National Aeronautics and Space Administration

The Dryden X-PRESS

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# UP reaches altitude record

**By Jay Levine**
X-Press editor and
**Leslie Williams**
Dryden Public Affairs

It was "up, up and away" June 21 when UP Aerospace Inc.'s SpaceLoft 7 suborbital rocket reached a record altitude for sounding rockets of 73.9 miles – more than 390,000 feet – after a NASA-funded launch from Spaceport America near Las Cruces, N.M.

NASA's Flight Opportunities Program, which is managed by Dryden, funded the flight to carry five space-technology experiments and two sets of student experiments aboard the suborbital sounding rocket.

"We are very happy with the successful launch of SpaceLoft 7 and look forward to future flights with UP Aerospace," said Ron Young, Flight Opportunities Program manager at NASA Dryden.

The Flight Opportunities Program is part of NASA's Space Technology Mission Directorate. NASA's Ames Research Center at Moffett Field, Calif., manages the technology maturation and tracking for the program.

The sub-orbital flight lasted nearly 15 minutes and provided a weightless environment for testing the experiments for 3.5 minutes. After a drag chute slowed the rocket's descent and a parachute opened, the nose cone and payload bay landed as anticipated at a site about 320 miles downrange on the U.S. Army's White Sands Missile Range in New Mexico.

The components were recovered and flown back to the launch site by an army helicopter within an hour of landing. At the launch site the payloads were removed from the nose cone and payload bay and returned to the researchers.

"We successfully completed the flight and retrieved the section of the rocket carrying all the payloads," said Dougal Maclise, NASA's Flight Opportunities technology manager. "The payloads were removed from the rocket. We're checking the data we collected to see how the flight went, and how the technologies functioned while they were in microgravity. We'll report back in about four months."

The main objective of the Flight Opportunities Program is to aid the maturation of technology for future space and high-altitude missions that benefit NASA. Flying on suborbital launch vehicles in zero gravity, experimental technologies are briefly exposed to the space environment where these technologies are expected to operate. Researchers can then check their experiments to ensure they operated as expected.

A second objective of the program is to foster the emerging commercial suborbital launch industry.

**Altitude record, page 12**

Contributed / Heriberto Ibarra

# Dream Chaser welcomed

**By Alan Brown**
Dryden Public Affairs

NASA Administrator Charlie Bolden visited Dryden May 22, taking the opportunity to see the Sierra Nevada Corporation's Dream Chaser test vehicle that had arrived at the center a week earlier.

Bolden, SNC's Director of Flight Operations and former NASA astronaut Steve Lindsey and Patrick Stoliker, Dryden deputy director, outlined the coming ground and flight tests for the Dream Chaser to news media representatives gathered in a Dryden hangar. SNC is preparing the vehicle for tow, captive-carry and free-flight tests at Dryden.

"I'm personally excited about having Dream Chaser here at Dryden," Bolden told the assembled news media personnel, Sierra Nevada and NASA staff. "I can't think of a better place to be testing a vehicle like this than bringing it right out here to the Edwards dry lake bed, which is very historic in its own right," he added.

The testing is part of NASA's Commercial Crew Program initiatives to develop safe, reliable and cost-effective access to and from the International Space Station and low-Earth orbit. It is one of three spacecraft being developed for that role under the CCP program, the others being Boeing's CST-100 capsule and a crewed version of Space Exploration Technologies' (SpaceX) Dragon capsule. The Dream Chaser is the only one designed to make a soft airplane-style landing on a runway, similar to landings of the now-retired space shuttles.

"Ultimately, it's going to be commercial capabilities getting us to low-Earth orbit," Bolden added. "I'm really anxious to help Sierra Nevada, Boeing and SpaceX get on with the competition to determine who's going to carry our astronaut crews."

The administrator noted that if funding for NASA's Commercial Crew Program is cut,

**Dream Chaser, page 12**


**ED13-0155-29** **NASA/Tom Tschida**

*NASA Administrator Charlie Bolden, left, Steve Lindsey, center, Director of Flight Operations for Sierra Nevada Corporation, and Dryden Deputy Director Patrick Stoliker, respond to reporter's questions in front of Sierra Nevada's Dream Chaser flight test vehicle during a media briefing at Dryden.*

## Dream Chaser tow tests go well

Sierra Nevada Corporation is putting its Dream Chaser engineering test vehicle through a series of ground tests at Dryden in preparation for upcoming captive-carry and free-flight tests later this year.

During two tow tests, a pickup truck pulled the Dream Chaser test vehicle on Dryden's concrete taxiway to validate the performance of the spacecraft's nose skid, brakes, tires and other systems. The company has performed the tests at 10 and 20 mph and is working toward 40 and 60 mph tests in late July. Range and taxi tow tests are standard for winged vehicles that touch down on a runway to prove the overall spacecraft handling post-landing.

**ED13-0164-64** **NASA/Ken Ulbrich**

*Sierra Nevada Corporation's Dream Chaser test vehicle is towed down a Dryden taxiway to prepare for upcoming captive-carry and free-flight tests.*

# Stuber fondly remembered

**By Jay Levine**
X-Press editor


*Alex Stuber*

A standing room only crowd of Dryden employees met June 17 to remember Alex Stuber, who was described as an exceptionally capable engineer who had a great sense of humor and a brilliant smile. He died June 14 at age 25 from injuries he received in a traffic accident a day earlier.

Dryden Director David McBride said people are connected like kin because of the center's size and geography and "Alex made a big impact on his family here."

Stuber's Dryden career began with a student internship through the Aeronautics Research Mission Directorate in 2009. He returned as an Undergraduate Student Research Program student the next year and then was selected as part of the Pathways program the past several years. He received a Dryden peer award in 2011 for his work.

In December, Stuber completed his master's degree in aerospace engineering from North Carolina State University, the same university where he earned undergraduate degrees in aerospace and mechanical engineering. He was hired at Dryden in January.

