Boeing-built P1 Truss to Join Twin Aboard International Space Station

The Boeing-built P1 (port one)truss joins its twin, the S1 (starboard one) truss aboard the International Space Station, when space shuttle Endeavour delivers it in November 2002.

The P1 is the latest addition to the space station's 10-segment Integrated Truss Structure that will eventually span more than the length of a football field. The trusses will carry the station's solar arrays along with a cooling system for the orbital outpost.

Boeing [NYSE: BA] designed the 45-foot-long P1 truss in Huntington Beach, Calif., and began construction there in January 1997. Work on P1 was completed in Huntsville, Ala., in June 2000. The P1 moved to Kennedy Space Center, Fla., in July 2000 for flight processing and multi-element integration testing. Boeing delivered the P1 to NASA in November 2001 for final preparations and preflight checks.

The P1 truss along with one CETA (Crew and Equipment Translation Aid) cart costs about $390 million. The cart is used to move spacewalkers, tools and equipment along the truss structure.

"The P1 and the truss system may appear to be simple metal structures, but they're not," said Christi Gau Pagnanelli, Boeing P1 element manager. "Each segment has miles of wiring, along with plumbing lines, electronics, mechanisms, software and other items necessary for efficient and safe space station operation."

When deployed both P1 and S1 have a set of three radiators that is about the size of a tennis court. Each set of radiators has the cooling capacity to chill four 2,000 square-foot houses on a hot summer day and consumes the equivalent power used to cool and light eight houses. To cool the station's electronics, each truss element has about 1.5 football fields worth of plumbing to carry the 99.6 percent pure ammonia used as coolant. Inside each truss segment is also about 15 miles of electrical wiring.

The P1 and S1 radiators are each mounted on a radiator beam assembly that rotates to keep itself in the shade and away from the sun in order to maximize thermal performance. The radiator beam is attached to the truss via a rotating mechanism called the thermal radiator rotary joint (TRRJ) that rotates the three radiators 105 degrees in either direction. The TRRJ power data transfer assembly transfers power and the flex hose rotary coupler transfers ammonia between the radiators and the rest of the space station.

The addition of P1 also extends the Mobile Transporter (MT) rail line. The MT car travels along the length of the truss structure to carry the space station robotic arm along with space walkers, tools and construction items. Also, the two CETA carts operate on the S1 and P1 rail lines and are used to move spacewalkers, tools and equipment along the truss structure. A CETA cart can be used alone or coupled to the MT.

The P1 truss will be attached to the left or port side of the S0 (starboard zero) truss delivered in April 2002. In October 2002, Space Shuttle Atlantis delivered and installed the S1 truss to the right or starboard side of S0.

NASA Systems, based in Houston, is a business unit of Boeing Integrated Defense Systems and is NASA's prime contractor for the International Space Station and responsible for design, construction and integrating the components. The company also supports NASA in operating the ISS. Boeing was also the manufacturer and developer of the space shuttle fleet, the world's only reusable and human-rated spacecraft. Boeing is a major subcontractor to United Space Alliance for space shuttle operations and support.

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