

GROUND SYSTEMS DEVELOPMENT & OPERATIONS

H I G H L I G H T S

MARCH 2017

GSDO MONTHLY HIGHLIGHTS



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First umbilical installed on ML



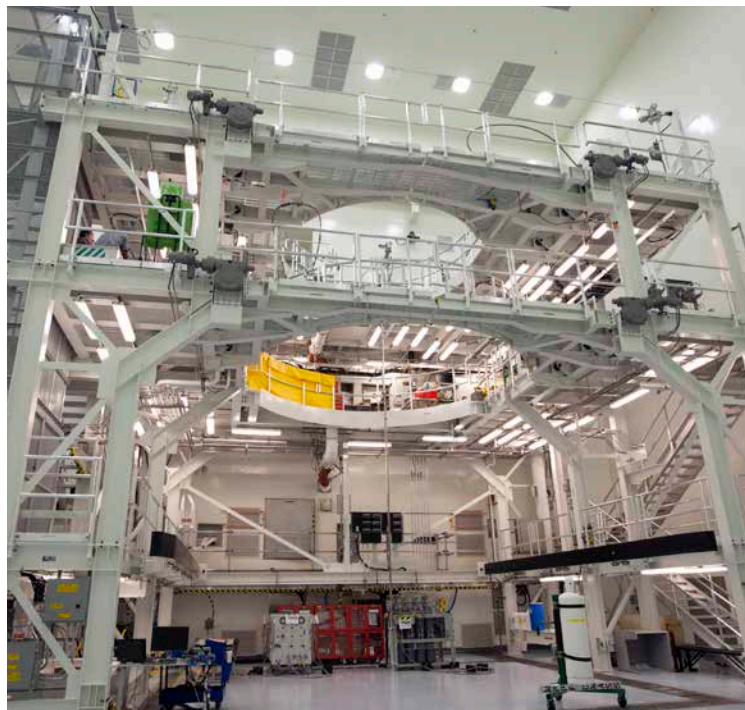
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Check out the GSDO 2016 Year in Review at <http://go.nasa.gov/2IT52Pe>

FIRST UMBILICAL INSTALLED ON MOBILE LAUNCHER FOR NASA'S SPACE LAUNCH SYSTEM AND ORION

The first launch umbilical for NASA's [Space Launch System](#) (SLS) and [Orion](#) spacecraft was installed on the mobile launcher tower March 16 at Kennedy Space Center. The Orion Service Module Umbilical, or OSMU, was installed high up on the tower at about the 260-foot level. "Installation of the OSMU is a major milestone for the mobile launcher team," said Sam Talluto, deputy project manager. "This is the first of multiple umbilicals and launch accessories that will be installed." The tower on the mobile launcher will be equipped with several connections, called [launch umbilicals](#), which will connect to the SLS core stage and twin solid rocket boosters, the interim cryogenic propulsion stage and the Orion spacecraft. They will provide power, communications, coolant and fuel.

The OSMU will connect from the mobile launcher tower to the Orion service module. Prior to launch, the umbilical will transfer liquid coolant for the electronics and purge air/GN2 for environmental control to the Orion service module that houses these critical systems to support the spacecraft. The umbilical also will provide purge air/GN2 for environmental control to the Launch Abort System. Before launch, the OSMU will tilt up and the umbilical lines will disconnect. The first integrated launch of SLS and Orion, [Exploration Mission 1](#), will send the spacecraft to a stable orbit beyond the moon. Orion will return to Earth and be recovered from the Pacific Ocean. The mission will demonstrate the integrated performance of the SLS rocket, Orion and ground support teams.



CRAWLER-TRANSPORTER 2 TAKES TEST DRIVE ALONG CRAWLERWAY



NASA's upgraded crawler-transporter 2 (CT-2), carrying mobile launcher platform 1, moves slowly along the crawlerway March 22 at Kennedy Space Center. The crawler's upgrades and modifications were monitored and tested under loaded conditions during its travel to the crawlerway Pad A/B split and back to the crawler yard to confirm it is ready to support the load of the mobile launcher carrying the Space Launch System with Orion atop for the first test flight, Exploration Mission 1. The Ground Systems Development and Operations Program at Kennedy is managing upgrades to the crawler. Photo credit: NASA/Leif Heimbolt

NASA's crawler-transporter 2 (CT-2) took a test drive along the crawlerway at Kennedy Space Center to determine the structural dynamics and loading environments of the crawler's recent upgrades. The test was performed to ensure that the crawler is ready to support the [first integrated flight](#) of the agency's Orion spacecraft atop the Space Launch System.