He had a thirst for knowledge and to be challenged that kept his mentors busy during his years as a student employee. Tom Horn, chief of the Aerostructures branch, said Stuber was always ready to help and take on new challenges including a time when, "he helped a mentor with a complicated algorithm that was in a language he didn't know. He strived for excellence with humility and he learned from his mistakes."

Stuber also was selected as a NASA Student Ambassador. In a profile on the Student Ambassador Virtual Community, he said he planned, "to encourage others to consider a career path (in NASA) that will benefit not only themselves, but also the country and the world. Encouraging the study of STEM (science, technology, engineering and mathematics) fields is essential to continuing the technological advances seen today, and it will be integral in solving the problems encountered in the future."

Lance Richards, acting Education Office director, said Stuber was a bright, hard-working guy with a beaming smile.

"He was proud to work for NASA and we were proud to have him," Richards said.

Chris Kostyk said Stuber had, "ability, potential and character and would have been one of the best engineers at the center."

Matt Moholt, a close friend of Stuber, described him as "a genuinely good person. He was over so much that my kids would ask, 'Where's Alex?' if he wasn't there."

Stuber's family attended the memorial including his dad Chuck, his mom Janet and his sister Andie.

Chuck Stuber thanked the Dryden community for the outpouring of love and support for the man who was not only his son, but also his best friend.

"We are here to celebrate his life rather than focus on the events of the past several days. He was an intelligent, fun kid and a good athlete. He was loving, caring, personable and a passionate snow skier," he said.

The Stuber family had traveled together all over the U.S., Europe, Japan and a recent graduation present – a trek to climb Mount Kilimanjaro in Tanzania, Africa, and an African wildlife safari.

The last words exchanged by father and son are the only ones that matter, "I love you."

# ISS science: learn the latest

As everyday ambassadors of NASA, employees need to know and understand what's happening aboard the International Space Station. Here's six ways employees can keep track of the latest and greatest science on the ISS:

• Employees can subscribe to the ISS Program Science listserve, which includes twice-weekly emails with compelling stories about important ISS research. Listserve is available to everyone, including external audiences, at: https://lists.nasa.gov/mailman/listinfo/iss-program-science-group

• Read the ISS Research and Technology Web page: http://www.nasa.gov/iss-science/ and the engaging ISS Research 'A Lab Aloft' Blog: http://go.usa.gov/atI

• Watch the 'International Space Station Research 101' video lecture on Satern, course No. JSC-AC-ISSR101. It is designed for the entire NASA team interested in understanding the research and technology development conducted onboard the station.

• Know the ISS research benefits for humanity: http://www.nasa.gov/mission_pages/station/research/benefits/

• Follow ISS research updates on Twitter: https://twitter.com/ISS_Research and Facebook: https://www.facebook.com/ISS

• Learn how to get research onto ISS, or how to refer those interested: http://www.nasa.gov/mission_pages/station/research/ops/research_information.html

For further assistance, contact the ISS research helpline at 281-244-6187.

# News at NASA

## Sweet is new CIO

Larry N. Sweet is NASA's new chief information officer. Sweet joined the agency in 1987 at the Johnson Space Center, Houston, where he served as supervisor and manager for more than 26 years. Since February 2007, Sweet has been Johnson's chief information officer and information resources director.

As NASA CIO, Sweet began leading the agency's information technology efforts and capabilities on June 30. He is responsible for ensuring NASA's information assets match up with federal policies, procedures and legislation.

As NASA's top IT official, Sweet also will manage a number of other major IT efforts, including the Information Technology Infrastructure Integration Program, or I3P, which consolidates and integrates NASA's IT services to enable collaboration and reduce agency costs.

Sweet began his career with NASA as a branch chief in the Center Operations Directorate. He moved to the Information Resources Directorate, serving as office manager, division chief and deputy director prior to being selected as director. In addition, Sweet completed a formal detail in 2002 as Johnson public affairs office deputy director and a rotational assignment in 2005 at NASA headquarters in the Institutions and Management Office.

Sweet earned a visual communications degree in 1978 from Texas Lutheran University, in Seguin, Texas.

# SBLT-II flight series concludes

**By Gray Creech**
Dryden Public Affairs

Dryden's F-15B Research Testbed aircraft recently completed flying an experimental test fixture in partnership with Aerion Corporation of Reno, Nev.

Called the Supersonic Boundary Layer Transition, Phase II, or SBLT-II, the experiment consisted of flying a small test airfoil, or wing section, attached underneath the F-15B. This allowed NASA and Aerion engineers to continue investigating the extent and robustness of natural laminar flow over the test section at supersonic speeds.

Conducting the experiment in supersonic flight conditions with the F-15B enabled engineers to capture data in a real-world flight environment, allowing for more precise refining of supersonic natural laminar flow airfoil design. There were a total of 12 SBLT-II flights.

"The objective of the flight series was to investigate the extent and robustness of smooth, or laminar, airflow over the specially-designed test airfoil," said Brett Pauer, Dryden's deputy High Speed Project manager. "Then, researchers will work to better understand when imperfections in the airfoil's surface cause the air to transition from laminar to rough, turbulent flow. The greater the extent of laminar airflow over a wing, the less aerodynamic drag there is, which reduces fuel consumption," Pauer said.

It is believed that significant laminar flow has never been achieved on any production supersonic aircraft before, so this research and the data collected from the SBLT-II test fixture may help provide some of the data that might enable the design of supersonic aircraft in the future that have wings that produce laminar flow at supersonic cruise conditions.

**ED13-0108-13** **NASA/Tom Tschida**

*Dryden's F-15B takes to the sky for an SBLT-II mission.*

One of the goals of NASA's High Speed Project, which utilizes the F-15B and other high performance jets, is reducing the fuel consumption and increasing efficiency of future supersonic aircraft.

