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COMBINED MONTHLY REPORT

May 2017
ORION

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ORION

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WELDED, WRAPPED AND READY TO GO
ORION’S MONTHLY HIGHLIGHTS

ORION TEAM WRAPS UP CLEAN ROOM WORK ON EM-1 SPACECRAFT

ON TRACK FOR EM-1 UNCREWED MISSION

ILLINOIS SUPPLIERS RECOGNIZED FOR EM-2 PROGRESS

STANDING BEHIND THEIR WORK

LAUNCH ABORT SYSTEM FACILITY TEAM FIRES UP NEW SYSTEM

COLLEGE STUDENT TEAMS TEST MICRO-G NEXT PROTOTYPES

ORION TEAM MEMBER SHOWS AND TELLS ALL AT MINI MAKER FAIRE

ORION APPRENTICE TEAM WINS SCHOLARSHIPS

A CELEBRATION ONLY A MARTIAN COULD LOVE
Work continues to prepare NASA’s Orion crew module for its first integrated flight atop the Space Launch System (SLS) rocket – Exploration Mission-1 (EM-1). The crew module was moved from a clean room to a work station inside the Neil Armstrong Operations and Checkout Building high bay at the agency’s Kennedy Space Center in Florida to prepare for the next additions to the spacecraft.

In the clean room, engineers and technicians completed the welding of the tanks to the propulsion and environmental control and life support systems (ECLSS) tubing. They also completed welding to install the propellant, pressurant and post-landing coolant tanks. The pressurant is used to maintain the flow of propellant and coolant in the propulsion and ECLSS systems, respectively.

Now secured in a work station, Orion will undergo additional processing to prepare it for launch in 2019. The crew module uprighting system, comprised of five uprighting bag assemblies, each with an inflation gas assembly, will be installed in the crew module’s forward bay. The uprighting bags are inflated after the crew module splashes down in the ocean and will turn the spacecraft upright if external forces cause it to roll over. The three main parachute assemblies also will be installed in the forward bay.

Orion’s crew module will be populated with avionics components, including control systems and communication and data units. Flight wire harnesses, which distribute power and data among the spacecraft’s systems, will be routed throughout the crew module’s forward bay, crew cabin and aft and mid bays.

The first flight of SLS and Orion will send the spacecraft beyond the moon before Orion returns to Earth and splashes down in the Pacific Ocean. The mission will demonstrate the integrated performance of the SLS rocket, Orion and ground support teams before a flight with crew in the early 2020s.
ON TRACK FOR EM-1 UNCREWED MISSION

In February, NASA began an effort looking at the feasibility of putting crew aboard the first integrated flight of the Space Launch System rocket and Orion spacecraft – Exploration Mission-1. After weighing the data and assessing all implications, the agency will continue pursuing the original plan for the first launch, as a rigorous flight test of the integrated systems without crew. However, engineers will apply insights gained from the effort to EM-1 and the integrated systems to strengthen the long-term push to extend human presence deeper into the solar system.

NASA determined it is technically capable of launching crew on EM-1, but after evaluating cost, risk and technical factors in a project of this magnitude, it would be difficult to accommodate changes needed to add crew at this point in mission planning. The effort confirmed that the baseline plan to fly EM-1 without crew is still the best approach to enable humans to move sustainably beyond low Earth orbit.

EM-1 is the first in a broad series of exploration missions that will eventually take humans to deep space, and on to Mars. It is designed to be a flight test of our entire system -- one that is challenging in itself and will offer the opportunity to better understand our capabilities and limitations and ultimately build confidence in our ability to safely send crew into deep space. As part of the assessment, NASA reviewed the schedule for EM-1 and will adjust the target launch date for the mission to 2019, and will execute its normal process in the coming weeks to determine an official revised launch date.

NASA continues to keep each part of the enterprise – Orion, SLS, and ground systems – moving at their best possible pace toward the first integrated test mission. While components for EM-1 are being delivered, contractors can turn to the next phase of their work for the second flight, Exploration Mission-2, which will carry crew beyond the moon.

NASA continues to lead the way in sending humans into deep space beyond the moon through building a flexible, reusable and sustainable capability and infrastructure that will last multiple decades and support missions of increasing complexity. This infrastructure will be available for use by partners, both domestic and international, as they want to join in the effort to advance human presence into the solar system. These systems create an incredible capability from which future generations will continue to benefit.

