Air Vehicles News and Accomplishments

January 2008

Cooperative Operations in UrbaN TERrain (COUNTER) project reaches important flight test milestone

A Nighthawk UAV, ready for use in the recent COUNTER flight test.

AFRL scientists recently completed a successful flight test as part of the COUNTER program.

During the test, conducted at the US Marine Corps Air Ground Combat Center in Twentynine Palms, Calif., three UAVs were sent to inspect potential threat targets that had been hidden previously in the facility's urban landscape. The UAVs collected video telemetry that was then sent back to the operator controlling the Vigilant Spirit Control Station.

The test was an important milestone for the COUNTER program. This final major flight test for the COUNTER program represented the first time three micro Unmanned Aerial Vehicles (UAVs) flew simultaneously at 75, 100, and 125 foot altitudes respectively, under the control of one operator.

Additionally, Automated Decision Logic was tested for the first time with three UAVs in flight. Automated Decision Logic enables the operator to instantly revisit a particular threat target given a set of predetermined conditions, such as fuel remaining. Automated search patterns and automated wind compensation were also tested successfully.

In order to demonstrate other applications of the COUNTER system, the researchers also performed missions in perimeter surveillance and missions involving multiple vehicles orbiting a single point.

The flight test successfully brought together all the technologies being developed under the COUNTER program over the last three years. As a result of the test, the COUNTER team collected over 41 gigabytes of video, telemetry, still photos, and other critical data.

AF Special Operations Command was also invited to provide operational insight into the COUNTER system. AC-130 Gunship sensor operators were given a chance to operate and evaluate the multiple UAV sensor video streams. During each of the operators' time in the seat, they had a chance to utilize the available tools to locate targets in the urban areas.

Fourteen researchers were involved in the successful test, including personnel from the AFRL Air Vehicles and Human Effectiveness Directorates, General Dynamics, Applied Research Associates, and Air Force Special Operations Command.

The COUNTER project is an effort designed to provide situational awareness to special operations forces in an urban environment. The COUNTER team uses small and micro Unmanned Air Vehicles to perform surveillance and collect video telemetry to detect possible threat targets in an urban environment.

Dr. David Pratt named Royal Aeronautical Society (RAeS) Fellow

Dr. David Pratt was recently named a 2008 Royal Aeronautical Society Fellow.

AFRL engineer Dr. David Pratt was recently named a 2008 Fellow of the Royal Aeronautical Society, the highest grade attainable in the organization.

Dr. Pratt serves as the Air Vehicles Directorate's senior technical advisor for the Structures Division. In this role, Dr. Pratt serves as the primary technical authority for all research and development efforts in structures, thermal management, and structural design methods for AFRL. To date, he has authored or co-authored over 60 technical publications and had been invited to speak or present papers at numerous technical conferences.

Dr. Pratt began his AFRL career in 1989 as a research engineer in the Flight Dynamics Directorate (now the Air Vehicles Directorate). In 1996, he became the technical advisor for the directorate's Mechanical and Thermal Systems Branch, and in 1999 he was named to his current position.

The recipient of many awards for his work in AFRL, Dr. Pratt has most recently been honored with the Department of the Air Force Performance Award (for the years 1990 through 2005), the Valued Service Award Certificate from the American Society of Mechanical Engineers (2003), and the Air Vehicles Directorate's Benjamin D. Foulois Award for Excellence in Research (1998).

Dr. Pratt graduated in 1989 with a bachelor's degree from Wright State University in systems engineering with a mechanical engineering option. He also holds a master's degree (1991) and doctoral degree (1996) from the University of Dayton, both in mechanical engineering.

Fellowship in the RAeS is granted to professionals who have demonstrated outstanding contributions, a high degree of responsibility, and/or a long experience of high quality in the field of aeronautics.

The RAeS is the only professional organization that serves the entire aerospace community. Members of the society come from many different professional disciplines within the aerospace industry worldwide. The RAeS serves as a leader within the aerospace community and often serves in an advisory role to leaders in government, academia, and industry.

Dr. Scott Sherer and Dennis Carter, recently named AIAA Associate Fellows.

Sherer, Carter named 2008 AIAA Associate Fellows

AFRL Air Vehicles engineers Dr. Scott Sherer and Mr. Dennis Carter have recently been named AIAA Associate Fellows for their outstanding contributions to the arts, sciences, or technology of aeronautics and astronautics.

Dr. Sherer, an aerospace engineer in the Computational Sciences Branch, performs research in the field of computational fluid dynamics. His research in the area of high-order numerical interpolation techniques resulted in the greatly-enhanced capability of the computer code FDL3DI. The enhancement to this fundamental CFD software allowed researchers the ability to carry out direct numerical and large-eddy simulation computations on geometrically-complex configurations. Additionally, Dr. Sherer has also made significant contributions in the technical areas of aero-acoustics and aero-optics.

Mr. Carter, an aerospace engineer in the Aerodynamic Configuration Branch, has provided significant contributions in the area of air vehicle ground and flight tests. During his 29-year tenure in AFRL, he has participated in the most complex wind tunnel test ever completed in an AFRL wind tunnel, the Commercial Aircraft Hardening Program (CAHP). Additionally, Mr. Carter has also supported many flight test projects, including the NF-16D Variable-stability, In-flight Simulation Test Aircraft (VISTA), the F-15 STOL Maneuvering Technology Demonstrator (SMTD), the X-29 Forward Swept Wing, the F-111 Mission Adaptive Wing, and the SkyTote unmanned aerial vehicle.

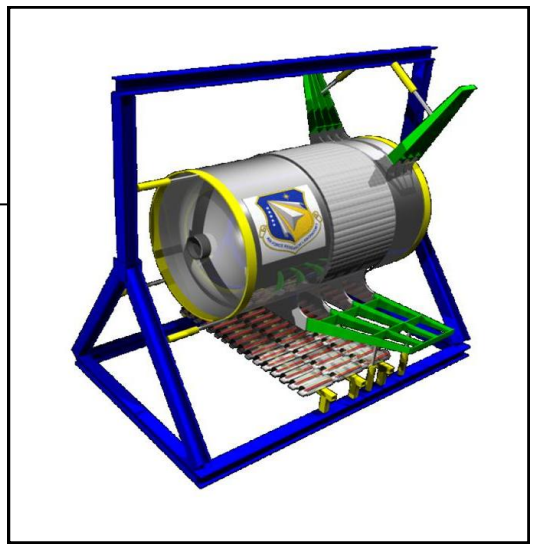
The AIAA has been the premiere society for aerospace engineers and scientists for over 70 years. It is the world's largest professional society dedicated to the progress of engineering and science in aviation, space, and defense. Associate Fellows are peer-nominated and elected and must have 12 years of professional experience to be considered for this honor. The AIAA will recognize these individuals at the Associate Fellows Dinner held in conjunction with the 46th AIAA Aerospace Sciences Meeting and Exhibit in January 2008.

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

February 2008

FAST program seeks to mature hypersonic air vehicles and space launch technologies



AFRL is teaming up with a number of aerospace industry contractors to begin ground experiments as part of the Future-responsive Access to Space Technologies (FAST) program.

The FAST program seeks to mature hypersonic air vehicles and space launch technologies by designing, developing, and then testing the technologies in a series of ground-based experiments. These technologies could potentially be used on a variety of future reusable high-speed air and space vehicles.

“We want to deliver a set of completed experiments to the leadership that allows them to make decisions on a group of technologies for a variety of air and aircraft-like vehicles,” says FAST program manager Maj Nidal Jodeh.

A concept drawing of the FAST structural tank test rig.

Three sets of ground experiments are planned as part of the FAST program. These experiments are: Design and Operability, Composite Airframe Development, and Integrated Adaptive Guidance and Control (IAG&C).

