NASA's second crash test harvests valuable data to improve emergency response

July 30 2015, by Sam Mcdonald

With a thunderous rattle, the Cessna 172 aircraft plowed into the soil as its windshield shattered, its wings wrenched off and its fuselage flipped—tail over nose—onto its back.

It was a startling sight, but one that left researchers at NASA's Langley Research Center in Hampton, Virginia, pleased.

Having been hoisted 100 feet into the air by cables, the aircraft plummeted onto a slab of dirt in a violent but controlled experiment that will help NASA improve aviation emergency response times.

"This will provide very good data collection for us," said Lisa Mazzuca, NASA's Search and Rescue mission manager. "This is exactly what we wanted. The nose hit the ground first."

Wednesday's test, the second of three being conducted at Langley, is part of a push to bolster the reliability of emergency locator transmitters. The systems automatically alert rescue personnel in the event of an airplane crash.

But the systems, called ELTs for short, are often so damaged in crashes they fail to transmit as designed. That means it's harder for rescue teams to reach a crash site quickly.

Through research funded by NASA's Goddard Space Flight Center in Greenbelt, Maryland, engineers and technicians are working to solve the problem. Tests like the one conducted Wednesday will help NASA and its government and industry partners find ways to make ELTs more likely to function after a survivable crash.

The first test in the series, which took place July 1 at Langley, used the same 1958-vintage model aircraft, but dropped it from a lesser height and onto concrete instead of soil.

You'd think that crash landing on soft dirt would be less destructive than on hard concrete, but that's usually not the case. "It's actually worse," said Chad Stimson, NASA Langley Emergency Locator Transmitter Survivability and Reliability (ELTSAR) project manager. On concrete, an aircraft is more apt to skid forward, dissipating some of the energy, he said.

On soil, the aircraft can stop more suddenly. "So all that force is absorbed by the airframe and the occupants," Stimson said. "This was clearly more severe than the first test. No one would have walked away

from this. They might be alive, but they'd need help right away. In that sense, it's the perfect search and rescue case."

The project's goal is to make ELTs work better in crashes where rescue workers have the best chance of saving lives.

"With this one, we're trying to push the envelope," Stimson said of Wednesday's test. "It's severe, but survivable."

One factor being measured in the tests is how the ELT systems are installed. The systems are made from two main components. A brick-sized beacon is typically affixed to the interior of the aircraft's fuselage. An antenna is mounted to the outside of the airplane. Once the beacon and its sensors detect signs of a crash, it automatically transmits location information through the antenna to a satellite. That information is then relayed to emergency personnel on the ground.

Data gathered from the tests will lead to better guidance on how to install the systems so they're more likely to work after a crash.

A test like Wednesday's comes as close as possible to replicating real-world conditions. The five ELT units mounted on the test aircraft work exactly as they would on an airborne aircraft, even transmitting information to satellites.

"The cool thing is we're using the whole system," Stimson said. "We get real-time feedback from space … and we're getting first-of-its-kind data to help search and rescue get better outcomes."

Provided by NASA

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