AAW

Phase 2 flights proving concept

By Jay Levine
X-Press Editor

Dryden’s F/A-18 active aeroelastic wing flights resumed in December, continuing validation of the concept that flexible wings can be twisted, or warped, in flight to control aircraft roll.

AAW Project Manager Larry Myers said the project’s second phase will establish whether in-flight research results match predictions and expectations Dryden researchers calculated based on phase one flight data obtained in 2002.

“We’ve demonstrated four subsonic and three supersonic flights where we’ve taken advantage of the aeroelasticity of the wing,” Myers said. “Initial results indicate the aeroelastic effects—the AAW concept, if you will—is proven out.”

Another 20 to 25 flights are anticipated before the program wraps up by the end of March or early April.

Phase one, in 2003, included about 50 flights made over more than five months. Those missions evaluated the control surfaces’ effectiveness in twisting the wing at different speeds and altitudes.

That process, called parameter identification, allowed for development of control laws that would direct the aircraft’s software to use wing elasticity effectively.

In the second phase, the new control laws in the aircraft’s software are being used to twist the wings—unlike in a traditional F/A-18, which attains roll control through deflection of its horizontal stabilizers. While the first phase showed the wings functioned well, the second phase is designed to verify that with the new software, the AAW can attain similar and effective roll.

Production F/A-18 aircraft currently have rigidity built into the wings to reduce vibration called flutter) on them. Flutter is reduced during an aircraft’s design and testing phases to keep

Center’s future linked to mission directorate

Dryden finding a niche in Exploration Systems

By Jay Levine
X-Press Editor

Dryden employees got a glimpse Jan. 6 of how the Center’s activities fit in the goals of NASA’s Exploration Systems mission directorate and how Dryden could play a bigger role in those goals in the future. Rear Adm. Craig E. Steidle, U.S. Navy (Ret.), NASA’s associate administrator for Exploration Systems, delivered the preview.

The event also featured remarks by Deputy Administrator Fred Gregory, Gwendolyn Sykes, NASA’s chief financial officer and chief acquisitions officer, and Johnny Stephenson, One NASA team leader. As stated, One NASA is a philosophy and policy that focuses all NASA centers and resources on successful mission completion.

Also at the presentation were Bobby Watkins, Exploration Systems assistant associate administrator, and Deb Duarte from Headquarters’ One NASA office.

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News

Center Director's Column

Dryden accomplishments and the year ahead

In a year marked by many changes affecting NASA, Dryden delivered some tremendous accomplishments in 2004 and is poised for another successful year in 2005. During 2004 two X-43A flights, to Mach 6.8 and Mach 9.6, set world speed records for aircraft propelled by air-breathing engines, proved that scramjet propulsion is a viable aerospace technology and gathered much new data for future applications of scramjet propulsion. These were truly "milestone flight" events.

In May, we began the ambitious High-Altitude, Long-Endurance Remotely Operated Aircraft in the National Aerospace project to enable the safe integration of uninhabited aerial vehicles into civil airspace during the next five years. We also partnered with the Defense Advanced Research Projects Agency, the Air Force and Boeing in advancing the X-45 Unmanned Combat Aerial Vehicle program. Successes in that program during the year included the first two "miles" of flight.

Successes in that program during the year included the first two "miles" of flight. Among other "milestones of flight" events. In December, Dryden's Active Aerelastic Wing F7 A-18 began its second phase of research flights to test active controls of wing flexibility for primary role maneuvering, a technology that could lead to development of lighter, more flexible wings for future high-performance military and commercial aircraft. All of you at Dryden should be proud of these significant accomplishments.

During 2005, we expect to have an active agenda of flight testing and research. Dryden will support the Space Shuttle's return to flight with a series of tests on the F-15B. These flights will gather data on the impact from the external tank's foam to help quantify trajectories for pieces of foam that break free and to help validate analytical predictions. Another F-15B project probably will look at new ways to mitigate sonic booms. Center pilots also will continue flying the F/A-18 AAW to validate the efficacy of wing warping. Another flight research project will assess the F-15 Damage Adaptive Control System to determine its effectiveness in compensating for simulated losses of flight control surfaces and other failures.

