JTSB Safety Recommendation to the FAA

April 26, 2013

Aircraft Accident - N526FE (McDonnell Douglas MD-11F)
Operated by Federal Express Corporation
Occurred at Narita International Airport on March 23, 2009

On March 23 (Monday), 2009, about 06:49 JST (Japan Standard Time), a McDonnell Douglas MD-11F, registered N526FE, operated by Federal Express Corporation as the scheduled cargo flight FDX80, bounced repeatedly during landing on Runway 34L at Narita International Airport. During the course of bouncing, its left wing was broken and the airplane caught fire. The airplane rolled over to the left being engulfed in flames, swerved off the runway to the left and came to rest inverted in a grass area on the west side of the runway.

The airplane approached with a high sink rate, with its autothrottle "on" amid strong gusty winds and with unstable airspeed and attitudes. The late flare caused hard landing and the airplane bounced. Large nose-down elevator input just before and during the touchdown caused the second touchdown on the NLG with negative pitch attitude developing into porpoising. Upon the third touchdown, the left wing structure fractured because it surrendered to an overload transferred from the left MLG.

As a result of the investigation of this accident, the JTSB makes the following recommendations to the Federal Aviation Administration of the United States of America to take the following measures to prevent the recurrence of similar accidents.

Actions to Be Taken by the Federal Aviation Administration

a. Although the MD-11 airplane was certified to the requirement 14 CFR 25.721(a) under the interpretation at the time of certification, its design would not meet the present interpretation of the requirement since the design allows the possibilities of causing severe damage to the airplane structure in the failure mode under an overload condition where the vertical load is the primary component, resulting in the fire due to fuel spillage. As this kind of design should not be certified from now on, the airworthiness regulation rather than the guidance material should be revised to mandate the assumption of the overload condition in which the vertical load is the primary component.

b. Heat and smoke from the fire reached the cockpit at an early stage after the accident, making it difficult to initiate quick rescue activities from outside. In

order to increase the crew survivability, studies about ways to separate the flight crew compartment from heat, smoke and toxic gas should be made, and if there are any effective solutions, the FAA should consider their application to in-service airplanes.

Measures to Be Taken to Supervise the Boeing Company as the Airplane Manufacturer

Past MD-11 accident investigation reports pointed out that in case of the primarily vertical overload transferred from MLG to wing structures, the gear design allows the fire hazard as a result of the destruction of wing structure followed by fuel spillage. The Boeing Company has so far focused its efforts on improving flight control programs which are effective in lessening overloads and these efforts are positively appraised to some extent; however, it's not a fundamental solution. As the occurrences of vertical overload have been reported after this accident, the measures taken so far are not considered to be satisfactory.

The JTSB recommends that the Federal Aviation Administration require the Boeing Company to study the possibility of design change for the MLG support structure and matters mentioned below in order to prevent the recurrence of similar accidents and minimize damage to be caused by such accidents.

c. In order to reduce the occurrence of MD-11 series airplanes' severe hard landing and bounce in which an overload is transferred to the MLGs and their supporting structure, the Boeing Company should improve the controllability and maneuver characteristics by improving the LSAS functions, reducing the AGS deployment delay time and other possible means.

   Possible improvement on LSAS functions may include: a function to limit large nose-down elevator input during touchdown phase, which is a common phenomenon in severe hard landing cases accompanied by structural destruction for MD-11; and a function to assist bounce recovery and go-around in case of bounce.

d. In order to help pilots to conduct recovery operation from large bounces and judge the necessity of go-around, studies should be made to install a visual display and an aural warning system which show gear touchdown status on MD-11 series airplanes.