FE8026 Occurrence Investigation

Executive Summary

On July 2nd, 2018, a Boeing MD-82 aircraft of Far Eastern Air Transport, scheduled passenger flight number FE-8026, nationality and registration number B-28035, took off at 1829 Taipei local time from Penghu Airport to Taipei/Songshan International Airport (Songshan Airport) with one pilot, one copilot, 4 cabin crew members and 165 passengers, 171 in total on board. The flight crew declared a "pan pan" of engine failure at final approach phase about 9.6 nautical miles away from the runway 28 threshold of Songshan Airport, the aircraft landed safely at the Songshan Airport at 1908. The on board persons were all safe.

Pursuant to the Transportation Occurrence Investigation Act of the Republic of China and, referring to Annex 13 to the Convention on International Civil Aviation, the Taiwan Transportation Safety Board (TTSB), an independent transportation occurrence investigation agency, started the investigation. The organization or agency been invited to join the investigation team included: National Transportation Safety Board of United State, Pratt & Whitney Company, Civil Aeronautics Administration, Ministry of Transportation and Communications and Far Eastern Air Transport.

The investigation report of this occurrence was drafted in June 2019. In accordance with the procedures, it was reviewed at Aviation Safety Council's (ASC) 81th Council Meeting on 16th July, 2019 and distributed to the relevant organizations and authorities for comments. Upon compilation and integration of comments, the final investigation report was reviewed and approved by TTSB 5th Board Meeting on November 1, 2019.

Based upon the factual information gathered during the investigation process and the results of analysis, 7 findings were obtained and 4 safety recommendations for improvements were issued as follows.

Definitions of the findings as the result of this investigation: The TTSB presents the findings derived from the factual information gathered during the investigation and the analysis of the occurrence. The findings are presented in three categories: **findings related to probable causes**, **findings related to risk**, and **other findings**.

The **findings related to probable causes** identify elements that have been shown to have operated in the occurrence, or almost certainly operated in the occurrence. These findings are associated with unsafe acts, unsafe conditions, or safety deficiencies associated with safety significant events that played a major role in the circumstances leading to the occurrence.

The **findings related to risk** identify elements of risk that have the potential to degrade transportation safety. Some of the findings in this category identify unsafe acts, unsafe conditions, and safety deficiencies including organizational and systemic risks, that made this occurrence more likely; however, they cannot be clearly shown to have operated in the occurrence alone. Furthermore, some of the findings in this category identify risks that are unlikely to be related to the occurrence but, nonetheless, were safety deficiencies that may warrant future safety actions.

Other findings identify elements that have the potential to enhance transportation safety, resolve a controversial issue, or clarify an ambiguity point which remains to be resolved. Some of these findings are of general

interests that are often included in the ICAO format accident reports for informational, safety awareness, education, and improvement purposes.

Findings as the result of this investigation

Findings Related to Probable Causes

1. One of the 58 Low Pressure Turbine 4th stage (LPT4) blades on left engine of occurrence aircraft was fractured due to high cycle fatigue, the fracture occurred before its next scheduled check time is due, which was after performed an Airworthiness Directive (AD) check per CAA-2011-03-013 requested, the blade did not reach its designed initial check schedule when the blade fractured either. The fractured blade caused the fall-off of 5 segments of the LPT4 stator blades, the displacement of No. 6 bearing and the fracture of the other 57 LPT4 blades, and resulted in an uncontained engine failure by the fractured blades penetrated through the turbine fan bypass case and engine cowling.

Findings Related to Risks

1. In the past 3 times of LPT4 shroud notch wearing checks, there were twice that Far Eastern Air Transport maintenance personnel did not in compliance with AD CAA-2011-03-013 requested to be performed with engine on-wing condition.
2. There was no manufacturing serial number of LPT4 blade on the occurrence engine for maintenance control, and no traceable historical records with total time usage since new either.

Other Findings

1. The flight crew of the occurrence flight was qualified and in compliance with the Civil Aeronautics Administration (CAA)

regulations and Far Eastern Air Transport (FAT) requirements with valid airman license and medical examination. There was no evidence indicating the performance of the crew had been influenced by any medical, alcohol or fatigue factors during the occurrence flight.

2. According to the reliability data from Pratt & Whitney Company (P&W), in the 12 months period of time from 1st April, 2018 to 31st March, 2019, the in-flight shut down rate per 1,000 flight hours of JT8D-219 model engine was 0.0189, which was lower than the target setting as 0.02 per 1,000 flight hours.
3. According to the historical documents of LPT4 module of the occurrence engine and the airworthiness and maintenance records of FAT, no evidence indicating that the LPT4 blade of the occurrence engine had been in non-compliance with airworthy condition.
4. From the characteristics of the occurrence, the information per relevant manuals and the situation of runway has been in-sight, the flight crew did not fully implement the single engine failure procedures but decided to continuously approach and to land as soon as possible was considered as an adequate address at that specific moment.

Safety Recommendations

To Far Eastern Air Transport

1. Perform LPT blade torque check per CAA AD 2011-03-13 and the post-occurrence requests by CAA, and performs the LPT blade check in accordance with CAA's requests per the latest revision of P&W's ASB A6224 R7.

To Civil Aeronautics Administration, Ministry of Transportation and

Communications

1. Supervise FAT to perform LPT blade torque check per CAA AD 2011-03-13 and the post-occurrence requests by CAA, and supervise FAT to perform the LPT blade check by following the revised time interval as per the latest revision of P&W's ASB A6224 R7.

2. Request FAT to draft a concrete and feasible monitoring and control method for the hot section parts without manufacturing serial number or incomplete historical documents of the occurrence engine model, and continuous monitoring the usage of occurrence engine model in FAT.

To Pratt & Whitney Company

1. Despite the revision of the latest ASB A6224 with more restricted inspection criteria and interval on JT8D engine LPT4 blade in third quarter, 2019, P&W still ought to continuously watch global operation conditions of the occurrence engine model. Revise relevant inspection criteria to avoid the occurrence of uncontained engine failure by the fractured LPT blades.