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ACTE takes flight

New flap may validate new technologies

By Peter Merlin

NASA Armstrong Public Affairs

NASA's green aviation project is one step closer to developing technology that could make future airliners quieter and more fuel-efficient with the successful flight test of a wing surface that can change shape in flight.

This past summer researchers replaced an airplane's conventional aluminum flaps with advanced, shape-changing assemblies that form seamless bendable and twistable surfaces. Flight testing will determine whether flexible trailing-edge wing flaps are a viable approach to improve aerodynamic efficiency and reduce noise generated during takeoffs and landings.

The Adaptive Compliant Trailing Edge (ACTE) project is a joint effort between NASA and the U.S. Air Force Research Laboratory (AFRL), using flaps designed and built by FlexSys, Inc. of Ann Arbor, Michigan. With AFRL funding through the Air Force's Small Business Innovative Research program, FlexSys developed a



ED14-0338-081

NASA/Ken Ulbrich



ED14-0338-016

NASA/Ken Ulbrich

Above, for the initial ACTE flight, the experimental control surfaces were locked at a specified setting. Varied flap settings on subsequent tests will demonstrate the capability of the flexible surfaces under actual flight conditions.

At left, flight results will validate whether the ACTE flap's seamless design and advanced lightweight materials can reduce wing structural weight, improve fuel economy and efficiency, and reduce environmental impacts.

New configuration has first flight

By Jay Levine

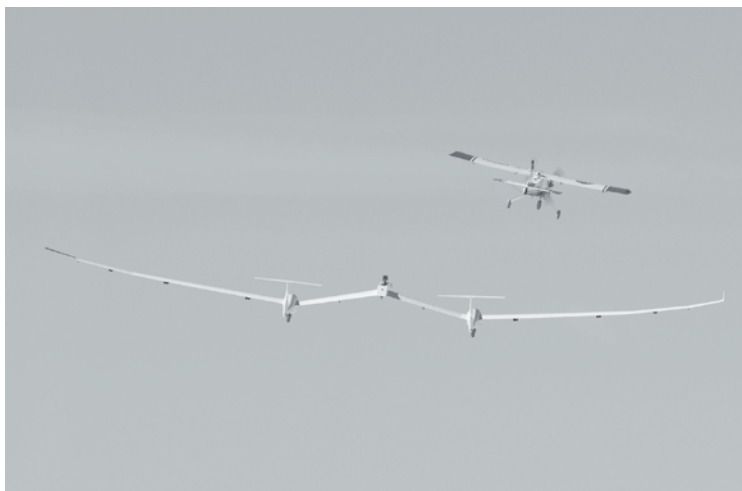
X-Press Editor

NASA has successfully flight-tested a prototype twin-fuselage towed glider that could lead to rockets being launched from pilotless aircraft at high altitudes – a technology application that could significantly reduce the cost and improve the efficiency of sending small satellites into space. The first flights of the one-third-scale twin fuselage towed glider took place at NASA Armstrong on Oct. 21.

The towed glider is an element of the novel rocket-launching concept of the Towed Glider Air-Launch System, or TGALS. NASA Armstrong researchers are developing the project, which is funded as a part of the Space Technology Mission Directorate's Game Changing Development program.

The 27-foot-wingspan glider was towed behind the Dryden Remotely Operated Integrated Drone, or DROID, unmanned aircraft into the blue skies above Edwards Air Force Base. Minutes later the towline was released and the twin fuselage aircraft glided to a perfect landing on Rogers Dry Lake.

After reviewing wind conditions and checking the systems of both aircraft, mission managers decided to go for a second flight. As with



ED14-0159-69

NASA/Tom Tschida

One of NASA Armstrong's DROID small, unmanned research aircraft tows the twin-fuselage towed glider into the blue sky on its first test flight.

the first, the glider was towed behind the DROID, leveled out in flight and the glider was released for another free flight to the dry lakebed.

"We had a really good first flight," said John Kelly, TGALS project manager. "Both aircraft performed well."

"It flies fantastically," said Robert "Red" Jensen, who piloted the dual-fuselage glider. "There were no squawks (problems)."

The goal is to build confidence with the aircraft and with tow operations before the final element – an experimental rocket payload

– is mated with the glider and ultimately launched from the glider after its release from the DROID.

Gerald Budd, who for about three years has conceptualized and sought funding for the concept, piloted the DROID during the test flight and was pleased that the project had a successful first test flight.