Read more: https://bit.ly/EM1Affirmed
NASA executives joined program leadership and industry team managers from the Orion and Space Launch System programs at Ingersoll Machine Tools and UTC Aerospace Systems in Rockford, Illinois, to see the first hardware nearing completion for Exploration Mission-2, which will be the first crewed flight of Orion and the Space Launch System rocket. The Ingersoll team has been machining parts of the Orion spacecraft, and the UTC Aerospace team has been involved in the design and management of parts for the Orion spacecraft and SLS. NASA Deputy Associate Administrator for Exploration Systems Development William Hill, Orion Program Manager Mark Kirasich, and Astronaut Rex Walheim were among the leadership team that toured the facilities and commended employees for their stellar work on the programs.

Read more: https://bit.ly/OrionIL
MJW Consolidated has successfully completed a fire protection project at the Launch Abort System Facility (LASF) at NASA’s Kennedy Space Center in Florida. The facility is used for the assembly and integration of the Orion spacecraft with the launch abort system (LAS). The abort system is designed to protect astronauts in the unlikely event of an emergency during launch or ascent that would require propelling the spacecraft away from the rocket or launch pad.

MJW was contracted in a full design-build capacity, providing professional engineering, detailed design, procurement, construction and commissioning of the new systems protecting the LASF. The project included modification and extension of site firewater systems, fabrication and installation of a custom enclosed fire pump skid, fabrication and installation of a building wet-pipe sprinkler system and high-bay water spray system. The project culminated in a successful full-flow test of the high-bay water spray system, demonstrating its ability to protect the LAS vehicle.

STANDING BEHIND THEIR WORK
The team at Ensign-Bickford Aerospace & Defense in Simsbury, Connecticut, stand behind their frangible joint and separation bolts following completion of the pre-ship review. The hardware was shipped on May 15 to NASA’s Michoud Assembly Facility in New Orleans, Louisiana, where it will be installed on the fairing panels for the structural test article.
REACHING OUT TO FUTURE EXPLORERS

ORION TEAM MEMBER SHOWS AND TELLS ALL AT MINI MAKER FAIRE
At the 5th annual Tyler County Mini Maker Faire, Orion team member Stuart McClung shared a presentation with hundreds of participants about the future of deep space exploration aboard the Orion spacecraft. The Maker Faire in Tyler, Texas, is a family-friendly festival that brings artists, inventors, tinkerers, and scientists together to share what they do and how they do it.

ORION TEAM MEMBER DUSTIN NEILL SPEAKS TO MICRO-G NExT STUDENT TEAMS TESTING THEIR PROTOTYPES IN MAY.

COLLEGE STUDENT TEAMS TEST MICRO-G NExT PROTOTYPES

Thirty-one student teams from across the country tested their designs in simulated microgravity this year as part of NASA’s Micro-g Neutral Buoyancy Experiment Design Teams (Micro-g NExT) activity. Test sessions started in May and more will occur in June. Micro-g NExT challenges undergraduate research students to design, build and test a tool that addresses an authentic, current space exploration challenge. Students spent months designing and building their unique spacewalk tool prototypes, which will be put to the test in NASA Johnson Space Center’s Neutral Buoyancy Laboratory, a 6.2-million-gallon indoor pool used to simulate microgravity for NASA astronaut spacewalk training.

Dive deep into the Micro-g NExT program at – https://bit.ly/NASAMicroG

ORION APPRENTICE TEAM WINS SCHOLARSHIPS
The current Orion Apprentice team from Eastern Florida State College recently won the Composite Competition at the Aerospace Maintenance Competition (AMC) in Florida. Each year, selected students are brought onsite to NASA’s Kennedy Space Center in Florida and receive experience and mentorship with Orion team members. This year, the Orion Apprentice team participated in the AMC at the Orlando Orange County Convention Center in conjunction with MRO Americas, and received a paid scholarship to attend a prestigious composite advanced training program.
SEEING RED: EVENTS FOCUSED ON MARS EXPLORATION

A CELEBRATION ONLY A MARTIAN COULD LOVE

NASA representatives joined thousands of residents and visitors in Mars, Pennsylvania, to celebrate the Martian New Year on May 5-6. Every 687 days, Mars completes its orbit around the Sun, and an event is held to celebrate the new year for the distant planet. Those who attended learned more about the planet and NASA’s programs involving it, including the Journey to Mars. NASA scientists and engineers also explained to visitors why time keeping on Mars is so important, as it will influence the timing of future exploration mission astronauts will take to Mars.