The Design and Operability experiments will focus on subsystems and integration, and how to increase the efficiency of flight and ground operations.

The Composite Airframe Development experiments will look at airframe components such as thermal protection systems and load-bearing fuel tanks. Improved techniques for removing, replacing, and attaching thermal protection systems to the vehicle will be studied, as well as the capability of the fuel tank to bear structural loads.

The IAG&C experiments focus on the capability of avionics to perform systems health monitoring and compensate for off-nominal flight conditions.

The ground experiments are currently in the design phase. All three ground experiments will be conducted concurrently, and data will be shared among the various contracting teams. IAG&C tests will be conducted through hardware-in-the-loop simulations, providing a realistic testing environment in which actuator components are tested in the loop with computer simulations.

Although there is no specific vehicle platform currently planned to utilize the FAST technologies, Maj Jodeh says the ultimate goal of the project is to deliver technologies to enable affordable and responsive space access while advancing hypersonic air vehicle technologies.

FAST is a joint effort between AFRL and a number of contractors, including Lockheed-Martin, Northrop Grumman, Honeywell, and the University of Dayton Research Institute.

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

March 2008

Spirit of volunteerism shines at FIRST Lego League championship

Air Vehicles personnel recently showcased their community spirit, participating in the FIRST LEGO League (FLL) Ohio State Championship, held January 12-13 at Wright State's Nutter Center.

Several RB employees participated in the event, serving in many different capacities, from referees to judges.

The FLL is a program designed for children ages 9 to 14, to spark an interest in science and technology. FIRST is an acronym that translates into For Inspiration and Recognition of Science and Technology. Each year, children who participate in the local, state, and national competitions build robots using LEGO components and demonstrate problem-solving and teamwork skills before a panel of judges.

This year's championship challenge was "Power Puzzle." The student participants were required to use robotics to solve energy challenges that confront them and their communities every day.

The Energizer Monkeys (from Reading Community City Schools in Reading, Ohio) won the FIRST LEGO League state championship and will be representing Ohio at the 2008 High Tech Kids FIRST LEGO League International Open Championship, to be held at the University of Minnesota on May 1-3, 2008. (Photo courtesy of the Fairborn High School Media Team)

The Power Puzzle challenge required students to do an energy audit of a building in their community and develop ways to change and improve the building's energy usage. The students then presented their findings to the judges during the competition. Additionally, the teams performed robot table missions on competition day that required them to use their robots to perform energy-related tasks such as delivering solar panels to houses, setting up wind turbines on properties, and replacing oil burning trucks with electric cars, just to name a few.

The teams were scored on their performance at the robot table, the quality of their project, their teamwork, and their technical presentation.

According to Skip Gridley, Air Vehicles engineer and FLL judge advisor, this year's group of students performed better than ever.

"This year, we had three teams with perfect scores on the table. Fifteen out of the 48 received excellent ratings in all areas, whereas last year, there were only three. The teams just seem to get better every year," Gridley says.

Gridley adds, "The quality of the program is great. It is headed up by the Educational Outreach Office. I give them all the credit. They hold coaching seminars, they do a lot of training, they have kickoff events so that kids can find out how to do a good project, and they find experienced coaches to mentor. We've had a really high-quality program since its inception, and every year it just seems to get better and better."

The Green Berets from West Chester, Ohio perform the robot table challenge. (Photo courtesy of the Fairborn High School Media Team)

Additionally, the student participants themselves also contribute to the excellence of the program. Gridley says this year's state champions, The Energizer Monkeys (from Reading), actually sent their team members to help other teams, and one of the team's members won a Youth Mentor Award.

Many Air Vehicles employees devoted much of their time and energy to the program as well. Along with Gridley, Steve Scherr, Joe Harrington, Bonnie Schwartz, Dave Schwartz, Matt Goettke, and Bruce Cox served in various judging, refereeing, and technical roles. Tom Dermis and Stephanie Flanagan coached teams, and other RB employees have children who participate in the event.

According to Kathy Levine, Wright Patterson's Educational Outreach Office Robotics Program Manager and FLL director for Ohio, volunteers from throughout

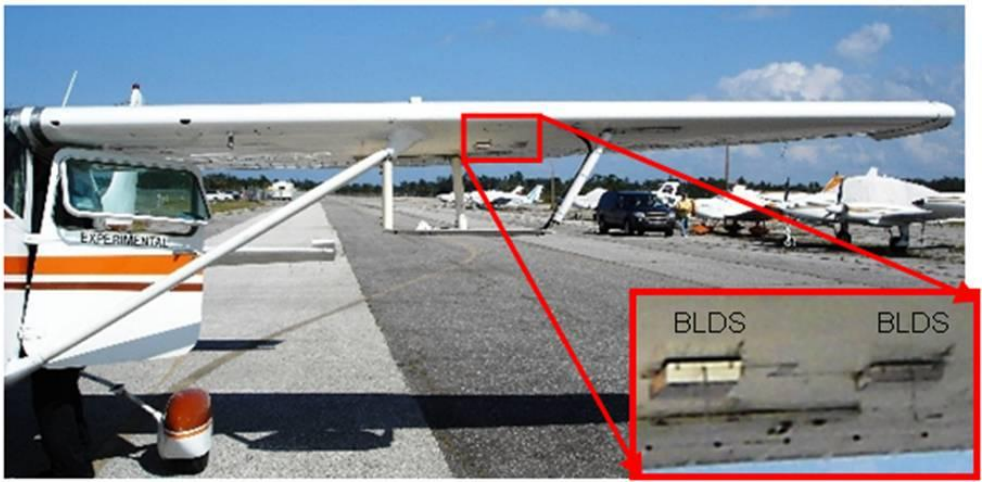
Wright-Patterson and the surrounding community were integral to the event's success.

"Here at Wright Patterson Air Force Base we understand the importance of giving back to the community, as evidenced by the more than 130 volunteers who came out to support the FLL Ohio State Championship. FIRST LEGO League is an important educational program and the time invested by our volunteers is time invested in a powerful future for our country. These children will be our next scientists, engineers and civic leaders. We couldn't deliver this program without our volunteers," Levine says.

Air Vehicles participants will likely remain busy with FLL for some time to come. Gridley will be attending the FLL World Festival tournament in Atlanta later this year, and in May 2009, Dayton will host the FLL U.S. Open Championship, an event that is sure to bring out a large RB presence. According to Gridley, most RB participants also volunteer at regional events throughout the course of the season.

"Once you get involved, you get hooked," Gridley says.

AFRL researchers test Boundary Layer Data System



The Boundary Layer Data System, attached to the wing of a test aircraft in preparation for the latest round of flight tests.

AFRL researchers, in conjunction with Northrop Grumman and Washington State University, completed a series of flights to test the recently-developed Boundary Layer Data System (BLDS-A).

The BLDS-A is an instrument designed to characterize the boundary layer of an aircraft. The boundary layer is the thin layer of air at the surface of the aircraft. At this region, airflow over a surface transitions from laminar (smooth) to turbulent. Understanding the boundary layer properties is critical in understanding how an aircraft performs, especially in terms of lift and drag.

The BLDS-A is a small, lightweight, self-contained unit that can be attached to virtually any location on an aircraft surface with a removable structural adhesive. All power, data acquisition, and data storage is contained within the instrument, which means there is no need to route pressure tubes or instrumentation wires to the device. The small size of the unit allows it to accurately collect data while in flight without interfering with the operation of the aircraft.

To test the BLDS-A, researchers attached the device to a Northrop Grumman-owned Cessna TU206 aircraft. A total of eight sorties were flown, during which the BLDS-A successfully collected boundary layer data. The data was then taken to be analyzed by researchers at WSU.

