Australian Government
Civil Aviation Safety Authority

AIRWORTHINESS BULLETIN

Standard Practices - Propeller

AWB 61-008 **Issue** : 1
Date : 24 January 2011

1. Applicability

Propellers.

2. Purpose

To provide guidance on propeller continuing airworthiness/maintenance practices.

3. References

- AC 21-22 - Approval of Imported Engines, Propellers, Materials, Parts and Appliances.

4. Service Bulletins and Letters

On occasion information within Service Bulletins/Letters may conflict with the approved maintenance data and Airworthiness Directives (AD). All propellers fitted to Australian registered aircraft must comply with the propeller manufacturer's published Time Between Overhaul (TBO); or the CASA TBO period as listed in Appendix 1 of AD/PROP/1. In cases where the CASA and manufacturer TBO differ, the more restrictive limit should be applied.

5. The Nature of Fatigue Failures in Propeller Blades

1. Many propeller blade failures have been found to be the result of fatigue crack growth from a small sharp indentation present on the blade leading edge. The indentations are believed to have been the result of stone chip damage sustained during operation. Failure occurs almost exclusively in the outer (tip) half of the blade and this type of failure is not unique to any one propeller manufacturer or model of blade.

2. The fatigue crack propagates in a chordwise direction, initially penetrating both the rear and front faces of the blade leading edge for a very short distance. The crack continues to propagate in a chordwise direction; however it may not penetrate the front face of the blade until just prior to final failure.

3. Analysis has shown that a single crack propagating in a chordwise direction may intersect the rear face of the blade for up to 75% of the chord length without intersecting the front face of the blade, therefore detection of the crack may only be possible from the rear of the blade (see figures 1a and 1b). The crack propagates in this manner due to thrust bending loads applied during operation.

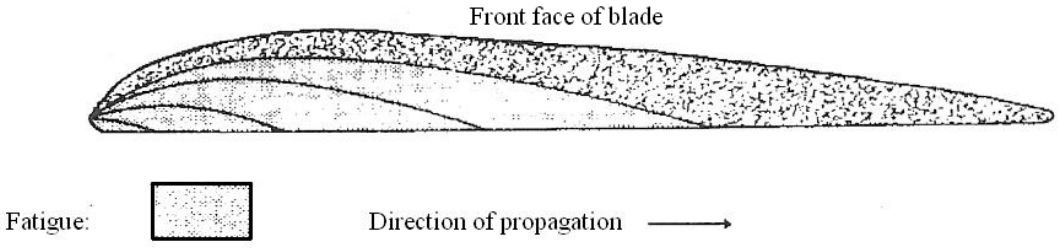

Figure 1a. A schematic diagram of the crack propagation. Note the shape of the crack front intersecting the rear face but not the front face of the blade.

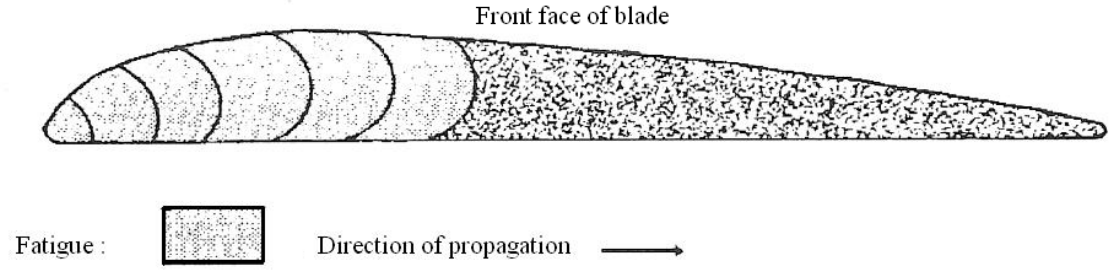

Figure 1b. A schematic diagram of the generally perceived nature of the crack propagation. Note the shape of the crack front.

4. Investigation has shown that cracks have propagated over a long period, which in some cases exceeds thirty ground/air/ground cycles i.e. thirty flights. There is no evidence to suggest that failures have occurred where a crack may have propagated from initiation to final failure in one ground/air/ground cycle i.e. one flight. Therefore detection of the crack and prevention of failures of this nature should be achievable.

5. Some blade paint schemes are not conducive to easy inspection of the rear surface of the blade; therefore detection of the crack will rely on a more vigilant inspection of the blade in general, with particular attention being paid to the rear face and leading edge during the pre-flight inspection.

6. Enquiries

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

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