

A History of AEDC

Toward New Horizons

Amidst the ashes of World War II, American scientists surveying German technology were disturbed to find a network of flight simulation test facilities. It was a wake-up call for the future — a realization that the United States was years behind the Germans in the process of developing aerospace technology. Fortunately, the Germans had developed these technologies too late to turn the tide of the war.

It confirmed the suspicions of General of the Air Force Henry H. “Hap” Arnold, commanding general of the Army Air Forces during World War II. Arnold had been preoccupied with the role of technology, research and development in air power even before the war. In 1940, Arnold appointed scientist Dr. Theodore von Karman as his special advisor at Wright Field, Ohio. In November 1944, Arnold asked von Karman to form a scientific advisory group to chart a long-range research and development program for the Air Force.

von Karman sent a task force from his newly formed scientific advisory group to take a closer look at German test facilities.

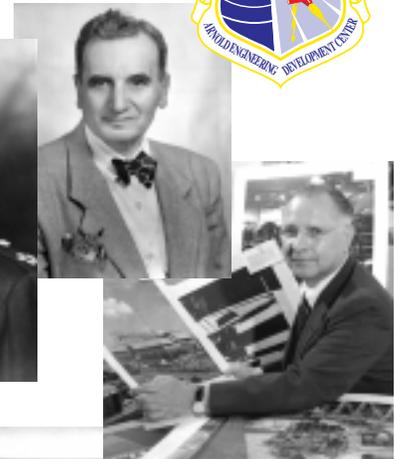
Dr. Frank Wattendorf was one of the American scientists that made the trek to Germany. He was responsible for surveying German wind tunnels and engine test facilities. Impressed by a need for action, Wattendorf wrote up recommendations on his plane trip home that called for using captured German test facilities to establish a test and evaluation center that would consolidate the

best civilian and military scientists and state-of-the-art test facilities to guarantee a strong national defense.

Wattendorf’s notes became part of von Karman’s 1945 report called “Toward New Horizons.” The document became a blueprint for the Air Force’s future research and development and called for the construction of an air engineering development center that would include facilities for developing supersonic aircraft and missiles.

In 1949, Congress authorized \$100 million for the construction of the Air Engineering Development Center. A site was selected for the new center at the Army’s old Camp Forrest near Tullahoma and Manchester, Tenn. The site was chosen for its abundance of land, water and power. Land was needed to buffer surrounding communities from potential test hazards and noise. Water was needed to cool rapidly flowing air and hot exhaust gases. Abundant electricity was needed to power huge testing systems. Construction on the center started in 1950.

On June 25, 1951, a year after General Arnold’s death, President Harry S Truman dedicated the Air Engineering Development Center in Arnold’s honor, naming it the Arnold Engineering Development Center.



“Never again will the United States ride the coat tails of other countries in the progress and development of the aeronautical art,”

Harry S Truman
AEDC Dedication
June 25, 1951





50s

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One of the government's early decisions concerning the center was to employ a primarily contractor work force. The Arnold Research Organization known as ARO was formed by Sverdrup and Parcel to become that contractor work force. Part of the rationale was to maintain a stable work force that came to accumulate a volume of experience with the test facilities that were to be built. That idea would make the center a model for outsourcing for the Department of Defense by the 1990s.

The 1950s saw the development of three major test facilities that remain active today — the Engine Test Facility, the von Karman Gas Dynamics Facility and the Propulsion Wind Tunnel Test Facility.

Following Dr. Frank Wattendorf's recommendations six years previous, the first jet engine test equipment installed at the center was acquired from the Bavarian Motor Works in Munich, Germany. It took 58 railroad cars and two barges with another 450 tons by truck to move the equipment. After refurbishment, this equipment became the cornerstone for the Engine Test Facility, which was completed in 1953. By May 1954, the facility was put to work, testing the General Electric J49 engine for the B-47 bomber.

A flight dynamics facility for testing aerospace designs at high speeds was built and dedicated to Dr. Theodore von Karman in 1959. Operations began with a prototype test cell called E-1, which was used to test the Falcon guided missile.