Dryden's DC-8 is being used to support the Polar Aura Validation Experiment, to corroborate the accuracy of satellite instrumentation. Among other missions, the Center's ER-2 aircraft will participate in the Tropical Cloud Systems Program, flying from Costa Rica as part of NASA's largest Earth science field campaign in 2005. Additionally, we are testing a Navy E-2C Hawkeye carrier-based electronics platform in the Dryden Loads Laboratory to help develop loads equations. These will assist the Navy in determining how the additional weight of planned modifications to the aircraft will affect its flight envelope. If successful, this project could lead to other, similar work in the future.

We expect to continue the HALE ROA in the NAS project with some cooperative collision-avoidance activities, probably using piloted vehicles as a first step in meeting the Federal Aviation Administration's requirements for integrating high-altitude UAVs into the civil airspace. Dryden has initiated the acquisition of a Predator B for further testing of UAVs, but we won't have it available until 2006. However, we do expect to fly AeroVironment's solar-powered Pathfinder UAV this year to validate some of its structural-mode interactions.

Additional testing of UAVs will utilize General Atomics' Altair aircraft to test a number of sensors for the National Oceanic and Atmospheric Administration, near the Channel Islands off the California coast. This effort also will determine if a UAV can support NOAA operational and research goals. In a different mission, we expect to use an Altair to monitor forest fires for the U.S. Forest Service during the next few fire seasons.

Finally, NASA's Exploration Systems mission directorate has selected Dryden to be lead center in the study of an Astro Assisted Mars Transfer Vehicle and to perform thermal and load testing of an airt heat shield for the Crew Exploration Vehicle. These are only a few of the projects we will support in 2005, but they suggest that we will have a lot of work on our plates. I look forward to working with all of you on what looks to be another exciting year of flight research and testing.

Bus service is now available

Long-awaited bus transportation between the Antelope Valley and Edwards Air Force Base began Jan. 31. The daily service begins at 6:43, 5:13 and 5:37 a.m. at the location. Daily departures from the same location are at 4:43, 5:13 and 5:37 p.m. The buses stop at Dryden. All civil service and contractor personnel may use the service.

The Antelope Valley Transportation Authority operates the commuter bus service, which currently departs daily at 6:10 a.m. from the park-and-ride lot at Los Angeles City Park, located on 10th Street West between avenues K and L. Upon completion of the Palmdale Transportation Center later this spring, additional departures from that location are scheduled to begin March 5.

Cost of the service is $150 per month, and passes may be purchased on the 15th of each month for the following month. Disabled riders may qualify for monthly passes for $75. Passes and additional information about the service are available online at http://www.avta.com.

Dryden civil service employees may apply for a program that results in a $100 reimbursement of the monthly fee, reducing their cost to $50, by contacting Tracy Edmonson, ext. 3320. Officials at the AVTA say the service may be expanded in the future if demand is sufficient.

The next generation

Dryden aerospace engineer mentors high school student

Quartz Hill High School senior Tyler Whitaker, right, flies Dryden's F-18 simulator on Oct. 28 as Dryden aerospace engineer Chris Nagy looks on. Nagy has served as mentor for Whitaker's senior project, a high school graduation requirement calling for Whitaker to spend 15 hours shadowing a mentor working in a profession of interest, for which Whitaker is aeronautics. Nagy called Whitaker's sim flight "surprisingly good," with Whitaker landing the simulated aircraft on first attempt. He also attended the X-43A flight 3 technical brief. Whitaker's second visit to Dryden took place Jan. 26, when, in addition to flying a C-17 simulator, he attended an Earth Science Capability demonstration project meeting. A research paper and six-minute presentation will complete Whitaker's graduation requirements.