"It was surreal to watch it fly after all of the work it took to get here," Budd said.

If the project continues to succeed, Budd believes the ultimate goal would be to build a relatively

inexpensive remotely or optionally piloted glider that will be towed aloft by a transport aircraft. Following release at about 40,000 feet, the glider would launch a booster rocket into an optimal trajectory to place its payload into low Earth orbit.

The glider was built primarily with commercial-off-the-shelf components, but some parts were manufactured by NASA Armstrong's Fabrication Branch. Assembly was accomplished in NASA Armstrong's Small Unmanned Aircraft Systems Research Lab, or model shop. In January 2014, flights confirmed that towing and releasing a single-fuselage version of the aircraft by the DROID tow plane functioned as expected. The recent flights confirmed the dual-fuselage version also is airworthy.

TGALS chief engineer Ryan Dibley said using two commercial-off-the-shelf glider halves and joining them together with a center wing structure created challenges. While the center wing section was built in-house and was designed specifically for this mission, the outer wing sections were built for the standard single-fuselage glider without the additional weight.

"One of the concerns was we didn't know what the outer wing

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ACTE... from page 1

variable geometry airfoil system called FlexFoil that can be retrofitted to existing airplane wings or integrated into brand new airframes.

FlexFoil's inventor, FlexSys founder and Chief Executive Officer Sridhar Kota hopes testing with the modified Gulfstream III will confirm the design's flight worthiness and open doors to future applications and commercialization. ACTE is being flown from NASA Armstrong.

"This flight test is one of the NASA Environmentally Responsible Aviation (ERA) Project's eight large-scale integrated technology

demonstrations to show design improvements in drag, weight, noise, emission and fuel reductions," said Fay Collier, ERA project manager at NASA's Langley Research Center in Hampton, Virginia.

During the initial ACTE flight, the experimental control surfaces were locked at a specified setting. Different flap settings will be employed on subsequent flights to collect a variety of data demonstrating the capability of the flexible wings to withstand a real flight environment. The flaps have the potential to be retrofitted

to existing airplane wings or integrated into new airframes.

"We have progressed from an innovative idea and matured the concept through multiple designs and wind tunnel tests, to a final demonstration that should prove to the aerospace industry that this technology is ready to dramatically improve aircraft efficiency," said AFRL Program Manager Pete Flick, from Wright-Patterson Air Force Base, Ohio.

ACTE technology is expected to have far-reaching effects on future aviation. Advanced lightweight

materials will reduce wing structural weight and give engineers the ability to aerodynamically tailor the wings to promote improved fuel economy and more efficient operations, while reducing environmental impacts.

"The first flight went as planned – we validated many key elements of the experimental trailing edges," said Thomas Rigney, ACTE project manager at Armstrong. "We expect this technology to make future aircraft lighter, more efficient and quieter. It also has the potential to save hundreds of millions of dollars annually in fuel costs."

FAA honors McMurtry

By Alan Brown

NASA Armstrong Public Affairs

Retired NASA Armstrong research pilot Thomas C. McMurtry was honored by the Federal Aviation Administration Oct. 25 with the presentation of the agency's Wright Brothers Master Pilot Award during a ceremony before family, friends and associates at the AERO Institute in Palmdale.

Richard Dilbeck, coordinator of the Master Pilot award presentations for the FAA's Sacramento regional office, presented the prestigious award to McMurtry as his wife, Mary Louise McMurtry and an estimated 120 attendees applauded the honoree.

McMurtry, whose activity is severely limited following a debilitating stroke, was also presented with resolutions and certificates honoring his service to NASA and the nation from several public officials, including California state senator Stephen Knight of the 21st district, Los Angeles County fifth district supervisor Michael Antonovich and U.S. Congressman Howard "Buck" McKeon of California's 25th district.

Now 79, McMurtry joined the NASA Flight Research Center in 1967 after service as a U.S. Navy pilot and with Lockheed Corporation. He was a project pilot on some of the most significant

McMurtry, page 8



ED14-0325-021

NASA/Jim Ross

Richard Dilbeck (left), coordinator of the Master Pilot award presentations for the Federal Aviation Administration's Sacramento regional office, presents the award to retired NASA Armstrong research pilot Tom McMurtry as McMurtry's wife Mary Louise assists.



