National Transportation Safety Board
Washington, DC 20594

Aircraft Accident Investigative Update

On November 4, 2025, about 1714 eastern standard time (EST), United Parcel Service (UPS) flight 2976, a Boeing (McDonnell-Douglas) MD-11F airplane, N259UP, was destroyed after it impacted buildings and the ground shortly after takeoff from runway 17R at Louisville Muhammad Ali International Airport (SDF), Louisville, Kentucky. The 3 crewmembers aboard the airplane and 11 people on the ground were fatally injured, 2 people on the ground were seriously injured, and 21 people on the ground sustained minor injuries.[1] Flight 2976 was a domestic cargo flight operating under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 121 from SDF to Daniel K. Inouye International Airport (HNL), Honolulu, Hawaii.

Parties to the investigation include the Federal Aviation Administration (FAA), UPS, The Boeing Company, Independent Pilots Association (IPA), General Electric (GE) Aerospace, International Brotherhood of Teamsters – Airline Division, and Collins Aerospace.

NTSB Materials Laboratory Exam

As indicated in the preliminary report for this investigation, airport surveillance videos that captured part of the airplane's takeoff roll showed that the left (No. 1) engine and pylon separated from the wing shortly after airplane rotation, and a fire ignited on the left engine and near the area of the left pylon wing attachment. The pylon aft mount bulkhead is an assembly composed of two independent fittings, bolted together, with lugs (forward lug and aft lug) that house a single spherical bearing assembly (see figure 1). The lugs from the left pylon aft mount bulkhead were found fractured, and the associated spherical bearing assembly for this location, consisting of a ball element and bearing race, was found still installed on the left wing clevis at the accident site and was exposed to the postcrash fire. The spherical bearing race, which is normally one piece and housed within the lugs of the aft mount bulkhead, was found fractured into forward and aft portions.

[1] One person on the ground who was seriously injured succumbed to their injuries 51 days after the accident.