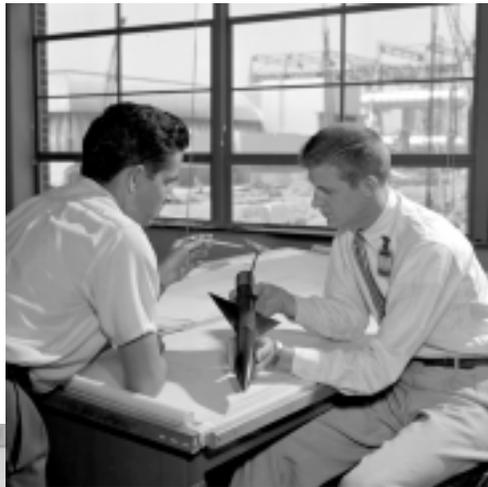
Construction was completed on the Propulsion Wind Tunnel Test Facility at the end of the decade. PWT's huge wind tunnels have become hallmarks of the center and are perhaps the most heavily used facilities on base.

Milestones

- First engine test
- First test in PWT
- VKF dedicated

Systems Tested

- B-58 Hustler
- XB-70 Valkarie
- X-15
- T-38 Talon
- GAM-78 Quail
- Atlas ICBM
- Sergeant Missile
- BOMARC
- Snark
- Project Mercury
- Discoverer
- Vanguard



A History of AEDC

As the space race heated up, so did AEDC's workload.

PWT was used to investigate configurations for the Mercury space capsule, which sent Alan Shepherd and John Glenn into space.

The center was a key player in supporting Project Gemini, and the center played a multi-faceted role in supporting the Apollo Program, which put man on the moon. Apollo tests included aerodynamic assessments of the Apollo capsule and tests of Saturn 5 rocket upper stage engines.

Some new test facilities came on line to help turn numerous aerospace system ideas into reality. The J-4 Large Rocket Engine Test Facility was dedicated in 1964. PWT got an addition in 1968 when the 4-foot Transonic Tunnel came on line, which is used largely to test store separations.

With several test facilities running at full bore, the pace of testing increased exponentially. Among the systems tested during the decade were the F-105 Thunderchief, C-141 Starlifter and C-5 Galaxy cargo planes, the E-3 Sentry, Airborne Warning and Control System (AWACS), the TF39 engine for the C-5 and the upper stage rocket motors for the Minuteman III Intercontinental Ballistic Missile.

In the middle of the decade, the University of Tennessee and AEDC worked together in founding the University of Tennessee Space Institute. The institute became a place for AEDC engineers and scientists to further their education, and for students and professors to work on research projects to help AEDC.



60s

Milestones

J-4 dedicated

UTSI established

Systems Tested

C-5A Galaxy

C-141 Starlifter

F-105 Thunderchief

F-111 Aardvark

E-3A Sentry

Polaris SLBM

Poseiden SLBM

Short Range Attack Missile

Little John

Minuteman ICBM

Thor-Delta

Saturn 5

Apollo

Dyna Soar

Project Gemini

Viking

Voyager

Scout





70s

A History of AEDC

There came a natural turndown in the furious pace of aerospace after the moon landing and the end of the Vietnam War. But despite the turndown and a corresponding reduction by the government in funding for AEDC and the number of its employees, the pace of testing held steady as nearly 3,000 test projects were completed in the decade.

The list of systems tested during the decade read like a who's who of aerospace. Included on that list were the Space Transportation System, which would later be called the Space Shuttle, the F-15 Eagle, F-16 Fighting Falcon, B-1 Lancer bomber, A-10 Thunderbolt II, Pratt & Whitney F100 engine, MX missile, Sidewinder missile, Navy Tomahawk Cruise Missile, Air Force Air-Launched Cruise Missile and the Global Positioning Satellite.

AEDC developed Laser-Illuminated Photography during the decade to better study projectiles in the center's ballistic ranges that would be traveling up to 20,000 mph. The technique provided a photographic exposure equivalent to 20 billionths of a second.

A heritage for environmental stewardship and uniqueness was born in 1976 when the Department of Interior registered AEDC as a unique natural area. The honor recognized AEDC's superior management of fish and wildlife resources, conservation practices and environmental achievement.

And in a decade when the nation turned energy conscious, AEDC help explore alternative energy sources. A 750-ton magnet was used as part of a magnetohydrodynamics research demonstration at the center, sponsored by the Department of Energy. The demonstration assessed the effectiveness of using a large MHD generator to boost coal's efficiency in producing electricity. AEDC later transferred the project to the University of Tennessee Space Institute.

