



# Orion Spacecraft Completes First Spaceflight Test!

## Glenn's Contributions Instrumental to Flight

NASA marked a major milestone, Dec. 5, on its journey to Mars as the Orion spacecraft completed its first voyage to space! This uncrewed Orion flight, Exploration Flight Test-1, tested systems critical to crew safety. It traveled farther into space than any spacecraft built for humans has traveled in more than 40 years.

As NASA prepared to take the next step in deep space exploration, the Glenn team of engineers and scientists that worked on Orion for more than a decade closely monitored the mission from NASA Kennedy and back home at Glenn.

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The Orion spacecraft splashed down shortly after 11:30 a.m. in the Pacific Ocean, 6,000 miles southwest of San Diego.

## Lightfoot and Roe Stress Operating Model Synergy



Center Director Jim Free, NASA Associate Director Robert Lightfoot and Deputy Associate Director Lesa Roe update Glenn employees on the agency operating model. See page 2.

## Game Changing Oxygen Recovery

Future long-duration space and planetary surface exploration will require updated sustainable life support systems that provide a comfortable work and living environment.

Presently, International Space Station tenants rely on an environmental life-support subsystem that recovers only 50 percent oxygen. For long-term missions that leave low Earth orbit, the oxygen recovery will need to be increased. NASA has solicited proposals for systems that will increase the recovery rate to greater than 75 percent.

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## Oxygen Proposals



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Two Glenn proposals are among four selected by NASA's Game Changing Development (GCD) Program to receive \$750,000 each for 15 months through Phase I to develop engineering test units that address recovery issues. If the ideas prove promising, NASA would provide another \$2 million over 2 years for Phase II to develop a prototype.

Kenneth Burke, Photovoltaic and Electrochemical Systems Branch, proposed a two-step process that uses a carbon dioxide electrolyzer and a catalytic bed reactor estimated to provide 100 percent oxygen capture. Robert Green, Fluid Physics and Transport Processes Branch, in collaboration with pH Matter, LLC, Columbus, submitted the other proposal. It uses a solid oxide co-electrolyzer (SOCE) with a carbon formation reactor to produce synthetic gas and pure dry oxygen for a recovery rate greater than 80 percent.

For more information on NASA's GCD Program, visit <http://gameon.nasa.gov>.

—By S. Jenise Veris

### Mission Success!

The smooth launch and recovery of the Orion spacecraft in December may have made spaceflight look easy to viewers across the world. But NASA and our industry partners know the complexities involved in this test flight. It is the product of years of hard work and testament to the importance of engineering, safety and mission assurance, and operational reviews in ensuring success. Watching those fairings separate and parachutes deploy was an emotional experience for many of us at Glenn! I want to thank those who contributed to this historic flight. Your expertise and dedication helped NASA achieve a major milestone on our journey to Mars.

Happy New Year to you and your family!

—Jim

## Social Media Followers “Like” Orion

Glenn joined centers throughout the agency to host a NASA Social, Dec. 3, for NASA's social media followers to learn and share information about Orion's EFT-1 mission. The Social guests toured facilities and interacted with researchers who have been working on design and hardware for future space exploration, and shared their experiences through Twitter, Facebook and Instagram postings. Pictured is Dr. Dan Raible briefing social followers on iROC satellite communications hardware.



C-2014-8423

Photo by Marvin Smith

## Lightfoot and Roe Discuss Agency Operating Model

Constructing a new agency operating model is like doing a jigsaw puzzle. Several pieces must fit together to achieve a balance between NASA's mission and capabilities.

During a visit to Lewis Field, Dec. 11, NASA Associate Administrator Robert Lightfoot Jr., and Deputy Associate Administrator Lesa Roe, held an All

Hands meeting to discuss the agency's efforts to ensure the pieces fit together.

They provided an update on the first piece of the agency puzzle, the Technical Capability Assessment, and encouraged employees to visit <https://tcat.hq.nasa.gov/> (internal only) for details on TCAT developments. Lightfoot and Roe also touched on the other puzzle pieces—

Competitive Model, Program/Project Planning, Mission Integration and Business Services Assessment—that must fit together synergistically to achieve an effective operating model.

The Headquarters visitors then toured several facilities, met with supervisors and shared lunch with some of Glenn's early career employees.