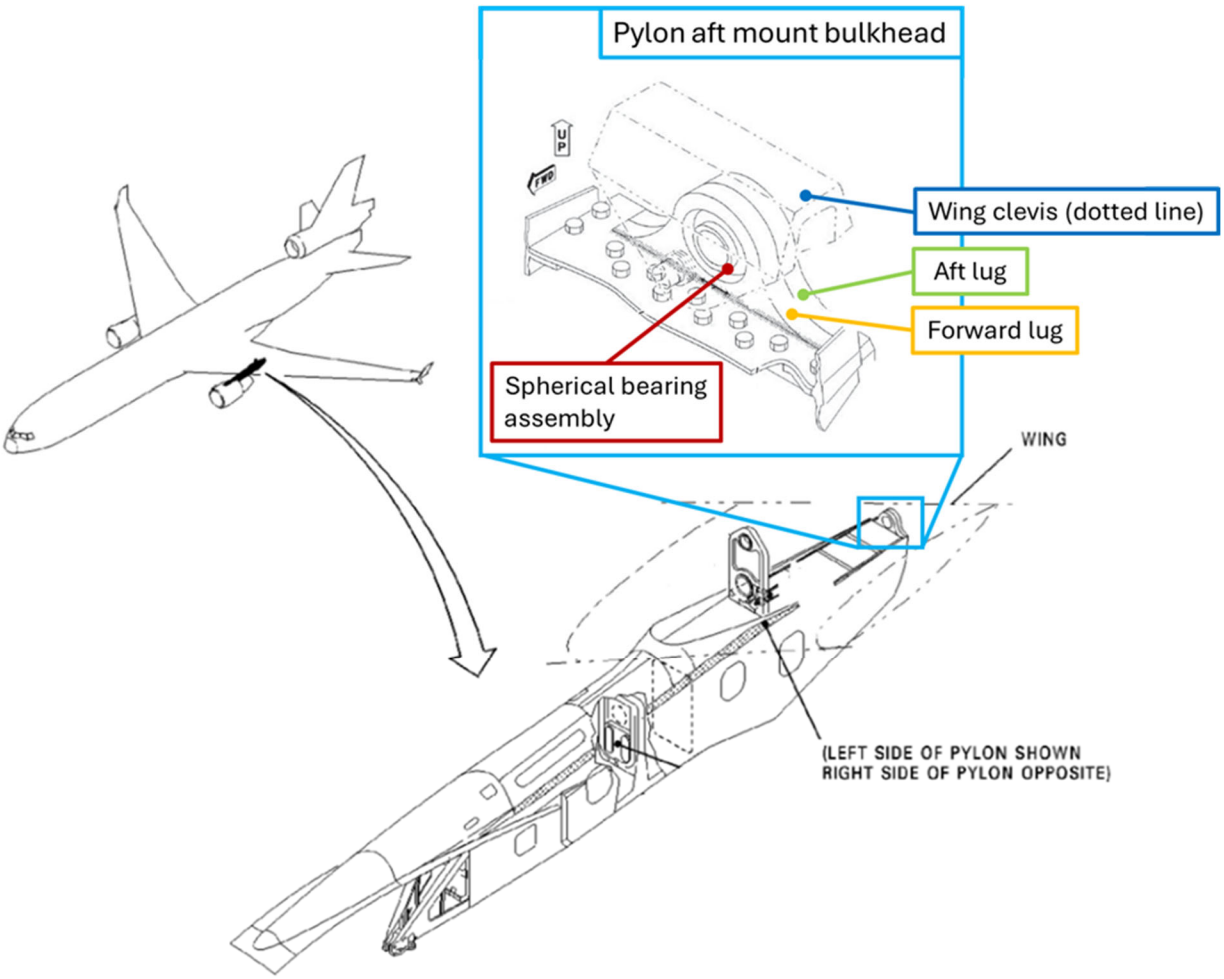

Figure 1. The pylon-to-wing mount diagram, with the inset image showing details of the pylon aft mount bulkhead connection to the wing clevis. The hardware that attaches the wing clevis and the lugs are not shown in this diagram. (Source: Adapted from a Boeing diagram)

The NTSB Materials Laboratory in Washington, DC, has subsequently examined this spherical bearing assembly. Investigators observed that the interior surface of the bearing's race had fracture surfaces that showed evidence of fatigue cracking originating around the entire circumference at the edge of the design recess groove (a design feature on the interior surface of the race). The fatigue cracking extended through the thickness of the bearing race toward the exterior surface, encompassing about 75% of the fracture surface, with the remaining fracture surface consistent with overstress failure (see figures 2 and 3). Remnant grease-like material was found within the spherical bearing assembly (that is, between the ball element and the bearing race).

Figure 2. The accident spherical bearing assembly from the left pylon aft mount bulkhead showing the bearing race fractured into forward and aft portions.

