

Glenn Team Celebrates Saffire Launch!



GRC-2015-C-06652 Photo by Rami Daud The Glenn team bids farewell to Saffire hardware prior to shipment to NASA Kennedy Space Center for launch.

On March 22, a NASA Glenn-developed Spacecraft Fire Experiment, known as Saffire, successfully launched aboard an Orbital ATK Cygnus cargo resupply mission to the International Space Station. Saffire is a series of experiments to investigate how fire spreads on a variety of combustible materials in a microgravity environment. Each of the experiments will be conducted remotely, at no risk to the astronauts or space station, inside a 3- by 5-foot module. The experiment will remain aboard Cygnus and run autonomously for a few hours after the spacecraft pulls away from the space station (planned in May). Data will be transmitted to Orbital ATK and relayed to Glenn before Cygnus incinerates upon reentry into Earth's atmosphere. Pictured is the Glenn team bidding farewell to the hardware prior to shipment to NASA Kennedy Space Center for launch. To learn more about the experiment, visit http://www.nasa.gov/feature/fire-in-the-hole-studying-how-flames-grow-in-space.

Orion Solar Array Wing Deployment Test Success!

On Monday, Feb. 29, an international team of engineers successfully deployed an Orion solar array wing inside the Space Power Facility (SPF) at Plum Brook Station.

The deployment of the 24-foot wing qualification model was an important

first step to verify Orion's power system for Exploration Mission-1, the spacecraft's first flight atop the agency's Space Launch System rocket.

The solar array is based on the European Space Agency (ESA) Automated

Kavandi Succeeds Free as Director





Dr. Kavandi

Free

NASA Administrator Charles Bolden has named former astronaut Dr. Janet Kavandi director of NASA Glenn. Kavandi has been serving as deputy director since February 2015. She succeeds Jim Free, who was named deputy associate administrator for technical in the agency's Human Exploration and Operations Mission Directorate in Washington.

Kavandi was selected as an astronaut in December 1994. During her time in the Astronaut Office at NASA's Johnson Space Flight Center, she supported space station payload integration, capsule communications, robotics, and served as deputy chief of the Astronaut Office. She is a veteran of three spaceflights.

For more information on the assignment, visit http://go.nasa.gov/1RKwc1C.

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Let's Celebrate Our First ESM Test Success

Congratulations to everyone involved in the first major milestone for the European Space Agency Service Module (ESM) structural test in Plum Brook Station's Space Power Facility! The ESM international team, working with NASA and Lockheed Martin personnel, successfully deployed the ESM solar array wing. A highly committed Area 9 Safety Committee that conducted hazard reviews, and an outstanding safety team that assured critical lifts and procedures, played key roles in the safe deployment. As we proceed with a demanding series of acoustic and vibration tests in the coming months, we need to remember that mission success is not only achieved through our technical merits but also by our commitment to the health and well-being of all team members.

Success and Safety Work Hand in Hand!

—Janet

Orion Solar Array -

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Transfer Vehicle's X-shaped array of four panels. It will generate about 11 kilowatts of power and span about 63 feet when extended. It is a component of Orion's service module, which is being provided by ESA and built by Airbus Defence and Space to supply Orion's power, propulsion, air and water.

The first of two wing deployments to take place in SPF this year, the test confirmed the array unfurled properly and locked into place, and that all of the mechanical parts functioned as expected.

For more information about the test, visit http://www.nasa.gov/feature/orion-solar-array-wing-deployment-test-is-a-success-0.



One of Orion's solar arrays was successfully deployed in a Feb. 29 test at Plum Brook Station to ensure it can properly unfurl.

Glenn's Public Open Houses Come Join the Fun!

Plans are underway for public open houses at NASA Glenn's Lewis Field in Cleveland on May 21 and 22 and Plum Brook Station in Sandusky on June 11 and 12. The hours for each day of the two events will be 10 a.m. to 6 p.m.

Employees, contractors and retirees are needed to staff a variety of positions. On-site personnel should visit http:// events.grc.nasa.gov/OpenHouseVol (internal only) for information and to register. Retirees should call 216-433-5555 to express interest in staffing.

