



National Transportation Safety Board
Washington, D.C. 20594

Safety Recommendation Report

Spool Bearing Failures in Rolls-Royce 250-Series Engines

Accident Number:	CEN16FA171
Operator/Flight Number:	Rotor Blade LLC
Aircraft and Registration:	MD Helicopters 369E helicopter, N629JK
Location:	Near Reedsville, Wisconsin
Date:	May 4, 2016
Adopted:	June 5, 2017

The National Transportation Safety Board (NTSB) is providing the following information to urge the Federal Aviation Administration (FAA) to take action on the safety recommendation in this report. This recommendation is intended to prevent failures of spool bearings installed in the power turbine governors (PTG) of certain Rolls-Royce (formerly Allison) 250-series engines.¹ It is derived from the NTSB's investigation of a fatal accident in which an MD Helicopters 369E helicopter, N629JK, impacted trees and terrain near Reedsville, Wisconsin.² As a result of findings in this investigation, the NTSB is issuing one safety recommendation to the FAA.

Background and Analysis

On May 4, 2016, about 10:00 am central daylight time, an MD Helicopters 369E helicopter, N629JK, impacted trees and terrain near Reedsville, Wisconsin. The commercial-rated pilot, who was the sole occupant, was fatally injured and the helicopter sustained substantial damage. The helicopter was registered to Padgett Ag Air LLC, Pawleys Island, South Carolina, and operated by Rotor Blade LLC, Georgetown, South Carolina, under the provisions of 14 *Code of Federal Regulations* Part 133 as an external load operation to transport personnel and equipment in support of power line maintenance. The flight departed from Manitowoc County Airport, Manitowoc, Wisconsin, about 0730.

Three witnesses who were nearby at the time of the accident reported that, as the helicopter approached a power line structure, they noticed a change in the sound of the helicopter's engine (a Rolls-Royce 250-C20B); the helicopter then descended suddenly. It veered to the right and the main rotor blades appeared to decrease in speed. Postaccident examination of the engine found that the PTG dual-spool bearing had failed due to a lack of lubrication.³ Failure of this component

¹ The PTG spool bearing supports one end of the PTG driveshaft assembly. The function of the PTG is to sense and adjust engine power to maintain the desired levels.

² Information about this accident, NTSB case number CEN16FA171, is available from the NTSB's [Aviation Accident Database web page](#).

³ For more information, see the NTSB Materials Laboratory Factual Report in the docket for this accident (<https://dms.nts.gov/pubdms/>).

can result in engine oscillations, uncommanded engine acceleration, or, as occurred in this accident, a loss of engine power.

The dual-spool bearing within the PTG, which is designed and manufactured by Honeywell, replaced the legacy design single-spool bearing in Rolls-Royce 250-series engines in 2003 as a cost-of-ownership-reduction measure.⁴ Since its introduction, 23 dual-spool bearing failures have been reported in the field, not including this accident (which is the first resulting in a fatality). In 2008, to address this failure mode, Honeywell released a service bulletin (SB) recommending replacement of the dual-spool bearing with the single-spool bearing (which had no prior service issues). Rolls-Royce then released four commercial engine bulletins (CEB) calling for replacement of dual-spool bearing PTGs with single-spool-bearing PTGs (that is, the PTGs that complied with the Honeywell SB).⁵

The SB and CEBs indicate that the recommended action is intended to improve reliability of the PTG by incorporating a new bearing assembly, but do not contain any discussion about the consequences of not complying with the bulletins.⁶ The FAA did not mandate compliance with any of these bulletins via an airworthiness directive (AD), and the helicopter involved in this accident had not undergone the action recommended in the bulletins. If a single-spool-bearing PTG assembly had been installed on the accident helicopter in compliance with the SB and CEBs, the accident would have been prevented. Honeywell estimates that about two-thirds of all affected PTGs have been modified in compliance with the SB; the status of the remaining one-third of the population is unknown.

For certain helicopter operations (such as those under Part 133) that sometimes operate within airspeed and altitude combinations from which a successful autorotation landing may be difficult to perform (typically designated the “avoid” region on height-velocity diagrams), a loss of engine power during these operations would result in a forced landing that could end with catastrophic consequences, such as the accident in Reedsville.

The NTSB concludes that, to ensure that all affected PTGs have been modified as recommended in Honeywell SB GT-73-344, compliance with the SB should be required. Therefore, the NTSB recommends that the FAA issue an AD to require all owners and operators of helicopters equipped with Rolls-Royce 250-series engines to comply with Rolls Royce CEBs 318, 1402, 73-2076, and 73-4057, which call for the replacement of PTGs with ones that comply with Honeywell SB GT-73-344.

⁴ Applicable Rolls-Royce 250-series engines include the 250-C18, -C20, -C20R, and -C28 series.

⁵ Honeywell SB GT-73-344 is applicable to Honeywell model AL-L4, AL-AA2, AL-AC3, and AL-AD2 PTGs installed on Rolls-Royce 250-series engines. Rolls-Royce CEB Nos. 318, 1402, 73-2076, and 73-4057 are applicable to 250-C18, -C20, -C28, and -C20R series engines, respectively.

⁶ In November 2016, Rolls-Royce issued a revised commercial service letter (originally issued in March 2011 and applicable to 250-C18, -C20, -C28, and -C20R series engines) informing owners and operators of the consequences of not replacing the dual-spool bearing with the single-spool bearing.

Recommendations

To the Federal Aviation Administration:

Issue an airworthiness directive to require all owners and operators of helicopters equipped with Rolls-Royce 250-series engines to comply with Rolls Royce Commercial Engine Bulletins 318, 1402, 73-2076, and 73-4057, which call for the replacement of power turbine governors with ones that comply with Honeywell Service Bulletin GT-73-344. (A-17-33)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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