



Green Technology Set for Demonstration

Research Throttles Up Into Second Gear

NASA's Environmentally Responsible Aviation (ERA) Project has selected eight large-scale integrated technology demonstrations to advance aircraft concepts and technologies that will reduce the impact of aviation on the environment over the next 30 years. NASA Glenn is responsible for three of the eight technologies that will be demonstrated.

The ERA Project, created in 2009, is part of NASA's Aeronautics Research Mission Directorate's Integrated Systems Research Program. ERA's research



C-2012-5932

Pictured: Pratt & Whitney geared turbofan installed in the 9- by 15-Foot Low Speed Wind Tunnel incorporates Glenn-developed propulsion technology that reduces fuel consumption.

portfolio is a healthy balance of industry and government partnerships working collaboratively to mature key technologies, often employing multidisciplinary computational engineering tools and methods in conjunction with integrated systems

Continued on page 3

Deputy Center Director Named

NASA Glenn Center Director Jim Free has selected Gregory L. Robinson as the center's deputy director. Robinson, a native of Danville, Va., is expected to report to his new position by March.



Robinson

Robinson brings to Glenn nearly 30 years of engineering experience, including 6 years in the private sector, while the balance has been with NASA at varying levels of senior management. He was appointed NASA Deputy Chief Engineer in November 2005 and has been responsible for developing and implementing NASA's Engineering Excellence and Technical Authority across the agency.

All Aboard! NASA Glenn Technology Fuels RTA Bus

NASA Glenn's years of fuel cell research are helping to make traveling by bus a cleaner, quieter experience for Greater Cleveland Regional Transit Authority (RTA) passengers.

In 2009, Glenn began supporting a community-based partnership to establish a hydrogen fueling station and add a hydrogen-powered demonstration bus to the RTA fleet. This past fall, Glenn, working with subcontractor Sierra Lobo Inc., installed a refueling station located at RTA's Hayden bus garage in East Cleveland. The station, equipped with hydrogen sensors co-invented by Glenn's

Dr. Gary Hunter and commercialized under a Small Business Technology Transfer contract, generates hydrogen from water for use as fuel for the city bus.

"What makes this project unique is that Glenn has installed the first electrolysis-based refueling station in Ohio," said Brianne Scheidegger, technical lead for the fueling station under the Space Power Systems Project. "This means we don't have to transport hydrogen tanks; we make the fuel onsite, which is safer and more cost effective."

Scheidegger explained that most buses run on diesel or gas-powered engines

and emit the characteristic black plume of smoke when they accelerate from a stop. Fuel cell buses, however, are powered by an electric motor and use a fuel cell instead of a battery to generate the electricity. There is no smoke, just water emitted.

Continued on page 2

In This Issue

- 2 ... Suggestion Award Highlight
- 4CFC Chili Champs
- 5Energy-Efficient Design
- 8Young Astronauts' 20th

Partnership Boasts First Hydrogen Refueling Station in Ohio



C-2012-5674

Photos by Michelle Murphy

The East Cleveland fueling station with bus.

Continued from page 1

On Jan. 22, RTA invited local media to learn more about the energy and environmental benefits of the hydrogen-powered bus. Glenn employees, who have worked on the project through the years, joined media on the bus to help educate the public on Glenn's role in fuel cell development.

"NASA Glenn has a long history of developing fuel cells and we want the public to understand how they can be used in an efficient and clean transportation system," says Dr. Carolyn Mercer, manager of the Space Power Systems Project in the Space Technology Game Changing Development Program. "The concept of a 'fuel cell' was around in the 1800s but when NASA developed a fuel cell for the Gemini program during the early days of space flight, it enabled the creation of a viable commercial market for fuel cells—yet another way that NASA technology creates jobs."

—By Nancy Smith Kilkenny and Doreen B. Zudell



C-2013-319

Pictured are, left to right: Glenn's Dr. Valerie Lyons (retired), Dr. Robert (Joe) Shaw, Scheidegger and Dr. Mercer, who worked with RTA management on the project.

