National Aeronautics and Space Administration

THE NEIL A. ARMSTRONG FLIGHT RESEARCH CENTER

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# Legends live on

## Neil A. Armstrong and Hugh L. Dryden honored at center festivities May 13

**By Jay Levine**
X-Press editor

Two aerospace legends and their families were honored at a formal dedication ceremony May 13. It marked the dedication of NASA's Armstrong Flight Research Center, formerly the Dryden Flight Research Center.

Legislation passed in January to rename the center after the late Neil A. Armstrong, a former research test pilot here and the first man to step on the moon during the historic Apollo 11 mission in 1969. Armstrong flew aircraft, including the rocket-powered X-15s, during his seven-year tenure at the center from 1955 through 1962.

The legislation also directed the naming of the center's aeronautical test range for the late Hugh L. Dryden, the center's namesake since 1976. A brilliant aeronautical engineer for the National Bureau of Standards from the 1920s through the 1940s, Dryden served as the director of the National Advisory

**Event, page 6**


**ED14-0144-108** **NASA/Jim Ross**

*A black cloak falls to reveal the new name of the Mojave Desert NASA center – NASA's Neil A. Armstrong Flight Research Center.*

www.nasa.gov/ **Legendary NASA pilot Bill Dana passes, page 10**

# It's all about access

## Invitees gain first-hand look at Access II research, center

**By Jay Levine**
X-Press editor

Social media followers and news media representatives from across the United States, Canada and the United Kingdom came to the high desert of Southern California May 20 to learn about a NASA project that is investigating the effects of alternative fuels on the environment.

Based at NASA Armstrong Flight Research Center's facilities in Palmdale and Edwards Air Force Base, California, the NASA Social focused on the Alternative Fuel Effects on Contrails and Cruise Emissions, or ACCESS II, research effort and a look at what's new in aerospace research at NASA Armstrong's facilities.

The ACCESS II research supports NASA Aeronautics' strategic vision, one of whose goals is to enable transition of the aviation industry to low-carbon fuels and alternative propulsion systems.

The ACCESS II campaign is a joint project involving NASA Armstrong, NASA's Langley Research Center in Hampton, Virginia, and Glenn Research Center in Cleveland, along with partner agencies the German Aerospace Agency (DLR) and the National Research Council (NRC) of Canada.

Key speakers during briefings on ACCESS II included NASA Langley's Bruce Anderson, ACCESS II chief scientist and principal investigator; NASA Glenn's Rubén Del Rosario, NASA Aeronautics Fixed Wing Project manager; and NASA Armstrong's Gary Martin, deputy project manager for the Fixed Wing project.

Four research aircraft have been involved in the ACCESS II campaign – the German Aerospace Center's Falcon 20-E5, the National Research Council of Canada's CT-133, NASA's four-engine DC-8 flying laboratory and NASA's HU-25C Guardian. In addition to learning about the aircraft involved in the missions, event attendees were able to board the DC-8 and HU-25C.


**ED14-0152-01** **NASA/Tom Tschida**

*NASA Social attendees, news media, scientists, flight and ground crew and escorts gathered in front of NASA's venerable DC-8 flying science laboratory in Bldg. 703's hangar during the ACCESS II NASA Social and media event.*

**ED14-0152-49** **NASA/Tom Tschida**

*From left, Michelle Haupt, Tom Jones and Nils Larson tell NASA Social attendees what they like about their jobs at NASA Armstrong.*

Following presentations and tours at NASA Armstrong's Bldg. 703 in Palmdale, many of the attendees were transported some 40 miles to NASA Armstrong's main campus at Edwards, where they toured aircraft hangars, experimental fabrication facilities, the model shop and key historic aircraft.

Attendees learned first-hand from NASA Armstrong employees about NASA aeronautics research and work at the center, including a panel session with NASA Armstrong flight test engineers Michelle Haupt and Tom Jones and research pilots Nils Larson, Hernan Posada and Jim Less.

NASA continues to push for

**Access, page 20**

# Range honors Dryden

The Western Aeronautical Test Range at NASA's Armstrong Flight Research Center was named in honor of the late Hugh L. Dryden in brief ceremonies at the center April 15.

In so doing, the memory of Dryden, the person for whom the NASA field center owes its existence as a permanent aeronautical research facility, is perpetuated.

Center director David McBride and NASA Associate Administrator Robert Lightfoot presided at the brief dedication ceremonies in the lobby area of the test range's mission computer and control room complex on the third floor of the center's administration building at Edwards Air Force Base.

Naming the test range for Dryden was included in the legislation redesignating the center in memory of the late NASA research pilot and Apollo 11 astronaut Neil A. Armstrong, the first person to set foot on the moon.

Dryden, who had been the namesake of the center since 1976, was a brilliant aeronautical engineer with the National Bureau of Standards for more than a quarter century. He became the first director of research for the National Advisory Committee for Aeronautics (NACA) in 1947 and that agency's first director in 1949. Upon the NACA being folded into the newly established National Aeronautics and Space Administration in 1958, Dryden served as its first deputy director until his death in 1965.

A formal ceremony to mark the renaming of the center as the Neil A. Armstrong Flight Research Center happened May 13.

**ED13-0397-01** **NASA/Tom Tschida**

*NASA Armstrong Director David McBride unveils a painting of the late Hugh L. Dryden while NASA Associate Administrator Robert Lightfoot prepares to do likewise for a bust of Dryden during a ceremony naming the center's aeronautical test range in his honor.*

# Shin honors Hackenberg

Jaiwon Shin, Aeronautics Research Mission Directorate associate administrator, presented a trophy and a certificate to NASA Armstrong's Davis Hackenberg at the center on March 21. The awards were part of the Associate Administrator Award that Hackenberg received for his work on strategic partnerships.

Hackenberg received the award for, "exemplary performance in his role as strategy and integration manager for the Unmanned Aircraft Systems – UAS – in the National Airspace System – NAS – Project Office," according to the nomination letter.

Hackenberg has focused on

**Honor, page 18**

**ED14-0087-04** **NASA/Ken Ulbrich**

*Tom Irvine, ARMD deputy director, left, presents the Associate Administrator Award to Davis Hackenberg, center. At right is Jaiwon Shin, NASA ARMD associate administrator.*

# News at NASA

## Orion heat shield is installed

NASA and Lockheed Martin engineers have installed the largest heat shield ever constructed on the crew module of the agency's Orion spacecraft. The work marks a major milestone on the path to the spacecraft's first launch in December.

"It is extremely exciting to see the heat shield in place, ready to do its job," said Mark Geyer, Orion Program manager at NASA's Johnson Space Center in Houston. "The heat shield is such a critical piece, not just for this mission, but for our plans to send humans into deep space."

The heat shield is made of a coating called Avcoat, which burns away as it heats up in a process called ablation to prevent the transfer of extreme temperatures to the crew module. The Avcoat is covered with a silver reflective tape that protects the material from the extreme cold temperatures of space.

Orion's flight test, or Exploration Flight Test-1, will provide engineers with data about the heat shield's ability to protect Orion and its future crews from the 4,000-degree heat of reentry and an ocean splashdown following the spacecraft's 20,000-mph reentry from space.

Data gathered during the flight could lead to design improvements on the heat shield and other Orion systems, and authenticate existing computer models and new approaches to space systems design and development.

# NASA assists Soyuz

## Armstrong has key role in mission success

**By Jay Levine**
X-Press editor

Shortly after its launch on March 26, 2014, an anomaly was discovered with the Soyuz TMA-12M spacecraft when the rocket's software failed to execute the orbital burns that would allow it to rendezvous and dock with the International Space Station, or ISS.

It wasn't clear initially what had occurred or how serious it was to the mission that was carrying three new Expedition 39 crewmembers to the ISS.

The problem remained unsolved during the first six Soyuz orbits around the Earth. Russian space flight officials then asked NASA to join the effort to determine where the Soyuz was and establish emergency two-way communication between the spacecraft's crew and mission control in Moscow, according to Mark Severance, director of NASA's Human Spaceflight Network at Goddard Space Flight Center in Greenbelt, Maryland.

NASA facilities worked together to find a solution including NASA Armstrong, the Flight Dynamics Facility at Goddard, the Wallops Flight Facility on Wallops Island, Virginia, and the White Sands Ground Terminal in White Sands, New Mexico, Severance said.