NASA to aid consortium

NASA officials recently accepted an invitation for the Agency to join the National Invasive Species Council, a consortium of 12 federal agencies formed to battle the effects of invasive organisms in the environment.

An invasive species is an organism, such as a microbe, plant or animal that entered the U.S. through natural processes or with human assistance and whose presence poses a threat to public health or the economy. NASA, whose track record of achievement in invasive-species monitoring led to the invitation to join the council, will provide Earth observations and predictive models resulting from space research and systems-engineering expertise.


Return to flight ‘rehearsal’ begins

Ever have one of those days? Return to Flight Space Shuttle Commander Eileen Collins is having one. Her STS-114 crew is battling an electrical short in a crucial laser – one that helps inspect Space Shuttle Discovery for damage – and struggling to restart a malfunctioning fan in astronaut Souhi Noguchi’s spout.

The good news is that crewmembers, along with dozens of flight controllers and other experts, are calmly working through the issues like the pros they are. The even better news is that it’s all part of an elaborate simulation – the real mission is still weeks away.

"The long sim is great practice for us," said Collins. "We’ve been training on these tasks for a year and a half, but this allows us to put it all together."

This "long sim" is a rigorous 36-hour dress rehearsal of the mission’s second and third days, which include orbiter inspection activities and Space Station rendezvous and docking.

http://www.nasa.gov/news/highlights/returntoflight.html
Above, NASA’s chief of safety and mission assurance, Bryan O’Connor, explains key refinements to the Agency’s Independent Technical Authority organization. Below, Brian Binnie, program business manager and test pilot for Scaled Composites of Mojave, discusses the success of SpaceShipOne’s flights last year, which captured a $10 million prize for the company.
At the beginning of John F. Kennedy’s presidency, no one familiar with his public life could have predicted his decisive role in the early American space program. Indeed, until he entered the White House in January 1961, he showed virtually no enthusiasm for the subject. In fact, during the first weeks of the Kennedy Administration, NASA Administrator James Webb tried to interest the president in a project to fly astronauts to the moon. Kennedy replied in no uncertain terms that curbing federal spending took precedence over space travel.

Two events changed his mind. First, between April 17 and 20 of the same year, a band of about 1,500 exiles trained and armed by the Central Intelligence Agency mounted an attack on the south coast of Cuba at the Bahía de Cochinos, or Bay of Pigs. They suffered a crushing defeat at the hands of the Cuban army, which captured and imprisoned 1,173 of the insurgents. A week after this disaster unfolded – on April 12, 1961 – Cominquent Yuri Gagarin, aboard Vostock I, became the first human being to orbit the Earth. The American response the following month only added to the sense of despair. Alan Shepard’s suborbital flight aboard Freedom 7 lasted a mere 15 minutes.

By Michael H. Gorn  
Acting Chief, Code T

Focus

February 25, 2005

NASA, Dryden on the Move

By Bob Meyer

Dryden management plans today with an eye to the future, as the Center must be positioned well to contribute in these new areas of opportunity. A key to this is a new ‘whole-of-Center’ approach to planning and implementing projects. This new model will allow Dryden to take advantage of opportunities on a larger scale than in the past, while maintaining the flexibility of a smaller organization.

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In exchange for the risks, the X-15 program rewarded researchers with a measure of technical data. Its flight research program had direct application to the later reentry Shuttle Orbiter, but it also proved invaluable to designers of other hypersonic air vehicles like Helios could be part of Dryden’s future.

At left, Dr. Wernher von Braun, center, explains the Saturn launch system to President John F. Kennedy on Nov. 16, 1963, at Cape Canaveral, Fla. NASA Deputy Administrator Robert Seamans is at left of von Braun. Image provided by James B. Hill, audiovisual archivist at the John Fitzgerald Kennedy Library in Boston, Mass.

But the golden heritage of Apollo and X-15 proved nearly impossible to sustain. Those engineers and scientists who joined NASA’s ranks after these projects found it hard enough to measure up to the legendary accomplishments of the past. Harder still, they found that changes in domestic and international politics made it increasingly difficult to pursue bold new ventures of any kind.

