

Aging Evaluation of F/A-18 A-D Wing-Root Stepped-Lap Joint

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ABSTRACT

The F/A-18 wing root structure consists of composite-titanium bonded stepped-lap joint. This effort is designed to evaluate the residual static strength and remaining life of this joint area after 1 lifetime of aircraft service. A reliability analysis is conducted on residual strength and fatigue life data to compare the original certification data used in the scatter analysis. Spectrum loading representing fleet usage with load-severity factors (to accelerate the fatigue damage growth) is used for cyclic testing to determine the remaining life of the stepped-lap joints. This effort also supports the life-extension efforts without additional large-scale testing to determine the remaining life of the structure. Furthermore, the tests are designed to address one of the biggest concerns with the aging aircraft fleet—the unknowns that emerge with little or no warning, raising the concern that an unexpected phenomenon may suddenly jeopardize an entire fleet's flight safety, mission readiness, and/or support costs. The results of this research provided adequate assurance on the integrity of the joint beyond the design service goal.

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