# Technologies tested aboard DC-8

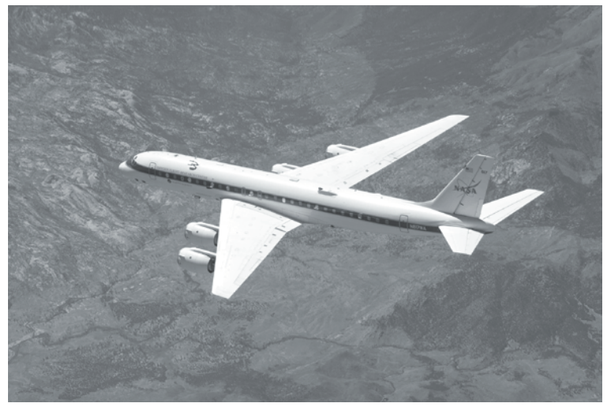
**Beth Hagenauer**
Dryden Public Affairs

NASA's DC-8 airborne laboratory has flown Earth science missions for more than 25 years. The converted jetliner recently carried several instruments testing new technologies that could aid those missions, Global Positioning System accuracy and aviation safety, in years to come.

One such instrument is the High Definition Sounding System comprised of dropsondes using long-range telemetry. The instrument was developed by Yankee Environmental Systems in western Massachusetts and funded by the Navy, NOAA and a Phase 1 Small Business Innovation Research grant through NASA's Ames Research Center at Moffett Field, Calif. Eight soda-can sized sondes were dispensed during flight, sending back data on pressure, temperature, humidity, winds and sea surface temperature.

Next phase of the dropsonde study will be flown in September on several NASA WB-57 flights when up to 96 sondes per flight will be automatically dispensed at high altitude. This research, which includes flights on NASA's P-3B flying laboratory, is leading up to installation on a NASA Global Hawk for the 2014 Hurricane and Severe Storm Sentinel mission.

A second technology study flown on the DC-8 had two parts, the first of which is related to airline safety. The prime task was to demonstrate the real-time measurement of radiation on aircraft, transmit it to the ground via satellite link, incorporate the data into global radiation models and distribute it to users – all within 15 minutes. Space Environmental Technologies is mapping radiation doses over Earth and at different altitudes. The company, which received real-time data during portions of the DC-8 flight, will provide a system for the commercial airline industry to monitor severe radiation from solar flares for global aviation safety.



**ED12-0143-21** **NASA/Lori Losey**

*NASA's DC-8 recently flew technology that could prove valuable to future science missions. Some of the instruments also have potential applications to increase Global Positioning System accuracy and aviation safety.*

Atmospheric & Space Technology Research Associates of Boulder, Colo., producers of GPS receivers, conducted the second part of this study. Company instrumentation collected longitude and latitude data as the system made ionospheric, or upper atmosphere, measurements. The company is exploring whether it is feasible to measure scintillation, or GPS signal fluctuation, from an airplane.

# Upgrades increase capabilities

**By Sam Smith**
Dryden Public Affairs

Major renovations to the gold and blue rooms may sound like the grand re-opening of a popular nightclub, but at Dryden it means an increased capability in flight operations and testing.

The almost six-month overhaul of Dryden's MCC1 and MCC2 Mission Control Centers – known at the center as the "blue" and "gold" rooms respectively for their color schemes – included replacing hardware almost a decade old. With the demanding schedule the MCCs face, this hardware upgrade had to be planned in such a way to allow one control room to be available for scheduled research flights. All 42 control room workstations, 26 in the blue room and 16 in the smaller gold room, were replaced.

"There is a lot more horsepower, a lot more onboard storage," said Russell James, the range systems engineering group lead. "All the networking is incredibly fast and robust compared to what it was."

Additionally, upgrades were made to the software, including improvements in information technology security. High definition video was also added to the gold room along with some cosmetic changes.

**ED13-0070-19** **NASA/Tom Tschida**

*The gold room is active during a flight of the Dryden Gulfstream G-III Adaptive Compliant Trailing Edge flap.*

For approximately $320,000, the renovations increased the MCC capabilities, enabling collection, processing and display of mission data for all flight projects using the control rooms to progress with greater speed and reliability.

"This is why Dryden is here," James said. "We fly airplanes, and to do so safely they (researchers) want to be able to monitor the health and status of the vehicle in near real time and the MCC is the place to do that."

The flight research center needs two control rooms with nearly identical capabilities to maintain the flexibility needed to support ongoing aeronautics projects. This flexibility was especially important during the upgrade. As one MCC was down for renovations, the other was supporting flight research missions.

The gold room has been designated the control room for the upcoming approach and landing flight tests of Sierra Nevada Corporation's Dream Chaser. The Dream Chaser is intended to be a space-faring vehicle capable of airplane-style landing on a runway, similar to landings of the now-retired space shuttles.

The recently refurbished blue room is set to host the F/A-18 No. 853 Launch Vehicle Adaptive Control Experiment. The project entails a look at the launch trajectory software for NASA's Space Launch System.

In addition to supporting Dryden's flight tests, the Western Aeronautical Test Range, which the MCCs are a part of, support Air Force test flights.

When both MCCs are up and running, it is seamless to researchers which room they use for research. This permits necessary system tests in the other. Data quality is essential to the research and to protect resources and lives that a failed flight test could endanger.

Flight test data, according to MCC software engineering manager Jack Sheldon, "has to be right the first time, every time."

# Dryden University

## What we do and how we do it

**By Sam Smith**
Dryden Public Affairs

The tuition is free, students do not have to buy books, and it's located in sunny Southern California.

Dryden University is a series of courses by and for Dryden employees. What began as a student project for NASA's Foundations of Influence, Relationships, Success, and Teamwork leadership development program has evolved into an ongoing institution at the center. The first full session began in May.

"We had a good turnout," said Larry Cliatt, an aerospace engineer and one of the three founders of Dryden University. "We didn't expect 23 courses, but it speaks volumes for how well we're doing."