STUDENTS EXPERIENCE THE MAKING OF A MARS MISSION

During a recent Space Center University program at Space Center Houston, Orion team member Paul Boehm talked to students about NASA’s Journey to Mars. During the five-day engineering design challenge, students from all over the world experienced a simulated mission to Mars as they tested heat shields with blow torches, made Mars habitats and built robotic rovers. Students also went on tours of various NASA Johnson Space Center areas as well as a scuba diving activity before graduating from the Space Center University program.
HOUSTON MCNAIR GROUP TOURS NASA JOHNSON SPACE CENTER

The McNair Group, the collection of companies owned and controlled by Robert C. McNair who is most notably the Founder, Chairman and Chief Executive Officer of the Houston Texans, toured NASA's Johnson Space Center this May. McNair has been a leading businessman, sportsman and philanthropist in the city of Houston for more than 55 years. The McNair Group leadership was given a tour showcasing NASA's current programs and achievements, including the Orion spacecraft mockup which was shared with the group by NASA Orion Assistant Manager for Program Integration Annette Hasbrook.
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SPACE LAUNCH SYSTEM HIGHLIGHTS

CORE STAGE ENGINE SECTION ARRIVES AT MARSHALL
TEST VERSION OF CORE STAGE ENGINE SECTION LOADED INTO TEST FIXTURE

After a 1,240-mile voyage from NASA’s rocket factory, Michoud Assembly Facility, near New Orleans, NASA’s barge brought a structural test version of the massive SLS rocket’s engine section (located at the bottom of the core stage) to Marshall Space Flight Center. The barge, pushed by one tugboat and pulled by another, left Michoud on April 28 and arrived at Marshall on May 15, after navigating floodwaters on the Mississippi River.

After arriving at Marshall’s dock on the Tennessee River, workers unshackled the more than 30-foot-tall and about 27-foot-wide test article from its restraints and moved it using a specially designed engine section transporter. From there, the article went to its home for the next several months, the foundation of a test fixture that will be built up around the test article. Structural testing on the article to ensure it can withstand the extreme forces of launch and ascent will begin later this year.

Read the full story: bit.ly/2rLFtCI

MEET THE CREW OF NASA’s BARGE PEGASUS

Ever wonder what it’s like to take a two-week journey up the Mississippi, fighting floodwaters and strong currents along the way, onto the Ohio River and then down the Tennessee River, carrying test hardware that replicates the rear portion of the world’s largest rocket stage?

“The lack of things to see along the lower Mississippi is pretty amazing,” said Marine Operations Manager Terry Fitzgerald, who leads the crew of four Coast Guard-licensed mariners that kept the barge carrying the engine section structural test article safely cruising from Michoud Assembly Facility to Marshall Space Flight Center. “When it was time to change the watch, we’d ask if there was anything to report. The standard response was, ‘Trees to the left. Trees to the right. And water in the middle.’ But the lack of scenery didn’t bother any of us because we’re working on a vessel that’s unique and amazing. And we’re part of making history.”

Watch the video:
ON SOLID GROUND: NASA, SLS AND THE PRESIDENT’S FISCAL YEAR 2018 BUDGET PROPOSAL

On May 23, NASA Acting Administrator Robert Lightfoot commented on the release of the administration’s detailed budget for the upcoming fiscal year. “As the President has said, ‘American footprints on distant worlds are not too big a dream.’ Lightfoot said. “NASA is executing programs, step by step, to make this dream a reality, as well as the broader quest to explore and understand the universe. We’ve had a horizon goal for some time now of reaching Mars, and this budget sustains that work.”

After viewing the core stage engine section test article and the facilities constructed for structural testing at Marshall, William Gerstenmaier, NASA’s Human Exploration and Operations Mission Directorate associate administrator, affirmed the progress the program has made, and some of the challenges. “Seeing this enormous test hardware and the towering test stands and facilities, really brings home the scale and complexity — and the tremendous engineering challenges — the SLS Program is tackling every day. This is amazing hardware and an amazing team building an amazing rocket.”

