



The Dryden XPRESS

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DC-8 flies DC3 mission Science aircraft flies to study thunderstorms

By Beth Hagenauer
Dryden Public Affairs

A complex environmental science campaign employing ground, airborne and space-based sensors to aid scientists' understanding of how large thunderstorms affect atmospheric chemistry has begun.

The Deep Convective Clouds and Chemistry, or DC3, field campaign is being led by the National Center for Atmospheric Research in Boulder, Colo., with additional funding from the National Science Foundation and NASA.

The DC3 campaign is employing several modified aircraft, satellites, ground-based radar, and lightning antenna stations to explore the impact of large thunderstorms on the concentration of ozone and other substances in the upper troposphere over the central and southern United States.

After several shakedown and practice flights over the two prior weeks, NASA's DC-8 airborne science flying laboratory and a Gulfstream V operated by the National Center for Atmospheric Research, or NCAR, flew science missions May 18 and 19. Twenty-seven specialized instruments installed in the DC-8 sampled storm inflow as the aircraft flew a series of L-shaped patterns at different



ED12 0143-19

NASA photo by Lori Losey

Above, the NASA DC-8 Airborne Science laboratory completes a checkout flight in May. The aircraft carries a number of probes that support science instruments.



ED12 0139-19

NASA photo by Tony Landis

At left, this view of the DC-8 shows the different probes for collecting atmospheric samples. The aircraft based at the Dryden Aircraft Operations Facility in Palmdale is supporting the DC3 mission through June. Following that mission, the DC-8 is scheduled to participate in the Southeast Asia Composition, Cloud, Climate Coupling Regional Study, or SEAC4RS, the most complex airborne science campaign of 2012.

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Yeah, we've got an app for that

'Smart' phone and DROID aircraft demonstrate key ability

By Gray Creech

Dryden Public Affairs

The project team that is developing Automatic Ground Collision Avoidance System software technology at Dryden has accomplished most of the project's objectives, following a recent series of demonstration flights on one of the Dryden Remotely Operated Integrated Drone, or DROID, small, unmanned research aircraft.

During the flight series that wrapped up earlier this year at a remote location northeast of Edwards Air Force Base, the project team tested the automatic ground collision avoidance algorithm in a variety of terrain conditions. Its ability to prevent ground impact has been out-performing engineering expectations, according to project manager Mark Skoog.

The team is currently evaluating whether to complete one final software modification to improve



ED11 0256-40

NASA photo by Tom Tschida

The Dryden DROID aircraft has helped to validate an automatic ground collision avoidance system. Once such a system is fully developed, it could have wide application in general aviation.

the system's fault tolerance and conduct one final flight series to evaluate that fix.

The software has been adapted by the project team into an application

for the Android smartphone linked to a small Piccolo autopilot.

The smartphone remained on the ground but it was in the operational loop during most of

the 19 flights flown during the flight validation phase. However, three of the flights had the smartphone with the Auto-GCAS application actually functioning aboard the DROID aircraft. The project team next plans to analyze data from the flights and report on the final results.

During one of the recent collision-avoidance flight tests earlier this year, Aviation Week & Space Technology writer Guy Norris took the controls of the DROID aircraft, completing three successful runs in which the software commanded the aircraft to automatically pull up or turn to avoid impacting steeply rising terrain ahead of its initial flight path.

When fully developed and matured, the miniaturized Auto-GCAS technology could have wide applications for use in general aviation aircraft, including both manned and remotely operated unmanned aircraft systems.

F-15B set to research laminar flow

By Gray Creech

Dryden Public Affairs

Aerion Corporation is continuing its partnership with Dryden with a scheduled second round of Supersonic Boundary Layer Transition, or SBLT, research flights slated for this summer on the Dryden F-15B Research Test Bed aircraft.

