

INVESTIGATION FINDINGS

N369MH Accident WPR18LA221

The following enumerates the IIC's findings regarding the tail rotor (TR) failure and resulting accident involving MD-369 N369MH on August 8, 2018

Synopsis

All four teeter bearings were found to have been improperly installed in the TR system. All available evidence indicates that at least two of those were installed by HAS. Contrary to FAA requirements, HAS failed to document the installation of these bearings (as required). Disbonding of one or more of these bearings resulted in fracture of the outer teeter bolt, and subsequent failure of all four primary structural attach points for the TR transmission. Immediate and correct response by the pilot prevented a more serious accident.

Detailed Enumeration

1. Magnum Helicopters is a wholly-owned subsidiary of Schuman Aviation operating iaw FAR Part 136
2. Makani Kai Helicopters is/was a wholly-owned subsidiary of Schuman Aviation
3. Hawaii Aviation Services (HAS) is a wholly-owned subsidiary of Schuman Aviation
4. HAS is an FAA Part 145 certificated repair station
5. California Aero Components (CAC) is a wholly-owned subsidiary of Heli-Mart (HM)
6. CAC is an FAA Part 145 certificated repair station
7. Heli-Tech (HT) is an independent FAA Part 145 certificated repair station
8. N369MH was registered to Schuman Carriage (Aviation) and operated by Magnum Helicopters
9. HAS performed most or all maintenance on N369MH
10. On an unknown date before 8/17/16 CAC overhauled TR transmission SN 7604-0356. [TBD Work Order 6622]. The transmission included a 4-arm fork
11. On or about 8/17/16, HAS installed that TR transmission on N369MH
12. On or about 9/20/16, an unspecified (either inner or outer) teeter bolt (PN 369A1602-3 or equivalent) on N369MH fractured in flight
13. On an unknown date before 9/22/16, HT overhauled a 4-arm TR fork (PN 369D21701-21, SN 043765-0209); the overhauled fork included 4 installed teeter bearings.
 - a. The overhaul is reportedly documented in HT WO 15303
 - b. HT representatives stated that due to the vintage of that overhaul, they no longer have any relevant detailed records, including WO 15303
14. On an unknown date on or before 9/22/16, HT provided that fork to an undetermined division of Schuman Aviation
15. On or about 9/22/16, HAS installed that fork, two new teeter bolts (PN 369A1602-3) and other TR components and hardware on N369MH [HAS WO 4674]
16. On or about 6/27/17, HAS accomplished 100/300 hr TR inspection on N369MH

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17. On or about 8/22/17, Makani Kai purchased 3 teeter bearings from HM, including SN LK23819
18. On or about 11/8/17, HAS accomplished 100/300 hr TR inspection on N369MH [HAS WO 0501]
19. On or about 2/8/18, Makani Kai purchased 2 teeter bearings from HM, including SN LK23918
20. On or about 3/21/18, HAS accomplished 100/300 hr TR inspection on N369MH. Also repacked TR swashplate bearing [HAS WO 0485]
21. On or about 4/26/18, HAS accomplished 100 hr TR inspection on N369MH. Also removed TR assembly, replaced boots (2) & TR pitch links (4), balanced TR [HAS WO 0479]
22. On or about 6/19/18, HAS accomplished 100 hr TR inspection on N369MH. Also replaced outboard T/R blade SN C656, installed SN C613, balanced TR [HAS WO 0473]
23. On an unknown date on or before 8/8/18, teeter bearing LK23819 was improperly installed (no primer or scrim cloth) on an inner seat of fork SN 043765-0209
24. On an unknown date on or before 8/8/18, teeter bearing LK23918 was improperly installed (no primer or scrim cloth) on an outer seat of fork SN 043765-0209
25. A search of N369MH maintenance records between 2016 and 8/8/18 did not reveal any entries regarding teeter bearings
26. On or before 8/8/18, outer teeter bearing LK 23918 became disbonded from its fork seat
27. On 8/8/18, during a passenger-carrying sightseeing flight, due to the disbonding of one or both outer teeter bearings, the outer teeter bolt fractured, which precipitated rapid failure of all four primary structural attach points for the TR transmission
 - a. In response to significant vibration and unusual noises, the pilot conducted an immediate emergency landing
28. On 8/8/18, contrary to FAA & NTSB regulations, HAS and/or its affiliates recovered N369MH prior to notification to and permission by FAA or NTSB personnel
29. On 8/8/19 and 8/9/19, contrary to FAA & NTSB regulations, HAS and/or its affiliates began disassembly of and maintenance on N369MH prior to notification to and permission by FAA or NTSB personnel
30. On 8/31/18, NTSB, FAA, & MDHI investigators observed remnants of black paint on the mating surfaces of the TR transmission and tail boom. Paint on those surfaces is prohibited by the MDHI maintenance guidance
 - a. It is not explicitly prohibited by Aerometals guidance; Aerometals guidance does not address that topic, but does refer technicians to the MDHI guidance as the baseline
31. On 8/31/18, an HAS representative told investigators that he had begun removing that paint subsequent to removal of the TR transmission from the tail boom.
32. Repeated NTSB requests to HAS for the 8130 or other documentation (eg WO15303) regarding the accident fork have not resulted in any responses or documents from HAS
33. FAA inspector visit to HAS in early 2020 did not obtain any explanations for mx errors