The unloaded CT-2 rolled from the crawler yard along the crawlerway to the Pad A/B split for the first leg of the trip and traveled back to the mobile launcher platform park site near the Vehicle Assembly Building. For the loaded test, the crawler picked up Mobile Launcher Platform 1 at the park site and returned to the Pad A/B split. Engineers took measurements during the entire trek using accelerometers, strain gauges and pressure transducers. The data collected will be used to validate the dynamic model of the integrated SLS.

CT-2 is the vehicle that will carry the SLS rocket and Orion spacecraft on the mobile launcher to Pad B for launch. The behemoth vehicle recently was [upgraded](#) to support the heavier load of the SLS atop the mobile launcher.

Upgrades to the crawler included installation of new generators, gear assemblies, jacking, equalizing and leveling (JEL) hydraulic cylinders, roller bearings and brakes. Other systems also were upgraded.

The Ground Systems Development and Operations Program is overseeing upgrades to facilities and ground support equipment necessary to support the launch and deep space missions, including the Journey to Mars.

NEW GROUND LAUNCH SEQUENCER SOFTWARE DEMONSTRATED IN LAUNCH CONTROL CENTER

A demonstration of the automated command and control software for NASA's [Space Launch System](#) (SLS) rocket and [Orion](#) spacecraft, recently took place in Firing Room 3 in the Launch Control Center at the agency's Kennedy Space Center in Florida. The software, called the ground launch sequencer, will be responsible for nearly all of the launch commit criteria during the final phases of launch countdowns. The Ground and Flight Application Software Team, or GFAST, demonstrated the software for [Charlie Blackwell-Thompson](#), [launch director](#) for the [first integrated flight](#) of the SLS and Orion spacecraft. Also attending were representatives from the NASA Test Director's Office.



NASA engineers and test directors gather in Firing Room 3 in the Launch Control Center at NASA's Kennedy Space Center in Florida, to watch a demonstration of the automated command and control software for the agency's Space Launch System and Orion spacecraft. In front, far right, is Charlie Blackwell-Thompson, Exploration Mission-1 launch director. Photo credit: NASA/Bill White

The software is in the advanced stages of development. It includes nearly all of the core capabilities required to support the initial use during Ignition Over-Pressure/Sound Suppression and follow-on tests through launch of the agency's SLS rocket and Orion spacecraft. The suppression stage ensures the water dampening system initiates in the final second of launch countdown. It also produces the pattern and volume needed to dampen the pressure waves and acoustic environment caused by the firing of the SLS core stage RS-25 engines and solid rocket motors.

"We were pleased to be able to demonstrate the continued evolution of the ground launch sequencer for members of the launch team, and look forward to its first use in operations support," said Alex Pandelos, operations project engineer for Launch Integration in the Ground Systems Development and Operations Program (GSDO).

The software was developed by GSDO's Command, Control and Communications teams at the center. Development of the software will continue, with a goal of beginning verification and validation of the software in summer 2017.

Engineers and technicians completed verification and validation testing of several pneumatic systems inside and outside the Multi-Payload Processing Facility (MPPF) at NASA's Kennedy Space Center in Florida. In view is the service platform for Orion spacecraft processing. The MPPF will be used for offline processing and fueling of the Orion spacecraft and service module stack before launch. Orion also will be de-serviced in the MPPF after a mission. The Ground Systems Development and Operations Program (GSDO) is overseeing upgrades to the facility. The Engineering Directorate led the recent pneumatic tests. Photo credit: NASA/Kim Shiflett



PNEUMATIC SYSTEMS TESTED IN MULTI-PAYLOAD PROCESSING FACILITY

Testing of systems critical to preparing Orion for its first flight atop NASA's Space Launch System rocket were successfully completed in the Multi-Payload Processing Facility (MPPF) at Kennedy Space Center.

The MPPF is the location where fuel and commodities will be provided for the Orion spacecraft prior to launch. Orion also will be defueled and prepared for its next mission in this facility. Engineers and technicians completed a series of verification and validation tests of the pneumatic systems inside and outside the facility and confirmed they are ready to become operational, and that the systems meet requirements to support flight and ground systems that use pneumatic commodities.

"Completion of verification and validation testing of the pneumatic systems helps ensure that ground systems at Kennedy are ready to support Orion spacecraft processing," said Stephen Anthony, pneumatic design engineering lead in the Environmental and Life Support Systems branch in the center's Engineering Directorate. Four pneumatic systems supply high pressure gases to various locations in the MPPF. These include gaseous nitrogen, gaseous helium and gaseous oxygen. They will be used to pressurize flight tanks on the Orion spacecraft. Another system, the breathing air system, provides an air source for personnel using Self-

Contained Atmospheric Protection Ensembles, or SCAPE suits, which protect them during hazardous operations inside and outside the facility.