More than 100 employees enrolled in those courses during the first full session of the Dryden University. Operations engineer Ashley Parham enrolled in two different courses – Critical Conversations, Conflict Management and Advanced Communication Skills and

**Dryden U, page 9**

**ED13-0222-06** **NASA/Ken Ulbrich**

*Employees attend Yale University's Work and Family Stress Toolkit as part of Dryden University, a series of courses by and for members of the Dryden family.*

# Dryden tech sharpens the cutting edge

**By Jay Levine**
X-Press editor and
**Gray Creech**
Dryden public affairs

No one can know for sure what the future will bring, but Dryden researchers think they have some ideas that can change the world, or at least help to enable a brighter tomorrow.

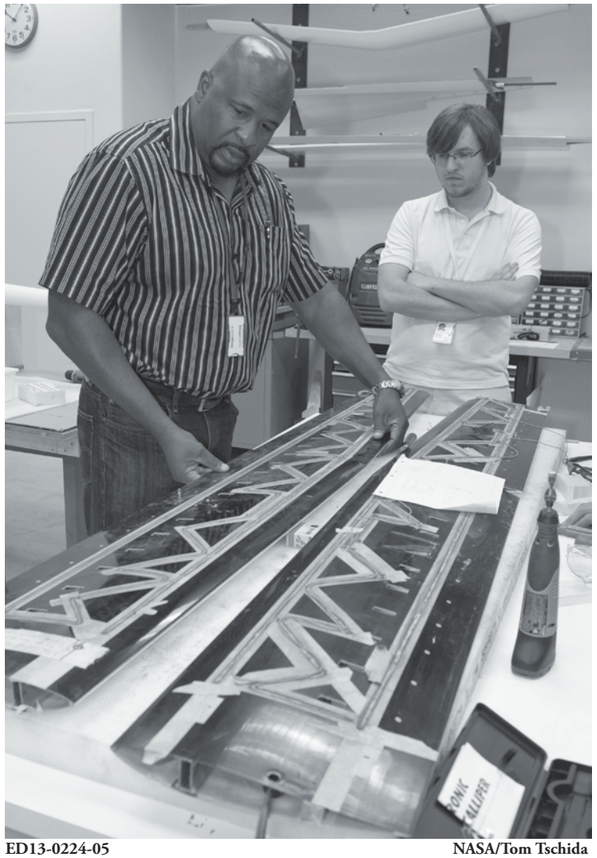
Some of these promising technologies include sensors the diameter of a human hair, validation of an unproven rocket nozzle to help space vehicles get off the ground, a new method to air launch satellites, and assisting with the overhaul of part of the national air traffic control system.

**Fiber optic sensors**

Dryden fiber optics sensing work is out of this world. Dryden has developed the fiber optics sensors, hardware and algorithms to a technology readiness level that it is useful not only on Earth, but also for at least two space or near-space vehicle projects.

A Space Act Agreement with Virgin Galactic will have Dryden engineers and technicians heading up an effort to help the company instrument the White Knight II vehicle to measure strain along the wings and center section. Use of fiber optic sensing technology could help the company to make special strain and deflection measurements while at the same time gaining confidence in the technology for possible future flight applications, said Dryden researcher Allen Parker.

Another application for the fiber optics sensing technology is on an effort funded by Kennedy Space Center in Florida. The concept is to use the technology on an expendable launch vehicle. The multi-center effort also relies on a partnership Dryden is developing with Marshall Space Center, Huntsville, Ala., on determining how to integrate the fiber optic sensors onto a rocket on which a fiber optic sensing system could be ready for testing by the end of the year, Parker said.



ED13-0224-05 NASA/Tom Tschida

*Allen Parker assists Andrew Haynes with the installation of fiber optic sensing system components on an experimental aircraft model.*

"The fibers are capable of wide temperature ranges. The system has to operate from launch to space and stream data off for a few hours once it is in space. The biggest challenge is to survive the dynamic launch environment. We have a few ideas and we are fortunate to work with Marshall engineers, who do this day in and day out," he added.

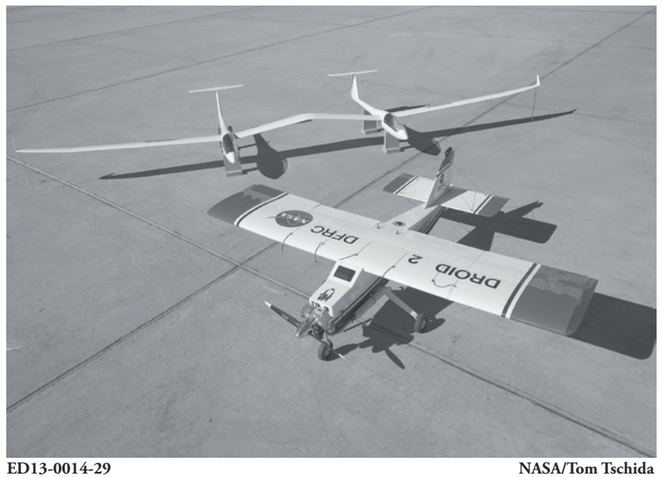
**Compensating for altitude**

Helping a rocket get to space is the objective of another Dryden and Marshall partnership. Researchers from the two centers believe that an idea proposed in the past can gain new life by validation through flight research. If the predictions for the concept can be proven in flight, the technology could result in a rocket with greater performance that delivers a 5 percent increase in payload to low-Earth orbit.

Dryden principal investigator Daniel S. Jones, Dryden researcher Trong T. Bui and Marshall principal investigator Joseph H. Ruf believe the dual-bell nozzle, which is a type of altitude-compensating nozzle, could be an answer to reducing the cost of getting to space. Research on a flight test fixture under one of Dryden's F-15 airplanes could validate and verify the technology works as advertised.