One political factor involved money, or its absence. Even before Apollo 11, successive Congresses voted for a steady retrenchment of the NASA budget, which declined in every year but one between 1965 and 1975. President Richard Nixon accelerated the process. Under pressure to reduce federal spending, Nixon felt that NASA needed to shed the heroic persona of the Apollo days and become more practical. The president and like-minded policymakers felt that the lunar missions had satisfied John Kennedy’s ultimate objective of evening the score on the Cold War battlefield. As a result, Nixon and his advisors turned their backs on expansive projects and embraced more attainable ones. Any thought of mounting missions to other worlds evaporated in the new climate of budgetary restraint.

But powerful forces outside the U.S. also dictated change. During the 1970s, Cold War rivalries cooled somewhat, at least temporarily. Soviet and American negotiators agreed to a partial truce known as Detente, resulting in a congressional mood less inclined toward supporting futuristic new planes and visionary new spaceships. After a resumption of tensions during the 1980s, at the end of the decade the Cold War came to an abrupt end. Despite an attempted coup aimed at restoring Communism in the Soviet Union — and regardless of the many political and economic uncertainties inherent in refreshing the Russian economy and politics — the fight for supremacy between the U.S. and the U.S.S.R. diminished, and...
DC-8 supports Arctic mission

By Beth Hagenauer and Gretchen Cook-Anderson

Dryden Public Affairs and NASA Headquarters

Aboard Dryden’s DC-8 flying laboratory, an international team of scientists embarked on a journey in January to improve modeling of global-scale air quality and climate-change predictions through high-quality measurements of the Arctic region’s atmosphere.

Researchers in the Polar Aura Validation Experiment gathered information that will validate data from NASA’s Aura satellite, launched in July 2004. The PAVE is the third in a series of planned Aura validation and science missions aimed at better understanding the transport and transformation of gases and aerosols in the lower atmosphere (troposphere) and their exchange with those in the lower stratosphere.

The mission began Jan. 24 and was completed Feb. 9.

“The DC-8 performed a number of specialized maneuvers to permit concurrent flights under the path of the Aura satellite and to sample ozone concentration at very high altitudes,” said Walter Klein, Dryden’s mission manager for the project. “The aircraft carried 13 instruments weighing more than 20,000 pounds, and a group of 40 scientists, engineers and technicians in support of the PAVE mission.

“In addition to providing important validation for the various Aura data products, PAVE brings together a full NASA complement of space-based and suborbital measurements to study the atmospheric chemistry and transport of gases and aerosols in this sensitive region of our planet,” said Dr. Michael Kurylo, program scientist for the PAVE at NASA Headquarters.

In particular, PAVE research focuses on the high-latitude (Arctic) region of the Northern Hemisphere, where, over more than a decade, winter chemistry has led to significant seasonal reduction of the stratospheric ozone layer. The ozone layer restricts the amount of the sun’s ultraviolet radiation reaching the Earth. Depletion of this protective layer can have harmful effects on humans and other ecosystems.

The DC-8 flying laboratory and high-altitude balloons collected valuable scientific data, especially on ozone and ozone-depleting chemicals, using a suite of atmospheric remote-sensing instruments. The mission was flown from Pease International Tradeport, Portsmouth, N.H. Balloons were launched from the European Sounding Rocket Range facility in Sweden.

Instruments aboard the DC-8 are characterizing upper tropospheric and stratospheric gases inside and outside the Arctic polar region to study ozone-depletion chemistry. Such flights also permit measurement of the outflow of gases from the North American continent, contributing to an understanding of how regional pollutants are distributed on a hemispheric basis. Scientists will make remote-sensing measurements (extending many kilometers away from the aircraft) of tropospheric and stratospheric ozone, aerosols, temperature, nitric acid, and other ozone-related chemicals. These are complemented by measurements (such as ozone, methane, water vapor, carbon monoxide, nitric acid and nitrous oxide) in the atmosphere immediately surrounding the aircraft.