Project Reinforces Glenn's Fuel Cell Research

- NASA created today's fuel cell industry with the Gemini program in the 1960s.
- Glenn continues to innovate with award-winning non-flow-through fuel cell technology.
- Glenn collaborates closely with industry to create jobs in the United States.



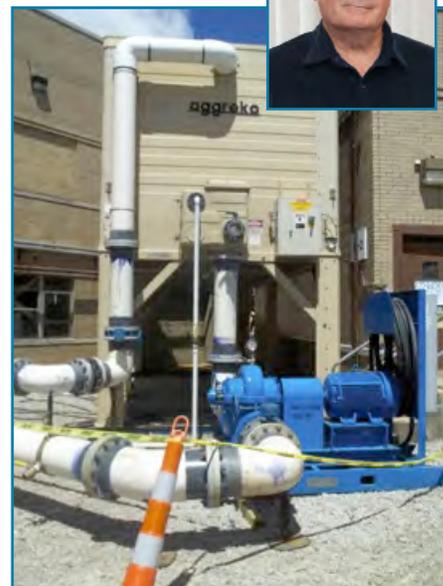
Suggestion Improves Efficiency, Saves Money

Employees realize their ideas count through the Employee Suggestion Program.

During a shutdown of a cooling tower, city water is used to maintain water service to the center's institutional chillers. Large volumes of water is passed through the chillers and discharged into the storm sewer and not recirculated (known as "once-thru cooling"). While shutdowns are required to perform routine maintenance, the process is costly—soaking up thousands of dollars in domestic water costs. Art Hugo, an engineer in the Engineering Management Branch, suggested an alternative approach to this costly method.

Hugo proposed the center rent mobile cooling towers to perform the task. Cooling towers and pumps are attached to chiller equipment through temporary piping. Despite an initial investment to design and install the infrastructure to support the mobile units and the rental equipment, the center saved \$1,250,476 in water fees and nearly 400 million gallons of water during a 2-month shutdown. Additional savings is expected in 2013 and the outlying years.

Hugo is one of several employees whose ideas were recently adopted under the Employee Suggestion Program. The program allows cash awards, up to \$7500, paid to employees who submit suggestions that directly improve efficiency, economy and/or effective execution of government operations. To learn tips and guidelines for submitting ideas, contact Harvey Schabes, 3-5309.



Pictured: A mobile cooling tower with piping
Inset photo: Hugo.

Environmentally Friendly Technology

Continued from page 1

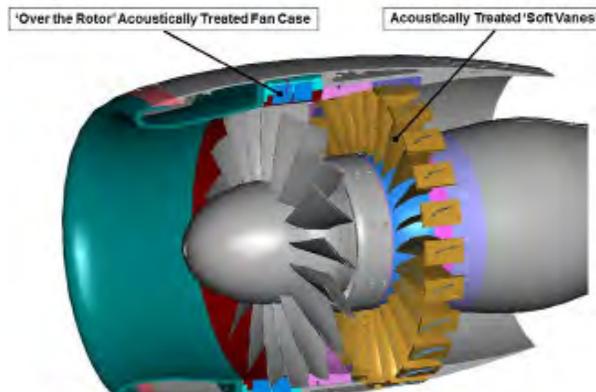
analysis to aggressively pursue fuel burn, noise and emission reductions goals for tomorrow's transport aircraft. Each of the demonstrations, which are scheduled to begin this year and continue through 2015, is expected to include selected industry partners, many of which will contribute their own funding.

The demonstrations will focus on five areas: aircraft drag reduction through innovative flow control concepts; weight reduction from advanced composite materials; fuel and noise reduction from advanced engines; emissions reductions from improved engine combustors and fuel consumption; and community noise reduction through innovative airframe and engine integration designs.

"With these demonstrations we will take what we've learned and move from the laboratory to more flight and ground technology tests," said Fay Collier, ERA project manager based at NASA Langley. "We have made a lot of progress, but the real challenge is to integrate ideas and

pieces together to make an even larger improvement."