EC76-4973

NASA/Tom Tschida

Retired NASA research pilot Tom McMurtry is pictured with the X-24B lifting body after he made the 36th and final flight in the unique craft on Nov. 26, 1975.

News at NASA

Orion set to launch

NASA's new Orion spacecraft now is at its launch pad after completing its journey Nov. 12. It arrived at Space Launch Complex 37 at Cape Canaveral Air Force Station in Florida, where the spacecraft then was lifted onto a United Launch Alliance Delta IV heavy rocket in preparation for its first trip to space.

Orion will travel almost 60,000 miles into space Thursday, Dec. 4, during an uncrewed flight designed to test many of the spacecraft's systems before it begins carrying astronauts on missions to deep space destinations.

The spacecraft, which includes the crew and service modules, launch abort system and the adapter that will connect it to the rocket, was completed in October.

"In less than a month, Orion will travel farther than any spacecraft built for humans has been in more than 40 years," said William Gerstenmaier, NASA's associate administrator for human exploration and operations.

Orion is scheduled to liftoff at 7:05 a.m. Dec. 4. During its two-orbit, 4.5 hour flight test, Orion will travel 3,600 miles beyond Earth. From this distance, Orion will return through Earth's atmosphere at speeds approaching 20,000 mph, generating temperatures near 4,000 degrees Fahrenheit on its heat shield. The flight will allow engineers to test systems critical to safety, including the heat shield, parachutes, avionics and attitude control.



ED14-0319-082

NASA/Ken Ulbrich

Happy 50th

NASA Armstrong Flight Loads Laboratory chief test engineer Larry Hudson, at left, displays the hot structures loads testing of the carbon-silicon-carbide ruddervator conducted in the lab for Aerostructures Branch Chief Randy Thompson and to Don Lange and Chuck Harris of the Air Force Test Center. Hot structures loads testing was one of eight technology demonstrations featured during the lab's 50th anniversary celebration Oct. 23.

Armstrong employees honored

The NASA Honor Awards for Armstrong employees was Sept. 17 and included 21 individual awards and three group awards. John Grunsfeld, Science Mission Directorate associate administrator, attended and helped present some of the awards.

Outstanding Leadership Medal

Dennis O. Hines

For providing exceptional leadership to the agency programs and projects at the NASA Armstrong Flight Research Center.



David Voracek

For demonstrated leadership in promoting and maintaining a culture of innovation.



Eddie Zavala

For exceptional leadership in guiding the SOFIA program from development into operational status, while simultaneously collecting valuable and unique scientific information.



Exceptional Service Medal

Troy A. Asher

For sustained high performance both as a pilot across mission directorates and for continuous improvement of research aircraft and Flight Operations policies and practices.



ED14-0283-26

NASA/Ken Ulbrich

Larry Hudson, center, accepts the NASA Group Achievement Award for the HIAD Team from John Grunsfeld, left, and David McBride, right.



ED14-0283-27

NASA/Ken Ulbrich

Christopher Miller, center, accepts the NASA Group Achievement Award for the F/A-18 No. 853 LVAC Team from John Grunsfeld, left, and David McBride, right.



ED14-0283-28

NASA/Ken Ulbrich

Tim Krall, center, accepts the NASA Group Achievement Award for the SOFIA Program Team from John Grunsfeld, left, and David McBride, right.

John G. Coggins

For using his noteworthy negotiating and technical skills to achieve customer satisfaction at the center, agency and national levels.



William D. Eason

For exceptional service resulting in lasting improvements to the Reliability Centered Maintenance Program delivering dependable facilities and infrastructure.



Joe Hernandez

For exceptional engineering leadership in the area of flight instrumentation aboard the G-III No.804 research aircraft.



April M. Jungers

For outstanding support, expertise and analytical ability providing AFRC success in gaining the high credibility and standards within the civil service labor discipline area.



James W. Smolka

For exceptional and sustained performance in the execution of aeronautical flight test and flight operations for AFRC and NASA.



Staff honors some of its finest

NASA Armstrong Center Director Award

For outstanding teamwork in managing facility projects, facility operations and maintenance, across multiple years to maintain, repair and modernize the infrastructure of the NASA Armstrong Flight Research Center.

Code F Project Team

Andrew L. Boykin, William D. Eason, Gemma V. Flores, Jin S. Oh, Justin D. Reed and William R. Werner

Milton O. Thompson Award

In recognition of lifetime leadership and contributions to the advancement of aeronautical vehicles and flight research.

