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NASA takes giant leap forward to RS-25 testing

Testing of the rocket engines for NASA's new Space Launch System (SLS) took another giant leap forward Oct. 24 with the RS-25 engine and its new engine controller unit in place on the A-1 Test Stand at Stennis Space Center. Pending final preparation and activation work, the first engine firing test is scheduled to begin by the end of the year with additional tests continuing into 2015. The SLS core stage will be powered by four RS-25 engines originally developed for the Space Shuttle Program, as well as a pair of shuttle-heritage solid rocket boosters. SLS will carry humans deeper into space than ever before. The engine will be tested at the higher thrust and other operating requirements for the SLS, as well as the new engine controller. The advanced controller regulates valves that direct the flow of propellant to the engine, which determines the amount of thrust generated during an engine test. In flight, propellant flow and engine thrust determine the speed and trajectory of a spacecraft. The controller also regulates the engine startup sequence, which is especially important on an engine as sophisticated as the RS-25. Likewise, the controller determines the engine shutdown sequence, ensuring it will operate properly under both normal and emergency conditions.



Goal – \$195,000

To-date – \$73,224

(38% of goal) *as of 11/13/14

“The way we maintain our great reputation is by working as a team, helping each other out and looking out for our coworkers.”



From the desk of
Ken Human

Associate Director, Stennis Space Center

As we are nearing Thanksgiving, I originally was going to write about some of the many reasons we have to be thankful. While I think it is important for us to remember that spirit of Thanksgiving, in light of recent spaceflight incidents, I would be remiss if I did not mention them.

There have been several high-visibility aerospace failures in the last month, and I believe there are a number of lessons to be learned. Orbital Sciences' Orb-3 launch at NASA's Wallops Flight Facility was supposed to provide cargo to resupply the International Space Station (ISS). But after the launch failure, it turns out that there is no supply crisis on the ISS. The ISS still has sufficient supplies to tide it over for some time, and the other cargo supply company, SpaceX, is scheduled to launch its resupply mission early in December. It just goes to prove that the logistics planners do a pretty good job of making sure that a single failure does not cripple the supply chain. I know that our folks here at Stennis also engage in contingency planning, so we have multiple suppliers and sources and critical back-up parts available in storage.

As I write this, I have no knowledge about the causes of the recent failures, but if you look back and examine the history of NASA failures, two factors show up more often than not: complacency and normalization of deviance.

With regard to the first: beware of success; it can be our worst enemy. With regard to the second: beware of slippery slopes. Sometimes, you can break the rules

and cut a corner, and not only do you get away with it, it also appears to offer its own rewards. So, next time you venture a little further ... and so forth and so on. Well, as you know, eventually, it catches up with you! Sometimes, it is in catastrophic failures, as in the case of accounting short cuts at Enron, steroid use by baseball players and not understanding the consequences of foam loss or O-ring erosion and blow-by in NASA's case.

Spaceflight is inherently risky, and we must always remember that. We have a responsibility to do our best to maintain a safe working environment every day. We must also learn from our failures, and that is the measure of future success.

I am thankful for the dedicated workforce that is our Stennis family. We have a great team here at Stennis, great esprit de corps and high morale. The way we maintain our great reputation is by working as a team, helping each other out and looking out for our coworkers. Help us all be safer by not being tempted by slippery slopes. And do not let success go to your head. We have to earn it every day.

Let us all remember the reasons we have to be thankful, and do not forget that in times of adversity, greatness often emerges.

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FULFILLING NASA'S EXPLORATION MISSION

A bright new look

Danny McKinney of Lake Area Sign Co. in Sulphur, La., paints the NASA "meatball" logo on the B-2 Test Stand on Oct. 31. The new meatball is part of the overall modification of the B-2 stand in preparation for testing the core stage of NASA's new Space Launch System (SLS). NASA is building the SLS to carry humans deeper into space than ever before. Beginning in 2016, the agency will test the core stage of the new launch vehicle at Stennis. After testing is complete, the core stage will be used for the maiden, unmanned flight of the SLS. The testing – and the new meatball – evokes memories of the Apollo Program, when NASA tested Saturn rocket stages on the B stand. The meatball itself dates back to 1959 and the formation of NASA. After an official seal was chosen for the new agency, NASA employee James Modarelli was asked to design a logo that could be used for less formal purposes. Known officially as the insignia, NASA's round logo was not called the "meatball" until 1975, when NASA decided a more modern logo was in order and switched to the "worm," a red, stylized rendering of the letters N-A-S-A. In 1992, Administrator Dan Goldin brought NASA's meatball back from retirement to invoke memories of the one-giant-leap-for-mankind glory days of Apollo.