—By Doreen B. Zudell

# Orion Test Flight

Continued from page 1

Glenn staff gathered in the MIC Auditorium at Lewis Field and the Engineering Building Assembly Area at Plum Brook Station to view the launch, originally scheduled for Dec. 4. When NASA rescheduled the launch due to an issue related to fill and drain valves on the Delta IV Heavy rocket, many employees re-assembled the following day. The Great Lakes Science Center (GLSC) in downtown Cleveland opened its doors at 6:30 a.m. both days to provide public viewing on large screens. Glenn staff provided exhibits and speakers in the Visitor Center galleries in the GLSC.

Glenn's Deputy Chief for the Exploration Systems Project Office and Orion's Crew and Service Module Deputy, Kathy Schubert, said Glenn has been an integral part of the Orion team from day one.

"We have performed leadership roles in project management, contractor oversight, and systems engineering for the design and development of the crew and service module, and for the management of the integrated vehicle requirements and interfaces," Schubert explained.

Glenn's project management and engineering expertise has been instrumental in the following areas as well:

- Engineering oversight and in-line contributions to the design and development of Orion's crew and service module systems, including structures, mechanisms, pyrotechnics, propulsion, thermal protection, materials, power and avionics.
- Support for the development of the vehicle's guidance navigation and control capability.
- Conducted wind tunnel testing to validate the aerodynamics of the spacecraft's launch abort system in Orion's early development.
- Direct contributions to the design of Orion's electrical power system and power distribution capability; the crew module and service module structure; the crew module thermal protection



C-2014-8525 Photo by Bridget Caswell



Photo by Betsy Smith

*Pictured top: Glenn's I'm On Board! banner displayed on a fence at NASA Kennedy. Pictured left: Guests at the GLSC cheer as they watch the launch. Right: Glenn employees fill the MIC Auditorium awaiting the launch.*

system; and many of the spacecraft mechanisms including those used for fairing separation, the umbilical ground connections, and the crew and service module retention and release.

Schubert said the Glenn team will continue its tradition of providing major contributions to the Orion Program as they proceed with the development and test of the first Exploration Mission vehicle. The date for the Exploration Mission will be announced later this year. Orion will include a European Space Agency provided service module and will launch on NASA's new Space Launch System.

"Later this year we'll be testing the European Service Module structure, along with Orion test support equipment and hardware, in the Space Power Facility (SPF) at Plum Brook Station," Schubert said. "This test will allow us to exercise the full test capabilities of the upgraded SPF."

—By Doreen B. Zudell

## Glenn's Yuko Supported EFT-1 Mission



Jim Yuko, Thermal Systems Branch, supported the EFT-1 launch as part of the Thermal Team in the Engineering Support Room in the Neil Armstrong Operations and Checkout building, NASA Kennedy. Yuko, left, is pictured with fellow team members who monitored the thermal telemetry and heater control from the vehicle during all phases of its mission.



Photo courtesy of LLF

### Naughty or Nice?

Peter, son of Glenn's William Varis, shared his wish list with Santa (Tom Hinshaw) during holiday festivities at Lewis Little Folks (LLF). The child development center's multipurpose room was lit up with colorful decorations and camera flashes, Dec. 5, as NASA employees dressed as cartoon and popular holiday characters—Mickey Mouse, Minnie Mouse, Ernie, Bert, Elmo, Tigger, Frosty the Snowman, Santa's elves, and more—as they mingled and took pictures with the children.



Photo courtesy of Doug Klein/Firelands Photography

### Symphony With the Stars

The Firelands Symphony Orchestra presented NASA videos on a large screen as they performed their Patriotic Pops concert with a Tribute to NASA at the Sandusky State Theatre in Sandusky, Nov. 9. Astronaut Doug Wheelock and Center Director Jim Free (above) participated in a pre-concert conductor conversation with the audience and introduced songs during the concert.