The flights will gather baseline data on a composite flat plate designed to calibrate instrumentation. The flights also will investigate the extent and stability of natural laminar or smooth flow at supersonic speeds over a special test airfoil section. Additionally, engineers will use the data to determine the effect of airfoil manufacturing tolerances on laminar airflow. In 2010, the company flew an SBLT flat plate experiment on Dryden's F-15B to gather airflow data that is aiding company engineers in preparing a representative airfoil shape for the upcoming flights.

In addition to flying the test article on its supersonic F-15B, Dryden is providing the required ground and flight support for the effort, which is being accomplished through a Space Act Agreement between the two partners. NASA is sharing in the resulting data from the flights, which take the experiment to speeds up to Mach 2, or twice the speed of sound.



ED10 0183-012

NASA photo by Tony Landis

Aerion Corporation's test article used in the initial Supersonic Boundary Layer Transition flight test project in 2010 is shown attached to the Centerline Instrumented Pylon beneath the NASA F-15B research aircraft.



ED12 0162-02

NASA photo by Tony Landis

FSC construction underway

The \$11.2 million Facilities Support Center construction has begun. The 38,000-square foot facility will replace old and inefficient buildings, while alleviating flightline safety concerns. The building also is anticipated to save 40 percent on energy compared to traditional construction.

Slam dunk Mr. Roboto

Robots designed and built by members of the Tehachapi (left), Antelope Valley (second from left) and Lancaster (at right) high school robotics teams for the 2012 FIRST Robotics Competition demonstrated basketball-shooting skill. Students controlled the robots by radio. All three teams competed at the national championships in St. Louis recently. Dryden is a major sponsor of area high school robotics teams.



ED12 0161-14

NASA photo by Tony Landis



ED12 0160-01

NASA photo by Tom Tschida

NASA honors the small business

Robert Medina, Dryden small business specialist, tells employees about some of Dryden's work. The exhibit was part of the center's celebration of NASA's Small Business Week.

News at NASA

SpaceX delivers supplies

The hatch between the newly arrived SpaceX Dragon spacecraft and the Harmony module of the International Space Station was opened by NASA Astronaut Don Pettit May 26.

The hatch opening began four days of operations to upload more than 1,000 pounds of cargo from the first commercial spacecraft to visit the space station and reload it with experiments and cargo for a return trip to Earth.

It was scheduled for splashdown several hundred miles west of California on May 31.

Wearing protective masks and goggles, as is customary for the opening of a hatch to any newly arrived vehicle at the station, Pettit entered the Dragon with Station Commander Oleg Kononenko. The goggles and masks will be removed once the station atmosphere has had a chance to mix air with the air inside the Dragon.

The Dragon capsule lifted off May 22 from the Cape Canaveral Air Force Station in Florida aboard a SpaceX Falcon 9 rocket. The demonstration mission is the second under NASA's Commercial Orbital Transportation Services program, which provides investments intended to lead to regular resupply missions to the space station and stimulate the commercial space industry in America.

At Dryden, 'Safety starts with you'

By Jay Levine
X-Press editor

Dryden's work is inherently dangerous. That point was brought home by a close call that nearly resulted in the loss of a pilot and an aircraft in December, said David McBride, center director.

If Dryden employees suspect something isn't safe, "it is your responsibility and duty to say stop," he said.

In fact, McBride said a policy is being formalized so that people, "have courage to stop something unsafe. You've got our backing."

He concluded his presentation with a question: "If you could prevent someone from being injured, what would you do?"

Vince Chacon, assistant center director, also spoke about Dryden's unique work that includes research with one-of-a-kind vehicles. Safety has to be a top priority for everyone, he added.

As an example of how it is possible to complete dangerous work without hurting people, Chacon mentioned that for 13 years, the Facilities Engineering and Asset Management, or Code F, has had a spotless record on lost-time accidents on its construction sites.

