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Virgin Galactic delivers

By Leslie Williams
Armstrong News Chief

Virgin Galactic's SpaceShipTwo successfully flew to suborbital space Dec. 13 with four NASA-supported technology payloads onboard.

SpaceShipTwo separated from the WhiteKnightTwo twin-fuselage carrier aircraft and continued its rocket-powered test flight. The rocket motor burned for 60 seconds, taking the piloted spacecraft and payloads beyond the mission's 50-mile altitude target.

The flight was Virgin Galactic's first mission for NASA. The agency's Flight Opportunities program helped the four experiments hitch a ride on SpaceShipTwo. The program purchased flight services, the accommodation and ride, from Virgin Galactic for the payloads. During the flight, the payloads collected valuable data needed to mature the technologies for use on future missions.

"The addition of SpaceShipTwo to a growing list of commercial vehicles supporting suborbital research is exciting," said Ryan Dibley, Flight Opportunities campaign manager at Armstrong. "Inexpensive access to suborbital space greatly benefits the technology research and broader spaceflight communities."

NASA's investment in the growing suborbital space industry and strong economy in low-Earth

Flight Opportunities, page 12

Above, *WhiteKightTwo takes off with SpaceShipTwo. Once at altitude SpaceShipTwo continued its rocket powered flight beyond the mission's 50-mile altitude target with a NASA payload of Flight Opportunities experiments.*

***At left**, SpaceShipTwo returns from its successful mission.*

Photos courtesy of Virgin Galactic

X-56A suppresses flutter

By Jay Levine
X-Press editor

The X-56A team has suppressed flutter, which is a potentially destructive oscillation, with a modern and a classical controller for the first time at Armstrong. The controllers are essentially two mathematical ways of directing the aircraft in flight and permit the project to advance research on more flexible, lightweight wings.

The X-56A aircraft is intended to facilitate the development of tools and technologies and acquire data to validate modeling techniques. The results could enable future airliners to use lighter weight, flexible wing designs to conserve fuel, said Cheng Moua, X-56A project manager.

Taking advantage of calm and sunny skies, the X-56A team flew with the modern controller to expand the flight envelope. The flight also featured the collection of additional data to improve understanding of the aircraft dynamics at a range of fuel levels with the two controllers.

The classical controller is a simpler formulation, which makes it easier to intuitively understand the aircraft behavior and dynamics. The modern controller is more complex and robust. It is expected to permit the aircraft to operate safely at higher speeds, suppressing flutter deeper into the regions where the aircraft is less stable.

In an effort to prove the effectiveness of the flutter suppression with the modern controller, researchers planned a sequence of flight maneuvers during which the controller was turned off for less than two seconds at a time as the aircraft approached flutter, allowing the flutter mode to grow uncontrolled. When the system reactivated after a set time, it stabilized the flutter mode and lessened the oscillations. The calm conditions allowed the team to clearly see the aircraft dynamics, as turbulence can make it difficult to determine the cause of a given set of dynamics.

AFRC2018-0272-53 **NASA/Carla Thomas**

The remotely piloted X-56A concludes a research mission with a final approach and landing.

AFRC2018-0222-02 **NASA/Ken Ulbrich**

The control room for the remotely piloted X-56A has a feature that most do not – the pilot and co-pilot are in the front of the room, seen in front at left.

"If the controller works well, you would fly right past flutter and you'd never know it because you don't see a thing," Moua said. "During these test points we could see the growth of flutter. The team did a really good job of making sure it was a gradual buildup to flutter instability."

The flight success means Jeffrey Ouellette, an Armstrong dynamics and controls engineer, might soon be able to get the information he needs to refine the aircraft models.

'With the more sophisticated modern controller we will eventually fly at faster and faster speeds, well past flutter," Ouellette said. "That's when we will obtain the information that will allow us to refine the model to better predict the speed that the aircraft will encounter flutter."

For now, the team is happy with the milestones and is ready to reach new ones.

"We have been working since 2012 for a flight day like that," Moua said. "We have had to persevere and go back to the drawing board to overcome major obstacles. These achievements are awesome."