Glenn's open houses will offer a fun and exciting way to engage, inform and inspire the public. All events are free. Among the things to do and see:

- Tour research facilities at Lewis Field and Plum Brook Station used to develop and verify cutting-edge technologies for use in aeronautics, aerospace and space.
- Talk to and ask questions of the engineers, scientists and technical staff to learn about NASA's exciting work being done right here in Ohio.
- See NASA aircraft used for flight research involving solar cell calibration, sensor development, aircraft icing and environmental research.
- Take part in hands-on educational activities for children.

All employees, retirees, U.S. citizens and lawful permanent residents are invited to attend. Visit www.nasa.gov/ glenn75 for important details on attending this year's public open houses. Visitors, vehicles and personal belongings are subject to inspection.

These free events are part of a year-long celebration following Glenn's 75th anniversary on Jan. 23, 2016. They will look back at 75 years of scientific and technological excellence and look forward to a promising new era of discovery.



Glenn Technology Pumps Hope Into Broken Hearts

Advanced motor technology originally developed for flywheel applications may find its way into the hearts of thousands of children who are born with a missing heart ventricle.

By having half a heart, the body is missing half of its pumping ability to oxygenate blood and circulate it to stay alive. Dr. Mark Rodefeld, a pediatric heart surgeon at Indiana University, has spent decades repairing these heart defects through transplants and a partial fix called the Fontan procedure.

While the Fontan procedure helps children survive, Rodefeld said it is only a temporary fix. "Eventually, inefficiency in circulation due to the low pumping pressure catches up with them in their early adulthood when the remaining part of the heart gets worn out from doing all the work," he explained.

So Rodefeld reached out to NASA Glenn to help him develop a small conical pump, driven by an electrical motor, into an existing Fontan network. This

Center Celebrates Women's Potential

In conjunction with Women's History Month, NASA Glenn recently sponsored events to motivate, connect and celebrate women.

Discussion on work life integration, navigating a male-dominated work environment and building a broader network were some of the topics explored during an onsite Women IGNITE Workshop, March 9. It featured speakers from Glenn and the greater Cleveland community.

"This workshop was an opportunity to reflect, rejuvenate and connect with other fabulous women from inside and out of Glenn, and to help develop future leaders throughout the center," explained Glenn's Marlena Hudson, Office of Human Capital Development.

During the workshop, the center premiered the Women@GRC 2015 video. The video provides a glimpse of the nominees and their inspirational messages, which offer encouragement to women and girls who are considering a career at NASA. This video also features historic pictures of women



Bi-conical beart.

pump would reproduce the pressures and flow coming from the body and head, reducing the wear and tear on the single remaining ventricle and extend the life of the patient.

"I knew I wanted to put a bi-conical motor into the cross section of the network, but I needed experts in flywheel technology at NASA Glenn to design and scale it to size," he said.

A team of Glenn engineers spent two years designing, building and testing a bi-conical heart pump for Rodefeld. Eventually they completed a functional



Members of the Glenn team working on the bi-conical heart. Pictured: back row, left to right: Dr. Kirsten Duffy, Paul Passe, Ralph Jansen and Tyler Burba. Second row from back, left to right: Dr. Peter Kascak, David Avanesian and Brian Tomko. Third row from the back, left to right: Beth Arent, Yaritza De Jesus-Arce and Eric Anderson. Front: Irebert Delgado.

prototype of the pump to allow for traditional motor operation as well as levitation operation.

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Featured panelists at Women IGNITE, left to right: Dr. Kathleen Buse, Weatherhead School of Business adjunct professor; Wendy Grant, City of Bedford Heights council at large; and Kellie Rotunno, Northeast Obio Regional Sewer District chief operating officer.

celebrating the 75th Anniversary of NASA Glenn. The Women@GRC 2015 video is available on YouTube at https://youtu.be/EUwmzvXxWls.