However, the same isn't true for the center as a whole. Five lost-time incidents were reported in fiscal year 2011 and two lost-time injuries were reported so far in fiscal year 2012. There were back strains that led to lost time at work or restricted duty. In addition close calls ranged from sprains, cuts, falls and trips that affected backs, shoulders, necks, legs, wrists, eyes, arms, fingers, knees and a hit on the head.

To continue safety improvement, Chacon offered this: "Our goal is to complete one year without a lost-time injury."

The two lost-time injuries both



ED12 0153-016 NASA photo by Tom Tschida

Center Director David McBride wants Dryden employees to take responsibility for safety.



ED12 0153-024 NASA photo by Tom Tschida

Jacobs Engineering Group CEO Craig Martin challenged Dryden employees to achieve no lost-time injuries.

happened in February and Chacon asked Dryden employees to be vigilant with safety to see if the center can reach February 2013 without a single lost-time incident.

While Dryden overall has a solid safety record, where half as many people are injured as in other space research and technology

institutions, Jacobs Engineering Group CEO Craig Martin offered a different view on safety. Jacobs is the parent company of Jacobs/Tybrin, which is Dryden's prime contractor for the Engineering and Technical Services contract. Jacobs is a Fortune 500 company with about 60,000 employees

Top 10 safety items

Dryden safety inspectors typically uncover these top 10 items:

- Machine guards intended to protect people from safety hazards, such as saw blades, are missing.
- Electrical issues including exposed wiring, defective insulation, broken covers, or misuse of cords can pose a danger.
- Appliances are sometimes connected to power strips, but should not be.
- Electrical panel issues include blocked panels, incomplete circuit directories, or unsecured or exposed panels.
- Hazardous or flammable chemicals, are sometimes left in unlabeled containers.
- Earthquake preparedness challenges involving bracing or

See Top 10, page 6

in more than 25 countries. Jacobs' employees also are six times less likely to be injured than Dryden employees, Martin said.

Jacobs used traditional methods of decreasing the number of injuries in the workplace and found in 2001 that while the injury rate was decreasing significantly, the number



ED12 0153-094 NASA photo by Tom Tschida

Above, Bobby Montez talks to a person about cell phone safety. Below, Bill Smith helps Mae Yook Wong put out a blaze with a fire extinguisher.



ED12 0153-118 NASA photo by Tom Tschida

of new employees was growing at a faster rate than the rate for lost-time accidents was decreasing. The trends showed it would take 50 years for the company to get to zero accidents. That was unacceptable.

"We don't want people hurt if it can be prevented," Martin said.

So, the company tried something

different. In addition to the safety plans, policies and procedures, the company began a culture change and worked to change the attitudes of employees. Called BeyondZero, A Culture of Caring, the goal is to take safety beyond zero by preventing even one accident from occurring. The personal health and



ED12 0153-120 NASA photo by Tom Tschida

Above, Edward Smith has Tameka Williams put on glasses to show how a drunk person sees. Below, Erin Waggoner wraps up Clint St. John.



ED12 0153-135 NASA photo by Tom Tschida

safety of employees comes first – wherever they are.

"We worked to change the way we think and feel about safety. It was going to take caring to make the dramatic improvement we were seeking. It comes down to driving caring into the organization. It was not easy," he said.

No one wants to be unsafe, he said, and Jacobs is committed to sending employees home uninjured. Behavior makes a difference and caring and courage were some of the ways that Jacobs turned things around on their safety culture.

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Safety Day... from page 5

To show that zero accidents are achievable, Martin pointed to the Shell-operated Pearl Gas to Liquids, or GTL, which has the world's largest facility in the Middle Eastern country of Qatar. It is there that gas to liquids fuel production is accomplished and will produce 120,000 barrels of oil equivalent per day of natural gas liquids and ethane.

The facility took 77 million hours to build and included thousands of people on the work site, representing a work force from 50 different countries. There was not a single lost-time incident.

"It can be done," Martin said.