In addition to gathering data, the flight test confirmed the functionality of the BLDS-A system, which will be used in the Sensorcraft wing flight test to be conducted in Fall 2008 on Scaled Composite's White Knight Aircraft. The data gathered from the BLDS-A flight test will help researchers better understand the boundary layer behavior on the Sensorcraft wing test article to be flown in this upcoming test.

The BLDS-A flight test is part of Northrop Grumman's Aerodynamic Efficiency Improvement program, which seeks to develop and test aircraft structural and aerodynamic technologies for future intelligence, surveillance, and reconnaissance vehicles such as the Sensorcraft concept.

AFRL tests potential vehicle designs

AFRL researchers recently tested six different hypersonic vehicle configurations to learn about the flight characteristics of potential reusable vehicles.

One of six hypersonic vehicle configurations recently wind tunnel tested as part of the High Alpha Reusable Launch Vehicle (RLV) Aerodynamic Configuration Development program.

The series of tests, conducted at the Arnold Engineering Development Center's Hypervelocity Tunnel 9, is part of the High Alpha Reusable Launch Vehicle (RLV) Aerodynamic Configuration Development program. The tests were designed to gather data on the different vehicle configurations and to validate the computational fluid dynamics (CFD) codes used to predict airflow around the vehicles.

Of the six vehicle configurations tested, five were developed by the AFRL High Speed Configurations team. The other was the Hot Eagle design developed by the Conceptual Research Corporation. All of the configurations are reusable second-stage hypersonic vehicle designs.

Each of the configurations was tested at speeds of Mach 14, at 30-75 degree angles of attack. Under these test conditions, researchers gathered stability, pressure, and heat flux data for each of the vehicle designs.

All tests were completed successfully. The data gathered will be used to help modify the computational modeling processes and approaches, and to identify the areas in which CFD codes could not accurately model the airflow. Additionally, the data will be used to assist AFRL's in-house reentry vehicle design studies. The tests also provided new knowledge in the field of hypersonic flight, since high angle of attack data above 50 degrees on complex configurations was not previously available in current literature.

High Alpha RLVs are reusable space access vehicles that could potentially carry payloads into space and return to be used again quickly and at increased savings in money and manpower. These vehicles may also provide benefits in terms of increased reliability and safety.

Frank Witzeman was the recipient of the 2007 AFRL Supervisory Award.

Frank Witzeman receives AFRL Supervisory Award

Air Vehicles Design and Analysis Methods Branch Chief Frank Witzeman was recently honored with the AFRL Supervisory Award for his outstanding guidance and innovative approaches to branch leadership.

Mr. Witzeman was presented the award at the annual AFRL Awards Banquet, held February 27, 2008, at the Wright-Patterson Club and Banquet center.

During his tenure as the Design and Analysis Methods Branch Chief, Mr. Witzeman has worked to achieve a more unified and focused branch. He encouraged employees to identify their main strengths in order to concentrate on areas in which the branch could add the most value to the Air Force Research Laboratory.

Additionally, Mr. Witzeman worked to reinvent his branch's image by focusing on personnel achievement and recognition. He created a focus on striving for and achieving award nominations and encouraged branch leaders to highlight employee achievement. To facilitate this goal, Mr. Witzeman developed a more efficient process for the creation of award nominations, greatly streamlining the current writing procedures.

Mr. Witzeman encouraged branch employees to work as a unified team, excelling through times of change, rather than resisting them. He also solved a number of personnel issues and coached emerging leaders and supervisors to better understand the impact of their actions on others.

With a focus on the Air Force Core Values of Integrity, Excellence, and Service Before Self, Mr. Witzeman promoted the treatment of others with dignity and respect. He worked to invigorate his branch and promote a positive attitude.

"Mr. Witzeman's expert leadership has been invaluable to our organization. Under his direction, the branch has seen a revitalization in terms of confidence, morale, and overall excellence. He is truly deserving of this tremendous honor," says Mr. John Bowlus, Air Vehicles Structures Division Chief.

Martha Hall wins AFRL Senior Admin Excellence Award

Air Vehicles Control Sciences Division Administrative Assistant Martha Hall was honored with the Senior Administrative Excellence Award at the AFRL Awards Banquet, held Wednesday, February 27, 2008, at the Wright-Patterson Club and Banquet Center.

Ms. Hall received the award for her outstanding administrative support as well as her volunteer activities and enthusiastic team spirit.

In addition to her regular office management duties, Ms. Hall has served as the Control Sciences Division's expert on Livelink, promoting the use of the portal for records management and file sharing. Additionally, she leads records management for the division, ensuring paper and electronic records are accurate and complete.

A highly-active event planner, Ms. Hall organizes and promotes a number of directorate events, including the annual picnic, Halloween and Thanksgiving festivities, and Holiday party and decorations contest. She also initiated a series of "Cafeteria Appreciation Days" to increase traffic for the Building 45 Canteen.

Martha Hall was honored with the AFRL Senior Administrative Excellence Award

Ms. Hall developed and organized the Lifeskills series of lunchtime learning classes. These classes offer participants the opportunity to network with fellow employees and learn valuable skills for personal enrichment. Ms. Hall personally recruits instructors from throughout the Wright-Patterson community and opens the classes to any interested participant.

Ms. Hall serves a leader and a mentor within the division, the directorate, and throughout her local community. She has trained a number of new personnel and serves as the division expert on administration of Government Purchase Card accounts. Additionally, she renovated the Control Science Division conference room and updated the division office area. Locally, Ms. Hall serves on the Fairborn Beautification Committee to improve the cultural and civic environment within her hometown.

"Ms. Hall exhibits an infectious enthusiasm and a willingness to take on any task. She is a highly-valued asset, both to our division and the directorate as a whole," says Control Sciences Division Chief Jim Kocher.

In addition to this honor, Ms. Hall was the 2007 recipient of the Doris C. Mooney Award for administrative and clerical support within the Air Vehicles Directorate.

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

May 2008

Dr. Mark Haney honored with Foulois Award

AFRL's Air Vehicles Directorate recently honored Dr. Mark Haney with the Benjamin D. Foulois Award for developing a better understanding of the behavior of aircraft structures under high thermal loads and proposing a new method of design.

Dr. Haney's research centers on aircraft that experience high thermal loads, such as those with engine exhaust-washed structures from embedded engines. These aircraft often experience structural problems such as cracking or buckling from thermal expansion. These deformities can cause greater problems, such as increased visibility to radar.

Dr. Mark Haney was honored with the Foulois Award for his work with aircraft structures.

Traditionally, structural engineers have attempted to solve this problem by adding additional material to the potential failure locations, a practice known as “stiffening.” While stiffening works well on many types of aircraft, Dr. Haney realized that it is often not the best technique for aircraft that encounter heavy thermal loads. In fact, traditional stiffening techniques can often increase stress levels in the adjacent structures and lead to structural failure.

Dr. Haney responded to this problem by developing an “intelligent stiffening” method that takes into account a vehicle’s complex geometry and reinforces the appropriate areas without inducing overly large loads into surrounding structures.

Dr. Haney applied his intelligent stiffening technique to the B-2 aft deck, which has experienced cracking at less than ten percent of its intended life because of its current design. He applied his research to develop an independent, alternative B-2 aft deck design that is able to withstand thermal loads without buckling and cracking.

If adopted, Dr. Haney’s newly-designed aft deck stiffening technique could eliminate the need for one of the two future planned deck replacements, saving the Air Force an estimated $100 million and increasing the availability of the B-2 fleet.

