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Title:

Occupant Protection for Legacy Rotorcraft

Abstract:

Rotorcraft aviation has a high injury and fatality rate from what should be survivable crashes. Only 10% of the U.S. fleet are compliant with the latest regulations with respect to the Emergency Landing Dynamic Condition Rule (14 CFR 27/29.562). Regulators are looking to reduce the risk of blunt force trauma in crashes of rotorcraft that do not meet the latest safety certification level. Dynamic research tests are needed to fill the knowledge gap in order to advance the crash safety for the existing rotorcraft fleet. This data can assist rotorcraft and seat manufacturers in the design of retrofit seats and structures and help industry groups in developing a set of guidelines to reduce the risk of injury to occupants.

The Federal Aviation Administration (FAA) will be conducting a series of dynamic tests at the Civil Aviation Medical Institute's (CAMI) accelerator impact sled. The seat used in this test series will be the Reusable Energy Absorbing Lab Seat (REAL) developed by the Department of the Navy. The seat will be pitched back 30 degrees from vertical with zero degrees of roll and yaw. The REAL seat will evaluated at five seat stroke distances: 2, 4, 6, 8 and 10 inches. Three sled input pulses will be evaluated: 21, 25 and 30 feet per second. Each seat stroke and input pulse combination will be tested three times resulting in a total of 45 tests. Data will be collected by means of an instrumented 50th percentile FAA Hybrid III Anthropomorphic Test Device (ATD). Acceleration measurements on the ATD will be collected at the head, spine and pelvis. Forces on the ATD will be collected at the upper neck and lumbar. Moments will be evaluated at the upper neck and lumbar. The REAL seat will be instrumented to measure seat pan acceleration and seat pan displacement. One channel on the accelerator sled will collect the acceleration results to verify the input pulse. ATD and seat motion during the dynamic test will be collected with two high speed cameras positioned perpendicular to X-Z and Y-Z planes of the sled coordinate systems. Outputs from this test series is anticipated to aid manufacturers of rotorcraft and seats to develop seats for the existing fleet to reduce in blunt force trauma during an accident. This dataset could benefit the general aviation aircraft and Electrical Take Off and Landing (eVTOL) manufactures and designers. Results from the test series will be presented during the conference.