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The Effect of Peening on the Fatigue Life of 7050 Aluminum Alloy

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ABSTRACT

Many changes in the design and manufacture of high-performance military aircraft — for example, the use of highly optimised design and the use of higher-strength material — have led to an increased sensitivity of airframe fatigue life to surface features such as corrosion or mechanical damage. The peening applied to the F/A-18 represents a significant departure from traditional manufacture, and it is therefore important that the RAAF and AMRL have a thorough understanding of the peening process, the surface conditions produced, and their effect on structural integrity.

This report discusses the fatigue crack growth research at AMRL, and elsewhere, relating to peening of aluminum alloys, and summarises the improvements in peening which have arisen from this research. The overall aim of the peening research and development discussed was to establish a Life-Improvement-Factor (LIF) for the peening used on the F/A-18, as well as any future peening required by modifications. It also attempted to provide a means of measuring peening quality, to allow the full exploitation of peening to improve fatigue life. It also highlights areas where further research could be beneficial in relation to peening and the structural integrity of the F/A-18 aircraft. The report highlights the practical problems of introducing changes to fatigue critical surfaces, with particular reference to the RAAF and CF fleets.

Approved for public release.

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