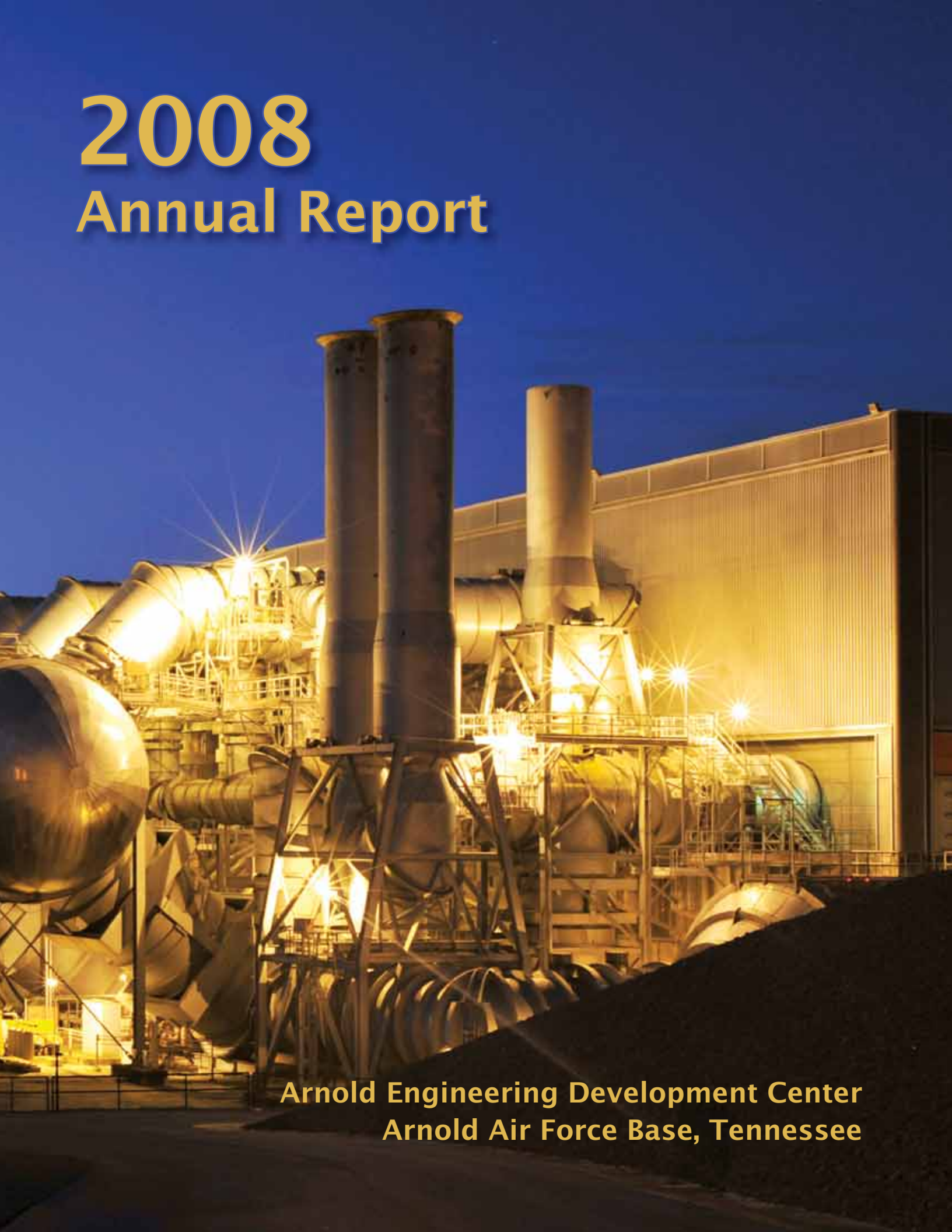
2008
Annual Report



Arnold Engineering Development Center
Arnold Air Force Base, Tennessee

Overview

Arnold Engineering Development Center (AEDC), located at Arnold Air Force Base (AFB), Tenn., is the world's largest and most advanced collection of flight simulation test facilities in the world. AEDC currently operates 58 aerodynamic and propulsion wind tunnels, rocket and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges and other specialized units. Twenty-seven of the center's test units have capabilities unmatched elsewhere in the United States; 14 are unique in the world.

The base, dedicated on June 25, 1951, by President Harry S Truman, sits on 40,000 acres in Middle Tennessee. Since its dedication, AEDC has tested virtually every high-performance aerospace system the Department of Defense has developed.

Arnold AFB is the only active-duty Air Force base in Tennessee.

Our Mission

To provide our customers with the world's most effective and affordable aerospace ground test and evaluation products and services. To ensure AEDC test facilities, technologies and knowledge fully support today's and tomorrow's customers.

AEDC Strategic Objectives

- Satisfy our internal and external customers and stakeholders
- Reduce the unit cost of products and services each year
- Increase our overall external customer business
- Improve productivity each year
- Nurture a high-performance work force

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Commander's Foreword

Col. Arthur F. Huber II
AEDC Commander

It is with pleasure that I present Arnold Engineering Development Center's Annual Report for Fiscal Year 2008. Considering AEDC's almost 60 year history of providing world-class test and evaluation services advancing the state of the art of our nation's aerospace capabilities, this past year may seem like many that have preceded it and indeed, that is largely the case. Nevertheless, in its own right, 2008 was a year where notable achievements were accomplished and the foundation laid for significant advances in the future.

Within this report you will see accomplishments made in fiscal year 2008 with some peeks at what is to come in fiscal year 2009. The report is organized along the lines of our major operating units summarizing each of their undertakings and plans for the near-term future. However, the report is not all-inclusive as it lacks summaries of the accomplishments of the center's directorates (the so-called "2-Letters") as well as many of the activities conducted in cooperation with outside agencies. Examples of these include:

- The Commander's Technical Excellence Initiative and its spin-offs
- Visits by people of note such as the Chief of Staff of the Air Force, General Norton Schwartz, and Dr. Hans Mark, former Secretary of the Air Force
- Activities in coordination with the Arnold Community Council
- Support to higher headquarters initiatives such as the Developing and Sustaining Warfighting Systems (D&SWS) thrust and export of the Capability Analysis and Risk Assessment (CARA) process to the rest of the Air Force Test and Evaluation (T&E) Enterprise
- Support to national test and evaluation facility assessments such as those with our colleagues at the National Aeronautics and Space Administration (NASA)
- Progress in revitalizing the center's strategic planning process

Since AEDC's inception following World War II, AEDC has established a rich heritage of support to DoD, NASA and commercial aerospace firms. Today, AEDC strives to continue providing test and analysis capabilities which measure up to the vision of General of the Air Force Hap Arnold to maintain an Air Force that is second to none.

In that respect, 2008 was no less a banner year and I can confidently state we have stayed the course in our pursuit of General Arnold's vision.

Test before Flight

History of Excellence

General of the Air Force Henry 'Hap' Arnold led the Air Force in World War II.

An Air Force second to none

As World War II was ending in Europe, General of the Army Henry H. "Hap" Arnold and Hungarian-born aerodynamicist Dr. Theodore von Kàrmàn met to discuss America's future requirements for air power. General Arnold, alarmed by the Germans' development of advanced jet aircraft and rockets, asked Dr. von Kàrmàn to convene a group of scientists to work out guidelines for air research for the next 20 years or more.

Dr. Frank Wattendorf, a member of this Scientific Advisory Group, proposed the creation of an Army Air Force center that would provide new directions and major new national capabilities for research and development programs. The primary purpose of the new center was to help the U.S. lead technological developments, not merely keep up with them. In keeping with a larger blueprint for the future of the U.S. Air Force, the Scientific Advisory Group's study "Toward New Horizons" was published in December 1945.

In 1949, Congress passed Public Law 81-415: The Unitary Wind Tunnel Plan Act of 1949 and the Air Engineering Development Center Act of 1949. The laws were enacted to promote the national defense by authorizing a unitary plan for the construction of transonic and supersonic wind-tunnel facilities and the establishment of an Air Engineering Development Center.

Congress selected Middle Tennessee as the site for the new center because of its availability of land, water and power. Construction of the center began in 1950. President Harry S Truman dedicated the center on June 25, 1951, to the memory of General Arnold as the Arnold Engineering Development Center, on what would have been General Arnold's 65th birthday.

At the dedication, President Truman vowed, "Never again will the United States ride the coattails of other countries in the progress and development of the aeronautical art."

In 1954, a J49 engine, the power plant for the B-47 bomber, was tested at a simulated altitude of 30,000 in an AEDC test cell. Today, the B-47 – the predecessor of B-52, B-58 and FB-111, as well as the KC-135 and Boeing 707 – is no longer flying, but serves as a testimony to the beginning – the beginning of America's jet age and the beginning of AEDC's support to the warfighter.

Over the last 55 years, as new military systems have been developed, their components – engines, airframes, stores, sensors and more – have made their way to AEDC facilities.

In the center's jet engine and rocket motor test cells, transonic, supersonic and hypersonic wind tunnels and ballistic and impact ranges, AEDC engineers and scientists have pushed these systems to the edge of simulated flight.

Almost every high performance aircraft flown by the Air Force, Navy and Marines can trace part of its roots to AEDC. The technological advances achieved in the last 55 years at the center have helped put man on the moon, established America's air dominance, deterred aggression, saved American lives on the battlefield and helped prosecute the global war on terror.

From left, President Harry Truman dedicated AEDC in memory of General of the Air Force Hap Arnold June 25, 1951. The Scientific Advisory Group (SAG) presented the idea of developing AEDC to General Arnold. Dr. Theodore von Kármán was the first chairman of the SAG. General Arnold awarded the Meritorious Service Medal to Dr. von Kármán after the SAG's first year.

ISO 9000 / UCI

ISO 9000

Striving to meet the highest levels of quality and customer expectations, AEDC organizations have worked hard to measure up to standards such as ISO 9000, which has become the worldwide benchmark for quality. AEDC's contractor, Aerospace Testing Alliance (ATA), became ISO 9001:2000 certified in July 2004 and was recertified in June 2007 by Det Norske Veritas (DNV). Since being initially certified under the ISO compliant AS9100 standard in 2004, it has become apparent that AEDC cannot retain certification under the Aerospace industry standard and comply with Federal Acquisition Regulations.

As such, the government management of AEDC will adopt the ISO-9000 standard for defining and implementing the center management system and ensure that it meshes seamlessly with ATA's management of AEDC operations. ISO 9000 is a series of five individual, but related, standards on quality management and quality assurance. The ISO system created a series of standards for the exchange of goods and services. The primary objective of a compliant ISO 9000 operation is to have all major processes documented and the interrelationship of these processes identified and reflective of the actual way the organization performs work. The goal of ISO 9001 is to help organizations establish and maintain a management system that drives continual improvement of the company's operation and ensure its ability to satisfy its customers.

Unit Compliance Inspection

In February 2008, a team of inspectors from Headquarters (HQ) Air Force Materiel Command conducted a Unit Compliance Inspection (UCI) at Arnold AFB.

The UCI allows AEDC leadership and HQ AFMC to assess how well the center accomplishes its mission and how each organization performs. In addition, it also highlights AEDC best practices so they can be shared throughout the command.

Overall, the base received a score of 'Excellent' from the inspection team. In addition, no unit was found to rate below 'Satisfactory' and all common core and special interest items were rated 'In Compliance' or 'Satisfactory.'

There were several findings requiring corrective actions; however, by the end of fiscal year 2008 most actions were addressed. The AEDC Inspector General, Lt. Col. Cameron Habbick, worked with the Plans and Programs Directorate to track the status of all findings and close out all corrective actions with HQ AFMC.

Satisfy our internal and external customers and stakeholders

An Arnold Engineering Development Center (AEDC) Public Affairs publication, edited and produced by Aerospace Testing Alliance (ATA), the support contractor for AEDC.

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Alliances

Increase our overall external customer business

When Congress passed a series of legislation between 1994 and 1999, they encouraged industry to use underutilized capabilities at DoD Major Range Test Facility Bases (MRTFB). The law focused on preserving MRTFB capabilities by keeping them in use, reducing and sustaining costs to all MRTFB customers and supporting U.S. commercial competitiveness in the international market. Additionally, the legislation reduced commercial testing prices, bringing them close to government testing rates.

Thus, AEDC transformed from a test center for Air Force customers to a test center serving the DoD, NASA and commercial aerospace industry. More importantly, the transformation allowed the center to form strategic alliances and partnerships with industry and government.

For almost two decades, AEDC has recognized that building such alliances with major aerospace corporations is an important element of its mission.

In a time of declining defense budgets, alliances benefit the center by bringing in non-traditional work, which reduces operating facility costs for the American taxpayer. They also benefit the American aerospace industry by giving them access to facilities unavailable in the civilian sector.

By forming strategic alliances, the center establishes itself as a mainstay in the aerospace industry and ensures the continued development of its most important resource – our work force.

In addition to the alliances AEDC has with major aerospace companies, the center has also signed several local alliances with educational institutions including the University of Tennessee Space Institute (UTSI), Motlow State Community College, Middle Tennessee State University (MTSU), and other civic organizations including the Hands-On Science Center, the Tennessee Correction Academy and the Southern Tennessee Medical Center.

Aerospace Industry Alliances

Pratt & Whitney

On Dec. 16, 1992, AEDC and Pratt & Whitney signed a $350 million, 20-year alliance for the testing of jet engines. Pratt & Whitney has maintained a 50-year relationship with AEDC that began with its first engine test in 1958, a J75/P/9 engine–the power plant for the Convair F-106 fighter.

Boeing

On May 5, 1993, Boeing signed a 20-year pact with a potential value of several hundred million dollars. The alliance allows Boeing and the Air Force Materiel Command to work together for developmental testing at AEDC on Boeing's next-generation subsonic and supersonic transport plane.

General Electric

On July 9, 1993, officials from General Electric (GE) signed a 20-year alliance with AEDC for the testing of jet engines. Other GE systems tested include the GE F414, the power plant for the Navy's F/A-18 E/F and the GE F110.

Lockheed Martin

On Jan. 10, 1994, AEDC signed a 10-year alliance with Lockheed to work together to accomplish research and development testing of Lockheed aerospace systems at AEDC.

McDonnell Douglas Corporation

McDonnell Douglas Corporation signed a 20-year alliance on Nov. 7, 1994 to accomplish research and development testing of McDonnell Douglas aerospace systems. McDonnell Douglas merged with Boeing in 1997.

Economic Impact

In fiscal year 2008, AEDC's economic impact – which includes AEDC and its operating locations Hypervelocity Tunnel 9 at White Oak in Silver Spring, Md., and the National Full-Scale Aerodynamics Complex at Moffett Field, Calif. – exceeded $728 million. This represents an 11.5 percent or $75 million increase from fiscal year 2007. In fact, it is the largest increase since fiscal year 2000.

Each location impacted its local areas through payroll, secondary jobs created through local spending, and other expenditures for supplies, utilities, fuel and services, and the spin-off impact of those purchases. AEDC's impact for each operating location is: Tennessee: $697.4 million; Maryland: $11.3 million; and California: $19.3 million.

AEDC employed a mixture of active-duty military personnel from the Air Force and Navy, DoD civilians and contractor personnel, which totaled 2,785 personnel in fiscal year 2008.

Additionally, using the Tennessee Valley Authority (TVA) economic impact model methodology, AEDC estimated that 1,900 secondary jobs were created in the local area, for a total of 4,634 jobs related to AEDC. Examples of secondary jobs include those created by home construction, local supermarkets, car dealerships and department stores.

During fiscal year 2008, the payroll cost for AEDC government and contractor personnel was $247 million. AEDC's direct expenditures – which include utility costs, service contracts with outside vendors, and military health insurance paid to local doctors and hospitals – was more than $248 million. Furthermore, the indirect spin-off of these direct expenditures is approximately $234 million.

The overall economic impact figure does not include the estimated $160 million paid to retired military personnel and the $30 million paid to retired AEDC government and contractor civilians living in the local area. In total, the two retired pay groups generate more than $76 million in spin-off effect. When those figures are added in, the economic impact soars to approximately $994 million.

