Continuing Airworthiness Notice – 63-001

Robinson R22 Main Rotor Drive System and Drive Belts

7 September 2009

Issued by the Civil Aviation Authority of New Zealand in the interests of aviation safety. A Continuing Airworthiness Notice (CAN) is intended to alert, educate, and make recommendations to the aviation community. A CAN contains non-regulatory information and guidance that does not meet the criteria for an Airworthiness Directive (AD). The inspections and practices described in this CAN should still be carried out in accordance with the applicable NZCAR Parts 21, 43 and 91.

The contents of this notice are ADVISORY ONLY and are NOT MANDATORY.

CAN numbering is by ATA Chapter followed by a sequential number for the next CAN in that ATA Chapter.

Applicability:

All Robinson R22 helicopters.

Purpose:

This Continuing Airworthiness Notice (CAN) is issued to draw attention to the occurrence of main rotor drive failures on R22 helicopters and the inspection/maintenance requirements of main rotor drive systems. This CAN provides a guide to the information available with emphasis on the inspection and maintenance requirements of main drive belts.

Background:

This CAN is prompted by numerous reports of R22 main rotor drive system failures in New Zealand and Australia. Investigation revealed a significant number of main drive belt failures may be due to either maintenance and/or the type of aircraft operations. Failures include low TIS main rotor drive belts. R22 aircraft on aerial work operations are subject to more strenuous operations which may have a detrimental effect on main rotor drive system reliability.

Typical Main Drive System Failures:

Several reported failures of newly installed main drive belts were described as feeling "sticky", "soft" and "stretchy" at the time of installation. In one instance a set of drive belts had a lumpy drive face which caused excessive vibration. Experience has shown that drive belts are more likely to fail due to the belts not having been inspected for defects prior to installation, and newly installed belts are more likely to fail due to not adhering to the correct V-belt 'break in' procedure.

Failures are due to pre-existing defects in drive belts not being identified prior to installation, incorrect tension of new/used belts, the unacceptable surface condition of the sheave V-grooves, incompatible sheave types used as a pair, sheaves installed in the incorrect position, misaligned sheaves and incorrect actuator rigging.

Some failures of the lower pulley bearing have been due to incorrect servicing of the lower pulley bearing.

Reports of cracks found in the lower pulley bracket have been attributed to excessive vibration from the engine cooling fan and lower pulley or sheave.

In addition, an in-flight alternator drive belt failure may interfere with the operation of the main rotor drive belts and can result in malfunction or failure of the main rotor drive belts.

Recommendation:

The CAA strongly recommends operators/maintainers of R22 aircraft consider the following:

- Inspect the main drive belts for defects before installation.
- For the installation and 'break in' of main drive belts refer to the manufacturer instructions.
- Inspect main rotor drive belts at every pre-flight inspection and periodic maintenance inspection for condition.
- Inspect the lower sheave for condition at every daily or pre-flight inspection. The grooves should be smooth with uniform drive groove surfaces.
- Monitor main drive belt wear and stretch in service by checking the clutch shaft angle. When the maximum extended dimension of the actuator has been reached the main drive belt should be replaced.

- Check the sheave alignment after a heavy landing, after the installation of new main drive belts and/or the installation of new engine mounts, every time any of the drive line components are disturbed for servicing, after a main transmission / engine change, and whenever the main drive belts are removed due to signs of stress, such as fraying / shredding.
- Inspect alternator belts for condition, correct alignment, cracks, missing teeth, fraying or delamination including heat deterioration or permanent set at installation and in service.
- Operators of R22 helicopters must adhere to the flight limitations specified by the manufacturer and the cautions in the POH, specifically those applicable to the main rotor drive system. The manifold pressure should be monitored as a means of limiting the available engine power. Failure to observe these limitations may result in sudden failure of the main rotor drive belts.

Applicable References:

Manufacturer information which pertains to the maintenance of the R22 Main Rotor Drive System:

- Instructions for the removal, installation, replacement and maintenance of the drive train system and components - Section 7 'Drive Train' in the R22 Maintenance Manual (MM).
- V-belt Installation – Service Letter No. 20A and No. 39.
- Replacement of V-belt Upper Sheave – Service Bulletin No. 77.
- V-belts inspection requirements - Section 2.507 'V-belt Inspection' in the R22 MM.
- Special Cautions When Installing V-belts or Other Drive Line Components – Service Letter No. 23A.
- V-belt installation and 'break in' procedure - Section 7.282 'V-belt Installation' of the R22 MM.
- Alignment of V-belt Sheaves – Service Letter No. 35.
- Special inspection requirements for lower sheaves - Section 2.508 'Lower Sheave V-belt Wear Pattern Inspection' in the R22 MM.
- Balancing instructions for the engine cooling fan - Section 6.240 'Balancing Fanwheel' in the R22 MM.
- Maintenance requirements for the clutch shaft angle - Section 7.240 'Clutch Shaft Angle' in the R22 MM.
- Inspection/maintenance requirements of the lower actuator bearing assembly – Service Bulletin No. 95 'A181-4 Lower Actuator Bearing Assembly' and Service Bulletin No.58 'Actuator Bearing'.
- Early detection of lower bearing failure – Safety Notice No. 28 'Listening for Impending Bearing Failure'.
- Inspection/maintenance requirements of alternator drive belts - Section 2.410 'Inspection Procedures and Checklist' in the R22 MM, SL No. 57 'Alternator V-belts' and Textron Lycoming Service Instruction No. 1129.

Manufacturer information which pertains to the operation of the R22 helicopter:

- Pre-flight drive belt inspection requirements - Section 4 'Normal Procedures' in the R22 Pilots Operating Handbook (POH).
- Warning/caution lights applicable to main rotor drive belts - Section 3-0 'Emergency Procedures' in the R22 POH.
- Safety Alert 'Exceeding Manifold Pressure Limits' dated 01 December 2004.
- Safety Alert 'Exceeding Power Limits can be Fatal' dated 20 December 2004.

Note: The above mentioned references are for general guidance and may not be revised in this CAN. These references are not intended to exclude any other approved data or new information including ADs.

Enquiries:

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