Cosmic connection

Boeing and NASA are developing a common docking system to enable international and commercial spacecraft visits to the space station

By Ed Memi

GRAPHIC: The Common Docking Adapter is shown on the Node 2 Tranquility module of the International Space Station in this artist's rendering. JAMES POMIER/BOEING

PHOTO: Boeing senior technician Pete Becak, left, and Stan Daniels, a Boeing operations engineer, demonstrate a spacecraft and space station docking sequence using a mock-up of a common docking system being designed by Boeing and NASA. ELIZABETH MORRELL/BOEING

In the not too distant future, commercial spacecraft could be paying regular visits to the International Space Station—especially if space tourism evolves into more than an entrepreneurial dream.

But those spacecraft would need a common docking system that attaches to the space station, allowing transfer of crew and payloads.

For Boeing and NASA, such a docking system is no dream. They are already designing an international docking system that will enable a variety of spacecraft to bring crews to the station. It will replace the Orbiter Docking System when the space shuttle is retired in 2011.

"It is a very dynamic project, still being defined, but there has been a lot of good conceptual design," said Craig Tyer, Boeing mechanical design lead for the Common Docking Adapter. He has been working on structurally integrating the new docking adapter with the space station and led the effort to build a docking mock-up.

NASA is designing the active side of the docking system that will attach to the front of a spacecraft. Boeing is designing the Common Docking Adapter (the passive side) that attaches to the Node 2 module on the space station.

"We were provided some funding to help understand a docking system that would ultimately be a hybrid between the Russian system and an active smart system," Tyer explained. "That helped us better understand how these two different approaches to docking systems could come together as one."

As the spacecraft approaches the space station, magnets energize to help align the docking system during its initial contact with the ISS. The control system then gradually pulls the spacecraft in as magnetic forces are reduced. Emerging hooks grab the spacecraft and tighten until an airtight seal is achieved and the connection is then pressurized. The docking port can accommodate one astronaut at a time as a crew transfers between the spacecraft and the station.

NASA funded the Boeing project with financial support from the American Recovery and Reinvestment Act. Boeing recently received additional funding to continue design process toward a Preliminary Design Review. Following this review and assuming NASA funds the next stages, there will be a Critical Design Review in October 2011, followed by qualification testing before manufacturing of flight hardware begins. ■

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