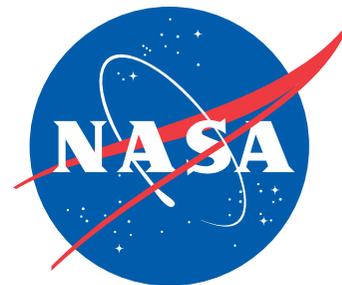


Spaceport News

John F. Kennedy Space Center - America's gateway to the universe



NASA, industry committed to human spaceflight

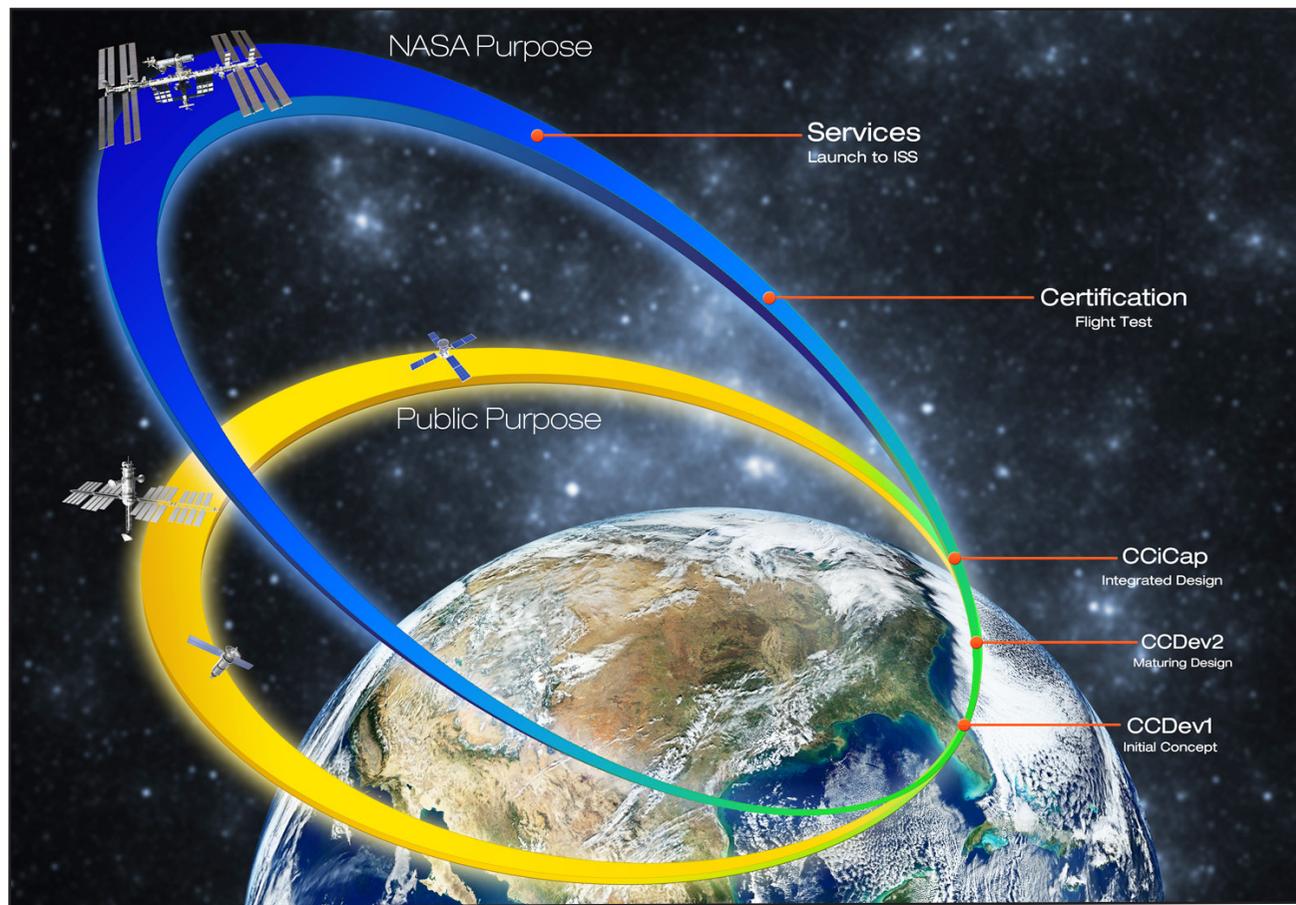
By Rebecca Regan
Spaceport News

NASA's Commercial Crew Program (CCP) and its industry partners have spent the last few years investing their time, money, efforts and reputations into shaping America's next-generation human spaceflight capabilities.

"This program really brings new meaning to 'skin in the game,'" said Phil McAlister, NASA Commercial Spaceflight Development director, during a televised status update Jan. 9 at Kennedy Space Center.

NASA and company representatives participated in the update to discuss their accomplishments to date and lay out their plans for 2013 and beyond as they work toward ensuring America has safe, reliable and affordable crew transportation systems launching from U.S. soil by mid-decade.

"The agreements are paid-for-performance milestones, so our partners only get paid when they show demonstrative progress toward developing their crew transportation systems," McAlister said. "This allows



NASA's Commercial Crew Program has two purposes: The first is to develop a national capability to launch humans from U.S. soil atop American rockets and spacecraft. The second is to certify one or more of those systems to safely transport NASA astronauts to and from the International Space Station by the middle of the decade. NASA is working with industry partners to advance human spaceflight technologies, subsystems and systems. Through certification phases, NASA will ensure companies can meet agency safety and performance requirements prior to a services phase. NASA image

us to ensure that our partners are making good progress and are making good use of taxpayer money."

