



AeroSpace FRONTIERS

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Glenn Embraces Safety Culture

Our workforce continues to demonstrate NASA's culture of safety-mindedness, as evidenced by our return to work activities following the recent lapse in funding and the ensuing partial government shutdown. Throughout the 5-week furlough, our safety, security and operations personnel worked methodically to provide an incident-free opening of our center, both at Lewis Field and Plum Brook Station. I appreciate seeing the commitments to safety, and the participation of employees in the active reporting of issues and incidents that were corrected to make our community safer and healthier for all.

Thank you for strengthening our safety-focused climate at the Glenn Research Center!

AeroSpace Frontiers

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ALBus Hopes to Increase Power Availability for CubeSats

A new CubeSat, launched Dec. 16, 2018, will test high-power electric systems and the use of unique shape memory alloy (SMA) components for the first time.



The solar arrays on this high-power CubeSat use a custom-designed shape memory alloy construction, allowing for greater design flexibility.

Photos by Bridget Caswell
GRC-2017-C-09615



The ALBus CubeSat team with the flight hardware prior to shipment to Rocket Lab's Huntington Beach Facility for launch vehicle integration.

Completely designed and led by a team of 12 early career scientists and engineers at Glenn, the Advanced Electrical Bus, or ALBus, will be the first CubeSat to demonstrate power management and distribution of a 100-watt electrical system. The CubeSat will also employ a custom-built SMA release mechanism and hinges to deploy solar arrays and conduct electricity.

CubeSats are very small, lightweight satellites, about the size of a loaf of bread, and typically operate within a power range of 5 to 20 watts. Lower power systems are typically used in CubeSats because of size and weight limits, while higher power systems and components cause excessive heat.

"We looked at some of the challenges of high-power CubeSat applications—power management and distribution, system performance and reliable release of solar arrays—and how we could use Glenn technologies and in-space power expertise to address them," said Project Manager Katie Oriti, European Service Module Integration Office.

If ALBus successfully validates its 100-watt power system, it could open up future opportunities for different advanced CubeSat missions requiring high power, while adding functions like electric propulsion and advanced communications systems to these small satellites.

ALBus will collect energy from solar arrays and store it in batteries as it conducts multiple tests of the 100-watt power system. Four solar arrays will be deployed on ALBus by a single, resettable SMA mechanism, which is unique because, unlike other CubeSats, its arrays can unfurl at the same time. While the use of SMA in space isn't new, they've been used on several high-profile missions like the Parker Solar Probe. The ALBus project expands SMA capabilities by creating new, more dynamic materials that could enable future missions.

"We developed advanced shape memory alloys that can function at high temperatures and perform in a stable and repeatable manner," said Othmane Benafan, High Temperature and Smart Alloys Branch.

Another special characteristic of the SMA components is each solar array hinge will transfer electrical power from the respective array to ALBus' power management system. This feature decreases the total number of parts needed, reducing weight and minimizing risk.

"This is done by conducting electricity generated by the solar arrays through the superelastic springs in the hinges," said Benafan. "This is a novel use of superelastic SMAs, particularly in CubeSats where space and weight come at a premium."

Unlike deployment systems used on other CubeSats that can only move once, ALBus' SMA components are also capable of resetting, or moving, multiple times. This allows for greater design flexibility, additional preflight testing, and the ability to make last-minute changes, which could improve future mission success rates.

"This is the first for us as we've been able to develop a resettable, reusable mechanism enabled by shape memory alloys," said Allen Guzik, Mechanisms and Tribology Branch. "This allowed us to ground test these parts several times to ensure everything worked before installing it on ALBus. This capability should significantly reduce component failure risk on CubeSats in the future."

The ALBus CubeSat launched out of New Zealand on Rocket Lab's Electron rocket, and will operate in orbit for up to a year to prove the system is capable of operating 100-watt distribution in the low-Earth orbit environment.

By Jimi Russell and Nancy Smith Kilkenny



On the Cover:

NASA Glenn engineers Mark Sorrells, left, and Allen Guzik make final adjustments to the ALBus CubeSat before shipping to New Zealand for launch.

