NASA Facts

National Aeronautics and Space Administration

Space Shuttle Main Engine Processing Facility

When a NASA space shuttle (below) lifts off the launch pad, it does so with the help of three reusable, high-performance rocket engines (center). The space shuttle main engine, developed in the 1970s by NASA's Marshall Space Flight Center, in Huntsville, Ala., is the world's most sophisticated reusable rocket engine.

Each of these powerful main engines is 14 feet (4.2 meters) long and 7.5 feet (2.25 meters) in diameter at the end of its nozzle, and weighs approximately 7,000 pounds (3,150 kilograms).

Preparing the engines for safe and reliable launches is the responsibility of the Space Shuttle Main Engine Processing Facility (SSMEPF). It is state-of-the-art, designed specifically for processing the space shuttle main engines in support of NASA Space Shuttle Program flight operations.

Completed in June 1998, the SSMEPF is located in part of the Orbiter Processing Facility at Kennedy Space Center in Florida and it is a significant upgrade over the previous facility located in the center's Vehicle Assembly Building.

The 34,600 square-foot facility was built to specifications provided by design team representatives from Pratt & Whitney Rocketdyne - SSME, NASA Design Engineering, and United Space Alliance.

Incorporated in the design are many features that not only enhance the efficiency of engine processing, but also offer increased levels of safety to personnel and reduced opportunities for damage to flight hardware. Among the improvements are:

1. Increased floor space providing additional clearance for both personnel and hardware when repositioning engines.

2. Built-in plumbing and wire runs for pneumatic, hydraulic and electrical services.

3. Built-in soundproofing to isolate hydraulic pumps, fan rooms and the

Space Shuttle Atlantis launches Sept. 8, 2000.

This space shuttle main engine contains 50,000 parts, of which 7,000 are tracked periodically for replacement.

shop floor, reducing noise levels for shop personnel.

4. Co-location of control panels and test stands, improving communication between test directors and technicians during test operations.

5. Relocation of the SSMEPF outside of the Vehicle Assembly Building, thus removing the engine processing from the area where solid fuel rocket motors are handled and processed.

The facility provides the capability for post-flight inspections and maintenance, as well as functional checkout of all engine systems prior to installation in the orbiter.

Each of the three main engines used for a shuttle launch is composed of 50,000 parts. About 7,000 of those parts are tracked for periodic replacement. Other parts are replaced as needed. Currently the Space Shuttle Program works with a stable of 12 engines.


Using a horizontal engine installer, technicians in the Orbiter Processing Facility install a new turbo-charged engine in the orbiter Atlantis.

The design of the SSMEPF incorporated:

- special areas to accommodate engine drying to remove residual moisture (the byproduct of the liquid hydrogen and liquid oxygen propellants),
- overhead cranes for lifting, rotating, loading and unloading engines,
- workstands to provide access to the engines during processing, and
- specified clean areas for the inspection of critical turbo machinery.

The facility includes a low bay with six vertical engine stands and a 10-ton crane, and a high bay with a 15-ton crane, drying cells, pump room, ground support equipment storage and a workshop.

Each of the six vertical engine workstands is provided with pneumatic, hydraulic and electrical power to support engine system verification and functional checkouts that are directed from the avionics control room (adjacent to the workstands).


Shuttle main engine test firing at Stennis Space Center in Mississippi

Each main engine's vital signs are measured 50 times per second during ascent. The avionics control room is connected by ground link to the Launch Complex 39 Launch Processing System data recording center to provide backup documentation and verify engine checkouts.

Designed specifically for the space shuttle main engines, but with the capability to accommodate future engines, the SSMEPF serves as the center for the coordination and integration of all main engine processing activities regardless of engine location.

Efficiencies achieved through the activation of the SSMEPF provide not only an improved means of processing the shuttle's main engines, but also a better and safer work environment for the engineers and technicians.

An additional, but equally important, result has been an increased level of confidence on the part of the NASA astronauts in KSC's ability to provide a safe and reliable set of main engines to support the most critical phase of their mission.