Countdown to space – NASA set for Dec. 4 test flight



(Above photo) NASA's Orion spacecraft arrives at Space Launch Complex 37 at Cape Canaveral Air Force Station on Nov. 12. The exploration spacecraft is designed to carry astronauts to deep space destinations, including an asteroid and on the journey to Mars. The first uncrewed flight test of Orion is set to launch Dec. 4 atop a United Launch Alliance Delta IV Heavy rocket.

NASA's new Orion spacecraft now is at its launch pad after completing its penultimate journey in the early hours of Nov. 12. It arrived at Space Launch Complex 37 at Cape Canaveral Air Force Station in Florida at 2:07 a.m. CST, where the spacecraft then was lifted onto a United Launch Alliance Delta IV Heavy rocket in preparation for its first trip to space.

Orion will travel almost 60,000 miles into space Dec. 4 during an uncrewed flight designed to test many of the spacecraft's systems before it begins carrying astronauts on missions to deep space destinations.

The spacecraft, which includes the crew and service modules, launch abort system and the adapter that will connect it to the rocket, was completed in October and has since been awaiting its rollout inside the Launch Abort System

(Right photo) Four protective panels make up Orion's Ogive Assembly, which plays a part in protecting the crew module – where the astronauts sit – providing protection during its journey through the atmosphere. Shown inside a Kennedy Space Center facility, a crane brings the fourth and final Ogive panel closer for installation on Orion's Launch Abort System.

Facility at NASA's Kennedy Space Center in Florida. Although storms in the area delayed its move slightly, Orion completed its 22-mile journey with no issues.

"This is the next step on our journey to Mars, and it's a big one," said William Gerstenmaier, NASA's associate administrator for human exploration and operations. "In less than a month, Orion will travel farther than any spacecraft built for humans has been in more than 40 years. That's a huge milestone for NASA, and for all of us who want to see humans go to deep space."

Once it arrived at Space Launch Complex 37, Orion was hoisted up about 200 feet and placed atop the Delta IV Heavy rocket that will carry it into orbit. In the days prior to liftoff, the spacecraft will be fully connected to the rocket and powered on for final testing and preparations.



"We've put a lot of work into designing, building and testing the spacecraft to get it to this point and I couldn't be prouder of the whole team," said Mark Geyer, Orion Program manager. "Now it's time to see how it flies. Sending Orion into space will give us data that is going to be critical to improving the spacecraft's design before we go to an asteroid and Mars."

Orion is scheduled to liftoff at 7:05 a.m. Dec. 4. During its two-orbit, 4.5-hour flight test, Orion will travel 3,600 miles beyond Earth. From this distance, Orion will return through Earth's atmosphere at speeds approaching 20,000 mph, generating temperatures near 4,000 degrees Fahrenheit on its heat shield. The flight will allow engineers to test systems critical to safety, including the heat shield, parachutes, avionics and attitude control. For more about Orion, visit: <http://www.nasa.gov/orion>.

Eight things to look for during Orion's first flight

Orion is launching December 4 on its first test flight. This launch involves more than just a rocket that goes WHOOSH! Orion will reach a height of 3,600 miles – 15 times higher than the International Space Station – and orbit the Earth twice during the 4.5-hour mission. Want a closer look at what will take place during flight? Here are the eight things you can expect to see on Orion's first flight.

Launch

It is going to be loud. It is going to be bright. It is going to be smoky. Engines are fired, the countdown ends, and Orion lifts off into space atop the United Launch Alliance Delta IV Heavy rocket from the launch pad at Cape Canaveral in Florida.

Exposure

It is time to fly! The protective panels surrounding the service module are jettisoned and the launch abort system separates from the spacecraft.

Re-ignition

Orbit 1 is complete! The upper stage will now fire up again to propel Orion to an altitude of 3,600 miles during its second trip around Earth.

Separation

It is now time to prepare for reentry. The service module and upper stage separate so that only the crew module will return to Earth.

