Boeing Engineers Fine Tune Problems Solving Skills

Boeing [NYSE: BA] space shuttle engineers are getting a refresher course in how to better understand and solve complex engineering problems in an effective team environment.

James F. Peters, Boeing principal scientist and engineer for the International Space Station and Space Shuttle, developed the four-hour Problem Resolution workshop to give engineers additional tools to analyze the multiple root causes of complex problems while highlighting the need for a systematic approach to problem solving and prevention.

Although most Boeing engineers have good engineering problem solving skills, the workshop takes the additional step of standardizing the approach engineers follow across all Boeing space shuttle sites when identifying the hazards associated with spaceflight, understanding the causes of failures and the factors for successful problem resolution.

Two case studies used in the course to highlight successful problem solving include the fuel cell problem on the Microgravity Science Lab Mission on STS-83 and the crack in the 17-inch ball Strut Tie Rod Assembly (BSTRA) that could have caused structural failure of the feed line to the Space Shuttle Main Engines. The lessons learned from these two case studies along with the problem solving methodology from the class are applied to exercises designed to provide engineers practical experience using the problem solving techniques.

Four common themes about successful problem resolution teams (PRTs) are taught in the workshop. "Engineers are taught that a clear definition of the problem is necessary and about the importance of getting the right people working together to solve the problem. A critical member of the PRT is the leader, who is responsible for selecting the team members, executing the problem resolution process, and ensuring all possible root causes are identified," Peters said.

The rest of the workshop focuses on a roadmap containing a sequential series of steps teams should follow to identify the root causes using fault tree analysis. The final step is to develop an action plan, which has multiple dimensions aimed at fixing or preventing problems and can range from additional testing to hardware changes and redesign.

The workshop is open to all Boeing space shuttle engineers at NASA Systems sites in Huntington Beach, Calif., Kennedy Space Center and in Houston. In addition to space shuttle employees, ISS, United Space Alliance and NASA employees have been attending classes, which average about 20-25 engineers. Every week, about one to two classes are conducted at each site, and will run to the end of the year. "This workshop is very beneficial to Boeing engineers and our customers as the fundamentals are applicable to other programs as well," added Peters.

"I wanted additional training for our engineers so that they could better solve technical problems in a team environment. What we do everyday in the shuttle program requires our best engineering effort, everyday. This workshop will improve the quality of support we give to our customer," said Bo Bejmuk, manager of the Boeing Space Shuttle Orbiter Program and the champion of establishing this workshop, which is a mandatory for his engineers.

What do engineers think about the workshop? In class surveys, all of the engineers think the workshop was effective at providing a better understanding of problem resolution while the vast majority highly recommends the workshop to others.

"It was a straightforward approach to problem solving, especially for some people who have not been a part of a PRT. People often struggle initially with the mechanics of problem solving and this helps people effectively pinpoint what they need to do first and how to avoid overlooking something important," said Robert Mills, a provisioning project engineer on the space shuttle program, who attended the workshop.

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