

AE788 Occurrence Investigation

Executive Summary

On 22 August 2018, an ATR72-212A aircraft of Mandarin Airlines, scheduled passenger flight number AE788, nationality and registration number B-16852, on a flight from Penghu Airport to Taichung/Cingcyuangang Airport (Taichung Airport), with 2 flight crew, 2 cabin crew and 70 passengers, totally 74 people on board. At about 1928¹, the aircraft veered off runway and hit runway edge lights which caused damage to the aircraft during landing on runway 36 of Taichung Airport. 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: Bureau d'Enquêtes et d'Analyses of France, ATR-GIE Avions de Transport Régional, Civil Aeronautics Administration, Ministry of Transportation and Communications, Air Force Command Headquarters, Ministry of National Defense and Mandarin Airlines.

The ‘Draft Investigation Report’ of the occurrence was first reviewed and approved by the Aviation Safety Council’s (ASC) 77th Board meeting on March 26, 2019. This Report was sent to relevant agencies for comments. Upon compilation and integration of comments and suggestions, this Report was finally approved as amended on July 16,

¹ Unless otherwise indicated, all the time in this summary refers to Taipei Local Time (UTC + 8 hours).

2019 by the 81th Board meeting of the ASC.

Based upon the factual information gathered during the investigation process and the results of analysis, 10 findings were obtained and 7 safety recommendations for improvements were issued as follows.

Definitions of the findings as the result of this investigation: The TTSTB 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. The occurrence flight crew did not comply with Mandarin Airlines Flight Operations Manual, the first officer acted as the pilot flying for the approach and landing while the visibility during approach did not meet the first officer takeoff and landing minimums.
2. During the time the pilot flying disengaged the autopilot and controlled the aircraft manually, the aircraft continued to deviate from the runway center line to the left. The pilot flying was unable to manage the lateral control of the aircraft and correct the aircraft back to the runway center line.
3. The captain allowed the aircraft to deviate from the runway center line to a large extent, reducing the fault tolerance range of safety margin, and did not recognize the possible risk of aircraft slow and continuous left deviation. The rain affected the visibility right before the aircraft touched down. After the aircraft landed near the runway edge line and continuously deviated to the left, the captain then took over the control. It was too late for the correction and caused the aircraft to veer off the runway.

Findings Related to Risk

1. Before the occurrence aircraft descent, the contents of the approach briefing by the pilot flying included only approach procedure related information. The briefing did not follow the company's

CFIT/ALAR/RWY EXCURSION AVOIDANCE checklist and threat and error management content, examining possible risk increasing to approach landing due to threats of heavy rain, thunderstorms and low visibility.

2. The ground base of the runway edge lights within the runway strip of Taichung Airport existed potholes and hard vertical cement concrete structures. It may increase the possibility of aircraft damage during runway veer-off occurrence.

Other Findings

1. The Taichung Airport runway 36 was classified as a category I precision approach runway. Without the setting of runway centerline lights was in compliance with the Civil Aerodrome Design and Operation Standards. However, considering that the distance between the runway edge lights was greater than 50 meters, the compliance of the proposed setting of runway centerline lights would assist pilots to align the runway.
2. The runway average transverse slope of Taichung Airport is 0.53%, which is lower than the recommended 1% to 1.5% slope of the Civil Aerodrome Design and Operation Standards.
3. The results of the latest runway surface friction coefficient measurements of Taichung Airport before and after the occurrence were all in compliance with the relevant standards.
4. The flight crew of the occurrence aircraft held valid Air Transport Pilot License and medical certificate issued by the Civil Aeronautics Administration, Ministry of Transportation and Communications. The rest and activities of flight crew 72 hours before the occurrence were

all normal. No evidence indicated any pre-existed medical conditions, alcohol or fatigue that might have adversely affected the flight crew's performance during the occurrence flight.

5. The control and implementation of the airworthiness directive and technical notice of the occurrence aircraft complied with relevant regulations. The aircraft's aircraft and engine maintenance records 3 months before the occurrence flight revealed that there was no abnormal entry that related to the aircraft's directional control systems.

Safety Recommendation

To Mandarin Airlines

1. Request flight crew to perform flight operations in accordance with the relevant manuals, including first officer takeoff and landing minimum standards, the implementation of risk assessments and briefings, the mastery of safe landing guidelines, and the timing the captain to take over the control in an unsafe condition.

To Civil Aeronautics Administration, Ministry of Transportation and Communications

1. Supervise Mandarin Airlines to request flight crew performing flight operations in accordance with the relevant manuals.
2. Coordinate and cooperate with the Air Force Command Headquarters, Ministry of National Defense, establishing a continuous object inspection mechanism within the runway strip to timely identify and eliminate objects that may cause impact damage during aircraft runway veer-off.

3. Coordinate and cooperate with the Air Force Command Headquarters, Ministry of National Defense to evaluate and improve the runway average transverse slope of Taichung Airport.

To Air Force Command Headquarters, Ministry of National Defense

1. Coordinate and cooperate with the Civil Aeronautics Administration, Ministry of Transportation and Communications, establishing a continuous object inspection mechanism within the runway strip to timely identify and eliminate objects that may cause impact damage during aircraft runway veer-off.
2. Coordinate and cooperate with the Civil Aeronautics Administration, Ministry of Transportation and Communications, referring to the Civil Aerodrome Design and Operation Standards to evaluate and install runway center line lights of Taichung Airport
3. Coordinate and cooperate with the Civil Aeronautics Administration, Ministry of Transportation and Communications to evaluate and improve the runway average transverse slope of Taichung Airport.