

## SPF Backdrop for Celebration of Orion Test Hardware

#### International Partnership

NASA and its partners gathered at Plum Brook Station, Nov. 30, to celebrate the arrival of a full-size test version of the Orion service module provided by the European Space Agency (ESA). Representatives from ESA, Airbus Defence and Space and Lockheed Martin joined NASA personnel as panelists during the program, sharing highlights of the hardware and answering questions from U.S. and international media.

"Today, we welcome Orion's Service Module-'The Powerhouse'-for testing at NASA Glenn," Center Director Jim Free said in his welcoming remarks.

The event took place in the Space Power Facility (SPF), and featured the massive European Service Model and



GRC-2015-C-7641 Photo by Marvin Smith Center Director Free addresses the media and guests. Panelists look on as special guest Congresswoman Marcy Kaptur awaits her turn, in the background, to share support.

Continued on page 3

## Glenn Earns R&D 100's "Oscar of Innovation"



A team of Glenn researchers and partners won an R&D 100 award for their Polyimide Aerogel-Based Antennas, presented dur-

ing R&D Magazine's annual awards ceremony, Nov. 13. An independent judging panel and R&D Magazine editors selected it among the 100 most technologically significant products introduced into the marketplace in 2015.

### In This Issue

Director's Safety Corner ...... 2 Best Place to Work-Again! ...... 2

Nominated in the category of IT/ Electronics, polyimide aerogel-based antennas are a new approach to manufacturing antennas. Developed under NASA's Aeronautics Research Mission Directorate Seedling Project, the research advances communication system technologies, particularly in aircraft and spacecraft.

Aircraft require large numbers of antennas-up to 100 in a typical commercial or military aircraft. Aerogels are especially useful as an innovation Continued on page 2

## **Rocket U Gives Employees a Boost**

Nine Glenn employees graduated in the inaugural class of the Rocket University (RU), Nov. 19. The 2-year pilot program was designed to train earlycareer employees through the full lifecycle of a flight project, and develop the next-generation workforce to transition into higher-profile projects.

The program consists of a combination of Academy of Program/Project & Engineering Leadership (APPEL) courses,

Continued on page 8

Celebrating 75 Years...... 3 Meeting Sustainability Goals ...... 5

Center Holiday Gathering ......7



### **Strong Safety Culture Leads to Mission Success**

This month, NASA pays tribute to the crews of Apollo 1 and space shuttles Challenger and Columbia, as well as other NASA colleagues, during the agency's annual Day of Remembrance. This observance honors members of the NASA family who lost their lives while furthering the cause of exploration and discovery. As part of their legacy, NASA has created a safety culture where everyone works to ensure workplace safety and an environment where we feel comfortable communicating safety issues. In reverence to our fallen heroes, and those who continue the quest, let's take the time to complete NASA's 2016 Safety Culture Survey that will be conducted this month. Your voice is important and I look forward to your feedback.

Based on the 2013 survey, we established this Safety Corner, initiated quarterly supervisory dialogues on mishap statistics and streamlined our Safety Bulletin messages.

### NASA Earns Best Place to Work—Fourth Year!

The Partnership for Public Service has named NASA as the "Best Places to Work" in the large agency category for the fourth consecutive year. The award is based on several factors, including the results from the Federal Employee Viewpoint Survey. The survey is just one opportunity for employees to influence change. This year, the center response rate increased 15 percent and the agency response rate increased 5 percent. Employees are the greatest asset to this agency, and leadership is always looking for feedback from the workforce on what matters most and taking action. We are proud to be part of this agency and continue to strive to be better every day. We hope you join in celebrating this achievement! Read more about this award at http://bestplacestowork.org/BPTW/index.php.

—Office of Human Capital Management

## **R&D 100 Awards**

Continued from page 1

for antennas because they possess low density and low dielectric constant, which allows for faster switching speeds and lower heat dissipation. They are 10 times lighter and offer considerably greater bandwidth.