"We have an emergency capability to patch [mission control in] Moscow into our ground stations and allow them to have two-way communication with the crew, and that was the scenario we were in," Severance

**Soyuz, page 5**

NASA/Joel Kowsky

*The Soyuz TMA-12M rocket launches from Baikonur Cosmodrome in Kazakhstan on Wednesday, March 26, 2014, carrying Expedition 39 cosmonauts Alexander Skvortsov and Oleg Artemyev of the Russian Federal Space Agency Roscosmos and NASA astronaut Steven Swanson to the International Space Station.*

ED14-0122-01 NASA/Tom Tschida

*NASA Armstrong's communications team was instrumental in re-establishing communications between the Soyuz and Moscow after the March 26 launch. Team members include, from left, Marcos Lopez, Michael Yettaw, Joseph Fernandez, Justin Thomas, Jovany Bautista, Richard and Jon Batchelor.*



## Soyuz... from page 4

explained. "The rendezvous burns were not executed for the Soyuz at the expected time. Because of that we were unsure of the orbit the Soyuz was in."

Mission control centers in Moscow and Houston wanted to ensure they knew where the Soyuz was along its planned orbit, he added. A call also was placed to the Morrell Operations Center at Cape Canaveral Air Force Station, Florida, to assist with coordinating radar support and to help track the Soyuz.

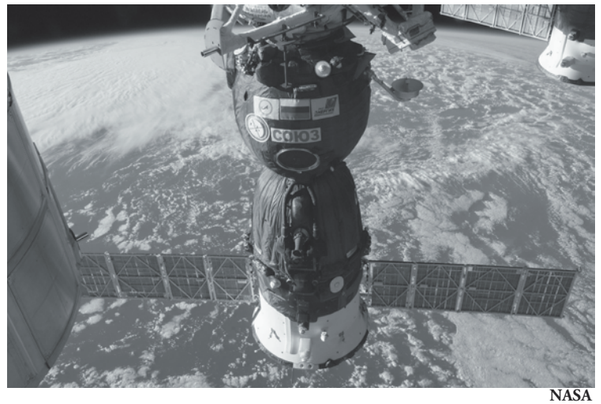
The Flight Dynamics Facility was able to update the orbital information that was then used to determine where to point communication antennas. The operations center coordinated its radars with those at Armstrong, Wallops and Patrick Air Force Base in Florida, he said.

"Soyuz 38-S's third and fourth burns in that sequence couldn't be executed because the spacecraft was not in the proper orientation for the third burn," Severance explained. "We didn't understand why, and neither did Moscow. Folks at the MCC (mission control center) in Moscow, through MCC Houston, requested ground support. They wanted to have additional communication support as the Soyuz passed out of range of the Russian ground stations."

Challenges with establishing communication with the Soyuz initially made the spacecraft's last pass over Armstrong critical, but communications were established during the 13th orbit using NASA Armstrong's emergency capabilities.

"Armstrong provided the first radar contact and was with us the entire night. They also supported from their VHF communications station and on the 13th orbit they provided two-way communication between the Soyuz and MCC Moscow," Severance continued.

That information was enough to develop a new plan to get the crew to the ISS. The remaining question was how severe the problem was



NASA

*On March 26 NASA Armstrong assisted with the docking of a Soyuz mission to the International Space Station. The Russian Soyuz TMA-12M spacecraft dominates this image taken by an Expedition 38 crewmember aboard the ISS.*

that caused the rocket thrusters not to fire properly. Radar tracking concluded the third and fourth thruster burns were successful.

"The situation was under control after the Russian ground station talked to the Soyuz crew through us," said Mike Yettaw, NASA Armstrong's communications facility work lead.

If communications had not been established, the Soyuz crew had provisions on board and could continue to orbit, but that option became unnecessary. In fact, until a year ago Soyuz trips from launch to the ISS were amended from a two-day journey to the current set of procedures where the Soyuz safely reaches its destination in about six hours.

The systems used during this challenge originated during the days when the Russian Space Station Mir operated and Yettaw and Severance first worked together in the 1990s.

"This is an emergency capability we have maintained for exactly this kind of scenario," Severance said. "It turns out that the problem that caused this was a software problem. It could have been much worse. It's nice to know the safety net that we have for the crews, if they are encountering difficulties with the Soyuz, worked pretty well. This is a scenario we have talked about for years. On that night we had to execute it."

The mission challenges also provided learning opportunities for the communications teams during a follow-up lessons learned meeting in April. That meeting helped determine new tracking methods to find a spacecraft sooner under similar circumstances, Yettaw said.

NASA Armstrong's Hugh L. Dryden Aeronautical Test Range, a contingency site for communications and tracking for the ISS and Soyuz, was prepared for the challenge.

"Technicians Tim Miller and Brady Rennie were operating the radar, which was critical in determining where the spacecraft was," said Yettaw. "With the correct location determined, the Armstrong VHF communications system operated by technicians Justin Thomas and Jovany Bautista acquired and established communications with the Soyuz spacecraft. The Russian ground station was able to work the problem through the Armstrong VHF communications system. The Armstrong system was ultimately the only communications system used by the network during the contingency," Yettaw said.

The Soyuz event was the third major situation where Armstrong supported contingencies in space.

"The first time we assisted was in July 1997 when, in the aftermath of the collision of an unmanned Progress cargo vehicle with the Mir, the space station lost the gyros that kept the stations solar panels pointed at the sun and the station's batteries quickly ran down," Yettaw explained. "The cosmonauts entered the Soyuz return vehicle to manually orient the Mir using the thrusters on the Soyuz in order to point the station's solar panels at the sun."

But communications assistance was still needed.

"Russian mission control asked for additional communication through the American stations to save the Mir," Yettaw said. "Armstrong provided emergency communications to the Soyuz on two orbits and on the third the Mir electrical system was back on line, allowing the cosmonauts to re-establish communications with Moscow from inside the station using the ground stations at Armstrong and Wallops. At the time, Armstrong was the only American ground station to support communication with the Soyuz."

Another instance was in 2002.

"The ISS lost attitude control causing a slow roll, which started to drain the batteries," Yettaw recalled. "[Mission control in] Houston was able to uplink emergency instructions through Armstrong, which stabilized the station until the attitude system could be restored. Houston had the astronauts manually point the ISS solar panels at the sun by looking out a window of the ISS."

No matter what the next emergency might be, Yettaw said NASA Armstrong's communications staff and facilities would be ready to assist.

# Event... from page 1

Committee for Aeronautics from 1949 to 1958 and NASA's first deputy administrator from 1958 until his death in 1965.

The event venue included a mock-up of the X-15 No. 3 rocket plane and the second Lunar Landing Research Vehicle, or LLRV, adjacent to the stage. Armstrong piloted the actual X-15 No. 3 five times and was a key figure in the development of the LLRV and its successor, the Lunar Landing Training Vehicle that prepared astronauts for moon landings. Armstrong credited the LLTV for his ability to manually land the Eagle lunar module on the moon on July 20, 1969.

Speakers included NASA Administrator Charles Bolden, Armstrong Center Director David McBride, State Senator Steve Knight and Rep. Kevin McCarthy of California's 23rd District. Armstrong's sons Rick and Mark, and Dryden's grandson Eric also spoke briefly, and Armstrong's granddaughter Kali Armstrong, sang the national anthem in the center's main hangar. The event was capped with a flyover of a NASA F/A-18 research aircraft and the unveiling of the sign bearing Armstrong's name on the main administration building.

"This renaming is a fitting tribute that honors both their legacies," Bolden said. "From Hugh Dryden's experiences and work with airplanes when the field was in its infancy, to Neil Armstrong's work as a test pilot and historic footsteps on the moon, these two helped pioneer a field that sustains us today in ways they could hardly have imagined."

"Hugh Dryden was considered an aeronautical genius, who pushed the boundaries of high-speed flight," he continued. "Beginning in 1931, Dryden's expertise at the NASA Advisory Committee for Aeronautics and then at NASA established America's leadership in space and organized the research that led to our first steps in space. His organizational leadership was at the root of Neil Armstrong's most spectacular flight achievements, from the X-15 to his first footsteps on the moon."

ED14-0144-049 NASA/Ken Ulbrich

*NASA Administrator Charlie Bolden speaks at the May 13 event to rename the center in honor of Neil A. Armstrong. Members of the Dryden and Armstrong families attended.*

ED14-0144-040 NASA/Ken Ulbrich

*U.S. Rep. Kevin McCarthy of California, who authored the bill to honor Armstrong, spoke at the May 13 event.*

Although bearing a new name, NASA Armstrong will continue with its roles in NASA's key missions, Bolden added.