Dr. Haney’s research has far-reaching benefits beyond the B-2. His methodology can be applied to virtually any aircraft that experiences extreme thermal loading. In fact, his thermal structures expertise has been enlisted by the joint Air Force/ DARPA hypersonics demonstration program known as Blackswift.

The Foulois Award is named for Benjamin Foulois, who enlisted in the Army in 1898 and went on to make great contributions to the Army Air Corps, including participating in the Wright Flyer No. 1 Trials in 1909 and developing the first airplane radio receiver in 1911. Prior to his retirement as a Major General in 1935, he was the first aviator to be Chief of the Army Air Corps. AFRL established the General Benjamin D. Foulois Award in 1965 to perpetuate this pioneering aviator’s exploratory spirit. This award honors AFRL engineers and scientists who made the most significant contributions to aerospace technology during the previous year.

David Adamczak (left) and Dr. Roger Kimmel received the Courtland D. Perkins award for developing an affordable approach to flight testing in the hypersonic regime.

AFRL researchers Adamczak, Kimmel receive Perkins Award

AFRL engineers Dr. Roger Kimmel and David Adamczak of the Air Vehicles Directorate were recently awarded the Courtland D. Perkins award for developing an affordable approach to flight testing in the hypersonic regime. Their research has been applied to the Hypersonic International Flight Research and Experimentation (HIFiRE) project.

HIFiRE seeks to explore the characteristics of hypersonic flight through the launch of experimental payloads and the evaluation of data acquired as the payloads reach the hypersonic regime and return to earth. Hypersonic flight speeds are defined as speeds of Mach 5 and above.

Typically, researchers have been limited in their ability to fully study hypersonic phenomena through traditional methods. Hypersonic wind tunnel tests often fail to accurately replicate the details of the flight environment, and flight tests frequently result in data with exceedingly large uncertainty bounds. By launching experimental

vehicle configurations to hypersonic speeds and recording flight data, researchers are able to study hypersonic flight under more realistic conditions.

Kimmel and Adamczak helped to ensure the success of the HIFiRE program by developing and designing the vehicle's on-board experiment for use in the first HIFiRE launch. Additionally, they performed thermal and structural analysis to demonstrate the robustness of the design when subjected to a hypersonic thermal environment.

The two researchers also overcame numerous challenges to incorporate instrumentation onto the vehicle capable of withstanding the harsh hypersonic environment and capturing high-quality data.

The research performed by Kimmel and Adamczak will help to advance the HIFiRE program and further research into hypersonic reusable launch vehicles.

AFRL established the Dr. Perkins In-House Engineering Award in 1990 to perpetuate the spirit of excellence and innovation exemplified by Dr. Courtland D. Perkins. Dr. Perkins began his career as an entry level engineer for the Aircraft Laboratory at Wright Field and later became Assistant Secretary of the Air Force for Research and Development, Air Force Chief Scientist, Senior Scientist of the Air Force Scientific Advisory Board, and President of the National Academy of Engineering. This award honors the engineers or scientists making the most significant in-house contribution to aerospace technology.

AFRL researchers test Directed Energy Beam Improvement system

AFRL researchers recently completed testing of the DEBI-BATL turret model with active flow control devices installed. DEBI-BATL stands for Directed Energy Beam Improvement using Binary Control for the Advanced Tactical Laser.

The DEBI-BATL program seeks to reduce aero-optic interference around an aircraft turret. Aero-optic interference describes the distortion a beam (such as a laser beam) experiences as a result of airflow turbulence around an air vehicle in flight. This interference can adversely affect communications, targeting, and other aircraft systems. Even a small distortion at the beam's source can lead to a large optical distortion over a long distance.

To help combat this aero-optic interference, AFRL researchers are testing the placement of active flow control devices in strategic positions around a turret model. These devices are small pulsating jets that change the air flowfield around the vehicle, suppressing turbulence.

The DEBI-BATL turret model, in the AFRL Subsonic Aerodynamic Research Laboratory wind tunnel during the most recent round of tests. (AFRL photo by Servane Altman)

In this most recent series of tests, researchers sought to determine the optimum configuration of the flow control devices to produce the maximum reduction in aero-optic interference. The turret model was placed on the side wall of the AFRL's Subsonic Aerodynamic Research Laboratory (SARL). The flowfield around the turret was measured using several methods, including particle image velocimetry (PIV), hot wire, and static and sound pressure sensors. These methods allow researchers to accurately determine the airflow pattern around the test object. The turret was tested at various angles, at speeds from Mach 0.1 to Mach 0.5.

All tests were completed successfully, and data was recorded to help the AFRL and Boeing team prepare for an upcoming test, scheduled for spring 2008. This upcoming test will measure the effectiveness of active flow control devices in controlling aero-optic distortion for high-energy laser applications.

High-energy lasers could potentially be integrated onto aircraft for use as tactical weapons. It is essential to minimize the beam aero-optic distortions in order to maximize the effectiveness of the weapon system.

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

June 2008

COUNTER team receives AFMC Science, Engineering and Technical Management Award

The multi-organizational COUNTER team received the 2008 AFMC Science, Engineering and Technical Management Award for their efforts in enabling the use of small and micro UAVs to provide increased situational awareness in urban areas (AFRL photo).

AFRL's Cooperative Operations in UrbaN TERrain (COUNTER) team was recently honored with the 2008 AFMC Science, Engineering and Technical Management Award for their efforts in enabling the cooperative use of small and micro Unmanned Aerial Vehicles (UAVs) for intelligence, surveillance, and reconnaissance (ISR) missions.

The AFMC award recognizes the efforts and achievements of the top US Air Force Scientists who make noteworthy and/or significant contributions to technology and/or solving technical problems in sustainment, testing, training, or advancement of Air Force systems.

The COUNTER team received the award based on their successful research efforts to use small and micro UAVs to provide increased situational awareness in an urban environment. Recent team efforts have successfully enabled a single operator to optimally manage multiple small unmanned aerial vehicles

working in cooperation. The team demonstrated the game-changing utility of these UAVs for ISR missions in the 2007 Talisman Saber US-Australia joint warfighting exercise.

According to newly-appointed COUNTER program manager Mark Mears, the success of the program is the result of a highly-professional, multi-organizational team effort.

“The COUNTER program is an example of what can be accomplished by a team of people who are individually outstanding and who unselfishly reach across organizational boundaries with mutual respect, working tirelessly toward a goal,” says Mears.

The COUNTER team during the award period consisted of Maj Nidal Jodeh, Dr. Dave Gross, Steve Rasmussen, Jeff Hill, and Dr. Raymond Holsapple of the Air Vehicles Directorate, and Gregory Feitshans, Jason Davis, and Allen Rowe of the Human Effectiveness Directorate.

(WPAFB 08-3383)

This tower, built by the Tower Heights Middle School Science Olympiad team, carried 3,389 times its own weight, winning the team the tower building championship at the State Science Olympiad competition.

Air Vehicles engineer guides Science Olympiad team to victory

Air Vehicles engineer Michael Falugi recently played a big role in the success of a group of young students, coaching the Tower Heights Middle School team to victory in the Ohio Science Olympiad Championships, held April 12 at the Ohio State University.

The Science Olympiad is an organization that promotes interest in science among young people. Each year, students from grades K-12 compete in local, regional, and state events, much like academic track meets. Each tournament consists of 23 team events, covering a broad range of scientific interests.

Michael has served as a volunteer Science Olympiad coach for the Tower Heights Middle School for the past two years, a role in which he mentors the students and helps them develop an understanding of the basic principles of structural engineering. This year, as tower building coach, he advised his team on the proper methods of building a lightweight, balsa wood tower with tremendous weight-bearing capacity.