GRC-2017-C-09627

Honoring Their Legacy

Photo by Bridget Caswell
GRC-2019-C-00148

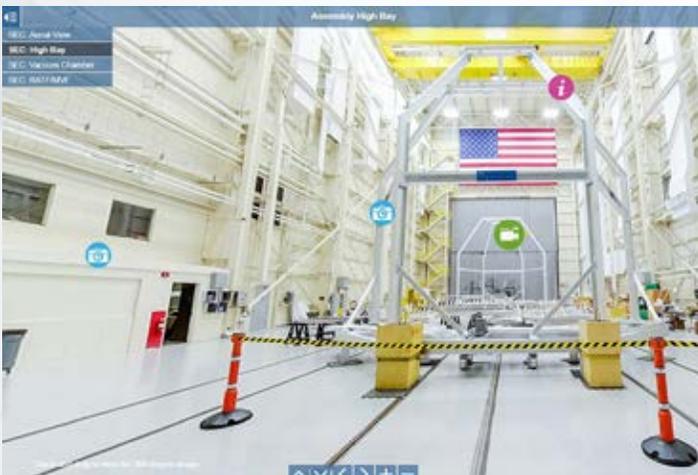


On NASA's Day of Remembrance, Feb. 7, Glenn joined the agency in remembering the Apollo 1, Challenger and Columbia crews and members of the NASA family who lost their lives supporting NASA's mission of exploration. Center Director Dr. Janet Kavandi, pictured, led an observance at Glenn where she expressed the importance of honoring their legacy. She urged employees to remain vigilant in their safety practices and speak up if they feel there may be a problem.

NEWS AND EVENTS

Virtual Tours Provide an Inside Look at Glenn

<https://www.nasa.gov/content/nasa-glenn-virtual-tours>



Curious NASA fans have a new way to discover what goes on behind the gates at Glenn.

A collection of 360-degree virtual tours takes online users behind the scenes to learn about the unique capabilities of Glenn's research and test facilities. The virtual tours feature real imagery, and users can tap icons within each 360-degree image to view narrated videos and see testing in action.

Six tours are available, including the Icing Research Tunnel, Space Environments Complex and Zero-G Facility. Work is underway to launch additional tours in 2019.

National Aeronautics and Space Administration



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Door Hangers Recognize Glenn Inventors

If you happen to see the pictured door hanger on an office door or cubicle, consider congratulating the recipient. Door hangers are presented by the Technology Transfer Office, New Technology Representative, as part of the New Technology Report (NTR) in-reach campaign acknowledging the “Brilliant Ideas” submitted by our inventors. The NTR is an opportunity for Glenn inventors to show the potential value and impact of their invention to NASA and its innovative space.

“Submitting an NTR is part of the natural development process to protect innovator ideas,” explained Irene Cierchacki, NASA lead, New Technology Representative. “They are also a way to bring recognition, licensing opportunities and possibly additional program funding to Glenn.”



Administrator, Glenn Center Director Welcome Back Staff

On Jan. 29, Administrator Jim Bridenstine held a town hall meeting livestreamed on NASA TV to welcome back the workforce after a 35-day government shutdown.

Bridenstine addressed several issues pertaining to activities during the shutdown and plans for moving ahead. “I understand the burden all of us went through,” he said. “I want to say thank you for your patience and for your commitment to this agency and to the mission we all believe in so dearly.”

Although the majority of the NASA civil servant and contractor staff was on furlough, Bridenstine said that those involved in activities deemed “critically important during the shutdown” worked without pay through the furlough. He said several of NASA’s critical programs, such as maintaining the International Space Station and ongoing planetary missions, continued operations.

Work also progressed on NASA’s Commercial Crew Program, where private vehicles made by SpaceX and Boeing transported cargo to the space station. Additionally, contractors funded in advance of the shutdown continued working, enabling achievements in New Horizons/Ultima Thule and OSIRIS REx missions. However, in other areas, some contract workers were reassigned to other clients, so it will take some time to replace them.

Bridenstine addressed back pay for federal employees. He said NASA’s financial office worked through the weekend to make sure everyone received their back pay by the end of the first week. Because each company funded by NASA has its own contract and provisions with the agency, retroactive pay for contractors would depend on each contract.

Chief Information Officer Renee Wynn reported that cybersecurity was of paramount importance during the shutdown, so activities were monitored and prioritized.