Donald H. Gatlin, NASA Retired

Pride in NASA (PIN) Awards

Given in recognition of an employee's example, set through their words and deeds, of what pride is within NASA Armstrong.

John A. Saltzman and Carla Thomas

Can-Do Attitude

Recognizes employees who regularly "get the job done" with a positive attitude.

Charlie Aguirre, Chuck Johnson, Kathleen Kirk and Sky Yarbrough

Engineer/Scientist/Pilot

Recognizes an employee who applies fundamental principles, develops and tests new technologies or performs other outstanding contributions in their field.

Christopher E. Baker and Christopher J. Miller

Facilities Personnel

Recognizes an employee for significant work toward meeting the center's facilities goals and objectives.

Rita Carrete and Angela Ross



ED14-0334-05

NASA/Tom Tschida

Don Gatlin, left, received the Milton O. Thompson Award from NASA Armstrong Center Director David McBride, right. Marty Gatlin, Don Gatlin's wife, is in the middle of the image.



ED14-0334-02

NASA/Tom Tschida

William Eason, left, and Gemma Flores, right, accept the Director's Award for the Code F project team from David McBride.

Rising Star

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

Christopher E. Baker, Josh Martin, Eric J. Miller and Priscilla M. Wright

Jim Ferguson Safety Award

Recognizes employees who have made NASA Armstrong a safer

place to work through their primary, collateral or significant voluntary efforts.

Andrew D. Blua and Julie Bond

Mission Impossible

Recognizes an employee who succeeds using innovation and hard work despite difficult or challenging circumstances.

Starr Ginn, Robert Novy and Aric D. Warner

Henry Arnaiz Mentor Award

Recognizes an employee who demonstrates outstanding performance in mentoring new and established employees.

Ricardo A. Arteaga

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 during their term at the center.

Justin Behling, Cassidy McLaughlin and Nicholas Ross

Supervisor/Manager/Leader

Recognizes outstanding leadership and/or management qualities that deliver exceptional results.

Laurie A. Grindle, Larry D. Hudson, Christopher J. Miller and Edmund Swan

Technician/Mechanic

Recognizes an employee who exhibits technical expertise, significant performance, enthusiasm, determination and dedication to NASA Armstrong in a technical support area.

Ted Powers, Ronald W. Rohe and Juan P. Salazar

Mission Support:

Administrative Professional

Recognizes employees who perform exemplary work.

Ryan T. Daily and Afreekia Stillwater

Mission Support: Education/ Outreach/Volunteer

Recognizes an employee who epitomizes the true spirit of outreach through enthusiasm and dedication; for those individuals who give back to NASA Armstrong

Recognition, page 7

NASA Awards ... from page 4

Chauncey C. Williams

For sustained exceptional service and significant legal contributions in implementing the agency's projects, programs and initiatives.



photographic ambassador.

Exceptional Engineering Achievement Medal

Albion H. Bowers

For groundbreaking work leading to the first flight verification of potential game-changing aerodynamic theory.



Valerie J. Zellmer

For exceptional contributions in formulating and executing the financial stewardship of the Armstrong Flight Research Center.



Nelson A. Brown

For ingenuity, leadership and technical excellence as principal investigator for his research on the intelligent control for performance project.



Exceptional Public Service Medal

Judy Grizzard

Judy Grizzard's steady, consistent leadership has made the Kay and Associates team one of the highest performing organizations at the Armstrong Flight Research Center.



Christopher J. Miller

For leadership and technical excellence as Chief Engineer of the Full-scale Advanced Systems Testbed, or FAST, Launch Vehicle Adaptive Control.



Tom Speer

For sustained excellence in support of the SOFIA Program as early operations development lead, flight and maintenance crew instructor and evaluator and flight manual author.



Exceptional Administrative Achievement Medal

Denise M. Cope

For your exceptional achievement and significant contributions in the Safety and Mission Assurance directorate at the NASA Armstrong Flight Research Center.



Exceptional Public Achievement Medal

James C. Ross

For excellence in public service to the NASA Neil A. Armstrong Flight Research Center as an airborne photographer and



Exceptional Achievement Medal

Frank W. Cutler

For exemplary service to the center and the agency while leading successful completion of a 10-year DC-8 life extension effort at significant cost savings.