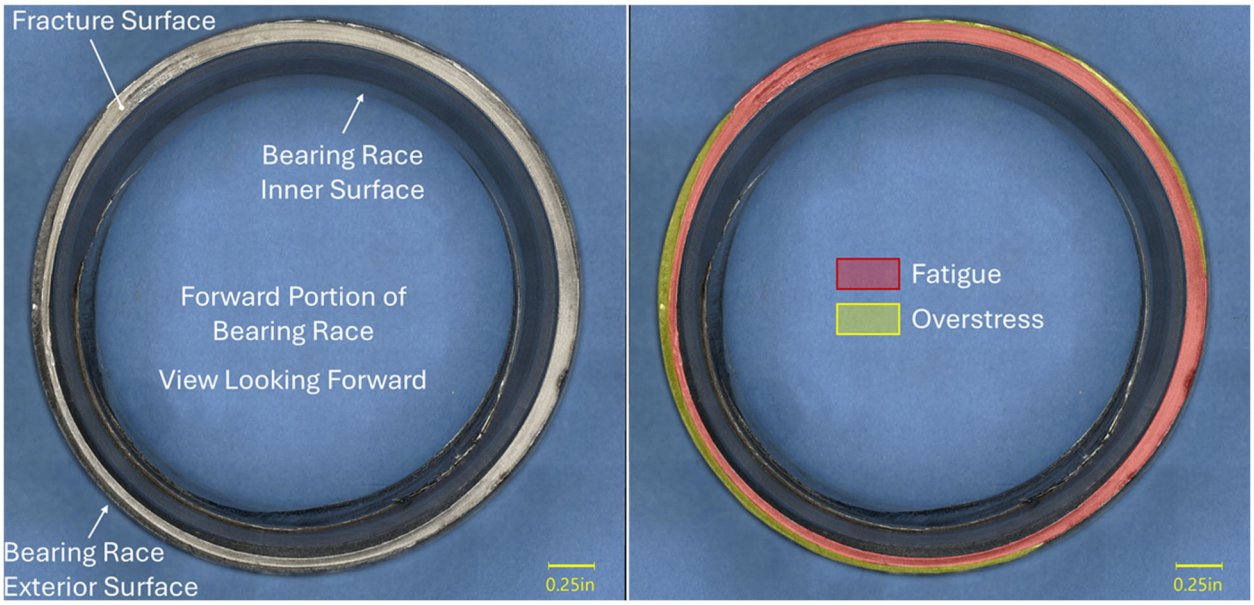

Figure 3. The forward portion of the fractured spherical bearing race from the left pylon aft mount bulkhead, with the right image showing the respective areas of fatigue and overstress.

Boeing Service Letter MD-11-SL-54-104-A

The design of the accident airplane's aft mount bulkhead spherical bearing assembly appears consistent with the design of part number (P/N) S00399-1, which was the subject of a Boeing Service Letter regarding previous spherical bearing race failures.

Boeing Service Letter MD-11-SL-54-104-A, dated February 7, 2011, informed operators of four previously reported bearing race failures (on three different airplanes) involving P/N S00399-1 spherical bearing assemblies. Specifically, each failure had initiated at the design recess groove on the interior surface of the bearing race.

Per the Service Letter, the spherical bearing race is normally flush with the outer surface of the lugs (see figure 4). In the previously reported events, a total circumferential fracture of the bearing race, resulting in the bearing race splitting into two pieces, allowed for these two pieces to migrate in the forward and aft directions. The failure of these spherical bearing assemblies was visually identified by observing the displacement of the fractured bearing race pieces beyond the outer surface of the lugs. According to the Service Letter, a review of the spherical bearing failure by Boeing determined it would not result in a safety of flight condition.