Orientation

Orion's first flight will be uncrewed, but that does not mean Orion can return to Earth upside down. This test flight will help test the control jets to ensure that they can orient the capsule in the correct reentry position.

Heating

Things are heating up as Orion slams into the atmosphere at almost 20,000 mph and encounters temperatures near 4,000 degrees F.

Deploy

After initial air friction slows the capsule from 20,000 mph, Orion will still be descending at 300 mph – too fast for a safe splashdown. A sequence of parachute deployments will create drag to further slow the spacecraft to a comfortable 20 mph.

Landing

Orion will splashdown in the Pacific Ocean off the coast of Baja California, where it will be recovered with help from the United States Navy. Orion's first flight has been successfully completed. Next step: deep space.

Stennis Space Center Family Day 2014



Stennis Space Center employees and families enjoyed a day of activities at INFINITY Science Center during its 2014 Family Day event on Nov. 1. Visitors were able to view space-related exhibits, participate in fun, hands-on activities, greet Stennis mascot Orbie the astronaut and learn more about the history and future of the nation's space exploration program. Participants were able to take photos of themselves as "astronauts," as well as meet Apollo 13 astronaut Fred Haise, a native of Biloxi, and Alyssa Carson of Baton Rouge, who has dreamed of being an astronaut since she was three years old and continues to work toward that goal (Top center photo). Participants also had the opportunity to sign a banner of support for NASA's upcoming Exploration Flight Test-1, set to launch Dec. 4 (top right photo). The unmanned mission marks the first test flight of the new Orion multipurpose crew vehicle. NASA engineer Stu McClung from Johnson Space Center in Houston offered participants an overview of the Orion Program during his Family Day presentation (bottom right photo). More than 700 people attended the Family Day event.



FULFILLING NASA'S EXPLORATION MISSION

NASA in the News

Global leaders reaffirm support of ISS

The heads of the International Space Station (ISS) agencies from Canada, Europe, Japan, Russia and the United States met on Nov. 4, 2014. The following is a portion of the joint statement issued by the leaders: Recognizing the full mission breadth of the ISS from research that benefits all of humanity, to technology development, to expanding commercial use of low-Earth orbit, to enhancing international cooperation and understanding, the agency heads reaffirmed their support for continued ISS operations. The heads discussed the many ways that research on ISS is benefitting people on Earth. The ISS partner agencies are working for continued ISS utilization through at least 2020 and noted the U.S. commitment to extend ISS utilization to at least 2024. The heads reaffirmed the ISS is the foundation for human exploration beyond low-Earth orbit, highlighting its technical, scientific, and developmental capabilities. The ISS partnership will continue to advance the use of the ISS for the benefit of humanity. For more information about the ISS, visit: <http://www.nasa.gov/station>.