The material and electrical properties developed in Glenn's polyimide aerogels enable superior mechanical strength over other types of aerogels and flexibility in fabrication to meet specific needs in aeronautics, as well as automotive, biomedical applications and radio frequency identification (RFID).

Dr. Mary Ann Meador attended the awards ceremony to accept the coveted "Oscar of Invention" R&D 100 Award on behalf of fellow collaborators. The aerogel team includes Dr. Baochau Nguyen (OAI) and Meador, Materials Chemistry and Physics Branch; Dr. Félix Miranda, Dr. Frederick Van Keuls and Dr. Carl Mueller (Vencore), Advanced High Frequency Branch; and Nick Varaljay, Space Power & Propulsion, Communications & Instrumentation Branch.



—Jim

GRC-2015-C-8115

Photo by Bridget Caswell

The 2015 R&D 100 award winners for Polyimide Aerogel-Based Antennas, pictured, left to right: Dr. Nguyen (OAI), Dr. Meador, Dr. Miranda, Varaljay and Dr. Van Keuls. (Vantage Partners). Not pictured: Dr. Mueller, formerly with Vencore.

The Supercooled Liquid Water Content (SLWC) Sensor for Radiosondes was also chosen as a finalist in the category of Analysis/Testing. The SLWC sensor can change the way icing conditions are measured and analyzed. The water sensor is the only technology for in-situ measurement of SLWC available that does not require flying an aircraft into potentially hazardous conditions. Its ease-of-operation and compact design can easily be added to existing weather balloon instrument packages. The developers include Michael King and Andrew Reehorst from the Icing Branch; and Anasphere, Inc.'s Dr. John Bognar.

The R&D 100 Awards have long been a benchmark of excellence for industry sectors as diverse as telecommunications, high-energy physics, manufacturing and biotechnology. The awards can be vital for gauging a government agency's efforts at commercializing emerging technologies.

To view the full list of award winners, visit www.rdmag.com/news/2015/11/2015r-d-100-award-winners. By S. Jenise Veris

## Happy 75th Anniversary NASA Glenn!

NASA Glenn Research Center celebrates its 75th anniversary this month! A reenactment of the groundbreaking, with modern representatives of the original participants, is scheduled for Jan. 25, 2016. Watch *Today@Glenn* for details.

Ground was broken for the Aircraft Engine Research Laboratory on Jan. 23, 1941. Pictured, left to right, in the foreground: William R. Hopkins, former city manager who developed the airport; John Berry, Airport Commissioner; Frederick C. Crawford, President of the Cleveland Chamber of Commerce; General George Brett, Edward Warner and Captain Sidney Krause of the NACA Main Committee; Edwin Blythin, Mayor of Cleveland; and George W. Lewis, NACA Director of Aeronautical Research.



**Celebrating Orion Test Hardware** 

Continued from page 1

its tooling. The Orion hardware arrived in Ohio earlier in the month. Since then, the NASA team has been working nearly around the clock to prepare for the next testing cycle.

Over the next several months, test engineers will use the SPF's large vibration table and acoustic chamber to mimic the shaking and noise the service module will experience during its ascent into space. They also will conduct a solar array deployment test and use pyrotechnics to simulate the shock the service module will experience during separation from the Space Launch System (SLS) rocket. The testing allows engineers to validate engineering analysis and make sure flight hardware will perform to NASA's safety and flight requirements.

The Orion spacecraft is being developed to help send astronauts to deep space destinations, such as an asteroid placed in lunar orbit and Mars. It will launch on the agency's SLS rocket. ESA, along with its contractor Airbus, is providing the service module for Orion's next mission. This partnership will bring international cooperation to the Journey to Mars. The service module will supply power and propulsion to the Orion spacecraft for Exploration Mission-1 (EM-1).



Above: U.S. and international media ask questions during the program. Right: Robin Brown, right, briefs special guests and media on Orion test bardware.

