National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Log 1958

Date: March 8, 1989

In reply refer to: A-89-7

Honorable Robert E. Whittington
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

On February 8, 1987, a McDonnell Douglas 500D helicopter, N1102U, crashed into shallow water shortly after taking off on a local sightseeing flight from a beach helipad in Honolulu, Hawaii.[1] The pilot was killed and the four passengers were injured, two seriously. Investigation of the accident by the National Transportation Safety Board revealed that one of the five main rotor blades separated from the rotor head when the main rotor blade retention strap pack assembly, part number 369D212110-501, failed. Detailed examination of the failed strap pack indicated that 11 of the 16 strap laminates had preexisting cracks and corrosion present at the outboard end of the pack.

At the time of the accident, Airworthiness Directives (AD) 77-15-09R1 and 81-10-08 were in effect; the ADs required that the main rotor blade retention strap packs be visually inspected for cracked laminates in the area of the pitch housing every 25 or 100 hours. The inspection frequency depended on the strap pack part number, certain pack serial numbers, and certain helicopter horizontal stabilizer and main rotor blade damper configurations. Despite the compliance of owners/operators with the ADs, the investigation revealed that the majority of the cracked laminates on the failed strap pack were preexisting and were located outboard the pitch housing, an area not specifically addressed in the ADs. Examination of the five strap packs from the main rotor head also indicated varying degrees of corrosion on 78 of the 80 strap laminates. The Safety Board noted during a review of the accident helicopter maintenance records that three laminates had been found cracked several months before during an inspection. The significance of these cracks could not be determined since the location of the cracks was not documented in the helicopter maintenance records, nor were maintenance personnel required to document the location of any cracks (lead leg, lag leg, tongue area, strap pack serial number, or manufacturer's identifying color code). Both the manufacturer's service information notice and the ADs require main rotor hub replacement if three or more cracked laminates are discovered in the lead leg or lag leg of any one of the five strap pack assemblies.

[1] For more detailed information, read Field Accident Brief 2351 (attached).

The Safety Board is pleased to note that AD 89-02-01, effective February 2, 1989, has been issued which supersedes all previous ADs concerning inspection of the main rotor blade strap pack assemblies. This AD provides for a more detailed inspection of the laminates for evidence of cracks and corrosion in accordance with published manufacturer's service bulletins. It also requires that maintenance personnel document in the helicopter's maintenance logbooks the location of all cracks found during the inspection.

The Safety Board remains concerned, however, with the lack of an established corrosion control program for the MD 500 model helicopters operating in a marine or corrosive environment. On April 1, 1983, McDonnell Douglas issued Service Information Letter DL-54 which recommends that helicopter main rotor hub assemblies operating in a marine environment be subjected to a tri-flow wash procedure following the last flight of the day to combat corrosion. The Safety Board believes that, based on the amount of corrosion found on the accident helicopter's main rotor hub assembly, a preventive corrosion procedure should be mandatory for all MD 500 model helicopters operating in a marine environment.

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

> Issue an airworthiness directive to require that the main rotor hub assemblies of any McDonnell Douglas 500 model helicopter operating or based in a marine environment be subject to a tri-flow wash in accordance with the procedures described in McDonnell Douglas Service Information Letter DL-54. (Class II, Priority Action) (A-89-7)

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in this recommendation.

By: James L. Kolstad
Acting Chairman

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident

File No. - 2351 2/08/87 HONOLULU,HI A/C Reg. No. N1102U Time (Lcl) - 1530 HST

----Basic Information----

Type Operating Certificate-ON-DEMAND AIR TAXI

Type of Operation -SIGHTSEEING
Flight Conducted Under -14 CFR 91
Accident Occurred During -TAKEOFF

Aircraft Damage: DESTROYED
Fire: NONE

Injuries	Fatal	Serious	Minor	None
Crew	1	0	0	0
Pass	0	2	2	0

----Aircraft Information----

Make/Model - HUGHES 369D
Landing Gear - SKID
Max Gross Wt - 3550
No. of Seats - 5

Eng Make/Model - ALLISION 250-C20B
Number Engines - 1
Engine Type - TURBOSHAFT
Rated Power - 375 HP

ELT Installed/Activated - YES/NO
Stall Warning System - NO

----Environment/Operations Information----

Weather Data
Wx Briefing - NO RECORD OF BRIEFING
Method - N/A
Completeness - N/A
Basic Weather - VMC
Wind Dir/Speed- 220/008 KTS
Visibility - 20.0 SM
Lowest Sky/Clouds - 3000 FT SCATTERED
Lowest Ceiling - NONE
Obstructions to Vision- NONE
Precipitation - NONE
Condition of Light - DAYLIGHT