"This wonderful center continues to blaze new trails in aeronautics and the technologies that support our path to Mars," Bolden said. "Its Earth science work has immediate value for understanding our changing planet and it also supports our broader science portfolio and the human spaceflight program, which even now is reaching for new destinations."

Rep. McCarthy, whose district includes the center, authored the resolution to rename the facility for Armstrong.

"To be here today took an act of Congress," said McCarthy. "With everything you hear about Washington, I'm proud to say no one voted against it. We are here to honor two men and their amazing accomplishments."

McCarthy's bill to redesignate the 68-year-old facility, NASA's center of excellence for atmospheric flight research, in honor of Armstrong was passed by the House of Representatives in early 2013, by the Senate on Jan. 8, and was signed into law by President Obama on Jan. 16, 2014. The name change became official March 1.

"We are here today to honor the contributions of two men who

**Celebration, page 7**



# Celebration... from page 6

made significant roles in placing America as a preeminent leader," McBride said. "Their actions and contributions to aeronautics, aerospace and exploration will be forever remembered."

"Hugh Dryden prepared America for the space age and remains one of the world's pivotal figures in both aeronautics and space and spaceflight. Neil Armstrong was the first man to stand on the moon – he was also an engineer and a research test pilot at this center for the NACA and NASA."

McBride noted that the mission, core values and vision of the center remain unchanged.

"Our role throughout our history is in the integration of complex flight systems and their safe test and flight operations," he explained. "Though we have diversified from our traditional aeronautics base, the work we continue to do in science and space explorations utilizes our ability to understand the problem and its connection to flight, to understand the vehicle, and to safely clear the flight envelope."

McBride also called for a moment of silence to honor the passing of another of Dryden's heroes – former Dryden research pilot Bill Dana, who passed away on May 6.

"He was one of our friends, our inspirations and a friend and colleague of Neil Armstrong," McBride said. "Bill's presence is terribly missed, but his memory and legacy continue on with us."

Knight, the son of legendary test pilot William J. "Pete" Knight, who in the X-15 flew the fastest flight of the 199-flight program at Mach 6.7, looked back at the center's history.

"You can't drive across the lakebed without getting a smile on your face, or a tear in your eye," said Knight. "We have a lot of history out here like the Armstrong family and the Walker family and the McKay family and the Dana family. This is where history was and is made."

"It was an absolute honor to share the Dryden name with this amazing test facility and all of its employees here at NASA for the past 38 years," said Eric Dryden, Hugh Dryden's grandson. "I knew my grandfather for five months before he passed away, but I know he would be extremely proud and honored to pass the torch to an amazing engineer, test pilot, astronaut and true aerospace pioneer Neil Armstrong."


ED14-0144-115 NASA/Ken Ulbrich

*NASA Administrator Charlie Bolden, Rick Armstrong (Neil Armstrong's older son), Janet Armstrong, Andrew Armstrong, Wendy Armstrong, U.S. Congressman Kevin McCarthy, Kali Armstrong, Mark Armstrong, Matthew Hugh Dryden (Hugh Dryden's great grandson), NASA Armstrong Center Director David McBride, Tristan Dryden, Logan Dryden, Eric Dryden (Hugh Dryden's grandson) and Lisa Dryden.*

Mark Armstrong, Neil Armstrong's younger son, said Hugh and Neil are inextricably linked by a center where they "make real that which we have imagined."

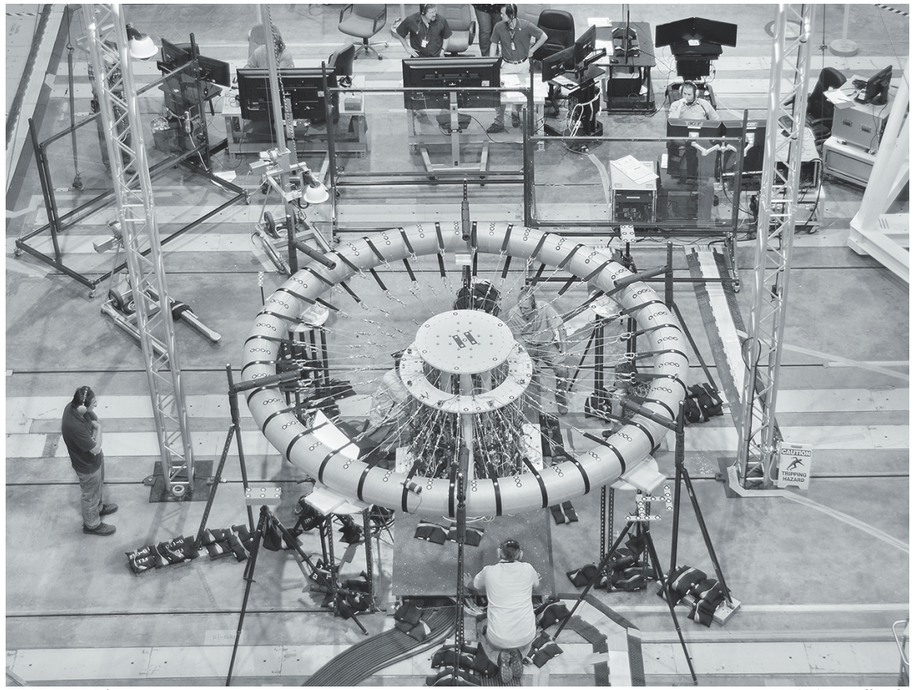
Neil Armstrong's older son, Rick, also represented the family on stage.

"He considered himself an engineer first," added Rick Armstrong. "He said science is about what is and engineering is about what can be." Rick Armstrong said his father would be proud to have his name on the NASA facility to continue inspiring young people in science, technology, engineering and mathematics so they can achieve great things like those accomplished at the center.


ED14-0080-08 NASA/Tom Tschida

*Armstrong Deputy Director Patrick Soliker, and Center Director David McBride show off some of the new Armstrong merchandise available in the centers' gift shop.*

The center's mission, vision and goals are aligned to focus on pushing through technological barriers to new frontiers. It is exactly what NASA asks and what the two great men honored at the ceremony would work to make a reality.



ED13-0233-147 NASA/Ken Ulbrich

*Technicians prepare a "donut" test article for the Hypersonic Inflatable Aerodynamic Decelerator structural loads testing in NASA Armstrong's Flight Loads Laboratory.*

# HIAD

## New concept test articles validated

**By Jay Levine**
X-Press editor

A new donut-shaped inflatable device designed to more effectively slow down a spacecraft upon atmospheric re-entry to Earth or other planets could not only be more economical than current methods, but also available as soon as 2020.

However, before the hardware can be fully developed for use on a spacecraft, the technology developed by NASA's Langley Research Center in Hampton, Virginia, had to undergo tests to validate its structural integrity. NASA Armstrong's Flight Loads Laboratory was called on to do the job, with laboratory personnel conducting structural tests on eight different donut-shaped test articles of three different sizes. The testing occurred over a seven-month period beginning in mid-2013 and extending through early 2014.

Called the Hypersonic Inflatable Aerodynamic Decelerator, or HIAD, the concept had previously been tested under simulated flight loads, but the additional testing at NASA Armstrong helped validate models for future decelerator configurations, said Langley's Anthony Calomino, principal investigator for materials and structures for hypersonic re-entry.

"The tests have shown what we expected with the differences in test articles," he said. "The work (at Armstrong) helped us define where the structure will fail, which had been hard for us to capture.

"As an engineer, you have to know where a system will fail so that you can back off from that point and optimize a design," he added. "We now know how far we can push it. We didn't have good failure models and that's what the work [at Armstrong] allowed us to do."

The testing involved flexible sensors and hydraulic jacks that applied mechanical loads to each test article, said Tony Chen, NASA Armstrong's HIAD testing project manager. The sizes tested had diameters of roughly 11, 13 and 14.5 feet, about half the size envisioned for the functional system that would use about eight to 10 concentric rings.

A series of straps on the top and bottom of the test articles applied mechanical loads to cause the donuts to pull or twist to determine their mechanical characteristics, Chen explained. Each test article was built differently in order to find the optimal design for their construction. The test articles were also tested at different inflation pressures to see the differences in their structural integrity.

