Photo by Jim Simmons/Annette Del Zoppo Photography

Ground Control To Major Tom

Space-age HSS trusses help enhance the modern feel of the new Apollo/Saturn V Exhibit

NOT EVERYONE CAN BE AN ASTRONAUT, blasting off to the moon. But everyone can experience the thrill of man's first step on the moon at the Apollo/Saturn V Exhibit Center at the Kennedy Space Center in Florida.

The 100,000-sq. ft building is home to the 365' Saturn V rocket, which carried the Apollo astronauts to the moon. The main plaza rises 80' above the landscape and is surrounded by two 400-seat theaters, along with artifacts and exhibits from the Apollo era.

One of the key points NASA officials stressed was that the exhibit and the story of the Apollo mission were to have an impact on visitors, instead of just simply providing them with information. This storytelling

Project:
Apollo/Saturn V Exhibit Center
Kennedy Space Center, FL

Owner:
Delaware North
Kennedy Space Center, FL

Structural Engineer:
Tilden Lobnitz Cooper
Orlando

Architect:
Morris*Architects
Orlando

General Contractor:
W&J Construction Corp.
Cocoa, FL

The model below shows an overview of the entire exhibition space. (Photo by Anthony Fulker)

A close-up view of the trusses during erection shows the intricate angles at the joints.

concept, along with visitor flow considerations, became a main theme in the architectural design which featured a vibrant exposed truss composed of round hollow structural sections (HSS).

"During value engineering, other systems such as a pre-engineered space frame were considered. These systems, however, provided only a minimal economic gain and lost a great deal of the aesthetic goal set by the exhibit's owner (NASA)," said Russell Skrabut, Structural Engineer for Tilden Lobnitz Cooper. He said their goal was to recall the era of U.S. manned space program while representing the cutting-edge technology that is personified in the current space exploration program—all this along with being able to withstand 110-mph hurricane force winds and the gravity loads

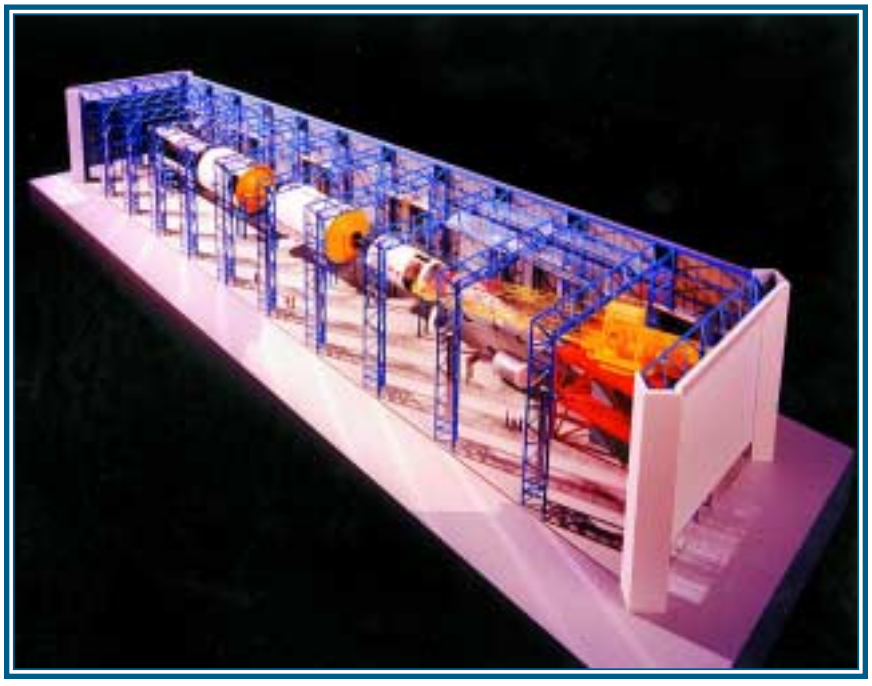

Photo opposite and above by Jim Simmons/Annette Del Zoppo Photography

from the displays. In order to meet all of these needs, HSS members were used to construct three-dimensional space-truss frames and k-braced bays.

Along the main plaza, 80' tall space-truss frames are placed at 45' on centers in order to protect the facility from the hurricane force winds. In an effort not to underscore the Apollo history, the profiles of the members were limited to 4" and 8" diameters. The decision to move forward with the custom three-dimensional space frame prompted many challenges. The thin profiles of the 4" and 8" pipe members created high punching shear forces in the corner joints of each frame. Special shear tabs were designed and inserted at the corners to overcome the concentrated shear forces. The geometry of the space frames created highly complex joints. Pipe sections were designed using a combination of fillet welds and partial-penetration groove welds to develop the full capacity of each member. "Special care was taken during fabrication to produce coping at the desired angles for welding," Skrabut stressed.

Two additional trusses were added near the north end of the plaza to support the 30,000-pound Command Service Module (CSM). The CSM, supported by a specially designed steel cradle, was suspended by stainless steel cables from the bottom chord of the additional trusses allowing visitors to pass directly underneath. Skrabut said the K-braced pipe frames provide necessary longitudinal resistance to lateral forces along the 500'-long plaza walls.

Extensive detailing was necessary to incorporate mechanical catwalks and elevated air-handler platforms, as well as to accommodate visitor flow from the Firing Room, Lunar Surface Theater (LST) and VIP Viewing Lounge. The 60'-tall circular LST seats 400 visitors for a re-enactment of the first lunar landing. The framing consists of 52" deep