Milestones

APTU dedicated

Systems Tested

A-7 Corsair

F-4 Phantom II

F-15 Eagle

F-16 Fighting Falcon

A-10 Thunderbolt II

Firebee

F/A-18 Hornet

X-24 B/C

B-1 Lancer

Tomahawk Cruise Missile

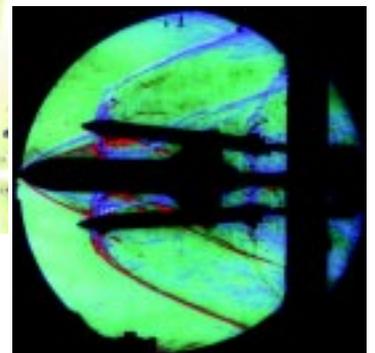
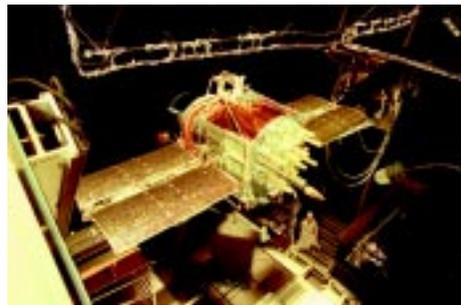
Air-Launched Cruise Missile

Pershing

Space Shuttle

NAVSTAR Global Positioning

Satellite



A History of AEDC

The conflict in the Persian Gulf at the beginning of the 1990's became a defining event in late 20th Century America. It also showed the world what AEDC had been doing in the 1980s.

As people around the world watched from their living rooms, people saw the United States score overwhelming victories in Desert Storm. And they saw the end product of what AEDC people had been working on throughout the decade.

From the Patriot Air Defense Missile to the F-117A Nighthawk stealth fighter, AEDC people worked on every aerospace system deployed to the Persian Gulf. It was the first time technology showed up so dramatically in a real-world conflict, and it was a testament to the test and development work Arnold, von Karman and Wattendorf envisioned would be performed at AEDC.

The decade also marked the addition of the world's largest jet engine testing facility — the Aeropropulsion Systems Test Facility — to the center's collection of aerospace flight simulation test facilities.

And for the first time in the center's history, more than one major contractor performed work on base. The center's workload split into three contracts — support, propulsion testing and aerodynamics testing. In 1981, Pam Am World Services became the support contractor, Sverdrup Technology Inc. took over propulsion testing and Calspan Corp. began aerodynamics testing. In 1985, Schneider Services International replaced Pan Am as support contractor.



80s

Milestones

ASTF completed

J-5 destroyed/rebuilt

Systems Tested

AV-8 Harrier

F-14 Tomcat

F-117 Nighthawk

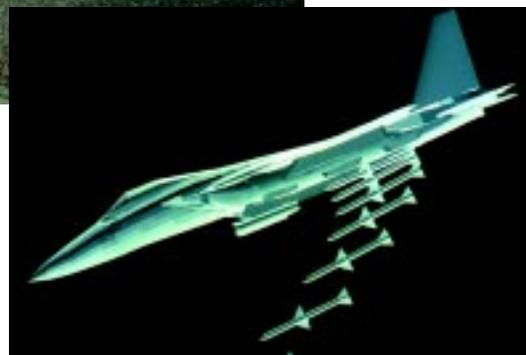
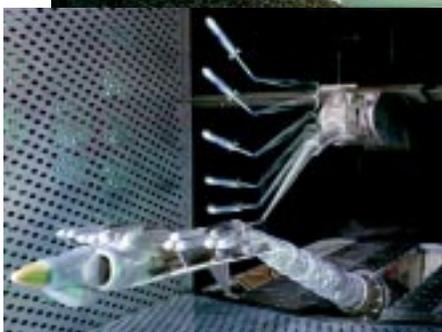
C-17 Globemaster III

V-22 Osprey

X-29

Trident SLBM

Peacekeeper ICBM





90s

A History of AEDC

The '90s were a decade of change at AEDC. From opening its doors to commercial customers to "reengineering," the center's people explored better ways of doing business.

Early in the decade, the center signed formal, long-term working alliances with a number of commercial aerospace organizations (Boeing, General Electric, Lockheed, McDonnell Douglas, Pratt & Whitney) in hopes of steadying workload and to offset dwindling defense budgets. That led to companies like Pratt & Whitney and Boeing bringing projects that were strictly commercial to AEDC.

AEDC leaders began to emphasize strategic management, meeting in focus groups to consider the long-term health of the center and to formulate ways to make the future brighter. An outgrowth was reengineering the center, an ongoing process that seeks to streamline operations and standardize maintenance processes.