NASA scientists from Dryden, Goddard, Ames Research Center, Moffett Field, Calif., Langley Research Center, Hampton, Va., and the Jet Propulsion Laboratory, Pasadena, Calif., are participating in the PAVE. PAVE partners include the University of New Hampshire, University of California-Berkeley, University of Bremen, Germany; the National Center for Atmospheric Research, Boulder, Colo.; the U.S. Naval Research Laboratory; the Koninklijk, Netherlands, Meteorological Institute and Los Gatos Research Inc., Los Gatos, Calif.

For more information about the PAVE on the Web, visit http://cloudl1.arc.nasa.gov/ave-polar.

For more information about the Aura mission, visit http://aura.gsfc.nasa.gov.

Photos of NASA’s DC-8 are available on the Web at http://www1.drc.nasa.gov/gallery/Photo/DC-8/index.html.
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with it the original basis for pursuing space flight in the first place. The stimulation of the Cold War represented only one factor contributing to NASA’s woes. In addition, the Agency’s bright reputation lost some of its luster during the years after Apollo, all the more newsworthy because of the mystique of perfection that flourished during the lunar program. Indeed, some critics even pointed out flaws in Apollo itself, reinterpreting the terrible fire that killed three in Apollo 1 and the events that nearly took three more lives in Apollo 13 less as heroic events than as serious lapses. Many raised doubts about the value of human space flight itself, contrasting the relatively modest yet astounding success missions in which robotic systems toured the solar system during the 1970s.

Later on, the Space Shuttle drew fire due to cost overruns and doubts about the degree to which it actually lowered the cost of access to space and increased the frequency of launches. The Challenger incident in 1986 shocked the nation as well as NASA itself. The Agency suffered still more scrutiny because of the famous aftermath of the Hubble Space Telescope, and later in 1990 for the budget negotiations with the International Space Station.

As a result of these events (not surprising in light of the Agency’s mandate to pursue high-risk ventures), Congress slowly reversed its assessment of NASA. By and large, during the Mercury, Gemini and Apollo programs, project directors treated NASA like the government’s prodigal son. Many years afterward, NASA administrators traded on these early achievements to win funding for new projects. In effect, one standard existed for all other federal entities, and a different one for NASA.

But by the 1980s, the Agency had become fallible. By then, those in control of the nation’s purse did not hesitate to question NASA’s requests. In fact, after a number of reductions in size and capacity due to budget cuts, the International Space Station was a congressional showdown by just one vote. Since then, NASA has been expected to conform to the requirements imposed by the rest of the federal establishment: curb cost overruns, be willing to outsource a portion of its work, and above all, account for its budget and spend it well. Gone is the luster during the years after Apollo, during the Cold War, from which NASA sprang. Indeed, some critics even pointed out flaws in Apollo during the lunar program. Indeed, some critics even pointed out flaws in Apollo itself, reinterpreting the terrible fire that killed three in Apollo 1 and the events that nearly took three more lives in Apollo 13 less as heroic events than as serious lapses. Many raised doubts about the value of human space flight itself, contrasting the relatively modest yet astounding success missions in which robotic systems toured the solar system during the 1970s.

In the past, customers came to the Center with a requirement to fly a research aircraft. In Dryden’s new role, it’s expected we’ll see the kinds of technologies required for the aircraft of the future, and will seek partnerships with other NASA centers working with those technologies, putting them together into integrated systems. The aeronautics directorate within NASA is operating differently than in the past as a result of new requirements that technology development be connected to a future flying experiment, either as part of an integrated system or an experimental aircraft or as a flight experiment on a Dryden flight test aircraft.

For example, in the last decade the Center has been treated as just another governmental body, with a budget, by the end of the decade, 60 percent of the Center’s total work is expected to increase further, to about 17 and designed to monitor and diagnose jet engine status. There also is research being done with the F-15 Damage Adaptive Control System, aimed at designing a flight control system capable of compensating for loss of an aircraft’s flight control surfaces. These programs have implications for both civilian and military aircraft.