Additionally, these figures do not include the impact from test customers like Pratt & Whitney, General Electric or a number of other companies who maintain staff at AEDC to manage tests of their products or participate in the test process. When the monetary amount of customer field offices are added the economic impact exceeds $1 billion.

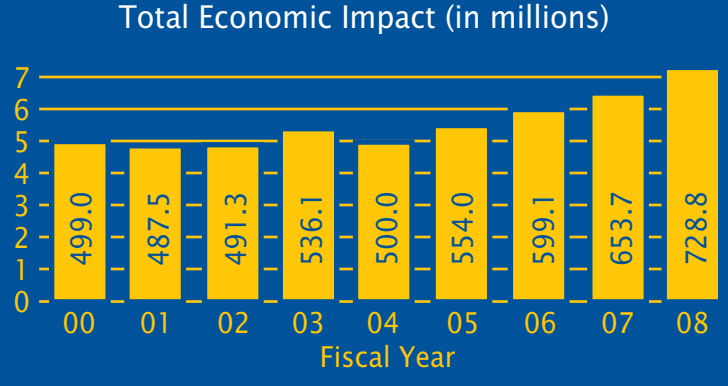
The economic impact data and secondary employment estimates were made using the TVA economic impact model methodology and represent AEDC's economic impact during fiscal year 2008, which runs from Oct. 1, 2007, to Sept. 30, 2008.

In addition, AEDC operates the world's largest complex of flight simulation facilities with a replacement value of more than $7.8 billion.

Fiscal Year 2008 Economic Impact Data

TVA Model Estimates for AEDC
As of Sept. 30, 2008

Economic Impact (in millions)	
Non-construction Expenditure	$ 494.50
Indirect spin-off Impact	$ 232.40
Construction Expenditures	$ 0.76
Indirect Spin-off Impact	$ 1.20
Total Direct Expenditures	**$ 495.20**
Total Indirect Expenditures	**$ 233.60**



Work Force Breakdown

Nurture a high-performance work force

AEDC stands out from other bases because of its distinctive work force – 84 percent contractor employees and 13 percent government personnel.

Since the center's inception in 1951, contractors have been utilized to save money and grow and foster an experienced group of people who would make their careers at AEDC.

This philosophy has worked. The average age of the contractor and government civilian work force is 47.8, with an average of 14.3 years of experience at the center. The average age of the active-duty military portion of the work force is 37, with an average of two years at the center.

AEDC employed 2,785 people in fiscal year 2008. This number includes active-duty military personnel from the Air Force and Navy, DoD civilians and contractor personnel. Active-duty military members made up less than 3 percent of the work force.

AEDC's government staff is composed of military personnel and civilian employees who provide management direction, resource allocation, oversight and contractor administration.

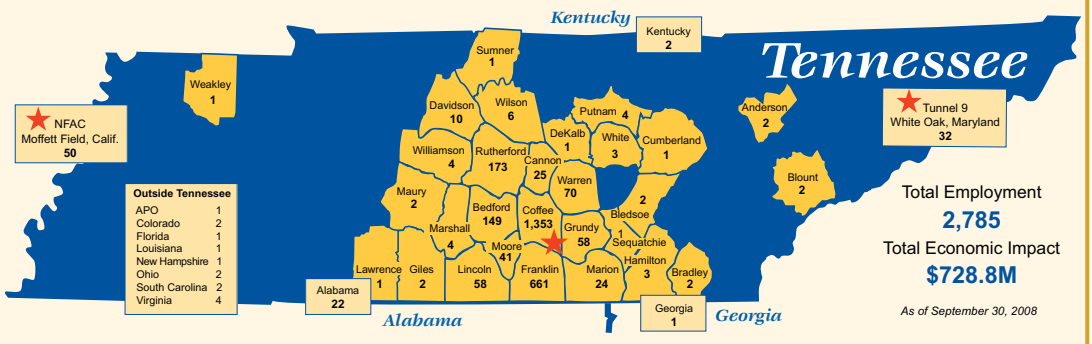
The contractor for fiscal year 2008 was ATA, a joint venture of Jacobs, Computer Sciences Corp., and General Physics.

Fiscal Year 2008 Work Force Impact Data

TVA Model Estimates for AEDC
As of Sept. 30, 2008

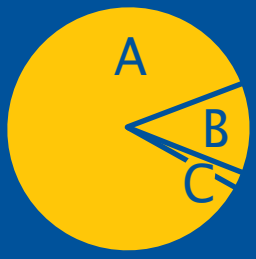
Direct Employment at AEDC	
Military	68
DoD Civilian	258
Non-appropriated Fund	48
ATA	2,325
Other	86
Base Exchange, Commissary, Ascend Federal Credit Union, tenant organizations, other contractors	
Total	**2,785**
Secondary Jobs Created	1,892
Total Employment Impact	**4,677**

Where the AEDC Work Force Lives



Fiscal Year 2008 Work Force Breakdown

A Contractor – 83.5%
B DoD Civilian/NAF – 11.0%
C Active Duty – 2.4%
C Other – 3.1 %



What They Do

Craft	33.0%
Engineer/Scientist	26.8%
Admin/Clerical	11.3%
Technical	11.8%
Other	9.2%
Manager/Supervisor	7.8%

Craft Employee Breakdown

Machinists	17.1%
Instrument Technicians	15.2%
Electrical	15.2%
Operating Engineers	11.1%
Police/Fire	9.7%
Pipefitter	7.4%
Store Keeper/Driver	5.5%
Working Foreman	4.9%
Laborer	4.9%
Boilermaker	2.9%
Ironworker	2.1%
Refrigeration Technician	1.4%
Painter	0.9%
Sheetmetal	0.3%
Other	0.1%

Engineer/Scientist Breakdown

Mechanical	19.8%
Electrical	16.3%
Computer Science	16.1%
Test Project Management	7.3%
Aeronautical/Aerospace	9.2%
Industrial	4.6%
Other	23.0%
Associate	13.2%
Bachelor's	55.9%
Master's	27.2%
Doctorate	3.7%

Initiatives

During fiscal year 2008, AEDC took several steps to enhance future planning and stimulate work force development by focusing on initiatives to revitalize the strategic planning process. These specific initiatives were designed to keep the center on the forefront of technology.

Strategic Planning

AEDC did not become the world's most diverse complex of aerospace flight simulation test facilities overnight. Rather it took years of intense planning and forward thinking to ensure AEDC's responsibilities to future generations and the warfighters of tomorrow were met by looking beyond the immediate issues of the day.

Soon after arriving at the center, AEDC Commander Col. Art Huber asked how center leadership strategically planned. The answer, "Strategic planning had been done very well in the past, however, it had not been a focus for a few years." Thus, Colonel Huber began re-invigorating AEDC's Strategic Plan.

"If you look around the center here, you can see the fruits of strategic planning that people have done in the past," said Colonel Huber. "The fact that AEDC has a world-class altitude jet engine test cell capability, like the Aeropropulsion Systems Test Facility (ASTF), shows that someone many years ago looked to the future and said AEDC needs to have a place to test jet engines at altitude in a ground simulation facility."

In December 2007, Colonel Huber hosted a strategic planning offsite, which had not occurred in several years. During the two-day offsite, AEDC leadership met with government and commercial test customers to examine future requirements and determine what AEDC capabilities were needed to support those requirements.

In July 2008, AEDC held its second Strategic Planning offsite. During this session, key staff established strategic priorities, goals and objectives. Each was a stepping-stone to determining the overall Strategic Plan.

First, the group identified AEDC's three priorities: 1) to provide decision-quality test and evaluation information to customers; 2) develop and care for Team AEDC; and 3) posture the center to meet the requirements of emerging and future test customers.

Then, the group translated the center's priorities into four strategic goals (listed below) and the strategic goals into eight strategic objectives (listed on page 5).

Altogether, the strategic priorities, goals and objectives form the basis of AEDC's Strategic Plan. This plan serves as the framework for making decisions on the future direction of AEDC. Each quarter, AEDC will review, assess and report progress on the Strategic Plan to the center commander.

In the end, by returning to a strategic planning process the center will become more effective in supporting the DoD and Air Force and allocating AEDC's resources in the right direction.

Strategic Goals

a) Provide world-class test and evaluation services; deliver the capabilities AEDC's customers require at the time, cost and quality promised with world-class customer service.

b) Develop and enable our people; develop processes to build and shape a work force capable of accomplishing our mission.

c) Field, develop and sustain quality installations; provide safe, secure, quality, reliable, environmentally friendly facilities for current and future customers.

d) Identify, develop and transition technology; identify, develop and rapidly transition test and evaluation technologies that assure war-winning effects.

Technical Excellence

The vision of the Technical Excellence Board (TEB) is to foster the technical excellence of the AEDC work force so that it can provide the acquisition enterprise with the depth and breadth of technical ground Test and Evaluation (T&E) capability necessary to meet weapon system development requirements.

Technical excellence has always been a hallmark of AEDC; however, cost reductions and acquisition policies have driven the center to a greater focus on efficiency of operations. While efficiency is vital to the center's operations, it had softened the focus on technical rigor.

For that reason, leadership designed an initiative for AEDC to get back to the basics.

This initiative focused on developing and implementing methods to re-establish technical excellence amongst military, civilian and contractor personnel. By doing this, AEDC would instill a technical excellence culture.

Thus, the center established the AEDC Technical Excellence Board (TEB). The TEB, chaired by Dr. Ed Kraft, AEDC's chief technologist, is responsible for developing policies and practices to enhance technical excellence at AEDC and alleviating any barriers keeping the center from achieving technical excellence.

The TEB took a multi-faceted look at education, job experience, mentoring, recruiting and other areas to come up with ways to ensure our customers that AEDC has a robust, technically sharp, respected work force now and in the future.

In December 2007, AEDC held its first technical forum. During the forum, the AEDC community gathered and discussed technical ideas and issues affecting the center and their work environment.

In 2008, after determining the best course of action, AEDC began executing the various aspects of the technical excellence initiative. This includes, but is not limited to, employee development, education, career broadening initiatives, technical achievement awards, recruitment activities, technical review forums, validation of research topics, participation in Technical Review Boards, technical publications, reviews of AEDC's technology program and much more.

Dr. Arloe Mayne presents his paper on Dr. Robert Goddard—his career and the first liquid-fueled rocket—at the monthly technical excellence forum. Dr. Mayne once worked in the center's von Kármán Gas Dynamics Facility.

Strategic Objectives

1. Deliver test and evaluation capabilities on time, on cost.
2. Actively collaborate to shape and meet shared Research, Development, Test and Evaluation (RDT&E) expectations.
3. Deliver a technically excellent work force and supervisors.
4. Provide Air Expeditionary Force (AEF)-ready Airmen.
5. Create a wellness-focused and safe work force.
6. Balance center resources through capabilities based planning.
7. Sustain the AEDC infrastructure.
8. Invest in test and support infrastructure.

Aerospace Testing Alliance (ATA)

Reduce the unit cost of products and services each year

AEDC has seen some benefits from its competitive contract award, including more definitive Air Force control of the operation, more effective cost control and improved responsiveness of the contractor to Air Force and AEDC customer needs.

In October 2003, Aerospace Testing Alliance (ATA) became the new contractor to provide the personnel and services for operating and supporting the center's test facilities and infrastructure.

ATA is a joint venture of Jacobs, Computer Sciences Corp. (CSC) and General Physics. The contract has a possible length of 12 years in one-year increments and is worth up to $2.7 billion.

ATA supports the center with a wide range of services including: operational maintenance of a wide variety of unique aerospace test facilities; information technology; desktop operation and maintenance; center communications; test utility operations; environmental, safety, industrial health and quality assurance; calibration, chemical and photo laboratories; civil engineering; transportation; materials management; fire protection; security services; emergency management; food services; custodial; and public affairs.

Six subcontractors help to make up ATA's organization.

ATA provides AEDC strong technical enhancement with its approach to management and operations.

ATA Vision

ATA will be a trusted partner in delivering best value warfighter support and asset stewardship to AEDC.

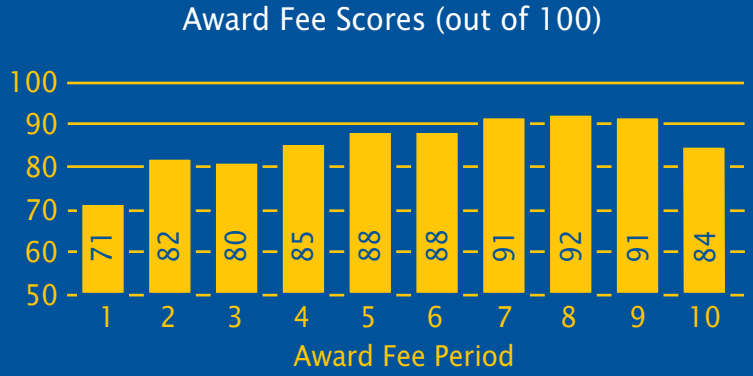
ATA Core Values

- Be accountable for our own actions
- Ensure the safety of individuals and equipment
- Demonstrate the highest integrity and ethical standards
- Communicate clearly and openly
- Deliver professional and technical excellence
- Nurture, enable and treat people fairly
- Align with customer goals and objectives
- Use disciplined and innovative processes
- Continually improve in all that we do

ATA Subcontractors

- **Eurest** – provides food services
- **Dynetics** – provides core competency in ballistic missile defense analysis for tactical weapon systems and missile seeker systems performance evaluation supporting the technology program
- **Future Research Corp. (FRC)** – providing communications and postal services
- **Information International Associates (IIa)** – provided a broad range of information-related services specializing in scientific/technical information and business services
- **Comprehensive Occupation Resources, LLC (CORE)** – manages employee health services
- **Premiere Building Maintenance Corp.** – provides janitorial services and refuse collection/disposal

ATA
Aerospace Testing Alliance



One distinct feature setting AEDC apart from other military installations is its contractor work force. At AEDC, contractors represent almost 85 percent of the work force and perform almost 90 percent of the work.

A military work force is by design transient. Roughly every two to three years, new personnel transfer in or out, making it difficult to build corporate knowledge.

The original rationale for operating AEDC with private sector personnel was based on the limited availability of qualified technical personnel in the Air Force, either as military or civilians. Also recognized was the flexibility afforded by the use of private companies who could hire and terminate employees more easily than the federal government. In addition, a private company has a greater ability to tailor its pay scales or even individual salaries to market rates, thereby allowing them to recruit personnel with special skills who the government may not be able to attract.

The decision to use a for-profit corporation has proved beneficial. Although the original contracts were cost-plus-fixed fee, the contracts over the last 28 years have been cost-plus-award-fee. The award fee feature has enabled the Air Force to use the profit motive to incentivize contractors to continually improve productivity and quality while controlling costs.

Dr. Lynn Sebourn, an ATA facility systems analysis team engineer, inspects the cooling water lines of the combustion air heater at the Aerodynamic and Propulsion Test Unit (APTU) prior to a test run.

A total of $1,400 was raised by donations from the ATA golf scramble in September. Four organizations – 5 Loaves 4 Kids; Heart of Tennessee Chapter of the American Red Cross; Manchester Angel Tree and the Hands-on Science Center – were chosen to each receive $350.The ATA Golf Committee will choose four different charities each year from a list of organizations vetted by the ATA Employee and Community Activities Committee to donate to.

Each year, four scholarships are awarded to children of Jacobs employees who desire to pursue full-time academic work in several technical disciplines. In 2008, Dr. David Elrod, ATA general manager, presented two, $3,000 scholarships to two ATA dependents. James Routh Jr. (left) is a sophmore at the University of Tennessee in Knoxville and Lindsay Smith (right), a junior at Tennessee Technological University in Cookeville.

R. A. Millen, an ATA pipefitter, checks fuel flow at the AEDC fuel farm.

Community Involvement

AEDC's impact goes beyond national defense and aerospace programs.

Approximately 75 percent of AEDC's personnel live within a 50 miles radius of the center.

