

## **Narrow-body & Wide-body Mishap Kinematics Study**

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### **Abstract:**

The presentation will describe a study<sup>1</sup> conducted on 86 narrow-body and 29 wide-body transport aircraft mishaps. The purpose of the study was to improve the understanding of transport aircraft crashworthiness by quantifying the kinematics of the crashes and the outcomes. Ultimately an understanding of the crashworthiness of existing airframes, mostly metallic structure, will enable future understanding of crashworthiness for composite airframes.

The mishaps selected were those with thorough and readily available investigation reports and deemed to be potentially survivable. Data on mishap kinematics, damage, placement of occupants, and occupant outcomes was extracted from the reports. The mishaps were assigned to one of seven mishap scenarios. The data were used to develop correlations between crash kinematics and the mishap outcome as represented by aircraft damage and occupant injury severity. The two aircraft types, narrow-body and wide-body, are treated separately and equally in the analysis.

The report develops correlations between the kinematic parameters of the mishaps and the resulting mishap damage and injury fractions. Data were also extracted on emergency evacuations, and exit functionality and availability. The frequency of post-crash fire was also noted. The data are analyzed by mishap scenario. The damage and the injuries are allocated to five segments of the aircraft fuselage: cockpit, forward cabin, overwing cabin, aft cabin, and tail. Predictive models are developed for injury fraction using binary logistics regression on the kinematics data.

The purpose of this presentation is to make the conference attendee aware of the study and the contents of the report. The presentation will describe the mishap selection criteria, the data extracted, and the mishap scenarios. The presentation will describe selected results from the analysis and the results.

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<sup>1</sup> Study of Mishap Kinematics, Damage, and Injury Interactions for Wide-Body and Narrow-Body Transport Aircraft, Labun, L.C. Cress, J.P. Kennedy, D., DOT/FAA/AR-xx/xx. June 2018.