ED13-0156-69 NASA/ Ken Ulbrich

*Daniel Jones is working toward validating an altitude-compensating engine nozzle on a Dryden F-15 aircraft.*




ED13-0014-29 NASA/Tom Tschida

*The towed Glider Air-Launch concept is expected to get a boost from the towing of the proof-of-concept model, rear, by Dryden's Remotely Operated Integrated Drone.*

The idea builds on research of the Jet Propulsion Laboratory in the late 1940s and by Rocketdyne, now known as Pratt & Whitney Rocketdyne, in the early 1990s. The idea is for the nozzle flow to adjust with changes in ambient pressure as the rocket ascends. The result is greater integrated performance and better fuel usage for the rocket throughout its trajectory.

At a recent Dryden technology event, Jones said, "It's the right time to do this project."

He might be right. The conceptual design work is underway as part of funding from the Game Changing Development Office. If progress continues to be made the project could be flying in 2015, he said. Success of the project could ultimately lead to the incorporation of this technology in future launch systems worldwide.

**Launch system**

Brute force of rocket engines might not be how future rockets depart from Earth's surface.

In fact, satellites could receive a boost to orbit from the Towed Glider Air-Launch. The concept is for a large transport aircraft to tow a relatively inexpensive remotely or optionally piloted glider to altitudes approaching 40,000 feet. The glider will carry a booster rocket capable of launching payloads into low Earth orbit.

Gerald Budd, Dryden business development and towed glider project manager, is having the NASA Model Shop build a proof-of-concept model glider with a 24-foot wingspan and a twin fuselage. The model is expected to fly later this year, towed aloft by one of Dryden's small DROID – for Dryden Remotely Operated Integrated Drone – unmanned aircraft.

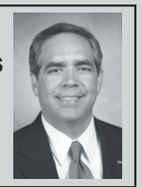
Recent feasibility analyses done by independent contractors indicate that a performance gain of up to 50 percent may be realized by use of Budd's towed-glider technique over vertical launch of a similar-sized rocket from the ground. Engineers continue working trade-offs with launching the rocket either with the glider still in tow, or following release from the tow aircraft. Either way, after the rocket has launched, the glider will return independently of the tow aircraft to its base to be used again.

Budd maintains the Towed Glider Air Launch Concept has the potential to realize the operational flexibility of a custom airplane, but without the price tag. The

**Technology, page 8**

# Good ideas are valuable no matter what the area

**Center Director's Column**
**by David McBride**



You can't look at a modern aircraft without seeing the imprint of NASA and Dryden.

From lightweight materials, to aircraft shape, to aerodynamic surfaces at the end of the wing tip called winglets found on most transport and commercial aircraft to improve fuel economy, NASA and Dryden have made a difference.

Something you can't see that is common to modern aircraft is the digital flight controls used on most transport aircraft and proven by NASA and validated in flight on a F-8 Digital Fly-By-Wire aircraft flown here. Test methodologies and techniques proven at Dryden are used throughout the industry to make flight testing more efficient.

At a recent Technology Day, researchers shared their work. Thanks to Earl Adams, Monika Dewald, Laura Fobel, Janeya Griffin, Sam Hull and David Voracek for the event that is the first of what I expect will be many opportunities for Dryden researchers to showcase their innovation.

This work, which was a small representation of the overall technology effort going on center wide, displayed examples of new technology we are advocating and any one of which may change the world.

The event showcased Dryden-developed innovation that has implications across the agency such as our fiber optic sensing work. The advancements with fiber optics sensing could one day be common on a host of aviation, space and commercial products. In fact, Dryden's fiber optic sensing work has moved from a technology development effort to one of implementation and validation.

Not all of the ideas are new. Some concepts have theoretical merit, but didn't have flight research data to prove it. One such project is funded through the Center Innovation Fund – an investigation by Al Bowers and his students of the Prandtl-D, a model flying wing glider. Prandtl-D is an acronym for the Primary Research Aerodynamic Design to Lower Drag. The name also is a tribute to Ludwig Prandtl, a German whose research is considered a foundation

**Column, page 8**

## Technology... from page 7

Towed Glider Air-Launch vehicle initial research and development is possible thanks to the Center Innovation Fund. The CIF is funded through the NASA Office of the Chief Technologist and each of the NASA field centers have these funds to spark new ideas and encourage pursuit of promising technologies.

ED13-0156-60 NASA/Ken Ulbrich

*Ricardo Arteaga demonstrates advantages of the Automatic Dependent Surveillance-Broadcast at a recent Dryden Technology Day.*

**Air traffic control**

Closer to Earth, Dryden is contributing to the next generation air traffic control system by helping to validate the Automatic Dependent Surveillance-Broadcast, or ADS-B, device, for unmanned aircraft.

Dryden's Ikhana aircraft, which is a Predator B, flew for the first time last March with ADS-B. It was the first time the system was flown on an unmanned aircraft as large as Ikhana – with a 66-foot wingspan, a takeoff weight of more than 10,000 pounds, and a cruising altitude of 40,000 feet. ADS-B is an aircraft tracking technology that all planes operating in U.S. airspace must adopt by January 2020 to comply with Federal Aviation Administration regulations.

Current tracking devices aboard aircraft are called transponders, but the ADS-B isn't just a new-fangled transponder. It provides much more detailed and accurate information to air traffic controllers, and will enable navigation by satellite in addition to the current system of ground radars.

Ground radars interact with transponders once every four to 12 seconds in order to get an aircraft's position, velocity and altitude. In contrast, the ADS-B constantly and automatically broadcasts information every second to air traffic controllers. The more frequent updates, coupled with information updated through the Global Positioning System, result in much greater accuracy in the display of an aircraft's position, velocity and altitude.

Validation and verification of ADS-B could lead to a future where mail and packages move from city-to-city aboard unmanned aircraft systems, or UAS, flying in the same airspace as airliners, cargo planes, business jets and private aircraft. When it does, it is likely that the ADS-B technology developed and flight tested at Dryden helped make it possible.

## Help for the innovative

Dryden's Innovative Partnerships Office, or IPO, works to identify patentable and licensable inventions and help manage them.

