1. Effectivity

This AWB is applicable to all aircraft.

2. Purpose

To advise maintainers, registered operators and manufacturers on the unintended mechanisms that could result when corrosion inhibiting compounds are applied to aircraft structural joints.

3. Background

A recent study has been carried out into the effects of corrosion inhibiting compounds (CIC) on aircraft structural joints. The work formed the basis for a Phd thesis and was funded by CASA. The resulting outcomes are promulgated in this AWB for the benefit of the aviation industry.

The study involved identification of common aircraft structural joints and testing of representative structural specimens in which conclusions were drawn.

4. Recommendations

- That the use of water displacing thin film CIC can offer substantial benefits in terms of preventing and/or retarding corrosion. Any change in the use, frequency or application of these compounds should be done in close consultation with the aircraft manufacturer before making changes to the Corrosion Prevention and Control Program (CPCP) for the aircraft. An approved change should be via Service Bulletin or Letter or approved as maintenance data under CAR 2A(4).

- Research has shown that the use of CICs on structural joints that rely on friction/clamp up force and are primarily in shear, such as aircraft lap joints, may experience a reduction in fatigue life due to the ingress of CICs on the faying surfaces of the joint. This effect is more apparent for highly loaded joints where CIC application can exacerbate relative movement within the joint. The use of CICs on certain lap joint specimens tested shifted the failure mode from sheet failure to a less desirable rivet failure mode at higher loading.

Caution should be exercised in applying CIC to aircraft structural joints known to be highly loaded and/or fatigue critical. Fatigue critical joints tested in the analysis showed a reduction in fatigue life of up to half when CIC were introduced. Where a fatigue crack has been initiated, the use of CICs has been shown to increase the fatigue crack growth rate.
• Careful sheet metal work practices should be followed during the manufacture and repair of aircraft structures to ensure that the correct rivet driving (clamp-up) force has been applied during installation. Rivets that do not meet correct tail diameter specifications (i.e. D/Do = 1.5) can result in working (smoking) of rivets under normal conditions and coupled with the application of CICs, may result in joint fatigue life reduction. Working rivets can lead to premature rivet failure with a subsequent increase in loading on surrounding fasteners.

• CICs should not be employed (without appropriate demonstration of safety) in aircraft featuring unusual construction or materials such as non-metallic structure or adhesives not normally employed in modern aircraft. Caution should also be followed for the application of CIC near and around aircraft electrical system wiring.

5. Summary

If CICs are used appropriately they can offer substantial benefits in protecting aircraft structure however caution should be exercised to ensure that they are applied in accordance with the manufacturer’s instructions.

6. Reporting

Aircraft defects should be reported via the SDR system in accordance with the requirements of CAR Part 4B.

7. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

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Civil Aviation Safety Authority
GPO Box 2005, Canberra, ACT, 2601