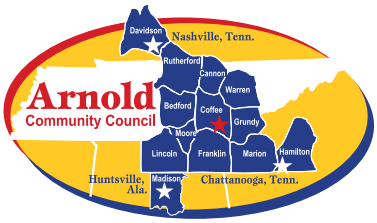
When AEDC employees go home, many are dedicated to making a difference in the communities they live in.

Several employees hold political office, serve on various city and county government boards and committees, volunteer with religious and community organizations, such as the Boy and Girl Scouts, Lion's Clubs, Kiwanis Clubs, Salvation Army, Habitat for Humanity, Meals-on-Wheels, the Special Olympics and many others.

Throughout the year, AEDC also helps raise funds for many worthwhile causes. For example, the center's annual Turkey Trot raises money for local charities at Thanksgiving, and personnel support an Angel Tree for 200 children during the Christmas season.

In addition, every year, military and civilian personnel contribute to the annual Combined Federal Campaign, while the ATA Employee and Community Activities Committee provides contractor personnel with an opportunity to contribe to charitable, civic, educational and athletic organizations.

Arnold Community Council



Mission Statement

The Arnold Community Council was established in 2000 to promote, protect and preserve AEDC and to facilitate interaction and cooperation between the center and surrounding communities.

The Arnold Community Council (ACC) is a coalition formed to support and promote AEDC. The board of directors includes community leaders, business leaders and political officials from Middle Tennessee and north Alabama counties surrounding Arnold AFB. The council receives monthly briefings from the AEDC commander and key staff on situations and events impacting the base.

The ACC holds an annual meeting with the state legislature and Tennessee Congressional delegation to improve awareness of AEDC; provides year-round phone lines for troop morale calls; donates to quarterly and annual government award winners; and supports the annual Veterans Picnic, the AEDC Children's Christmas Party and receptions for dignitaries.

The number of individual and business memberships in the ACC continues to increase each year thanks to five special committees, including a proactive membership committee. The ACC typically hosts an annual membership appreciation banquet in the fall and other events throughout the year to raise money.

Jerry Mansfield, past president of the Arnold Community Council, welcomes civic leaders from the Little Rock, Ark., area who visited AEDC as part of a community relations tour from Little Rock Air Force Base.

AEDC employees support local communities throughout the year by donating blood during drives held on base.

Minds in Motion

AEDC personnel partnered with the Tullahoma City Schools and Tullahoma Area Chamber of Commerce to host Minds in Motion, a special tour event for the eighth grade students from East Middle, West Middle and St. Paul the Apostle Catholic School.

The event helped promote the importance of math and science at AEDC, UTSI and throughout the Air Force.

"The goal of the tour was to provide an engaging, visual and interactive tour for the students demonstrating the importance of AEDC's mission and integrating with their classroom studies," AEDC Commander Col. Art Huber said. "With this in mind, I hope the tour sparked some interest in the students and ultimately encourages them to work in math and science areas as adults."

Minds in Motion proved to be a successful venture for both AEDC and the students. AEDC plans to expand the program and reach out to schools in other counties.

Lt. Col. Vanessa Bond, commander of the 716th Test Squadron, explains a wind tunnel model to a group of eighth grade students.

Veterans Picnic

Each year, AEDC hosts a veterans picnic to show its gratitude to the veterans of Tennessee. Veterans from the Department of Veterans Affairs' Tennessee Valley Healthcare System's Alvin C. York Murfreesboro Campus, the Veterans Community Care Center, the Tennessee Veterans Home and other facilities attend the picnic with great hopes and share their experiences with others

"AEDC has a long history of serving a certain role and these veterans who came to this picnic have served in different roles," said one picnic volunteer. "We're all part of a bigger team that has the same ultimate mission to defend the country."

Another volunteer said that the nation should be very proud and grateful for all the veterans have done for us. "This was a great day to have them visit – we've had a great time with them, especially listening to the stories they have to share," he said. "They enjoy comparing what things were like when they were in the military with the way things are now. These veterans are part of our heritage and history – they're American heroes."

At the annual veterans picnic, Airmen get the chance to interact with veterans who served our country in the past.

The AEDC Honor Guard leads the opening ceremony parade of the local Special Olympics.

704th Test Group

The 704th Test Group oversees and manages three test squadrons (TS) – the 716th TS, the 717th TS and the 718th TS. The 716th TS is responsible for aerodynamic (flight systems) testing; the 717th TS is responsible for aeropropulsion testing; and the 718th TS is responsible for space and missile testing.

AEDC's total customer funding for all testing in fiscal year 2008 was $83.7 million – an increase of $22.6 million from fiscal year 2007 and $6.7 million increase from fiscal year 2006. The increase was due primarily to an increase in turbine engine testing, which represented slightly more than 64 percent of the total.

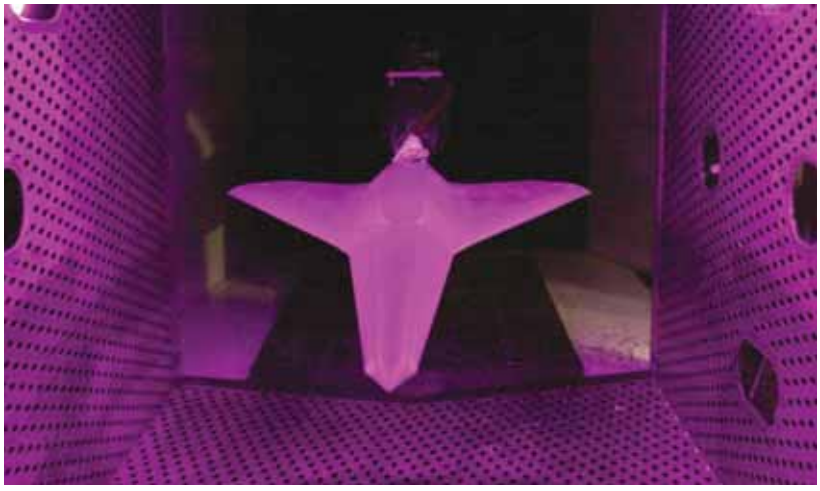
Air Force-led projects represented 37 percent of the center's total workload, with joint and commercial programs making up 35 percent of the total. The remaining 28 percent of the workload was composed of a combination of U.S. Navy, U.S. Army, NASA, Missile Defense Agency (MDA) and other government and commercial programs.

Fiscal Year 2008 Highlights

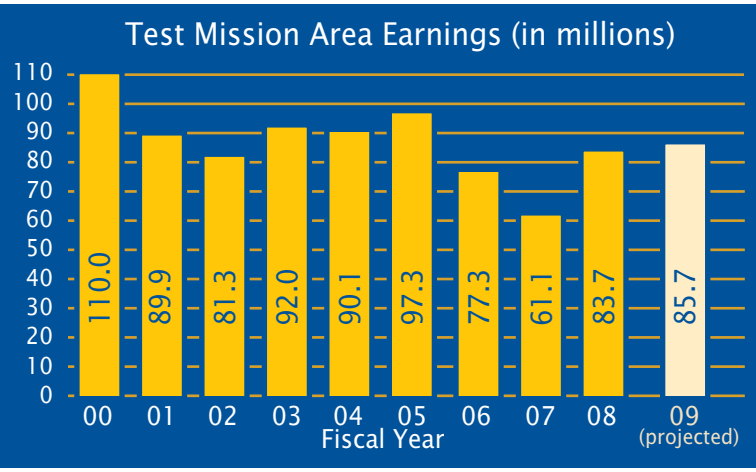
A major program AEDC supported in fiscal year 2008 was the F-35 Lightning II Joint Strike Fighter (JSF). In fact, 13 percent of the work done in fiscal year 2008 was for JSF customers. Other work included store separation testing for the Navy's EA-18 Growler, aerodynamic testing of the Orion Crew Exploration Vehicle, Ares and Constellation, NASA's replacement for the Space Shuttle, as well as propulsion testing on the F100, F101, F118 and F119 engines. Additionally, AEDC supported Minuteman, Peacekeeper and Minotaur rocket

Mission Statement

Leads and manages developmental testing at the world's largest and most advanced complex of flight simulation test facilities in the world. Leads more than 700 government and contractor personnel operating 58 aerospace test facilities valued at $7.8 billion. The facilities simulate flight from subsonic to hypersonic speeds at altitudes from sea level to space.



A one-eighteenth scale model of a tailless aircraft concept was tested in Tunnel 4T. The test was a technology demonstration entry in which conventional methods and Pressure Sensitive Paint were used to compare the effectiveness of a jet effects spoiler with a solid spoiler in yaw and roll control and stability of the aircraft.



Leads and manages developmental testing at the world's largest and most advanced complex of flight simulation test facilities in the world

motor test programs, as well as the Terminal High Altitude Area Defense (THAAD) and Mars Science Laboratory.

Another program heavily supported this fiscal year was the Air Force Alternate Fuels Certification program. AEDC tested both the GE F101 and Pratt & Whitney (P&W) F100 engines fueled by a 50-50 mixture of Fischer-Tropsch (FT) and JP-8 jet fuels. Early in the fiscal year, then Secretary of the Air Force, Michael Wynne, viewed the ground testing of the F101 engine. The testing helped qualify the first high-performance, afterburning engine with synthetic fuel for a combat aircraft.

Fiscal Year 2009 Forecast

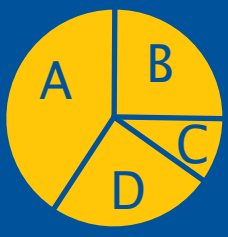
In fiscal year 2009, AEDC will continue to provide support to Air Force, Navy, Army, MDA and NASA programs and more. Overall, testing revenue is expected to slightly increase. Estimated revenue increases include $6.5 million for the 716th TS and $1.7 million for the 718th TS, while the 717th TS anticipates a $7.2 million decrease in revenues.

A technician examines the Army's Mid-Range Munition model during aerodynamic testing in the center's four-foot transonic wind tunnel (4T).

From left, Terry Finley, an engineer with Willbrook Solutions, the Missile Defense Agency support contractor providing aero and test engineering service, and David Carlson, lead test engineer with Raytheon, inspect the Stunner missile model between configuration changes during the testing in Tunnel A.

The Pratt & Whitney F100 engine, the power plant for the F-15 Eagle and the F-16 Fighting Falcon, undergoing synthetic fuel testing in the center's J-1 jet engine test cell.

Fiscal Year 2008 Total Workload by Revenue



A Air Force – 37%
B Joint – 26%
C Commercial – 9%
D Navy – 6 %
D Other – 6%
D DoD – 5%
D NASA –5%
D MDA – 4%
D Army – 2%

Squadron Area Earnings (in millions)

	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09
716	24.9	26.3	25.0	28.1	16.8	20.0	20.1	13.6	14.7	21.2
717	63.3	43.3	32.8	41.5	50.6	56.5	42.6	35.6	53.9	47.7
718	21.8	20.3	23.5	22.4	22.7	20.8	14.6	11.9	15.1	16.8

716th Test Squadron

AEDC's 716th Test Squadron (TS) offers aerodynamic ground test capabilities from very low subsonic speeds through Mach 10 in various wind tunnels. These wind tunnels provide essential test and analysis services in support of DoD, national, U.S. industry and international aerospace programs. AEDC operates five active wind tunnels in two primary facilities, the Propulsion Wind Tunnel Facility (PWT) and the von Kármán Gas Dynamics Facility (VKF).

AEDC wind tunnels are used for conducting vehicle aerodynamic performance evaluation and validation, weapons integration, inlet/airframe integration, exhaust jet effects and reaction control systems, code validation, proof-of-concept, large- and full-scale component research and development, system integration, acoustics, thermal protection system evaluation, hypersonic flow physics, space launch vehicles, operational propulsion systems and captive flight.

The 716th TS generated almost $15 million of test revenue in fiscal year 2008. Testing in fiscal year 2008 included multiple store separation tests and multiple tests in support of NASA's shuttle replacement program – Constellation. Additionally, several classified programs added heavily to the total workload.

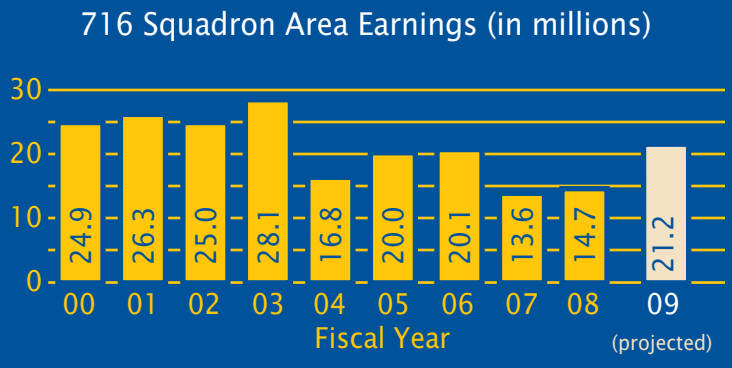
Fiscal Year 2008 Highlights

Two new war-fighting tools in America's arsenal joined forces for the first time during simulated store separation testing at AEDC.

Mission Statement

Leads a team of more than 150 government and contractor personnel conducting flight systems development and evaluation testing in simulated subsonic, transonic, supersonic and hypersonic flight envelopes to include government, commercial and international aircraft, missile and space systems. Serves as primary customer interface and center planning and execution agent for performing the flight systems test mission. Responsible for developing and communicating the strategic roadmap for all aspects and support to the flight systems product area. Responsible for all aspects of the test mission including budgeting, business development, test planning, test execution, and data analysis and reporting. Directs flight systems analysis and evaluation program

Dennis Odear, ATA outside machinist, inspects a tailless aircraft model in the four-foot transonic wind tunnel while talking to engineers in the control room.



Conducting flight systems development and evaluation testing in simulated subsonic, transonic, supersonic and hypersonic flight envelopes

A team from Lockheed Martin and Arnold tested the Small Diameter Bomb (SDB) separating from the F-35 Lightning II in the center's four-foot transonic wind tunnel (4T). The primary focus was to assess the SDB and its interactions with this aircraft.

Additional store separation test were conducted in 4T that provided weapons compatibility and separation data for AIM-9X, AIM-120C, AIM-132, GBU-31 and GBU-39 stores on a 1/15-scale model of the F-35 Lightning II.

In the 16-foot transonic wind tunnel (16T), store separation testing was conducted on a model of the Navy's F/A-18. The test provided weapons compatibility and separation data for AIM-120C, AWW-13, GBU-10, GBU-12 F/B, MK-65, MK-83 over a Mach range from 0.6 to 1.5 on a 1/10-scale F/A-18E/F. The testing included two phases; one focused on captive loads entries and the other on captive trajectory system (CTS) entries. The loads phase measured the force and moment of stores mounted on the aircraft.

Testing performed in Wind Tunnel A on the NASA Ares I and 1-X was conducted to obtain stage separation data at Mach numbers 4.5 and 5.5. The Ares I rocket will be used to lift the manned Orion Crew Exploration Vehicle (CEV) into orbit.

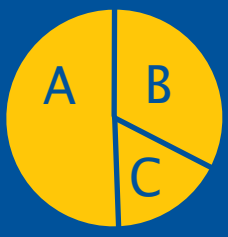
Fiscal Year 2009 Forecast

Fiscal year 2009 is expected to have an increase of approximately 40 percent above fiscal year 2008 revenues. Multiple miscellaneous store separation tests are expected, including extensive F/A-18E/F testing and some NASA Ares support. Several classified programs are expected to round out the workload.

ATA Outside Machinist Carey Wofford inspects the leading edges on the standard check model between tests in 16T.

Adam Burt, a co-op student working with ATA, inspects the 1/10-scale models of the sting-mounted AIM-120C store and F/A-18E/F Super Hornet aircraft during a break in store separation testing inside 16T. The testing marked the 13th entry of the Super Hornet for store separation testing in 16T. The data from the testing goes into a database and aids flight testing.

Fiscal Year 2008 Total Workload by Revenue (millions)



A Air Force – $6.8
B Other Government - $3.9
C Other DoD – $1.4
C Commercial – $0.6

aerodynamics

717th Test Squadron

AEDC's 717th Test Squadron (TS) is responsible for propulsion testing in the Engine Test Facility (ETF) test cells, which are used for development and evaluation testing of turbine-based propulsion systems for advanced aircraft. These test cells provide test and evaluation services in support of DoD, U.S. industry and international programs. AEDC operates nine active test cells for atmospheric inlet and altitude testing.