The company's concept of BeyondZero is equated to a runner in a race. The company wants to sprint past the finish line, which Martin said is the idea of continuing to keep the momentum going when the company reaches the goal of zero accidents to keep people from getting hurt.

He concluded with a challenge for Dryden: "You do marvelous and wondrous things here. I know you have it in you and you have the courage to care and for there to be no injuries. You have the talent for it, so I encourage you to make it happen," he said.

Other presentations included:

- Scott Polgar of the Los Angeles County Fire Department explained disaster preparedness and the Community Emergency Response



ED12 0153-072

NASA photo by Tom Tschida

The Lampshades, a Los Angeles-based act, performed during Safety Day.

Team, or CERT.

- Jeff Baumgartner, a representative of the Antelope Valley Chapter of the American Red Cross, discussed his organization's work.

- Dryden safety specialist Wayne Dedafoe detailed travel and safety abroad.

- CHP officer Edward Smith, a Mojave-based officer, told Dryden employees that text and cell phone use is responsible for 28 percent of traffic accidents and 168,000 tickets were issued in 2011 for cell and text use while driving.

- Dryden aerospace engineer Ed Haering discussed QuakeGuard, an early warning, earthquake-detection

system. A center-wide test of the system May 22 validated that an emergency signal would be sent to center phones, alerting people to find cover. Three buildings were included in the test, but the system will be activated across the center and include the Dryden Aircraft Operations Facility in Palmdale.

The afternoon sessions included Red Cross first aid training and fire extinguisher practice.

Also, safety booths and exhibits included the CERT trailer, the California Highway Patrol, local desert wildlife, water conservation and recycling tips, the safety checklist, Kern County Search and Rescue, Red Cross first aid,

Top 10

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improper overhead storage are sometimes found.

- Air compressors are found without proper certification, or pressure vessels with gases such as nitrogen, oxygen and hydrogen are not properly secured.

- Accumulations of combustibles, storage issues and heavy items that could fall and injure someone in an earthquake are common findings.

- Another common violation is emergency equipment – lighting, exit signs, and fire extinguishers are not operational or ready for use.

- Ladder safety issues include missing warning stickers and proper use of a ladder for the job. Also, how the ladder is set up can be hazardous.

mishap lessons learned, Global Electric Motor car, or GEM safety, health and wellness center, motorcycle safety, hand tool safety, heat-related illness, the Safety Action Forum for Employees and Arcata Associates.

Dryden's Mission Information and Test Systems, or Code M, sponsored Safety Day.

Trek knows

The king of quiz shows, Alex Trebek, is helping answer the question, "How does NASA affect our daily lives?" The host of the long-running syndicated program "Jeopardy" is featured in a new public service announcement.

In the video, Trebek said technologies we rely on in our daily lives come from those developed by NASA for space exploration. The video is airing on NASA Television and at: http://www.nasa.gov/topics/technology/features/TREBEK_PSA_feature.html

Mission ... from page 1

altitudes around thunderstorm cells.

A May 18 flight focused on the areas of northeast Colorado near Greeley and southwest Nebraska. In addition to the L-patterned flight legs, the DC-8 transited to the downwind side of the storm system and flew four steps of a ladder pattern in the cirrus clouds of a storm anvil. The NCAR G-V flew at higher altitude than the

DC-8 downwind of storms during this same period, according to DC-8 mission manager Frank Cutler.

On May 19, the two aircraft flew to an area west and northwest of Oklahoma City, Okla., and performed similar flight profiles as the prior day, including data collection around a huge thunderstorm "supercell" whose anvil top reached an estimated

45,000 feet high. Cutler noted that the mission was "very challenging and successful," and mission scientists were very pleased with the data collected from instruments on the aircraft and on the ground during the flight.

The DC3 airborne science mission is based at Salina, Kan. NASA's DC-8 is scheduled to return to the Dryden Aircraft Operations Facility in Palmdale June 30.