ERA is one of many NASA aeronautics research efforts to develop technologies to make aircraft safer, faster and more efficient and to help transform the national air transportation system. Research is being conducted at several NASA centers. To view the complete list of breakthrough technologies, visit www.nasa.gov/centers/glenn/news/pressrel/2013/13-002_throttles.html.



This cutaway image illustrates a Pratt & Whitney Advanced Ducted Propulsor fan model. It was used to validate Glenn's work on first generation acoustically-treated parts to reduce engine noise.

Glenn's Technologies To Be Demonstrated

- **Highly Loaded Front Block Compressor Demonstration:** Tests to demonstrate the enabling technologies required to achieve higher pressure ratio and thermal efficiency of core engines for reduced fuel consumption.
- **2nd Generation Ultra High Bypass Ratio Propulsor Integration:** Continued development of a geared turbofan engine to help reduce fuel consumption and noise.
- **Low Nitrogen Oxide Fuel Flexible Engine Combustor Integration:** Demonstration of a full ring-shaped engine combustor that produces very low emissions.

Exploring Extreme Sustainable Solutions

Since October, 24 students, ranging from 14 to 20 years old, have been immersed in activities designed to help them become responsible and innovative caretakers of the environment. They are members of the newest addition to the NASA Glenn Exploring Project, Post 634/eXtreme Green, which is participating in a

variety of projects related to the next-generation green laboratory.

The Exploring Project is a collaboration of NASA Glenn's Educational Programs Office and the Boy Scouts of America, providing students exposure to Glenn-specific research and technology activities, while inspiring interest in science, technology, engineering and mathematics (STEM) careers.

"Each week, students participate in roundtable discussions and monitor the Big 6 metrics—pH (hydrogen ions), temperature, oxygen, phosphate, nitrate, and true specific gravity and electrical conductive properties—for

their own portable green-lab systems set up in Glenn's GreenLab," explained Dr. Bilal Bomani, GreenLab Research Facility manager and Post 634 advisor. "We're concentrating on finding alternative, renewable and sustainable solutions for self-sustainable renewable energy ecosystems."

Over the next few months, students will conduct biofuel, biomass and alternative energy optimization experiments, as well as analyze eXtreme green data, to potentially be used in Glenn's world-class laboratory and published in a NASA Technical Memorandum.

In addition to Bomani, Henry Fain, Energy Systems Branch; Bethany Gigante, a co-op in the Energy and Environmental Management Office; and Glenn retiree Dr. Valerie Lyons, mentor eXtreme Green Post participants.

—By S. Jenise Veris



Dr. Bomani, second from right, guides students in constructing a portable greenlab ecosystem.

Photo by Tim Dedula



C-2012-5990

Photo by Marvin Smith

Local Coast Guard Connection ^

Officers in the United States 9th Coast Guard District visited the center on Nov. 26 to learn how NASA Glenn overcomes challenges, motivates its staff and achieves inclusion among its workers using innovation and creativity methods. Presentations by several senior managers, one-on-one discussions and facility tours helped establish new relationships and connections between the Coast Guard and NASA Glenn.

Building Anticipation v

The 2013 Buckeye Regional FIRST Robotics Competition Kickoff was held on Jan. 12 at the Cuyahoga Community College Unified Technologies Center. More than 150 local students, teachers and volunteers from 24 Northeast Ohio high school teams attended the kickoff, which revealed the new game, "Ultimate Ascent." Each team received an identical kit of parts to begin an aggressive design-build of their own robot. For more information on FIRST (For the Inspiration and Recognition of Science and Technology) Robotics and the Buckeye Regional competition, March 28-30, visit <http://www.oai.org/firstbuckeye/index.html>.