The Nov. 30 program emphasized the international partnership through a panel comprising Center Director Free; Greg Williams, deputy associate administrator for Human Exploration and Operations at NASA Headquarters; Mark Kirasich, manager for the Orion Program at NASA's Johnson Space Center; Mike Hawes, program manager for Orion at Lockheed Martin; Nico Dettmann, development department head at ESA; and Oliver



GRC-2015-C-7710

Photo by Marvin Smith

Juckenhöfel, vice president and head of the ESM program at Airbus Defence and Space.

"It's all about the success of EM-1 and the Orion service module provided by our partners," Free affirmed. "We're excited about this international partnership. We're proud of our [Glenn's] role in the mission and we're proud of Ohio's participation in the Journey to Mars."

### News and Events

### Young Astronaut Day Celebrates NACA Legacy

More than 350 students (grades 1 through 12) gathered in NASA Glenn's hangar to complete a variety of hands-on engineering challenges during Young Astronaut Day, Nov. 7. All eight activities-developed and conducted by volunteers from Glenn, Cleveland State University, Case Western Reserve Robotics Team and the Cleveland Government Engaged Leaders—centered on aeronautics in recognition of NACA's 100th anniversary. Featured astronaut, Deputy Director Dr. Janet Kavandi, kicked off the event. She highlighted the importance of teamwork and shared her experiences as an astronaut. This year's event was co-sponsored by the Exploration Systems Project Office, the Northern Ohio Section of American Institute of Aeronautics and Astronautics and TFOME. Pictured right: A group of future engineers prepare a Lego airplane launcher for its test.

### News Anchor Reflects on Veterans' Service



GBC-2015-C-7425

Photo by Quentin Schwinn

Glenn's Veteran Awareness Committee welcomed NewsChannel 5 anchor Leon Bibb as keynote speaker for this year's Veteran Awareness Program, Nov. 10. An Army veteran of the Vietnam War, who earned a Bronze Star, Bibb shared poignant stories of some of the soldiers with whom he served or interviewed. One of those memories centered on Randall, a young man from Sioux Falls, South Dakota, with whom he trained as an artillery surveyor in Vietnam. Bibb wrote a poem honoring Randall called "57," which recalls Randall's love of hot cars like the '57 Chevy and his death, 57 days before discharge.

## Virts Shares Insights on Living, Working in Space

Employees welcomed Expedition 42 Flight Engineer and Expedition 43 Commander Terry Virts for a post-flight mission briefing, Dec. 9. Virts, who resided on the International Space Station (ISS) for 199 days, shared highlights on living and working in space, which included three spacewalks. He thanked Glenn employees for their contributions in support of the mission. An avid photographer and videographer, Virts showed a video that captured scenes of the Earth outside the ISS windows. Virts also visited students at Wade Park Elementary School in Cleveland, pictured.





### **Native Americans Share** Water Preservation



GRC-2015-C-7405

Photo by Rami Daud

On Nov. 12, Glenn welcomed Christina Mokhtarzadeh, a hydrologist with the Bureau of Indian Affairs, as the keynote speaker for this year's National Native American Heritage Month observance. Mokhtarzadeh oversees a myriad of services to help protect Indian land and water rights. She seeks to expand the Native American Water Corps, which trains Native Americans to become water resource technicians in their local tribal governments and/or government agencies. Glenn's Roger Tokars followed up with an overview of Ohio's water issues and the center's role in ongoing efforts to monitor the Lake Erie Algae Bloom.

## **Construction Project Helps Meet Sustainability Goals**

#### Saves Thousands of Dollars

A storm water construction project at Lewis Field is providing benefits by decreasing chances of flooding and reducing sewer district fees.

With increased frequency of highintensity thunderstorms, storm water management can be more challenging than ever before. A storm water and sewer assessment at Lewis Field showed rainfall trends put the center's aging infrastructure at risk.

