



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: October 10, 2008

In reply refer to: A-08-79 through -82

The Honorable Robert A. Sturgell
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

The National Transportation Safety Board has recently investigated several events in which engine fan cowls have separated during flight, causing damage to the airplanes involved. The Safety Board is concerned that the procedures for checking that engine fan cowls are latched properly are inadequate. The events discussed in this letter highlight deficiencies in the current procedures.

Background

On August 4, 2008, about 0545 eastern daylight time, a Bombardier CL-600-2B19, N422AW, operated as US Airways flight 4099, lost part of its right engine upper fan cowl¹ while in flight at approximately 11,000 feet. The flight continued to its intended destination and landed without further incident at Charlotte Douglas International Airport, Charlotte, North Carolina, about 0630. The pilot, copilot, flight attendant, and 50 passengers on board were not injured; the airplane sustained minor damage, including damage to the left and right horizontal stabilizer and the fuselage. The airplane was operated under the provisions of 14 *Code of Federal Regulations* (CFR) Part 121 as a scheduled domestic passenger flight. Visual meteorological conditions (VMC) prevailed, and an instrument flight rules (IFR) flight plan was filed.

The Safety Board's investigation revealed that the right engine upper fan cowl latches were not properly fastened following engine maintenance performed the night before the incident, resulting in part of the engine fan cowl separating from the airplane during flight.

On May 6, 2008, about 0643 eastern daylight time, an Airbus single-aisle (SA)² A319-132, N516NK, operated as Spirit Airlines flight 417, lost its outboard left engine fan cowl at takeoff from Detroit Metropolitan Wayne County Airport (DTW), Detroit, Michigan. The crew returned to DTW and landed the airplane safely about 0653. The pilot, copilot, 3 flight attendants, and 144 passengers on board were not injured; the airplane's landing gear door and

¹ Bombardier refers to engine fan cowls as nose cowl access panels.

² Airbus SA airplanes (also known as the A320 family) consist of the A318, A319, A320, and A321 models.

wing to the fuselage area received minor damage from the engine fan cowl's impact. The airplane was operated under the provisions of 14 CFR Part 121 as a scheduled domestic passenger flight. VMC prevailed, and an IFR flight plan was filed.

The Safety Board's investigation revealed that the engine fan cowl latches were not properly fastened following engine maintenance performed the night before the incident.

On January 9, 2008, about 0749 eastern standard time, an Airbus SA A319-114, N349NB, operated as Northwest Airlines flight 853, lost its outboard right engine fan cowl while on approach to land on runway 27R at DTW.³ The airplane subsequently landed without further incident. The pilot, copilot, 3 flight attendants, and 68 passengers on board were not injured. The airplane received substantial damage when the separated engine fan cowl contacted the horizontal stabilizer's right side, thus damaging the stabilizer; in addition, the fan cowls, right engine pylon, right engine reverser, and the right wing No. 1 slat were damaged. The airplane was operated under the provisions of 14 CFR Part 121 as a scheduled domestic passenger flight. VMC prevailed, and an IFR flight plan was filed.

The Safety Board determined that the probable cause of the accident was the separation of the engine fan cowl, which resulted from maintenance personnel failing to follow maintenance procedures by latching the engine fan cowl following the maintenance inspection.

On April 22, 2007, about 0624 eastern daylight time, an Airbus SA A319-111, N904FR, operated as Frontier Airlines flight 851, lost its outboard and inboard right engine fan cowls on initial climbout at 200 feet.⁴ The flight crew leveled off the airplane at 3,000 feet and declared an emergency. The flight was cleared for an approach and landed without further incident at William B. Hartsfield Atlanta International Airport, Atlanta, Georgia, about 0642. The pilot, copilot, 3 flight attendants, and 124 passengers on board were not injured; the airplane sustained minor damage⁵ and was operated under the provisions of 14 CFR Part 121 as a scheduled domestic passenger flight. VMC prevailed, and an IFR flight plan was filed.