Bridenstine said the NASApeople website was considered a “gold standard” for communications during the shutdown. He reminded employees to continue monitoring it for updates at <https://nasapeople.nasa.gov>.

“We have a lot of amazing projects ahead of us in 2019. Keep the faith.”



Photos by Bridget Caswell
GRC-2019-C-00103

Glenn employees listen to Administrator Bridenstine’s live broadcast in the MIC Auditorium. Others viewed from their desktops or NASA TV.



Center Director Kavandi and Chief Information Officer Sean Gallagher answer questions pertaining to information technology issues. Several senior leaders addressed issues pertaining to the shutdown during the town hall.

Immediately following the Administrator's broadcast, Center Director Janet Kavandi hosted a local town hall to provide post-shutdown information and answer employees' questions.

Kavandi told employees that she and other staff communicated with NASA Headquarters three times a week. Other staff monitored/protected information technology equipment and facilities at both Lewis Field and Plum Brook Station during the shutdown.

"I want to thank everyone who worked so hard during the furlough."

Members of the Director's Senior Management (DSM) Team provided information on shutdown activities and guidance moving forward in the areas of Human Capital; Office of Chief Counsel; Information Technology; Center Operations; Facilities; Safety and Health and Office of Chief Financial Officer.

Before gates opened for returning employees, DSM senior leaders and safety personnel inspected buildings to eliminate any hazards and ensure a safe work environment. Employees are encouraged to report potential hazards to the NASA Mishap Information System.

The key topic employees were most anxious to hear about was the issue of back pay. Office of Human Capital Management Director Lori Pietravoia reported that civil servants would receive back pay by the end of the first week.

Along with the NASA People site, employees are encouraged to visit the Glenn Human Resources page for more specific information. See the *Today@Glenn* archives for an attached document with information that was presented by the directorates at the town hall. Important websites are included.

By Doreen B. Zudell



NASA Earns "Best Place to Work"

NASA has once again been named the "Best Place to Work" among large agencies in the federal government. This marks the seventh year in a row the agency has received this honor. The ranking emerges from the annual results of the Federal Employee Viewpoint Survey. The "Best Places to Work" results are published by the Partnership for Public Service.

"I could not be prouder of the work each of you have done to create such a positive work environment."

—Administrator Jim Bridenstine



Apollo Program Reflections

From October 2018 through December 2022, NASA will mark the 50th anniversary of the Apollo Program that landed a dozen astronauts on the moon between July 1969 and December 1972.

Here's a snapshot of the Apollo mission that occurred during March 1969:



Apollo 9

DATE: March 3 to 13, 1969

MISSION: Tested the Lunar Module

CREW: McDivitt, Schweickart, Scott

To learn more about the Apollo Program, visit https://www.nasa.gov/mission_pages/apollo/index.html.



A team at Glenn is building a spaceflight experiment—Flow Boiling and Condensation Experiment (FBCE)—that will operate on the International Space Station in 2020. FBCE will study boiling (liquid to gas) and condensation (gas to liquid) in space to understand the effect that gravity has on our knowledge of heat transfer and two-phase flow (liquid and gas). This information will be used to build smaller, lighter and higher performing thermal management and power transfer systems for future space exploration platforms.

In order to prepare for the spaceflight experiment, the FBCE team built a high-fidelity brassboard system that operates in room 127 of the building 110 high bay. The system has been used to mature the science objectives, develop flight software and test critical avionics, thermal and fluids hardware components.

FBCE will be conducted in the Glenn-managed Fluids Integrated Rack (FIR) on the Destiny module of the space station. The experiment will take 6 months and be controlled by project personnel from Glenn's Telescience Support Center in building 333.

The research team includes Glenn's Dr. Henry Nagra and Dr. Mohammad Mojibul Hasan and Purdue University's Dr. Issam Mudawar. Several early career engineers are also involved in the project.



Philip Gonia, left, and Jordan Higgins record and discuss test run data in front of the FBCE baseboard control station.

Employees Caught— Doing Right!

We are often quick to point out when someone does something wrong, but NASA's Safety Culture Team believes it is equally important to identify good behavior. In 2016, they launched NASA's Caught Doing Right, an initiative that provides employee on-the-spot recognition, and promotes and celebrates the NASA family's commitment to practicing proper safety procedures.