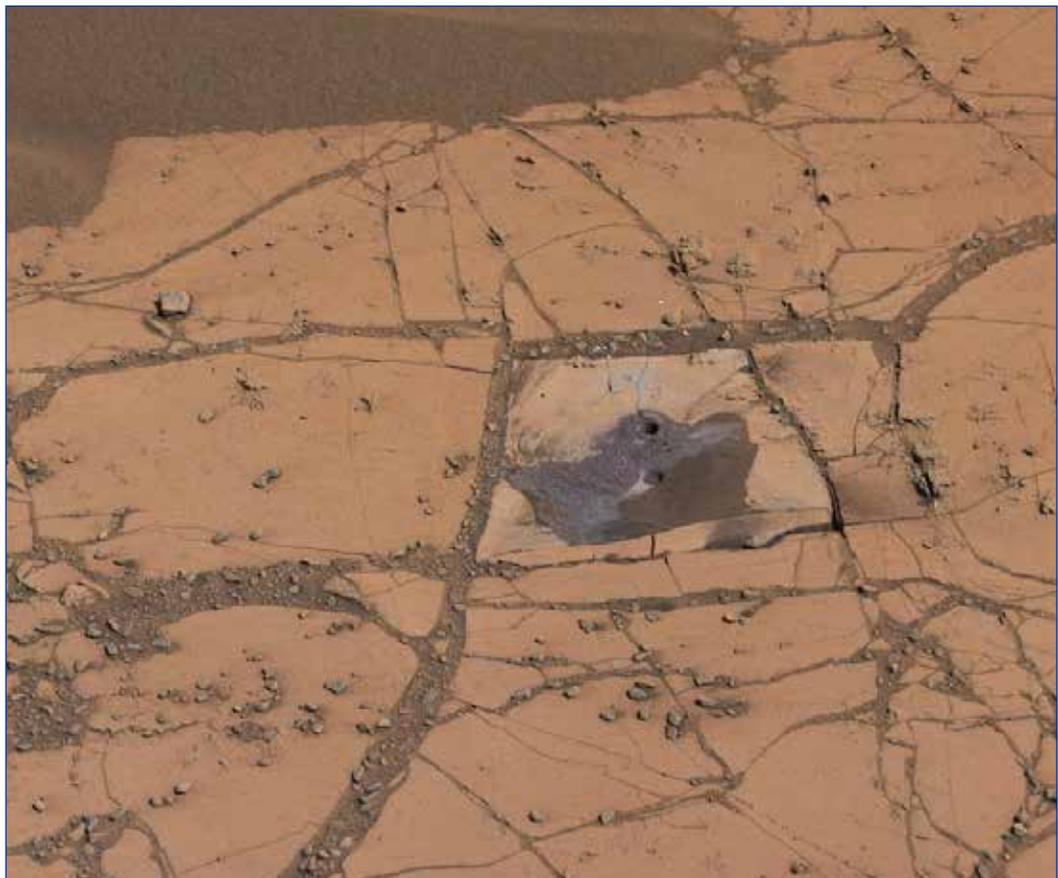
NASA tests revolutionary aircraft flap

NASA's green aviation project is one step closer to developing technology that could make future airliners quieter and more fuel-efficient with the successful flight test of a wing surface that can change shape in flight. This summer, researchers replaced an airplane's conventional aluminum flaps with advanced, shape-changing assemblies that form seamless bendable and twistable surfaces. Flight testing will determine whether flexible trailing-edge wing flaps are a viable approach. The Adaptive Compliant Trailing Edge (ACTE) project is a joint effort between NASA and the U.S. Air Force Research Laboratory. The flaps have the potential to be retrofitted to existing airplane wings or integrated into new airframes. ACTE technology is expected to have far-reaching effects. Advanced lightweight materials will reduce wing structural weight and give engineers the ability to aerodynamically tailor the wings to promote improved fuel economy and more efficient operations, while reducing environmental impacts. For more, visit: <http://go.nasa.gov/1Ai2YV4>.

For NASA news releases, visit: www.nasa.gov/news/releases/latest/index.html.

Curiosity collects 1st sample from Mars mountain

This image shows the first holes drilled by NASA's Mars rover Curiosity at Mount Sharp. The loose material near the drill holes is drill tailings and an accumulation of dust that slid down the rock during drilling. The site is on a patch of flat rock called "Confidence Hills" in the "Pahrump Hills" area of Mars' Gale Crater. This is Curiosity's first drill site since reaching the base of Mount Sharp in September. The view combines several exposures taken by the Mastcam's left-eye camera during the 759th Martian day, or sol, of the rover's work on Mars (Sept. 24, 2014). The component images have been calibrated, linearly scaled and brightened, which results in colors that resemble those that would be seen under daytime lighting conditions on Earth. For more regarding Curiosity and its mission, visit <http://www.nasa.gov/msl> and <http://mars.jpl.nasa.gov/msl>.



Stennis team selected for NASA pilot program

Recognizing that technology drives exploration, NASA has selected four teams of agency technologists for participation in the Early Career Initiative (ECI) pilot program. The program encourages creativity and innovation among early career NASA technologists by engaging them in hands-on agile technology development opportunities needed for future missions.

A team of technologists from Stennis Space Center is one of the four selected for the program. The selection represents Stennis' first competitively awarded project from NASA's Space Technology Mission Directorate. The directorate created the ECI to enable a highly collaborative, joint-partnering work environment between the best and brightest NASA early career innovators and leading innovators in industry, academia and other government organizations.

"Continued investment in technology is a requirement for the success of NASA's current and future missions," said Michael Gazarik, associate administrator for Space Technology at NASA Headquarters in Washington.