The next task will be to fine tune the modern controller, which should allow the X-56A to travel faster with a larger safety margin. Other items for the team are data analysis, model validation and a continuation of technology verification through the end of flights in February.

One of those technologies the team would like to explore in a potential X-56A follow-on phase is the Fiber Optic Sensing System. It is possible that the system, because it measures the structural response with such high resolution, could be used to not only collect real time data, but use that data in the flight control system. If that happens, it opens the door to simplifying aircraft control and producing even higher performance and more reliable control system designs.

A flight Sept. 14 marked the first time the team had suppressed flutter with the classical controller. The flights with the classical controller were intended to allow the team to gather the necessary flight data to precisely determine the open loop flutter speed and understand the dynamics at and beyond flutter onset, before beginning testing with the more complex and less intuitive modern controller.

Lockheed Martin developed the X-56A aircraft for the U.S. Air Force Research Laboratory and transferred the aircraft to Armstrong at the conclusion of their flight program. The program is funded through NASA's Advanced Air Transport Technology project, NASA's Flight Demonstration Capabilities project and the U.S. Air Force Research Laboratory.

Ikhana honored for flight

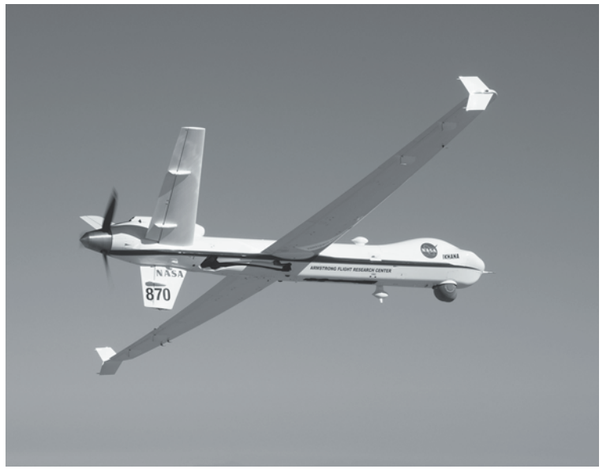
By Elvia Valenzuela
Armstrong Public Affairs

NASA Armstrong had a remarkable 2018 that included conducting flight operations in support of Commercial Supersonic Technology, modifying the all-electric X-57 Maxwell into its early experimental phase and a unique milestone recognized by a national aviation magazine.

Armstrong's collaboration with General Atomics, Honeywell and the Federal Aviation Administration resulted in flying the first remotely piloted aircraft, the Ikhana, in the national airspace without a safety chase plane. It is that historic achievement that "Aviation Week & Space Technology" magazine recognized as it selected the Ikhana achievement as a winner of its 62nd Annual Laureate Awards in the category of Commercial Aviation, Unmanned Systems.

"For more than six decades, Aviation Week editors have annually awarded Laureates to great achievers in aerospace and aviation," said Joe Anselmo, Aviation Week network editorial director. "This year's winners exemplify the spirit and innovations that are transforming our industry to meet the challenges of tomorrow."

The Laureate Awards honor extraordinary achievements in the global aerospace arena in the categories of Business Aviation, Commercial Aviation, Defense and Space.



18-051c NASA/Carla Thomas

NASA's remotely-piloted Ikhana aircraft, based at Armstrong, was flown in preparation for its first mission in public airspace without a safety chase aircraft.

Ikhana is the first aircraft to achieve a No Chase Certificate of Waiver Authorization (COA) flight without the need for a chase plane or visual observers as it operated in various classes of airspace. The teamwork among the organizations made the Ikhana a success and demonstrated the opportunity for Unmanned Aircraft Systems to be integrated into the National Airspace System.

"The Ikhana represents an extraordinary collaboration among innovative individuals dedicated to bringing Unmanned Aircraft Systems one step closer into our reality," said Jaiwon Shin, NASA's associate administrator for aeronautics. "We are very grateful to be recognized by this prestigious award. It's an honor and a privilege to be selected as a recipient."

The winners of the 2019 Laureate Awards will be honored on March 14, 2019 at the National Building Museum in Washington, D.C. In addition to winning an award in a category, "Aviation Week & Space Technology" will announce a Grand Laureate in each of the four categories.