Photos, called "safies," are taken of employees doing right and submitted to the agency's Safety Culture website. Last year, the Caught Doing Right site featured many photos of Glenn employees working safely. The photos submitted not only show the agency commitment to safety, but also share great work practices as well.

How can you become involved?

When you see an employee or group working safely:

- Take a photo
- Submit your photo and complete the form by using the "Submit Photos" button at <https://sma.nasa.gov/sma-disciplines/safety-culture>

At the end of each year, a team of NASA safety professionals will assess the safies and decide on one to feature on a poster for all NASA centers. NASA's Safety Culture Team chose Glenn's Brandon Hale and Morgan Miller's Caught Doing Right photo for the 2019 poster! Be a part of celebrating your team's outstanding safety practices while encouraging others to do the same agencywide.

View photos at <https://sma.nasa.gov/sma-disciplines/safety-culture/safety-culture-caught-doing-right>.



Photo by Amanda Shalkhauser
GRC-2018-CN-00061

Hale is quantitatively fit tested by Miller with an air-purifying respirator to assure he has the right fit to perform his work safely. This photo will be showcased on the 2019 NASA Safety poster.



GRC-2018-CN-00062

John Casciano was found wearing proper personal protective equipment (ear plugs, safety glasses and safety shoes) while operating a blasting machine in one of the center's many shops.

Women@NASA

March is Women's History Month

Looking for interesting stories about women's contributions during Women's History Month? Visit the NASA STEM Engagement site featuring NASA women at <https://www.nasa.gov/education/womenstem>.

It highlights the accomplishments and dedication of women, who by their example as role models, embody the essence of Women's History Month. The site has been expanded to feature not only women who serve NASA as program/project managers, but also those in nontraditional roles in pursuit of careers in science, technology, engineering and mathematics.

RETIREMENTS

David Anderson, Space Science Project Office, Space Flight Systems Directorate, retired Jan. 3, 2019, with 40 years of federal service, including 30 years with NASA.



Anderson

Sylvia B. Cooper, Aeronautics and Ground-Based Systems Branch, Systems Engineering and Architecture Division, retired Jan. 3, 2019, with 36 years of service.



Forman

Cynthia Forman, Office of Human Capital Management, retired Jan. 4, 2019, with 40 years of federal service, including 33 with NASA.



Harpster

George R. Harpster, Thermal Systems and Transport Processes Branch, Propulsion Division, retired Jan. 3, 2019, with 41 years of service.

Robert Hauer, Facilities Infrastructure Division, Facilities, Test and Manufacturing Directorate, retired Jan. 3, 2019, with 36 ½ years of service.

IN APPRECIATION

Dear LLF friends, families and co-workers of NASA,

After 20 years of service at Lewis Little Folks, I am leaving to embark on a new career with 18 wheels under my feet and the open road before me. I would like to express my everlasting gratitude for the love, laughter and friendship so many of you have given me and my family. I will miss my many morning greetings and hugs the most.

Please stay in touch!

—Linda Ryan

MORE THAN A MEMORY



Hyde

William F. Hyde, 80, a 1995 retiree with 38 years of NASA service, died Oct. 14, 2018. Hyde was a 1961 graduate of NASA's Apprentice Program. He served primarily with the Facilities Engineering Division Design Team, where he was recognized in a NASA Group Achievement Award for implementing the Construction of Facilities FY1990 Minor Program. He also helped develop a NASA Lewis test rig supporting the Convertible Engine Systems Technology Program to research experimental aircraft capable of vertical take-off and landing.



Kozlowski

Donald Kozlowski, 84, a 2001 retiree with 20 years of federal service, died Jan. 30. Kozlowski was a U.S. Marine Corps veteran who joined NASA as a draftsman in 1987. He advanced to senior design engineer and later earned a 1995 Group Achievement Award for the W-7 Stators and Laser Window Design for Space Station Training Facility Compressor. He was also on the Lewis Heart Pump Team that assisted the Cleveland Clinic Foundation in the design of the Innovative Ventricular Assist Device.