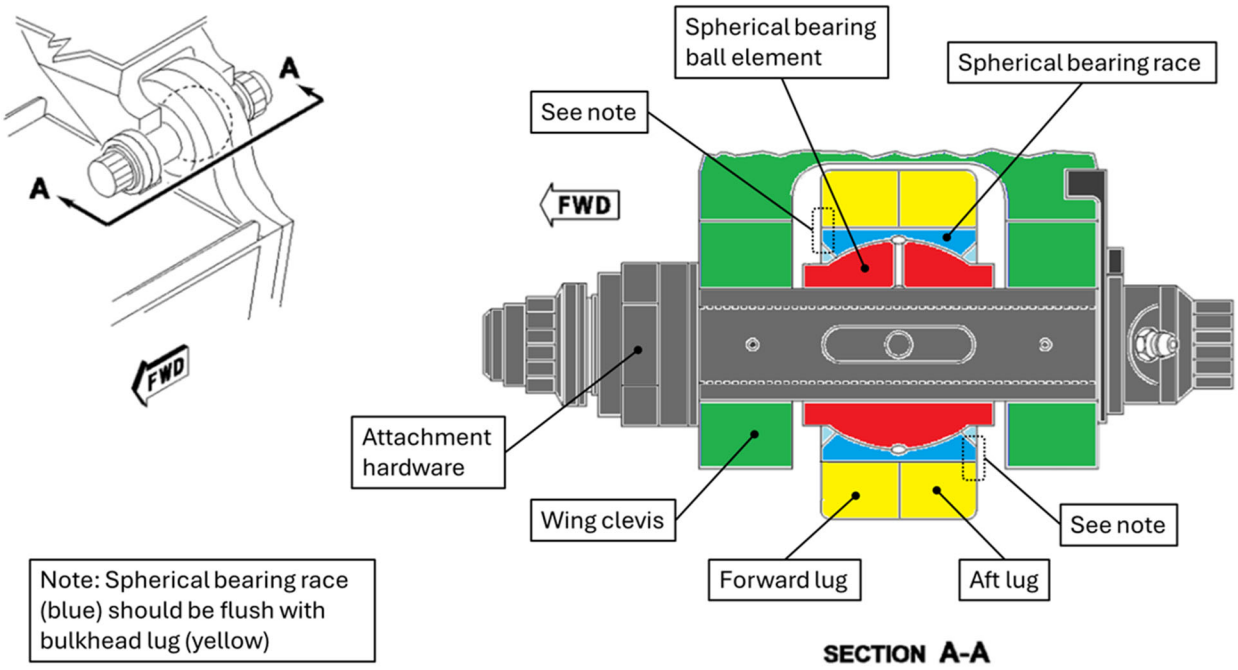

Figure 4. A cutaway diagram of the assembly comprising the wing clevis, aft mount lugs, spherical bearing assembly, and attachment hardware. The diagram shows an example of the spherical bearing race (blue) remaining flush with the aft mount bulkhead lugs (yellow). (Source: Adapted from a Boeing diagram)

The Service Letter stated that, for Boeing MD-11 airplanes, inspection of the spherical bearing assembly would be included in the general visual inspection (GVI) and detailed visual inspection of the pylon aft mount, normally at a repetitive 60-month interval. The Service Letter also stated that

the Boeing MD-11 aircraft maintenance manual was updated to include inspection of the spherical bearing race for evidence of migration, specifically by checking that the spherical bearing is not protruding forward or aft beyond the surfaces of the pylon aft mount lugs. Lastly, the Service Letter discussed a new configuration spherical bearing assembly, P/N S00399-523, which eliminated the design recess groove on the bearing race and recommended its installation in the event an installed spherical bearing is found to be unserviceable. However, the installation of spherical bearing assembly P/N S00399-1, to replace an unserviceable bearing, was not prohibited by the Service Letter.

The NTSB investigative review of the incorporation of the spherical bearing assembly inspection, discussed in the Service Letter, into Boeing MD-11 maintenance planning documents and maintenance manuals is ongoing. Additionally, investigators are reviewing UPS's incorporation of the contents of the Service Letter into its Boeing MD-11 maintenance program as well as the correspondence history between Boeing and the FAA leading up to issuance of the Service Letter and thereafter.

Flight Data Recorder (FDR) Data

A preliminary review of data from the FDR showed nominal performance of the airplane and engines until about 1713:11, about 20 seconds before the end of recorded data, when the parameters from the No. 1 engine were no longer reliable (see figure 5). Shortly after 1713:11, the FDR showed that only the No. 1 engine fire parameter changed from "no fire" to "fire," and the throttle resolver angle (TRA) for the Nos. 2 and 3 engines increased. Subsequently, the speed values for the low-speed rotor (N1) and high-speed rotor (N2) for the No. 2 engine showed minor perturbations, while the N1 and N2 values for the No. 3 engine increased and remained steady until about 3 seconds before the end of recorded data. The airplane's groundspeed was about 184 kts from 1713:11 until about 3 seconds before the end of recorded data at 1713:30.

FDR and other engineering data will be incorporated into the NTSB airplane performance study to understand why the airplane's altitude did not substantially increase after separation of the left pylon and engine. Additionally, the NTSB airplane performance study will explore the effects of the separation of the left pylon and engine on airplane handling qualities.

Additional information will be released as warranted.

