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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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(202) 426-8787

ISSUED: September 21, 1976

Forwarded to:

Honorable John L. McLucas
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-76-129 through 131

The National Transportation Safety Board's metallurgical laboratory has recently examined five McCauley propeller hubs that have been involved in four separate incidents investigated by the Federal Aviation Administration and one fatal accident investigated by the Safety Board. The hubs failed as a result of fatigue cracks which originated in the blade-retention thread area. Failure of the hub in this area allows propeller blade(s) to separate from the hub.

The model numbers of the failed propeller hubs examined by the Safety Board were 2D34C53-AMN, D2AF34C61-XM, 2AF34C55-N and D2AF34C81-XM. Each of the hubs contained blade-retention threads that were shot peened and truncated, which modified the original design and was intended to decrease fatigue failure; both the design and modification were approved. Four of the hubs had been modified after being in service. The fifth hub had been modified during manufacture.

A review of information obtained from your Maintenance Analysis Center for the past 5 years revealed that 60 McCauley propeller hubs of various models had been reported cracked. Nine of these 60 hub failures resulted in blade separations.

The Safety Board has not been able to isolate the cause or causes of these fatigue failures; the results of our preliminary examinations indicate that metal folds, which were caused by the shot peening on some thread shanks, may have contributed to the fatigue cracking. The truncated thread may also have contributed to more intense stresses in the threaded area by reducing the bearing area on the thread flanks. Moreover, abnormal loads on the propeller assembly, such as that produced by a ground strike on the blades, may also have been a source of detrimental stresses in the blade retention thread area and may have caused the fatigue cracks.

Failure of McCauley hubs in the blade retention thread area is not a new problem; the Safety Board is aware of the actions taken by the manufacturer and by the Federal Aviation Administration in an effort to prevent these failures. However, the problem still exists.

Therefore, the National Transportation Safety Board believes that further corrective action is needed and recommends that the Federal Aviation Administration:

Evaluate the service life of hubs with truncated and shot-peened retention threads and limit the life of the hubs accordingly. (Class II - Priority Followup) (A-76-129)

Until an appropriate life limit is established on these propellers, issue an Airworthiness Directive (AD) to require periodic inspection of the threaded area. (Class II - Priority Followup) (A-76-130)

Issue an AD to require that the relevant provisions of AD-75-24-12 are applied to all model propellers which have been involved in ground strikes or sudden stops. (Class II - Priority Followup) (A-76-131)

TODD, Chairman, BAILEY, Vice Chairman, McADAMS and HOGUE, Members, concurred in the above recommendations. HALEY, Member, did not participate.

By: Webster B. Todd, Jr.
Chairman

THESE RECOMMENDATIONS WILL BE RELEASED TO THE PUBLIC ON THE ISSUE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THE CONTENTS OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.