The Stennis project selected for the ECI pilot program is: High-Speed Video Imaging with Disruptive Computational Photography Enabling Technology, with partner, Innovative Imaging and Research (I2R) of Mississippi. The team will develop and demonstrate a system for high-speed, 3-D, High Dynamic Range (HDR) imaging. Video imaging will be performed at the chip level using computational photography, providing NASA with advanced visualization technologies to meet future needs.

Other ECI projects are: a Lightweight Integrated Solar Array and Transceiver, by NASA's Marshall Space Flight Center; an On-Orbit Autonomous Assembly of Nanosatellites, by NASA's Langley Research Center; an Integrated Display and Environmental Awareness System, by NASA's Kennedy Space Center.

"We're all very excited about this opportunity for Stennis civil servants to partner with I2R in development of revolutionary visualization capabilities," Stennis Chief Technologist Ramona Travis said. "Not only will these capabilities enhance our own rocket engine test programs, but they have great potential for use in space exploration missions."

Dawn Davis, NASA electrical design lead in the Stennis Engineering and Test Directorate, is a mentor to the ECI team. "This is a great opportunity for Stennis to be involved in the development of technology that addresses a fundamental need in supporting our test activities," she said.

NASA engineer Howard Conyers is the proposal author and lead of the Stennis ECI team. "A major benefit to the ECI team is to actually de-

velop hardware with applications beyond rocket engine testing using the agile design process as required by winning the proposal, instead of the typical waterfall design process."

I2R Cofounder and President Mary Pagnutti said the project will build on ongoing efforts. "This project will enable us to advance and apply the image processing techniques we've been developing for Homeland Security and the private sector to the challenging problems associated with imaging extremely high-contrast rocket motor firings," she said. "We look forward to working with and mentoring the next generation of NASA scientists and engineers at Stennis."

Stennis team members are: Conyers (lead), Andrew Bracey, David Carver, Andy Guymon, Aaron Head, Rosa Obregon and Mark Turowski.



Stennis participates in virtual market

Three Stennis Space Center patented technologies were highlighted during a virtual "tech-to-market" forum sponsored by the Federal Laboratories Consortium for Technology Transfer on Nov. 6. Gigi Savona (l to r), intellectual property manager with the Stennis Applied Science and Technology Project Office, joined NASA engineers Scott Jensen and Bruce Farner to monitor forum activity and answer questions from participants. During the virtual event, which was set up to look like an exhibit forum, online visitors could view and learn about products from various organizations and companies. They also could dialogue online with product representatives. Stennis products featured in the forum were a conical seat shut-off valve developed by Farner, and an in situ measurement system for monitoring the performance of piezoelectric sensors and an improved monitoring system that uses remote sensor units and wireless, one-way communication, both developed by Jensen.

Early career employees visit Stennis

Early career employees from NASA's Marshall Space Flight Center in Huntsville, Ala., visited Stennis Space Center on Oct. 23 for a day of briefings and facility tours. In addition to receiving updates on rocket engine testing and applied science efforts under way at the center, the employees toured several sites, including the Aerojet Rocketdyne engine assembly facility and the A-1 Test Stand. They also were able to view a RS-68 engine test on the B-1 stand (seen in background).



Michoud team tours facilities

Employees from NASA's Michoud Assembly Facility in New Orleans visited Stennis Space Center on Oct. 29, touring the B-2 Test Stand and the Aerojet Rocketdyne engine assembly facility. The NASA team is working with the Boeing Co. to build the core stage of NASA's new Space Launch System (SLS), which will carry humans deeper into space than ever before. Stennis will test the core stage built at Michoud on the B-2 Test Stand.

Stennis focuses on disability awareness

Michele Beisler of NASA talks with Kevin Galloway of the University of Southern Mississippi Institute of Disability Services during a disability awareness exhibit at Stennis Space Center on Oct. 23. Several area organizations offered information about disability services, focusing on such topics as wounded war veterans, pet therapy, disabled mobility and independence, and vocational rehab. October is annually observed as Disability Employment Awareness Month.



Stennis partners with area Native American tribe

Note: For more than 50 years, NASA's John C. Stennis Space Center has played a pivotal role in the success of the nation's space program. This month's Lagniappe provides a glimpse into the history of the south Mississippi rocket engine test center.

A first-ever Space Act Agreement between NASA and a Native American tribe almost 20 years ago began many avenues of collaborations in education. Highlighted this month for Native American Indian Heritage Month is NASA's partnership with the Mississippi Choctaw Tribal Council of Philadelphia, Miss.