The 717th TS generated $56.9 million of aeropropulsion systems test revenue in fiscal year 2008, accounting for more than 60 percent of AEDC's total reimbursement revenue. The primary customers were the Air Force, the F-35 Lightning II Joint Strike Fighter (JSF) Program Office and the Japan Ministry of Defense (MOD).

Fiscal Year 2008 Highlights

Air Force tests were funded by the engine Component Improvement Program (CIP) and the Alternate Fuels Certification program. Air Force CIP funded testing of the Pratt & Whitney (P&W) F119 engine for the F-22A Raptor, the P&W F100 engine for the F-15 Eagle and F-16 Fighting Falcon and the General Electric (GE) F101 for the B-1B Lancer bomber.

The Air Force Alternate Fuels Certification program funded testing of synthetic fuel (synfuel) on both the GE F101 and P&W F100 engines. These tests consisted of back-to-back comparisons of engine performance and operability using 100 percent JP8 fuel and a 50/50 blend of synfuel/JP8 fuel.

The JSF Program Office funded testing in support of the Systems Development and Demonstration phase of both the P&W F135 primary engine and the GE/Rolls-Royce F136 alternate engine.

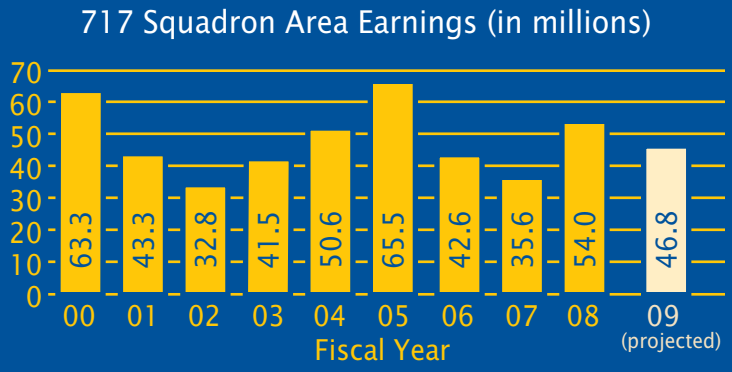
The Japanese MOD funded qualification testing of their XF7-10 engine for the Kawasaki P-1 maritime patrol aircraft. The P-1 is the first Japanese domestically designed and built combat aircraft since World War II.

A factor impacting engine testing during the fiscal year was the replacement of cooling coils in the Aeropropulsion Systems Test Facility's (ASTF) RC1 cooler. The cooler is the larg-

This is a side view of the General Electric F101 engine, the power plant for the B-1B Lancer Bomber, which underwent altitude testing in propulsion J-1 test cell.

Mission Statement

The world's preeminent aeronautical propulsion test facility – providing safe, efficient and reliable research, development, test and evaluation on current and future systems in support of the Warfighter and our Coalition partners.



Providing safe, efficient and reliable turbine-based propulsion systems research, development, test and evaluation for current and future systems

est of the facility's three pressurized air supply units that dry and cool air, which provide the required conditions to simulate flight at altitude and sea level conditions in the jet engine test cells. Engine testing was suspended for several months during the project.

Fiscal Year 2009 Forecast

The 717th TS projects a decrease in aeropropulsion systems test revenue in fiscal year 2009 due to a lower projected test workload.

Primary customers will again be the Air Force, the JSF Program Office and the Japanese MOD. Additionally, we will resume commercial testing at the request of Rolls-Royce Germany.

Air Force CIP will fund testing of the P&W F119 engine in test cells C-1 and SL-2; the P&W F100 engine in test cells SL-2, J-1, and SL-3; and the GE F110 engine in test cell J-1.

The Air Force Alternate Fuels Certification program will fund testing of the GE F110 engine to certifiy it for operation on a 50/50 blend of synfuel/JP8 fuel. The Air Force Research Laboratory (AFRL), along with the Defense Advanced Research Projects Agency (DARPA) will jointly fund testing of the Williams International (WI) XTE88 High Speed Turbine Engine Demonstrator (HiSTED) engine in test cell T-3. Operation of the XTE88 engine will be demonstrated at Mach 4+ test conditions. The Air Force Reconnaissance Systems Wing will also fund reactivation of test cell T-4 in preparation for early fiscal year 2010 testing of the Rolls-Royce F137 engine used in the Northrop-Grumman RQ-4 Global Hawk.

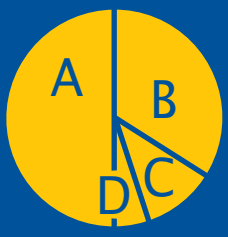
The JSF Program Office will fund testing of the P&W F135 engine in test cells C-1, J-2, and SL-3 as well as testing of the Fighter Engine Team (FET) GE/Rolls-Royce F136 engine in test cell J-2. The JSF Program Office is also investing more than $16 million to upgrade and prepare test cell SL-3 to perform corrosion testing of both the primary and alternate engines. Corrosion testing of the F135 and F136 engines is planned for fiscal years 2011 and 2012, respectively.

Following completion of the Japanese MOD-funded qualification test of their XF7-10 engine in test cell C-2, certification testing of the Rolls-Royce Germany-funded BR725 engine will begin in test cell C-2.

A GE/Rolls-Royce F136 engine, the alternate power plant for the F-35 Lightning II Joint Strike Fighter, is tested at intermediate power conditions. The recent successful altitude testing of the engine took place in the J-2 test cell. The team working on the project was testing augmentor performance and operability to meet mission requirements over a full envelope of altitude and Mach numbers.

From left, Yoshiki Miyairi and Atsushi Hirano, researchers in Japan's Technical Research and Development Institute within the Ministry of Defense, inspected the XP-1 engine during a break in the testing in the C-2 test cell.

Fiscal Year 2008 Total Workload by Revenue



A Air Force – 50.6%
B Joint – 32.6%
C FMS – 11.5%
D Commercial – 3.6 %
D DARPA – 1.7%

aeropropulsion

718th Test Squadron

The 718th Test Squadron (TS) is responsible for ground testing space and missile weapon systems from subsonic to hypersonic conditions reaching Mach 20. The 718th TS provides hypersonic, rocket propulsion and space environmental Test and Evaluation (T&E) services and coordinates testing in more than 30 facilities. The facilities support the development of defensive ballistic and tactical missile interceptors, as well as weapons systems such as theater, cruise missile, high-speed aircraft and launch vehicles.

Additionally, the 718th TS is chartered with maintaining the nation's largest archive of missile and rocket hard-body and plume signature data at the Advanced Missile Signature Center (AMSC).

In fiscal year 2008, the 718th TS earned slightly more than $15 million, a 10 percent increase in test revenue from fiscal year 2007. The 718th TS categorized its customer base into six strategic areas: missile defense, long-range strike, space access, space and near-space missions, persistent surveillance and nuclear deterrence.

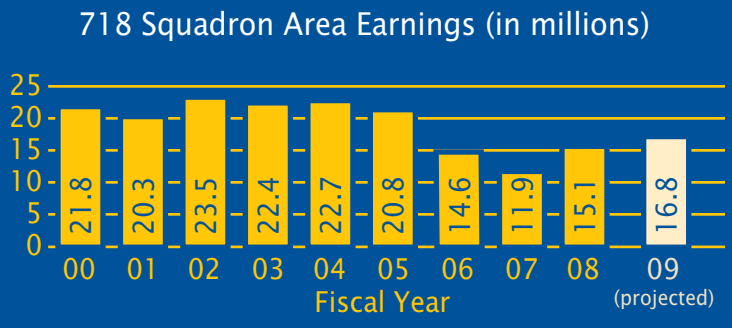
Fiscal Year 2008 Highlights

The AEDC Signature Measurement Team supported numerous Missile Defense Agency (MDA) flight test intercepts with state-of-the-art imagery and signatures of launch and

Mission Statement

Leads a team of more than 200 government and contractor personnel conducting ground test and evaluation of solid rocket motors; hypersonic air-breathing propulsion; satellites, space components and materials; advanced sensors; hypervelocity ballistic projectiles, heating effects from atmospheric reentry and high-speed flight; and signature collection, measurement, analysis and information archival of friendly and threat weapon systems. Serves as primary customer interface for DoD, NASA and commercial space and missile test programs. Develops and communicates the strategic roadmap for all center space and missile test and evaluation capabilities. Responsible for all aspects of the space and missile test mission including budgeting, business development, risk management, test planning, test execution, data analysis and reporting.

From left, Joe Syler, ATA outside machinist, inspects the Ares I first stage booster model in Tunnel B with Jonathan Kodman, an ATA test engineer.



Conducting ground test and evaluation for space and missile systems

intercept events using ground-based multi-spectral imagers (visible, near-infrared [IR], short, mid and long-wave IR). Support was also provided to the Advance Tactical Infrared Counter Measures (ATIRCM)/Common Missile Warning System (CMWS) Tonopah Measurement Support.

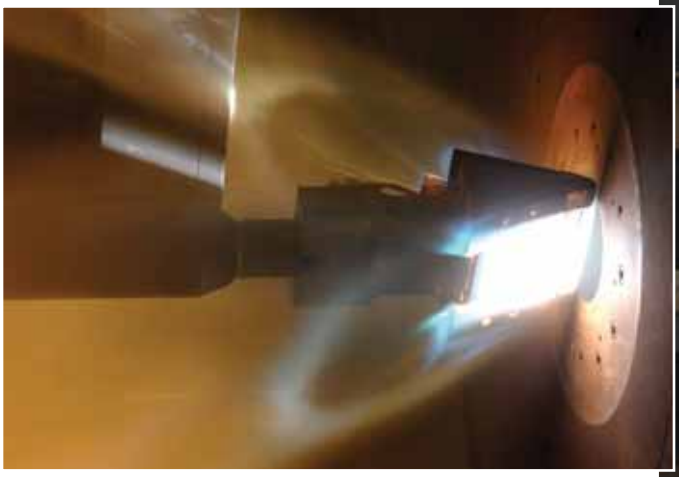
AEDC signature measurements team also deployed to the Tonopah Test Range to support Man-Portable Air Defense (MANPAD) testing. The team successfully collected visible, IR and ultraviolet data on 31 test articles.

Additionally, the team supported Aegis Ballistic Missile Defense (BMD) and the Japanese Navy during the JFTM-1 flight test at the Pacific Missile Range Facility (PMRF) in Kauai, Hawaii.

In the arc heaters, Defense Advanced Research Projects (DARPA) Falcon materials testing occurred in various arc heaters. These tests provided representative dwell times on a material candidate at pressures and temperatures seen in flight. The test runs also demonstrated the tripled H2 run-time capability provided by new power supply cables.

Seven test runs and one equipment validation run were accomplished in H2 to evaluate the suitability of candidate thermal protection system materials for use on the NASA Mars Science Lab (MSL) spacecraft and the NASA Orion Crew Exploration Vehicle (CEV). One key accomplishment of this series was to demonstrate that the new Mach 3.8 heater nozzle could provide the lower shear, and lower heat flux test point required by NASA for new Orion flight missions.

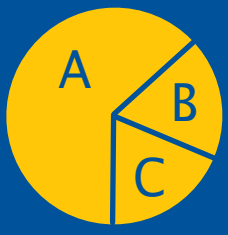
Minuteman III Stage 2 and Stage 3 production quality assurance motors were fired in the J-6 for the 526th Intercontinental Ballistic Missile (ICBM) Systems Group, Ogden Air



Orion CEV heat shield material undergoes preproduction aerothermal testing in the center's H2 facility as a part of a facility validation and calibration run.

Troy Davis, an ATA outside machinist, checks the alignment of the Orion heat shield material sample prior to testing in H2.

Fiscal Year 2008 Total Workload by Revenue



A MDA/Other DoD – 63%
B Air Force – 18%
C Navy – 8%
C Army – 7%
C Commercial – 4%

space and missiles

Logistics Center, Hill Air Force Base, Utah. A total of eight Minuteman motors were fired in fiscal year 2008.

Also in J-6, a Minotaur IV Stage 3 solid rocket motor was tested at simulated altitude conditions. The motor static firing was in support of the Rocket Systems Launch Program (RSLP) aging and surveillance test program sponsored by the Space Development Test Wing (SDTW), Launch Test Squadron (LTS), Kirtland Air Force Base, N. M. The primary test objective was to identify any age-related degradation in motor ballistic performance and sub-systems operation of this modified Peacekeeper (PK) Stage 3 motor. Motor performance was compared to results from 26 PK Stage 3 motors previously tested at AEDC for Trend Analysis Life Estimate (TALE) determination.

In the center's 7V chamber, Ball Aerospace's advanced early warning space sensor testing was successfully accomplished. During the course of the test, sponsored by AFRL Space Vehicles Directorate and Space and Missiles System Center (SMC), with Ball's sensor was calibrated and presented with realistic scenes for sensor performance evaluation. The data collected allowed for model corrections and performance evaluation.

The first calibration shot for the Terminal High Altitude Area Defense (THAAD) Live Fire Test and Evaluation (LFT&E) program was conducted in the Range G facility. This was the first of two shots to verify the performance of the solid rocket motors used to pitch the THAAD projectile prior to impact with a simulated threat target.

ATA Outside Machinist Jeffrey Fulmer conducts a test probe inspection at the APTU facility. The inspection was part of an ongoing major capability upgrade to APTU. The ongoing project includes a new combustion air heater (CAH) at APTU. The CAH, which underwent a successful preliminary burn using butane, is a crucial part of the upgrade, officially called the Hypersonic Air-Breathing Propulsion Test and Evaluation Capability. This upgrade has provided AEDC with a high fidelity flight simulation capability in support of emerging missile-class hypersonic weapon systems and vehicles.

David Brown and Troy Perry, ATA outside machinists, install a slug projectile with a pitch motor installed into the barrel of the Hypervelocity Range G's launcher. This projectile was launched out of the G Range two-stage light gas gun at a velocity of 8,200 feet per second. This was the first test of a new rocket motor that will be used to pitch the Terminal High Altitude Area Defense projectile up to a predetermined angle prior to impacting simulated threat targets. The primary objective of this shot was to verify pitch motor ignition and performance.

Furthermore, calibration of the Aerodynamic and Propulsion Test Unit (APTU) Mach 3, 4 and 6 nozzles were completed. The culmination of this checkout program marked the official addition of a customer-ready hypersonic propulsion test facility at AEDC. This will allow the DARPA Falcon Combined-Cycle Engine Technology (FaCET) demonstrator test to proceed. The nozzle calibrations used a Design-of-Experiments (DOE) matrix to ensure 95 percent confidence in nozzle/facility characterization.

Fiscal Year 2009 Forecast

Current projections for fiscal year 2009 predict a 10 percent workload increase to that of fiscal year 2008.

The 718th TS will remain heavily engaged with programs to determine investment requirements and technology developments for test facilities to meet national mission requirements in the futures.

The workload in arc heaters is projected to be strong with more than 50 tests planned and Range G will be supporting MDA and others with more than 15 shots already on the books.

Solid rocket testing in J-6 is also forecasted to be strong with roughly 10 firings scheduled while the space chamber workload is up with more than 3,000 test hours projected in support of MDA, AFRL and others.

The workload in the AMSC is expected to be robust, growing by almost 6,000 manhours. APTU is also expected to finish the DARPA/Lockheed Martin/P&W FaCET testing this year.

ATA Instrumentation Technician Doyle Jones performs a continuity check on the instrumentation inside the Orion Crew Exploration Vehicle heat shield material candidate model prior to a test run in the H2 test facility.

A Multiple Launch Rocket System (MLRS) rocket motor is installed in J-6 Large Rocket Motor Test Facility. Temperature-indicating paint stripes on the top of the MLRS rocket motor monitor temperatures ranging between 200 and 1,200 degrees Fahrenheit.