To help the team prepare for their numerous tournaments, Michael advised and evaluated the students’ tower designs, coaching them on the elements of good structural design. The team would then take one of their towers to a local invitational tournament, where their design would be put to the test. After each local tournament, the team would then assess their performance and, with Michael’s help, find ways to improve on their design.

The team took their accumulated knowledge and put it to good use in the state championships, where they competed in a field of 40 teams from throughout the state. Their preparation paid off, as the team took first place in the tower building competition, building a structure that carried a record-breaking 3,389 times its own weight.

For their efforts, the team was presented with Olympic-style medals. According to Michael, the team was also greeted enthusiastically upon their return home.

“As the bus returned to the school, all the parents were lined up to greet the kids. When they got off the bus, everyone clapped and cheered,” says Michael.

For the team, the victory was a great achievement, but Michael says the kids get a lot more out of the experience than just a medal. “We are doing this to try to build the scientific knowledge base among our youth. If we get them interested in science now, they can go on to do great things in their careers,” he says.

Michael plans to continue in his Science Olympiad volunteer efforts. He has already agreed to serve as a coach for next year’s team.

(WPAFB 08-3073)

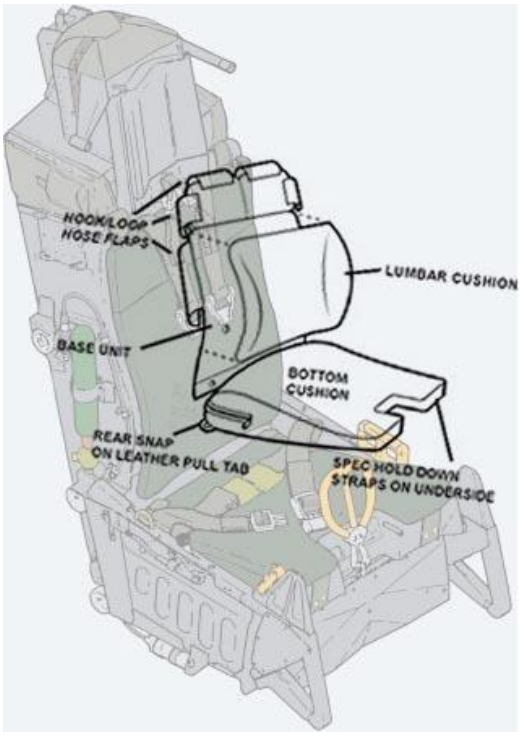
AFRL Air Vehicles Directorate participates in Pilot Feedback Study

AFRL Air Vehicles engineers recently teamed up with the 711th Human Performance Wing to conduct a feedback study aimed at improving flight comfort levels using advanced seat cushion options for pilots in ejection seat aircraft.

The goal of the study is to reduce the amount of discomfort and improve mission effectiveness for pilots who conduct long flights. To accomplish this, several seat cushion prototypes, including an air bladder seat cushion, are being studied.

To get pilot feedback on the seat cushions, 711th Human Performance Wing engineers turned to the Air Vehicles Directorate for simulator support. By using one of the Infinity Cube Simulators, the pilots were able to fly representative missions in a simulated cockpit with a large field of view that recreates the experience of sitting in an actual aircraft.

During the simulations, eleven different pilots flew four Instrument Landing System (ILS) landings with each seat cushion concept. A different seat cushion was tested and evaluated with each mission. Air Vehicles engineers collected and evaluated flight performance data, and the pilots filled out questionnaires assessing each seat cushion prototype after the mission.



An example of a seat cushion concept recently tested by pilots in the AFRL Infinity Cube Simulator.

Pilot feedback, the measured results from these tests, and other tests being conducted by the 711th Human Performance Wing will be used to help determine which seat cushion provides the greatest benefit to the pilot for long flights and meets ejection seat aircraft requirements.

(WPAFB 08-2976)

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

July 2008

AFRL completes latest Sense and Avoid flight testing

The Sense and Avoid (SAA) test platform flies above the Niagara International Airport during the recent Multiple Intruder Autonomous Avoidance flight test. The test vehicle is a Calspan Learjet equipped with the electro-optical cameras, AI-130 radar, and airspace deconfliction technologies that make up the SAA system (Calspan photo).

AFRL engineers, in conjunction with Northrop Grumman and Calspan Flight Research, recently completed the latest in a series of flights to test autonomous airspace deconfliction capabilities for unmanned aircraft systems (UAS).

The Multiple Intruder Autonomous Avoidance (MIAA) testing took place at the Calspan facilities at Niagara International Airport in New York. The goal of this series of flights was to record data from the multiple, dissimilar sensors that make up the SAA system.

The SAA system includes three electro-optical (EO) based cameras and a low-power radar coupled with decision logic and autonomous maneuvering technology. The SAA system also incorporates Traffic Collision Avoidance System (TCAS) and Automatic Dependent Surveillance Broadcast (ADS-B) for detection and avoidance of similarly-equipped aircraft.

Currently, UAS lack airspace deconfliction capabilities, preventing them from being able to operate freely in national and international airspace. The goal of the SAA team is to equip UAS with autonomous airspace deconfliction capabilities, one of several necessary steps toward achieving airspace integration. Among the aircraft that could benefit from SAA technology are the Global Hawk and Predator UAS.

The flight testing involved head-on, crossing, ascending, overtaking, and descending encounters. Also flown were trail formation flights with various levels of background clutter (such as clouds, ground, and water) and obscuration (such as rain and haze). EO, radar, and TCAS data were recorded that will be used to further refine the sensors and evaluate the SAA target correlation algorithms. The information gathered from the testing will also be used in developing and refining simulations.

Two more rounds of MIAA flight activity are planned for Nov 2008 and Apr 2009. The ultimate goals are to demonstrate the ability to detect and track multiple aircraft on potentially conflicting paths with the test platform, and to maneuver as appropriate to safely pass well clear of the conflicting aircraft and avoid collisions.

The SAA team is made up of engineers, pilots, technicians and mechanics from AFRL, Northrop Grumman (prime contractor), Calspan Flight Research (flight test), ICx (surrogate AI-130 airborne detection radar),

Defense Research Associates (EO detection/tracking system), Bihrle Applied Research (algorithm development and simulation), FAA Hughes Technical Center (flight test aircraft, precision positioning information, technical advisors), and C2Projex (real-time situation awareness monitoring).

(WPAFB 08-3516)

Joe Harrington honored with Gold Presidential Volunteer Service Award

by Kathleen Schweinfurth, Educational Outreach Office

Joseph Harrington, former deputy branch chief of the Future Capability Branch, volunteers a great amount of time to others, including work with the state of Ohio FIRST LEGO League.

The Wright-Patterson Educational Outreach Office celebrated National Volunteer Week 2008 with the announcement of seven Presidential Volunteer Service Awards (PVSA) earned by individuals and families who have provided volunteer support to the program during 2007.

The PVSA recognizes the valuable contributions of volunteers nationwide who are answering the President's call to serve others through their current volunteer activities or lifetime service. As one of several Certifying Organizations on base, the Educational Outreach office identifies eligible recipients, verifies their service hours and distributes the award to outstanding volunteers who perform at least 25% of their volunteer service in support of Educational Outreach activities. Recordkeeping can be as simple as a hand-written log or computer spread sheet and eligibility for this award runs on a calendar year basis (January-December).

Receiving the top-level "Gold" Award for over 500 volunteer service hours was Joseph Harrington, formerly of the Air Vehicles Directorate. Mr. Harrington is a multi-talented volunteer for the State of Ohio FIRST LEGO League (FLL) program which is run by the Educational Outreach Office. He has served as regional lead referee and assisted with field set up. He also volunteers with the Boy Scouts of America and area youth sports.

