National Aeronautics and Space Administration

What We Do At Kennedy

Information Summary

The role of Kennedy Space Center is to enable the NASA vision by successfully processing and then launching space shuttles, rockets and their cargo into space.

Since 1981, Kennedy has sustained America's human spaceflight heritage by preparing and launching space shuttles for NASA's Space Shuttle Program. The center also supports launch services for NASA and agency-sponsored payloads on expendable launch vehicles through the Launch Services Program by providing processing, mission analysis and spacecraft integration.

Since 1998, the International Space Station has relied on the center to integrate, test and process every U.S.-launched element currently assembled in orbit. Kennedy matches every stride as NASA makes its first steps toward America's long-term space exploration goals.

Kennedy is the primary NASA center for the test, checkout and launch of space shuttles and their payloads, as well as the turnaround of shuttles between missions. Space shuttles launch from Kennedy's Launch Complex 39, on Merritt Island, Fla., just north of Cape Canaveral and also is the primary landing site.

Many of the Launch Complex 39 facilities originally supported the Apollo Program. They currently include three orbiter processing facilities, Space Shuttle Main Engine

Processing Facility, Vehicle Assembly Building and Launch Control Center. The launch support facilities in the Industrial Area include the Operations and Checkout Building, Canister Rotation Facility and Space Station Processing Facility.

Preparing for Shuttle Launches

Routine servicing of the shuttle takes place in three orbiter processing facilities. The process includes safing ordnance devices, off-loading hazardous materials, reconfiguring payload accommodations, verifying and testing systems, and examining, repairing and waterproofing thermal protection system materials. In addition to reconfiguring shuttles for upcoming missions, Kennedy Space Center also has assumed responsibility for implementing many major vehicle modifications and upgrades.

When processing is complete in a facility, the shuttle is transferred to the Vehicle Assembly Building where it is mated to the external tank and solid rocket booster stack, already in place on the mobile launcher platform.

After the mating, the crawler-transporter moves underneath the launcher platform, lifts it and rolls it out to the launch pad. After several weeks of system checks, the shuttle is ready to launch.

The two elements needed for launch -- an external tank and solid rocket boosters -- are partially processed at Kennedy. The external tank is manufactured at the Michoud Assembly Facility in New Orleans and shipped by barge to Port Canaveral, Fla.

One of NASA's solid rocket booster retrieval ships tows the barge. At the port, tugboats take over and move the barge upriver to the turn basin in the Launch Complex 39 area. Once docked there, the tank is off-loaded and transported to the nearby Vehicle Assembly Building where it is stored in a checkout cell until needed.

The solid rocket boosters are recovered after each launch and towed back to Hangar AF at Cape Canaveral Air Force Station in Florida.

The empty propellant-carrying segments are transferred to the rail yard, installed in railroad cars and sent to the manufacturer in Utah for propellant reloading.

The inert segments of the boosters are reconditioned at the hangar and taken to the Assembly and Refurbishment Facility for assembly and testing.

On their return, the reloaded segments go to the Canister Rotation Facility and eventually are integrated with the reconditioned segments. They are stored until needed in the Vehicle Assembly Building for stacking.

Processing Shuttle Payloads

Space shuttle payloads may be installed in the shuttle's payload bay vertically at the launch pad or horizontally in an orbiter processing facility. Some horizontally handled payloads are International Space Station elements and scientific payloads that remain attached to the shuttle's payload bay.

Vertically handled payloads include deployable communications, scientific spacecraft and space station elements. They are transferred to the shuttle's payload bay through the payload changeout room, a clean room located on the launch pad's rotating service structure.

Launching Payloads on Rockets

The Launch Services Program was established at Kennedy Space Center for NASA's acquisition and program management of expendable launch vehicle (ELV) missions. Some of these ELV missions have expanded our knowledge of planets, stars and comets, while others have added to our knowledge of Earth. Historic missions include the Mars exploration rovers, Stardust, Genesis, Deep Impact, Cassini, and GOES and TDRS satellites.

All ELVs use the same basic technology to get into space: two or more rocket-powered stages that fall away when their engine burns are completed. Whatever a launch vehicle carries above, the final discarded stage is considered the payload. A payload's weight, orbital destination and purpose determine the size of the vehicle required for launch.

Some of the more prominent ELVs are the Atlas/Centaur, Delta (from II to IV), Taurus, Titan and Pegasus.