Library visit turns sweet

A visit to the Armstrong Research Library can sometimes uncover sweet data finds, but on Nov. 15 visitors were invited to have a customized cup of cocoa. It was the library's Second Annual Hot Cocoa Bar, which was a chance for people to discover what's new at the library and sign up for a library card. In the photo, library technician Kaylynn Clark welcomes guests.

AFRC2018-0300-11 NASA/Lauren Hughes

News at NASA

CubeSats enabled for new missions

A series of new CubeSats are now in space, conducting a variety of scientific investigations and technology demonstrations, following launch Dec. 16 of Rocket Lab's first mission for NASA under a Venture Class Launch Services (VCLS) contract.

An Electron rocket lifted off from the company's launch complex on the Mahia Peninsula in New Zealand, marking the first time CubeSats have launched for NASA on a rocket designed specifically for small payloads.

"With the VCLS effort, NASA has successfully advanced the commercial launch service choices for smaller payloads, providing viable dedicated small launch options as an alternative to the rideshare approach," said Jim Norman, director of Launch Services at NASA Headquarters.

At the time of the VCLS award in 2015, launch opportunities for small satellites and science missions were limited to ridesharing - flying only when space was available on other missions. Managed by NASA's Launch Services Program at Kennedy Space Center in Florida, VCLS awards are designed to foster a commercial market where SmallSats and CubeSats could be placed in orbits to get the best science return.

This mission includes 10 payloads selected by NASA's CubeSat Launch Initiative, which seeks to enhance technology development and student involvement.

NASA Honor Awards

The 2018 NASA Honor Awards for Armstrong employees included 29 individual honors and four group awards.

Outstanding Leadership Medal

Dana L. Askins

For exceptional leadership of Armstrong's human capital operations in advancing NASA's aeronautics research and airborne science goals

Charles E. Irving

For exemplary leadership of the Airborne Science mission at the center, which has resulted in numerous extraordinary scientific campaigns utilizing Armstrong science aircraft for the national benefit

Jennifer H. Cole

For demonstrated leadership of Armstrong's efforts to enable the ND-MAX flight research experiment

Karla S. Shy

For exceptional leadership creating world-class STEM education, research and development in the study of aerospace and establishing the foundation of NASA's future workforce

Laurie A. Grindle

For exemplary leadership in Unmanned Aircraft Systems Integration in the National Airspace System, enabling new commercial industry and UAS operations of national importance

AFRC2018-0169-39 NASA/Ken Ulbrich

Timothy Moes, center, receives a NASA Group Achievement Award on behalf of the Armstrong DC-8 Team from NASA Glenn Research Center Director Janet Kavandi, left, and Armstrong Director David McBride. The group received the award for outstanding achievement in accomplishing the complicated DC-8 Atmospheric Tomography (ATom) campaign.

AFRC2018-0169-40 NASA/Ken Ulbrich

Jeff Nichols, center, accepts the Group Achievement Award from McBride and Kavandi. The B703 Fuel Farm Design and Construction team was recognized for perseverance and collaboration in overcoming significant obstacles and building the jet fuel storage and pumping facility for the SOFIA program.

Peggy S. Williams-Hayes

For outstanding leadership and contributions to the operational success and safety of Armstrong

Wayne M. Ringelberg

For exceptional leadership in the Airborne Science Program resulting in multiple, highly successful, multi-center science campaigns which significantly advanced NASA's Earth science objectives

Troy A. Asher

For the outstanding leadership of Armstrong's organizational planning and research flight execution

Exceptional Achievement Medal

Robert D. Sakahara

For substantial improvement in operation of Unmanned Aircraft Systems Integration in the National Airspace System project through leadership and innovative, rigorous processes

James G. Williams

For consistently demonstrating exceptional performance and key leadership while supporting multiple NASA Aeronautics projects or programs

Exceptional Service Medal

Dave M. Baptiste

For exceptional service while leading Armstrong's Export Control program in support of NASA's Aeronautics research and airborne science goals

David B. Dowdell

For sustained excellence as the lead flight instrumentation engineer on high-visibility flight projects