NASA Armstrong innovation also was tapped. Loads lab researchers had been looking at new strain gauges and the HIAD presented the perfect opportunity to test out those devices, said instrumentation specialist Anthony "Nino" Piazza. Strain gauges used for the HIAD tests were constructed from highly elastic material tubes, used frequently in the medical field for sensitive arterial procedures that require monitoring changes in volume. Because the sensors were flexible, they did not interfere with the tests like contemporary rigid sensors could have done, he explained.

That doesn't mean the HIAD device didn't offer challenges to obtaining the best data. While the sensors were flexible, the wires from the test equipment were not, Piazza explained. Meshing the flexible with the inflexible required some silica bonding material and careful

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## HIAD... from page 8

connections in the right places to properly conduct the tests, Piazza said. The sensors were secured to 16 locations on each test object.

Once successfully developed and validated, the sensor technology could be used to provide valuable in-situ flight response data for an actual spacecraft.

In a real spacecraft, a connected stack of donut rings would be inflated before entering a planet's atmosphere to slow the vehicle for landing, Calomino said. The spaceship would look a lot like a giant cone with the space donuts assembled, similar to a child's stacking ring toy. The stacked-cone concept would allow NASA to land heavier payloads to the surface of the planet than is currently possible, and could eventually be used to deliver crews.

"The idea is that you would have something that could be packed up, put in a very small volume and then deployed into a very large size," Calomino said. "Think airbag, something we could pack into compressed volume that will fit the size limits of a launch shroud, but allow for a much larger aeroshell.

"Think of putting your hand out the window when you drive out on the highway," he explained. "The bigger the hand, the more the force you create. The bigger the aeroshell, the more you decelerate."

The HIAD structural loads effort marked the end of a three-year development funded through NASA's Game-Changing Technology program. However, a proposal is being prepared for a follow-on effort in 2016 because many researchers don't know about the new technology, Calomino said. If that proposal is successful, Langley's HIAD researchers could return to NASA Armstrong for additional testing.

Calomino suggests the HIAD decelerator system could be a good candidate for a future Mars rover mission after 2020, he added.

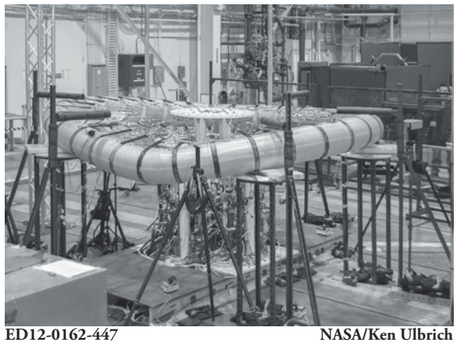
"We could deliver a Mars rover similar in size to Curiosity, but to a much higher elevation," he said. "The science of exploration would benefit from a system like HIAD because it would allow the investigation of the southern highlands, where it is thought that a portion of the planet was not under water when Mars had an ocean."

The research articles tested at NASA Armstrong are the size needed to enable a future Mars rover to land at a higher elevation on the Martian surface, he added.

"That size can change depending on what we do on Mars and the system has beneficial application for re-entry to Earth, outer planet moons and nearly any planet with an atmosphere," Calomino said. "The system also is being examined for use in retrieving the second-stage rockets used to propel vehicles into space."

ED14-0122-01 NASA/ Ken Ulbrich

*A NASA Armstrong Flight Loads Laboratory team that worked on HIAD test articles included bottom row, from left, Tony Chen, David Neufeld, Matthew Moholt, Wally Hargis and Anthony Piazza. Second row, from left, are Ted Powers, Jeffery Howell, Ray Sadler, Ronnie Haraguchi and Gary Williams. Third row, from left, are Darren Mills, Jacob Roepel and Aaron Rumsey.*



ED12-0162-447 NASA/Ken Ulbrich

*A HIAD structural test article deforms under the pressure of hydraulic jacks acting on straps around the circumference of the ring while flexible sensors record the stresses.*

ED12-0162-447 NASA/Ken Ulbrich

*Instrumentation specialist Anthony Piazza carefully installs strain sensors on one of the HIAD test articles.*

# Farewell to a Friend: Aerospace icon William H. "Bill" Dana passes at 83, but his legend lives on

**By Peter W. Merlin**
NASA Armstrong Public Affairs

Distinguished research pilot and aeronautical engineer William Harvey Dana died on May 6, 2014. He was 83.

His long and illustrious career at NASA Armstrong spanned more than five decades, during which Dana logged more than 8,000 hours in over 60 different aircraft from helicopters and sailplanes to the hypersonic X-15. Several of the airplanes he flew are displayed at the National Air and Space Museum in Washington, D.C.

A graduate of the United States Military Academy at West Point, Dana spent four years in the Air Force before he was hired as an aeronautical research engineer at what was then called the NASA High-Speed Flight Station. Dana started work on Oct. 1, 1958 – the day NASA was established. His first assignments included development of a rudimentary performance simulator for the X-15 rocket plane and stability and control research involving the F-107A fighter prototype.

In September 1959 he transferred to the Flight Operations Branch as a research pilot conducting variable stability experiments in a modified F-100C. Next, he flew an A-5A to simulate the characteristics of a supersonic transport for air traffic control studies. He served as project pilot for experiments to determine the minimum visibility necessary for a pilot to safely land an aircraft or space vehicle, and helped develop cockpit systems for the proposed X-20 Dyna-Soar space plane until that program's cancellation in 1963. He was then assigned to the wingless lifting body research aircraft program and made his first flight in the lightweight M2-F1 in July 1965.

NASA

*NASA research pilot Bill Dana takes a moment to watch NASA's NB-52B cruise overhead after a research flight in the HL-10 in this image from Nov. 30, 1968.*

*Bill Dana*

A few months later Dana accepted an offer to fly the X-15, a rocket-powered airplane designed to provide an understanding of complex aerodynamic heating, structural loads, stability and control for vehicles exiting and reentering Earth's atmosphere. Over the next three years he flew 16 research missions, attaining a maximum speed of Mach 5.53 (3,897 mph) and a maximum altitude of 306,900 feet (nearly 59 miles). Dana was awarded astronaut wings on Aug. 23, 2005, for two of his X-15 flights that exceeded 50 miles altitude. That honor came nearly 40 years after the flights themselves because at the time of the X-15 program, NASA did not confer astronaut wings on its pilots.

Dana's next assignment was to fly the heavyweight lifting bodies to validate engineers' assertions that such vehicles could be precisely controlled during approach and landing, and providing NASA with the confidence needed to proceed with designs for the Space Shuttle orbiter.

Dana completed nine flights in the HL-10, achieving the highest altitude of the program of 90,303 feet. He flew 19 flights in the M2-F3 including its maiden flight in June 1970, and the fastest flight at Mach 1.613 or 1,064.2 mph. He piloted the X-24B only twice in September 1975, including its last rocket-powered flight. This was also Dana's 46th and final rocket flight.

From 1976 to 1991, Dana served as project pilot on 186 research flights in the F-15A to acquire benchmark boundary-layer transition data on a specially instrumented experiment attached to the airplane's nose. His exceptional piloting abilities resulted in a world standard data set that has been used to assess wind tunnel performance ever since. Dana's other F-15 projects included base drag studies, airframe/propulsion integration, shuttle heat shield tile tests, stability and control evaluations, agility and handling qualities studies, and development of digital electronic engine controls.

NASA

*Above, Dana just completed a research flight in the X-24B. Judi, Dana's wife, and Bill are in the back. In the front are the Danas' children Sidney (Sparks), Jan (Sieving), Leslie (Dana-Kirby) and Matt. Below, Dana is pictured with the X-15.*

NASA

In 1976, he flew the YF-17 lightweight fighter prototype that was used by NASA for base drag studies and transonic maneuvering capabilities evaluations. He also performed space shuttle approach simulations in a YF-12A in 1978, helping pave the way for the first shuttle orbital flight tests. From 1980 to 1986, Dana flew 77 research flights in a specially modified F-16 for the Advanced Fighter Technology Integration program to provide major advancements in cockpit displays, weapons systems and fly-by-wire control.

Dana accepted the inherent risks associated with flight research. He had his share of close calls, but never suffered a serious accident. On March 26, 1962, while making touch-and-go landings on Grapevine Dry Lake in an F5D-1 to check surface hardness, the aircraft sunk into the soft clay lakebed and became stuck. During research flights, he was forced to make emergency landings at Silver Lake in the X-15 in April 1967 and Rosamond Lake in the M2-F3 in September 1971. While flying the F-18 on Sept. 26, 1989, the canopy departed the aircraft but Dana landed safely.

