

EVA Airways Flight BR 701 Occurrence Executive Summary

Date: 2011/12/28

Aviation Safety Council (ASC), Executive Yuan, released: the investigation report of an EVA Airways(EVA Air) Boeing 747-400 ,landed under the condition of cross-wind and wet runway. The aircraft did not maintain stabilized parallel direction with runway centre line and tended to veer to the left hand side. After landing, the aircraft kept veering to the left due to increased right cross-wind and the inertia to veer to the left before landing. Although pilots kept rectifying with right rudder, the situation of veering to the left was not rectified in time, so that then the aircraft lost the control of direction and veered off the runway.

On September 2, 2010, EVA Air flight BR 701, an Boeing 747-400 (bearing national registration number B-16410), the aircraft was on a scheduled passenger flight from Shanghai Pudong International Airport to Taoyuan International Airport. There were 2 flight crew members, 14 cabin crew members and 281 passengers on board. The aircraft deviated from runway center line after landing, which led the left main gear to veer off the runway. The aircraft had all people on board were safe.

The ASC launched investigation according to the Aviation Occurrence Act after the occurrence. Several departments were invited for joint investigation, including: Civil Aeronautics Administration (CAA), EVA Air and, NTSB and Boeing. Investigation report was published after approval by the ASC council members on November 29, 2011, at 150th Council Meeting.

Findings related to probable causes: The aircraft landed at Taoyuan Airport Runway 24 under the condition of right cross-wind and wet runway pavement. Before landing the flight track was not stabilized to keep the parallel direction with runway center line and the aircraft had the tendency to veer toward the left. After landing the aircraft kept deviating to the left due to the increased right cross-wind and the inertia of veering to the left before landing. Between the time when the main gears and the nose gear landed the friction between the tires and pavement might be insufficient because the aircraft' weight did not completely fall on wheels, and the runway was wet, which made the wheels change the direction, and also the tracking ability decreased. Although pilots kept counter correcting with the right rudder, the aircraft's veering to the left was not rectified in time, and before rudder and rudder nose wheel steering mechanism came to effect, the aircraft veered off the runway due to uncontrollability.

Findings related to risks : Before the occurrence 2 sets of ATC Alphanumeric Alerts Display (AAD) had displayed a message of low-level wind shear, however the controller did not notice the warning for some unknown reasons. While the controller was communicating with pilots, the "Air Traffic Management Procedures" had not been followed to provide the most current or complete weather information. Before landing the aircraft encountered drifting on the runway and the main gear landing location was out of the normal landing area on the runway; which did not meet the stabilized approach standard in EVA Air Flight Operation Manual. The co-pilot's maneuvers of rectification, speed, roll control and timing of throttle, all those combinations, were factors that led the aircraft to fail to land within the normal landing area. During the time when the aircraft was veering to the left and off the pavement, the captain tried to take over but he did not follow EVA Air Flight Operation Manual to use standard terminology, which might have caused confusion about responsibilities of taking over. There have been a few runway incursions at Taoyuan

International Airport in recent years, and there is a trend for the events to increase. The airport did not follow ICAO's recommendation to establish "Runway Safety Team" to respond to the hazard of runway incursions. Besides, the nighttime operation at Taoyuan Airport ATC is more complicated than the one during day time, and the night duties were performed by controllers who had less experiences and had never acted as radar training instructor, which did not meet the principle of manpower dispatch. The risk factors related to Taoyuan Airport facilities include that the loading strength of some cement hand hole covers from the runway edge lights was not sufficient to support the weight of the occurrence aircraft; several manhole structures of underground fire hydrants were not in compliance with "Specifications of Civil Aerodrome Design and Operations"; there existed potential safety risks in some height gap at junctions of different runway areas; down slope angle of cross-slope at both north and south sides of Runway 06/24 flat area was out of its specified value; anti-ski inspection of runway pavement did not fully reflect the anti-ski capability of runway pavement; the actual execution of pavement friction coefficient inspection was not compliance with relevant operation regulations; Taoyuan Airport has not yet established a solid mechanism of runway/taxiway maintenance; in total 17 findings.

The Aviation Safety Council issued a total of 19 Safety Recommendations

To EVA Air:

1. Review and reinforce pilots landing training and tests under cross-wind and wet runway conditions;
2. Reinforce and ensure that pilots follow regulations to use standard call-out and perform go-around procedure when aircraft does not meet the stabilized approach standards;
3. Reinforce flight crew's cooperater training and timing for captains to take over under abnormal conditions and request pilots to use explicit password when taking over the operation;
4. Request pilots, when asked if the aircraft has left runway, to report the runway clearance to ATC controller only after the whole section of the aircraft passes runway-holding position, and pilots shall respond "not affirmed" when pilots cannot confirm the runway clearance.

To CAA :

1. Supervise EVA Air's improvements, which include to review and reinforce pilots to land under cross-wind and wet runway conditions and flight crew cooperation training and tests concerning the timing for captains to take over under any abnormal situation; reinforce pilots to follow regulations to have standard call-out and to perform go-around procedure when aircraft does not meet stabilized approach standard; request pilots to inform ATC controller of the runway clearance only after the whole section of aircraft passes relevant runway-holding position.
2. Supervise Air Navigation & Weather Services (ANWS) include: reinforce the supervision to ANWS to review and implement the existing training and audit to ensure that controllers follow relevant regulations and procedures during operations; ensure Low Level Wind Shear Alert System (LLWAS) to function normally and maintain equipment in proper condition; request ANWS to improve the existing Airport Surface Detection Equipment (ASDE) or to install any additional detecting equipment at each runway-holding position to ensure runway clearance before aircraft's take-off or landing and to provide with accurate runway invasion warnings. Before it is improved, the limitation of the existing ASDE operation should be taken into consideration to revise the existing Air Traffic Management related operation regulations and manuals to reflect the reality. Consider national law and regulations to add recommendations from ICAO's "Manual on the Prevention of Runway

Incursion” and supervise each airport to follow the manual’s recommendations to establish “runway safety teams” to reinforce the prevention of runway incursion and hold regular meetings to reduce runway incursion occurrences.

3. Supervise Taoyuan Airport Corporation include: all operations concerning runway area, runway shoulders, facilities, inspections of pavement anti-ski function and flatness shall follow the standard and recommendations from CAA’s “Specifications of Civil Aerodrome Design and Operations” or relevant regulations; reinforce managing mechanism of runway/taxiway maintenance and supervise the airport to reinforce relevant organizations and manpower dispatch; reinforce the drainage and friction effect of Runway 06/24 pavement, for example, to consider to have grooves or scores on pavement.

To Taoyuan Airport Corporation

1. All operations concerning runway area, runway shoulders, facilities, inspections of pavement anti-ski function and flatness should follow the standard and recommendations from CAA’s “Specifications of Civil Aerodrome Design and Operations” or relevant regulations;
2. Reinforce managing mechanism of runway/taxiway maintenance and supervise the airport to reinforce relevant organizations and manpower dispatch;
3. Reinforce the drainage and friction effect of Runway 06/24 pavement, for example, to consider to have grooves or scores on pavement;
4. Follow recommendations from ICAO’s “Manual on the Prevention of Runway Incursion” to establish “runway safety teams” to reinforce the prevention of runway incursion and hold regular meetings to reduce runway incursion occurrences.

The full investigation report is available for download at <http://www.asc.gov.tw> (Chinese version only)