Agreements made with The Boeing Company, Sierra Nevada Corp. (SNC) Space Systems and Space Explora-

tion Technologies (SpaceX) during NASA's Commercial Crew Integrated Capability (CCiCap) initiative are set to bring about some exciting milestones this year.

Boeing is on track to pick up the keys this summer to

Kennedy's former Orbiter Processing Facility-3, now called the Commercial Crew and Cargo Processing Facility (C3PF), to begin manufacturing its CST-100 spacecraft. C3PF has been undergoing modifications by

Space Florida to support the clean-floor processing needs of the spacecraft. Incorporating astronaut feedback into the cockpit design and demonstrating flight soft-

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Kennedy's future bright with full plate for 2013

During the past year, Kennedy Space Center made great strides in transitioning from a historically government-only launch facility to an affordable, sustainable, multiuser spaceport for both government and commercial customers. NASA has never been an agency to rest on its laurels, even with 50 years of achievements. We have a great future ahead, including a full plate for 2013.

Coming up later this month is the launch of a TDRS satellite scheduled to lift off from Cape Canaveral Air Force Station. In February, the Landsat Data Continuity Mission will be the first of two launches from Vandenberg Air Force Base this year. The second launch from the West Coast, slated for this Spring, will be the Interface Region Imaging Spectrograph (IRIS).

We also are moving ahead with plans for NASA's Commercial Crew Program. On Jan. 22 the certification

products contracts will begin to ensure integrated crew transportation systems will meet safety requirements to launch astronauts to the International Space Station.

Kennedy will continue to support ongoing operations aboard the space station. That will include two Commercial Resupply Services flights launched by SpaceX Falcon 9 rocket in March and again in October.

In August, Orion will undergo a series of recovery procedures trials at Naval Station Norfolk, Va. in preparation for its first test flight in 2014. Orion is designed to meet the needs of our nation's space program, taking crews on missions to deep space, including to asteroids and Mars.

Speaking of Mars, the next step in our continuing robotic exploration of the Red Planet will be the Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft to launch on a United Launch Alliance Atlas V



Kennedy Space Center Director Bob Cabana poses with the Orion mockup in the transfer aisle of the Vehicle Assembly Building.

rocket in mid-November.

I want to thank all of you for your hard work and dedication. I'm confident the Kennedy team will

continue to meet any challenges we face in 2013.

Keep charging.
Bob

From CCP, Page 1

ware, ground operations and landing/recovery plans are on tap for 2013.

"Everything is focused on making sure we properly and aggressively mature the design so that we can have a very robust critical design review at the end of this phase," said John Mulholland, Boeing's Commercial Programs Space Exploration vice president and program manager. "It will give us confidence that we can move in with very low risk into the qualification and flight demonstration phase."

Boeing's subcontractor, United Launch Alliance, will focus on verifying that its dual-engine Centaur can perform as planned on the Atlas V rocket and testing the launch vehicle adaptor between the spacecraft and the rocket.

Pratt and Whitney Rocketdyne also will complete additional propulsion testing on the CST-100's launch abort engines.

SNC is gearing up for its

first free-flight test of the Dream Chaser spacecraft at NASA's Dryden Flight Research Center in California early this year. During the test, the vehicle will be dropped for a full autonomous flight to demonstrate the aerodynamics and controllability during the approach-and-landing phase that culminates in a hard surface runway landing and runway rollout.

"The facility there has been the home of so many tests, including the shuttle tests, and we're going to be picking that mantle up and starting our first flight tests here in the first quarter of this year," said Mark Sirangelo, Sierra Nevada Corp. vice president and SNC Space Systems chairman.

The company currently is testing its Environmental Control and Life Support System (ECLSS) and reaction control system, performing landing gear tests and flight simulations. Testing of the company's hybrid rocket motors is ongoing at its facility in California.

SpaceX also has ambitions to fly its Falcon 9 rocket and Dragon capsule during CCiCap. A pad abort test scheduled for late 2013 will prepare the company for an in-flight abort test in 2014.

"We'll end this year with a flight-like, full-scale pad abort test for certification as well as risk mitigation," said Garrett Reisman, SpaceX Commercial Crew project manager. "We're going to take a Dragon, as flight-like as possible, take it from our pad over at Cape Canaveral Air Force Station and demonstrate our ability to get away from the Falcon 9 on the pad from zero altitude and zero airspeed if we were ever having a bad day on the pad."

Reisman said they'll spend CCiCap stressing and bending their primary Dragon structure to prove it's ready to be manufactured. They'll culminate their agreement with an in-flight abort test during which Dragon will launch from Cape Canaveral Air Force Station and then

light up its SuperDracos to prove the abort system could safely whisk the spacecraft and its crew members away from a failing rocket and safely splash down in the Atlantic Ocean.

"Having strapped into a rocket before, I can tell you that I have personal and emotional reasons of why I want to build a vehicle that is safer than anything that's ever flown before by an order of magnitude," said Reisman, who is a two-time space shuttle astronaut and International Space Station flight crew engineer.

The same three CCiCap partners were awarded contracts that kick off Jan. 22. Called the Certification Products Contracts (CPC), the initiative will allow certification plans to take shape for agency missions to the International Space Station.

During the conference, Blue Origin also announced its plans to continue its Commercial Crew Development Round 2 (CCDev2) partnership with NASA in an unfunded capacity.

The company previously received \$22 million to advance its subsystem technologies, a new Liquid Hydrogen and Liquid Oxygen engine and pusher escape system. A continuation of a CCDev2 partnership would allow the company to receive expert feedback from NASA on the progress of its engine development, biconic-shaped spacecraft and integration plans for future flights.