The May 1995 signing ceremony held at Stennis Space Center opened many new educational opportunities for Choctaw students, teachers, parents and the community.

"What we hope to do is to work with the Mississippi Choctaw Tribal Council in enhancing their educational system – providing new tools for the classrooms, new inspirational tools for their teachers – bring a little piece of the space program into the classrooms," then-Stennis Space Center Director Roy Estess said.

The joint venture paved the way for

the establishment of the only NASA Educator Resource Center (ERC) located on a Native American reservation, which was on the campus of Choctaw Central High School near Philadelphia. This educational relationship with NASA enhanced existing, and developed new, academic and vocational-technical training programs for the Mississippi Band of Choctaw Indians. It also enhanced



NASA Coordinator Patricia Overstreet of Choctaw Tribal Schools works with students at Choctaw Central High School near Philadelphia, Miss., during a class on basic rocketry, while then-Tribal Chief Phillip Martin (standing right) of the Mississippi Band of Choctaw Indians observes.

the school, industry and civic linkage by increasing awareness of state-of-the-art technologies in education.

By year 2000, NASA provided hundreds of videotapes of NASA-related activities in space, and other resources such as publications and computer software for teachers and for student use in the classroom. It not only served teachers in the tribal

school, but also teachers in surrounding communities. They received resource materials, lesson plans and other assistance from the ERC.

Some project and experiments conducted through the Choctaw ERC include demonstrations representing the vacuum of space, and classes in basic rocketry and working with elements of weather through the Global

Learning and Observations to Benefit the Environment (GLOBE) program. Choctaw Central, the first and only Native American FIRST (For Inspiration and Recognition of Science and Technology) Robotics team, received the 2001 prestigious Judges' Award at the Lone Star Regional FIRST Robotics competition in Houston, with technology assistance and sponsorship from NASA.

The success of the Space Act Agreement, demonstrated by the ERC, led to the recognition of Stennis Space Center and the Mississippi Band of Choctaw Indians by Vice President Al Gore's National Performance Review Office. The partnership was honored with a Hammer Award, given to those who have made a notable contribution in support of National Performance Review ideas.

Hail & Farewell

NASA bids farewell to the following:

Courtney Cackowski

Student Trainee

Office of Communications

And welcomes the following:

Kevin Camp

Logistics Management Specialist

Center Operations Directorate

Office of Diversity and Equal Opportunity

Inclusion – everyone has a role to play

The following article was provided by Cecile Saltzman, a human resources specialist in the Stennis Office of Human Capital.

Breaking down group barriers, respecting others' work and opinions, cross pollination of ideas – these are some of the concepts associated with the word “inclusion.” But what is it, really? What is the inclusive component of Diversity & Inclusion? I decided to seek out a definition, and the Office of Personnel Management (OPM) defines it this way:

Inclusion – The degree to which an employee perceives that he or she is an esteemed member of the work group through his/ her needs for belongingness and uniqueness.

Got it! Everyone wants to feel appreciated for his/her individual value and professional contributions to overall mission success, and that's not a lot to ask. Every day, every one of us contributes to Stennis accomplishments, and everyone needs to be valued as an important team player.