Reshotko

Meyer Reshotko, 77, a 1995 retiree with 30 years of NASA service, died, Nov. 11, 2018. Reshotko began his NASA career in 1965 in the Reactor Fluid Dynamics Systems Section. He spent most of the 1970s in the Jet Acoustics Branch where he authored Tech Briefs on noise measurement systems. By 1981, he moved to the Launch Vehicles Division as a member of the Medium Launch Vehicle Evaluation Team that won a NASA Group Achievement Award. He was an AIAA Associate Fellow in 1988.

Page Helped Keep the Glenn Workplace Safe



Timothy L. Page, 68, a nondestructive examiner with Mainthia Technologies, Inc., died on Dec. 31, 2018. Page began his 44-year career at NASA Glenn in 1974 as a draftsman working in the Reliability Safety Maintenance group. He later transitioned to an inspector role working with the Pressure Systems Office, performing various non-destructive examinations of pressure vessels and piping systems to ensure their safety and continued safe operation.

"Tim had a significant impact on our organization and on his co-workers, both personally and professionally. He will be greatly missed," said Calogero DiRienzo, Pressure Systems Office manager.

Upcoming Center Events



Moon Landing Night

The Cleveland Monsters ice hockey team is paying tribute to the 50th anniversary of the Apollo 11 Moon Landing.

Saturday, March 23

7:00 to 9:30 p.m.

Doors open at 6:00 p.m.

Quicken Loans Arena

One Center Court, Cleveland, Ohio 44115

Discounted tickets for current and retired employees and contractors are available at www.theqarena.com/fetix.

Former NASA astronaut Mario Runco drops the puck at 7:00 p.m.



Save the Date

Glenn's Safety Culture Survey will be open March 15 through April 15, 2019.

IFPTE LOCAL 28, LESA MEETING

LESA will hold its next membership meeting, Wednesday, March 13, noon, in the Glenn Employee Center's Small Dining Room.

GSEL MOBILE LIBRARIAN

The Glenn Science and Engineering Library (GSEL) Mobile Librarian will be visiting building 6 through March 14 from 1 to 3 p.m. and building 15 from March 19 to 28 from 11 a.m. to 1 p.m. A Glenn reference librarian will be ready to assist employees with subject searches, finding specific books and articles and other information needs on the spot.

POC: Robin Pertz, 3-5776

HELP NEEDED FOR FIRST ROBOTICS

The 2019 FIRST Buckeye Regional Robotics Competition will be held March 28 to 30 at the CSU Wolstein Center in Cleveland. Over 60 high school teams and 1,500 students will be participating in this annual STEM event.

Help is still needed for various positions throughout the 3-day event. Roles, descriptions and registration information can be found at

<https://www1.grc.nasa.gov/frcbuckeye/>

POC: Stephanie Brown-Houston, 3-8006

OUTDOOR SIREN TESTING

The Emergency Management Office staff will conduct a mass notification "voice" test at building 39 on Wednesday, April 3 at Lewis Field. An audible siren test will be conducted on the "emergency condition" tone on Saturday, April 6.

POC: Allen Turner, 3-6826

**National Aeronautics and
Space Administration**

John H. Glenn Research Center

Lewis Field

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Cleveland, Ohio 44135

Plum Brook Station

3597 E. Scheid Road
Sandusky, Ohio 44870

www.nasa.gov

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



Plum Brook Station Completes Acoustic Test for SLS



Photo by Larry Opper
GRC-2018-CN-00063

Researchers at Plum Brook Station have completed a development test on a proposed design of acoustic panels for the Space Launch System's (SLS's) Universal Stage Adapter. Given the extreme sound produced by the world's most powerful rocket, this test series, conducted in the Reverberant Acoustic Test Facility, provided data for acoustic modeling. It will be used to ensure future payloads aboard the second configuration of SLS, called Block 1B, are protected from the high levels of noise and vibration experienced during launch. The testing was supported by personnel from Glenn; Marshall; USA prime contractor, Dynetics; and acoustics subcontractor, ZIN Technologies. The Block 1B version of NASA's SLS is scheduled to launch Exploration Mission-3 in 2024, carrying both crew and cargo to the moon.

Emergency and Inclement Weather Lines

Lewis Field: 216-433-9328 (WEAT)
Plum Brook Station: 419-621-3333

Connect With Glenn