From new technology reporting to receiving patents, members of the IPO office assist researchers to avoid inadvertent legal or intellectual property missteps that could endanger the ability to protect the proposed center innovations.

Some of the ways IPO staff help is by classifying of technologies that require protection, featuring new technologies, helping researchers gain patents and recognizing inventors' achievements.

Another element of the IPO is seeking ways to share developed technology widely to assist in transitioning ideas – whether the technology is patentable or not – from NASA to other government agencies and the private sector. That technology transfer can lead to further development and commercialization to benefit the largest number of people.

For more information call ext. 3368.

## Column... from page 7

of modern aerodynamics.

The CIF is one way Dryden can pursue ideas or technologies that we believe could have a big impact. The Prandtl-D idea originated in 1932, but was not widely accepted because there wasn't any flight data to validate the concept. Dryden's Fabrication Branch built the glider that Bowers and his student assistants used to change that. During recent flights, they obtained the first recorded evidence that proverse yaw, created by thrust at the wingtips, is possible.

I need, NASA needs and the nation needs ideas. I want to see those seeds of technology from our people blossom and grow. Tech ideas can lead to a capability for something new. Ultimately, we'd like to see those technologies in the marketplace. Just one could change the world of aviation.

Another example is the concept of towing a vehicle to altitude rather than using a rocket-based first stage for a Earth-to-orbit vehicle. Jerry Budd is working on a 1/3-scale Twin Ventus glider to validate in flight the aerodynamics of his Towed Glider Air-Launch concept.

Supersonic low-boom validation in a relatively low-cost, efficient series of flights is another way Dryden is helping to develop next generation aircraft. With solid coordination and collaboration, this validation could be the path to seeing the next new X-Plane. When Charlie Bolden visited he said he saw the possibilities of a supersonic X-Plane and so do we. Langley Research Center in Hampton, Va., would have the lead on such a project, but Dryden would play a prominent role in the flight research aspects, beginning with the low-boom flights over select cities in an effort to help create new Federal Aviation Administration rules to fly supersonically over populated areas. Current rules forbid such operation because of the noise created by supersonic aircraft.

Innovation at Dryden is not limited to aeronautics. The Center Innovation Fund also is for anyone in any Dryden organization that has an idea, which with a small investment could greatly lead to cost savings or efficiencies. Your ideas are welcome anytime and the best of those will have high priority as funds become available.

# Dryden outreach team recognized

*Dryden Center Director David McBride, left, recognizes the Dryden ARMD Outreach team that received the 2012 Associate Administrator Group Award. From left are McBride, Jay Levine, Terri Lyon, Nils Larson, Steve Lighthill, Jim Less, Lisa Mattox, Carla Thomas, Jim Ross, Kevin Rohrer, Jim Sokolik and Mary Ann Harness.*

ED13-0164-64 NASA/Ken Ulbrich

## Dryden U... from page 5

Yale University's Work and Family Stress Toolkit.

She attended the first course during Dryden University's pilot session, which lasted about a month. She chose these courses to improve her interpersonal and communication skills, as well as to develop skills for work-life balance.

"The Conflict Management course helps you understand your personality and how people view you in different situations. The course also provides you with tools and tips to resolve conflict, while working with others in your professional and personal lives," Parham said.

"For new employees or employees who have been at Dryden for many years, I highly recommend this course to help you grow and advance your communication skills in your career," she added. "As an operations engineer, I am interacting with different people and multiple branches on a daily basis."

Working with people is a key skill needed by engineers who want to make the move from technical to managerial positions. However, Dryden University assists with employee retention as well.

"We are losing a lot of younger engineers," Cliatt said. "People from college get bored and want to do more. Dryden University gives the ability for people to diversify and get interested in the center outside of (their) cubicle."

The courses provide a comprehensive look at Dryden operations across several disciplines, from engineering to finance to communication. According to the center's Deputy Director of Programs, Joel Sitz, whom Cliatt called a champion of Dryden University, inclusion is a key aspect of the program.

"I think Dryden University resonates with the Executive Leadership Team," Sitz said. "It's a way to tell employees about what we do and how we do it."

Dryden University is available to all Dryden employees including interns, contractors, and civil servants. A complete course catalog is available online at https://satern.nasa.gov.

For more information about Dryden University, including enrollment information, visit http://www1.nasa.gov/centers/dryden/xnet/organizations/human_resources/dryden_university.html

# Whitlow to retire, Keegan to be AA

Woodrow Whitlow, Jr., NASA's associate administrator for the Mission Support Directorate, will retire Aug. 9. Following Whitlow's retirement, Richard Keegan, currently NASA's associate deputy administrator, has agreed to assume the mission support duties.

Whitlow is responsible for most NASA management operations, including human capital management, headquarters operations, agency operations, the NASA Shared Services Center, strategic infrastructure, cross-agency support, and construction and environmental compliance and restoration.

Whitlow's long NASA career began in 1979, when he started as a researcher at the Langley Research Center in Hampton, Va. He also was director of the Critical Technologies Division in the Office of Aeronautics at NASA Headquarters in Washington, deputy center director at the Kennedy Space Center in Florida,

**Whitlow, page 12**

# Dryden researchers publish

Dryden researchers have captured the results of some of the most dynamic research at Dryden in technical publications. The publications are listed by the month they were released.

**March**

Sean E. McMorrow and Roberta B. Sherrard collaborated on the, "Mission Information and Test Systems Summary of Accomplishments, 2011," NASA/TM-2013-216043. (H-3131) (TR/RG)

**April**

Peter M. Suh and Dimitri N. Mavris co-authored, "Modal Filtering for Control of Flexible Aircraft," AIAA-2013-1741, presented at the 21st AIAA/ASME/AHS Adaptive Structures Conference, Boston, Mass., April 8-11, 2013.