Robbin M. Kessler

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



Early Career Achievement Medal

Priscilla M. Wright

For expertise in the labor, and foreign travel discipline areas, which ensures employees are paid appropriately and contributes to mission deployment success.



Group Achievement Award HIAD Mechanical Test Team

For the development of an innovative test technique enabling the collection of important data to advance the maturity of the HIAD system.

F/A-18 No. 853 LVAC Team

For outstanding achievement through inter-center collaboration in the development and flight test of SLS control algorithms.

The SOFIA Program

For outstanding contributions toward the successful first deployment of the Stratospheric Observatory for Infrared Astronomy, or SOFIA, to the Southern Hemisphere in July 2013.

TGALS

... from page 2

sections were made of, how they were constructed, or what kind of loads they could take," Dibley said. "We performed a loads test in NASA Armstrong's Flight Loads Lab where we cleared the structure up to 2 g's to ensure that the wings could handle the loads of the glider itself and then with a partial mass payload. In the near future, we will put a wing back in the loads lab and test it to the loads required to carry the full payload."

The system will eventually carry the scale-model Mini Sprite rocket, designed and built by Whittinghill Aerospace of Camarillo, California, under NASA's Small Business Innovation Research program.

Initial research and development was internally funded at NASA Armstrong through the Center Innovation Fund. Potential U.S. Department of Defense and industry partners are sought for future phases.

David Voracek, NASA Armstrong chief technologist, said he is pleased to see a project that was in the Center Innovation Fund sprout wings and fly in another NASA program.

"I am happy to see that STMD is funding this for the next year under the Game Changing Development Program," Voracek said. "We need to keep developing innovative technologies here at Armstrong that can be picked up by the NASA mission directorates or industry. I am looking forward to seeing this project continue to fly, especially when we put a rocket on the glider and get a launch off in the next year or so. The whole team came together and made the flight happen. It has been a long time in coming."



ED14-0334-47

NASA/Tom Tschida

Phil Wellner, from left, and Wason "Haku" Miles accept the DC-8 Heavy Maintenance Team Award from John Saltzman.



ED14-0334-48

NASA/Tom Tschida

Maricio Rivas, left, accepts the Ikhana Deployment Team Award from John Saltzman.

Recognition... from page 5

and our communities through volunteerism and selfless giving.
Martel Martinez

Mission Support: Financial/ Resources Support

Recognizes an employee performing exemplary financial or resources-management work.

Kerri Tannert

Mission Support: Other Support Services

Recognizes an employee performing exemplary support services in an enthusiastic manner.

Steve S. Parcel, Winter Preciado and Sky Yarbrough

Unsung Hero

Recognizes employees who make critical contributions to the NASA Armstrong Mission in a behind-the-scenes role.



ED14-0334-49

NASA/Tom Tschida

Nikki Martin, left, accepts the Active Compliant Trailing Edge, or ACTE, Instrumentation Team Award from John Saltzman.

Gary E. Beard, Sean C. Clarke, April M. Jungers, Arvid C. Knutson, Ashley Prueitt, Miriam Rodon and Meryl Zimmerman

Best NASA Technical Report/ Best Paper

Recognizes best NASA Armstrong technical report or paper.

Trong Bui

Create Your Own Award
"Above and Beyond the Call of Duty" Award
Donald E. Bailes, Terrance L. Dilworth, Bradley P. Grantham, Lorenzo R. Sanchez and Scott Silver

"Technician of the 20th and 21st Centuries" Award
Young Choi

"Big Sister" Award
Dena L. Gruca

Teamwork

Recognizes a high-performing team that collaborates to successfully achieve common goals.

ACTE Instrumentation Team
DC-8 Heavy Check Maintenance Team
Ikhana Deployment Team

NASA Armstrong researchers publish

NASA Armstrong researchers have recorded the results of their work in technical publications. The following listing is for August, September and October.

August 2014

Stephen B. Cumming, Mark S. Smith, Larry J. Cliatt and Michael A. Frederick collaborated on, "Aerodynamic and Acoustic Flight

Test Results and Analysis for the Stratospheric Observatory for Infrared Astronomy," NASA/TM-2014-218375.

Daniel S. Jones, Joseph H. Ruf,

Trong T. Bui, Martel Martinez and Clinton W. St. John published, "Conceptual Design for a Dual-

Publish, page 8

Reedy, former technician, dies at 80

Former NASA Armstrong Flight Research Center technician Jerry Reedy died on Sept. 25, 2014. He was 80.