Additionally, NASA has tasked the Center with assuming a different role in becoming integrators of technologies. These new relationships probably will result in a cluster of meaningful, although perhaps different management programs consisting of different modules that encompass a range of NASA financial and administrative areas. Through these and similar improvements, all the business systems and tools should be in place to assess the operational efficiency of the Center and its individual units.

These new systems and tools will be elements of a sort of “scorecard.” The scorecard will use metrics to measure progress against defined strategies, much the way an airplane’s instrument panel keeps a pilot apprised of flight progress. On an airplane, a pilot scans instruments continuously for useful information, but also to see whether a warning light appears. If something is wrong it’s important for the pilot to focus attention on that. Flying cross-country in an airplane, the primary functions are communication and navigation: but if you’re scanning your instruments, you notice oil pressure is down and oil temperature is going up, you might have an indication of an engine problem. Now your focus becomes keeping the plane on the ground as soon as possible, and not so much navigating to your destination.

In much the same way, then, the scorecard is intended to measure what’s happening at the Center and reflect it in a balanced sense, so if something is getting out of whack, it can be dealt with before it becomes an emergency.

If we’re to build upon our rich past, we’ll have to use some of the same kind of creativity and innovative thinking in these new lines of business that are hallmarks of the Center’s reputation, as well as becoming more businesslike and improving our value to customers. As we become more successful, we’ll find these efforts will likely result in a cluster of meaningful, although perhaps different projects than the Center and the Agency may have considered in the past.

But if some of NASA’s history no longer applies, other parts remain as relevant and timely as ever. Still prominent is the NACA and NASA impact is a separate organization within the Center dedicated exclusively to UAVs. UAV work at Dryden has increased from 24 percent in fiscal 2004 to more than 80 percent in the current fiscal year and is expected to increase further, to about 60 percent of the Center’s total work budget, by the end of the decade.

Another effort tied directly to Center involvement with UAVs is one aimed at incorporating UAVs routinely and safely into the national airspace. The project, called High Altitude, Long Endurance Remotely Operated Aircraft in the National Airspace, is a partnership with industry and U.S. Department of Homeland Security. They serve as partners for developing and testing remotely operated air vehicles, with the ultimate goal of being able to account for its budget and spend it well. Gone is the luster during the years after Apollo, during the Cold War, from which NASA sprang. Indeed, some critics even pointed out flaws in Apollo during the lunar program. Indeed, some critics even pointed out flaws in Apollo itself, reinterpreting the terrible fire that killed three in Apollo 1 and the events that nearly took three more lives in Apollo 13 less as heroic events than as serious lapses. Many raised doubts about the value of human space flight itself, contrasting the relatively modest yet astounding success missions in which robotic systems toured the solar system during the 1970s.

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And as part of ongoing work with the Defense Advanced Research Projects Agency, the Air Force and the Navy, Dryden is seeking a role in the joint unmanned combat aircraft program, or J-UCAS, after research on the X-45A UAV is complete. Dryden researchers are poised to remain a part of the program aimed at developing a common J-UCAS operating system for the Boeing X-45 and Northrop Grumman X-47.

Dryden also is working with the Exploration Systems mission directorate to review Dryden capabilities that can support the Agency’s exploration vision. In the past, Dryden has supported space activities in many ways, among them development of the Lunar Landing Research Vehicle, Solid Rocket Booster recovery system testing, Orbiter landing chute testing, thermal protection system testing and many other activities.

Realigning Center leadership, streamlining processes and developing partnerships are tools Dryden will use to be successful in a new era in aeronautics now beginning. As in the past, Dryden will be ready for the future and will continue to show why its reputation as NASA’s premiere flight research center is well earned. We need the help of everyone at the Center to be successful. Future “expansion” articles will appear in the X-Press to examine additional details of subjects mentioned in this article, such as Center strategies, the “scorecard” and new business opportunities.