PBS Helps With On-the-Job Training >

High school students in the culinary arts program at EHOVE Career Center in Milan, Ohio, recently showcased their skills by providing lunch for sale at Plum Brook Station (PBS). The buffet-like menu items, offered at PBS a few times a year, help the students gain experience cooking for and serving to the public. Pictured is EHOVE student Hannan Smith with Rick Sorge, test program manager in the Space Power Facility. Miss the opportunity to enjoy the cuisine? Culinary arts students will return for an encore on April 16 and Oct. 16.



Photo by Larry Opper



C-2012-6406

Photos by Michelle Murphy

CFC Chili Champions v

On Dec. 11, the Combined Federal Campaign (CFC) Chili Cook-Off proved to be an overwhelming success! Thanks to the generosity of 19 employee chili chefs, patrons and volunteers, Glenn raised \$742 for the CFC Undesignated Fund in a matter of 90 minutes. The Cook-Off winners include: pictured far left, left to right: Judge's Choice Award—Jim Free's Two-Vote Chili; People's



C-2012-6404

Choice Award—Anna Falcon's Jackpot Chili; and Showmanship Award—Nicole Smith and Trudy Kortess's Chili Con Cuties. Left: employees sampling the entries.

Buildings Adhere to Energy-Efficient Design Standard

Modern building construction includes much more than stability and comfort. NASA Glenn employees can be confident that new buildings constructed at the center are energy efficient and use environmentally friendly materials according to LEED (Leadership in Energy and Environmental Design) certification standards.

Developed by the U.S. Green Building Council in 2000, LEED provides a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. LEED for New Construction addresses design and construction activities for both new buildings and major renovations of existing buildings, which includes major heating, ventilation, and air-conditioning (HVAC) systems improvements, significant building modifications and major interior rehabilitation.

Efficient and Effective

An internationally recognized mark of excellence, LEED certification provides independent third-party verification that a building was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selections and indoor environmental quality.

“Upfront planning for green operations and maintenance can help ensure that a building performs to its full potential,” Project Management Branch Chief John Selby said. “LEED certification standards help lay the foundation for sustainable operations and maintenance practices once the project has been completed.”

Significant Savings

Selby said the energy model design for the Centralized Office Building was developed to LEED standards and predicts a 30 percent decrease in energy use compared to a standard new office building. He estimates



C-2011-4979

Photo by Marvin Smith

The new Main Gate is LEED-certified Gold, boasting a number of "green" features.

that compared to existing Glenn office buildings, the energy costs per square foot of building area for the Centralized Office Building will be less than half, saving more than \$100,000 annually.

In addition, several Lewis Field buildings, including the Guerin Management Center, Main Gate and Business Service Center (bldg. 60), hold LEED certification, and the new warehouse (bldg. 351) completed last year in the Lewis Field West Area is expected to receive certification soon. The Shipping and Receiving Facility (SARF), now under construction at Lewis Field and scheduled to open this year, has been designed to LEED standards. At Plum Brook Station, the Space Power Facility, which is planned for major renovations this year, is designed for LEED certification. The new Main Gate project at Plum Brook Station, also planned for construction starting in 2013, is designed to be LEED certified.

Future LEED-certified buildings in the early planning stages include a major expansion to the Building 351 Warehouse and a new 90,000-square-foot Research Support Building, the second major office building in Lewis Fields's central campus. All new buildings are designed to employ high-performing energy systems and advanced metering concepts.

“Most of the center’s buildings were never metered, making it impossible for us to accurately measure and trend energy usage,” Selby explained. “Our LEED-certified buildings, however, will allow us to track our energy usage and make adjustments when necessary. This will result in significant reductions in our maintenance and operations budget for these buildings.”

—By Doreen B. Zudell

Socialize with Glenn

Join thousands of people who are connecting to Glenn through these social media sites:

Facebook

<http://www.facebook.com/NASAGlenn>

Twitter

<https://twitter.com/NASAGlenn>

Flickr

<http://www.flickr.com/photos/nasaglenn/>

YouTube

<http://www.youtube.com/nasaglenn>



Awards, Honors and Promotions

Employees Crucial to Investigation Team

Space Flight Awareness Award



C-2013-109

Photo by Michelle Murphy

Pictured with the award, left to right: Melis, Meriwether, Lewis and Duane Revilock, another member of the Glenn sub team.