Edward A. Haering

For exceptional contributions toward supersonic research in the areas of measurement, prediction and modeling propagation of sonic booms

Joseph Pahle

For contributions to NASA and the nation in the area of classical controls, handling qualities, optimal control, adaptive control and cooperative flight

John F. Carter

For sustained flight controls research, project management and Center mission leadership in the advancement of science and technology through flight

Kirk Caldwell

For exceptional service and contributions to the operational success and safety of Armstrong flight projects

Timothy Moes

For exceptional service and lasting contributions to the agency and center aeronautical research and Earth science missions throughout an outstanding, highly productive 35-year career

Patricia M. Kinn

For exceptional contributions to NASA AFRC flight operations as flight management specialist and scheduler, resulting in more than 27,000 flight hours flown safely during a 12-year period

Early Career Public Achievement Medal

Samantha Hull

For exceptional performance in the Technology Transfer Office and for significant improvements to managing the Space Act Agreement at AFRC

Janeya Griffin

For exceptional performance in executing commercial licenses and technology transfer agreements while helping to manage the Center's technology portfolio

Jeffrey A. Ouellette

For his novel work in dynamic model development of flexible models for control of flexible aerostructures

Justin D. Reid

For exceptional fire protection program improvements and institutional safety leadership at Armstrong

AFRC2018-0169-41 NASA/Ken Ulbrich

Brett Pauer, center, accepts a NASA Group Achievement Award from Kavandi and McBride. The SonicBAT flight test team received the honor for using innovative flight test techniques and overcoming significant deployment difficulties to evaluate the effects of turbulence on sonic booms.

AFRC2018-0169-42 NASA/Ken Ulbrich

Sean Clarke, center, accepts a NASA Group Achievement Award from Kavandi and McBride. The X-57 battery test team received recognition for the redesign and development of a critical battery system that will enable the X-57 project to advance.

Jenny Y. Staggs

For substantial improvements in operations, efficiency and service of contracted capabilities necessary to conduct NASA's mission

Karen M. Green

For making significant impacts as a resource analyst using innovative and analytical approaches supporting multiple high-profile projects at Armstrong

NASA Awards, page 11

X-Press December 2018

Never standing pat

PAT wing validates concepts

By Jay Levine
X-Press editor

Structural tests on a uniquely designed, high-aspect ratio, lightweight test wing this fall proved new design and fabrication methods.

The 39-foot-long Passive Aeroelastic Tailored (PAT) wing could eventually enable full-scale longer, thinner wings that maximize structural efficiency, reduce weight and improve fuel efficiency, said Karen Taminger, an Advanced Air Transport Technology project technical lead at NASA's Langley Research Center in Virginia.

The PAT wing was tested during two phases this September and October at Armstrong. The experimental wing was tested with more than 10,000 sensors, making it one of the most densely instrumented test articles at Armstrong.

The tow steering composite technology, which refers to the way the carbon fibers are laid out, was used to build the wing skins. The concept was expected to passively control flutter, or vibration on the wings, through structural design that can also help minimize gusts for a smoother ride. The wing bent and twisted at the same time during the design load tests to make it more robust and controllable, but there were tense moments.

"There were a lot of unknowns going into the testing," she said. "We had to make some assumptions and some simplifications in order to be able to do the design and analysis leading up to building the test article and beginning the testing. However, it worked better than I could have imagined. There were a lot of nervous moments as I watched that wingtip pass the 80-inch (bending) mark. It was awesome and scary at the same time."

Now the analysis begins.

"I didn't know how much the skins would contribute to the overall response of the wing," she explained. "That's why we needed so much instrumentation. We are trying to go back through the huge number of data points to quantify the responses we observed."

The wing was more flexible than predicted, as was observed from early on in the October testing. To accommodate the increased flexibility the test team made some modifications to the test setup.

PAT wing, page 11

AFRC2018-0091-800 NASA/Ken Ulbrich

Ted Powers, from left, Larry Hudson, Ron Haraguchi and Walter Hargis make adjustments to the Passive Aeroelastic Tailored (PAT) wing testing apparatus.