**May**

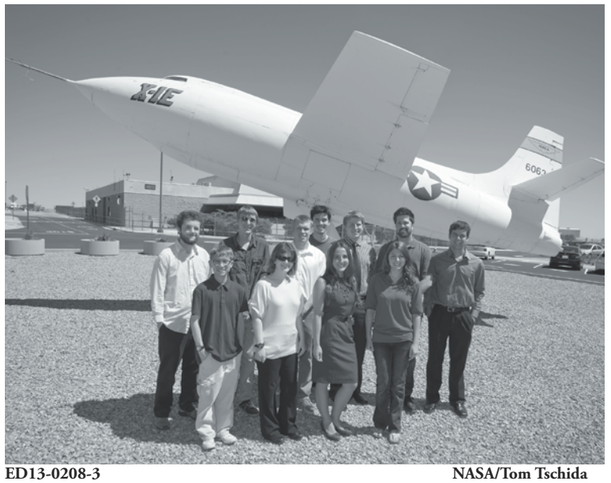
William L. Ko and Van Tran Fleischer, *Method for Estimating Operational Loads on Slender Aerospace Structures Using Span-wisely Distributed Surface Strains*, NASA/TP-2013-216518.

# Randleman, 95, passes

Winifred H. Randleman, a former Dryden employee who started as a library technician and later was a computer programmer, died May 8. She was 95.

She worked at Apollo Field during World War II in Lancaster, Calif., and at Dryden from 1963 until her retirement from NASA in 1981.

Services were May 18 at Joshua Memorial Park and Mortuary in Lancaster.



ED13-0208-3 NASA/Tom Tschida

*AERO Associates in row one, from left, are Nicholas Pontius, Cherie Day, Amanda Garvis and Erika Fedorko. Second row, from left, are Joshua Brewster, Nicholas Ross, Benjamin Sitz, Anthony Macpherson, Brandyn Ward, Adam Lucas and Michael Strauch.*

ED13-0208-4 NASA/Tom Tschida

*Aeronautics Academy members, from left, include Benjamin Martins, Nathan Suppanade, Andrew Putch, Kristyn Kadala, Corbin Graham, Louis Edelman and Eric Gutierrez.*

# Student programs

## Learning on the job

**By Jay Levine**
X-Press editor

Seventy-two students in 11 programs are gaining valuable work experience at Dryden, while learning to apply the theories to the practice of their specialties. The program in which they are participating lists students alphabetically.

The Achieving Competence in Computing, Engineering and Space Science, or ACCESS, program is designed for undergraduate and graduate students with disabilities who have strong backgrounds in science and are pursuing technical careers. Johanna Lucht represents the program this summer.

The Aeronautics Academy offered by the Aeronautics Research Mission Directorate, or ARMD, provides college students opportunities for intense training in aeronautics that includes research, leadership

**Student programs, page 11**

ED13-0208-05 NASA/Tom Tschida

*The CIPAIR students include, from left to right, Victor Jimenez, Abraham Garcia and Cristian Gonzalez*

ED13-0208-8 NASA/Tom Tschida

*AERO Scholars students include, from left to right, Cody Karcher, Jacob Hall and John Schaefer.*



## Student programs... from page 10

*Johanna Lucht*

*Anthony Popelar*

development and broad exposure to the nation's aeronautics enterprise. The seven participating students are Louis Edelman, Corbin Graham, Eric Gutierrez, Kristyn Kadala, Benjamin Martins, Andrew Putch and Nathan Suppandae.

The Aerospace Education Research and Operations, or AERO, Institute awards internships to students for work assignments that are made based on the needs of the center's branches or an internship for which they competed. AERO Associates are those chosen for specific jobs, while AERO Scholars, or Aeronautics Scholars, are students participating in work assignments as part of an ARMD scholarship they have been awarded.

This year's AERO Associates include Joshua Brewster, Cherie Day, Erika Fedorko, Amanda Garvis, Lauren Hudson, Adam Lucas, Anthony Macpherson, Matthew McSavaney, Nicholas Pontius, Nicholas Ross, Benjamin Sitz, Michael Strauch and Hovig Yaralian.

The three AERO Scholars are Jacob Hall, Cody Karcher and John Schaefer.

Three interns are participating in the Curriculum Improvements Partnership Award for the Integration of Research at Dryden. The program is structured to assist two- and four-year minority serving institutions to strengthen science, technology, engineering and mathematics, or STEM, and technical programs. Funding is used to integrate project management methodology to add real world experiences with theoretical knowledge to enhance STEM and technical classes. The aim is to increase the number of underrepresented and underserved students who attain degrees in science, technology engineering and mathematics. Selected for this program were Abraham Garcia, Cristian Gonzalez and Victor Jimenez.

ED13-0208-02 NASA/Tom Tschida

*USRP students in the first row, from left, include Andrew Cox, Vijayalakshmi Parthasarathy, Brooke Neufeld, Nancy Pinon and Charlecia Brownlee. In the second row, from left are David McWilliams, Jonathan Tivald, Jacquelin Patton, Daniel Isokpunwu, Sarah Pearson, Grant Pickett, Evan Kaiser, Samuel Sobul and Gary Bell.*

ED13-0200-1 NASA/Tom Tschida

*Pathways students include, from left to right, Stephanie Andrade, Sam Smith, Daniel Frecka, Michael Daub, William Gomez, Andrew Haynes, Ryan Alexin, Elizabeth Michell Feeney and Andrew Burrell.*

The NASA Pathways Program has been established at NASA during the past several years to streamline familiar programs that have long been staples of the student employment opportunities programs. For example, the streamlined Pathways Program replaces the Student Temporary Employment Program, or STEP, and the Student Career Experience Program, which was formerly known as the Cooperative Education Program.

NASA Pathways Intern Employment Program students working at Dryden include Ryan Alexin, Stephanie Andrade, Andrew Burrell, Michael Josef Daub, Paul Dees, Elizabeth Michell Feeney, Dan Frecka, Dominic Gonzales, William Gomez, Andrew Haynes, Janet Hoover, Samuel Kantor, Ethan Nieman, Ashley Prueitt, Sam Smith, Lee Southwood, Curtis Stump, Peter Suh, Jeff Requist and Nydia Wilkinson.