Reedy joined the National Advisory Committee for Aeronautics, or NACA, in 1957 at the Muroc Flight Test Unit at Edwards Air Force Base. For 51 years he served at what became the NASA Dryden (now Armstrong) Flight Research Center as a government employee and then worked for and retired from NASA contractor Kay & Associates in 2008. He remained a part-time liaison with the company until his passing.

He was known for his ingenuity and innovative technical achievements on generations of NASA flight vehicles including the X-1E, the X-15 rocket plane and contributions to NASA's Space Shuttle Program. He also worked on the triple supersonic SR-71 and was instrumental in the fabrication of the last ground-based drag study vehicle at the center, called the Roadrunner.

Reedy was honored with NASA's highest honor for a civilian – the Exceptional Public Service Medal – in 2006. He was also the recipient of the prestigious Silver Snoopy Award

presented by Astronaut Jim “Vegas” Kelly for Reedy's outstanding achievements related to human flight safety and mission success.

Reedy's know-how and can-do attitude is illustrated in an exchange with test pilot Milton O. Thompson, said Edward Thomas Rieth, Reedy's son-in-law.

“Jerry shared that one day he was approached by test pilot Milt Thompson and asked; ‘Hey, Jerry, can you make one of these?’” referring to a picture of a lawn chair with three little wheels on it, “like a triangle with wheels on it,” Jerry recalled. “It had a parawing

on top and a tilt stick coming down to steer it with! I laughed, and said, ‘Yes, we can build one.’ And then said to Milt, ‘Well, we don't want to build it out of a lawn chair.’

This idea morphed into a Dryden project called the Paraglider Research Vehicle, or Parsev. It was built at Dryden and towed into the air by a motorcycle and later a Stearman Sport Biplane. Parsev pilots included Thompson, Virgil I. “Gus” Grissom and then NASA test pilot Neil A. Armstrong – later the first man to walk on the moon and now the man for whom the center is currently named.

McMurtry... from page 3

flight research projects in the center's history during his 32-year tenure, including the AD-1 oblique wing program, the F-15 Digital Electronic Engine Control project, the KC-135 winglets and the F-8 Supercritical Wing program for which he received NASA's Exceptional Service Medal. He also served as co-project pilot on

a number of other flight research projects, including the F-8 Digital Fly-By-Wire program and the X-24B lifting body, and also flew the modified Boeing 747 Shuttle Carrier Aircraft when it ferried space shuttles across the country.

McMurtry also served the center as chief of the Flight Crew Branch, director for Flight Operations and

associate director for Operations and acting chief engineer prior to his retirement in June 1999.

McMurtry counts time in the triple-sonic YF-12C, the U-2 and F-104 aircraft in his more than 15,000 hours of flight time throughout his lengthy career, including 4,000 hours recorded while flying for two private aviation

firms for 12 years after his retirement from NASA. He was honored by the Society of Experimental Test Pilots with its Iven Kincheloe Award for his work on the AD-1 program in 1982, was enshrined in the Aerospace Walk of Honor in Lancaster, California, in 1998, and was awarded the NASA Distinguished Service Medal in 1999 prior to his retirement from NASA.

Publish... from page 7

Bell Rocket Nozzle System Using a NASA F-15 Airplane as the Flight Testbed,” AIAA20143956, presented at the 50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Cleveland, July 28-30, 2014.

September 2014

Albion H. Bowers, Oscar J. Murillo Jr., Robert “Red” Jensen,

Brian Eslinger and Christian Gelzer collaborated on, “Spanload Implications for the Flight of Birds,” a journal article submitted for the consideration of the editorial board of the journal “Nature,” Nature Publishing Group, @ 2014 Macmillan Publishers Limited. Sole distribution was to the publisher.

Michael A. Fredrick, Daniel W. Banks, G. A. Garzon, and J. R. Matisheck, “Flight Tests of a Supersonic Natural Laminar Flow Airfoil,” a journal article prepared for the consideration of the editorial board of the journal “Measurement Science and Technology,” IOP Publishing, @

2014. Sent only to the publisher.

October 2014

Daniel S. Jones, Joseph H. Ruf, Trong T. Bui, Martel Martinez and Clinton W. St. John collaborated on, “Conceptual Design for a Dual-Bell Rocket Nozzle System Using a NASA F-15 Airplane as the Flight Testbed,” NASA/TM-2014-218376.

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