Log 2314

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: December 8, 1992
In reply refer to A-92-122 thru -124

Honorable Thomas C. Richards
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On January 21, 1991, a Robinson R-22HP, N21439, executed an emergency autorotative landing near Scottsdale, Arizona. The pilot reported that, while in cruise flight, the drivetrain clutch caution light flickered twice. Shortly thereafter, the third light flicker was accompanied by a loud bang. A check of cockpit instruments by the pilot revealed increasing engine speed and decreasing main rotor speed. He entered autorotation and during the landing attempt, the helicopter rolled over on its right side. The helicopter was substantially damaged; the pilot was not injured.

The Safety Board's investigation of the accident revealed that two of the four vee-belts which transmit torque from the engine driven sheave to the main and tail transmissions through the upper clutch sheave had failed in flight. The other two belts had turned over in their grooves and were damaged. A review of maintenance records indicated that the belts had been in service 516 hours; the recommended replacement time is 1,000 hours. Metallurgical examination of the upper clutch sheave revealed that abrasive materials had entered the surface between the belts and the sheave grooves, wearing away the anodized coating of the sheave. This resulted in corrosion of the sheave and, later, sharp edges on the grooves. The sharp edges subsequently damaged the belts, causing two of them to fail.

The manufacturer has identified the factors which can lead to premature failures of the vee-belts and has issued Service Bulletin (SB) 66, dated April 19, 1991, and Service Letter (SL) 39 issued on the same date. SB 66 requires a one-time visual inspection of any wear patterns in the grooves of the lower sheave. The condition of the lower sheave is indicative of upper sheave wear patterns. If the patterns are markedly dissimilar, the manufacturer recommends immediate replacement of the belts and inspection of the sheaves as described in SL 39. Considering the large number of Robinson R-22 helicopters that are reportedly used "in the field" where abrasive materials could enter and damage the sheaves and the likelihood that the accomplishment of SB 66 and SL 39 would eliminate this hazard, the Safety Board believes that the above service bulletin and letter should be made mandatory in order to help assure the airworthiness of the R-22 helicopter. Frequent inspection of the vee-belts and sheaves, if

recommended in the maintenance manual and the operator's manual, would allow for detection of vee-belt wear by pilots or maintenance personnel before vee-belt damage could disable the helicopter in flight. The condition of the vee-belts and upper sheave could be inspected during the preflight inspection while the access door is open to check the main transmission oil level.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Issue an airworthiness directive applicable to all models of the Robinson R-22 helicopter making Robinson Service Bulletin 66 and Service Letter 39 mandatory. (Class II, Priority Action) (A-92-122)
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> Revise the Robinson R-22 Maintenance Manual to include inspection criteria that would adequately address the condition of the vee-belts, upper and lower sheave assemblies, and the clutch during the 100-hour periodic inspection. (Class II, Priority Action) (A-92-123)
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> Require that the Robinson R-22 Pilot's Operating Manual be revised to include the inspection of the vee-belts, upper and lower sheave assemblies, and the clutch during pilot preflight inspections. (Class II, Priority Action) (A-92-124)

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HART, and HAMMERSCHMIDT concurred in these recommendations.

By: Carl W. Vogt
Chairman