As the companies set out to prove their systems can be called upon for crewed missions to low-Earth orbit, the program is setting its sights on a second phase of certification contracts for station missions, which could be announced in mid-2014.

"I think the partnership between NASA and each of these companies clearly shows that we have a very vibrant space industry in the United States," said Ed Mango, CCP manager. "The four companies here today are capable and are the leading edge of what it takes to get folks back into low-Earth orbit over time."

Test and Operations Support Contract awarded to Jacobs

By Linda Herridge
Spaceport News

With the recent award of a new processing and launch operations contract, Kennedy Space Center is positioned for the next era of space exploration.

In late December, NASA awarded the Test and Operations Support Contract (TOSC) to Jacobs Technology Inc. of Tullahoma, Tenn. The contractor will provide overall management and implementation of ground systems capabilities, flight hardware processing and launch operations at Kennedy.

"With the award of this contract, Kennedy Space Center is positioned to be a 21st-century launch facility

that will support multiple users," Center Director Bob Cabana said. "It is an exciting time, as we watch the infrastructure for the next era of space exploration take shape."

These tasks will support the International Space Station, Ground Systems Development and Operations, Space Launch System, Orion Multi-purpose Crew Vehicle and Launch Services programs.

Jacobs will provide services to commercial entities, NASA, including support to the agency's programs, and other government agencies. Services include launch vehicle, spacecraft and payload integration and processing; operations and development of associated processes and ground systems to support integration, processing

and launch; servicing and testing of flight hardware; and launch of development and operational flights at Kennedy.

Ground Processing Director Scott Kerr said a core team of 12 senior managers, including Jacobs V.P. and general manager, TOSC program manager, and former astronaut Andy Allen, began working at Kennedy on Jan. 2.

"We are excited to be here at Kennedy," Allen said. "We are in the phase-in period and will be ready to hit the ground running with a strong leadership team and workforce."

"They are off to a great start in making sure there will be a seamless transition from the predecessor contracts and that everything will be

ready to start full contract performance on March 1," Kerr said.

Subcontractors working with Jacobs on the contract include Engineering Research and Consulting Inc., of Huntsville, Ala., and Aerodyne Industries LLC, of Oldsmar, Fla.

"The Source Evaluation Board did an outstanding job working this procurement as we transitioned from Exploration Ground Launch Services to the TOSC," Cabana said.

The contract begins March 1, after a two-month phase-in period that began Jan. 2.

The contract has a one-year, seven-month base period and options to extend the work through Sept. 30, 2022.

Labs help Orion move toward milestones through cooperation

By Cheryl Mansfield
Spaceport News

Using its experienced workforce and state-of-the-art facilities, Kennedy Space Center is working with private companies to ensure the future of U.S. space exploration stays on course. By bringing contracted work to Kennedy, NASA is providing a means to expedite Orion work from months to build and ship across the nation, to mere days.

NASA employees and Lockheed Martin contractors are working side by side in a revamped area of the Operations and Checkout Building. Their goal is to prepare NASA's Orion spacecraft for its first launch, Exploration Flight Test-1, (EFT-1) in 2014. Orion is designed to take American astronauts farther into space than ever before.

Colocating contractors on-site provides the advantage of having center personnel and facilities readily available. Because of this cooperative effort, the Orion team is achieving its scheduled milestones for assembly and checkout of the spacecraft ahead of schedule.

"This new and unique working relationship, in essence having a Lockheed Martin factory within a NASA facility, has allowed us to leverage Lockheed's strength



NASA/Jim Grossmann

Jim Niehoff, a mechanical engineering technician with the NASA Prototype Development Laboratory, is one of many Kennedy Space Center employees working alongside Lockheed Martin to ensure the future of U.S. space exploration.

in building spacecraft and the strength of our Kennedy workforce in providing world-class services and facilities," said Scott Wilson, manager of production operations for the Orion Program, and the offline processing and infrastructure development for the Ground Systems Development and Operations Program.

In preparation for EFT-1, a number of processing milestones have been set to make sure the spacecraft is ready for launch. Engineers and technicians from a number of different areas at Kennedy are lending their help by providing solutions to issues that arise during the on-site assembly and preparation.

Upcoming milestones will include testing the structure of the crew module, powering up the vehicle for the first time, completing the assembly and subsystem installations for the crew module, service module and launch abort system, and finally, joining the crew and service modules together.

"We are extremely proud of the exceptional effort the team has demonstrated in preparing the Orion crew module for a recent critical pressurization test. This test was a key milestone in our march toward orbital flight in 2014," Wilson said.

The materials and processing division possesses numerous capabilities that provide unique solutions

to unusual or urgent problems that arise during spacecraft preparation. One example comes from the Space Shuttle Program.

"One of the unique capabilities here at Kennedy is the ability to fabricate, install and repair thermal tiles," said Terri Holbert, project lead engineer for Assembly, Integration and Production. "The team that performed this work for the space shuttle is now executing the tile build for Orion."

Other areas that have contributed to Orion's preparation are labs that offered dimensional analysis of hardware, materials testing and evaluation, and chemical analysis; a prototype shop that provided mechanical design, fabrication and rapid prototyping; and the Launch Equipment Test Facility that executed a pyrotechnics test on the tiles.

In the end, the ultimate goal is Orion's uncrewed flight test aboard a Delta IV Heavy rocket. The flight will take the spacecraft on a two-orbit journey, reaching an altitude of about 3,600 miles above the Earth's surface -- more than 15 times farther than the International Space Station's orbital position -- and sending it farther than any human-rated spacecraft has gone since the Apollo program.