Operating Location

White Oak

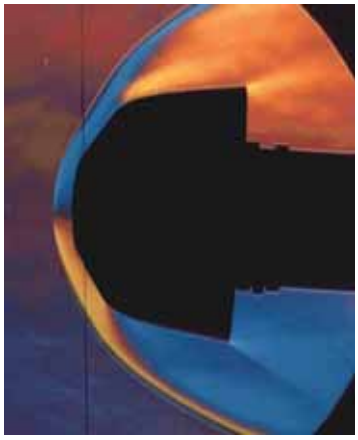
Due to the unique nature of the Hypervelocity Tunnel 9 test capability, utilization has been at record levels in recent years. Test income from fiscal year 2004 through fiscal year 2008 has continued at capacity level. Customers from each sector of the mission including missile defense, strategic systems and space access have performed testing events at Tunnel 9 located at Silver Spring, Md. All DoD agencies, Defense Advanced Research Projects Agency (DARPA) and Missile Defense Agency (MDA) were represented. In addition, the future looks solid for testing from research labs, Small Business Innovation Research (SBIR) programs, private aerospace companies and NASA. In fiscal year 2008, the Hypervelocity Wind Tunnel 9 completed 74 days of testing representing near-full capacity. Test programs were successfully completed for the U.S. Air Force, U.S. Navy, NASA and Lockheed Martin.

Fiscal Year 2008 Highlights

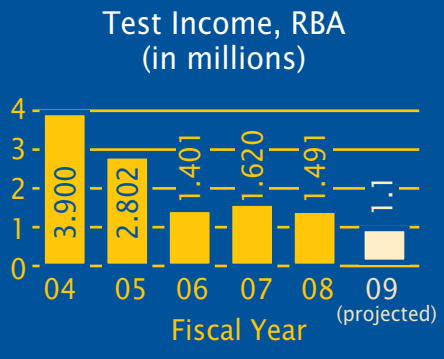
The High-Alpha Reusable Launch Vehicle (RLV) test program investigated the aerodynamic and aerothermal performance characteristics of reentry vehicle configurations designed to enter the atmosphere at high angles-of-attack. Data acquired during these tests will form the basis for a new database that will enable design of higher performance trans-atmospheric vehicles and

Mission Statement

Responsible for management and oversight of all aspects of the AEDC White Oak site. Manages the testing and evaluation of high-speed/hypersonic systems. Serves as the primary customer interface and center planning and execution agent for performing hypersonic system testing. Responsible for developing and communicating the strategic roadmap for all aspects and support to the hypersonics product area. Responsible for all aspects of the test mission including budgeting, business development, test planning, test execution and data analysis and reporting. Directs high-speed/hypersonics analysis and evaluation program. Reports to the Commander of the 704th Test Group coordinating test planning, resourcing, execution and reporting activities.



Engineers at AEDC's Tunnel 9 facility performed work on the High-Alpha RLV (left) to examine reentry characteristics. Engineers also performed reentry testing on the Navy's Reentry Systems Nose-tip.



Manages the test and evaluation of high-speed/ hypersonic systems

provide a design space for replacements of the current U.S. Space Shuttle. Testing concluded in October 2007 meeting all test objectives.

The U.S. Navy Reentry Systems Nose-tip test program provided characterization of several reentry body ablated nose-tip shapes. Aerothermal characterization was performed at Mach 8 on several nominal and ablated geometries. Data from this test entry will provide accurate design verification on candidate nose-tip materials for use in future reentry systems. All primary and secondary objectives were met.

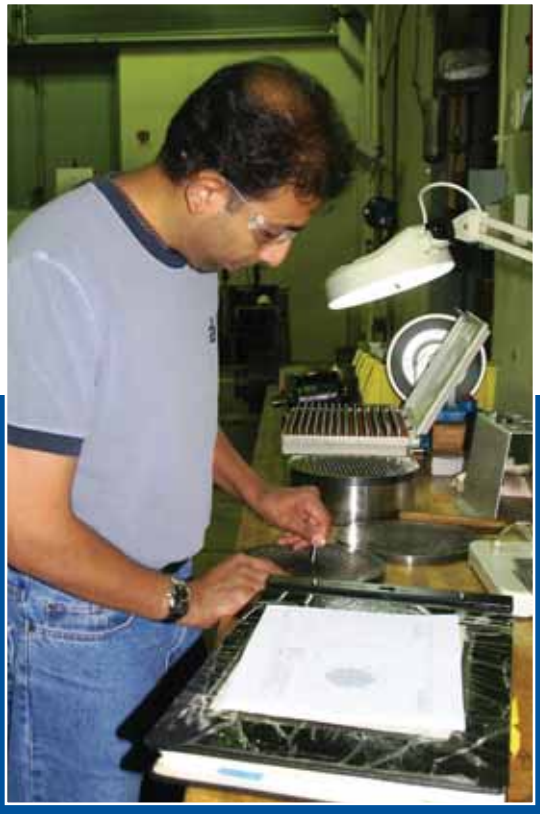
The NASA Orion Crew Exploratory Vehicle (CEV) Aerothermal test program focused on investigating surface roughness-augmented heating at simulated hypersonic atmospheric reentry test conditions. Data acquired during these tests will be used by NASA to understand the heating environment which the vehicle will need to survive during atmospheric reentry. Testing concluded in the summer of 2008, with successful completion of 32 runs which met all primary and secondary test objectives.

The goal of the Reentry Nosetip Aero Trim test effort was to acquire empirical data to validate computational fluid dynamic (CFD) codes that characterize the effects of asymmetric nosetip shapes on tri-conic reentry bodies at low angle of attack and low altitude conditions. Force, moment, surface pressure and surface temperature/heat transfer data were acquired from -3 to +3 degrees angle of attack at a Mach 8 free stream and high Reynolds number condition. Flowfield Schlieren/ shadowgraph imagery was also obtained. By the end of the fiscal year, a total test matrix of six runs was successfully accomplished. Data reduction and analysis began in fiscal year 2009.

Scheduled maintenance activities were successfully completed during the summer of fiscal year 2008 to maintain the facility in a mission ready status. The actual readiness and performance metrics for this capability were exceeded with a 100 percent availability and more than 97 percent success rate for test execution. The design of a new control room for the facility was completed and scheduled for installation during the first half of fiscal year 2009.

Fiscal Year 2009 Forecast

Tunnel 9 will begin a scheduled outage during the first two quarters of fiscal year 2009. Major construction of the federal property is to begin in October 2008 which will require suspending operations until complete. During that time, backlogged maintenance will commence and the new control room will be installed and verified. Once complete, testing is expected to start for the Air Force, DARPA and the Army.



Madhav Rao, an ATA systems engineer at AEDC's Hypervelocity Wind Tunnel 9, inspects one of the holes for ablators that fit into a flow restrictor assembly, which controls flow conditions in the test cell. Ablators, in this case, are devices that lose material from their surface by vaporization and friction during reentry into the Earth's atmosphere. Rao is measuring the holes as part of a redesign effort on the ablator retaining plate, which holds them in place when subjected to simulated reentry conditions during a test.

hypersonics

Operating Location

NFAC

The National Full-Scale Aerodyanmics Complex (NFAC), located at NASA Ames Research Center in Moffett Field, Calif., was reactivated in 2006 as an AEDC-operated facility. This wind tunnel testing facility – which closed in 2003 due to budget pressures – underwent two years of refurbishment before attaining full operational capability (FOC) in early 2008.

Fiscal Year 2008 Highlights

During the fiscal year, the U.S. Army, Defense Advanced Research Project Agency (DARPA), NASA and Sikorsky Aircraft Corporation tested at NFAC.

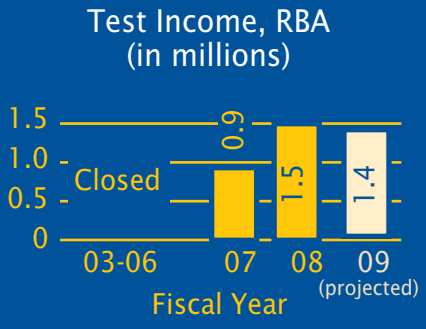
In December 2007, NFAC supported space exploration with the successful dynamic loads and development testing of NASA's Mars Science Laboratory parachute. The parachute – which is used to slow down spacecraft during entry, descent and landing – holds more air than a 3,000-square-foot house and is designed to survive loads in excess of 81,000 pounds. During testing, the parachute was attached to a launch arm, mounted on a swivel base inside the 80-by-120-foot wind tunnel, so it could be tested under conditions simulating entry into the Martian atmosphere.

NFAC Test Engineer Al Lizak surveys the large rotor test apparatus test rig prior to testing

After undergoing two rounds of testing, data concluded that the parachute could successfully survive while descending into the Martian atmosphere.

In early 2008, NFAC achieved FOC for rotorcraft testing which allowed the wind tunnel complex to conduct its first military test entry since its reactivation.

The first test article, Boeing Corporation's, Smart Material Actuated Rotor Technology (SMART) helicopter rotor, was tested in the 40-by-80-Foot Wind Tunnel to study the system's forward flight characteristics and collect baseline data to validate cutting-edge aero-acoustic analysis codes. Furthermore, the information obtained from the rotorcraft testing helped advance DARPA's Helicopter Quieting Program. DARPA is utilizing the data



Unique full-scale wind tunnel testing

to advance design tools for the next generation of the Department of Defense's service platforms.

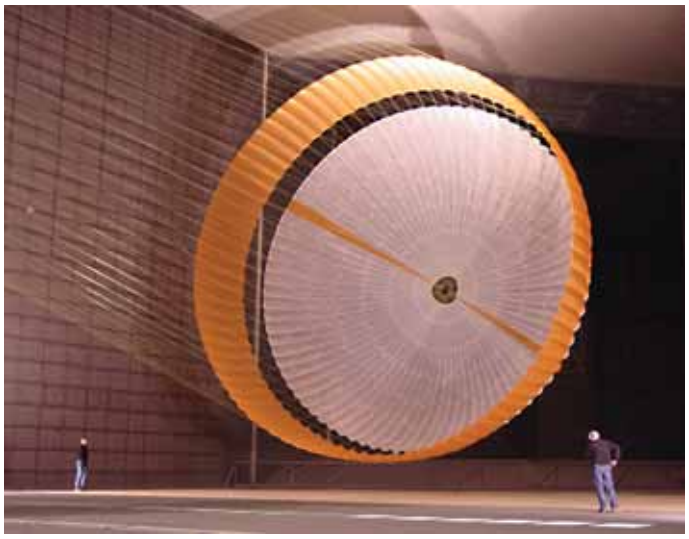
In fiscal year 2008, the NFAC team was awarded the San Francisco Chapter of the American Helicopter Society 2008 award for Outstanding Contribution to the Powered-Lift Field Vertical Take-Off and Landing (VTOL). The award recognized the multi-service and industry team who completed a five-month detailed check-out of the UH-60 rotor system mounted on NASA's Large Rotor Test Apparatus (LRTA) in NFAC's 80-by-120-foot wind tunnel. This test enabled the first forward flight rotor test in the facility since 2003.

Revenues for fiscal year 2008 were approximately $1.5 million.

Fiscal Year 2009 Forecast

During fiscal year 2009, NFAC will continue its focus on rotorcraft testing using the LRTA to evaluate the benefits of the Individual Blade Control (IBC) Technology for performance and acoustic enhancements.

Additionally, NASA's Mars Science Laboratory will return for a final series of testing before launching the satellite system in 2011.



Two engineers are dwarfed by NASA's Mars Science Laboratory's parachute, which holds more air than a 3,000-square-foot house and is designed to survive loads in excess of 36,000 kilograms (80,000 pounds). The parachute, built by Pioneer Aerospace, South Windsor, Conn., has 80 suspension lines, measures more than 65 feet in length, and opens to a diameter of nearly 55 feet. It is the largest disk-gap-band parachute ever built and is shown here inflated in the test section with only about 12.5 feet of clearance to both the floor and ceiling of the world's largest wind tunnel at NFAC. The parachute is attached to a launch arm mounted on a swivel-base that allows the test item to pitch and yaw under simulated conditions of subsonic entry into the Martian atmosphere.

From left, Chris Barkley, a Boeing mechanic, and Oscar Joson, NFAC wind tunnel mechanic, conduct a pre-flight blade inspection on a full-scale, state-of-the-art helicopter rotor system. The test article, a Boeing Corp., SMART helicopter rotor, was tested in the NFAC's 40-by-80-Foot wind tunnel to study the system's forward flight characteristics and to collect data to validate cutting-edge aero-acoustic analysis codes.

704th Test Systems Group

The 704th Test Systems Group, comprised of the 649th, 650th and 651st Test Systems Squadrons, is responsible for management of all test infrastructure investment and applied technology programs for improving AEDC's Research, Devleopment, Test and Evaluation (RDT&E) facilities, test techniques, instrumentation, analysis and evaluation capabilities.

The 704th Test Systems Group directs investment and technology programs valued at approximately $114 million annually in Improvement and Modernization (I&M), Central Test and Evaluation Investment Program (CTEIP), Restoration and Modernization (R&M), Military Construction (MILCON) and technology funding and sets policy for and manages AEDC's systems engineering process. In conjunction with AEDC's Plans and Programs (XP), the 704th Test Systems Group plans new test capabilities and/or facilities to satisfy future test requirements and prepares and executes long-range investment plans.

649th Test Systems Squadron

In fiscal year 2008, the 649th Test Systems Squadron (TESS) carried out technology development programs worth approximately $35 million. To successfully execute this program and meet a variety of test customer needs, the squadron has emphasized collaborative relationships that integrate and leverage technical expertise and various funding programs.

Working across AEDC and in coordination with internal and external customers, the 649th TESS identifies requirements that can potentially be met through technology development. The squadron then leverages the Small Business Innovative Research (SBIR), Test and Evaluation, Science and Technology (T&E/S&T), and the Air Force Office of Scientific Research (AFOSR) programs to mature and demonstrate many of the technologies. Once a technology has been shown to have potential, the squadron will then apply internal AEDC T&E, reimbursable outside customer or CTEIP funding to improve and transition the technology to AEDC mission areas. Technical expertise and advancements are also obtained through collaborative ventures with many organizations.

Mission Statement

Direct test systems/facilities restoration, modernization, and improvement projects to deliver AEDC RDT&E capability. Direct applied test technology and analysis programs for improving RDT&E facilities, test techniques, instrumentation, analysis and evaluation capabilities. Manage the AEDC systems engineering process.

Tech. Sgt. Michael Dambrino, 704th Mission Support Group, Logistics office, watches as Sam McKelvey operates the fuel additive injection rig, which adds chemicals to the synthetic fuel to prevent corrosion and icing, while improving the lubricity of the fuel.

Management of all test infrastructure investment and applied technology programs

Fiscal Year 2008 Highlights

AEDC mission areas advocate technology development programs to benefit their specific areas that are both visionary as well as requirement-driven.

The Flight Systems technology development program included wind tunnel flow and trajectory visualization, computational fluid dynamics (CFD), pressure sensitive paint and model attitude and deformation. Particle Image Velocimetry (PIV) technology (a non-intrusive flow measurement technique) was demonstrated in collaboration with Sandia National Laboratory and NASA Glenn Research Center. When combined with CFD, the "off-body" flow interactions (such as vortices impacting the tail surfaces) can be better characterized.

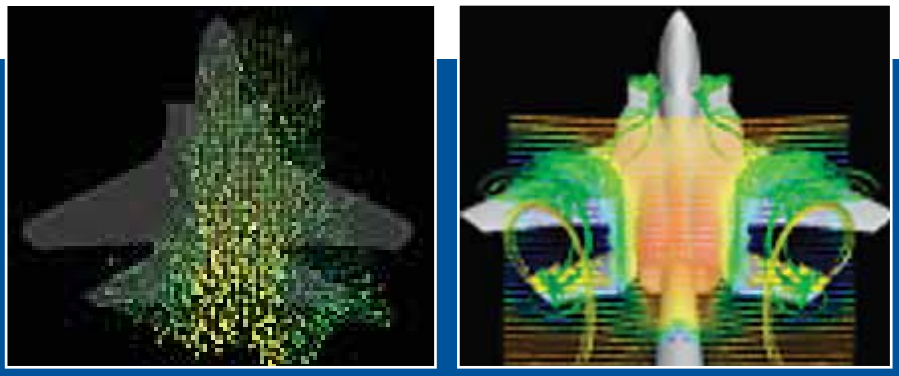
The Aeropropulsion technology developments were focused on aerodynamic and structural modeling, emissions characterization, inlet distortion simulation as well as intrusive and non-intrusive diagnostics. AEDC's technology personnel collaborated with the Air Force Flight Test Center to integrate ground test analysis techniques with flight test data. Additional collaborations with AFRL and Tinker AFB, Okla., resulted in the development of an alternative fuels certification testing technique for synthetic fuels.