Anthony Popelar is a recipient of the Minority University Student in Technology, or MUST, program. The scholarship covers half of a student's tuition up to $10,000 for undergraduate students in engineering and technology in return for work at NASA centers for each year in which they qualify. Participants are U.S citizens pursuing an undergraduate degree in science, technology, engineering or mathematics at a college or university in the United States. They also are members of an underrepresented group.

The Science Teacher and Researcher, or STAR, program provides opportunities to science teachers or researchers to work at Dryden. This year's awardees include Carey Baxter, Beyln Brant, Emilio Cantu, Kirsten Fogg, Shawn Kirby, Rebecca Salvemi and Steve Wilson.

Contractor Jacobs/Tybrin Corp. works with Dryden's technical branches to fill summer student positions. Austin Eslingler and Billy Sitz currently are part of this program.

The NASA Undergraduate Student Research Project, or USRP, offers internship opportunities for undergraduate science and engineering students at all 10 NASA centers and additional partner facilities.

USRP students at Dryden include Gary Bell, Charlecia Brownlee, Andrew Cox, Daniel Isokpunwu, Evan Kaiser, David McWilliams, Brooke Neufeld, Vijayalakshmi Parthasarathy, Jacquelin Patton, Sarah Pearson, Grant Pickett, Nancy Pinon, Samuel Sobul and Jonathan Tivald.

Dryden also supported a graduate student fellowship this summer. Neil Dhingra was awarded with the Harriet G. Jenkins Pre-Doctoral Fellowship.

## Altitude record... from page 1

Noting that it was the first time he had worked with UP Aerospace, NASA Campaign Manager Paul De Leon said he arrived early during launch preparations "to get a good feeling for all the processes of assembling their rocket and integrating our payloads into the rocket."

Two days before launch, he said, the researchers did a final check of their technology experiments and were allowed to physically mate their payloads into the rocket before the entire rocket was assembled.

Payloads included the Federal Aviation Administration's Automatic Dependent Surveillance-Broadcast, or ADS-B, the Italian DTM Technologies' Diapason, the Space Technology Game-Changing Development payload vibration isolation system as well as two high school science experiments funded by a New Mexico Space Grant.

ADS-B is a commercial off-the-shelf tracking device for use in air traffic control and related applications that the FAA is developing as part of the Next Generation Air Transportation System. Current plans will require all aircraft and other flight vehicles operating within U.S. airspace to be equipped with ADS-B by 2020.

The Diapason is an instrument that studies nano-particle migration and capture, achieved by very small thermal gradients. The particles range from 1 micron down to 1/1000 of a micron. This range allows the monitoring of combustion-generated pollution, the analysis of hostile environments, and the identification of atmospheric contaminants.

UP Aerospace SpaceLoft suborbital rockets are about 20 feet long and can carry up to 110 pounds of payload. SpaceLoft 7 was the firm's 11th launch from Spaceport America.

Based in Denver, Colo., UP Aerospace Inc. is one of seven companies NASA has contracted to fly experiments at the boundaries of space to verify that technologies work as expected in this environment. The other six firms are Virgin Galactic, Masten Space Systems, Near Space Corporation, XCOR Aerospace, Whittinghill Aerospace and Armadillo Aerospace.

NASA manages the Flight Opportunities manifest, matching payloads with flights, and pays for payload integration and flight costs for the selected payloads. It is intended that the other suborbital flight vendors contracted by NASA will provide flights after they have successfully flown their qualifying vehicles.

## Dream Chaser... from page 2

it would jeopardize the agency's congressionally approved programs for manned exploration of space beyond low Earth orbit. It would also force NASA to keep spending large sums – currently more than $70 million per mission – to Russia to fly American astronauts to and from the space station.

"We have got to get Commercial Crew funded, or we're going to be paying the Russians forever," Bolden maintained. "Without Commercial Crew, we probably won't have exploration."

The Dream Chaser Space System is based on NASA's "Horizontal Lander" HL-20 lifting body design concept. The upcoming flight tests will provide data on the spacecraft's aerodynamic performance during subsonic approach and landing on a traditional runway. The tests are part of pre-negotiated, paid-for-performance milestones with CCP, which is facilitating commercial, U.S.-led development of spacecraft and rockets that can launch from American soil.

"We think (Dream Chaser) is the right answer for our nation," said Lindsey. Although the Dream Chaser is much smaller and lacks the large cargo capacity of the space shuttles in which he flew five missions, Lindsey maintained Sierra Nevada's craft is "less complex, easier to operate, easier to turn around and we think ultimately safer."

The Dream Chaser shared the limelight at the event with the original and much smaller M2-F1 prototype lifting body, which pioneered wingless lifting body flight in the 1960s at Dryden.

While at Dryden, Bolden also met with SNC's ground and flight-test staff, flew approach-and-landing simulations for the Dream Chaser, addressed an employee town hall and was briefed by center management on current programs, projects and operations at the center.

"I couldn't be prouder of the work that's being done here at Dryden as well as our other NASA centers," Bolden said. "They do incredible work out here."

## Whitlow... from page 9

and held positions at the Glenn Research Center in Cleveland before becoming center director.

Whitlow's training includes a Bachelor and Master of Science, and a Ph.D. in aeronautics and astronautics from the Massachusetts Institute of Technology. He has received numerous awards, including the Presidential Rank of Distinguished Executive, Presidential Rank of Meritorious Executive, U.S. Black Engineer of the Year in Government, NASA Exceptional Service Honor Medal, NASA Equal Opportunity Honor Medal, the (British) Institution of Mechanical Engineers William Sweet Smith Prize, Minorities in Research Science Scientist-of-the-Year Award, and National Society of Black Engineers Distinguished Engineer of the Year Award. The American Institute of Aeronautics and Astronautics elected him as a Fellow in 2010.

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