Tomorrow ... from page 5

In the past, customers came to the Center with a requirement to fly a research aircraft. In Dryden’s new role, it’s expected we’ll see the kinds of technologies required for the aircraft of the future, and will seek partnerships with other NASA centers working with those technologies, putting them together into integrated systems. The aeronautics directorate within NASA is operating differently than in the past as a result of new requirements that technology development be connected to a future flying experiment, either as part of an integrated system or an experimental aircraft or as a flight experiment on a Dryden flight test aircraft.

And as part of ongoing work with the Defense Advanced Research Projects Agency, the Air Force and the Navy, Dryden is seeking a role in the joint unmanned combat aircraft program, or J-UCAS, after research on the X-45A UAV is complete. Dryden researchers are poised to remain a part of the program aimed at developing a common J-UCAS operating system for the Boeing X-45 and Northrop Grumman X-47.

Dryden also is working with the Exploration Systems mission directorate to review Dryden capabilities that can support the Agency’s exploration vision. In the past, Dryden has supported space activities in many ways, among them development of the Lunar Landing Research Vehicle, Solid Rocket Booster recovery system testing, Orbiter landing chute testing, thermal protection system testing and many other activities.

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February 25, 2005

NASA Dryden X-Press
Exploration ... from page 1

The presentation was part of the ongoing One NASA Leader-Led Workshop series being conducted at each NASA center and at Headquarters.

“The workshop series was established to explain the vision for space exploration and where the Agency is in that effort, and how each center will play a part in it,” said John Childress, Dryden One NASA point of contact.

Dryden’sfortunes currently are linked to the Agency’s Vehicle Systems Office and work with Uninhabited Air Vehicles, or UAVs, but Center officials are watching for opportunities emerging in other areas, such as those deriving from Exploration Systems.

Dryden researcher Dan Banks, for example, recently won a $4 million NASA award for development of an Aero-Assist Mars Transfer Vehicle System Technology Design. This is a two-year, advanced study of aerodynamic concepts to explore the potential for their use in design of future space vehicles. The project will examine the potential for incorporating into vehicle design aerodynamic maneuvers that, among other things, could be used to lessen the reliance on conventional propulsion systems as well as reducing the need for – and weight of – propellants that are required.

Specific technologies to be studied include a concept called lifting aeroarchitecture, for approaching Mars. Banks explained that this would involve use of aerodynamic forces in a planet’s outer atmosphere to slow a vehicle as it approaches, allowing it to be “captured” and its trajectory controlled through aerodynamics.

A second concept is that of aero-assisted orbital maneuvering of spacecraft, which would utilize aerodynamics to augment the role of conventional propulsion systems in changing a spacecraft’s orbit. A final concept to be examined is aero-gravity assist, which will involve study of using aerodynamic forces in conjunction with gravity from flybys of inner planets to give spacecraft a boost of speed. The latter would have applications for possible missions from Earth to Mars using a trajectory via Venus, or trajectories for abort or return of the spacecraft en route to Mars.

Banks said the study will include development of a conceptual design of vehicles to perform these studies, based on high-fidelity simulations, to determine net costs and benefits of the use of such maneuvers and vehicles.

In addition to the Aero-Assist Mars Transfer Vehicle System Technology Design, Steidle said Dryden is tasked with management of a $40 million project aimed at development and test of an aft heat shield for the Crew Exploration Vehicle, or CEV.

Additional CEV-related work for which Dryden could be tapped, Steidle said, includes parachutes, crew escape systems and flight research work. Other Center contributions could include development of solar or hypersonic technology (though it’s not expected that technology will be mature for use in the CEV), intelligent flight control systems, new vehicle configurations and planetary vehicles.

“Opportunities for the future are vast,” Steidle said.