AEDC was recognized by Research & Development Magazine for a top 100 technology advancement award for the Rumble and Screech Spectral Mapping Analysis Tool (RASSMAT). RASSMAT was jointly developed by AEDC and Advanced Fuel Research, Inc. under the SBIR program. When fully implemented, RASSMAT will support engine health monitoring and augmenter instability testing at a significant cost savings to the government.

Space and Missile technology emphasis was on high enthalpy material erosion visualization, hypersonic flow characterization, arc heater segment technologies, space sensor scene generation and space environments characterization. Four hypersonic probes were developed under the T&E/S&T program and prototypes were tested in hypersonic facilities. These optical and flow field probes are designed to withstand continuous exposure to high speed and high temperature environments and will help more accurately characterize test results.

In support of test facility and plant operations and maintenance, technologies are being explored that improve facility controllability, allow remote equipment and valve monitoring, and predict maintenance actions based on acoustical equipment monitoring. This year, the Non-intrustive Stress Measurement

RASSMAT team members Brad Winkleman (AEDC), Jim Markham (AFR) and Kent Wilcher (AEDC) receive the Research & Development (R&D) Magazine Top 100 Award (Not pictured from AEDC are Ron Bishel, Don Gardner, Paul Jalbert and Vince Zaccardi).



Images of Particle Image Velocimetry (PIV) flow field measurement coupled with CFD are shown.

System (NSMS), developed by AEDC for aeropropulsion engine monitoring, was adapted to support facility health monitoring in both the 16T wind tunnel main compressor and the NFAC compressors.

A major part of the program was core technologies that have joint application across the mission areas or those technologies with projected payoffs five to 10 years in the future. These technologies include the introduction and integration of new sensor technology into the production environment, reducing test installation time and improving system performance and reliability. Advanced turbulence modeling will improve the store separation accuracy for advanced aircraft and prediction of aerodynamic flow fields for inlets.

Fiscal Year 2009 Forecast

The fiscal year 2009 workload for the 649th TESS is very comparable to the fiscal 2008 workload. Collaboration will continue with the SBIR, T&E/S&T and AFOSR programs as well as with our other technology development partners. Additionally, AEDC will continue to support a CTEIP project called Towed Airborne Plume Simulator (TAPS). The 649th TESS is supporting the Center for Countermeasures to develop the TAPS burner and control system as well as providing the ground test development facilities. TAPS will be used in flight test to simulate missile launches, which will allow airborne sensors like those in the Large Aircraft Infrared Countermeasures system to be tested more realistically.

Providing faster and cheaper analysis of customer test data while continuing to refine the integration of computational tools will be key parts of the squadron program. The program will include facility and plant modeling, distortion modeling, high cycle fatigue instrumentation and test methods, force balance accuracy improvement, captive trajectory and store separation modeling, on-line data validation for dynamic wind tunnel testing, arc heater performance improvement, hypervelocity range launch technologies, data warehousing and space chamber and sensor test technology.

650th Test Systems Squadron

The 650th Test Systems Squadron (TESS) is responsible for the planning of restoration, modernization and improvement projects to deliver enhanced AEDC RDT&E capability in support of simulated flight tests of government, commercial and international aircraft,

Center engineers ran a series of tests on a Towed Airborne Plume Simulator (TAPS).

Tim Wright, an ATA outside machinist, coordinates the movement of a 1/10-scale model, sting-mounted AIM-120C store from an F/A-18E/F aircraft during a break in store separation testing inside AEDC's 16-foot transonic wind tunnel.

missile and space systems. Additionally, the squadron manages AEDC's systems engineering process.

Fiscal Year 2008 Highlights

Fiscal year 2008 culminated a year-long effort to revitalize and improve System Engineering (SE) processes at AEDC.

During this time, a more uniform and effective center SE approach was implemented resulting in products, services and processes that meet customer requirements throughout their systems life cycles in a cost-effective and efficient manner. This enabled AEDC's investment process to deliver new or increased capabilities to test facilities at AEDC by effectively following Department of Defense acquisition guidance on SE. It also developed an integrated SE approach that is applied throughout a system's life cycle providing AEDC personnel with information that assures consistent, efficient and effective performance of SE and Configuration Management (CM).

The new SE process facilitates each engineer and project manager to translate mission capability changes into a newly configured or modified system by using a systematic, iterative and integrated approach. Furthermore, the new SE process integrates all technical disciplines into a coordinated effort that meets established program, project, or activity cost, schedule and performance objectives.

The 650th TESS also revamped three operating instructions and two standards, which culminated a significant year-long effort involving four groups and nine squadrons. A Systems Engineering Council was established to support the center SE process, ensure consistent SE implementation across the AEDC enterprise and serve as a forum for collection and discussion of AEDC SE process improvements. The squadron also initiated a working group to re-scope the RDT&E Facility Investment Plan to identify capability project choke points–to tie new investment projects to strategic plans and roadmaps.

Another key improvement was the squadron significantly upgraded the AEDC investment planning process, changing the basic culture of how to plan investment projects. This resulted in a more efficient use of AEDC's limited resources and provided a higher degree of investment customer satisfaction.

During fiscal year 2008, 24 planning projects were started and 11 projects were completed through the systems requirement review. Twelve projects will continue to be planned in fiscal year 2009. AEDC saw significant benefits from three planning projects – the C-1/C-2 Test Cell Cooling, Aerodynamic Propulsion Test Unit (APTU) 6.9 kV Operational Power and APTU Hydrogen Detection – that would not have occurred under the previous requirements generation process.

Fiscal Year 2009 Forecast

During fiscal year 2009, the 650th TESS will continue to refine the SE process across the investment portfolio. Plans include implementing improvements in risk management, requirements analysis and SE tailoring, as well as implementation of the AF SE assess-

First Lt. Ryan Hawley briefs a group who toured the APTU facility. The visitors are members of the Supersonic Tunnel Association International (STAI). The STAI semi-annual conference was held in Nashville and part of the conference was to tour AEDC facilities to better understand their operation and capabilities. Some AEDC personnel have been STA/STAI members since the first meeting in 1954 in Texas. The visitors included personnel from NASA and other U.S. wind tunnel facilities in addition to international representatives.

704th Test Systems Group

ment tool to identify SE strengths and weaknesses. Additionally, the squadron will continue to plan projects in advance of execution. Approximately 21 fiscal year 2009 projects (including any fiscal year 2008 carry-overs) have been identified.

651st Test Systems Squadron

The 651st Test Systems Squadron (TESS) is responsible for the execution of restoration, modernization, and improvement projects to deliver enhanced AEDC RDT&E capabilities. The squadron provides program management for system design, procurement, fabrication, installation, construction and checkout.

The execution of the various projects includes multiple funding sources, such as CTEIP, MILCON, I&M, Test Investment Programs (TIPP), R&M and Maintenance and Repair (M&R).

These efforts provide the mechanism to meet future test needs while right-sizing the test infrastructure, reducing test systems maintenance and cutting operational costs.

Fiscal Year 2008 Highlights

The scope of the 4T Modernization project was to improve weapons separation simulation, acoustic measurement system, upgrading high angle-of-attack measurement system, updating the flex nozzle control system and data acquisition system hardware. It also included modernization and automation of process air controls and test section controls. The overall effort was comprised of several programs, each designed to achieve the necessary and required modernization.

The 4T test facility was originally developed to provide a lower cost option for air vehicle aerodynamics and weapons separation risk mitigation. Operational in the early 1960s, only a few of the key components and control systems were modernized in the intervening years. Key subsystems include the nozzle actuators and control system and the Captive Trajectory System (CTS). The existing CTS is nearing the end of its useful service life and does not have adequate structural load bearing capability as required by newer weapons systems.

Additionally, the 651st TESS conducted a System Requirements Review (SRR) to establish requirements for the 4T Flex Nozzle. Concept alternatives were evaluated and rated

(From left) ATA Outside Machinists Gary Cunningham and R.B. Ray install an External Tank Thermal Protection System foam sample tile prior to injection into Tunnel C which was already running at Mach 4 and 1,440 degrees Fahrenheit. The TPS foam protects the space shuttle's external tank during ascent.

ATA Outside Machinist Jim Lynch makes adjustments to a model of a GBU-31 Joint Direct Attack Munition (JDAM) before a F-35 Lightning II store separation.

for the CTS replacement. Additionally, a planning review was conducted on the 4T Data System as well as a System Requirements Review (SRR) to establish requirements to increase Mach number capability in 4T from 2.0 to 2.46.

Another effort underway was a modernization activity on Tunnels A, B and C. The scope of the effort over the next six years is to provide modernization and standardization through substantial upgrades for Transonic Tunnel 4T, the Supersonic Tunnel A, Hypersonic Tunnels B and C and the von Kàrmàn Plant (V-Plant) at AEDC.

Also, an additional effort will be to revitalize and upgrade the infrastructure of Tunnels A/B/C in order to provide enhanced operation, reliability, measurement, and simulation capabilities. The data acquired in these tunnels have contributed to the development of everything from the X-planes that stretched the boundaries of flight to the latest aircraft and missiles in the DoD inventory.

The Propulsion Consolidation & Streamlining project was a $36.6 million effort that executed from fiscal year 2004 through fiscal year 2008. This project upgraded the AEDC Engine Test Facility (ETF) Test Cells to take advantage of the AEDC C-plant capability by improving plant systems reliability/availability and mitigating single point failures throughout plant systems and reducing engine installation and removal cycle time. Completing this project was an important step in allowing AEDC to realize the benefits of consolidating to a single ETF plant by reducing AEDC reliance on aging infrastructure that is past its design life.

These improvements will provide benefits to all military engine programs tested at AEDC as well as commercial customers. Some of the programs supported include F100, F110, Rolls-Royce Trent, P&W GP7200, P&W 6000, F119 and the F135 and F136 JSF engine programs.

From left, AEDC's Brett Ables, Mark Chappell, Dr. Pete Cento, Brian Binkley, Dr. Don Malloy and Paul Burns (not pictured) were recognized with a Billy J. Griffith award during the local Tennessee AIAA section 2008 awards ceremony. The award was presented to the team made up of propulsion integration experts and system modelers from AEDC and the Air Force Flight Test Center (AFFTC) at Edwards AFB for their integration of historical J85 engine ground test results with flight test results, cycle deck and in-flight thrust predictions and CFD predictions. The J85 powers the T-38 military trainer aircraft.

The second Billy J. Griffith award was given to a team comprised of (from left) Mark Chappell, Andy Escue, Keely Beale, Tommie Heard, Ruth Clowers, Stephen Savelle and Woody Dorrell earned for their work developing the Engine Cycle Model Integration Software (ECMIS) suite, a set of tools which supports engine health management evaluations for the entire USAF fleet.

704th Test Systems Group

704th Maintenance Group

The 704th Maintenance Group (MXG) is responsible for the operations and maintenance of AEDC's Research, Development, Test and Evaluation (RDT&E) systems and equipment. This encompasses a 24-hours-a-day, seven-days-a-week support system to national aerospace ground test facilities, industrial plants, test cells, utilities, laboratories and a state-of-the-art fabrication shop.

On an annual basis, a cadre of experienced and knowledgeable government asset managers, Aerospace Tesing Alliance (ATA) system architects and engineers develop a comprehensive Asset Management Plan to manage these activities effectively.

This team identifies areas for improvement, tracks 'lost test time,' monitors asset health, performs configuration management, evaluates performance, and accounts for resources expended in the performance of contracted work. After each assessment, the center executes the plan with support from maintenance resource managers.

By focusing on good asset stewardship, the 704th MXG ensures the readiness and capability sustainment of facilities within the test mission areas.

All of these functions, help the AEDC maintenance program 'strike the right balance' in terms of assets, people and performance.

Fiscal Year 2008 Highlights

During fiscal year 2008, the 704th MXG implemented and built upon a number of programs and procedures to meet the needs and requirements of the center. The group successfully lowered lost test time by applying

Mission Statement

Responsible to the AEDC Commander for the programming, management, quality assurance evaluation, standardization, execution, and reporting of all test infrastructure facility operations and maintenance programs. Interfaces with DoD, non-DoD and commercial acquisition and logistics organizations to ensure project management of test infrastructure facility operations, maintenance and logistics projects meet AEDC mission requirements. Evaluates mission support contractor performance and recommends award fee grade for the Facilities Operations and Maintenance functional area to the Program Executive Officer for Major Service contracts and the Award Fee Review Board.

Members of the 704th MXG and ATA teammates pose for a photo commemorating the Group's selection by Uptime® Magazine for the 2008 Predictive Maintenance Program of the year.

Programming, management, quality assurance evaluation, standardization, execution, and reporting of all test infrastructure facility operations and maintenance programs

Reliability-Centered Maintenance (RCM) technologies, asset management planning, and safety initiatives in their daily operations.

The Maintenance Quality Assurance program helped the 704th MXG focus in on key areas such as tool control, housekeeping, safety and procedural compliance. In addition, it identified a need to establish a maintenance quality organization that would ensure individual work instruction/work tasks were performed within the specified standards. During weekly staff meetings, the group reviewed findings from Field Audit and Inspection Checklists, as well as the program and performance metrics, to determine areas for improvement.

The fiscal year also brought an increased emphasis on RCM efforts. By using ultrasound condition based maintenance technologies to identify leaks in RC1 cooler piping, center personnel were able to identify 'hot spots' with infrared thermography and conduct repairs without interrupting test schedules.

In addition, investment and maintenance personnel integrated scheduling through the Missions Operations Control Center (MOCC) to accomplish complex modifications and repair actions. ATA also created a dedicated planning team – who received accolades for managing a significant number of tasks in support of testing – for the ETF summer downtime to facilitate the repairs to AEDC's facilities.

Furthermore, the 704th MXG led development of Air Force Smart Operations for the 21st Century (AFSO21) Improvement Initiatives in the area of RCM. Maintenance personnel recorded their findings and presented them in papers at a number of public forums to include the University of Tennessee's Maintenance and Reliability Conference and the Predictive Maintenance Conference.

A key highlight was Bart Jones, ATA's maintenance director, serving as the keynote speaker for the International Maintenance Conference. At the conference, the ATA Facilities Operations and Maintenance Department's Conditioned-Based Maintenance (CBM) Team was recognized as the 2008 Predictive Maintenance (PdM) Program of the Year by Uptime Magazine.

The Chemical and Metallurgical Lab also received a recertification and recognition as one of the top three in the world during 2008.

All of the actions – training, certification programs, development of accurate techni-

An XS 2 rotor for Engine Test Facility repair.

Technicians perform an ultrasound inspection of RC1 cooler piping.

cal data, and investment projects – taken by the 704th MXG during fiscal year 2008 helped AEDC maintain a focus on Safe, Reliable, Effective Operations (SREO). This focus enabled AEDC to set an all-time record low injury rate, and ensure excellent maintenance performance.