Accident 'human factors' examined

By Leslie A. Williams
Dryden Public Affairs

The latest offering in the NASA Aeronautics Book Series, "Breaking the Mishap Chain," debuted at the 83rd annual Aerospace Medical Association conference May 13-17 in Atlanta, Ga. The three authors – Peter Merlin, Gregg Bendrick and Dwight Holland – discussed the book and autographed copies. The book details human factors lessons learned from aerospace accidents and incidents in research, flight test and development. It includes a number of mishap case studies that focus on the human factors that are often associated with a chain of events that, if even one element had been altered, could have prevented the disaster.

Merlin, an employee of Jacobs/Tybrin, has worked as an aerospace historian at Dryden since 1997. He has authored numerous books and publications on aviation history, many involving aerospace mishaps. He has also appeared on several television documentaries relating to aviation history.

"This book is designed for anyone interested in aerospace safety issues,

but may be of particular interest to aeromedical professionals and those responsible for planning, directing or managing aviation safety programs," Merlin said. "This work will make an excellent textbook for any class on aviation and space safety or safety management."

Dr. Bendrick, Dryden's chief medical officer, oversees all aspects of aerospace medicine, occupational medicine and fitness center operations. He previously served in the U.S. Air Force as a flight surgeon. He is board certified in aerospace medicine and is designated by the FAA as a senior aviation medical examiner. He is also a Fellow of the Aerospace Medical Association.

"Anybody involved in flying needs to learn the lessons of the past," Bendrick commented. "The same root causes of various accidents tend to occur over and over again.

Hopefully, by identifying latent causes from past incidents and the associated lessons learned, we will prevent future mishaps."

Dr. Holland, a principal partner in Human Factors Associates, has served as president of the International Association of Military

Flight Surgeon Pilots and the Space Medicine Association. He is also a Fellow of the Aerospace Medical Association. He has written more than 100 academic presentations, book chapters, journal entries and papers. "Human factors and human systems integration remain the most challenging components of the systems engineering design process," Holland said. "Failure to appropriately address these issues may, at best, result in system inefficiency or, in a worst-case scenario, in fatal accidents."

"This book is unique because it integrates aerospace history,

medicine, human factors, and system design issues in a compelling multi-level examination of some truly fascinating stories of aerospace exploration," he added.



Use your smart-phone to download the book now.



Peter W. Merlin, Gregg A. Bendrick, and Dwight A. Holland

The Aerospace Medical Association is comprised of specialists in the fields of aviation, space and environmental medicine. These national and international professionals gather at the conference to share their expertise on a broad range of issues ranging from medical standards, human factors, the aging pilot, medical evacuation and transport, fatigue management, psychological issues of aerospace flight and the physiological stresses of flight.

Publication of Breaking the Mishap Chain was sponsored and funded by the communications and education department of NASA's Aeronautics Research Mission Directorate. The book is available free of charge in electronic format at: http://www.nasa.gov/connect/ebooks/break_mishap_chain_detail.html

Dryden researchers are publishing results

Dryden researchers are not only working on interesting projects, but they also are writing about it to add to people's knowledge and for future researchers to study.

The X-Press will be listing technical publications released this year and the authors. These technical publications and previously released volumes are available at the Dryden Research Library. Items that are restricted in distribution, such as those covered by the International Traffic in Arms Regulations, or ITAR, are available to read in paper form at the research library.

Publications that are available for distribution to the public are available electronically. The Dryden Research Library has links, especially



in the gray box on its website, to find those materials at: <http://xnet.dfrc.nasa.gov/Organizations/Library/index.html>

Karl A. Bender, research librarian, said people seeking materials that are located on other government

websites can use NASA Launchpad passwords without having to establish a new password to access those databases.

The most current Dryden-developed Technical publications, and month the materials were

published, are listed.

April 2012

Christopher D. Regan and Christine V. Jutte co-wrote "Survey of Applications of Active Control Technology for Gust Alleviation and New Challenges for Lighter-weight Aircraft." Its publication number is NASA/TM-2012-216008.