During fueling of the final flight of Discovery/STS-133, NASA technicians discovered a crack in the intertank foam of the shuttle's external tank. After removing the foam from that location, they discovered longitudinal cracks in the intertank stringers. This launched a major investigation.

Marvin Meriwether and Sharon Lewis, SGT/Logistics and Technical Information Division, provided mission-critical support to the

External Tank Stringer Investigation Team assembled to assess the cause and resolve the problem so that STS-133 could fly safely.

On Jan. 15, NASA Glenn recognized Meriwether and Lewis for their efforts by bestowing on them a Space Flight Awareness (SFA) Team Award for their exceptional and dedicated mission-critical support to the investigation. Matt Melis, Structures and Dynamics Branch and a member of the investigation team assembled in sub teams across the agency, submitted the nomination and presented the award.

"Marvin and Sharon helped bring organization to chaos. They worked efficiently and effectively to ensure the equipment and materials we needed at Kennedy Space Center arrived on time so we could conduct a tanking test on the space shuttle launch pad. Their timeliness was key to the success of our efforts." Melis said. "The investigation was a true team effort, and Marvin and Sharon played a critical role in Glenn's contributions to the team."

— By S. Jenise Veris

William Camperchioli has been selected chief of Space Combustion and Materials Branch in the Testing Division, Facilities and Test Directorate. Camperchioli has progressively advanced over his 25-year career at NASA Glenn. He most recently served as the Space Simulation Facility Manager responsible for managing the center's research and development space simulation ground test facilities.



Camperchioli

Dr. Malcolm Stanford, Tribology and Mechanical Components Branch, was honored as a Modern-Day Technology Leader during the Black Engineer of the Year (BEYA) STEM Global Competitiveness Conference held Feb. 7 to 9. Stanford leads NASA Glenn's development of novel superelastic materials for corrosion-proof, damage-tolerant mechanical components. The event was hosted by Lockheed Martin Corporation, The Council of HBCU Engineering Deans, *US Black Engineer & Information Technology* magazine, and sponsored by Aerotek.



Dr. Stanford

Allen Turner has been selected the new Emergency Preparedness Manager for the Office of Protective Services (OPS). Turner joins the OPS staff from the United States Coast Guard (USCG), where he served as both a commissioned officer and a civil servant. Most recently, Allen served as a subject matter expert and program manager for the USCG emergency planning and preparedness efforts within the Great Lakes area.



Turner

Retirements



Dr. Chamis



Dr. Seng

Dr. Christos C. Chamis, Research and Technology Directorate, retired Oct. 13, 2012, with 46 years of federal service, including 44 with NASA.

Dr. Valerie J. Lyons, Power and In-Space Propulsion Division, Research and Technology Directorate, retired Jan. 3, 2013, with 37 years with NASA.

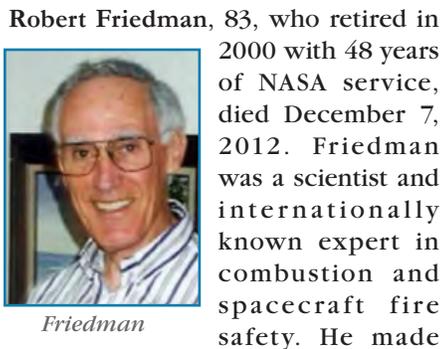
Dr. Gary T. Seng, Communications, Instrumentation and Controls Division, Research and Technology Directorate, retired Feb. 1, 2013, with 34 1/2 years of NASA service.

In Appreciation

My wife Loretta and I would like to sincerely thank our many NASA Glenn friends and colleagues who offered kind words of sympathy and support after the recent passing of Loretta's father, Frank Romanoski, Sr. Your thoughts and prayers meant more to us than words can express.