Photo by David DeFelice

### MythBusters Star Visits Glenn

Jamie Hyneman and Adam Savage, stars of the Discovery Channel hit show *MythBusters*, visited Cleveland for the *MythBusters—Behind the Myths* tour, Dec. 5. While in town, Hyneman visited NASA Glenn. Pictured in Glenn's Ballistic Impact Laboratory is, left to right, Duane Revilock, Dr. Mike Pereira, Hyneman, Kelly Carney and Matt Melis. Hyneman also visited the Icing Research Tunnel, Zero Gravity Research Facility and the Electric Propulsion Laboratory. **The Great Lakes Science Center will host the *MythBusters* traveling exhibit, beginning Feb. 7! Visit their website, [www.greatscience.com/](http://www.greatscience.com/), for details.**



C-2014-8627

Photo by Bridget Caswell

### Employee Art Showcase

Glenn employees showcased their artistic talents at the Combined Federal Campaign (CFC) Art Show, Dec. 8, at the MIC Auditorium. For a small entrance fee, visitors viewed and voted on a variety of impressive pieces. Proceeds went to the CFC fund. Pictured: Allen Turner and Brian Laney admire art.



C-2014-8367



C-2014-8386

Photos by Marvin Smith

## Event Raises Awareness for Diversity, Combined Federal Campaign

Glenn held its annual Diversity Day and Combined Federal Campaign (CFC) International Food Fair, Dec. 4, at Lewis Field. An employee panel representing Glenn's advisory groups answered questions on diversity-related issues, while several multicultural vendors sold fair trade items. Employees purchased tickets to taste a variety of homemade dishes donated by Glenn staff. The food fair, pictured top left, raised more than \$700 for the CFC. The Diversity Panel, pictured top right, included, left to right: Chrissy Stonebraker-Martinez (Fair Trade Vendor: InterReligious Task Force on Central America); Mary Lobo (Women's Advisory Group); Vikram Shyam (Asian Pacific Islander Advisory Group); Eunice Adams-Sipp (African Heritage Advisory Group); Diana Santiago (Hispanic Advisory Group); and Kathy Clark (Disability Awareness Advisory Group).

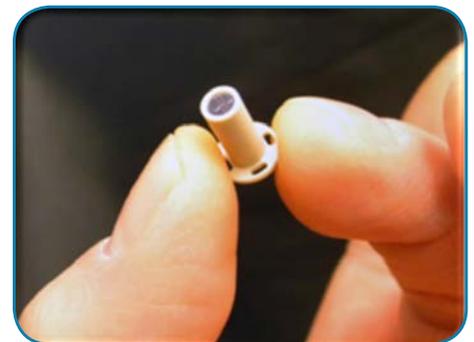
## Advancing Technology

### Medical Sensing Technology Breakthroughs

This month, *AeroSpace Frontiers* shines a spotlight on two exciting milestones, which were achieved by a NASA Glenn Small Business Innovation Research (SBIR) project and an exclusive licensing of Glenn patent technology.

Integrated Sensing Systems, Inc. (ISSYS), a small microelectromechanical system technology company in Ypsilanti, Mich., is completing a clinical study on their wireless implantable hemodynamic monitor. The sensor is designed to monitor pressures of the left side of the heart of patients with heart failure at will, anywhere in the world. Dr. Jerry Myers, Fluid Physics and Transport Processes Branch, served as the Contract Officer Representative through Phase I and II of the SBIR contract, titled "Chronic Telemetric Biofluid Flow Monitoring Device." He provided guidance on requirements for potential applications, including implantable sensors for astronauts to help track how the cardiac system operates during long-term missions.

Endotronix Inc., a wireless health monitoring company in Woodridge, Ill., received \$120,000 as a Distinguished Award Winner in this year's Nokia Sensing XCHALLENGE, sponsored by the XPrize Foundation. The competition sparks breakthrough medical sensing technologies that will ultimately enable faster diagnoses and easier personal health monitoring. The Endotronix system adapts two exclusively licensed Glenn-patented technologies for miniature implantable sensors. They include: "Radio Frequency Telemetry System for Sensors and Actuators," and "Hand Held Device for Wireless Powering and Interrogation of BioMEMS Sensors and Actuators," both by Dr. Rainee Simons and Dr. Félix Miranda. For more information, visit <https://www.nokiasensingxchallengevoting.org/>.



The ISSYS miniature wireless implantable hemodynamic monitor.



Endotronix's award-winning wireless sensor reader.

## Make a New Year's "Creative Resolution"

The Creativity and Innovation (C&I) initiative team encourages employees to make a different type of resolution for 2015—resolve to be creative! This initiative emphasizes that creativity is a skill, rather than an innate ability, and can be carefully honed to allow individuals a greater capacity for generating alternative problem-solving methods.