Flight research also had its lighter moments. In December 1969, when Dana received a new pressure suit to wear during high-altitude flights in the HL-10, it came with white boots instead of the standard black ones. Dana asked the life support technician for a black pair, declaring he would sooner wear pink boots than white. When the new boots arrived, they were hot pink with yellow daisies on the sides. He later received a black pair but accepted the pink ones as well, realizing that he had overreacted. Dana wore the pink boots on his last X-24B flight on Sept. 23, 1975.

Because of his demonstrated leadership and extraordinary service in flight research, he was appointed chief pilot in 1986 with responsibility for recruiting, developing and training Armstrong's cadre of research pilots. He was also assistant chief of the Flight Operations Division.

He subsequently evaluated F-14 aileron-rudder interconnect systems and high-alpha flight characteristics, and performed a guest pilot evaluation of the X-29 forward-swept-wing technology demonstrator. As co-project pilot Dana flew 53 flights in the pioneering F-18 High Alpha Research Vehicle, the first aircraft to use multi-axis thrust vectoring for vehicle control. His final flying program involved preparations to test space shuttle landing gear and braking systems on a modified Convair CV-990 airliner.

In 1993, he retired from flying to become Armstrong's chief engineer. In this position, he oversaw all of the center's research projects and was responsible for flight safety. Dana held this position until his retirement from civil service in May 1998.

He returned to Armstrong seven months later as a contractor with Analytical Services and Materials, Inc., to write analytical histories of various programs and to evaluate lessons learned. During a period of budget reductions, he gave up his salary and continued to work as a volunteer with the History Office.

Dana was born in Pasadena, California, on Nov. 3, 1930, and raised in Bakersfield.

His numerous awards and honors include the AIAA Haley Space Flight Award (1976), NASA Exceptional Service Medal (1976), Lancaster Aerospace Walk of Honor (1993), NASA Distinguished Service Medal (1997) and the Milton O. Thompson Lifetime Achievement Award (2000). He was honored in the "Salute to Test Pilots" at the Experimental Aircraft Association's Annual Convention in 1996. Dana was a distinguished member of the Society of Experimental Test Pilots. He joined the SETP in 1961 and was elected a fellow in 1998.

# What we do inspires

## The view from here

**by Jay Levine, X-Press editor**

The roar of the engines, the contrails in the sky and the awe I feel watching aircraft fly inspire me. My heart races, my blood pressure rises and I can feel the adrenaline pump as I watch a flight.

However, the reason I remain enthusiastic about aeronautics – specifically NASA aeronautics – is the people who work at NASA Armstrong. I am an optimist and a dreamer, but I understand the constraints and realities. However, my enthusiasm is reignited like an afterburner nearly every time I talk with Armstrong employees. They love what they do and many will happily tell you about their work if you ask.

We may take NASA aeronautics for granted because we work at Armstrong, but we have front row seats to the latest ideas in aeronautics. The people who are trying to bring that future to us are some of the best at what they do. They are our colleagues and friends and we are fortunate to see them reach new milestones.

I watched with pride as Tim Williams wowed the crowd at the Los Angeles County Air Show with fantastic flybys in the ER-2 high-altitude research aircraft on Friday, March 21. Dean Neeley put on a similar ER-2 demonstration the following day. The Dodge Charger used to keep an eye on the high-flier for takeoffs and landings also was on display at the show.

A number of Armstrong pilots,

**Inspires, page 13**


**ED14-0088-108** **NASA/Tom Tschida**

*The Blue Angels fly past the NASA Armstrong F/A-18. The NASA F/A-18, tail number 846 once flew as one of the Blue Angels prior to its transfer to NASA.*

**ED14-0088-32** **NASA/Tom Tschida**

*Richard "Rick" Nires shows NASA Armstrong life support equipment to Phillip Delgado of San Fernando.*

**ED14-0088-87** **NASA/Tom Tschida**

*A youngster looks at one of NASA's futuristic aircraft concepts.*



## Inspires... from page 12

flight-test engineers and employees signed autographs for lines of fans at the show that attracted as many as 100,000 people. All in all about 100 volunteers from the center contributed to the exhibit.

When NASA Armstrong test pilot Frank Batteas talks about his job he explains, "I can't imagine doing anything else." After you talk with him for a few minutes you would probably understand why.

"There were some high school kids here yesterday who wanted to know how to get into flying," Batteas explained. "The younger generation is really enthusiastic about airplanes. They also were enthusiastic about the projects I told them about and it was a great opportunity to give them insight into the aeronautics and science parts of NASA."

The Blue Angels were one of the biggest draws of the two-day event. Ironically, NASA Armstrong's F/A-18 No. 846, which was on display at the event, was formerly an aircraft used by the Blue Angels.

I talked with a number of people who visited the NASA Armstrong exhibit and saw the row of five models in a display case that represent NASA aeronautics officials' vision for the future. Young people were in awe of the concepts representing ideas like a supersonic business jet and more fuel efficient and environmentally friendly fliers. More experienced visitors shared that enthusiasm, adding that they hoped to see these concepts fly.

Al Bowers, newly selected as Armstrong's chief scientist, talked to people at the exhibit about the use of subscale aircraft. He himself was inspired by an airshow that his father took him to at Point Mugu, California. He said he wasn't even in kindergarten then, but his enthusiasm remains pure.

"When you are the very first person to ever see that data (from a flight) in the history of the universe, that is just the coolest thing," Bowers said. "To see these data and figure something out that has never been seen or understood before is what it's all about."


**ED14-088-73** **NASA/Tom Tschida**

***Above**, Tim Williams impresses the crowd flying NASA Armstrong's ER-2 aircraft. **Below**, Operations engineer Brian Griffin shines the F/A-18.*


**ED14-088-02** **NASA/Tom Tschida**

The impact of Armstrong, formerly known as the Dryden Flight Research Center, was seen in the wide eyes of Brandon Darus, age 9. He checked out the F/A-18 at the NASA Armstrong exhibit and then spoke to Batteas. Batteas told the boy about the aircraft and signed a photo that no doubt will be added to Brandon's collection of rocket and space shuttle models.

Ironically, his parents – Peter and Diana Darus – met at Dryden. Peter was a controls engineer of the F/A-18 High Alpha Research Vehicle and Diana was a cooperative education employee.

No doubt there are challenges in aviation and NASA aeronautics. However, the people at NASA Armstrong are looking to develop the technology and tools to push the frontiers of aviation – and by virtue of the application to space systems – space flight as well. Don't be surprised if when you meet some of us that you learn something you didn't know about NASA and gain a touch of our enthusiasm.

**ED14-0088-39** **NASA/Tom Tschida**

**Above**, *NASA Armstrong pilots Frank Batteas, left, and Nils Larson sign autographs for attendees of the Los Angeles County Air Show at Fox Field in Lancaster.*

# 3-D

## Researchers add new dimension to their work

**By Jay Levine**
X-Press editor

Robert "Red" Jensen had an engineering problem with a data cube for the Towed Glider's instrumentation. The cube, which contains the central nervous system of the aircraft, needed a new case to accommodate changes in how the electronics were put together.

Jensen, the NASA Armstrong Model Shop technician, sat at his computer and began to use a 3-D modeling program to help him merge elements of three separate drawings into a single design solution. He also made modifications so the data cube would fit in its intended position in the center fuselage of the aircraft.

In the past, he would have sent the designs to the NASA Armstrong Fabrication Branch to make the part. However, thanks to the foresight of center engineers, there was another option – just print it and place it in the aircraft with the proper approvals.

NASA Armstrong's Chief Technologist David Voracek was working with young engineers when he was asked by many of them to pursue purchase of a high-resolution 3-D printer. Voracek agreed and tapped Center Innovation Funds – available for technology development – and the printer arrived late last year. The printer is available to center staff members, as long as it is coordinated with Jensen, Voracek said.

"This is a good tool for engineers, technicians and mechanics to prototype a part, or make a part for use in their technology development," Voracek said.

