

Photogrammetric Techniques Utilized during Sub-scale and Full-scale Testing of Fokker F28 Aircraft Hardware

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Abstract

Multiple photogrammetric techniques were implemented during a series of dynamic drop tests on Fokker F28 aircraft hardware at the National Aeronautics and Space Administration (NASA) Langley Research Center's Landing and Impact Research (LandIR) facility during 2017 and 2019. These techniques included, pre- and post-test FARO laser scanning of the test article, full-field surface shape and deformation measurements during the impact event and marker tracking for displacement, impact angle and impact velocities. Marker tracking was also carried out on the Anthropomorphic Test Devices (ATD), more commonly known as crash test dummies, which were located inside the F28 test article(s).

Three different tests were conducted during this two-year time frame. The initial two tests were on partial fuselage sections, i.e., barrel sections, which were removed from a Fokker F28 MK4000 aircraft and consisted of a Forward cabin section and a Wingbox section. The third and final test was a full-scale crash test of a F28 MK1000 aircraft. Due to the size and cost of limitations of crashing a full-size aircraft, aircraft are usually evaluated through component-level tests, better known as sub-scale testing, however these tests are limited in their ability to fully replicate the complex loading conditions and environment which occurs during full-scale crash testing.

The results and data generated from the photogrammetric techniques mentioned above, aided in the evaluation of the aircraft and onboard occupant response during sub-scale and full-scale testing. Additionally, the data was used to provide comparisons between the two different test configurations.