Leak tests of all of the pneumatic hardware installed inside and outside the MPPF were performed. Checkouts included verifying proper function of valves, regulators, pressure gauges and other components; verifying that the systems can be operated by command and control software; and performing flow tests of the systems to validate analysis and demonstrate that the systems meet requirements. A simulation of Orion flight tank fill operations also was performed.

"The pneumatic systems at the MPPF provide high pressure gases to many other ground and flight systems, making them vital to successful ground processing operations," Anthony said. The vast majority of the testing was completed between August 2016 and January 2017. Additional testing is scheduled this spring.

A team of about 60 NASA and contractor workers supported the tests, including design, operations, systems and project engineers, mechanics, technicians, logistics, safety, quality, configuration management, and construction of facilities personnel.

GROUND SYSTEMS SPOTLIGHT - CRAIG DANIELS



Craig Daniels is a ground support equipment structural analyst with SGT on the Engineering Services Contract, supporting the Ground Systems Development and Operations Program. His main responsibilities include ensuring that the ground support equipment (GSE) is strong enough to perform its intended function and to provide suggestions to resolve problems as the products are developed.

A recent accomplishment was seeing the Space Launch System vehicle stabilizer umbilical arms installed at the Launch Equipment Test Facility for testing.

"I am really excited to see the retract, or drop, testing that will happen here in a couple of months," Daniels said.

Daniels has worked at Kennedy for 13 years. He began his career in 2001 as a University of Central Florida (UCF) co-op student for Sunbelt Engineering during construction of the Atlas V launch complex. After graduating from college, he was hired by Boeing and worked as a space shuttle mechanisms engineer at the NASA Shuttle Logistics Depot in Port Canaveral.

"I was hired during Return to Flight efforts after the Columbia accident, so there was a lot of non-routine maintenance going on and some new mechanisms were being built for the new inspection boom in the payload bay," Daniels said.

Memorable experiences include sitting on console at Johnson

Space Center in Houston for some launches, and once, getting to declare "Mech is GO" for his mechanical group during the launch director's poll of the systems for launch. He also had the opportunity to board space shuttles in the Orbiter Processing Facilities, and go into the White Room and shuttle payload bay when it was at the launch pad.

As the Space Shuttle Program ended, he moved into a career as a GSE structural analyst with Boeing on the Checkout, Assembly and Payload Processing Services contract and worked with the GSE group to design the servicing stands that will be used to process the Orion capsules in the Multi-Purpose Processing Facility.

Challenges in his current position include attention to detail on tight schedules, interpretation of requirements and codes that can be difficult to understand, and tedious technical report writing followed by even more updates and rewriting.

Daniels first became interested in space in grade school when his family came to the Kennedy Space Center Visitor Complex during summer vacation.

"I never really considered a career in space until my calculus teacher at Louisiana State University suggested it when I told him that I didn't know what I wanted to do with my new math skills," Daniels said. "He just threw it out there as something that was possible, and I latched onto the idea immediately."

Daniels considers his hometown Metropolis, Illinois. He earned a Bachelor of Science in aerospace engineering from UCF in 2004. His advice to students interested in a career similar to his is to make a goal and work toward it.

"I would tell students to work at their own pace and learn the core engineering and physics principles well. Get a summer co-op job. Keep learning about the things that interest you and always look for good opportunities that will help you meet your goals and keep you employed when things change," Daniels said. His first car was a 1976 Chevrolet Monte Carlo, medium blue metallic with a white "landau" vinyl top and rally wheels.

"I really wanted a classic Camaro, Mustang or Charger, but the Monte Carlo was nice," Daniels said.

Daniels has been married for 17 years to his wife, Aletha. They have a daughter, Hannah, 11, and a son, Thomas, 10. The family pets include a cat named Kitty Cat Cream who likes short walks and long naps, and a convicted ankle-biting Chihuahua named Wiggles.

Daniels' hobbies include watching his kids play sports, working on old cars, building furniture, mowing the grass when it's cool, flying kites, and building cheap model airplanes and Estes rockets.

GROUND SYSTEMS SPOTLIGHT - ALLISON MJOEN



Allison Mjoen is an integration engineer with Jacobs on the Test and Operations Support Contract (TOSC) supporting the Ground Systems Development and Operations (GSDO) Program at Kennedy Space Center. Mjoen's support focuses on Orion requirements development. She is responsible for integrating the requirements between the hardware provider (Lockheed Martin) and the TOSC systems engineers. She ensures that the operational requirements are not only correct, but also executable.

"So far I am most proud of the Space Flight Awareness Honoree Award I received in 2016 in recognition of the support I provided to ISS payload customers," Mjoen said.