AFRC2018-0091-958 NASA/Ken Ulbrich

Armstrong and Langley Research Center staff members monitor a test of the Passive Aeroelastic Tailored (PAT) wing at Armstrong. The test wing can be seen in the upward sloping area of the test fixture as a black area with white dots, a few feet down from the NASA logo.

AFRC2018-0091-1073 NASA/Ken Ulbrich

The Passive Aeroelastic Tailored (PAT) wing bends under pressure from the highest loads applied during testing at Armstrong.

AFRC2018-0309-01 NASA/Ken Ulbrich

Heather Maliska accepts the Center Director's Award for the Low-Boom Flight Demonstrator Source Evaluation Board Team from Center Deputy Director Patrick Stoliker.

Photo courtesy of Tim Sandon

Manny Antimisiaris accepts the Pride in NASA Award from David "Nils" Larson.

Peers recognize center's best

NASA Armstrong Center Director's Award
This award is presented to individuals or teams for exceptional work
Low-Boom Flight Demonstrator Source Evaluation Board Chair Heather Maliska and team

Pride in NASA (PIN) Award
Given in recognition of an employee's example, set through their words and deeds, of what pride is within NASA Armstrong
Manny Antimisiaris

James Harris Supervisor/ Manager/Leader Award
Recognizes outstanding leadership and/or management qualities that deliver exceptional results
Russell R. Leonardo

Engineer/Scientist/Pilot
Recognizes an employee who applies fundamental principles, develops and tests new technologies or performs other outstanding contributions in their field
David C. Fedors

AFRC2018-0309-14 NASA/Ken Ulbrich

Tony Satterwhite, from left, John Takas, Phillip Wellner, Mark Kraus, Ron Shepherd and Steve Spandorf accept the teamwork peer award on behalf of the Aircrew Life Support Team from Stoliker.

Mission Support: Administrative
Recognizes significant contributions in administrative or secretarial work
Ronnie Boghosian

Mission Support: Finances/ Resources
Recognizes an employee performing exemplary financial or resources management work
Glenda Almeida

Mission Support: IT Support
Recognizes significant information technology support contributions by an employee who is enthusiastic, creative, quick and successful at creating solutions for customers
Debbie Phillips

Mission Support: Education/ Volunteer/Outreach
Recognizes an employee who epitomizes the true spirit of outreach through enthusiasm and dedication; for those individuals who give back to Armstrong and our communities through volunteerism and selfless giving
Mary Ann Harness

Henry Arnaiz Mentor Award
Recognizes an employee who demonstrates outstanding performance in mentoring new and established employees
Roberta B. Sherrard

Steven B. Davis Co-op/ Student Award
Recognizes a student participating in NASA Armstrong's sponsored student program who shows exceptional initiative, cooperation, excellence and exemplary performance
Daniel W. Budolak

Peer Awards, page 11

Two ‘new’ hornets arrive

By Jay Levine
X-Press editor

Two of Armstrong’s “new” F/A-18B Hornets arrived at Armstrong Nov. 6 and Dec. 7.

The center uses F/A-18s as part of its fleet of research aircraft to accompany other aircraft on missions as a second set of eyes and for pilot training. The B models are two-seat versions of the aircraft, not unlike Armstrong’s F/A-18B No. 846 that also flies photographers and videographers to document research missions.

Although the aircraft Armstrong are receiving are nearing the end of their service life for the Navy, some of the aircraft could have extended use for the center, as there are fewer flight hours on research and mission support aircraft than the frequent flight rates required for the military, said Tim Krall, an Armstrong flight operations engineer.

The first F/A-18B came from the U.S. Naval Air Station Patuxent River in Maryland, a two-day journey as a result of winds along the route. Lt. Cmdr. Mike Shelton made a stop overnight at Kirtland Air Force Base in Albuquerque, New Mexico, before reaching Edwards Air Force Base the following morning.

The second F/A-18B, which also came from the Naval Air Station, was piloted by Lt. Tristan Brandenburg, Krall said. The third Hornet will come from the U.S. Naval Air Joint Reserve Base in Fort Worth, Texas, in early 2019.

