

Boeing Studies Keep ISS Humming

Boeing Studies Keep ISS Humming

Boeing [NYSE: BA] engineers have provided a number of studies to help NASA keep the International Space Station (ISS) viable for the foreseeable future, relying upon Russian vehicles, Soyuz and Progress, to transport cargo to the station.

Engineers at Boeing NASA Systems in Houston, many from the ISS Vehicle Integrated Performance and Resources (VIPeR) team, studied ways to maintain a safe and operable ISS. The team was asked by NASA immediately after the space shuttle Columbia accident to study a number of options, taking into account the delay of the unique cargo ferrying capabilities of the space shuttle.

The Boeing ISS team's primary assessment effort focused on a smaller ISS crew size and assessed the consumables used by the station and its crew and the need for spare hardware. The ISS team is relying upon the Russian vehicles as the only means of transporting cargo to the ISS until the shuttle returns to flight and/or the European Space Agency's Automated Transfer Vehicle is available.

The team tracked the primary consumables used by the station and its crew and worked closely with NASA's ISS Mission Integration group. Boeing conducted various analyses to minimize ISS supply and return requirements while optimizing the ISS vehicle performance and research.

The VIPeR team first focused on the issue of propellant on board the station, which is used to keep the ISS in the proper orbit and orientation and has been one of the most critical consumables in past studies. They concluded that currently planned Progress launches would meet propellant re-supply needs.

The next critical consumable is the water necessary to support the crew and system needs. Each crewmember uses about two kilograms of water a day for drinking, food and oxygen generation. The team looked at how water could be brought up while also examining ways to reduce water needs. "We looked at how long we could leave three crewmembers up there and when we would go to two crew members," said Neil Lemmons, senior systems engineer with the Boeing VIPeR team.

"Without the space shuttle, it was quickly determined by all involved that a three person crew could not be sustained," said Bob Korin, manager of the Boeing VIPeR team. Keeping a crew on the ISS was important, he added, because it would "give us a set of eyes, hands and creative thinking capability to respond to things that arise."

Although there would be some limits, a two-person crew could also continue to do scientific research. The Boeing teams, including a strong effort by the safety community, looked at the risks associated with a smaller two-person crew and concluded that there were no significant safety concerns. A two-person crew not only keeps research going but also maintains support for preventative and corrective maintenance, anomaly investigation and response, and other ISS System Operations needs that can best be done by an on-orbit crew.

Boeing and NASA engineers have studied the impact of a two-person crew on future science research. "The focus has been on new samples and consumables for the science and research apparatus already on board the ISS that require minimal space and weight," said Rick Golden, program manager of ISS payload integration.

"Our group (Boeing and its subcontractors, Teledyne Brown Engineering and United Space Alliance) ensures that interfaces between the science experiments and the space station are compatible," said Golden.

"A lot of our focus has been working the safety aspects to fly U.S. payload hardware on Soyuz and Progress launches," Golden explained. "We are positioning a select number of payloads at the Baikonur launch site in order to be able to take advantage of any space that becomes available on the upcoming Progress flights."

The Boeing ISS team reassessed the manifests for several planned shuttle launches. "We had to support system maintenance which may have required changing out filters, valves, bags and things along those lines or other items to support system repair," said Korin.

The team came up with a prioritized shopping list and looked at what they could take up without the space shuttle. The NASA/Boeing ISS team evaluated the amount of propellant, water, gas, and dry cargo that is needed to support the ISS and its crew. The ISS subsystem teams, including the logistics and maintenance team, played a critical role in defining the shopping list of needed items.

The Environmental Control and Life Support System group identified the selector valve and filter for the Carbon Dioxide Removal Assembly and the Internal Thermal Control System group identified the Pump Package Assembly as essential spares to be manifested on the upcoming Russian Soyuz and Progress flights.

The Soyuz is the ISS crew escape vehicle used in case of emergency and is certified for 200 days of life and is rotated every 180 to 190 days. They are normally taken to ISS by a "taxi crew" who then bring the "old" one

back. The Progress vehicle is unmanned and carries crew supplies and hardware spares to help maintain the life of ISS. There are normally 3 Progress flights a year.

"The Russians have given us about 30 kg allocation for US items to be launched on Soyuz 6S, so we have been working very hard with NASA to make sure all these items are certified to be launched on a Russian vehicle, and the Russians properly stow them for launch," according to Ray V. Gonzales, Boeing launch package manager for Russian vehicles. "We are also working to get these items to Moscow and then to Baikonur, Khazakstan where they will be launched."

A unit of The Boeing Company, Boeing Integrated Defense Systems, is one of the world's largest space and defense businesses. Headquartered in St. Louis, Boeing Integrated Defense Systems is a \$25 billion business. It provides systems solutions to its global military, government and commercial customers. It is a leading provider of intelligence, surveillance and reconnaissance; the world's largest military aircraft manufacturer; the world's largest satellite manufacturer and a leading provider of space-based communications; the primary systems integrator for U.S. missile defense; NASA's largest contractor; and a global leader in launch services.

###

For further information:

Ed Memi

Boeing NASA Systems

(281) 226-4029

edmund.g.memi@boeing.com

Kari Allen

Boeing NASA Systems

(281) 226-4844

kari.k.allen@boeing.com
