Space shuttle Columbia's second life - as a cautionary tale

Irene Klotz, Reuters

(Reuters) - Space shuttle Columbia's flying days came to an abrupt and tragic end on February 1, 2003, when a broken wing gave way, dooming the seven astronauts aboard.

Although Columbia now lies in pieces, its mission is not over.

The recovered wreckage, painstakingly retrieved from Texas and Louisiana for months after the accident, was preserved for a unique archive and education program at the Kennedy Space Center in Florida.

"I can talk about safety, but once I open those doors and folks enter into the room, it becomes a different conversation," said Michael Ciannilli, who oversees NASA's Columbia Research and Preservation Office. "When you come face to face with Columbia in the room, it becomes real. It becomes extremely real."

Ten years ago, Columbia was on its 28th mission, a rare research initiative in the midst of International Space Station construction [1] flights.

The crew included the first astronaut from Israel [2], Ilan Ramon, and six Americans - commander Richard Husband, pilot William McCool, flight engineer Kalpana Chawla, payload commander Michael Anderson and flight surgeons David Brown and Laurel Clark.

After 16 days in space, the shuttle was gliding back to Florida for landing when it broke apart due to wing damage that had unknowingly occurred during launch.

Accident investigators determined that a chunk of insulating foam from the shuttle's fuel tank had fallen off 81 seconds after liftoff and hit a carbon composite wing panel that turned out to be unexpectedly fragile. The breach proved fatal.

NASA had no idea falling foam debris, a common occurrence during shuttle launches, could do so much damage.

"One of the most important things that came from Columbia is to really learn to listen to your hardware. It's talking to you," Ciannilli said.

Pieces of Columbia's heat shield, including wing panels and protective thermal tiles, are among the most requested items for study from the archive.

Upon request, NASA lends specific components to researchers and educational institutes for analysis. In addition to NASA field centers and aerospace companies,

program participants include Caterpillar, the Colorado School of Mines and Ohio State University.

By understanding the dynamics of flight and how specific parts of Columbia were impacted, the hope is engineers will be able to design safer ships in the future.

The collection includes more than 84,000 individual pieces, most of which are cataloged and boxed. A handful of materials and structures - a tire, a wing panel, pieces of tile - are on display in the front part of a 7,000-square-foot room inside the Vehicle Assembly Building where the archive is housed.

"Sometimes I walk into the room, especially if I'm alone, and it comes back, some of the emotions, some of the feeling, some of the memories," Ciannilli said. "I lived the recovery operation in Texas, so you have these moments where you flash back."

"Some days are a little bit more introspective and difficult, but I really counter that with the fact that I've seen so much good come out of it. Every single tour engages in a conversation about safety," he said.

The Vehicle Assembly Building was once used to piece together space shuttles for flight, but it, like most of the Kennedy Space Center, is in the midst of a transition following the end of the shuttle program in 2011.

Only Columbia remains at the space center. Sisterships Discovery and Endeavour were relocated to museums, and Atlantis was transferred to Kennedy Space Center's privately operated visitors complex.

"We teach the story, show the effects of the accident and show the fixes that we put into place," Ciannilli said. "Columbia's mission was a mission of education and research. We try to continue that in their name."

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