Armstrong pilots and support staff will assess the condition of the aircraft to determine if they might replace some of the center’s aging jets. Once the aircraft have been flown and evaluated, the best of the first two aircraft will begin preparations to join the Armstrong active fleet, Krall said. However, in order for the aircraft to fly missions, a phase maintenance is required, which usually takes a few months per aircraft.

AFRC2017-0315-08 **NASA/Ken Ulbrich**

Lt. Tristan Brandenburg taxis an F/A-18B Hornet to a stop at Armstrong.

AFRC2018-0296-26 **NASA/Ken Ulbrich**

Lt. Cmdr. Mike Shelton delivers an F/A-18B Hornet to Armstrong. Shelton, center, was met by Armstrong’s Tom Grindle, from left, Ted Williams, Gary Gano and Brian Fox.

Once the third aircraft has arrived and been evaluated, decisions will be made regarding how many of the aircraft will be active and which ones could be used to fortify parts supplies needed to continue flying the F/A-18Bs.

Another consideration for the new aircraft to be mission ready is for installation of research equipment from the current NASA F/A-18B numbers 850 and 843 in two of the newer Hornets. Additional evaluations within the Armstrong support fleet are needed to make that determination, Krall said.

The Hornets will retain the charcoal gray Navy colors for most of the next year, although the aircraft immediately will receive a new tail number and a NASA logo. For example, one of the newly-arrived Hornets was here less than 24 hours before its new number, N868NA, was added. A NASA logo will appear on the vertical tail soon.

Armstrong first became aware of the Hornets’ availability within the past year when the Navy announced it would be ending active use of a number of aircraft. The center expressed an interest in acquiring some of those aircraft and obtained a list of what would be available. From that list, it was determined that the F/A-18B best fit what the center needed and the process to acquire the three aircraft began, Krall said.

The arrival of the Hornets marks the first time since 2010 that the center has received three aircraft in the same time frame. The center was able to acquire three F-15D aircraft that year from Tyndall Air Force Base in Florida.

McTigue, former project manager, dies at 90

John McTigue, a former Armstrong project manager who had a career spanning three decades, died Nov. 15. He was 90.

He came to California in 1952 where he accepted a job with the NACA at the High Speed Flight Research Station at Edwards Air Force Base, now known as Armstrong. During his career at NACA/NASA McTigue worked on many programs, such as program engineer and flight operations manager on the rocket-powered X-15 No. 3.

He was project manager for the Highly Maneuverable Aircraft Technology vehicles, the Supercritical Wing and five lifting body programs. He continued to advance his career with positions of increasing responsibility including

McTigue, page 11

AFRC2018-0288-42 NASA/Lauren Hughes

AFRC2018-0288-26
NASA/Lauren Hughes

***Above**, Heather McCoy is abducted as part of her award -winning funniest costume.*

***At left**, Erick Castillon, left, Mirela Isic, Jeremy Helke and Kate Squires show off their award-winning costumes as T-Rexes, Star Lord and a vampire, respectively.*

Chills and chili

Attendees of the Armstrong annual Halloween chili cook-off, bake sale, and costume contest seemed to have a howling good time. The event raised $1,550 for the center's Employee Exchange Council at the main campus and Building 703.

Chili Cook-off and costume contest winners:
People's Choice
Brisky Business Chile, Code 700, main campus
Buffalo Meets Brisket Chili, Christian Fischer, Building 703

Judge's Choice
Basic Chili, Tara McCoy, Susan Moreno and Olivia Carte, main campus
Nelms Pork Chili, Jeff Nelms, Building 703

Costume Contest Winners
Most creative
Jeremy Helke as Star Lord from Guardians of the Galaxy

Scariest
Kate Squires as a vampire

Funniest
Heather McCoy alien abduction

Honorable mention
Mirela Isic and Erick Castillon as T-Rexes

AFRC2018-288-21 NASA/Lauren Hughes

Pat and Pam Stoliker served chili at the center's annual Halloween event.