Read the story here: bit.ly/2s9H2wW
NASA REAFFIRMS PLAN FOR FIRST FLIGHT

In February, NASA began studying the feasibility of putting crew aboard the first integrated flight of SLS and Orion. After evaluating the data and assessing the implications, the agency will continue pursuing the original plan for the first launch: a rigorous flight test of the integrated systems without crew.

Read the full story: 

SIMULATING WINDS AT LAUNCH

NASA’s SLS, the world’s most powerful rocket, may experience ground wind gusts of up to 70 mph as it sits on the launch pad before and during lift off. Understanding how environmental factors affect the rocket will help NASA maintain a safe and reliable distance away from the launch tower during lift-off. NASA’s Langley Research Center’s Subsonic Wind Tunnel recently subjected a scale model of SLS Block 1B, the second configuration of the rocket, to these environmental conditions.

Read the full story: bit.ly/2rLiZ6V
NASA engineers successfully conducted the second in a series of RS-25 flight controller tests on May 23. The development engine rumbled to life for 500 seconds — more than eight full minutes — on the A-1 Test Stand at NASA's Stennis Space Center in Mississippi, marking another milestone toward qualifying a new engine controller. The engine controller is often cited as the “brain of the RS-25,” allowing communication between the engine and the rocket.

Read the full story here: bit.ly/2rWKUSr

Read more about the new engine controller here: bit.ly/2nAO2Qr
NASA CONTINUES TESTING, MANUFACTURING SLS CORE STAGE

Making a world-class evolvable rocket for the first time is challenging. The 212-foot-tall core stage uses four RS-25 engines to power SLS, and is the largest rocket stage NASA has ever manufactured. And, the core stage design will be the “backbone” of all configurations of SLS. The agency and core stage contractor, Boeing, are using innovative tools and new techniques and processes not only to build SLS, but also to transport it inside and outside the factory at NASA’s Michoud Assembly Facility in New Orleans.

Read more at: bit.ly/2qTALpm

SPACEFLIGHT PARTNERS:
Keystone Engineering

NUMBER OF EMPLOYEES: 300

WHAT THEY DO FOR SLS:
Keystone Engineering is a small business that works with Boeing to supply hydrazine tanks for the Exploration Upper Stage, the in-space portion of the rocket to be used on Block 1B, the second configuration of SLS, slated for the second integrated mission of SLS and Orion.

COMING UP:
Centennial Challenges secondary payloads
Orion Stage Adapter ships to Johnson Space Center
New astronaut class

FOLLOW THE PROGRESS OF NASA’S NEW LAUNCH VEHICLE FOR DEEP SPACE:

Twitter ............... Twitter.com/NASA_SLS

Facebook ............ Facebook.com/NASASLS

Check out the GSPO 2016 Year in Review publication at http://go.nasa.gov/2I752Pe
Vehicle Support Posts
Installed on Mobile Launcher
GSDO MONTHLY HIGHLIGHTS

Vehicle support posts installed on ML

50th Anniversary of Launch Complex 39B

Faces of GSDo Vicki Cox

Mobile Launcher ongoing installations
Vehicle Support Posts Installed on Mobile Launcher

The final four vehicle support posts were installed on the deck of the mobile launcher May 22, 2017. A total of eight support posts were installed to support the load of the Space Launch System’s (SLS) solid rocket boosters, with four posts for each of the boosters. The support posts are about five feet tall and each weigh about 10,000 pounds. The posts will structurally support the SLS rocket through T-0 and liftoff. The Ground Systems Development and Operations Program is overseeing installation of the support posts to prepare for the launch of the Orion spacecraft atop the SLS rocket. Photo credit: NASA/Leif Heimbold
Launch pads built on a swamp. A humble beginning for the two pads, A and B, at Launch Complex 39 at NASA's Kennedy Space Center. They were originally constructed in the 1960s to serve as a starting point for Apollo and our journey to the moon. Now, Launch Complex 39B will serve as the launch site for the agency's Space Launch System rocket and Orion spacecraft on deep-space missions, including the Journey to Mars.

Time flies, and NASA is celebrating the 50th anniversary of pad B, the launch site for one Apollo/Saturn V launch, three Skylab missions using the Saturn 1B rocket, one Apollo-Soyuz Test Project mission that also used a Saturn 1B, and 53 space shuttle launches.

