

DESIGN OF AIRCRAFT NOSEGEAR'S WEIGHT-ON- WHEEL SWITCH ACTUATOR FOR RETROFITTING

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ABSTRACT

This research used Learjet 45 flight test data to demonstrate the need for a nose landing gear weight-on-wheel (WOW) capability to improve directional control of mid-size business jets. This capability would be brought about by the installation of WOW switch and a switch actuation mechanism. The study also attempted to select the switch and design a plunger-type actuation mechanism, and showed that the mechanism worked well for this application. By using MECHANICA® Motion and Structure to perform motion analysis and finite element analysis respectively, the study demonstrated the capability of computer-aided-engineering (CAE) tools, which helped to arrive at the best design, functionally and structurally. Design-for-manufacturing-and-assembly principles were applied to the design process to ease manufacturing and assembly. A system safety analysis was performed on the mechanism.

The results of this research showed that nose gear WOW capability greatly improved directional control of aircraft upon landing. The actuator mechanism design was simple but proved to be robust, structurally sound, and reliable. As a result, this mechanism can be used on similar aircraft with only minor modifications. It was also concluded that CAE software the like of Pro/MECHANICA Motion and Structure are very versatile and instrumental in the design process.