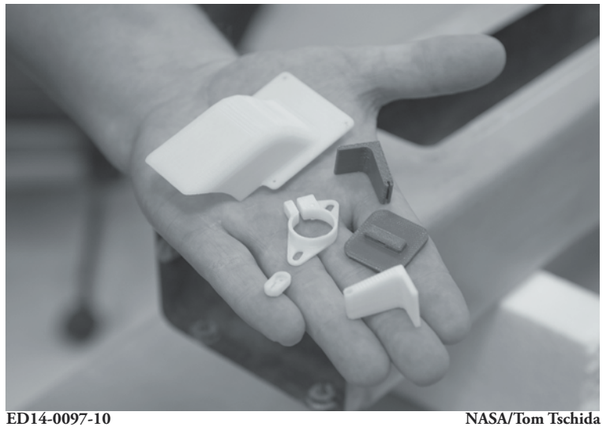
NASA Armstrong had 3-D printers, but none capable of the high-resolution of the new printer that can rapidly process prototype parts. Depending on the size and needs of the component, the completed item might be ready for placement on the aircraft following verification and validation.

"It adds a capability and an opportunity to draw, print and see how a part works," Jensen explained.

The printer makes its parts out of stable, high-performance plastic. Data cubes are traditionally enclosed in a metal case. In addition to a relatively quick 12-hour fabrication, the plastic material had the added benefit of reducing four to six ounces of weight from the aircraft, Jensen said. That's no light accomplishment, as weight is at a premium for this aircraft.

**ED14-0097-06** **NASA/Tom Tschida**

*NASA Armstrong model shop technician Robert "Red" Jensen shows the data cube that he fabricated with the center's new high-resolution 3-D printer. The sub-scale twin-fuselage towed glider model behind him is a frequent recipient of custom parts made with the specialized printer.*



**ED14-0097-10** **NASA/Tom Tschida**

*Jensen displays a handful of small parts fabricated by the center's high-resolution 3-D additive manufacturing printer.*

The 3-D printer, also known as a rapid prototyping machine, resembles a fancy oven or meat smoker. One of Jensen's parts is often "cooking" inside. A number of engineers use the tool, but Jensen frequently is producing parts for the Towed Glider including the data cube, cable tie clamps, wire loom holders, data storage boxes, servos and linkage covers to help with the aircraft's aerodynamics, he explained.

It all begins when a part designed from a 3-D modeling program is loaded into the printer. A low hum emanates from the machine after the start button is depressed, as the machine warms up and calibrates. Most parts are created in less than an hour, although that varies by complexity, Jensen explained. The printer creates a black base and builds up the part layer by layer to a size as large as a bowling ball.

"It creates good parts without my having to rely on someone else to do it," Jensen said. "I need a lot of one-of-a-kind parts here and I don't have to burden the Fabrication Shop every time I want to make a proof-of-concept part I don't have to fear wasting materials to do it," he said.

When parts are sent to the NASA Armstrong machine shop, it is with confidence.

"The printer is a blessing because we can check the fit and function of the part before we send it to the machine shop," Jensen said.

One example of that was a pitot-static boom clamp, a clamp used to keep the boom attached to the nose of an aircraft. The pitot static boom is used to relay real time flight information. Lesli Monforton, a former Model Shop technician, designed the one-of-a-kind clamp,

**Dimension, page 17**

# Armstrong focused on safety

NASA Armstrong employees are focused on safety. Four recent awards recognized individuals and teams working to identify, or take steps to avoid or abate, an unsafe condition.

During the center's Safety Day earlier this year, two teams and an individual were awarded for identifying and assisting with potentially unsafe conditions in 2013. It was the first annual safety awards, which were developed by the center's Aviation Safety Council. In addition, an Extra Mile Safety Award was presented later in the year to another safety-conscious individual.

*Bill Condzella*

Kay & Associates were recognized for the lift of the F/A-18 on loan to the JetHawks from its pedestal in front of the stadium for rehabbing. Their efforts included initial inspection, work on the pedestal, coordination and lift and oversized load transport to Building 703. They will reattach the aircraft once the work is complete. They also were critical to operations involving the recovery of the Dream Chaser following its flight here on Oct. 26, 2013.

*Heath Hatcher*

Awardees included: Steve Brink, Torin Carlson, Lisa Combs, D.J. Crawford, Jason Denman, Jesus Garcia, Judy Grizzard, Danny Holmes, Dean Lebret, Ed Lotter, Ed Mathieson, John McKay, Allen Pitts, Jose Rivera, Jose Rodriguez, Scott Rogers, John Valdez, Bruce Wise and Debbie Zamjahn.

An audit determined aircraft records were out of date and aircraft were grounded for an extensive review. The NASA Aircraft Maintenance Information System (NAMIS) Support Aircraft Audit team began reviewing maintenance records on NASA Armstrong's fleet of 11 support aircraft one by one to return the aircraft to flight status. The group is working now on a second round to correct aircraft data in NAMIS.

Challenges included cross checking extensive manufacturer and military maintenance plans and Armstrong records. The team became the go-to crew for solving NAMIS issues across the center and setting procedures and guidelines. Team members include Michelle Haupt, David Klassman, Ashley Flattery, John Takas, Brittany Martin and Kirsten Fogg.

At the same presentation, Bill Condzella was recognized for his contribution to the Stratospheric Observatory for Infrared Astronomy's safety. He identified and helped resolve complex programmatic and technical safety issues, some that included other NASA centers, support contractors and international partners.

In a separate presentation, Heath Hatcher was recognized for applying the Heimlich maneuver and dislodged the blockage of an Armstrong employee struggling to breathe. The person was sent to the hospital for a follow up, but returned to work the next day.


**ED14-0161-01** **NASA/Ken Ulbrich**

*Kay & Associates employees were honored for their contributions to safety. Recognized were, front row from left, Allen Pitts, D.J. Crawford, Jose Rivera, Jose Rodriguez, Debbie Zamjahn, John Valdez, Judy Grizzard and Dean Lebret. Back row from left are Jesus Garcia, Danny Holmes, Bruce Wise, Torin Carlson, Steve Brink, Scott Rogers, Jason Denman, Lisa Combs, Ed Mathieson and Ed Lotter.*

**ED14-0165-01** **NASA/Ken Ulbrich**

*The NAMIS Support Aircraft Audit team included, from left, David Klassman (working offsite, but not forgotten by team members), Ashley Flattery, Michelle Haupt, John Takas, Kirsten Fogg and Brittany Martin.*

# Holm treasures experiences

**By Jay Levine**
X-Press editor

It's been said that life is not a sprint, but a marathon. For Gwen Holm, it has been both.

Holm, who was NASA Dryden's – now NASA Armstrong – Director for Mission Support, outraced cancer. She retired in February following a more than 18-year career here and more than 30 years with NASA. She is preparing to return to a level of health that will enable her to complete a half marathon.


*Gwen Holm*

"I think because of my health – the cancer – that I really want to get back in shape. I really want to get back into my walking. I walked a half marathon in 2010 and my goal is to walk one next year," she said.

As she enters a new phase of her life, she said she would like to help breast cancer patients get through the tough times. Holm is currently in remission and may be able to help people who are coping with finding out they have the disease and treatment options.

"Fortunately we caught my cancer early," she explained. "It was in stage two. There was a prescribed treatment. I went through it without any major, major difficulties. I was sick, but when you are sick you meet people who are sicker. I was very fortunate."

She found strength when she needed it from friends and family.

"I am very religious and friends and family were really supportive. People I didn't know also offered me words of support," she said.

It was a struggle.

"I've had chemo, I've lost hair and I wore a wig," she said. "I can tell people it's OK. I've been through it and I can empathize with them."

Currently, Holm is moving with her husband to another area of California to be closer to family and she plans to do some volunteer work where she can "best make a difference." Hunger in America concerns her and she said she hopes to volunteer her organizational skills, or possibly deliver meals to the elderly. "I am passionate about hunger. We have such a rich country and there are people who don't have food, especially children," she said.

Holm said she hopes that her talks to groups and at schools have inspired some people, especially minority women, to pursue their career goals to work for NASA. Encouragement wasn't readily available when she was growing up.

"I had no aspirations to work for NASA, because I didn't think I could," she recalled. "I was really good at math and science in high school, but I had no career counseling. In the 1970s girls were married, or went to nursing school, or became a teacher. I became a teacher. No one told me, 'you're really good at math, you're really good at science you should go into engineering.' I did not have role models. That I ended up at NASA was amazing."

A defining moment occurred for Holm when she was selected as a

**Holm, page 17**

# Armstrong researchers publishing

Armstrong researchers have recorded the results of their work in technical publications. The publications are listed by the month they were released.