Construction of the pad began in December 1964 and was completed in April 1967. Drawings of the original pad B were completed by Giffels and Rosetti Inc. of Detroit in October 1964. Construction of the complex was completed by George A. Fuller Co. in Los Angeles. Design and construction supervisors were the Canaveral District of the U.S. Army Corps of Engineers.

To fill in and build up the area, hundreds of tons of sand was dredged from the Atlantic Ocean and pumped along a road to pad B. The behemoth structure of the pad required 68,000 cubic yards of concrete and 5,100 tons of reinforced steel.

The complex consisted of the launch pad, fuel and oxidizer facilities, environmental control system room, pad terminal countdown room, camera stations, electrical equipment buildings, a water chiller facility, an emergency egress facility, and operations offices. The only major difference between pads A and B is that pad B sits seven feet higher (55 feet) above mean sea level.

The first launch from pad B was Apollo 10 on May 18, 1969. It also was the first real use of the pad's water deluge system, used to cool the flame deflector in the flame trench after rocket ignition.

Read the complete story at https://go.nasa.gov/2s55nn3.
Vicki Cox is a senior management and program analyst. She works in the Program Planning and Control Division of the Ground Systems Development and Operations Program (GSDO) at NASA's Kennedy Space Center in Florida.

Cox supports GSDO by ensuring the Kennedy LX Support Services contract requirements support the GSDO mission goals and include ground systems development and operational planning for launch vehicles, spacecraft and payloads. Her role directly strengthens the GSDO Program community through enhancing capabilities for workforce, processes and tools.

“I absolutely love that I interface directly with all levels of GSDO management and have direct influence on the way mission requirements are met by our support contractors,” Cox said. “I am incredibly excited and extremely privileged to actually be a part of this amazing team that is making history with the upcoming Exploration Mission-1 and subsequent launches that will prepare us for deep space exploration.”

Cox came to Kennedy in 2000 as a graduate co-op student and worked in the Staff Office of the Joint Program Management Office on Cape Canaveral Air Force Station. She also worked on the Institutional Support Contract Source Evaluation Board and in multiple positions in the Center Operations Directorate, and transitioned to GSDO in 2015.

“I was truly honored to receive Employee of the Month after only working in the GSDO Program for seven months,” Cox said. Earlier this year, she received a Certificate of Appreciation for her contributions to GSDO. Her most recent achievement was being asked to serve as a voting member on the Kennedy LX Support Contract-III (KLXS-III) Source Evaluation Board.

She never imagined that working for NASA was even a possibility for her because she thought everyone who worked for NASA was an astronaut, astronomer, scientist or engineer. “Did I mention that calculus was very challenging for me?”

Cox grew up in Alexandria, Louisiana, and considers it to be her hometown. She moved to Brevard County in 1998, after visiting her best friend who was stationed at nearby Patrick Air Force Base. While on vacation, she was able to witness her very first shuttle launch.

“That was my first true taste of the Space Coast and NASA, and I immediately fell in love with all of it. I was so moved and inspired by the astonishing launch that I decided I wanted to be part of the amazing team that was sending astronauts to space,” Cox said.

She earned a Bachelor of Science in psychology from Louisiana State University in 1994 (Geaux Tigers!), and a Master of Arts in management and leadership from Webster University in 2001.

The advice she would give students interested in a career similar to hers is that there are more than scientific and engineering professions at NASA.

“NASA needs all kinds of people to fill all kinds of positions. Spend time researching what requirements are necessary to obtain an internship with NASA and start working on your ‘to-do’ list,” Cox said.

Cox and her husband Dave have been married for 12 years. They have a three-year-old son, Landon. They adopted an Italian greyhound named Kelsey.

Her first car was a maroon 1990 Mazda 626LX, four-door sedan. Some of her hobbies include cooking, going to theme parks or on cruises, and spending time with her immediate and extended family.
A view of the mobile launcher (ML) taken from a deck, referred to as the "eyebrow," on the north side of the nearby Vehicle Assembly Building at NASA’s Kennedy Space Center in Florida on May 30, 2017. The ML tower will be equipped with a number of lines, called umbilicals, that will connect to the Space Launch System rocket and Orion spacecraft for Exploration Mission-1 (EM-1). The Orion Service Module Umbilical was installed on the tower of the ML, and soon the Core Stage Forward Skirt Umbilical will be installed. The Ground Systems Development and Operations Program is overseeing installation of the umbilicals. Photo credit: NASA/Kim Shiflett