



New frontiers

Boeing is making good progress on its entry for NASA's commercial spacecraft competition

By Ed Memi

For engineers such as Boeing's Eric Jensen, it's an exciting opportunity to design a new commercial spacecraft that will continue the legacy of the space shuttle and the Apollo vehicles that came before.

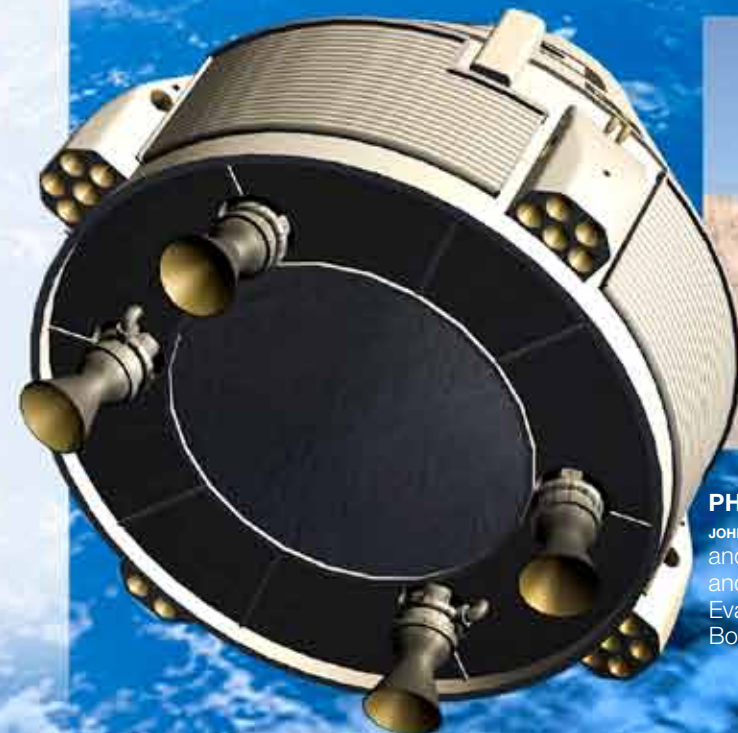
The Boeing Crew Space Transportation-100 capsule (CST-100) that Jensen is working on is the company's entry for NASA's Commercial Crew Development program, which aims to provide a commercial service for transporting a crew of up to seven to and from the International Space Station.

"I don't think there's a program at Boeing that could have provided the kind of opportunity I have at the onset of my career to interface with our NASA customer and to work on such a hands-on, fast-paced project," said Jensen, who has been with Boeing for only two years.

In addition to largely replacing the retiring shuttles on space station missions, Boeing's capsule could be used to support orbital habitats proposed by Bigelow Aerospace and other future destinations in low Earth orbit. And Boeing recently announced a preliminary agreement with Space Adventures to market unused seats on its crew capsule for private passengers.

Boeing has been making significant progress on its CST-100 spacecraft since it and four other companies were selected by the space agency earlier this year to develop critical technologies and capabilities for the Commercial Crew Development program.

With an \$18 million Space Act Agreement with NASA, Boeing has about 100 engineers in Houston and Huntington Beach, Calif., working on 36 design or demonstration milestones. The Boeing Space Exploration team in Florida and employees in St. Louis, Philadelphia and Seattle have also provided



PHOTOS: (Top) An artist's concept shows the Boeing CST-100 spacecraft as it approaches the International Space Station. **JOHN RANKIN/BOEING (Insets, from left)** The pressurized structure of the Boeing crew capsule after completing an extensive series of pressure and leak tests at the Bigelow Aerospace facility in Las Vegas. **BIGELOW AEROSPACE** Boeing engineers (from left) Grant Cooper, Lynna Wood and Xavier Simon inside a full-scale mock-up of the Boeing CST-100 cockpit. **ELIZABETH MORRELL/BOEING** Sam Baker, a Boeing Test & Evaluation engineer at the Huntington Beach, Calif., site performs a helium leak test on the seals of the pressurized structure of the Boeing CST-100 spacecraft. **BIGELOW AEROSPACE**

support. Their accomplishments to date include:

- Design, build and testing of a flight-like crew module pressurized structure
 - Creation of a mock-up of the interior of the spacecraft to ensure the crew can enter and exit the vehicle safely, as well as reach control switches and see easily through windows
 - Demonstration of the base heat shield structure and thermal protection system, which would protect the crew during re-entry into Earth's atmosphere
 - Development of an avionics systems integration facility to support rapid prototyping of avionics systems and full-scale avionics systems development
 - Development of a rendezvous sensor that allows the vehicle to autonomously approach and dock with the space station and the Bigelow Orbital Space Complex
 - Demonstration of airbag landing, water landing, uprighting and life-support systems
- NASA is expected to announce new contract awards by the spring of 2011 for the next round of competition.

Keith Reiley, Boeing's Commercial Crew Development program manager, said Boeing's progress thus far will likely put the company in a good position to earn the follow-on agreement and, eventually, a chance to compete for a large design, development, test and evaluation contract.

That Boeing, already a pioneer in commercial aviation, could help lead the way in developing a commercial space transportation system is exciting for engineers on the program such as Jensen. "I get to see my small part—helping to design the pressurized structure—go from concept all the way to fabrication and assembly of something that I think is a great venture for Boeing." ■

edmund.g.memi@boeing.com



PHOTOS: (Below) Leslie Robertson, Boeing Software Engineering, and John Wissinger, Boeing Space Operations and Ground Systems, run a simulation in the Avionics Systems Integration Facility in Houston to support rapid prototyping of avionics systems and full-scale avionics systems development for the Boeing CST-100 spacecraft. **ELIZABETH MORRELL/BOEING (Insets, from left)** Bill Overton, Boeing technology support subcontractor, Mike Fraietta, Boeing Space Operations and Ground Systems, and John Gasvoda, Boeing Software Engineering, participate in a simulation run in the Avionics Systems Integration Facility. **ELIZABETH MORRELL/BOEING** A test of the CST-100 airbags, which are used to upright the vehicle in case it inverts after an emergency water landing. **BIGELOW AEROSPACE** Bigelow Aerospace program manager Tom Londrigan performs tests in the full-scale CST-100 mock-up. **BIGELOW AEROSPACE**