For more information on the PVSA program and how you can begin tracking your volunteer service hours for 2008 awards, contact the WPAFB Educational Outreach Office at 904-8622 or email wpafb.educational.outreach@wpafb.af.mil.

Mary Bedrick of the Air Force Weather Agency was named Senior Civilian of the Quarter. Mary works closely with many Air Vehicles scientists and engineers, providing meteorological expertise for research activities.

AF Weather Agency's Mary Bedrick named Senior Civilian of the Quarter

Mary Bedrick of the Air Force Weather Agency (AFWA) was recently named Senior Civilian of the Quarter for the first quarter 2008.

Ms. Bedrick is part of the AFWA/Detachment 3 R&D Staff Meteorology Section, a team of advanced-degreed meteorologists at Wright-Patterson AFB who provide environmental support and services to research and acquisition scientists, engineers, and program managers. She works closely with many Air Vehicles personnel on such projects as the Falcon Hypersonic Test Vehicle, COUNTER, and Laser Gunship. As part of her duties, Ms. Bedrick regularly provides vital meteorological

expertise to scientists and engineers, informing them of environmental and atmospheric conditions that are often crucial to the success of a research event.

The guidance Ms. Bedrick provides helps researchers understand how weather-related conditions will impact testing events and critical research activities, ensuring that they are performed at the right time and under the proper environmental conditions. Her guidance can prove invaluable, allowing researchers to manage schedules to coincide with favorable weather conditions, saving the Air Force time and money.

Ms. Bedrick's job requires her not only to have extraordinary meteorological skills, but also an understanding of the research projects themselves and how the weather can affect them.

According to Major Kenneth Cloys, Chief of the R&D Staff Meteorology Section, Ms. Bedrick handles all customer requests in a professional and enthusiastic manner, whether the need is for a detailed climate analysis or for a simple weather forecast.

"Mary is a highly-motivated, multi-talented individual who consistently provides an exceptional level of support to AFRL," says Maj Cloys.

Ms. Bedrick was selected for this prestigious honor out of approximately 139 senior civilians working for the AFWA, winning awards at the Det 3 level, the AFWA/A8 division level, the AFWA A-staff level, and finally, for the entire AFWA.

(WPAFB 08-3794)

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

August 2008

Skip Gridley honored with FIRST LEGO® League World Festival Volunteer Award

Like many others, AFRL engineer Skip Gridley volunteers much of his time for charitable causes. Few, however, go as far above and beyond.

Mr. Gridley, Air Vehicles Directorate Propulsion Integration Team Leader, was recently one of only two people worldwide to be presented with the annual *FIRST* LEGO® League (FLL) World Festival Volunteer Award. *FIRST* is an acronym that translates into For Inspiration and Recognition of Science and Technology. The award honors volunteers who dedicate an extraordinary amount of time and effort toward the *FIRST*

Skip Gridley of the AFRL Air Vehicles Directorate was honored with the *FIRST* LEGO® League World Festival Volunteer Award for his innovative judging software and countless volunteer hours donated to the organization.

LEGO® League program.

The *FIRST* LEGO® League program is designed for children ages 9 to 14, to spark an interest in science and technology. Each year, children who participate in the local, state, and national FLL competitions build robots using LEGO® components and demonstrate problem-solving and teamwork skills before a panel of judges.

Mr. Gridley has been actively involved with the program since 2002 and has served in many different capacities, including judge, judge advisor, referee, and most recently, software designer.

This year, Mr. Gridley was asked to travel to the *FIRST* LEGO® League Power Puzzle World Festival, held in Atlanta, to serve as co-judge advisor and to facilitate the use of the judging software he developed to simplify the judging process. It was there that he was presented with the award.

"I am honored to be singled out from among the numerous FLL volunteers who work tirelessly to provide children with opportunities to learn about engineering, science, computers, and math, and to help them develop problem solving and teamwork skills needed to compete in the future business world," says Mr. Gridley. "I am rewarded enough when I see the spark in a kid's eye when he or she describes how much fun he or she has had while learning about autonomous robots or alternative energy. I am humbled to receive an award for having so much fun!"

Mr. Gridley's software assists FLL judges in scoring teams accurately and fairly according to all the scoring criteria. The software also aids the judges in timekeeping and overall organization, compiling all individual and team scores and assisting judges in making their final nominations for awards and recognition. In addition, the software creates certificates and even helps write the script for the awards ceremony.

Best of all, Mr. Gridley donated the software to FLL, free of charge.

According to Mr. Gridley, the creation of the software was a labor of love. After working with FLL for some time, he saw the need to assist the judges and standardize the scorekeeping.

Mr. Gridley's software has been a big hit with FLL, first being used in competitions throughout Ohio and then being rolled out in competitions worldwide.

Mr. Gridley has found himself traveling throughout the world, to Europe, Asia, and throughout North America, to provide support for his new software. As a result, he recently accepted a new volunteer position as Global Judge Advisor. In this role, Mr. Gridley will continue to provide support and institute new improvements for FLL.

The tremendous effort Mr. Gridley devotes to FLL is worth it, he says, to promote an interest in science and technology among young people.

For more information on FLL, visit www.firstlegoleague.org.

AFRL COUNTER team wins Air Force Outstanding Scientist Team Award

The award-winning COUNTER team. Front row, left to right: Major Nidal Jodeh, Phillip Chandler, Raymond Holsapple, Dave Gross, Jeff Hill, Jason Davis. Back row, left to right: Gregory Feitshans, Steve Rasmussen, Allen Rowe.

The Cooperative Operations in Urban Terrain (COUNTER) team was recently honored with the Air Force Outstanding Scientist Team Award for their research into using small and micro Unmanned Aerial Vehicles (UAVs) to seek out threats in urban terrain.

The award recognizes the efforts and achievements of the top Air Force scientists who make noteworthy and/or significant contributions to technology and/or solving technical problems in sustainment, testing, training, or advancement of Air Force systems.

The COUNTER project seeks to use UAVs for intelligence, surveillance, and reconnaissance missions. Small UAVs fly at altitudes of 1,000 to 3,000 feet, collecting video images and nominating potential threats for closer inspection. Micro UAVs are then launched to perform a closer inspection of the areas of interest to determine if actual threats exist.

Data from the UAVs is monitored by a human operator, using the Vigilant Spirit Control Station. By using the real-time data collected by the UAVs and sent to the control station, the operator can then decide which features within the environment warrant further action.

The UAVs used in COUNTER are ideal for surveying urban terrains, where potential threats can often be obscured by buildings or ground clutter.

The COUNTER team has recently engaged in a number of flight tests and demonstrations, including a test that successfully enabled a single operator to optimally manage multiple small UAVs working cooperatively. The team also participated in the 2007 Talisman Saber US-Australia joint warfighting exercise.

The team was previously honored with the AFMC Science, Engineering and Technical Management Award for their efforts.

“This is a tremendous honor for the COUNTER team,” says Dr. Mark Mears, AFRL COUNTER Program Manager. “This diverse, multi-organizational team has successfully worked together to demonstrate fieldable technologies for the warfighter and has used their experiences to improve the definition of areas for UAV control research.”

The COUNTER team during the award period consisted of Maj Nidal Jodeh, Dr. Dave Gross, Mr. Steve Rasmussen, Mr. Jeff Hill, and Dr. Raymond Holsapple of the Air Vehicles Directorate, and Mr. Gregory Feitshans, Mr. Jason Davis, and Mr. Allen Rowe of the Human Effectiveness Directorate.

The team members were presented with the award at a ceremony held at the National Museum of the United States Air Force on September 3, 2008.