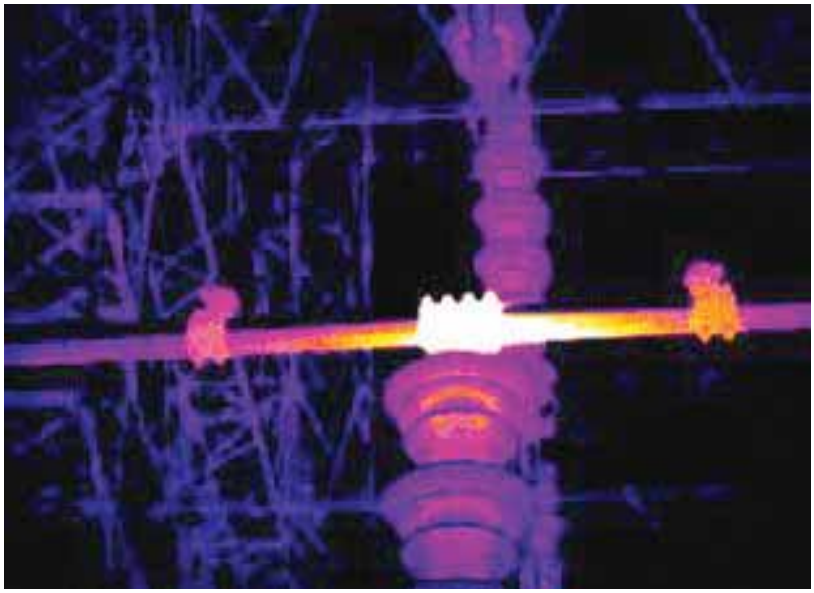
Fiscal Year 2009 Forecast

Another excellent year of maintenance performance is anticipated in 2009; however, there are challenges ahead.

A mixture of real-world events, base events, aging and deteriorating systems, funding, work force, deployments, programs, logistics and other issues will test the Group's ability to deliver reliable asset performance.

Thus, the maintenance program has identified initiatives (listed below) to improve performance in fiscal year 2009.

The initiatives will help AEDC cultivate a total systems sustainment culture to deliver highly reliable and available RDT&E systems. By proactively applying the latest maintenance technologies and business management principles, the 704th MXG will be an essential player in AEDC's success during fiscal year 2009.



This infrared image was taken from the Power Control Main 161 yard. The electrical connection that is yellow shows more than 150 degrees hotter than any other part of the main yard line. Infrared imaging provides a path toward safer operations and early detection of problems. As the benefits of infrared imaging were realized and the cost to attain the data was reduced, inspections were scheduled quarterly, whereas before it was often the practice to only perform this inspection once every year or two.

Fiscal Year 2009 Initiatives to Improve Performance

- Expanding development of asset strategies beyond the initial 10 developed previously to critical compressors, pumps and related equipment that are either included in large investment projects or have shown the need for RDM technologies application to increase reliability.
- Increasing coordination between government and contractor asset managers and system architects in the area of planning and configuration change processing and approval.
- Continuing the focus on quality performance of preventive maintenance actions as well as diligently documenting maintenance data, quality of work instructions and vaulting of configuration technical data.
- Integrating several Small Business Innovative Research initiatives into the maintenance program. These projects may prove the use of wireless for plant health monitoring can be performed with secure data transmission thereby avoiding costly installation costs and allowing expansion of the plant health monitoring program.
- Upgrading fabrication shop equipment and welding processes. ATA created a new organization within the AEDC shops to coordinate in-service inspection of pressure and hazardous material systems.

704th Mission Support Group

The 704th Mission Support Group (MSG) is responsible for mission support to include medical activities. AEDC's mission support includes communications, information management, civil engineering, security forces, Medical Aid Station, logistics readiness, services and resource management.

704th Civil Engineer Squadron

Fiscal year 2008 Highlights

In fiscal year 2008, 704th Civil Engineer Squadron (CES) projects included the construction of a new main gate; renovation of the Fire Department; upgrades to the base Fitness Center; and design/execution of 179 utility, infrastructure, roof, paving, and heating, ventilation and air conditioning system projects. Upgrades made to the Fitness Center included construction of covered walkways connecting the main facility and the racquetball courts.

Above, renovations at the Fitness Center included repaving the outside entry ways, adding new canopies, a new HVAC system, a renovated lobby, a new weight room and landscaping. Right, Arnold AFB's Main Gate construction project included reconfiguration of the entrance from Wattendorf Highway, a new entry facility and entry booth.

Row thinning takes place throughout the timbered acres of Arnold AFB. Thinning helps increase the growth of the remaining trees and develops and improves wildlife habitats.

Asset Management Flight (Environmental)

AEDC is committed to minimizing the impacts of our operations on the environment, while maintaining our excellent reputation for environmental stewardship. Our goal is to sustain mission capability while integrating sound environmental practices throughout all activities.

Under the guidance of DoD's Environmental Restoration Program, AEDC maintains an aggressive program to cleanup contamination from past military activities. Stakeholder involvement is crucial to the success of this cleanup effort.

AEDC's Restoration Advisory Board (RAB) provides the public (i.e., local residents, AEDC and regulatory personnel) with a forum for communicating current and future cleanup efforts. Each quarter, the RAB meets to discuss restoration plans and other environmental efforts impacting the surrounding communities.

Environmental scientists from Arnold organized, wrote the charter and chaired the Tennessee Bat Working Group to protect a federally listed endangered bat species, the Gray bat. Colonies of Gray bats make the home on Arnold Air Force Base property.

Fiscal Year 2008 Highlights

Integrated natural and cultural resource management is an important aspect of AEDC's environmental program. Significant progress on objectives in the implementation of both the 2007-2011 Integrated Natural Resources Management Plan and the 2007-2011 Integrated Cultural Resources Management Plan were made in fiscal year 2008. The objectives were accomplished through integrated planning with installation planners, military personnel (including the Tennessee Army National Guard), and conservation partners.

One major milestone achieved by the AEDC Environmental Restoration Program was the completion of the Resource Conservation and Recovery Act (RCRA) Facility Investigation and Corrective Measures Studies for the Engine Test Facility and Propulsion Wind Tunnel sites.

As a large industrial complex, the center requires the use of fuels, lubricating oils, hydraulic fluids, and refrigerants to accomplish its test mission. However, the center is continuously working to eliminate or replace these hazardous materials with environmentally friendly ones.

In the past year, AEDC placed a greater emphasis on 'buying green' and investing in green programs. For example, through our Green Procurement Program, employees receive training on how to identiy and purchase products made from recycled materials, bio-based materials and demonstrate energy efficiency. Other examples of 'green' initiatives at AEDC are the testing of bio-based janitorial cleaning products and soy-based lubricants and greases.

AEDC also completed an Endangered Species Act consultation to determine the potential impact of maintenance projects on Woods

The Prairie Gentian is one of 62 rare plant species found on Arnold AFB. In fact, it is one of the rarest plants in Tennessee, found only in three locations.

Reservoir's Dam on the federally protected Gray Bat. Additionally, the center contracted projects for Arnold AFB to enhance rare and sensitive species habitats, which includes the controlled treatment of 3,000 acres for invasive plant species.

Other environmental projects for fiscal year 2008 included the development and testing of an Independent Power Project (IPP) Monitoring protocol, management of the Eggert's Sunflower, controlled burning of 1,375 acres, and monitoring projects required by the U.S. Fish and Wildlife Service delisting criteria.

Overall, our conservation partnerships remain strong with the U.S. Fish and Wildlife Service (USFWS), Tennessee Wildlife Resource Agency, and the Tennessee Department of Environment and Conservation's Division of Natural Areas.

Fiscal Year 2009 Forecast

A major cleanup for the Model Shop will begin in the new fiscal year. The project will include a new design and construction of a thermal treatment system, which will combine stream and thermal conductive heating to remove perchloroethylene – a chlorinated solvent. While the project will conclude in fiscal year 2010, a majority of the work will occur in fiscal year 2009. Overall, the project will cost $11 million.

The center will also address the remaining sites which need environmental cleanup in the Camp Forrest area.

704th Security Forces Division

ATA security forces officers are "bonded and deputized" in Tennessee's Coffee and Franklin counties. They are also certified under the National Incident Management System (NIMS) and the DoD HAZMAT certification course.

Fiscal Year 2008 Highlights

Security and Emergency Response Forces continued to provide vigilant support to Arnold AFB's 40,000 acres and multi-billion dollar infrastructure. During the fiscal year, Security Forces continued efforts to upgrade AEDC facilities in accordance with DoD, Air Force and Air Force Materiel Command (AFMC) Anti-Terrorism/Force Protection requirements.

Additionally Security Forces hosted the Air Force Level II Antiterrorism Course which had national attendance by Air Force personnel.

Fiscal Year 2009 Forecast

Security Forces will be the lead oversight agency responsible for attaining full compliance with Underwriters Laboratories (UL) 2050 certification of the base-wide alarm system as mandated by the National Industrial Security Program Operating Manual. In fiscal year 2009, they will continue the process of upgrading the installation Closed Circuit Television (CCTV) System and stand-up a fully operational Ground Based Mobile Radar (GBR) trailer in support of AEDC's Integrated Base Defense Security System (IBDSS).

Jason Layne, AEDC Police K-9 Unit officer, poses with Astrid, the center's explosive detection dog, an eight-year-old Belgian Malinois. The duo participated in the Annual K-9 Olympics at the Vohne Liche Kennels in Denver, Ind., placing second place in Explosive Team Overall and in Residential Explosives.

704th Services Division

Fiscal Year 2008 Highlights

The 704th Services mission is to contribute to the readiness of the Air Force and other Armed Forces personnel through fitness and subsistence programs, fostering unity and community cohesion; support Air Force and other Armed Forces family well being; and offer efficient customer-driven programs to improve the quality of life for the Arnold work force and Community.

Services significantly improved the Fitness Center by adding a weight room, which simultaneously freed space for group classes and fitness assessment. In addition, the foyer/reception area was completely refurbished to better serve customers.

The inaugural Fitness and Health Expo hosted by the Fitness Center also welcomed more than 1,000 attendees showing how open the community is to welless.

At the Community Activities Center, the school age spaces renovation project was finished. Also the staff began offering guitar and drum lessons.

On the camping front, Crockett Cove, comprised of five rustic rental cabins located on Woods Reservoir, opened. Around the bend, the FamCamp was upgraded with new electrical and water hookups, as well as new level sites with concrete pads. Finally, in outdoor recreation, the RV storage lot was relocated and space doubled with easier access.

The Golf Course initiated removal of 77 trees and 133 stumps which improved playability of the course.

In December 2007, Air Force News covered the highly anticipated arrival of Santa by floatplane at the Children's Christmas Party. A crowd of near 1,000 enjoyed a day full of activities, food, snacks and gifts.

The fiscal year went out with a bang at the annual Air Force Birthday Bash in September 2008. This event was free to the public and welcomed a record number of more than 2,500 patrons. The day provided something for all ages from clowns, caricature artists, and magicians to games, rides, sports, music and fireworks.

Fiscal Year 2009 Forecast

Services will continue making strides toward improvements such as the Arnold Lakeside Club conversion initiative from a "club" to a "center." This realignment will provide more appropriated fund financial support conveying benefits to the customer through quality programming and facility amenities. The club also has a project aligned to renovate the bar.

Surrounding communities came out to Arnold's Gossick Leadership Center recreation area to celebrate the Air Force's 60th birthday. Carnival games, mini rides and lots of food were available along with live music and fireworks.

One of the single-room cabins at Arnold Air Force Base's Crockett Cove. It sleeps up to four people while the two-room units, visible on the right, sleep six.

"Buddy the Elf," portrayed by Capt. Clay Couitt rounds up nearly 700 children before passing out presents to each child at the annual Children's Christmas Party.

Outdoor Recreation has substantial plans to further improve the Crockett Cove area with lodge and bathroom facility renovations and to increase the marina fleet. The Fitness Center continues to progress with covered walkways connecting the main facility and racquetball building. The Golf Course is in negotiation to initiate the "We Proudly Brew" program to offer Starbucks brand products.

704th Communications Squadron

The Arnold Research & Engineering Network (AREN) was deployed to align Development Test and Evaluation (DT&E) activities accessing the Defense Research and Engineering Network (DREN) and provide improved network security for those mission activities while preserving data connectivity to DT&E customers.

The Communications Squadron began local deployment of the Air Force Enterprise Information Management solution SharePoint. When fully deployed, this will provide enhanced information sharing capability for personnel across the Command.

In response to direction from both Headquarters Air Force Materiel Command Vice Commander and the Secretary of the Air Force, Office of Warfighting Integration and Chief Information Officer, the squadron developed a base-wide approach and began consolidating and reducing digital printing and imaging devices that will result in providing these capabilities at reduced cost. In conjunction with the reductions, the squadron also began centralized management of print devices, which will result in greater standardization and reduced operations and maintenance costs, as well as engineered deployments of devices.

A network upgrade was completed in the Engine Test Facility (ETF). As a part of the upgrade, network switches throughout the ETF network were replaced with higher capacity switches to allow faster data transmission throughout the test cells and computer rooms supported by the ETF network. The project was complementary of a predecessor project to upgrade and modernize the core of the ETF network.

Finishing touches were applied to the upgraded base-wide security alarm network in 2008. This upgrade provides a communication backbone for the new, state-of-the-art security system implemented by AEDC's Security Forces Office.

The local Document Automation & Production Service (DAPS) office at Arnold AFB was closed at the end of the fiscal year. Closing the office eliminated the need to subsidize the under-utilized DAPS operation at a cost of more than $100,000 per year. In addition, quality of products produced at the regional DAPS facility is vastly better than could be accomplished on the aging equipment in the on-base print plant.

AEDC maintains one of the Department of Defense's largest High Performance Computing (HPC) Test and Evaluation (T&E) computational capabilities. The center currently maintains three HPC-class computer systems

AEDC's 704th Communications Squadron won the Lt. Gen. Harold W. Grant Air Force Communications and Information Annual Team Award for 2008. The award recognizes communications and information groups and squadrons for sustained superior performance and professional excellence.

704th Mission Support Group

with a combined capacity of 1.4 trillion Floating Point Operations per second also known as teraflops. During fiscal year 2008, a total of 900,000 computational hours on AEDC HPC resources were expended in support of the local Computational Fluid Dynamics (CFD) activities while maintaining a 99.76 percent availability of computational resources.

CFD projects which benefited from AEDC's infrastructure included: Swirl Generator Concept Wind Tunnel, Facility Flow Analysis for FaCET test in the Aerodynamic and Propulsion Test Unit (APTU), Aeropropulsion Systems Test Facility (ASTF) C-2 BR725 Engine Icing Test Analysis, C-130 Air Data Probe Positioning, APTU (Mach 6) nozzle heat-transfer computations for structural analysis, T3 Vectored Exhaust Study, Arc Heater Stilling Chamber Design, Analysis of YsZ elements, Institute for High Performance Computing Applications to Air Armaments (IHAAA) store separation development support, Armament Munitions Digital Modeling and Simulation (AMDMS) Directed Energy, H2 Mixing Chamber and Nozzle Upgrade and Enhanced Smart Triple Ejector Rack (ESTER) Support.

The data warehousing requirements of AEDC's HPC resources are handled by a high speed near-line mass storage capability which also supports archival of test data from AEDC's ETF and Propulsion Wind Tunnel Facility (PWT).

Upgrades to the mass storage system were conducted during fiscal year 2008. Aged Small Computer System Interface (SCSI) interfaces were replaced with new four gigabit/second fiber channel connections, an additional 12 terabytes of primary storage were added, and the tape drives were upgraded to support higher densities. The potential capacity of the tape library moved from 100 terabytes to 1 petabyte.

During fiscal year 2008, the mass storage system archived test data for the F100, F119, F135, F136 and F101 military turbine engines. AEDC also acquired data for a commercial Japanese XF7-10 turbine engine.

AEDC was chosen to become the High Performance Computing Modernization Program Office's (HPCMPO) shadow ops support center for the HPCMPO's Computational Research and Engineering Acquisition Tools and Environments (CREATE) project. CREATE is a 12-year, $360-million program which institutes the development and deployment of three computational tool sets for acquisition engineers. AEDC will support the aeronautical vehicles portion of the activity designated as CREATE/AV.

AEDC, in collaboration with Eglin's Air Force SEEK EAGLE Office, submitted a fiscal year 2009 HPCMPO Dedicated High Performance Computing Project Investment (DHPI) proposal. The submission, titled "USAF M&S Support to Aircraft/Store Compatibility, Certification and Clearance," was chosen as an award recipient in fiscal year 2008.