To combat some of these issues, Glenn's Facilities Division initiated a storm sewer project to replace the ailing undersized storm sewers within one of Lewis Field's largest drainage basins, Outfall 1, which discharges to Abram Creek. The project evaluated the existing infrastructure and consolidated the piping into one major main line. Under Phase I, the system was reconfigured to direct flow to water quality units to filter the water prior to entering the extended wet detention basin.

"We created a new basin by converting an unused 1-million-gallon industrial waste water basin in the central campus into a storm water basin," Civil Systems Manager John DeGreen explained. "We also installed two water quality units to treat the storm water entering the basin and settling



This unused 1-million-gallon industrial waste water basin in the central campus was converted to a storm water basin. This helps prevents flooding of local streams and rivers.

out 80 percent of total suspended solids during the storm's first flush."

DeGreen said reducing the volume and flow rate out of the basin allows Abram Creek and Rocky River to maintain its baseline parameters. These contributions will aid in reducing local flooding within the stream and river.

The Northeast Ohio Regional Sewer District (NEORSD) has reenacted its storm water management program to tentatively begin in the second quarter of 2016, giving it authority to manage and collect fees for regional storm water management. Under the program, NEORSD customers can proactively reduce fees by adopting "best management practices (BMPs)," such as installing detention ponds and rain gardens.

"By instituting several best management practices, Glenn will be eligible to apply for 75 percent off the water quantity portion of the NEORSD tax bill and up to 25 percent off of the water quality portion of the bill," said Bob Puzak, chief, Systems Management Branch. "The total yearly bill to the center is anticipated to be \$110,000."

Through the four-phase storm sewer project, Glenn will further attempt to reduce its bill, reduce storm water flow and volume and be environmental stewards to the Rocky River drainage basin.

By Doreen B. Zudell



## **Trending With Tech Transfer** Coating Applications Explored

NASA Glenn has signed a nonexclusive licensing agreement with Dayton-based Hohman Plating & Mfg. LLC to commercialize a suite of two Glenn-patented, high-temperature lubricants.

Hohman Plating specializes in the application of metallic coatings, particularly ones that involve difficult-to-coat parts or unusual processes. The company's reach is considerable, as it is in the top 5 percent of all metal finishers in the country in terms of physical—plant size, number of employees and sales. Hohman Plating licensed two NASA technologies: **PS300**, a self-lubricating, high-temperature coating material that keeps parts virtually maintenance free; and **PS400**, a solid-lubricant coating that maintains performance at continuous duty and is suitable for highly dynamic or extremely high-temperature applications. This agreement makes Hohman Plating the only source for the plasma-spray application of these two patented lubricants.

Hohman Plating's customers can use these coatings in rotating and mechanical wear applications such as bearings and turbomachinery, and exhaust components such as recirculating valves, high-temperature ducting and piping joints. With its connections to multiple industries, Hohman is poised to help NASA disseminate these technologies as widely as possible.

If you want to learn more about licensing, or if you are working on a technology with potential applications beyond the space program, please contact Karen Bartos (kbartos@nasa.gov).

Submitted by Glenn's Technology Transfer Office

### Retirements

Anita Arnold, Office of Human Capital Management, retired Jan. 1, 2016, with 39 years of federal service, including 37 with NASA.

Shirley Frye, Research and Engineering Directorate, retired Dec. 31, 2015, with 29 years of service.

Julius Giriunas, Facility Management and Planning Office, Testing Division, retired Jan. 1, 2016, with 36 years of service.

Daniel Haas, Space Combustion and Materials Branch, Testing Division, retired Jan. 1, 2016, with 35 years of service.

Halbert Hoyett, Space Power & Propulsion, Communications and Instrumentation Branch, Testing Division, retired Jan. 3, 2016, with 37 years of federal service, including 33 with NASA.