NASA Awards... from page 5

Francisco Pena
For significant contributions in the application of Fiber Optic Sensing System technology to aerospace vehicles and structures

Jason P. Nelson
For outstanding contributions to the Experimental Fabrication Branch's mission success

Silver Achievement Medal

Matthew J. Berry
For significant early career initiative and performance contributions to the mission success of the DC-8 aircraft

Melissa Searcy
For providing outstanding dedication and excellence in reimbursable and SOFIA areas while making substatial and vital improvements in the resources area at Armstrong

Exceptional Technology Achievement Medal

Allen R. Parker
For exceptional technology contributions to NASA missions in successful development of fiber optic strain and temperature sensing technology

PAT wing... from page 6

"We have to go determine why those results are different," Taminger said. "We expect we will find the answer and it will allow us to add fidelity to our models and then see if we can better match the data we measured."

Researchers also were pleased by an "unexpected, but hoped for" view of the wingtip turning in on the leading edge as a result of the towed steering concept. From an airflow perspective that would move the loading inboard into the thicker section of the wing where there is more structure that could passively alleviate gusts.

Once the models are refined, Taminger wants to see the approximately 30-percent wing scaled up to full size for a commercial transport to assess the benefits. In the end, the amount of fuel that can be saved by using such a wing will determine where the research will go. A longer wing usually requires more structure, but the tow steering concept could allow researchers the combined benefits of drag and weight reductions which translate to fuel burn advantages.

The challenging research had another benefit.

"We learned how to test highly flexible, high aspect ratio wings," said Larry Hudson, Armstrong Flight Loads Laboratory chief test engineer. "We also learned how to use a unique overhead loading system to meet our test objectives. When you have highly flexible wings you have a lot of displacement at the tip. The technique we used worked well. We look forward to future opportunities to test other flexible wing designs."

The project is funded through NASA's Aeronautics Research Mission Directorate's Advanced Air Transport Technology (AATT) project. AATT envisions enabling lightweight wings as much as twice as efficient as conventional commercial and military aircraft wings.

The test wing was designed by Aurora Flight Sciences facilities in Ohio and fabricated at the company's Mississippi plant.

Peer Awards... from page 8

Jim Ferguson Safety Award
Recognizes an employee who has made Armstrong a safer place to work through their primary, collateral, or significant voluntary efforts
Patricia Kinn

Rising Star
Recognizes an employee who makes critical contributions to NASA Armstrong's mission at an early stage in their career
Andrew C. Barry

Technician/Mechanic
Recognizes an employee who exhibits technical expertise, significant performance, enthusiasm, determination and dedication to NASA Armstrong in a technical support area
Lorenzo R. Sanchez

Facilities Personnel
Recognizes an employee for significant work toward meeting the Center's facilities goals and objectives
Nicholas A. Letourneau

Mission Impossible
Recognizes an employee who succeeds using innovation and hard work despite difficult or challenging circumstances
Gail Anton

Unsung Hero
Recognizes employees who make critical contributions to the NASA Armstrong Mission in a behind-the-scenes role
Walter A. (Tony) Beggs

Can-Do Attitude
Recognizes employees who regularly "get the job done" with a positive attitude
Daniel Nolan

Create Your Own Award
Dynamic Duo
Mike Kapitzke
Robert York

Teamwork
Recognizes a high-performing team that collaborates to successfully achieve common goals
Aircrew Life Support

McTigue... from page 9

director of Engineering and Facilities at Dryden; deputy director of Operations, NASA Ames Dryden; director, Extreme Envelope Aircraft and deputy director of Shuttle Operations.

In the 30 years that John McTigue worked for NACA/NASA he took a lead role in advancing aerospace knowledge and capabilities of aircraft development. His coordination, communication, program and project management skills, combined with technical knowledge and leadership, allowed him and his teams to complete projects on schedule and gain the required research, people who knew him said. He also is described as having a strong work ethic.

McTigue retired from NASA Dryden in 1982 with a number of NASA awards and medals.

SmartPay 3 is operational

NASA government employees should have new US Bank travel cards. Purchase cardholders also should have new US Bank purchase cards. The two cards are part of the transition to SmartPay 3.

"Go-live" with US Bank was Nov. 30 and all travel and purchase card transactions should be made with the US Bank cards as of Nov. 30. Card holders are also reminded to destroy old JPMorgan cards.