The Safety Board determined that the probable causes of this incident were the mechanic's failure to follow procedures and directives for securing the lower engine fan cowl after maintenance and the first officer's failure to follow the checklist to ensure the engine fan cowl was secured during the walk-around inspection.

Discussion

The issue of engine fan cowl separations has been an ongoing problem. The Safety Board reviewed records from Bombardier, Airbus, foreign investigations, and Federal Aviation Administration (FAA) service difficulty reports (SDRs) related to engine fan cowl separations. This review found that, since 1992, there have been 15 events involving Airbus SA model

³ More information about this accident, CHI08LA071, is available on the Safety Board's website at <http://www.nts.gov/nts/query.asp>.

⁴ More information about this incident, ATL07IA078, is available on the Safety Board's website at <http://www.nts.gov/nts/query.asp>.

⁵ The airplane subsequently lost a portion of its hydraulic pressure system. The partial loss of the hydraulic pressure system may have been caused by the separated engine fan cowl; a separated engine fan cowl has the potential to hit other parts of the airplane and cause further damage.

airplanes, including the 3 Airbus SA events cited in this letter; another 26 engine fan cowl separations occurred on 17 different airplane models since 1992.⁶ In addition, Board queries to Bombardier revealed 33 domestic and foreign cases of engine fan cowl separations (including 6 cases in 2007 alone), dating back to January 2001.

Despite the release of an FAA airworthiness directive (AD)⁷ for Airbus SA airplanes and numerous bulletins for Airbus SA and Bombardier CL-600 airplanes, engine fan cowl separations from Airbus SA and Bombardier CL-600 airplanes have continued to occur. Beginning in June 1999, Airbus has issued bulletins to require redesigning the engine fan cowl latches to improve detectability of improperly latched cowls and to remind operators and flight and ground crews to ensure that both engine fan cowls are latched properly after any engine maintenance that involved the opening of an engine fan cowl. In addition, in 2007, Bombardier studied the effectiveness of using a dual inspection signoff after maintenance. After completing its study, Bombardier elected to revise its aircraft maintenance manual (AMM) procedures (Temporary Revision 71-131, January 25, 2008) to require a dual inspection signoff of the engine fan cowls after maintenance activities.⁸

The Safety Board has also found that Airbus SA operators who have added dual inspection signoffs to their maintenance inspection paperwork to confirm latching of engine fan cowls have had success in preventing future accidents or incidents. For example, as part of its investigation of the April 2007 incident, the Safety Board spoke to three major U.S. carriers, which operate 451 (64 percent) of the Airbus SA airplanes flying in the United States, and learned that they use a dual inspection signoff to confirm latching of the engine fan cowls in their Airbus SA fleet. All three carriers had previous events of engine fan cowl separations and chose to institute a dual inspection signoff into their maintenance operations. Since instituting the new inspection procedures, they have had no further events. Therefore, the Safety Board concludes that the maintenance requirement for a dual inspection signoff to confirm latching of engine fan cowls would be an effective measure to prevent the separation of engine fan cowls. However, because dual inspection signoff is not mandatory, some Airbus SA and Bombardier CL-600 operators have not implemented this preventive corrective action for all engine maintenance activities.

The Safety Board is concerned that, without a required dual inspection signoff following maintenance involving the opening of an engine fan cowl, fan cowl separations from Airbus SA and Bombardier CL-600 airplanes like those discussed in this letter will continue to occur. Therefore, the Safety Board believes that the FAA should require all operators of Airbus SA and Bombardier CL-600 airplane models to revise existing AMM procedures and maintenance

⁶ The remaining 26 incidents occurred on McDonnell Douglas DC-8s (4 incidents), DC-10s (3), MD-88s (1), MD-90s (1), and MD-10s (1); Boeing 737s (1), 747s (4), 757s (1), and 767s (1); Airbus A310s (2) and A330s (1); Beech 200s (1), 400s (1), and 1900s (1); Cessna 182s (1); Falcon 200s (1); and Lockheed L1011s (1).

⁷ On October 29, 2003, the FAA issued AD 2003-18-06, requiring that the door latches for engine fan cowls on certain Airbus SA airplanes be modified and that a new hold-open device be installed; all operators were required to comply by April 2005.