Scenes Around Kennedy Space Center



NASA/Ben Smegelsky

Workers continue construction of the Antenna Test Bed Array for the Ka-Band Objects Observation and Monitoring (Ka-BOOM) system at Kennedy Space Center on Jan. 2. Check out the complete story in the next issue of Spaceport News.



NASA/Jim Grossmann

Author Stephanie Sisler reads one of her books, "Matthews Monsters, a Creative Comprehensive Exercise" to children at Kennedy Space Center's Child Development Center on Jan. 8.



NASA/Ben Smegelsky

CLICK ON PHOTO

Preparations made for TDRS-K launch

Above: In the morning fog at Cape Canaveral Air Force Station's Space Launch Complex 41, workers prepare to erect the first stage of the United Launch Alliance Atlas V rocket inside the Vertical Integration Facility Jan. 3 that will carry the Tracking and Data Relay Satellite-K (TDRS-K) into orbit. Launch of the TDRS-K on the Atlas V rocket is planned for Jan. 29. The TDRS-K spacecraft is part of the next-generation series in the Tracking and Data Relay Satellite System, a constellation of space-based communication satellites providing tracking, telemetry, command and high-bandwidth data return services. For more information, click on the photo above.



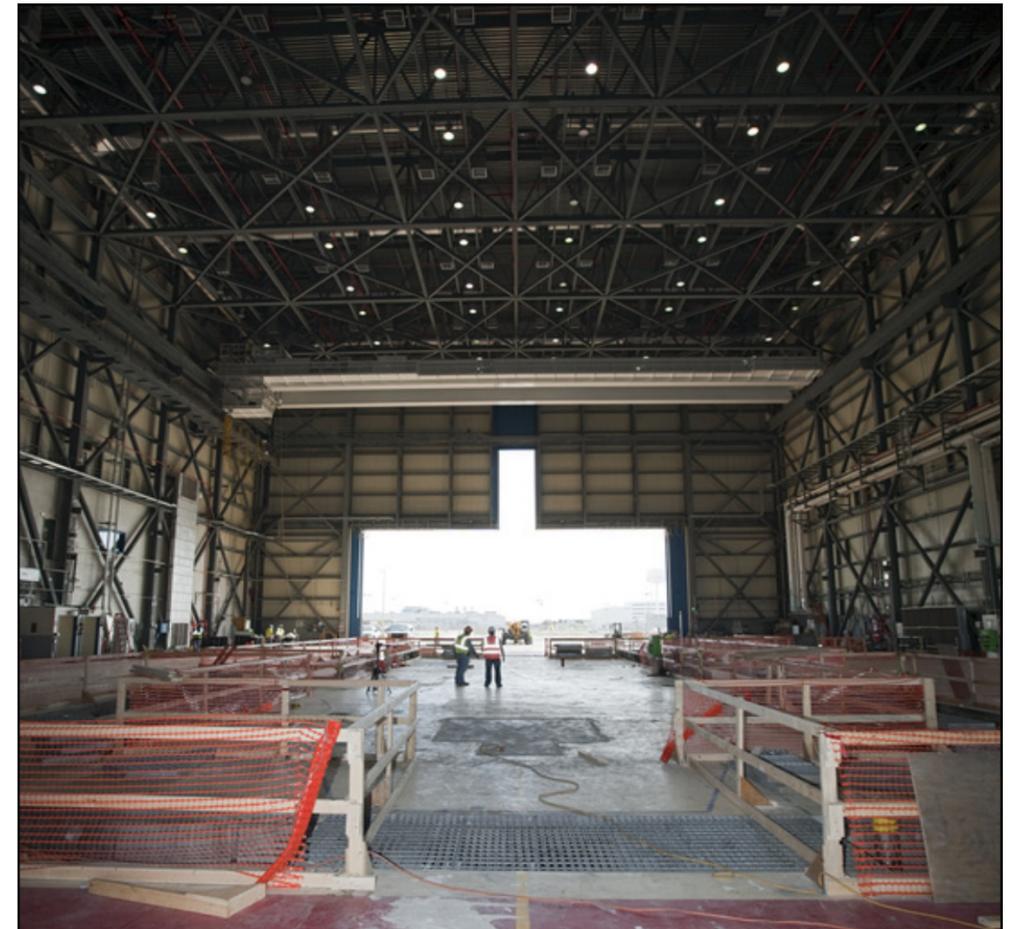
NASA/Charisse Nahser

Below: The Centaur upper stage is lifted onto the first stage booster of the Atlas V on Jan. 5. The rocket will loft the satellite into an orbit 22,300 miles above Earth. Following the task, workers will test the United Launch Alliance rocket's various systems.



NASA/Jim Grossmann

Three ducks splash in the water near Blackpoint Wildlife Drive in the Merritt Island National Wildlife Refuge, northwest of Kennedy Space Center on Dec. 19, 2012. Kennedy coexists with the Merritt Island National Wildlife Refuge, which encompasses 92,000 acres that are a habitat for more than 331 species of birds, 31 mammals, 117 fishes, and 65 amphibians and reptiles.



NASA/Ben Smegelsky

CLICK ON PHOTO

The Commercial Crew and Cargo Processing Facility, formerly known as Orbiter Processing Facility-3, at Kennedy Space Center is going through major renovations to support the manufacturing of The Boeing Company's CST-100 spacecraft. The facility's orbiter-specific platforms were removed recently to make room for a clean-floor, factory-like facility as shown in this photo taken Dec. 20, 2012.

