

A Comparative Analysis of Airframe Results Between Sub-Scale and Full-Scale Tests of Fokker F28 Aircraft Hardware

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Abstract

Between 2017 and 2019, three tests were conducted on Fokker F28 aircraft hardware at NASA Langley Research Center's Landing and Impact Research facility. Two tests, which were conducted in 2017, were of partial fuselage sections (commonly called "barrel sections") removed from a Fokker F28 Mark 4000 aircraft. The two sections were a Forward cabin section and a Wingbox section. The two sections were tested under pure vertical conditions of a nominal 30 ft/s impact velocity, with the Forward cabin section impacting at a level pitch onto a soil surface at an actual velocity of 28.9 ft/s and the Wingbox section impacting a 15 degree forward sloping soil surface at an actual velocity of 29.1 ft/s.

After the two barrel section tests were completed, a Fokker F28 Mark 1000 aircraft was crash tested under combined vertical and forward impact velocities onto a soil surface. The impact velocities were 31.8 ft/sec vertical and 65.3 ft/sec forward. The impact conditions were chosen such that the vertical velocity would be comparable to the barrel drop tests, while the forward velocity was a limitation of the test configuration.

Using common locations amongst the aircraft, along with a common vertical velocity, this report will examine and compare the impact loads developed on the airframe using the onboard data acquisition system acquired data and failure(s) in the structure, where applicable. The comparisons will specifically attempt to examine the effect of horizontal velocity on the vehicle response.