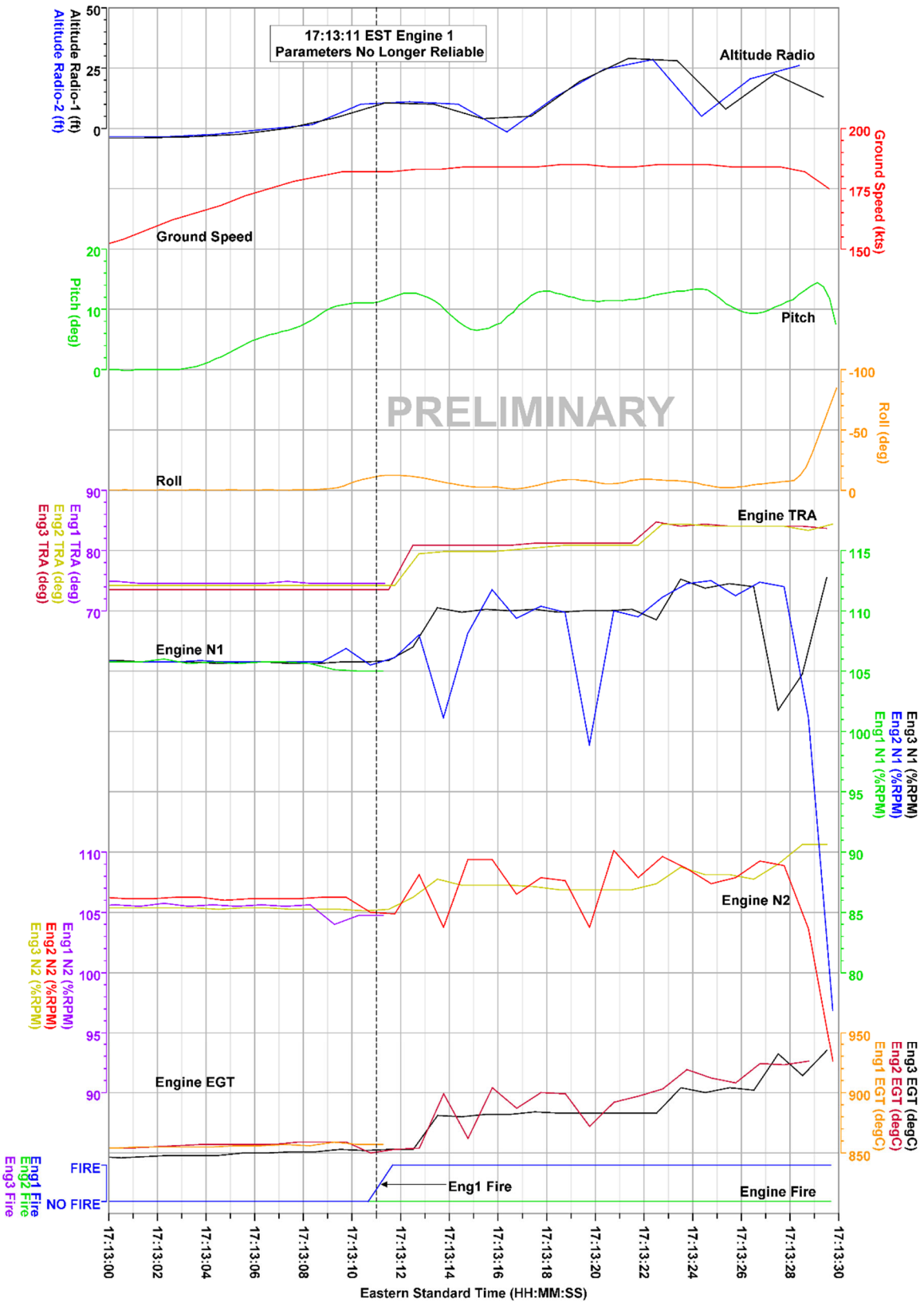

Figure 5. Preliminary FDR data plot for airplane and engine parameters for the last 30 seconds of recorded data for the accident flight.