Karen Hughes, Aeronautics and Ground-Based Systems, Systems Engineering and Architecture Division, retired Jan. 1, 2016, with 38 years of service.

Terrell Jansen, Space Power & Propulsion, Communications and Instrumentation Branch, Testing Division, retired Jan, 1, 2016, with 40 years of federal service, including 36 with NASA.







Krause

Mark E. Kilkenny, Technology Transfer Office, Office of Technology Incubation and Innovation, retired Jan. 1, 2016, with 42 years of service.

Dave Krause, Structural Mechanics Branch, Materials and Structures Division, retired Jan. 3, 2016, with 32 years of service.

Frank L. Kmiecik, Manufacturing Engineering and Process Branch, Manufacturing Division, retired Dec. 31, 2015, with 28 years of service.

Charles Lawrence, Structural Dynamics Branch, Materials and Structures Division, retired Jan. 1, 2016, with 33 years of service.

Maureen Messich, Office of the Director, retired Jan. 1, 2016, with 38 years of service.

Marlene S. Metzinger, Engineering Management Branch, Facilities Division, retired Dec. 18, 2015, with 35 years of NASA service.





Messich





Sikora

Trimarchi

William "Bill" Sikora, Office of Chief Counsel, retired Jan. 1, 2016, with 37 <sup>1</sup>/<sub>2</sub> years of federal service, including 27 <sup>1</sup>/<sub>2</sub> with NASA.

Paul B. Starner, Systems Management Branch, Facilities Division, retired Dec. 31, 2015, with 31 years of service.

Paul Trimarchi, Mechanical System Design and Integration Branch, Materials and Structures Division, retired Jan. 1, 2016, with 32 ½ years of service.

Due to the bigh number of employees retiring this month, more retirements will appear in the February 2016 issue.

### Welcome to the NASA Family

Glenn welcomed three new employees to the Materials and Structures Division, who reported for orientation Dec. 14. They include, left to right: Elliot A. Schmidt, Structural Mechanics Branch; Timothy M. Smith, Jr., High Temperature and Smart Alloys Branch; and Thomas F. Tallerico, Rotating and Drive Systems Branch.



Left to right: Schmidt, Smith and Tallerico.

### **Promotions**

Ransook Evanina has been selected the Environmental Program manager for the Energy and Environmental Management Office of the Facilities, Test and Manufacturing



Evanina

Directorate. Evanina has advocated for and managed many environmental projects, and also supported research and construction projects during her 25 years of service at Glenn.

## **Centerwide Holiday Gathering Highlights**

Glenn employees joined Center Director Jim Free and members of the Director's Strategic Management Team for some holiday cheer, Dec. 15, in the MIC Auditorium. Free kicked off the festivities with the presentation of 11 boxes of employee-donated toys-nearly double the donations for 2014-which will help spread cheer through the Marine's Toys for Tots campaign. He followed the presentation with highlights of the center's 2015 accomplishments and anticipated leadership in future agency programs/ projects. Festivities also included a trivia contest, emceed by Lance Foster; the Great Recipe Cookie-off contest won by Carlos Gomez; and light refreshmentsthree ingredients for fun holiday faire.

By S. Jenise Veris

# Hand Kangkangk

### More Than a Memory

Michael D. Slivka, 93, a 1986 retiree with 25 years of federal service, died Nov. 8. Slivka was a World War II Army Air Corps veteran who began his NASA career at Plum Brook Station in 1963. He earned the first of three Special Achievement Awards for developing methods and procedures in aluminum welding for the Space Power Facility's cold wall program. Slivka was a Speakers Bureau

#### Calendar

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

#### VOLUNTEERS WANTED FOR FIRST

COMPETITION: The Buckeye Regional FIRST (For Inspiration and Recognition of Science and Technology) Competition is looking for volunteers. There are many volunteer roles suited to your unique interest. Please register at http://www. firstinspires.org/ways-to-help/volunteer/ new-volunteers.