It was also a decade that saw the center break new ground on the computational front. Computational Fluid Dynamics, using computers to simulate flight, saw an ever-increasing role in the scope of many major test programs. Using CFD and traditional ground testing together, helped hold down costs and provide more reliable data to test customers. In 1998, the center was designated as one of the Department of Defense's High-Performance Computing Centers, making funding available to augment the center's supercomputing capability making AEDC the 9th largest computer center in DoD.

The Navy docked at AEDC when its engine test facilities at Trenton, N.J., were transferred to AEDC as part of DoD consolidations under the Base Realignment and Closure Act. The move added four engine test facilities (SL-2, SL-3, T-11, T-12) and about 10 Navy people. The Air Force and Navy quickly integrated, making the center's vice commander and other slots Navy positions. Later in the decade, on Oct. 1, 1997, AEDC assumed management for the former Navy Hypervelocity Wind Tunnel 9 in White Oak, Md.

Milestones

- Nature Conservancy Award
- Presidents Quality Award
- Commercial alliances
- J-6 on line
- DECADE Test Facility
- Navy Trenton Facilities
- Tunnel 9 at White Oak, MD
- DoD High Performance Computing Center

Systems Tested

- B-2 Spirit
- F-22 Raptor
- F/A-18 Super Hornet
- Global Hawk
- Dornier Alpha Jet
- Boeing 747
- Boeing 767
- Boeing 777
- P&W 4084 for Boeing 777
- Rolls-Royce Trent 800
- X-33 Venture Star



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Other facilities that came on line during the decade included J-6 — the world's largest solid rocket motor test facility — and DECADE, a nuclear weapons effects facility. Among facilities that saw significant modernization were the J-4 Liquid Rocket Engine Test Facility, the Aeropropulsion Test Unit and the Engine Test Facility. PWT also saw a major sustainment and modernization program begin.

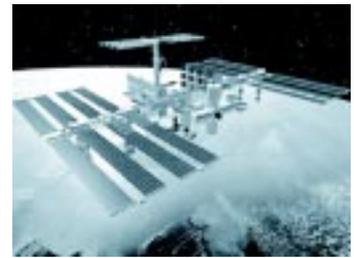
A number of major aerospace programs came to AEDC for testing, including the F-22 Raptor, the Joint Strike Fighter, the F/A-18E/F Super Hornet, the B-2 Spirit stealth bomber, the Pratt & Whitney 4000 series engines for the Boeing 777 and F119 engines for the F-22 and Joint Strike Fighter, the Boeing 747 and 767 and the RL-10 rocket engine.

The center's workload consolidated to two divisions — test and support — in the mid '90s, with Sverdrup as test support contractor and ACS as center support contractor. ACS is a joint venture of Computer Sciences Corp., DynCorp and General Physics.

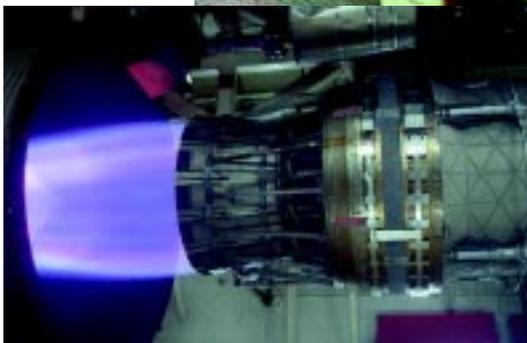
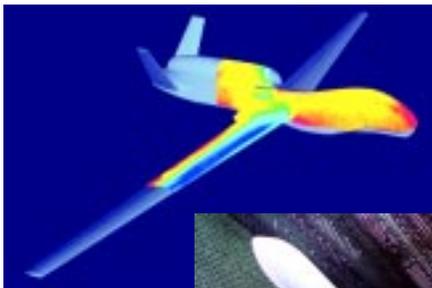
AEDC turns 50 on June 25, 2001. Its vision, testing today the air and spacecraft of tomorrow, was born in the minds of men like Arnold and von Karman and brought to fruition by the men and women of AEDC. The technologies have changed over the last 50 years, but the vision remains the same.

"The scientists who work here will explore what lies on the other side of the speed of sound," said Truman during his dedication address in 1951. "This is part of our effort to make our air power the best in the world — and to keep it the best in the world."

Building AEDC was a commitment to excellence by the United States government to the people of the United States. It's a commitment renewed every time an employee comes through the main gate for another day of work.



New World Vistas



"The scientists who work here will explore what lies on the other side of the speed of sound. This is part of our effort to make our air power the best in the world—and to keep it the best in the world"

Harry S Truman
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