In 2014, the C&I initiative gained many Glenn and external partner followers through ideation and lateral thinking training sessions. Last year, the C&I team also increased use of its creative spaces—C&I Commons (building 142) and 3-D printing iLab facility (building 5). The C&I team looks forward to even more creative success in 2015.

**Problem-Solving with Ideation**  
When the Great Lakes Science Center (GLSC) needed innovative ways to increase attendance, Glenn's C&I team hosted 20 GLSC staff members for two Ideation retreats. With the help of C&I facilitators, GLSC staff generated nearly 300 new ideas. They are already implementing some of those ideas, with plans to continue working creatively through C&I principles in 2015.

### Problem-Solving with Ideation

**iLab Saves Time, Money**  
Glenn engineer Jeff Polack, Rotating and Drive Systems Branch, sought to improve the design of a Nadir Port window frame for a window in a cargo pod of Glenn's S-3 Viking aircraft. With the help of the iLab's 3-D printer and staff volunteers, Polack created a \$70 prototype of the window frame. This verified the need for a critical design change in order to decrease aerodynamic drag. The final manufactured window frame is made of aluminum and costs about \$9,000 to produce.

### iLab Saves Time, Money

Your creative brain is a muscle—resolve to exercise it more in 2015!

Visit <https://ci.grc.nasa.gov/> for more information.

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## Awards, Honors

The Society of Women Engineers (SWE), Chicago, honored Dr. Frances Hurwitz, senior materials research engineer, with its 2014 Achievement Award. Hurwitz received SWE's highest honor for her pioneering work in the development of materials used in space exploration, for exceptional team leadership across disciplines and for her work to enable a more equitable work environment.



Dr. Hurwitz



Glenn's Native American Advisory Group advisor Avis Hudson-Burnette with Connolly.



Dr. Goldberg, left, accepts his award presented at the ASCE conference.

The American Indian Science and Engineering Society (AISES) presented the 2014 AISES Technical Excellence Award to Joseph Connolly, a native of the Haudenosaunee of the Onondaga Nation, Wolf Clan from the Six Nations Reserve of the Grand River. Connolly, Intelligent Control and Autonomy Branch, was recognized for STEM contributions to model-based control of turbofan engines and developing technologies for commercial supersonic aircraft, and for his enthusiastic mentoring.

The American Society of Civil Engineers (ASCE) presented the 2014 Associate Editor Award to Dr. Robert Goldberg, Ceramic and Polymer Composites Branch, at the ASCE Aerospace Division Earth and Space Conference, Oct. 27 to 29, 2014. The award recognizes Goldberg's consistent and exemplary service as an associate editor of the *ASCE Journal of Aerospace Engineering*.

## Welcome to the NASA Family

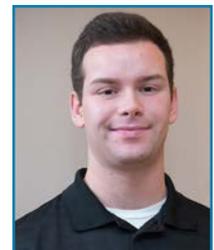
Glenn welcomed two new employees and one trainee, who reported for duty/orientation in November and December. They include Ryan McDonough, Architectures,



McDonough



Rice



Sadey

Networks and System Integration Branch; Amy Rice, Audits and Assessments Office (stationed at NASA Stennis); and James Sadey, a trainee in the Space Power & Propulsion, Communication and Instrumentation Branch.

## Three Honored for Space Flight Contributions

Three Glenn employees were recognized during a Space Flight Awareness (SFA) award ceremony at NASA Kennedy Space Center, Dec. 3, prior to the Orion EFT-1 launch. Kennedy Center Director Bob Cabana presented the awards to the following Glenn members of the Orion team for their integral role in the safe arrival of the Orion EFT-1 Crew Module to Kennedy:

**Terrian Nowden**, Power Architecture and Analysis Branch, for performing critical Electrical Power System analysis enabling safe and successful design and operation of NASA's premier human space flight projects for the International Space Station and the Multi-Purpose Crew Vehicle (MPCV) Orion.

**L. Nicole Smith**, Exploration Systems Project Office, for contributions advancing the state of the art in space flight integrated vehicle testing through her personal efforts in completing the Mechanical Vibration Facility at the Space Environment Test Facility, and for efforts as a mentor, advocate and role model to young women interested in STEM education and careers.