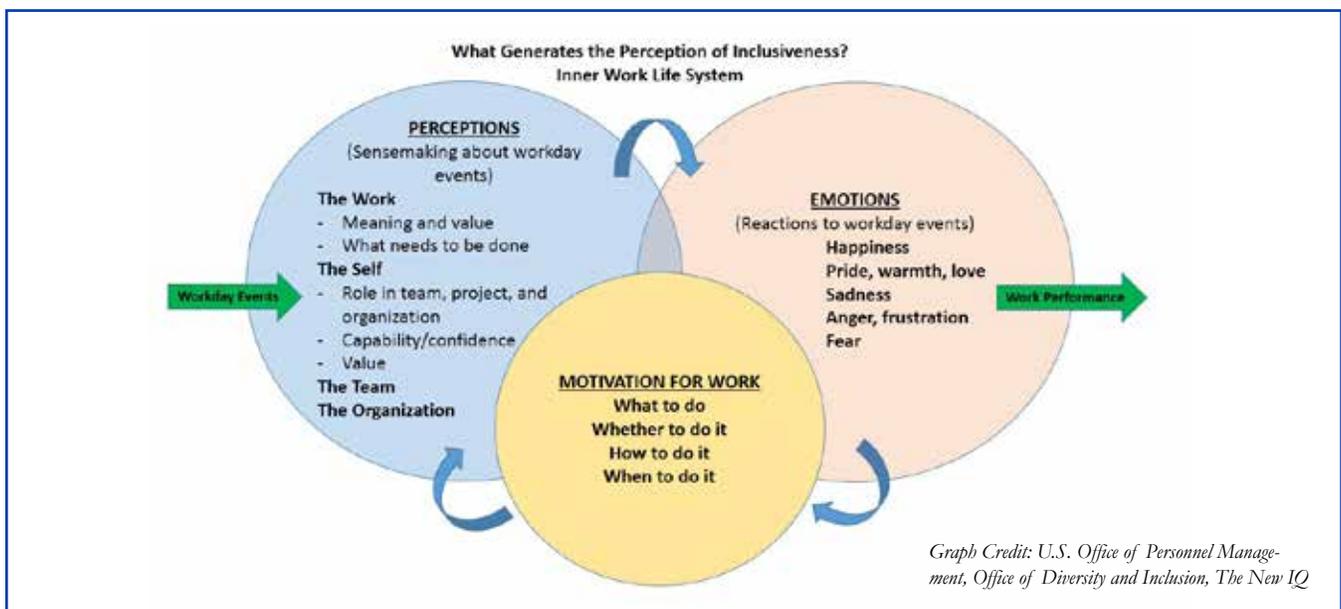
But what's involved in our perception of inclusion? It must be complicated, right? Actually, the concept of inclusion is simple and is something we can consciously notice within ourselves and inspire in others as we go about our work. It involves three things all of us do all day long: think, feel and act.

How so? It turns out that the basis of inclusion, and thus our motivation to be conscientious toward our work, lies in our individual emotional reactions to the information we receive. It's a continuous inner processing of infor-

mation coming from the outside, and since we are all in constant interaction across the center, it's clear that we influence each other's perception of inclusion.

So, how can inclusion be measured? What metric can possibly capture that? I'll give you one guess, and if you think it has something to do with the Employee Viewpoint Survey (EVS), you got it right. OPM developed an index within the EVS called the New IQ (Inclusion Quotient), which consists of 20 questions that have the highest correlation to inclusive environments. The 20 questions are grouped into five habits of inclusion: Fair (Nos. 23, 24, 25, 37, 38); Open (Nos. 32, 34, 45, 55); Cooperative (Nos. 58, 59, 42, 46, 48, 49, 50); Supportive (Nos. 2, 46, 48, 49, 50); and Empowering (Nos. 2, 3, 11, 30). The New IQ was developed from the idea that individual behaviors, repeated over time, form the habits that create essential building blocks of an inclusive environment. These behaviors can be learned, practiced and cultivated into habits of inclusiveness.

So, what does the New IQ have to say about Stennis? Given that the majority of our workforce participated in the annual EVS, as usual, the results are meaningful and of tremendous interest, and will be used by management at all levels to improve our center. I've pored over the results and will keep you in suspense until Stennis' 2014 scores have been posted, but I'm proud to say they are better than the agency's scores in every case. The voice of our collective workforce tells us that together we have built a strong, healthy environment where inclusion has evolved from a concept to a thriving cultural asset. In short, Stennis' New IQ evidences yet another reason why Stennis Space Center is NASA's No. 1 center.



Stennis educators host teacher, student workshops

The Stennis Space Center Office of Education hosted a trio of workshops for 48 pre-service, in-service and informal educators, and 39 middle school students in north Louisiana on Oct. 15-16. The workshops were a collaborative effort between Stennis, Louisiana Tech University, Grambling State University, and Ouachita and Lincoln Parish schools. NASA education specialists presented hands-on, problem-based learning and technology-based activities that can be integrated across the curriculum. In one activity, educators constructed parachute landers, which were dropped 75 feet from a local fire department ladder truck. In addition to the educator workshops, Stennis visited Dubach Elementary School in Ruston, La, to present a rocketry activity to science club students ages 8-13. Students built and launched stomp rockets while discussing propulsion, trajectory and Newton's Three Laws of Motion.

