engineering from the University of Maryland, and a master's in mechanical engineering from George Washington University.

He is married to his wife, Sandie,

and they have a 14-year-old son, Patrick. They have two dogs, Coco, a Havanese, and Trooper, an Akita. His mother and five older sisters and their families all live in Maryland.

Lanham's first car was a white 1964 Chevy II Nova. He enjoys running, working out, going to the beach, fishing and boating. Not surprisingly, he is an enthusiastic Baltimore Ravens and Orioles fan.

View Lanham's profile at <http://go.nasa.gov/1A25Rny>.



Singer-songwriter Brad Paisley announced the release of a new song titled "American Flag on the Moon" from Launch Pad 39B at Kennedy Space Center on Aug. 16. View a video of the event at <https://www.youtube.com/watch?v=LwZ2QUu-RJ8>. Photo credit: NASA/Daniel Casper