Congratulations to Janette Briones, Karen Meinert and Tonya Mitchell, NASA Glenn nominees forwarded to Headquarters for the agency's Women@ NASA 2015 video. The other inspiring Glenn women nominated include Saundra Gage, Natalie Henrich, Maria Kuczmarski, Lauren Clayman, Jacquelynne Houts, Jean Roberts and Ashlie Flegel. The Office of Human Capital Management kicked off Glenn's Women of STEM Leadership Development Pilot Program, March 7. The program entails modules intended to provide professional and leadership development for women of all stages in their careers. The March module "Ideal Self, Women in STEM" focused on unconscious habits and opportunities; intentional change model; values; personal vision; and participation in the IGNITE event. Additional modules will occur in May, July and September.

By Doreen B. Zudell

News and Events Developing a Diverse Workforce Ensures Success for All



Pictured left to right: Dr. Woodrow Whitlow Jr. (2005-2010), Dr. Julian Earls (2003-2005) and NASA Glenn's first African-American Center Director Donald Campbell (1994-2003).

Three of NASA Glenn's former center directors shared some of their challenges, accomplishments and insights into working successfully in a diverse workplace during this year's Black History Month Observance, Feb 17. The African Heritage Advisory Group sponsored the event focused on the theme "Our Past, Our Present, Your Future: Celebrating the Triumphs and Exploring the Future of African-Americans at NASA Glenn." Robyn Gordon, director of Glenn's Center Operations, moderated the panel.



Aviation Week Editor Tours Glenn Campuses

At the invitation of Center Director Jim Free, Frank Morring, *Aviation Week & Space Technology* magazine's Senior Editor on Space, visited Plum Brook Station and Lewis Field, Feb. 19. Morring, accompanied by Deputy Director Dr. Janet Kavandi and Spaceflight Systems Director Bryan Smith, toured several facilities to gain information for articles, some of which were recently published on Glenn's aerospace research.

Thomas Kacpura, left, and Daniel Raible, right, brief Morring, center, on Integrated Radio and Optical Communications technology.

Kelly Returns Home After One Year, Worked With Glenn Experiments on ISS



Astronaut Scott Kelly.

Photo courtesy of NASA

Astronaut and Expedition 46 Commander Scott Kelly and his Russian counterpart Mikhail Kornienko returned to Earth March 1 after a historic 340-day mission aboard the International Space Station (ISS).

During his mission, Kelly performed maintenance on NASA Glenn's microgravity science hardware and supported three Glenn experiments:

- Flame Extinguishment Experiment-2 (FLEX-2) and FLEX-2J
- Advanced Colloids Experiment Heated-1 (ACE-H1)
- Observation and Analysis of Smectic Islands In Space (OASIS)

Kelly's record-breaking mission will help advance deep space exploration and America's Journey to Mars.

For more information about the Glenn experiments, visit http://go.nasa.gov/21KyIg0.

Celebrating a 75-Year Legacy

This is the third in a monthly series of historical highlights commemorating Glenn's 75th anniversary and extraordinary technical accomplishments that reach across seven decades.

Looking Back: 1960s

NASA has relied on liquid hydrogen to fuel its upper-stage rockets for decades. In the late 1950s and early 1960s, Glenn was instrumental in demonstrating that the temperamental high-energy fuel could be successfully utilized in propulsion systems.

Early rocket pioneers recognized the potential of liquid hydrogen as a propellant, but the difficulties liquefying the gas, maintaining the required cryogenic temperature and storing the lightweight liquid prevented its use.

In the mid-1950s, Glenn researchers were the first to test liquid hydrogen in substantially sized rocket engines and fly a hydrogen-powered aircraft. This experimental work was a significant factor in the selection of liquid hydrogen for Centaur, the Saturn S-II and S-IVB in the 1960s.

Technology Pumps Heart

Continued from page 3

"Unlike conventional motors, the outside rotor of this pump spins around the inside, which allows for complex fluid pump shapes to be created on the surface of the rotor," said David Avanesian, Diagnostics and Electromagnetics Branch. "Those shapes then 'grab' blood coming from the body and head, mix it, and then direct it to the lungs for oxygenation."