New procedures developed for Orion recovery operations

By Bob Granath
Spaceport News

At first glance, recovery operations of NASA's Orion spacecraft look much like the efforts used to recover its Apollo predecessor.

However, many design and technological upgrades have been added to the new spacecraft by teams at Kennedy and Johnson space centers. NASA is partnering with the U.S. Navy to develop procedures to recover the Orion capsule and crew after splashdown.

All of Orion's parts that have been created around the country come together in Kennedy's Operations and Checkout Building.

This complete on-site operation enables the team to efficiently build the spacecraft, move it directly onto the launch vehicle and to the launch pad. Conducting these operations in one location saves the government transportation costs associated with tests and checkout prior to launch.

The Orion spacecraft is designed to meet the evolving needs of our nation's space program for decades to come. It will take crews of up to four astronauts on missions to deep space, including to asteroids and, eventually, to Mars. Orion has already passed rigorous human-rating reviews and has met critical milestones for safe, successful human spaceflight.

The first key Orion recovery test, scheduled for August 2013, will take place at the Naval Station in Norfolk, Va. The second major test is planned for January 2014 at Naval Base San Diego. The tests are part of preparations for the first flight of Orion, Exploration Flight Test-1 (EFT-1), in late 2014.

"The overall testing



NASA image

In this artist's concept, U.S. Navy boat teams have attached a winch line from inside the well deck of the landing platform-dock (LPD) ship to start pulling in the Orion crew module. Lines from small boats also will be attached to bring the capsule inside the stern of the LPD.

strategy uses a building block approach that we call a 'crawl-walk-run' strategy," said Jim Hamblin, landing and recovery operations manager for NASA's Ground Systems Development and Operations Program.

Validations of Orion's recovery systems already have been taking place in small steps, Hamblin noted.

"In December of 2011, we placed an Orion mockup in the Trident Turn Basin at Port Canaveral," he said. "That allowed us to check out basic procedures such as attaching the stabilization collar."

During tests in Yuma, Ariz., in 2012, a boilerplate crew module was dropped from an aircraft, successfully verifying the parachute system. At Johnson's Neutral Buoyancy Laboratory, U.S. Navy dive teams received training in the newly developed recovery procedures.

"During the simulations next August, we'll be conducting a two-day stationary recovery test to evaluate hardware and recovery processes in a controlled, benign environment," Hamblin said. "That's what we're calling the 'crawl phase.' In this test we'll utilize the

Navy's USS Mesa Verde, a landing platform-dock, or LPD, ship."

The LPD is an amphibious ship that has both a flight deck and a well deck. The well deck is in the lower portion of the ship and has a large door on the stern of the ship that can be opened to support the coming and going of landing craft or other amphibious vehicles. Use of a Navy LPD, instead of an aircraft carrier, is one of the most obvious differences in the recovery of Orion compared to the retrieval of the Mercury, Gemini and Apollo spacecraft.

"This is a new approach and is preferred due to the LPD's low cost, highly capable tracking radar and ability to launch helicopters from its flight deck," Hamblin said.

The Norfolk test involves working with an LPD while docked at the port to perfect the process of bringing in the Orion capsule with the crew aboard. The test will start at the point in the recovery operation in which the recovery divers, using small, raft-like boats are ready to approach the capsule.

Small boat teams, staffed by U. S. Navy divers, will

conduct a hazard assessment of the crew module to verify it is safe to approach without personal protection equipment.

"The Navy dive teams are crucial to the recovery operation," Hamblin said. "After the crew module is stabilized, boat teams will attach a winch line from inside the well deck of the ship and start pulling it in. Lines from small boats will also be attached to the spacecraft to bring it to the stern of the Navy ship."

When the crew module is inside the stern gate, the winching operation is temporarily halted. The small boat teams connect tending lines to Orion, and ship line handlers guide the

spacecraft over the recovery cradle on the well deck.

"Before approaching the recovery cradle, the ship's stern gate is raised 45 degrees to calm the waters inside the well deck," said Hamblin. "The crew module is then positioned over the cradle, and the well deck is drained to seat the spacecraft into the cradle."

The second major test, scheduled for January 2014, is a four-day underway recovery test.

"This will be the 'walk, then run phase' conducted on the LPD USS San Diego at sea on the west coast near San Diego," said Hamblin. "Its purpose is to evaluate hardware and recovery processes in progressively more challenging environments to determine capability limits."

Once EFT-1 is complete with splashdown off the California coast, the Navy ship will be brought to the pier in Long Beach, Calif., and the crew module towed from the well deck to a barge. After arrival, NASA will turn the crew module over to Lockheed Martin, the Orion prime contractor, for required post-flight operations.

"The testing in Norfolk and off the coast of San Diego will ensure we're ready for EFT-1," Hamblin said.



NASA file/2009

Members of the U.S. Air Force 920th Rescue Wing secure a flotation collar around the mockup Orion crew module in the Trident Basin at Port Canaveral during testing in 2009. The post-landing Orion recovery test helped determine what kind of motion astronauts will experience after landing, as well as what recovery teams should expect.

Space trash: radiation shields of the future?

By Steven Sicheloff
Spaceport News

Researchers at Kennedy Space Center are evaluating small tiles made of space trash to find out whether they can be stored aboard spacecraft safely or even used for radiation shielding during a deep-space mission.

The circular tiles were produced at Ames Research Center, where engineers developed and built a compactor that melts trash, but does not incinerate it. After compaction, a day's worth of garbage becomes an 8-inch-diameter tile about half an inch thick. Plastic water bottles, clothing scraps, duct tape and foil drink pouches are left patched together in a single tile along with an amalgam of other materials left from a day of living in space.