February 2012

Cheng M. Moua, Shaun C. McWherter, Timothy H. Cox, and Joe Gera co-authored "Flight Test Results on the Stability and Control of the F-15B Quiet Spike Aircraft." Its publication number is NASA/TM-2011-215978.

See Publishing, page 8

Olympiad challenged students

By Alan Brown

Dryden Public Affairs

About 300 elementary and middle school students participated in a hands-on application of science, technology, engineering and mathematics during the Bohn-Meyer Science Olympiad May 12 at Antelope Valley College in Lancaster.

Sponsored by the college in cooperation with Dryden, the Aerospace Education Research and Operations, or AERO, Institute and Lockheed-Martin Corporation, the Science Olympiad featured eight competitions designed to give the students practical application of the science and math lessons learned in the classroom. The eight activities included Bridge Building, Anatomy, Crime Busters, Egg-O-Naut, Mystery Architecture, Trajectory, Reach for the Stars and Write It, Do It.

Students were gathered into 16 teams that were rotated through the eight activities or competitions.

Formerly known as the Bohn-Meyer Math and Science Odyssey, the event is named in honor of the late Marta Bohn-Meyer, who worked in a variety of engineering, flight-test and management positions during a quarter-century career at Dryden prior to her untimely death in the crash of a private aerobatic airplane in 2005. Her husband, Robert R. "Bob" Meyer, who recently retired from



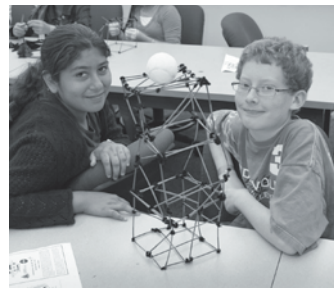
ED12 0150-131

NASA photo by Tom Tschida

In front of a poster photo of his late wife, Dryden flight test engineer Marta Bohn-Meyer, Bob Meyer chats with two of the winners of the Bridge Building competition during the Science Olympiad, Stephanie Rodriguez and William Ulla, both from Lincoln Elementary School in Lancaster.

NASA after a 40-year engineering and management career at Dryden, was on hand to offer welcoming remarks and present awards to the winners of the various competitions at the conclusion of the Saturday morning event.

Held in cooperation with the Southern California State Science Olympiad, the Bohn-Meyer Science Olympiad was intended to encourage students to continue their studies in math, science, engineering and technology and promote career interest in those fields.



ED12 0150-98

NASA photo by Tom Tschida

Students, such as these two, were challenged to build the highest tower. The materials were provided and the students were given a limited amount of time to build.

Publishing

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January 2012

Kevin Knudtson, Alice Park, Jack Sheldon, Bob Downing, Robert Harvey, and April Norcross co-wrote "WATR Chapter 10 Tools." The publication is a meeting paper that was presented at the 2011 International Telemetry Conference in Las Vegas on Oct. 24-27, 2011.

Timothy K. Risch authored "Blended Wing-Body Low Speed Vehicle X-48B Blocks 3 Through 6 Flight Test Data Report." Its publication number is NASA/TM-2011-215993 (five volumes) (ITAR).

Christine V. Jutte, William L. Ko, Craig A. Stephens, John A. Bakalyar, W. Lance Richards, and Allen R. Parker co-wrote "Deformed Shape Calculation of a Full-Scale Wing Using Fiber Optic Strain Data from a Ground Loads Test." Its publication number is NASA/TM-2011-215975.

Former pilots on 'Great Planes'

Retired Dryden research pilots Fitz Fulton and Don Mallick were featured on the third program in the Great Planes series on the Military Channel.

The program focuses on the North American XB-70, and includes interview segments shot last January with Fulton and Mallick, both of whom flew the XB-70 in the late 1960s at the Flight Research Center.

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