**November 2013**

Ricardo A. Arteaga, Mike Dandachy, Ed Koshimoto, Sam Kim and Andrew Strongrich collaborated on "ADS-B Flight Tests on Ikhana Unmanned Aircraft System," a draft meeting paper for upload and consideration for inclusion at the 12th Annual Conference on Systems Engineering Research (CSER 2014), Redondo Beach, California, March 21-22, 2014.

**December 2013**

William L. Ko and Van Tran Fleischer co-wrote, "Large-Deformation Displacement Transfer Functions for Shape Predictions of Highly Flexible Slender Aerospace Structures," NASA/TP-2013-216550.

**January 2014**

Eric J. Miller, Andrew C. Holguin, Josue Cruz and William A. Lokos collaborated on, "Strain Gage Load Calibration of the Wing Interface Fittings for the Adaptive Compliant Trailing Edge Flap Flight Test," a meeting paper presented at the 52nd AIAA Aerospace Sciences Meeting, National Harbor, Maryland., Jan. 13-17, 2014.

John J. Ryan, John T. Bosworth, John J. Burken and Peter M. Suh co-wrote, "Current and Future Research in Active Control of Lightweight, Flexible Structures Using the X-56 Aircraft," a meeting paper presented at the 14th AIAA SciTech Conference, National Harbor, Maryland., Jan. 13-17, 2014.

Peter M. Suh, Alexander W. Chin and Dimitri N. Mavris collaborated on, "Virtual Deformation Control of the X-56A Model with Simulated Fiber Optic Sensors," NASA/TM 2014-216616.

**March 2014**

Trong T. Bui wrote, "Analysis of Low-Speed Stall Aerodynamics of a Swept Wing with Laminar-Flow Glove," prepared for publication in the AIAA Journal of Aircraft.

**April 2014**

Trong T. Bui published, "Analysis of Low-Speed Stall Aerodynamics of a Swept Wing with Laminar-Flow Glove," NASA/TM-2014-216641.

Curt Hanson, Jacob Schaefer, John Burken, Nils Larson and Marcus Johnson collaborated on, "Complexity and Pilot Workload Metrics for the Evaluation of Adaptive Flight Controls on a Full Scale Piloted Aircraft," NASA/TM-2014-216640.

## Report close calls, mishaps

NASA Headquarters discontinued use of the NASA Incident Reporting Information System May 16 and the new NASA Mishap Information System, or NMIS database is not yet available.

Until the new system is up, the process for reporting a close call or mishap is to complete and submit the NASA Armstrong Close Call/Mishap Reporting, form D-WK 95-8b and notify your supervisor.

Personal computer users will be able to file the form electronically, but Macintosh users will need to take the form to Casey Tull, Mishap program manager. For more information, call Tull at ext. 2597.

## Dimension... from page 14

but there was only one and Jensen needed three. NASA Armstrong engineers reverse engineered the clamp and Jensen was able to create a prototype to see if it worked. It did.

Another example is a tiny part that is just a ¼ inch long called a control-position transducer coupler. It has a hollow center to attach measurement devices called string pots and is created with the 3-D printer to tolerance of about 15 thousandths of an inch, Jensen explained. The coupler is attached to control surfaces and in real time can help measuring hardware deliver high-precision data.

When multiple parts need to be printed at the same time, it's not a problem. The machine's software can determine the best configuration for arranging the parts to maximize the material used to create them, he said.

Instead of loading paper like an inkjet, this printer is loaded with plastic cartridges that melt and dispense the material as it builds the part layer by layer. The black material used for the base also settles in areas that are intended for mounting.

For example, if a screw goes into the part, the part would be one color and the black material fills in where the screw would go, Jensen explained. Once the part comes out of the printer and the tray where it was created, it is placed in an acid bath. The process melts the black base material, leaving a pristine part ready for use, or a good prototype to examine.

No doubt Jensen will keep the machine continually humming to forge one-of-a-kind parts.

**ED13-0384-06** **NASA/Tom Tschida**

*Robert "Red" Jensen removes a part made in the center's new high-resolution 3-D printer.*

## Holm... from page 16

Presidential Management Intern at NASA Headquarters in the Office of the Comptroller. She had just earned her master's degree in public administration from Brigham Young University in Provo, Utah, and found herself assisting with budget formulation. During that time she also had an opportunity to work for then-Congressman Daniel K. Akaka of Hawaii, supporting his staff's appropriation subcommittee.

From there she worked in the Office of the International Space Station and had a one-year detail as the NASA budget focal point in the Joint NASA/U.S. Air Force program office of the National Launch System at Los Angeles Air Force Base, California. Her next assignment was at NASA's Stennis Space Center, Mississippi, where she was resources management officer and responsible for the center's budget. Once she transferred to Dryden in 1995 as the center's chief financial officer, she took on management positions with increasing responsibility.

Her career path has given her insight on how to encourage students and she has talked to many groups and students.

"I tell them I never thought I would work for NASA," she said. "You only think of the pilots and astronauts, but we need everyone else, too. I'm here to tell you it can happen, even for someone with a degree in elementary education like me. NASA is a large organization so you may not hear about all of us, but a number of different careers are represented in the NASA workforce. You could have a place at NASA."

Holm also said that there is much more diversity in the career fields at NASA Armstrong.

"I have been happy to see more diversity in the engineering and technical areas. We have women who are managers, supervisors and more potential leaders are coming up the chain. I love seeing them step out from a program or technical role to a leadership position," Holm said.

Relationships have been the key to success, Holm said. While there have been challenges – such as when the Air Force could no longer offer Dryden parents use of the base day care facility – the dialogue with the Air Force has been honest and open.

Because of the relationship Holm developed with her Air Force counterpart, she said the safety hazard at Lilly Drive and Rosamond Boulevard at the entrance to the center was solved. A solution was needed as a number of close calls and an accident where a person sustained neck and back injuries happened at that intersection.

"Jerry McKee, then deputy director for Mission Support, came up with the idea of adding stop signs several years ago. I could not do it by myself. The Air Force was able to assist with stop signs and speed limit signs to slow and stop traffic in that area with no cost to the center," she said.

Holm considers changing the administrative structure at the center as one of her biggest challenges and contributions.

All of the chiefs reported to the deputy center director and it was hard getting time with him because he was so busy, she explained. The directors of operations, research, programs and safety were key to major decisions, but there were few relationships, or even contact.

Seeing the communication challenges, Holm approached then center director Kevin Petersen to create the Mission Support structure to foster relationships. All of the chiefs in Mission Support meet Mondays at a set time. It has built trust within the organization and provided a better way to work together because they already know each other – before challenges arise, she said. These relationships also have helped center organizations do more with less as budgets have become tighter and tighter.

All in all, Holm sees NASA Armstrong as a place where people have pride in their work and a closeness obtained from "spending more time with each other than our own families."

She said she treasures her career and her time at the center where, "I was able to do my regular job and see the SR-71 fly, or the Hyper-X, or see something else fly, while most people at NASA Headquarters are publishing budgets. It's the end product here that is exciting. I worked at one of the coolest places in the world to work."

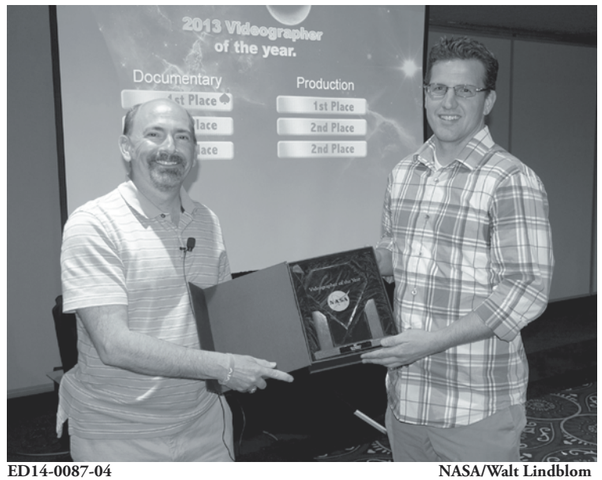
# Overdue recognition

ED14-0122-01 NASA/Tom Tschida

*At a NASA Armstrong management meeting earlier this year, Center Director David McBride presented a Small Business Advocates Award to the Facilities Engineering Team. From left to right are Code F Director Daniel Crowley, Andrew Boykin, Gemma Flores, Michele Hurd, Jin Oh and McBride. The award citation read, "In Recognition of the 2012 Small Business Advocates Awards selection in the category of Technical Team of the Year and for the outstanding efforts in developing and implementing innovative practices in support of the NASA's small business program."*

# Soukup is NASA's top videographer for 2013

*Rodney Grubbs, NASA Digital Television Program Manager, presents NASA Armstrong videographer Brian Soukup of Arcata Associates with the 2013 NASA Videographer of the Year award for Documentation video at the NASA working group meeting during the National Association of Broadcasters Expo 2014.*




ED14-0087-04 NASA/Walt Lindblom

## Honor... from page 3

defining strategic partnerships with the Federal Aviation Administration, the Joint Program Development Office, the U.S. Department of Defense and industry.