⁸ Although the temporary revision was sent to all operators, the operator involved in the August 4, 2008, incident elected to require a dual inspection signoff only after major engine overhauls. Dual inspection signoffs were not required on routine maintenance tasks, such as those performed before the incident flight; however, since the incident, the operator has added dual inspection signoffs after all maintenance tasks that involve the opening of an engine fan cowl.

inspection documents to require a dual inspection signoff to confirm that engine fan cowls are latched after completing any engine maintenance that involves the opening of an engine fan cowl.

As part of their walk-around preflight inspection, flight crews are instructed to view the engine fan cowls to ensure that they are latched. However, preflight inspection involves several elements across many parts of the airplane. The events discussed in this letter suggest that flight crews may overlook a cowl that may not have been properly latched, especially if they do not know that maintenance personnel have opened an engine fan cowl before flight. The Safety Board concludes that knowing that engine maintenance has recently been performed would alert flight crews to look at the engine fan cowls closely to make sure that they are latched. Therefore, the Safety Board believes that the FAA should require all operators of Airbus SA and Bombardier CL-600 airplane models to require maintenance personnel to inform flight crews when engine fan cowls have been opened before flight.

The events discussed in this letter also suggest that maintenance personnel and flight crews may not recognize that engine fan cowls have been improperly latched after engine maintenance activities have been performed. The Safety Board concludes that guidance to maintenance personnel and flight crews on how to inspect the engine fan cowls would help them identify improperly latched engine fan cowls. Therefore, the Safety Board believes that the FAA should require all operators of Airbus SA and Bombardier CL-600 airplane models to provide guidance to maintenance personnel and flight crews on how to inspect engine fan cowls to verify that they are latched properly.

The majority of engine fan cowl separations have occurred on Airbus SA and Bombardier CL-600 airplanes. However, the FAA's SDR database indicates that other airplanes have also experienced engine fan cowl separations to a lesser degree. The Safety Board is uncertain whether these separations are due to a systemic problem or just a one-time error. Because SDRs are voluntarily submitted, the Board is unable to determine the extent of the separation problem and whether a major safety issue exists for other airplane models. However, the Board is concerned that an engine fan cowl separation could lead to substantial damage to the airplane and affect the safety of flight. The Safety Board concludes that the risk of other airplane models experiencing engine fan cowl separations is unknown but potentially hazardous. Therefore, the Safety Board believes that the FAA should determine the extent of the problem of engine fan cowl separations on all airplanes and, should a widespread problem exist for any airplanes, require operators of those airplanes to include a dual inspection signoff in their maintenance procedures to confirm that engine fan cowls are latched after completing any engine maintenance that involves the opening of an engine fan cowl.

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

Require all operators of Airbus single-aisle and Bombardier CL-600 airplane models to revise existing aircraft maintenance manual procedures and maintenance inspection documents to require a dual inspection signoff to confirm that engine fan cowls are latched after completing any engine maintenance that involves the opening of an engine fan cowl. (A-08-79)

Require all operators of Airbus single-aisle and Bombardier CL-600 airplane models to require maintenance personnel to inform flight crews when engine fan cowls have been opened before flight. (A-08-80)

Require all operators of Airbus single-aisle and Bombardier CL-600 airplane models to provide guidance to maintenance personnel and flight crews on how to inspect engine fan cowls to verify that they are latched properly. (A-08-81)

Determine the extent of the problem of engine fan cowl separations on all airplanes and, should a widespread problem exist for any airplanes, require operators of those airplanes to include a dual inspection signoff in their maintenance procedures to confirm that engine fan cowls are latched after completing any engine maintenance that involves the opening of an engine fan cowl. (A-08-82)

In response to the recommendations in this letter, please refer to Safety Recommendations A-08-79 through -82. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our Tumbleweed secure mailbox procedures. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Acting Chairman ROSENKER and Members HERSMAN, HIGGINS, SUMWALT, and CHEALANDER concurred with these recommendations.

[Original Signed]

By: Mark V. Rosenker
Acting Chairman