She has worked at Kennedy for 10 years. She started in 2007 as a flight crew systems engineer with United Space Alliance, where her primary responsibilities were to test, maintain and stow/destow mission critical crew

systems hardware. These included seats, pressure suits, locker and stowage bags, crew accommodations and crew survival equipment in support of the Space Shuttle Program.

"Before GSDO, I supported the International Space Station Program as a payload integration engineer for Jacobs," Mjoen said. "I represented principal investigators selected through peer review with their experiment payload design, development and implementation on the space station."

One of the biggest challenges of her job is effective communication.

"It is impossible to be an expert on each Orion system. Instead, it is important to know the right system experts to reach out to, obtain key information, and convey it accurately," Mjoen said.

When did she first become interested in space? Mjoen said it was in elementary school when her class started learning about weather and space.

"I couldn't believe that we had people living in space, and I wanted to learn how that was possible," Mjoen said.

Mjoen has lived in Orlando for 13 years. But she also has lived in Blue Earth, Minnesota (where she was born), Naples, Florida, and Sewanee, Tennessee. She earned a Bachelor of Science in aerospace engineering in 2009 from the University of Central Florida.

The advice Mjoen would give to students who are interested in a career similar to hers is: "Be resolute in your decision to pursue engineering. You are smart enough and don't let anyone convince you otherwise." Mjoen has been married to her husband Pete for five years. They have one son, Elijah, who is four months old. She says one of the biggest challenges of working and having a newborn is planning ahead but remaining flexible.

"Each day is a little different and often unpredictable," Mjoen said.

Her first car was a 1994 Ford Tempo. It was teal green and had automatic seat belts.

Some of Mjoen's interests include traveling, hiking and spending quality time with her family and friends.

Regina Britton

Program Analyst Lead, Ground Systems Implementation Business Office



Regina Britton is a program analyst in the Ground Systems Development and Operations Program at Kennedy Space Center. Her official title is lead for the Ground Systems Implementation (GSI) Business Office.

Britton's main responsibilities include managing the budget and schedule for the GSI Division of the GSDO Program.

"The part of my job I like the most is being involved in so many parts of the GSDO Program. I have learned so much about the program as I plan and execute the budgets of the various elements of GSDO. I feel I have a first-hand seat to see all of the cool stuff going on," Britton said.

She is very proud of all that GSI has achieved in such a short amount of time.

"It is amazing to see so many things are complete or very near completion.

It's exciting to think how close we are to being done with development and moving toward our first launch of the Space Launch System rocket with Orion," Britton said.

She started working at Kennedy in 1990 with McDonnell Douglas on the Payloads and Ground Operations Contract. She worked on that contract for 13.5 years, and then transitioned to Analex on the Expendable Launch Vehicles Integrated Support contract. After working there for five years, she moved to Abacus Technology on the Information Management and Communication Support (IMCS) contract.

In 2011, 21 years into her career, she became a civil servant working for NASA. She came directly to the business office supporting GSDO.

"I feel I landed in the best place at Kennedy Space Center. I wouldn't want to be working anywhere else," Britton said.

She first became interested in space when she was very young. She grew up around aviation all of her life.

"My family owned a small private airport. To my family, aviation and space was the coolest. To think I now work for NASA is beyond my belief and I feel so privileged," Britton said.

Her hometown is Milton, Florida. She earned a Bachelor of Science in business administration in 1982 from Troy University in Troy, Alabama.

The advice she would give to students interested in pursuing a career in a field similar to hers is that business administration is a wonderful area to study.

"It will open you up to a number of different career options, not limiting you to one thing," Britton said. "As a business analyst, you will find yourself at the heart of the organization, which is an exciting place to be."

Her first car was a 1982 white Chevrolet Cavalier, which she says back in the day was a cool car.

She has been married to her husband, Keith, for 27 years. They have a 23-year-old son, Spencer, and a 21-year-old daughter, Sarah. Sarah was born in a Kennedy Space Center ambulance.

"She received a special Payload Delivery Award and a permanent Kennedy badge when she was two weeks old," Britton said.

They have a Labradoodle named Cali, that Britton says is the best dog ever. Her hobbies include running and gardening.

A long-exposure view of the mobile launcher at NASA's Kennedy Space Center in Florida. Cranes and rigging were used to lift the bracket for the Orion Service Module Umbilical (OSMU) up for installation on the mobile launcher tower on March 13. The tower will be equipped with a number of lines, called umbilicals, which will connect to the Space Launch System rocket and Orion spacecraft for Exploration Mission-1. The OSMU will be located high on the mobile launcher tower and, prior to launch, will transfer liquid coolant for the electronics and air for the Environmental Control System to the Orion service module that houses these critical systems to support the spacecraft. The Ground Systems Development and Operations Program is overseeing installation of the umbilicals. Photo credit: NASA/Cory Huston



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