(WPAFB 08-5193)

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Vehicles News and Accomplishments

October 2008

AFRL Air Vehicles researchers earn AFOSR Star Team status

The Air Vehicles Directorate's Computational Fluid Dynamics Star Team members. Back row, left to right: Joel Malo-Molina, Raymond Gordnier, Jonathan Poggie, Scott Sherer, Philip Morgan. Front row: Eswar Josyula, Datta Gaitonde, Miguel Visbal, Michael White, Donald Rizzetta. (AFRL photo)

The Computational Fluid Dynamics (CFD) Team of the Air Vehicles Directorate Computational Sciences Center of Excellence recently received the Air Force Office of Scientific Research (AFOSR) Star Team Award for their internationally-recognized research and technical leadership.

Dr. Brendan Godfrey, AFOSR Director, presented the team with the award. The team is made up of members of the Multi-Disciplinary and High-Speed groups within the Aeronautical Sciences Division.

The CFD team members are highly regarded for their pathfinding research and have received numerous national and international awards for their contributions to the fields of micro air vehicles, high-altitude long-endurance systems, high-speed flight, and access-to-space. Together, they have been awarded three AFRL Fellowships, seven Gen Benjamin D. Foulois awards, two Outstanding Scientists of Dayton awards, and numerous AFRL, DoD, and other technical awards.

Additionally, the team members serve in technical leadership roles in a number of professional organizations and are frequently invited to give talks on their respective topics of expertise. From 2005 to 2007, the team published more than 90 articles that appeared in numerous technical journals or were presented at various national and international conferences.

AFOSR presents the Star Award annually to select teams of scientists and engineers who have achieved world-class status and sustained excellence in their chosen research areas. The award promotes in-house research excellence and highlights the essential role that basic research plays within the Air Force.

Team Members include Dr. Miguel Visbal (Team Leader and AFRL Fellow), Dr. Datta Gaitonde (Team Leader and AFRL Fellow), Dr. Raymond Gordnier (AFRL Fellow), Mr. Eswar Josyula, Mr. Joel Malo-Molina, Dr. Philip Morgan, Dr. Jonathan Poggie, Dr. Donald Rizzetta, Dr. Scott Sherer, and Dr. Michael White.

(88ABW-2008-0306)

Dr. Mark Haney received the Harold Brown award for his work toward a solution to the B-2 aft deck cracking problem

Air Vehicles Scientist Receives Harold Brown Award

Dr. Mark Haney of the AFRL Air Vehicles Directorate was recently honored with the Harold Brown award, the highest Air Force award given to a scientist or engineer who applies research to a problem in the field.

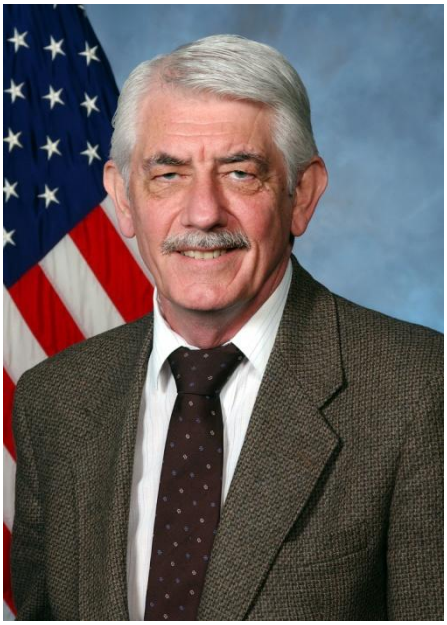
Dr. Haney has made tremendous strides in engineering a solution to the B-2 aft deck cracking problem. Aircraft such as the B-2, which experience high thermal loads, can experience structural problems such as cracking and buckling in the regions where exhaust washes over the structure.

To combat this problem, Dr. Haney developed and proposed an "intelligent stiffening" concept. He discovered that the traditional approach of adding extra material to a structurally weakened area can actually increase the rate of damage to thermally-loaded structures. His intelligent stiffening method takes into account the complex geometry of the B-2 and similar aircraft, reinforcing the appropriate areas without overloading the surrounding structure.

Dr. Haney has provided engineering guidance to the B-2 program office concerning the aft deck for several years. Early in his involvement, he was instrumental in alleviating a severe cracking problem by working closely with the prime contractor to develop a solution that reduced the aft deck stresses while minimizing the load transfer to surrounding structure. This design solution provided a significant savings to the Air Force compared to the existing baseline. To date, this design solution has been implemented in all the aircraft and is regarded as an overwhelming success. This early involvement inspired Dr. Haney to formulate a more general solution to generic constrained thermal structures that he regards as "intelligent stiffening". Dr. Haney's formulation has far-reaching implications and provides the proper context for addressing the design of hot structures. According to Dr. Haney, with the Air Force's renewed interest in hypersonic platforms, this technology will undoubtedly find additional uses.

The Harold Brown award is presented annually to a person who demonstrates significant achievement in research and development that led to, or demonstrated promise of, a substantial improvement in the operational effectiveness of the Air Force.

(88ABW-2008-0378)



AFRL engineer Dave Moorhouse was honored with the prestigious Theodore von Kármán Medal for his service to NATO's Research and Technology Organization.

Dr. David Moorhouse honored with prestigious von Kármán Medal

AFRL Air Vehicles engineer Dr. David Moorhouse was recently awarded the Theodore von Kármán Medal by NATO's Research and Technology Organization (RTO) for his significant contributions during his 35 years of service to RTO and the Advisory Group for Aerospace Research and Development (AGARD).

The von Kármán medal is awarded to those who have demonstrated exemplary service to the enhancement of progress in research and technology cooperation among the NATO nations carried out in conjunction with RTO activities. Only those who have exhibited the highest level of dedication to the RTO are considered for this prestigious international award.

During his tenure, Dr. Moorhouse was a major contributor to the AGARD Flight Vehicle Integration Panel, and the RTO Systems Concepts and Integration and the Applied Vehicle Technology Panels. Dr. Moorhouse authored 23 technical reports/papers and contributed to 32 RTO technical activities, four of them as chairman. As chairman of a Task Group, the technical report produced under his leadership entitled "Flight Control Design Best Practices" was declared as a "must read" at an international conference.

The formal presentation took place in Bucharest, Romania, September 24, 2008. The von Kármán Medal consists of a silver copy of the gold medal presented to Dr. Theodore von Kármán at NATO Headquarters in Paris in July 1962, on the occasion of the Tenth Anniversary of the formation of AGARD.

Some noteworthy past recipients of the von Kármán Medal include:

- Dr. Courtland D. Perkins, former Chief Scientist of the Air Force
- Dr. Frank L. Wattendorf, first director of AGARD
- Prof. Hermann Schlichting, pioneer in fluid mechanics

Dr. Moorhouse presently serves as the Director of the Multi-Disciplinary Technologies Center. Some of his past honors include the Courtland D. Perkins In-House Engineering Award, the AFSC Science and Technology Achievement Award, the Aviation Week and Space Technology Laurels Award, and the Royal Aeronautical Society fellowship.

(88ABW-2008-0659)

Three Air Vehicles scientists named AIAA Associate Fellows

AFRL Air Vehicles engineers Dr. Douglas Blake, Dr. Gregory Reich, and Dr. Michael Stanek were recently named Associate Fellows of the American Institute of Aeronautics and Astronautics (AIAA).

Dr. Douglas Blake serves as the deputy director of the Air Vehicles Directorate. Throughout his career, Dr. Blake has served the military, both as an active member of the Air Force and as a civilian. He has served as both the deputy chief and chief of the Aeronautical Science Division of the Air Vehicles Directorate, and in 2008 took on his current title. As deputy director, he leads the daily operations of the nearly-600 strong Air Vehicles Directorate, executing a $200 million annual budget to develop cutting-edge technology for current and future aerospace systems. Dr. Blake is a renowned expert in aeronautical engineering, holding a bachelor's degree in aerospace engineering from the University of Missouri—Rolla, and both a master's degree and doctorate in aeronautical engineering from the Air Force Institute of Technology.