The award included a "state-of-the-art" 1280 processor system with a projected computational capacity of 14 teraflops. With an estimated delivery of May 2009, the machine will be located in AEDC's Central Computing Facility (CCF). General availability to the DoD T&E community should occur sometime in late fiscal year 2009. The DHPI leverages an annual procurement process to negotiate the delivery of world-class HPC capacities and capabilities to the DoD's scientific community.

Medical Aid Station

The Air Force Medical Aid Station (MAS) is responsible to the 704th Mission Support Group Commander for health matters relat-

ing to active duty and government civilian personnel. The MAS provides and manages routine medical and dental care for military personnel and emergency medical care for on-the-job injuries of DoD civilian employees. Personnel arrange cost effective, high-quality medical care from local, federal and civilian sources. They also provides pharmaceutical services to military personnel, retirees and their family members. The beneficiary counseling and assistance coordinator provides supports to retirees and their family members on a vast range of TRICARE issues. Daily operations of the DoD/Veterans Administration (VA) satellite VA Clinic are administered through a share agreement administered by the MAS staff. Personnel also perform food facility and commissary inspections; ensure proper certification and training of food handlers; and develop and monitor base wellness and fitness programs for AEDC military and civilian personnel.

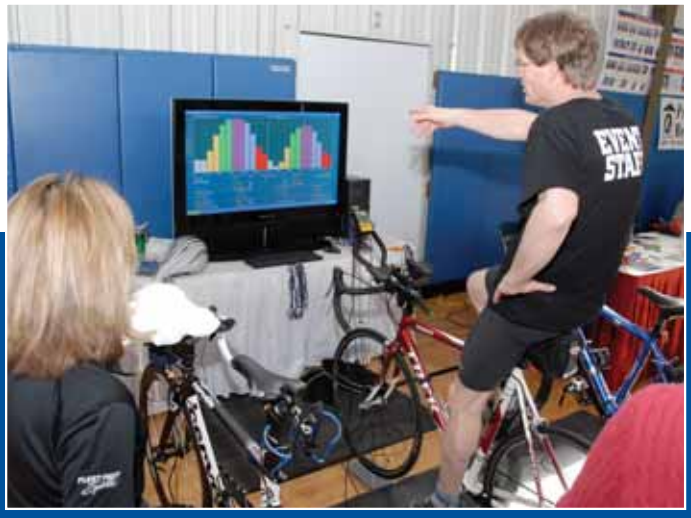
The MAS provides and manages routine medical care for active-duty military personnel while overseeing cost effective, high quality medical support to 12,000 DoD authorized beneficiaries and 3,000 assigned contract work force utilizing local, federal and civilian resources.

2008 Fiscal Year Highlights

The MAS pushed through 2008 by launching and/or completing several highly visible projects and visits. The first major event was the Health Expo, where we coordinated 27 vendors on-site, and worked through set-up of an event that saw 2,500 visitors. The administrative side of the house created an Memorandum of Understanding (MOU) with Maxwell AFB, Ala., to handle medical sufficiency statements and dependency determination status for eligible family members. Personnel streamlined overseas clearance processes and developed "one-stop" shopping for in-processing newly assigned members.

2009 Fiscal Year Forecast

The MAS kicked-off fiscal year 2009 by hosting the first-ever visit by the Chief Nurse of the Air Force, Maj. Gen. Melissa Rank along with the Medical Service Career Field Functional Manager, Chief Master Sgt. Joseph Potts. The tour provided Air Force leadership with a picture and vision for Arnold AFB now and into the future. In fiscal year 2009, the MAS expects a new digital radiological system, pharmacy dispensing upgrades, integrated Composite Health Care System training for all 33 staff members and continued quality care and services to beneficiaries.



Kevin Sipe demonstrates the Comp U Trainer at the Fitness and Health Expo.

704th Mission Support Group

Systems Tested at AEDC

The timeline is not an all-inclusive list of every system ever tested at AEDC. Systems are listed on the timeline based on their initial entry into an AEDC test unit. However, in many cases, work systems has continued for many years which is not shown on the timeline.

1950s

BOMARC

BOMARC
B-47 Stratojet
Atlas ICBM
T-38 Talon
Sergeant Missile
Snark
Nike

Project Mercury

Project Mercury
Project Gemini
Discoverer
Vanguard

F-105 Thunderchief
B-58 Hustler
Polaris SLBM
X-15
Titan
Minuteman

X-15

F-5 Freedom Fighter
XB-70 Valkyrie
GAM-78 Quail

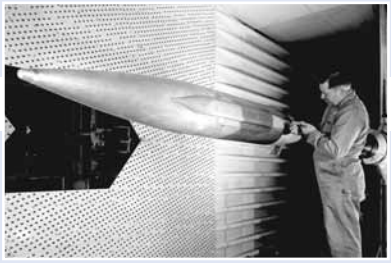
F-111 Aardvark

1960s

Apollo
Dyna-Soar
C-5 Galaxy
Little John
E-3A Sentry
Patriot

Dyna-Soar

Thor-Delta
F-111 Aardvark
Voyager
Scout
Saturn V
Short-Range Attack Missile
Viking



Short-Range Attack Missile

1970s

Space Shuttle

Space Shuttle
Trident SLBM
Sidewinder
A-9A
Firebee
Poseidon SLBM
YF-17
Air-Launched Microfighter
X-24B

Air-Launched Microfighter

Pershing
Maverick
F/A-18 Hornet
Walleye
Tomahawk

B-1 Lancer
F-15 Eagle
F-16 Falcon
F-4 Phantom
A-10 Thunderbolt II
A-7 Corsair

Air-Launched Cruise Missile

X-24C
Air-Launched Cruise Missile
F-117 Nighthawk
GPS
C-141 Starlifter
AMRAAM

C-141 Starlifter

1980s


V-22 Osprey

Peacekeeper

AV-8B Harrier

V-22 Osprey

F-14 Tomcat

C-17 Globemaster III

X-29


C-17 Globemaster III

1990s


X-30

X-30

Space Station Freedom
P&W 4084 (Boeing 777)

Boeing 767
Navy Standard Missile
Trent 800 (Boeing 777)


Navy Standard Missile

B-52 Stratofortress
KC-135 Stratotanker

A300-B2 Airbus
YF-36

F-35 Lightning II
Pathfinder

F-22A Raptor
YF-23

International
Space Station

Cassini-Hugens
Dornier Alpha Jet
F/A-18 Superhornet


F/A-18 Super Hornet

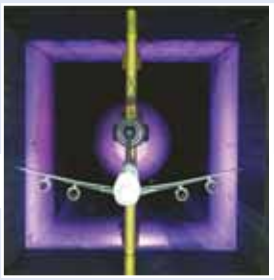
B-2 Spirit
EELV
Boeing 777

Global Hawk


Dornier Alpha Jet

P&W 4090 (Boeing 777)
Chandra

P&W 4098
X-33


Boeing 747

2000s


X-43 Hyper-X

X-43 Hyper-X

X-37
Boeing 747


EA-18 Growler

EA-18 Growler

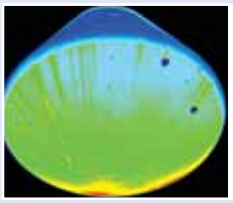
P-8A MMA
RQ-4 Global Hawk

Trent 1000 (Boeing 787)

GOES-M

Trent 900
(Airbus A380)

GP7200 (Airbus A380)


CEV

Crew Exploration Vehicle (CEV)
Mars Science Laboratory

Facilities Capabilities

Wind Tunnel Test Facilities

Tunnel	Test Section Size		Speed Range (Mach No.)	Reynolds No. Range (million per ft)	Dynamic Pressure (psf)	Total Pressure	Total Temperature (° F)	Pressure Altitude (nominal, K ft)
	Cross Section (ft)	Length* (ft)						
Propulsion Wind Tunnel 16T	16 x 16	40	0.05 - 1.6	0.03- 7.3	0.35 - 1150	200 - 3950 (psf)	80 - 140	Sea Level - 76
Propulsion Wind Tunnel 16S†	16 x 16	40	1.5 - 4.75	0.1 - 2.4	25 - 550	200 - 1900 (psf)	120 - 580	45 - 155
Aerodynamic Wind Tunnel 4T	4 x 4	12.5	0.05 - 2.46	2.0 - 7.1	0.35 - 1450	200 - 3400 (psf)	80 - 140	Sea Level - 98
Supersonic Wind Tunnel A	3.3 x 3.3	9.0	1.5 - 5.5	0.3 - 9.2	53 - 1780	1.5 - 200 (psi)	70 - 290	16 - 151
Hypersonic Wind Tunnel B	4.17 diam	9.0	6 or 8	0.3 - 4.7	43 - 590	20 - 900 (psi)	240 - 890	98 - 180
Hypersonic Wind Tunnel C	4.17 diam	9.0	10	0.3 - 2.4	43 - 430	200 - 1900 (psi)	1190 - 1490	132 - 188
Hypervelocity Wind Tunnel 9 (Hypersonic)	2.9 diam free jet	9	8	4 - 48	960 - 11,300	1000 - 12,500 (psi)	1100 - 1200	Sea Level - 65
	5 diam	12	10	0.5 - 20	95 - 4000	300 - 14,000 (psi)	1200 - 1350	39 - 111
	5 diam	12	14	0.055 - 3.6	8- 900	100 - 19,000	1750 - 2800	82 - 173
Aerothermal Wind Tunnel C	2.08 diam free jet	3.0	8	0.7 - 7.8	132 - 1322	200 - 1900 (psi)	760 - 1440	95 - 149
	2.08 diam free jet	3.0	4	0.2 - 8.1	231 - 1928	20 - 180 (psi)	2600 - 1200	56 - 105
Hypervelocity Wind Tunnel 9 (Aerothermal)	11.3 (in) diam free jet	6	6.7	4 - 7.6	3540 - 6850	2600 - 5500	2100 - 2900	52 - 67
National Full-Scale Aerodynamics Complex	40 x 80	80	0 - 300 knots	<3	0 - 262			Sea Level
	80 x 120	190	0 - 100 knots	<1.1	0 - 34			Sea Level

* Nominal test section length dimensions are shown. The actual model lengths that can be tested depend on Mach number and should be coordinated with the AEDC test engineering staff.

† Inactive

Engine Test Facilities

Propulsion Development Test Cell	Test Section Size		Nominal Capability Range			
	Cross Section (ft)	Length (ft)	Total Temperature (°F)	Speed Range	Pressure Altitude (Nominal, ft)	Axial Thrust Capacity (lb)
Test Cell C-1	28 diam	45	-60 - 350	Mach 0 - 2.3	Sea Level - 75,000	100,000
Test Cell C-2	28 diam	47	-40 - 350	Mach 0 - 2.3	Sea Level- 75,000	100,000
Test Cell J-1	16 diam	44	-60 - 720	Mach 0 - 3.2	Sea Level - 75,000	70,000
Test Cell J-2	20 diam	46	-60 - 450	Mach 0 - 2.6	Sea Level - 75,000	50,000
Test Cell SL-2	24 x 24	60	20 - 270	Mach 0 - 1.2	Sea Level	70,000
Test Cell SL-3	24 x 24	60	20 - 270	Mach 0 - 1.2	Sea Level	70,000
Test Cell T-3	12 diam	15	-85 - 1200	Mach 0 - 4.0	Sea Level - 100,000	20,000
Test Cell T-4	12 diam	47	-40 - 400	Mach 0 - 2.5	Sea Level - 75,000	50,000
Test Cell T-11	10 x 10	17	-80 - 250	Mach 0 - 2.0	Sea Level - 55,000	30,000

NOTE 1: Expanded capability is available with custom upgrades to test cells.
NOTE 2: Maximum performance values (temperature, speed, and altitude) do not occur simultaneously. Comparison of specific test points to cell capability will be required to ascertain feasibility.

Space and Missile Test Facilities

Lethality	Facility	Projectile Size (in. diam)	Launch Velocity (ft/sec)	Projectile Mass (lbs)	Pressure Altitude (ft)	Run Time (shot/day)
Ballistic Ranges - Hypervelocity and Impact Guns	Range G	3.3	4900 - 23,000	1.1 - 13.2	Sea Level - 225,000	1
	Range G	4.0	4900 - 19,700	1.1 - 13.2	Sea Level - 225,000	1
	Range G	8.0	5600 - 17,100	13.2 - 44.1	Sea Level - 225,000	1
	Range I	2.5	4900 - 21,300	0.7 - 8.8	Sea Level - 225,000	1
	Range S1	0.3 - 0.75	4900 - 26,200	0.018 - 0.036 (oz)	Sea Level - 225,000	2
	Range S3	7.0	131 - 2300	3.3 - 55.1	Sea Level	2

Rocket Propulsion	Facility	Test Section Size	Thrust Stand (lb)	Pressure Altitude (ft)	Cell Temp Control (°F)	Run Time (min)
Solid Propellant	Cell J-6	26 ft diam x 62 ft long	5000 - 500,000	up to 100,000	15 - 110	1 - 6 min
Liquid Propellant	Cell J-4†	48 ft diam x 82 ft high	5000 - 500,000	up to 100,000		5 min

Aerothermal	Facility	Nozzle Exit (in.)	Mach No.	Stagnation Enthalpy (Btu/lbm)	Pressure Atmosphere	Mass flow (lbm/sec)	Run Time (min)
High Enthalpy Ablations	H1	0.75 - 3.0	1.8 - 3.5	600 - 8500	<120	0.5 - 8	1 - 2
	H2	5.0 - 42.0	3.4 - 8.3	1200 - 5500	<120	2 - 10	3 - 30
	H3	1.2 - 4.5	1.8 - 3.5	600 - 8500	<150	3 - 25	1 - 2
	Tunnel 9	11.3	6.7	900 - 925	52 - 67	18 - 37	3 - 6
	Tunnel C	25	4, 8	170 - 480	1 - 130	0.6 - 55	Continuous

Air Breathing Propulsion	Facility	Contoured Nozzle	Test Section Size (in.)	Total. Pressure (psia)	Total Temperature (°R)	Pressure Altitude (ft)	Dynamic Pressure (psf)	Usable Run Time (sec)
Supersonic	APTU	Mach 4.3	42 diam	70 - 220	1825 max	63,700 - 88,400	500 - 1600	120 - 240
Hypersonic	APTU	Mach 5.2	42 diam	150 - 1100	2320 max	54,500 - 96,400	500 - 3600	90 - 120
		Mach 6.3	42 diam	410 - 1800	3233 max	76,000 - 105,000	500 - 2200	60 - 90
		Mach 7.2	42 diam	960 - 2800	4700 max	87,999 - 110,000	500 - 1450	30 - 60

Space Sensor	Facility	Environment	Image Sources	Background	Run Time
Sensor Calibration	7V	Sea Level - (15 K, 10^{-7} torr)	2 Independently Moving Precision Blackbody Targets - 800 K Complex Scenes - IR Array, 512 x 512, 45 Hz	15 Kelvin, 10^{-7} torr	Continuous
3-Color Sensor HWIL	10V	Sea Level - (15 K, 10^{-7} torr)	2 Independently Moving Precision Blackbody Targets - 800 K 2 IR Arrays, 512 x 512, 45 Hz 1 Visible Array, 1024 x 1024, 45 Hz	15 Kelvin, 10^{-7} torr	Continuous

Space Environments	Facility	Test Section Size	Wall Temperature	Pressure Altitude	Run Time
Electric Propulsion (<50kW)	12V	12 ft diam x 35 ft tall	15 K	10^{-7} torr	Continuous
Thermal Vacuum	Mark I	42 ft diam x 82 ft tall	77 K	10^{-7} torr	Continuous

Space Environments	Facility	Environment	Energy	Run Time
Combined Space	CCOSE	Electrons, Protons, Atomic Oxygen and UV Radiation	Bandwidth	Continuous
Radiation Environments	**Facility**	**Environment**	**Energy**	
X-Ray Environment	MBS	Cold or Hot X-Ray	MeV	

† Inactive