**Kevin Dickens**, In-Space Propulsion Systems Branch, for exceptional technical leadership in the development of the European Service Module's propulsion system, resulting in multiple key system design improvements and successful completion of the Preliminary Design Review.



Photo by Dr. Rickey Shyne

*Astronaut James M. Kelly, left, with SFA honorees, left to right, Nowden, Smith and Dickens.*

## Mentors Needed for Summer Interns

It's that time of year, when NASA Glenn looks forward to supporting and enriching the work experiences of summer interns. If you are interested in becoming a summer mentor again or for the first time, please take a close look at your projects and determine if there is challenging work that can be supported by a summer college or high school intern. Is there meaningful, mission-related work that a high school student, undergraduate or graduate student in the fields of STEM, business or communications could perform that would be advantageous to your organization, as well as broaden the student's experience base? Do you have the time to work closely with the intern in a mentoring capacity, providing your expert knowledge, daily support and career advice? If the answer is yes to these questions, then consider being a mentor.

Mentors can begin posting their opportunities now through February 6, 2015 in the One Stop Shopping Initiative (OSSI) website at <https://intern.nasa.gov/>. Below are the summer internships sessions:

College Internships: June 1 to Aug. 7, 2015; June 15 to Aug. 21, 2015

High School Internships: June 15 to Aug. 7, 2015

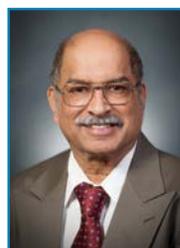
For more information or questions, please contact Monica Boyd at 216-433-2004.

## Retirements

**Susan Gott**, Office of Education, Center Operations Directorate, retired Dec. 31, 2014, with 35 years of NASA service.

**Alan Kane**, Mechanical Systems Design and Integration Branch, Materials and Structures Division, retired Dec. 31, 2014, with 25 years of service.

**Dr. Shantaram S. Pai**, Multiphysics Modeling Branch, Materials and Structures Division, retired Dec. 26, 2014, with 25 years of service.



Dr. Pai

**Connect with Glenn**

**Emergency and Inclement Weather Lines**  
 Lewis Field: 216-433-9328 (WEAT)  
 Plum Brook Station: 419-621-3333

## Calendar

**ASTRONAUT EMPLOYEE BRIEFING:** Astronaut Dr. Steven Swanson, Expeditions 39 and 40 astronaut, returned from the International Space Station in September. He will share his experiences in space during an employee briefing at Lewis Field, Tuesday, Jan. 13, MIC Auditorium. Look for more details on *Today@Glenn*.

**FPTE LOCAL 28, LESA MEETING:** LESA will hold its next membership meeting, Wednesday, Jan. 14, noon, in the Glenn Employee Center's Small Dining Room.

**RETIRED NASA WOMEN'S LUNCHEON:** The next luncheon is Thursday, Feb. 19, 2015 at 1 p.m. at Berea Union Depot Tavern (formerly Pufferbelly), 30 Depot Street in Berea. Reserve your place by calling Gerry Ziemba, 330-273-4850. Luncheons are held the third Thursday at 1 p.m. in February, May, August and November.

**BUCKEYE REGIONAL FIRST ROBOTIC VOLUNTEERS:** The 14th annual Buckeye Regional FIRST Robotics Competition will be held March 26 to 28 at the Cleveland State University Wolstein Center. Volunteers are needed to help make the competition run smoothly. To learn more about the volunteer opportunities visit <http://www.oai.org/firstbuckeye/volunteers.html> or contact Stephanie Brown-Houston, 216-433-8006.

**National Aeronautics and Space Administration**

**John H. Glenn Research Center at Lewis Field**

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# Gathering Spreads Good Tidings and a Glimpse at 2015

Center Director Jim Free and members of the Director's Strategic Management Team (DSMT) hosted a light-hearted Center Holiday Gathering in the MIC Auditorium, Dec. 15. The kickoff was a presentation of center donations to the Marine's Toys for Tots. Free and DSMT members followed with highlights of the center's 2014 accomplishments and future activities that will leave Glenn well positioned to take on leading roles in agency programs/projects in 2015. The event concluded with employees mingling and enjoying refreshments in the MIC foyer.

Photos by Marvin Smith