NASA DAY OF REMEMBRANCE: This month, NASA pays tribute to the



GRC-2015-C-8079



GRC-2015-C-8067



GRC-2015-C-8105



GRC-2015-C-8092

Photos by Rami Daud

member. He retired as a construction representative in the Facilities Engineering Division at Lewis Field.

Henry B. Tryon, 89, a 1986 retiree with 22 years of NASA service, died Nov. 15. Tryon was a World War II Navy veteran. He retired from the Advanced Communications Technology Satellite (ACTS) Project Office, where he helped update performance measurement information systems on ACTS that were key to integrating communications with the space shuttle. Tryon received a NASA Group Achievement Award as a member of the NASA/Department of Energy (DOE) Electric Vehicle Project Team, for technological advancements to electric vehicle propulsion systems and aircraft and space power systems.

crews of Apollo 1 and space shuttles Challenger and Columbia, as well as other NASA colleagues, during the agency's annual Day of Remembrance. This year is the 30th anniversary of the Space Shuttle Challenger accident. Stay tuned to *Today@Glenn* for information on this year's memorial program.

**REVISED SMOKING POLICY:** The center's smoking policy has recently been revised to better protect and promote a healthy work environment for all employees. Changes to the policy include: No Smoking within 25 feet of building and facility entrances, windows, air intakes and

other intrusion points where smoke may be entrained in the building; direction on reporting concerns; supervisor roles; and the addition of a policy regarding e-cigarettes. For more details on the policy and designated smoking locations, type "smoking" in the WING and *Today@Glenn* Search box in the upper left corner of WING.

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



#### National Aeronautics and Space Administration

John H. Glenn Research Center at Lewis Field 21000 Brookpark Road Cleveland, Ohio 44135

www.nasa.gov

AeroSpace Frontiers is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the second Friday of each month by the Office of Communications & External Relations in the interest of the Glenn workforce, retirees, government officials, business leaders and the general public. Submit short articles and calendar items via e-mail to the editor: doreen.b.zudell@nasa.gov or 216–433–5317.

February 2016 Calendar section deadline: Jan. 22, 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

## **Rocket U Grads**

Continued from page 1

center-based courses, applied laboratories, and assistance from subject matter experts and mentors. The pilot class began training in November 2013.

"Participants gained technical knowledge and experience on a crossfunctional project team in a low-risk, low-cost environment," explained Glenn RU Program Manager, Rochelle Gallagher, Human Capital Development Division. "This includes opportunities to improve their skills in communications and networking in and outside of the center."

On Sept. 4, the class successfully demonstrated its project, ANGEL (Autonomously Navigated parGliding Experimental Lander), at Fort Sumner, New Mexico. Their objective was to test a precision military ramair canopy designed for cargo drops, at a height of 100,000 feet, including a newly designed drogue chute. The system is scalable to a similar model that could return high-altitude telescopes to earth after their 100-day missions, and avoid landing in the water or inaccessible locations.

"Since I'm one of the youngest engineers in my branch, this program gave me opportunities to take on lead roles in program management early on in my career," said participant, Deb



GRC-2015-C-7599

Photo by Bridget Caswell

Pictured above: Graduates, left to right: Steven Korn, Douglas Astler, Jeremiah McNatt, Amanda Stevenson, Therese Griebel (advisor), Deb Goodenow, Dr. Howard Ross (advisor), Jeffery Chin and Anthony Roberts. Not pictured: Justin Niebuas and Fransua Thomas. Pictured below: The ANGEL System.

Goodenow, Diagnostics and Electromagnetics Branch.

The ANGEL team received further affirmation of the value of their time and effort earlier this month. Members of the class presented their data at the American Institute of Aeronautics and Astronautics SciTech Conference in San Diego.

Glenn's second RU program class began in February 2015. Their research focuses on using remote sensing technology to research algae blooms that pollute water supplies.

By Doreen B. Zudell