"One of the ways these discs could be reused is as a radiation shield because there's a lot of plastic packaging in the trash," said Mary Hummerick, a Qinetiq North America microbiologist working on the project. The idea is to make these tiles, and, if the plastic components are high enough, they could actually shield radiation.

Possible areas for increased radiation shielding include astronauts' sleeping quarters or perhaps a small area in the spacecraft that would be built up to serve as a storm shelter to protect crews from solar-flare effects.

Hummerick and the team working in the Space Life Sciences Lab are trying to identify if the tiles -- which are made according to recipes based on trash from shuttle missions -- are free of micro-organisms or at least safe enough for astronauts to come into contact with daily.

The compactor heats the trash for 3.5 hours to between 300 and 350 degrees F, which should be hot enough to kill any micro-organisms. The mechanism also squeezes a pound of material into the compressed tile, a reduction of at least 10 times the original size.

"Hopefully, we achieve sterilization within the tile," Hummerick said. "We're starting a series of tests with a certain process temperature and time. We just sent Ames six bundles of our special trash recipe. They'll compact it and send them



NASA/Steven Sicheloff

Researchers Richard Strayer and Marty Hummerick show an 8-inch-diameter tile compacted from a day's worth of garbage inside the Space Life Sciences Laboratory at Kennedy Space Center on Dec. 20, 2012.

back to us for analysis. If the time and temperature tests seem to be achieving what we want, we'll go to long-range storage testing."

The tiles are stored in an atmosphere identical to that of the International Space Station for the tests. The microbiologists take small samples from the tile and look for signs of microbial growth. They are also interested to see if the tiles will support the growth of fungi and other micro-organisms if left alone exposed to an environment like the one they would face inside a spacecraft.

"They are achieving sterilization for the most part," Hummerick said,

explaining that test strips containing bacterial spores are embedded in the tiles to see if the heating and compaction process is effective in killing bacteria. "What we don't know is, can a few possible surviving bacteria go inert and then grow back."

Handling trash is an important consideration for NASA mission planners and astronauts for several reasons. First, no one wants a cramped spacecraft to become overrun with garbage. Second, resources will be extremely limited for a crew expected to live in space for up to two years, the time it would take for a Mars mission.

Crews cannot simply jettison trash

as they go through space because it could land on -- and possibly contaminate -- a planet or moon. NASA policy dictates avoiding the contamination of other worlds.

"We don't want to contaminate the surface of an asteroid or something just by throwing the trash out the door," said Richard Strayer, a Kennedy-based microbiologist with Enterprise Advisory Services Inc. "If NASA doesn't do something about it, then the spacecraft will become like a landfill, with the astronauts adding trash to it every day."

Astronauts can pack their garbage from the International Space Station into Russian Progress supply ships, which burn up in Earth's atmosphere.

Another primary goal of the process is to remove water from the trash so it can be reused by the crew. Water is one of the densest life support materials upon which astronauts depend. Because water is so dense, it is very heavy to take into space, so efficiently processing it for reuse is seen as essential to a successful mission beyond low-Earth orbit.

"The mindset is, with limited resources, whatever you can use, you want to be able to repurpose," Hummerick said. "Water is a very valuable commodity, so you want to recover all of that you can."



NASA/Steven Sicheloff

A disc produced by heating and compressing a sample of trash simulants is shown Dec. 20, 2012. The discs could be used in space to create radiation shields or for other tasks.

NASA overcomes landing obstacles with new technology

Courtesy of
Langley Research Center

Autonomous is nearly a household word. We hear about autonomous cars, military drones and robots.

But what about spacecraft?

NASA is working on that -- technology to autonomously land a spacecraft on the moon, Mars or even an asteroid, called the Autonomous Landing Hazard Avoidance Technology (ALHAT).

ALHAT gives a landing craft the ability to detect and avoid obstacles such as craters, rocks and slopes and land safely and precisely on a surface. The project is led by Johnson Space Center and supported by the Jet Propulsion Laboratory (JPL) and Langley Research Center.

To ensure its design capabilities, the ALHAT instrumentation was installed on a NASA Huey helicopter followed by 12 successful flight tests -- starting at Langley and finishing at Kennedy Space Center. Helicopter tests allow researchers to test the functionality of ALHAT as an integrated system in a flight environment.

In other words, ALHAT will provide the pilots with on board automated guidance, navigation and control software, which gives them the ability to land precisely and safely.

"The integrated system on the helicopter worked just as we had hoped," systems engineer Kevin Kempton said. "The data sets that have been generated are by far the most realistic data we have ever gotten from the ALHAT system."

The next ALHAT flight tests will be on a vertical test bed called Morpheus that will demonstrate



CLICK ON PHOTO

NASA/Dimitri Gerondidakis

The Autonomous Landing Hazard Avoidance Technology (ALHAT) team installs and test its instrumentation on a UH-1H 'Huey' helicopter at Kennedy Space Center on Dec. 5.

autonomous landing on an imitated lunar surface.

"We flew down to Kennedy to perform similar tests

that will be done on Morpheus for risk reduction,"

ALHAT deputy project manager Edward Robertson

"The folks engaged in the science mission directorate and Mars missions are very interested in a number of these products . . . and are actually planning to incorporate those in future missions that they're looking at right now."

NASA's Autonomous Landing Hazard Avoidance Technology Deputy Project Manager, Edward Robertson

said. "This allows us the ability to verify functionality of our flash lidar system for mapping out terrain in 3-D and detecting hazards and identifying safe sites."