The Glenn team's extensive design, build and testing led to successful re-

By the 1960s Glenn researchers were conducting extensive investigations with its 2.2 Second Drop Tower, research aircraft and sounding rockets to determine fluid behavior in the low gravity of space.

Improved understanding of liquid hydrogen's capabilities enabled researchers to make significant progress in the development of systems critical to our ability to safely reach low-orbit. These systems include: high-speed turbopump systems to drive the low-density fluid from the tank to the engine; regenerative cooling systems to prevent nozzle disintegration; and complex insulation and storage systems to prevent the cryogenic fluid from sloshing and evaporating. Liquid hydrogen has since powered the space shuttle's main engines and continues to fuel Centaur and Ariane vehicles.



A technician runs a test on a hydrogen rocket engine in the Lewis Rocket Engine Test Facility.

Courtesy of NASA Glenn History Office

sults proving the feasibility of Rodefeld's original idea. While the size of the motor has been scaled down significantly, engineers need to make it even smaller to fit into the Fontan circulation architecture. Further development would help scale the motor down to the required diameter the size of a nickel.

Over the next few years Rodefeld hopes to engage Glenn engineers in additional

l and Test Team
Tyler Burba
Peter Kascak
Paul Passe (VPL)

development and testing, with the goal of advancing this life-saving technology in young patients.

To see a multimedia video simulating the bi-conical heart pump, visit http:// go.nasa.gov/1RqGjZs.

Upcoming Earth Month and Sustainability Events

Northeast Ohio Earth Day Coalition's EarthFest 2016—Celebrating the Year of Clean Transportation

Sunday, April 17, 10 a.m. to 5 p.m. **Cuyahoga County Fairgrounds** NASA Glenn will support this event with displays and sustainable transportation activities. POC: David Smith, 3-5109



Garlic Mustard Pull

Friday, April 22, Noon to 1 p.m. Near Abrams Creek, at the bottom of Duct Bank Road Learn to identify and combat invasive species. POC: Bethany Eppig, 3-3726

Sustainability Fair

Tuesday, May 5, 10:30 a.m. to 1 p.m. MIC Auditorium, Lewis Field Learn about opportunities to protect the environment while also perusing items from local vendors who keep sustainability as a top priority in their products. POC: David Smith, 3-5109

Rain Barrel Workshop

Tuesday, June 7, 11:30 a.m. to 1 p.m. Picnic Grounds Lean more about rainwater harvesting and build a rain barrel to take home. POC: Stacey Yanetta, 3-6468

APRIL 2016

GLENN RESEARCH CENTE

Dr. Shyam Earns Presidential Early Career Award



Dr. Shyam

The PECASE award recognizes recipients' exceptional potential for leadership

President Obama

named NASA Glenn's

Dr. Vikram Shyam

among six NASA

will receive the

Early Career Award

for Scientists and

Engineers (PECASE).

who

Presidential

researchers

2016

at the frontiers of scientific knowledge and commitment to community service as demonstrated through professional leadership, education or community outreach.

Shyam, a propulsion flow dynamist in the Turbomachinery and Turboelectric Systems Branch, leads Glenn's turbine technology development to reduce fuel burn and emissions for future generation aircraft engines. He leads Glenn's biomimicry group (VIBE—Virtual Institute for Bio-inspired Exploration) that seeks sustainable solutions to NASA technical and institutional challenges by emulating nature's patterns and strategies. The group is currently working on aerospace applications of harbor seal whiskers. Shyam is also a member of Glenn's Creativity and Innovation team.

By S. Jenise Veris

Employees Recognized for Promoting the Pursuit of Engineering Excellence

The Ohio Academy of Science has selected five NASA Glenn employees and contractors as Believe in Ohio STEM Exemplars. The honorees are Ohio-educated and employed STEM careerists, recognized for their success at various Ohio STEM-related industries, businesses and institutions and for their mentorship.

Believe in Ohio is a student STEM education program that integrates entrepreneurship. The program is developed by the Ohio Academy of Science and Entrepreneurial Engagement Ohio and funded by the Ohio Board of Regents. Glenn recipients include:

Dr. Paula J. Dempsey, a researcher in Glenn's Rotating and Drive System Branch, helps develop diagnostic and prognostic tools to assess the health and useful life of mechanical components in aeropropulsion systems. Dempsey graduated from three different Ohio universities: Youngstown State University, Cleveland State University and the University of Toledo.