—Joe and Loretta Shaw

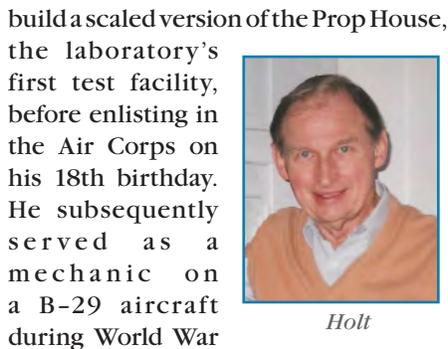
In Memory



Friedman

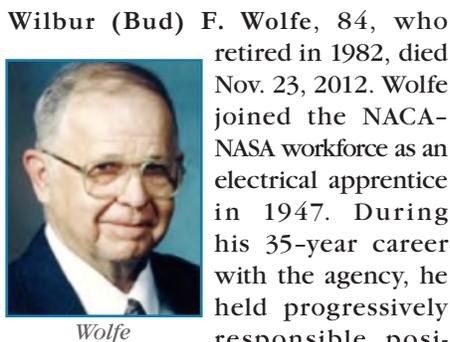
Robert Friedman, 83, who retired in 2000 with 48 years of NASA service, died December 7, 2012. Friedman was a scientist and internationally known expert in combustion and spacecraft fire safety. He made significant contributions to analytical and experimental microgravity-combustion research that was recognized as having great potential for spacecraft and terrestrial applications. Friedman's work aided the development of models and data for the prediction of material flammability for improved insulation, fire protection, more sensitive smoke detection and ultimately improved aircraft and spacecraft design. His contributions were the foundation of NASA Glenn's critical role in the agency's spacecraft fire safety strategy, a legacy that continues today.

Frank Holt, 87, who retired in 1980 with 38 1/2 years of federal service, died Dec. 10, 2012. At 16, Holt was the youngest hire at NACA's new Aircraft Engine Research Laboratory in Cleveland in February 1942. He was among a small group of talented high school students, along with local technicians, hired to create scaled models of facilities and test articles for wind tunnels. Holt helped



Holt

build a scaled version of the Prop House, the laboratory's first test facility, before enlisting in the Air Corps on his 18th birthday. He subsequently served as a mechanic on a B-29 aircraft during World War II and returned to the lab in 1946 to continue working as a mechanic in the Test Installations Division on various aerospace projects as NACA transitioned to NASA. He worked primarily in the wind tunnels on notable projects under the Crash Fire Test program and the V/STOL (vertical/short takeoff and landing) program.



Wolfe

Wilbur (Bud) F. Wolfe, 84, who retired in 1982, died Nov. 23, 2012. Wolfe joined the NACA-NASA workforce as an electrical apprentice in 1947. During his 35-year career with the agency, he held progressively responsible positions, which enabled him to practice his trade in nearly every research facility. Prior to retiring, Wolfe served as head of the Electrical Power Distribution Office overseeing a staff of power dispatchers who controlled and monitored the center's entire electrical power system. He also administered the center's contract with the Cleveland Electric Illuminating Company for the purchase of more than \$3 million dollars of additional electric power annually. Wolfe served on the center's Federal Energy Conservation and Electrical Power Reduction Committees and was a member of the Technical Service Division's Supervisor's Club.

February 20 is John Glenn Friendship 7 Day in Ohio



Calendar

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

GRC CONNECTIONS: The next GRC CONNECTIONS forum will be held Feb. 21 from 10 to 10:45 a.m. in the Briefing Center.

RETIRED NASA WOMEN'S LUNCHEON: The next NASA Retired Women's Luncheon will be Thursday, Feb. 21 at noon at the 100th Bomb Group on Brookpark Rd. Contact Gerry Ziemba, 330-273-4850, to reserve your place.