To date, Delta launch vehicles have carried more than 200 NASA scientific, wind and communications payloads into orbit, or to other planets. NASA used the Athena I and II vehicles to launch scientific satellites from Vandenberg Air Force Base, Calif., Cape Canaveral Air Force Station, Fla., and Kodiak Island, Alaska. The Pegasus, an Orbital Sciences fleet vehicle, is the only airborne launch vehicle in the ELV fleet. The Taurus vehicle, also built by Orbital Sciences, may be used for future NASA launches.

More than shuttles, rockets

Beyond vehicle and payload processing, Kennedy Space Center pursues other programs.

Environmental leadership is one. The center recognizes the significance of co-existing with the Merritt Island National Wildlife Refuge, and its environmental program applies both proven and new technologies to conserve and protect local and global resources. Kennedy is addressing the nation's energy

NASA

An aerial view shows the Kennedy Space Center Visitor Complex in Florida. In the foreground at left, is a full-size space shuttle replica called "Explorer," which allows guests to experience what it's like to live and work in space, as well as solid rocket boosters and an external fuel tank. On the right, is the Rocket Garden, which features eight rockets from the past, including a Mercury-Atlas rocket similar to the one used to launch John Glenn into space in 1962.

concerns with NASA's first large-scale solar power generation facility. A one-megawatt facility already is supplying electricity to the center, and another 10-megawatt facility, built by SunPower Corp. on Kennedy property, will supply power to Florida Power & Light customers in 2010. The center also puts to use 900 alternative fuel vehicles and new facilities are being built using principals from the U.S. Green Building Council's Leadership in Energy and Environmental Design, or LEED.

Another role is that of the Office of Education. Equipped with the center's unique facilities and more than 200 years of combined teaching experience, Kennedy's Education Programs and University Research Division prepares students to pursue careers in science, technology, engineering and mathematics, or STEM, and educates the public in NASA's activities and discoveries. The agency has a variety of educational programs for K-12 to the post-doctoral level. One such program is the Interdisciplinary National Science Project Incorporating Research and Education Experience, or INSPIRE, a multitier year-round program designed for students in ninth to 12th grade who are interested in STEM education and careers. For more information visit: **http://www.nasa.gov/offices/education/programs/descriptions/INSPIRE_Project.html**

Kennedy also offers internships to high school, undergraduate and graduate students. Kennedy Space Center's Intern Project is intended to attract students pursuing degrees that are of specific interest to KSC. The intern work schedule is concurrent with academic terms except for high school students who are only eligible during the summer term. The objective of the program is to inform students about KSC's mission and to give them valuable work experience related to their academic studies. The project also provides KSC an opportunity to evaluate the student's suitability for participation in the co-op program or full-time employment upon graduation.

To further interest in NASA, the center has an active **outreach program**, beginning with the KSC Visitor Complex. The Visitor Complex has continued to effectively spread NASA's message to more than 1.5 million guests annually from all over the world. Recent additions to the complex included the "Treasures Gallery" with artifacts from the Apollo moon missions and "Eye on the Universe: The Hubble Space Telescope" exhibit. A 10,000-square-foot exhibit called "Exploration Space" is scheduled to open this year.

Kennedy's Speakers Bureau and Display Management Team shares NASA's message with hundreds of thousands of people worldwide, including minority, library, university, retirement and community groups. Kennedy's Web site reaches millions and its home page at **www.nasa.gov/kennedy** consistently ranks in the top 10 most-popular pages out of more than 1 million pages within the NASA Web portal at **www.nasa.gov**.

Photos on front page:
(Left) July 4, 2006 -- Making history with the first-ever launch on Independence Day, space shuttle Discovery rockets off the mobile launcher platform on Launch Pad 39B on the STS-121 mission. During its 12-day mission, the STS-121 crew of seven tested new equipment and procedures to improve shuttle safety, as well as delivered supplies and made repairs to the International Space Station.

(Right) May 24, 2006 – A Boeing Delta IV rocket roars off the launch pad, lifting the GOES-N satellite into space. Liftoff from Launch Complex- 37 at Cape Canaveral Air Force Station was at 6:11 p.m. EDT. GOES-N is an Earth-monitoring satellite in the Geostationary Operational Environmental Satellite series developed by NASA and the National Oceanic and Atmospheric Administration.

National Aeronautics and Space Administration

Kennedy Space Center, FL

www.nasa.gov

IS-2006-09-029-KSC