AFRL Air Vehicles engineers Dr. Douglas Blake, Dr. Gregory Reich, and Dr. Michael Stanek (left to right) were recently named AIAA Associate Fellows.

Dr. Gregory Reich serves as the adaptive structures team lead for the Structures Division. First coming to AFRL in 1992, Dr. Reich has worked on projects in smart and adaptive structures, aeroelasticity, and health monitoring. His current work in adaptive structures is focused on enabling technologies for a wide range of applications, from morphing aircraft to high altitude, long endurance intelligence, surveillance, and reconnaissance platforms and micro air vehicles. A recognized expert on the subject, he has been named Technical Chair for the 2009 Adaptive Structures Conference. Dr. Reich holds a bachelor's degree from Georgia Tech, a master's degree from MIT, and a doctorate from the University of Colorado, all in aerospace engineering.

Dr. Michael Stanek is the technical advisor for the Aerospace Sciences Division. In this capacity, he focuses on the application of flow control to a wide range of problems of interest to the Air Force. Dr. Stanek has worked for AFRL since 1982, first as a member of the Propulsion Directorate before coming to Air Vehicles. Much of Dr. Stanek's work has involved the study of fluid sciences, particularly the unsteady aerodynamic problems encountered in this field. He is an expert in using computational simulation to detect and analyze unsteady flow patterns. Dr. Stanek holds a bachelor's and master's degree in mechanical engineering, both from Pennsylvania State University, and a doctorate in aerospace engineering from the University of Cincinnati.

The AIAA has been the premiere society for aerospace engineers and scientists for over 70 years. It is the world's largest professional society dedicated to the progress of engineering and science in aviation, space, and defense. Associate Fellows are peer-nominated and elected. They must have 12 years of professional experience to be considered for this honor. The AIAA will recognize these individuals at the Associate Fellows Dinner held in conjunction with the 47th AIAA Aerospace Sciences Meeting in January 2009.

(88ABW-2008-0796)

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.

Air Force Research Laboratory commander Maj. Gen. Curtis M. Bedke speaks during the Nov. 19 ribbon cutting at the Facility for Innovative Research in Structures Technology (FIRST).

AFRL dedicates new FIRST lab facility

In a ceremony held here November 19 in Building 65, AFRL Commander MajGen Curtis M. Bedke cut the ribbon on the Facility for Innovative Research in Structures Technology (FIRST), a $3 million in-house experimental validation facility.

FIRST brings together the existing AFRL Advanced Structural Concepts Lab facilities, combining them into one centralized, modern lab located wholly within Building 65. Research has already begun in the facility, and it is expected to be completely operational by January 2009.

MajGen Bedke spoke to the crowd about the history of research that has taken place in Building 65 facilities, saying, "I'm really glad that we're taking this building that's got so much history and…continuing the history. We're adding on to it."

Also speaking at the event was AFRL Air Vehicles Materiel Group Director and AFRL Wright-Site Commander, Col John Wissler.

Col Wissler called the FIRST lab a "leap forward" for the Air Vehicles Directorate.

"It strengthens the in-house research that is the basis of the technologies of tomorrow. From the smallest ideas grow tremendous breakthroughs, and this facility will be the incubator for those ideas." he said.

Some of the many technologies that will be advanced in the FIRST lab include Structural Health Monitoring, Multifunctional Structures, and Thermal Structures, among others.

According to FIRST facility manager Chet Brewster, the technologies developed in the FIRST lab are vital to the existing aircraft fleet as well as aerospace vehicles of the future.

The new FIRST lab updates the AFRL structural experimentation facilities with a standardized infrastructure that allows each individual lab area to be moved around interchangeably if necessary.

According to Brewster, this interchangability makes it easy for researchers to work collaboratively and to keep projects up and running if problems occur.

Designers of the facility took into account not only functionality, but aesthetics as well. The architectural design of the lab reflects elements of Building 65, a facility that has been used for over 60 years to advance technologies from early bombers to space vehicle structures.

According to Brewster, the facility will help advance the collaborative spirit within AFRL and will give researchers the environment they need to explore new ideas.

"We are tremendously proud of this facility and all that it means to AFRL. The research conducted here will help keep us at the forefront of Air Vehicle technology," Brewster says.

Total In-Flight Simulator makes final flight to National Museum of the USAF

A piece of aviation history was retired and transferred to the National Museum of the United States Air Force (NMUSAF) here Nov. 7.

The 1955 Convair C-131 known as the Total In-Flight Simulator (TIFS) made its final flight to the museum, ending a lifetime of over 2500 research flights and a legacy of advancing many of the flight technologies that are integral to today's Air Force. Prior to its retirement, the TIFS was the oldest operating aircraft in the Air Force inventory.

The U.S. Air Force C-131 known as the Total In-flight Simulator made its final flight to the National Museum of the United States Air Force at Wright-Patterson Air Force Base, Ohio, Nov. 7.

After a retirement ceremony at the Niagara Falls International Airport, the TIFS was flown to Wright-Patterson where, after a brief stop at the Area A active runway, it took its final flight to Area B runway adjacent to the world's largest military aviation museum, where it will eventually be placed on display.

For over 30 years, the TIFS served as a highly versatile in-flight simulator, allowing pilots to completely replicate the flight characteristics of many different types and configurations of aircraft. In addition, it facilitated research into flying qualities, avionics, and displays.

According to Vince Raska, AFRL program manager, the research that was achieved through the use of the TIFS provided Air Force program managers with a higher level of confidence in a concept's design, utility, and ultimately, pilot acceptance than would have been possible through ground simulation techniques.

TIFS remained a continuously-active research vehicle, performing simulation flights until its retirement.

The TIFS is a one-of-a-kind simulator, in both capabilities and appearance. One look at the TIFS reveals two very unique features, the sideforce generators on the wings and the dual piggybacked cockpits.

The sideforce generators allowed TIFS to accurately simulate an aircraft's six degrees-of-freedom (pitch, roll, yaw, lift, thrust, and sideforce) all the way to touchdown, something no other US in-flight simulator can do today.

The dual cockpits allowed test pilots to fly from the lower one, which served as the simulation cockpit during testing, while the upper one housed two safety pilots who monitored the simulations and the aircraft's normal controls and systems. These safety pilots were also capable of taking control of the vehicle if needed.

However, the unique qualities of the TIFS extend far beneath the surface. The nose of the TIFS was easily replaceable, giving it the flexibility necessary to simulate many different types of aircraft and actual flight hardware. The vehicle also featured a large cabin, which provided room for additional test equipment or pilot and engineering crews.

The TIFS has played a pivotal role in developing many of the Air Force weapon systems and technologies of today. Over the years, the TIFS has simulated both military and commercial aircraft such as the B-1, B-2, Space Shuttle, and the Boeing Supersonic Transport.

"After talking with many of the people involved with TIFS over the years, it's easy to see that the TIFS provided decades of critical simulation test results vital to aircraft research," says Raska. "It's role in advancing the acceptance of aircraft technologies made it the ultimate tool in the aircraft developer's and researcher's toolbag."

In the coming months, the TIFS will be prepared for preservation at the NMUSAF restoration hangar. A ceremony is planned to be held at the museum when the vehicle is placed on display.

For more information on any of the stories contained in this report, please contact AFRL/RB Marketing at (937) 255-2074, DSN 785-2074, or e-mail AFRL/RB Marketing.