Flight Opportuities... from page 1

orbit allows the agency to focus on farther horizons. NASA will venture forward to the moon – this time to stay, in a measured, sustainable fashion – in order to develop new opportunities and prepare for astronauts to explore Mars.

The technology demonstrations onboard SpaceShipTwo could prove useful for exploration missions. For Principal Investigator Josh Colwell at the University of Central Florida in Orlando, the Virgin Galactic flight helped further refine the Collisions Into Dust Experiment (COLLIDE). The experiment aims to map the behavior of dust particles on planetary surfaces. Suborbital flights let Colwell and his team gather data useful for designing exploration architectures at the moon, Mars and beyond.

The presence of dust on asteroids and moons with low surface gravity introduces challenges for human and robotic missions. Particles can damage hardware and contaminate habitats. Understanding dust dynamics could help NASA design better tools and systems for exploration missions.

On this microgravity flight, COLLIDE simulated the dusty surface of an asteroid and a surface impact. The experiment collected high quality video of the dust dispersing.

"We want to see how dust in microgravity behaves when it's disturbed. How fast will it fly around? How careful do you have to be to avoid disturbing the surface too much? If you have a hard landing and disturb the surface a lot, how long will you have to wait for the dust to clear?" Colwell explained.

Here on Earth this isn't as much of a concern. Colwell explained that in space, where the absence of gravity complicates every task at hand, such considerations are significant for mission planning.

"If you have a small dust disturbance and can work around it, great. If the dust particles have enough speed, they can contaminate and stick to equipment well above the surface, posing problems for safety as well as mission success," Colwell said.

COLLIDE data collected on its first mission to suborbital space, as well as data from a related experiment previously tested on NASA-sponsored parabolic aircraft flights, could help future human and robotic explorers throughout the solar system. The other technology payloads on the SpaceShipTwo flight were:

The Microgravity Multi-Phase Flow Experiment for Suborbital Testing from NASA's Johnson Space Center in Houston focuses on life support systems that are an integral part of a deep space habitation capability. They typically include processes where liquids and gases interact, therefore requiring special treatment in space. This two-phase system separates gas and liquid in microgravity. The technology could also be applied to in-situ resource utilization, power systems, propellant transfer and more.

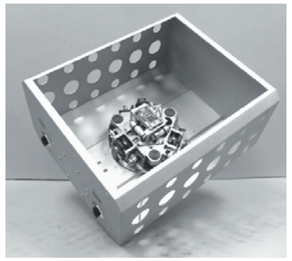


Photo courtesy of Controlled Dynamics Inc.

The Vibration Isolation Platform from Controlled Dynamics Inc. had completed five successful Flight Opportunities-sponsored flights on suborbital reusable launch vehicles (sRLVs). The SpaceShipTwo flight marked its sixth.

The Validating Telemetric Imaging Hardware for Crew-Assisted and Crew-Autonomous Biological Imaging in Suborbital Applications from the University of Florida in Gainesville investigated food growth for future missions in deep space. This experiment studies how microgravity affects plant growth. The experiment used a biological fluorescent imaging instrument designed to collect data on the biological response of a plant, or plant tissue.

The Vibration Isolation Platform developed by Controlled Dynamics Inc. in Huntington Beach, California, looked at the intense launch environment to which spacecraft and payloads are subjected. This mounting interface for orbital and suborbital vehicles is designed to lessen disturbances on payloads during launch, re-entry and landing.

All four payloads are currently scheduled for future flight demonstrations, enabling researchers to gather additional data and mature their technologies.

The Flight Opportunities program is funded by NASA's Space Technology Mission Directorate at NASA Headquarters and managed at Armstrong. NASA's Ames Research Center in California's Silicon Valley manages the solicitation and selection of technologies to be tested and demonstrated on commercial flight vehicles.

Virgin Galactic and other U.S. commercial spaceflight providers are contracted to provide flight services to NASA for flight testing and technology demonstration. Researchers from academia, industry and government with concepts for exploration, commercial space applications or other space utilization technologies of potential interest to NASA can receive grants from the Flight Opportunities program to purchase suborbital flights from these and other U.S. commercial spaceflight providers. The next solicitation for potential payloads is anticipated for release in January 2019.

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