"His efforts have earned NASA trust and respect in the UAS community at large, ensuring the agency will have a crucial role to play in helping to overcome technical barriers in order to make UAS a reality as a routine part of the NAS," according to the nomination letter.

Associate Administrator Awards are presented to NASA employees, contractors and students or interns who distinguish themselves, either individually or as part of a group, through their overall approach to their work and through results they achieved during the award year.

All four research centers and NASA Headquarters nominate individuals in teams in five categories: technology and innovation, leadership and management excellence, program and mission support, high potentials and strategic partnerships.

Winners in this category are honored for exemplary performance in establishing or strengthening strategic partnerships that significantly impact and advance the achievement of aeronautics research and development goals and objectives, generate robust and timely knowledge transfer, and strengthen trust and credibility with U.S. and foreign partners.

# NSSC news is available

The latest issue of the NASA Shared Services Center quarterly publication, the NSSC News, has the results of the NASA Shared Services Contact Center Customer surveys.

It is available at https://www.nssc.nasa.gov/voice. Click on the newsletter icon on the left side of the page for the latest issue.

# Former center director memorialized

Present and former directors of NASA's Armstrong Flight Research Center joined together March 7 to reflect on a life of national service by the late Lee R. Scherer, who served as director of the center from late 1971 through early 1975.

*Lee R. Scherer*

Current center director David McBride and former director Ken Szalai reflected on Scherer's life and career with members of Scherer's family who gathered at the center for the informal remembrance activities. Scherer died on May 7, 2011 at the age of 92.

An honors graduate of the U.S. Naval Academy in 1942, Scherer went on to a 25-year career in the U.S. Navy, flying F6F Hellcat fighter planes during World War II and flight testing helicopters later. After obtaining aeronautical engineering degrees, Scherer first came to NASA in 1962 while still on active duty as a captain in the Navy. After being employed in various managerial capacities with the Apollo program at NASA Headquarters, Scherer was appointed director of the Flight Research Center on Oct. 11, 1971, succeeding Paul Bikle and interim acting director De Beeler.

Scherer served as center director for a little over three years until he was selected to lead NASA's Kennedy Space Center on Jan. 19, 1975. Scherer oversaw Kennedy's involvement in the Apollo-Soyuz Test Program in 1975 and that center's build-up for the Space Shuttle Program over the following four years. He was appointed associate administrator for external relations at NASA Headquarters in 1979, a position he held until his retirement from NASA.


**ED14-0078-17** **NASA/Ken Ulbrich**

*Members of Lee Scherer's family join former center director Ken Szalai, left, and current center director David McBride, right, for a portrait.*

## Passings

# Barnett, an original X-15 crew chief, dies at 82

Lorenzo "Larry" Barnett, who was one of the original X-15 rocket plane crew chiefs, died Jan. 25, 2014. He was 82.

Barnett was employed at the center for more than 36 years. He began in 1955 as a crew chief for the F-101 Voodoo aircraft and retired as the deputy director of Flight Operations, a position he was chosen for in the mid-1980s.

He was crew chief for the triple supersonic YF-12 and SR-71 aircraft, branch chief of research aircraft maintenance operations and also served as the chief of the Maintenance Branch for all center aircraft.

Barnett had a major role in the acquisition of the F/A-18 support aircraft that are still in use. He also was part of a three-member team that evaluated turnaround operations for space shuttle missions from an aircraft operations perspective in early 1986 to recommend improved efficiencies. He retired in June 1991.

*Information on Barnett's NASA career courtesy of Florence Kailiwai-Barnett and center retirees Carol Reukauf, Larry Biscayart, Jim Phelps, Charlie Baker, Joe Ayers, John McKay and Gary Krier.*

# Monforton, model shop technician, dies at 67

Lesli Monforton, a former center model shop technician, died Dec. 24, 2013. She was 67.

She was the chief remote control pilot for the Dryden Remotely Operated Integrated Drone, or DROID project. In that position she assisted with a demonstration of the DROID to validate a system that can help an aircraft automatically avoid a collision, called the Improved Ground Collision Avoidance System. That system was previously flown on the joint U.S. Air Force/NASA F-16D Automatic Collision Avoidance Technology program and the system is now used on Air Force fighter aircraft.

Monforton had a number of jobs in industry and her own businesses, but also previously worked at Dryden (now Armstrong) in the 1990s during which she flew the Perseus A aircraft, a high-flying, remotely piloted aircraft built for NASA.

Monforton also supported work on the Dryden (now Armstrong) managed Pegasus Hypersonic Wing Glove Experiment flown on a booster after air launch from an L-1011 at Cape Canaveral, Florida. She helped design and led the fabrication of a wing glove that was installed on an Orbital Sciences Pegasus Launch Vehicle wing. The hypersonic experiment reached Mach 8 and more than 200,000 feet altitude. It was a secondary experiment on a satellite-launching mission on Oct. 22, 1998.

Another project Monforton worked was designing and building an aerodynamic shroud and a window for a periscope flown as an external vision experiment. The periscope required the shroud and window, as it was positioned under the belly of an F-104.

Monforton was an accomplished research radio control test pilot and had more than 100 awards and trophies earned for her skills as a competitive remote control pilot and remote control research pilot.

# Kempton, mechanic for the NACA, dies at 94

Lloyd M. Kempton, who was a mechanic at the National Advisory Committee for Aeronautics High Speed Flight Station, now NASA Armstrong, died on March 9. He was 94.

He worked for about four years in the Flight Operations Division as a mechanic in the 1950s.

ED14-0152-08 NASA/Tom Tschida

*Scott Spiro, left, and Gordon Tokumatsu, right, of KNBC-TV, Ch. 4 in Los Angeles interview Bruce Anderson of NASA's Langley Research Center, chief scientist for the ACCESS II research effort.*

ED14-0152-56 NASA/Tom Tschida

*James Sokolik, former NASA Armstrong life support technician, shows NASA Social attendees and members of the media how a NASA high-altitude pressure suit works.*

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aeronautics innovations, said Jones.

"What gets me to work everyday is what we are trying to do, which is to literally change the world," he said.

For example, Langley and Armstrong are working on steps to remove technical and regulatory barriers that currently prohibit commercial supersonic flight over land.

"I see my family on the East Coast [only] once or twice a year. I want to see them more," he added.

While it was clear that the panel members all enjoyed their work, Posada, who pilots unmanned vehicles, noted the work is complex.

"This is not a video game. We treat it like we are in the aircraft even if we are thousands of miles away from the mission we are flying," he said.

When asked by a social media attendee what excited them the most about their work, Larson had a ready quip: "We have really cool toys to play with. We never had to grow up!"

The tours offered a ton of "eye candy," said social media attendee Susan Hosking, including her first look at the Global Hawk aircraft NASA flies for environmental missions, such as an upcoming hurricane mission. The alternative fuels research, environmental missions and work inspired by birds in flight were, in her words, "close to my heart."

Matt Nicolaysen of Oakdale, California, was surprised at the quantity of aircraft involved in experimentation and tests.

"There is more going on than we hear about," he added.

NASA Social participant Rob Drysdale, a project manager and information technology consultant from Toronto, Canada, said he is an aviation and space enthusiast who is concerned about the environment and climate change. For him, this was an event that matched his interests.

"The ACCESS II research really interested me because the National Research Council of Canada is a partner," he said. "I liked seeing the planes and seeing the passion of the people doing this work."

Social media attendee Michelle Cassel, a financial manager in the aviation industry in Ontario, Canada, said she appreciated the tour of NASA Armstrong's experimental fabrication shop, where "designs come to life." She added that she enjoyed sitting in the pilot's seat of NASA Langley's HU-25C, "although they would not let me touch the buttons!"

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