Design of the CEV is expected to be complete in 18 months to two years, with applicable technologies flight demonstrated in 2008. A ship capable of returning to the moon is expected to be complete in 15 to 20 years. A common theme in all speakers’ presentations was that, in light of events of the past several years, from the Columbia accident, reports and analysis to President George W. Bush’s call for missions to the moon and Mars, the Agency is evolving to meet the challenges of a new day.

Center Director Kevin L. Petersen, through informal town hall meetings with Dryden employees, has worked to keep awareness of the dynamic environment high and to keep Center personnel abreast of what the changes will mean for Dryden. The Dryden management team also has streamlined and restructured both its own organization and Center processes, to be better able to react to change and advocate Dryden’s strengths to new generations of customers that might not be as well informed about the glories of Dryden’s past.

Dryden officials are and have been heeding Steidle’s counsel, working toward keeping themselves and others informed and continuing to watch for opportunities.

Dryden’s Jim Stewart and Rodger Romans, for example, are Center liaisons with the Exploration Systems mission directorate, and are watching developments within the directorate to identify roles for Dryden in emerging projects. Stewart is Dryden’s mission director for Exploration in addition to his role as Dryden point of contact. Romans is his deputy.

“A large group of folks at Dryden were not only aware of what was going on, but they are eager and interested in finding out more about it. The timing for the visit (by Steidle) was very, very good. It helped set the stage for the role Dryden could play in this new vision and new approach the Agency is following,” Romans said.

Steidle did an excellent job communicating where the mission directorate is going and came across as “charismatic and motivational,” Romans said.

Stewart reinforced the point that Dryden is only beginning to identify potential roles in the work of Exploration Systems.

“Currently, we have a role and we’re contributing – with leadership on the CEV heat shield – and we have people at Headquarters helping out,” he said.

“Additionally, we have an expectation that we’ll have a larger role in the future.”

Legacies ... from page 6

Feb. 1, 1970 – YF-12A (60-6935) was delivered to NASA FRC for a joint USAF/NASA research program.


Feb. 15, 1990 – SR-71A (61-7980) was delivered to NASA Dryden Flight Research Facility (DFRF) from Beale AFB, Calif.

Feb. 13, 1991 – General Dynamics test pilot Joe Bill Dryden delivered F-16XL (07-0074) to DFRF.

Feb. 10, 1992 – YF-12A (60-6935) was delivered to NASA FRC.

Feb. 25, 2005

Exchange Council lists 2005 activities

The Dryden Exchange Council is sponsoring the following activities:

- March 19 – a three-hour whale-watching trip to Ventura, Calif., with Island Packers Tour Co. Cost is $55 per person. Price includes lunch, and free time for shopping, lunch at the New Danish Inn and wine tasting at the Fess Parker Winery. A side trip to the Cheumash Casino is optional. Bus departs Lancaster at 6:30 a.m. and returns at 6 p.m.
- May 7 – a bus trip to Solvang, Calif. Cost is $25 per person, which includes free time for shopping, lunch at the New Danish Inn and wine tasting at the Fess Parker Winery. A side trip to the Cheumash Casino is optional. Bus departs Lancaster at 7:30 a.m. and returns at 7 p.m. Tickets go on sale April 12.
- Pizza nights, at Round Table Pizza in Lancaster, also are being planned for March. Cost for each event is $10 per person, and includes one large two-topping pizza and choice of four sodas, one pitcher of beer or one carafe of wine.

Tickets and information for all events may be obtained by calling the Dryden Grill Shop, ext. 2113, or Jessica Lux-Rasmussa, ext. 3820.

The X-Press is published for civil servants, contractors, retirees and people with interest in the work of the Dryden Flight Research Center.

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EXCLUSIVE

EC05 0012-1 NASA Photo by Tom Tschida

During his participation in a Jan. 6 One NASA Leader-Led Workshop at Dryden, NASA Deputy Administrator Fred Gregory spoke about some of the changes and challenges currently being faced at NASA.

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Feb. 10, 1992 – X-31A (164584) and X-31A (164585) were transferred to DFRF.