BLACK HISTORY MONTH: Glenn's Black History Month Observance event, featuring guest speaker Ohio State Senator Nina Turner, will be held Feb. 28, from 10 a.m. to noon in the Administration Building Auditorium. POC: Lynda Glover, 3-2463

Call for Summer Intern Mentors

Glenn's Educational Programs Office is looking for employees who can serve as mentors for the Glenn High School Internship Project (GHIP). The 8-week paid internship runs from June 17 to Aug. 9, 2013. Thirty mentors are needed to support high school sophomores and juniors. Employees interested in becoming a mentor for this program must post opportunities for student(s) in the One Stop Shopping Initiative (OSSI) at <http://intern.nasa.gov> through Feb. 13, 2013. You must begin your opportunity title with "GHIP". Intern funding will be secured for all GHIP mentors. POC: Giovanna Mignosa, 216-433-2894. For information on the internship, visit <http://www.nasa.gov/centers/glenn/education/GlennHighSchoolInternship.html>.



Article Submissions

News items and brief announcements for publication in the March issue is noon, Feb. 15. Larger articles require at least one month notice.

READ US ON THE INTERNET:

<http://aerospacefrontiers.grc.nasa.gov>

Hermes Award 2009-2012



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 Community and Media Relations Office in the interest of the Glenn workforce, retirees, government officials, business leaders and the general public. View us online at <http://aerospacefrontiers.grc.nasa.gov>. Submit contributions via e-mail to the editor: doreen.b.zudell@nasa.gov or 216-433-5317.

Editor: **Doreen B. Zudell**, SGT, Inc.

Assistant Editor: **S. Jenise Veris**, SGT, Inc.

Managing Editor: **Kelly R. DiFrancesco**



VOLUME 15 ISSUE 2 FEBRUARY 2013

Young Astronauts Day 20th Anniversary

What's it like to be an astronaut?

Each year, students in Ohio gain a glimpse into the skills needed to be an astronaut during NASA Glenn's Young Astronauts Day (YAD). In November 2012, YAD celebrated its 20th anniversary.

YAD annually attracts hundreds of students, representing schools, clubs and scouting troops throughout Ohio, who travel to NASA Glenn to test their skills on a number of competitive engineering and scientific activities related to a NASA mission. They work in groups designated Pilots (grades 1 through 6) or Commanders (grades 7 through 12).

NASA and the Northern Ohio Section of the American Institute of Aeronautics and Astronautics (AIAA) cosponsor this annual event initiated by Dr. Colin Drummond, a former aerospace engineer in NASA Glenn's Aeronautics Directorate. In 1992, while serving as chairman of that AIAA section comprised largely of NASA employees, Drummond proposed leveraging resources to conduct an educational outreach project in math and science.

MaryJo Long-Davis, chief of NASA Glenn's Inlet and Nozzle Branch and an AIAA member, who has coordinated the event for many years, said the success of this long-running program is largely due to the dedication of AIAA and NASA Glenn volunteers.

"A lot of planning and hard work goes into the program," she explained, "yet we've successfully hosted an average of 300 students each year with no reduction in participation by volunteers."

To emphasize this fact, Long-Davis cited how Ryan Edwards, a NASA employee at Plum Brook Station and former YAD student, is now following in his parents footsteps. Karen and Daryl Edwards are 15-year YAD veteran volunteers who recently retired from Glenn.

Glenn's Exploration Flight and Development Project Office and the AIAA Northern Ohio Section sponsored YAD's 20th anniversary activities, with the support of Glenn's Educational Programs Office. Astronaut and former Associate Director of External Programs Gregory H. Johnson fulfilled a YAD tradition of helping kickoff the day's activities.



Photos by Karen Edwards



Pictured, top: astronaut Greg Johnson greeting parents and students; and above, students participating in the 20th anniversary activities in the Glenn Hangar.

"The popularity of this annual event, and the enthusiasm of the students who experience it, proves the next generation of scientists, engineers and explorers is eager and up to the challenge," Long-Davis said.

—By S. Jenise Veris