Itinerary
Last Departure Point
SAME AS ACC/INC
Destination
LOCAL

ATC/Airspace
Type of Flight Plan - COMPANY (VFR)
Type of Clearance - NONE
Type Apch/Lndg - NONE

Airport Proximity
OFF AIRPORT/STRIP

Airport Data
ALA WAI HELIPORT
Runway Ident - N/A
Runway Lth/Wid - N/A
Runway Surface - N/A
Runway Status - N/A

----Personnel Information----

Pilot-In-Command
Certificate(s)/Rating(s)
PRIVATE,COMMERCIAL
SE LAND
HELICOPTER

Age - 44
Biennial Flight Review
Current - YES
Months Since - 18
Aircraft Type - 500D

Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT

Flight Time (Hours)

Total -	8518	Last 24 Hrs -	7
Make/Model-	4078	Last 30 Days-	36
Instrument-	350	Last 90 Days-	134
		Rotorcraft -	8340

Instrument Rating(s) - NONE

----Narrative----

DRG TKOF CLB, A LOUD NOISE OCCURRED AS 1 OF 5 MAIN ROTORS (MRB'S) & THE TAIL BOOM SEPD FM THE HELICOPTER (HEL). THE HEL THEN CRASHED & HIT A SUBMERGED REEF APRX 200' FM THE HELIPORT. AN EXAM OF THE FAILED MRB SHOWED ITS RETENTION STRAP ASSY (RSA), PN 369D21210-501, FAILED FM FATIGUE IN AN AREA OF CORROSION; 11 OF THE MRB'S 16 STRAP LAMINATES HAD PREEXISTING CRACKS. CORROSION WAS FND ON 78 OF 80 LAMINATES. THE MAINT HNDBK REQD THE RSA'S BE INSPECTED AT 25, 100 & 600 HR INTERVALS. SVC INFO NOTICE (SIN) DN-77.1 RCMDD A 300 HR INSPN IF ANY CRACK OR LAMINATE FAILURE WAS FND DRG A 100 HR INSPN. AD'S 77-15-09R1 & 81-10-08 REQD INSPN W/I (BUT NOT OUTBRD OF) THE PITCH HOUSING. DRG 100 HR/AD INSPNS AFTER 1768 & 1839 HRS OF OPN, UP TO 3 CRACKS WERE FND IN LAMINATE LEGS, BUT THEIR LCTNS WERE NOT DOCUMENTED FOR LTR INSPN. HOWEVER, DRG 2 SUBSEQUENT 100 HR INSPNS BY ANOTHER MECH, NO CRACKED LAMINATES WERE NOTED. THE HEL HAD 2135 HRS OF OPN WHEN THE ACDNT OCCURRED. SVC INFO LTR DL-54 RCMDD A TRI-FLOW WASH PROC AFTER THE LAST FLT OF EACH DAY WHEN OPNG IN A MARINE ENVIRONMENT

File No. - 2351 2/08/87 HONOLULU,HI A/C Reg. No. N1102U Time (Lcl) - 1530 HST

Occurrence #1 AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation TAKEOFF - INITIAL CLIMB

Finding(s)
1. ROTOR SYSTEM,MAIN ROTOR HUB - CORRODED
2. MAINTENANCE,SERVICE OF AIRCRAFT - INADEQUATE - COMPANY MAINTENANCE PSNL
3. ROTOR SYSTEM,MAIN ROTOR HUB - FATIGUE
4. MAINTENANCE,INSPECTION OF AIRCRAFT - IMPROPER - COMPANY MAINTENANCE PSNL
5. MAINTENANCE,RECORDKEEPING - INADEQUATE -
6. MAINTENANCE,SERVICE BULLETINS - NOT FOLLOWED - COMPANY MAINTENANCE PSNL
7. ROTOR SYSTEM,MAIN ROTOR BLADE - SEPARATION
8. FUSELAGE - VIBRATION
9. MISC ROTORCRAFT,TAIL BOOM - OVERLOAD

Occurrence #2 LOSS OF CONTROL - IN FLIGHT
Phase of Operation TAKEOFF - INITIAL CLIMB

Occurrence #3 IN FLIGHT COLLISION WITH TERRAIN
Phase of Operation DESCENT - UNCONTROLLED

Finding(s)
10. TERRAIN CONDITION - WATER,ROUGH

----Probable Cause----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 1,3,4,7

Factor(s) relating to this accident is/are finding(s) 2,5,6