"We would never have gotten there without all the exceptional help received over the last several weeks," Kempton said.

The help Kempton is talking about is from the six NASA centers that joined together to make this happen: Ames Research Center, Wallops Flight Facility, Johnson, JPL, Langley and Kennedy.

Each played an integral role. JPL, Johnson, and Langley provided the

instruments for the test.

Ames, Wallops, and Kennedy provided the pilots. Langley was responsible for the integration and airworthiness of the instruments on the aircraft. Wallops flew the helicopter to Kennedy where a test debris field was created at the Shuttle Landing Facility. Kennedy provided oversight of flight operations and the test debris field.

And because of their efforts, many NASA missions benefit.

"The folks engaged in the science mission directorate and Mars missions are very interested in a number of these products . . . and are actually planning to incorporate those in future missions that they're looking at right now," Robertson said.

ALHAT is not only bringing new technologies to NASA.

"We've been contacted by U.S. military and automobile manufacturers," Robertson said. He explained that there is long-term applicability that can be applied to helicopters.

When helicopters land, the dust kicked up can obscure the pilot's view of the landing site, putting lives of our servicemen at risk.

ALHAT may allow pilots to make quick decisions in avoiding hazardous landing sites and in so doing so, save lives.



NASA/Kim Shifflett

Workers constructed the test debris field in the summer of 2012 near the Shuttle Landing Facility at Kennedy Space Center.

E-motorcycle conversion saves worker gas money

By Frank Ochoa-Gonzales
Spaceport News

Ever wish you could get to work for only a few pennies?

For Otis Deal, who works in the Prototype Lab (M7-581) at Kennedy Space Center, it's only that much.

Deal, an engineering technician, grew tired of the cost of gasoline and converted a gas-burning internal combustion engine 1993 Kawasaki Vulcan 500 into a fully electric motorcycle, which he named Shocker.

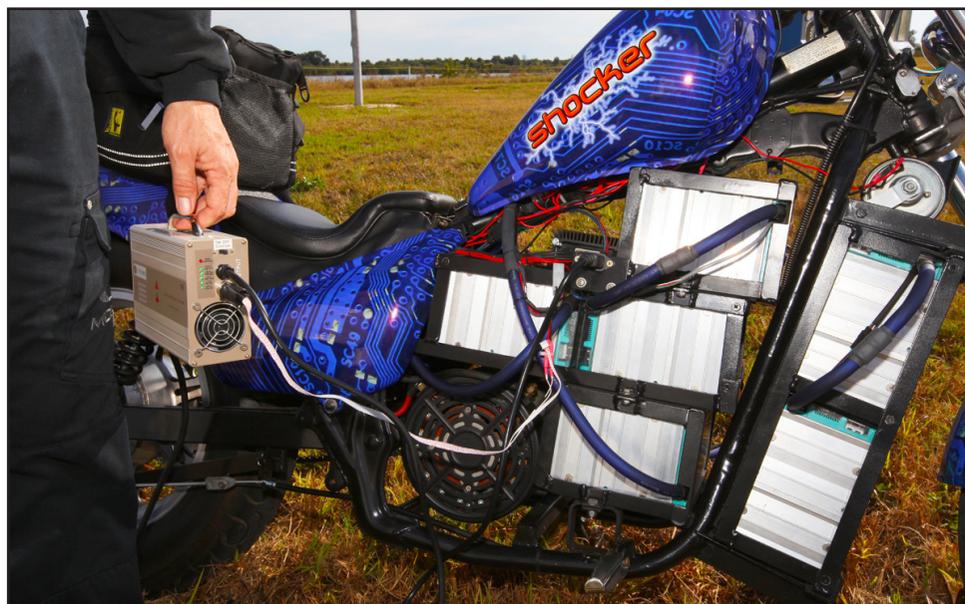
"I have always been into motorcycles and thought an electric motorcycle would be a great platform to try this on," Deal said. "I also did it because I thought it'd be a cool thing to do."

Deal took out the engine and replaced it with 24 battery cells, creating a 72-volt system. The only major change Deal made was replacing the forks, which was necessary to fit and support the batteries.

"Otis Deal did a great job on building his e-motorcycle," NASA Transportation Officer Bruce Chesson said. "I applaud him for his spirit in wanting to reduce petroleum and save money on energy as well as challenging himself to take on such a project."

Green initiatives are as important to the center as they are to employees. Kennedy operates 78 low-speed electric vehicles on the center and at the visitor complex.

"We have driven electric vehicle conversions on center for five years. They were a Smart Car and a PT Cruiser and from time to time we have had additional (electric vehicles) such as the Smart convertible and a Mini Cooper," Chesson said. "NASA Transporta-



CLICK ON PHOTO

Kennedy Space Center worker Otis Deal shows how the charger connects to his e-motorcycle, Shocker on Nov. 27, 2012. To see how Deal converted his motorcycle, click on the photo.

NASA/Kim Shifflett

tion has demonstrated almost every electric vehicle, low-speed and high-speed, that has been available to the market, including Hydrogen Fuel Cell vehicles which are electric vehicles which use hydrogen as its energy source instead of battery packs."

Deal, who spent \$7,500 to build Shocker, said a smart charger came with the battery system. There are two ports that plug into the bike from a standard 110-volt outlet. When the batteries get to 50 percent depth of discharge, it takes about two to three hours to charge them. Once the charge is complete, the charger turns off automatically.

One might think Deal has a degree in electrical engineering or, at the very least, is very knowledgeable about electronics. But, he claims, he's not even close to being an expert.