Ann Heyward, executive vice president at the Ohio Aerospace Institute, leads the programs and service lines in research and technology development; industry, university and government partnerships; and workforce development and education. She is a founding member and chair for 10 years of the Buckeye Regional FIRST Robotics Competition Planning Committee. She attended Case Western Reserve University.

Gary Lanik, Zin Technologies, supports the Guess 3 contract as an electrical controls systems engineer in Glenn's Engineering Facilities Group. Lanik oversees upgrades and repairs to the Air Central Process System, the backbone of the center, and other critical controls projects in buildings across the Lewis Field and Plum Brook Station campuses. He attended the University of Akron.

Jonathan Litt, an engineer in the Communications and Intelligent Systems Division, works primarily in the areas of control and health management of turbine engines. Litt attended Cleveland Heights High School and Case Western Reserve University. He authored/co-authored more than 75 technical papers and managed the development of two NASA Software of the Year nominees.

Nicole Smith, project manager for Orion Testing at Plum Brook Station, manages the facility readiness and testing for the Orion Program. Smith is an AIAA Associate Fellow and a member of HHW Ohio's Board of Directors. She graduated from Miami University and the University of Cincinnati.





Dr. Dempsey

Heyward





Lanik

Liti



Smith

Calling All Innovators

Let the Technology Transfer Office help you report your new technology. Watch *Today@Glenn* for upcoming dates, times and locations in May for New Technology Report (NTR) input sessions. For more information, contact Irene Cierchacki, 3–6036.

By S. Jenise Veris

Retirements





Kaustinen

moran

Gene Addy, Icing Branch, Division, retired Feb. 29, 2016, with 33 years of service.

Brad Kaustinen, Planning and Integration Office, Facilities Division, retired March 31, 2016, with 29 years of federal service, including 25 with NASA.

Matthew Moran, Office of the Director, retired March 19, 2016, with 31 years of service.

More Than a Memory -



Karen Lee Cook, 56, an onsite contractor for Wichita Tribal Enterprises (WTE), died Feb. 24. Cook worked as a financial analyst supporting Advanced Exploration and Space Launch Systems, Office of the Chief Financial Officer.

Cook Supported Multiple Customers, Projects

gram Management Office.

GRC-C-2016-413

Welcome to the NASA Family

Left to right: Zupanchick and Rhodes.

Glenn welcomed two new hires that re-

ported for orientation March 7. They

include Bryan A. Rhodes, Space Com-

munications & Spectrum Management

Office; and Anthony J. Zupanchick, Pro-

During 28 years at the center, Cook supported multiple organizations and projects. She began her NASA career as a computer programmer in 1986. In addition to other responsibilities, she enjoyed training employees on Purchase

COOK res

Requisition and Travel courses.

"Karen will be remembered for her smile, famous cookies and caring personality," said James Kubera, WTE's program manager at Glenn.

James A. Bova, 80, a 1990 NASA retiree with 30 years of federal service, died Feb. 18. Bova served in the U.S. Marine Corps before entering NASA's Apprentice class of 1965. He graduated as an aerospace mechanic and joined the Test Installation Division's Engine Research and Space Power Service Section. He helped build, check or modify a wide variety of components to aid aerospace research testing across eight divisions.

Leonard A. Zmijewski, 86, a 1980 NASA retiree with 20 years

of federal service, died Dec. 4, 2015. Zmijewski was a U.S. Air



Photo by Bridget Caswell

Bova

Force veteran. He served as a mechanical technician supporting the Test Installations Division at the Materials Processing Lab for most of his NASA career. Zmijewski received a 1970 Group Achievement Award for superior job performance in the installation of a transducer.

In Appreciation

I wanted to thank all those who offered condolences on the passing of my mother. You provided comfort to my family during a difficult time.

