NASA (KENNEDY SPACE CENTER)
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Chronology of NASA tour

To an engineer, NASA represents excellence, innovation, and the ultimate in technology. Thus, it was a great thrill for the Gledden students to have NASA as part of its itinerary. It was a cold Orlando morning, when our group of twenty three squeezed into two vans for the ninety minute trip to the NASA JFK Space Centre. Upon arrival we were greeted by Don Burris, and Ravi Margasahayam, who were the guide for the tour. Don is the lead of the launch structure transporter and has been at NASA for 31 years. Ravi is a mechanical engineer specialising in shuttle noise, vibration and structural analysis.

Rocket Garden

Almost all of the Space Vehicles developed by NASA can be found on this particular garden. To name a few, Saturn V, Saturn 1B and Titan III-E/Centaur. The Saturn V, America's most powerful staged rocket, carried out the ambitious task of sending astronauts to the Moon.

Orbiter processing facility (OPF)

This centre performs post flight procedures to orbiters that has returned from mission. After an orbiter lands on Kennedy Space Centre (KSC) runway, it is towed to OPF, where routine postflight servicing and checkout is performed along with any vehicle modification needed for future flight requirements, vehicle performance enhancement or deficiency corrections.

Launch pad Complex 39 Pad B

Taking a NASA bus, we next visited the launch pad, which at the time held a space shuttle preparing for launch. The pad was octagonally shaped and requires 68,000 cubic yards of concrete. A Channel was dig out under the launch pad to ensure that the rocket fumes are directed away from civilians. Another interesting feature, was that there were flying foxes that connected between the launch pad and escape shelter a safe distance away.

The pad was originally made for the Apollo/Saturn V mission, but have been heavily modified to suit the current space shuttle mission.

Vehicle Assembly Building

In the middle of Launch Complex 39 lies the Vehicle Assembly Building, which is one of the largest building in the world by volume. It covers a ground area of approximately 8 acres and contains a volume of 130 million cubic feet. It is the final area which the Shuttle passes before its eventual launch. In this building, the space shuttle built up operations are conducted. The operations include, transferring two solid rocket boosters from nearby assembly and checkout facilities to be hoisted onto a mobile launcher platform. They are mated to form two complete booster. The external tank (houses the fuel) is transferred and attached to the rocket boosters. Finally the orbiter gets towed from the orbiter Processing Facility to the Vehicle assembly building transfer aisle, then raised onto the Mobile Launcher Platform and mated into the other components.

With the assembly and checkout operations completed, the huge outer doors of the high bay open to permit the Crawler-Transporter to enter and move under the Mobile Launcher Platform. The *Crawler-Transporter* is used to move the fully assembled Space shuttle from the Vehicle Assembly Building to the launch pad. KSC has two Crawlers which each weighs about 2.7 million kilograms, unloaded. A Crawler has eight tracks, each of which has 57 cleats. Each cleats weighs approximately one ton. The Crawler can move at a maximum speed of about 1.6 kilometers an hour with a Space Shuttle loaded.

Typical Shuttle Mission

Spacecraft and other payload items arrive at the Kennedy Space Center and are assembled and checked out in special buildings before being loaded into the orbiter. Each Shuttle arrives as a set of component parts. The solid rocket booster propellant segments are received and checked out in a special facility, then taken to the Vehicle Assembly Building (VAB) and stacked on a mobile launcher platform to form two complete rockets. The external tank is received and prepared for flight in the VAB, then mated to the solid rockets. An orbiter is checked out in the Orbiter Processing Facility, then moved to the VAB and attached to the external tank. A giant crawler-transporter picks up the mobile launcher platform and the assembled Shuttle and takes them to the pad. The Shuttle remains on the platform until liftoff.

Space Shuttle and International Space Station

The *Space Shuttle* and the *International Space Station* (ISS) will served as laboratories for investigating human adaptation to space. Research done aboard those craft may lead to new commercial products on Earth, for instance, vaccine for HIV virus. It will also lay the groundwork for possible human expeditions to the Moon and Mars early in the next century. The ISS will be home and workplace for up to 6 people at a time.

Landing of Shuttle

Unlike conventional aircraft, the orbiter lacks propulsion during the landing phase. Its high-speed glide must bring it in for a landing perfectly the first time – there is no circle-and-try-again capability. Therefore the runway must be long enough for the orbiter to land, usually twice the length and width of those at commercial airports. The landing speed of the orbiter ranges from 343 to 364 kilometers per hour. Often a large dragchute is used to slow the orbiter during rollout, in order to reduce the wear on the wheel brakes.