"I've never been good with electronics and I previously had no knowledge of electronics," Deal said, "so I thought this would be a great way to learn."

According to Deal, an

average Joe can build one a bit cheaper depending on set-up, battery and chassis selection, the look, etc. Deal said there are several ways to set up an electric motorcycle. It depends on requirements for the build: how far one may need to travel, what speed one wants to go, and how often one can charge, among other, smaller factors.

Shocker, which weighs 400 pounds, can go up to 65 mph and travel 40 to 50 miles on a single charge

depending on conditions.

Deal did a comparison by cost per mile. It costs 27 cents and 24 cents a mile to drive his gas-powered car and truck, respectively, to work; and less than a penny a mile to drive Shocker to work. And believe it or not, Deal's motorcycle actually does better in the city than on the highway.

While Deal was inspired by the lower cost of fuel, he also welcomed the zero emissions from an electric motorcycle.

"They say every little bit helps and I figure I'm doing a very small part," Deal said.

Kennedy is scheduled to receive some electric vehicles as replacement GSA lease vehicles that include a mix of GM Volts, Ford C-Max Plug-in Hybrids and Ford Focuses.

"We continue to strive to green our fleet as well as work toward a solution that will allow charging for government and public on center as well as for our guests that come to the visitor complex," Chesson said.

Deal hopes to inspire the center to support workers who want to ride or drive to work using electricity.

"Maybe someday we will be allowed to plug in out here on center," Deal said. "If employees know we can plug in EVs (electric vehicles) out here, maybe it will inspire other people to buy or build their own."

Deal hopes someday he can build an electric car on a rail buggy platform.

The biggest drawback for Deal?

He said, "I can't do wheelies."



NASA/Kim Shifflett

Kennedy Space Center worker Otis Deal converted a 1993 Kawasaki Vulcan 500 into a fully electric motorcycle named Shocker in this photo taken Nov. 27, 2012.

NASA Employees of the Month: January



NASA

Employees of the month for January are, from left, Robert A. Schmidt, Center Operations; Louis F. Patalano, Procurement Office; Michael Shoup, Safety and Mission Assurance Directorate; Jerry L. Garcia, Engineering Directorate; Luis M. Bares, Information Technology and Communications Services; and Hong My Le, Engineering Directorate. Not pictured are Thomas M. Simon, Commercial Crew Program; Jay S. Gurecki, Ground Processing Directorate; and Britney R. Burch, Launch Services Program.



NASA/Kim Shifflett

Air Force Major earns 2012 McCartney Award

Air Force Major Kenneth A. Holmes, second from right, is awarded the 2012 Forrest S. McCartney National Defense Space Award from the National Space Club Florida Committee Chairman Jim McCarthy as Brig. Gen. Anthony Cotton, 45th Space Wing Commander, and Ruth McCartney, the widow of Lt. Gen. McCartney, look on Jan. 8 at the Radisson at the Port in Cape Canaveral. The award was created in 2005 by the NSC to recognize significant achievements and contributions made by Department of Defense personnel while on duty in Florida. The award, previously known as the Florida National Defense Space Award, was renamed in memory of Air Force Lt. Gen. McCartney who served as the fourth director of the Kennedy Space Center. McCartney died July 17, 2012.

NASA Spinoffs: Did you know?



NASA file/1976

Did you know a NASA-developed nickel-zinc battery sparked a comeback for electric cars in 1976? The first electric car was invented in 1887 and it provided strong competition for the gasoline-powered car in the first decade of the 20th century. Its battery needed recharging every 20 miles or so. Electric vehicles then faded gradually from view. NASA's John H. Glenn Research Center (at that time called Lewis Research Center) used technology from space satellites and created a battery that gave drivers twice the range.

Looking up and ahead . . .

* All times are Eastern

2013

Jan. 29

Mission: Tracking and Data Relay Satellite-K (TDRS-K)

Launch Vehicle: Atlas V 401

Launch Site: Cape Canaveral Air Force Station

Launch Pad: Space Launch Complex 41

Launch Window: 8:52 to 9:32 p.m.

Description: The TDRS-K spacecraft is part of the next-generation series in the Tracking and Data Relay Satellite System, a constellation of space-based communication satellites providing tracking, telemetry, command and high-bandwidth data return services.

January - Under Review

Mission: Orbital Sciences Corporation Test Flight

Launch Vehicle: Antares

Launch Site: Wallops Flight Facility, Va.

Launch Pad: OA

Description: The Antares is scheduled for a test flight under NASA's Commercial Orbital Transportation Services agreement with the company.

Feb. 11

Mission: The Landsat Data Continuity Mission (LDCM)

Launch Vehicle: Atlas V 401

Launch Site: Vandenberg Air Force Base, Calif.

Launch Window: 10:04 to 10:48 a.m. PST

Description: LDCM is the future of Landsat satellites. It will continue to obtain valuable data and imagery to be used in agriculture, education, business, science and government.

Feb. 12

Launch Vehicle: ISS Progress 50

Launch Site: Baikonur Cosmodrome, Kazakhstan

Description: Progress 50 will carry supplies, hardware, fuel and water to the International Space Station.

March 1

Mission: SpaceX-2 Commercial Resupply Services flight

Launch Vehicle: Falcon 9

Launch Site: Cape Canaveral Air Force Station

Launch Pad: Space Launch Complex 40

Description: SpaceX-2 will be the second commercial resupply mission to the International Space Station by SpaceX.

To watch a NASA launch online, go to <http://www.nasa.gov/ntv>.



John F. Kennedy Space Center

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