

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

May 4, 2001

Systems Group Chairman's Factual Addendum 2

A. ACCIDENT DCA99MA060

Location: Little Rock, Arkansas
Date: June 1, 1999
Time: 2351 Central Daylight Time (CDT)
Airplane: American Airlines Flight 1420, N215AA
McDonnell Douglas DC-9-82 (MD-82)

B. Systems Group

Chairman: Joseph Sedor
National Transportation Safety Board
Washington, DC

Member: Marion DeWitt
Michelin Aircraft Tire Corporation
Greenville, South Carolina

Member: Scott Feldman
American Airlines
Tulsa, Oklahoma

Member: Robert Ruiz
American Airlines
Tulsa, Oklahoma

C. SUMMARY

On June 1, 1999, at 2351 Central Daylight Time (CDT), a McDonnell Douglas DC-9-82 (MD-82), N215AA, operated by American Airlines as flight 1420, regularly scheduled passenger service from Dallas, Texas, overran the end of runway 4R and collided with the runway 22L approach lighting system at the Little Rock National Airport, in Little Rock, Arkansas. The captain and 10 passengers sustained fatal injuries; the remaining 134 passengers and crewmembers sustained various injuries. Shortly before the accident, the weather conditions at the airport were

reported as: wind from 180 degrees at 9 knots, visibility 7 miles with thunderstorms, few clouds at 7,000 feet in cumulonimbus clouds, ceiling broken at 10,000 feet; temperature 77 degrees F, dew point 73 degrees F; altimeter, 29.86 Hg; Remarks - ASOS observation - thunderstorm began at 23 minutes after the hour, frequent lightning in clouds, and cloud-to-cloud, located from the west through the northwest; thunderstorms west through northwest moving northeast. The airplane was being operated in accordance with 14 CFR 121, and an instrument flight rules (IFR) flight plan had been filed.

This addendum documents the examination of N215AA's main landing gear tires on October 10, 2000, at the Michelin Aircraft Tire Corporation's facility in Greenville, South Carolina. The examination was undertaken to determine if there was any evidence of reverted rubber hydroplaning on any of the tires.

D. DETAILS OF THE INVESTIGATION

The examination was a Systems Group activity, and representatives from the NTSB, American Airlines, and Michelin Aircraft Tire Corporation (MATC) elected to attend. The tires had been shipped from Little Rock, Arkansas, prior to the arrival of the group. The shipping containers were not opened until the group convened for the examination.

1.0 Visual Examination

A visual examination (tread, shoulder, and internal surfaces) of all four main landing gear (MLG) tires was conducted. All four main landing gear (MLG) tires exhibited similar wear characteristics. The wear patterns were typical of bias ply tires and it was estimated that the tires were approximately 50% worn. None of the tires showed any evidence of reverted rubber on the surface of the tire. In addition, there was no external evidence of any internal ply separation. In addition to the normal wear patterns, the group observed lateral scrubbing marks on the tread surface. These scrub marks were very superficial. Inspection of the inner liners revealed no visual evidence of under inflation or excessive load.

2.0 Hardness Tests

For each tire, durometer measurements were taken at 90° intervals (by a certified technician) using a Shore A Hardness durometer. All readings were within the expected operating values for in-service tires and ranged from 70 to 73 points. One participant questioned whether the extended storage (over one year) of the tires in a non-environmentally controlled hanger could affect the hardness readings. The Michelin engineers stated that this storage would most likely have only a minor affect on the tire hardness and that any reverted rubber present after the accident would not have been affected.

3.0 Reverted Rubber Hydroplaning Presentation

During the group's discussion of the results of these examinations, the Michelin tire engineers presented information on reverted rubber hydroplaning and the conditions that cause internal reverted rubber. Reverted rubber hydroplaning occurs on the molecular level on the surface of the tread. It occurs very quickly and does not cause internal heating of the rubber (due to the very low thermal conductivity of the rubber). Depending on the severity of the event, the evidence of reverted rubber hydroplaning can be worn away fairly quickly. This is in contrast to the conditions that lead to heating of the internal plies of the tire, which can result in internal rubber reversion. In order for this internal heating to occur, the tires must be under a significant load and rolling for a substantial distance. Importantly, the effects on the rubber due to this internal heating are accumulative over time.

4.0 Follow-on Testing

At the conclusion of the tire examination and durometer testing, the group discussed the necessity for further testing. The group unanimously concluded that the only further testing necessary would be to have Michelin conduct a more extensive mapping of the tread hardness (measurements at 10° increments across all four ribs). The group agreed that no additional testing (holographic imaging, sectional analysis, rubber analysis, and microscopic analysis) was necessary.

4.1 Results of the Follow-on Testing

The durometer measurements were taken by a certified technician using a Shore A Hardness durometer at 10° intervals on each of the five ribs. The average durometer of the four tires ranged from 72.5 to 73.3 points, with an averaged standard deviation of 1.4. These are within normal in-service values for this tread compound.

Two of the tires (left inboard and right outboard) were found to have localized soft spots compared to the rest of the tread. These soft spots are associated with surface contamination or cut damage to a rib, and are unrelated to any skidding or hydroplaning conditions.



Joseph M. Sedor
Systems Group Chairman

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