-Gus Martzaklis

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

Calendar

IFPTE LOCAL 28, LESA MEETING: LESA will hold its next membership meeting, Wednesday, April 13, noon, in the Glenn Employee Center's Small Dining Room.

GRC CONNECTIONS: April 15, 9 a.m., Baldwin Wallace University Honors Business students will present market study and focus group results on problem-solving in education, virtual reality and augmented reality.

April 21, 10 a.m.: Mark Mykleby, codirector of the Case Western Reserve University (CWRU) Strategic Innovation Lab, will highlight CWRU work on developing a new grand strategy for the 21st century. Both sessions will be held in the Briefing Center, Building 8.

YURI'S WEEKEND: Celebrate the first man in space with hands-on activities and shows at the Great Lakes Science Center, April 16 and 17. For details, visit GreatScience.com.

NASA SPACE APPS CHALLENGE: Glenn once again will host the Cleveland site for the 2016 Space Apps Challenge, April 22-24. To register, visit https://2016. spaceappschallenge.org/locations/ cleveland-oh-usa.

HARVEST FOR HUNGER: Glenn's 2016 Harvest for Hunger Campaign runs through Friday, April 29. The items most needed are: canned soup, tuna and stew; peanut butter; and cereal. Name brands are not required. Donation boxes are located throughout the center. Items help support local residents who are in need. POC: Robbie Reed, 3–2121.

NATIONAL DAY OF PRAYER: Join the Glenn community for a Christian observance, Thursday, May 5. This year's theme is "Wake Up America." Observances will be at 7:30 and 11:30 a.m. See *Today@Glenn* or type "Prayer" in the WING Transporter for locations and details. POC: Dale Mortensen, 3–6823.

RETIRED WOMEN'S LUNCHEON: The next NASA Retired Women's Luncheon is Thursday, May 19, 1 p.m., at Coppertop Restaurant, 5740 Center Rd. (Rt. 303), Valley City. Please notify Gerry Ziemba, 330-273-4850 or gto64gerry@ yahoo.com to reserve your place.

National Aeronautics and Space Administration

John H. Glenn Research Center at Lewis Field 21000 Brookpark Road

Cleveland, Ohio 44135

www.nasa.gov

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May 2016 Calendar section deadline: Apr. 20, noon News and feature stories require additional time

Editor: **Doreen B. Zudell**, ATS Assistant Editor: **S. Jenise Veris**, ATS Managing Editor: **Kelly R. DiFrancesco**



Read AeroSpace Frontiers online at http://www.nasa.gov/centers/glenn/news/AF/index.html

Next Master Plan Building to Create Campus Center

Progress on Glenn's Master Plan continues to unfold with approval of the design concept for the Research Support Building (RSB). The new building will sit adjacent to the Mission Integration Center (MIC) with an enclosed walkway linking the two facilities. These two buildings are key to creating a Campus Center at Lewis Field, a central destination envisioned to create excitement, promote innovation and serve as a gathering location for the Glenn community.

The 75,000-square-foot RSB will provide office space for 240 permanent occupants (workstations and closed offices). Space will also be dedicated to public areas, which will include a cafeteria, Exchange Store, ATM, hoteling spaces, informal seating, meeting and training rooms and more.

"Office areas will offer flexibility and adaptability, with spaces to enable collaboration. Large window walls will allow ample natural light to enter the workspace," explained Project Manager Tim Wardlow, Project Management Branch. "Public spaces will provide a central location for community gathering."

The area between the MIC and RSB will be transformed into a campus commons



This artist rendering shows an aerial view of the new RSB with MIC to create a Campus Center at Lewis Field.

to accommodate outdoor events. The RSB's elevated gateway architecture will promote this area as a desired destination for Glenn staff and visitors alike.

This Construction of Facilities (CoF) Recapitalization Project includes the demolition of Building 21 during the 2017-2018 timeframe. Construction of the new building is scheduled to begin in summer 2018 with full occupancy expected in 2020. The demolition of the north section (cafeteria wing) of Building 15 is also included and will take place after RSB occupancy, with its footprint being converted to green space.

By Doreen B. Zudell