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AIR PILOTS - COMMERCIAL AIR TRANSPORT SAFETY BRIEFING NOTE 19

[Issued 18 OCT 2026]

TAKEOFF RUNWAY EXCURSION RISK

The Context

An overrun of the end of the correct runway during take-off can follow a decision to reject a take-off from above V_1 or from completing one which continues beyond the available take-off distance (TODA) before getting airborne. In both cases the aircraft damage risk can be considerable. In many cases, the risk arises from a flight crew error when determining or inputting take-off performance data but an incorrect load sheet can also be the cause if the aircraft load is distributed other than as stated. Quite separately, a failure to maintain sufficient directional control on the ground during the take-off roll can lead to an aircraft veering off the side of the runway, again with a risk of considerable aircraft damage.

Some examples of actual or narrowly avoided runway excursions

- In 2019, an Embraer 175 departing Yamagata after running up against the brakes could not be kept on the centreline using rudder steering after the microswitch facilitating this transition failed. When rejecting the take-off, the PF Captain set reverse thrust but did not begin maximum braking. The aircraft veered off the runway at speed and continued on the grass for a further 400 metres before stopping.¹
- In 2021, a Boeing 737-800 made an intersection departure from Yerevan which left insufficient runway ahead. A premature slow rotation enabled the aircraft to get airborne 80 metres beyond the TORA. The OPT had been incorrectly configured to indicate that 2,300 metres TODA was available instead of the actual 658 metres. The OPT output was not checked against the aerodrome chart.²
- In 2021, an inexperienced Airbus A320 First Officer was allowed to continue take-off from Heraklion using a non-standard directional control technique until just below V_1 when, after an excessive rudder input which was assessed as likely to lead to a veer off, the Captain took control to reject the take-off but did so after rotating at V_R with extensive structural damage resulting from the de-rotation.³
- In 2022, an Airbus A319 departing Chongqing was close to V_1 when the PM Captain made an unintended left rudder input after being distracted by a loose object. Having then taken over as PF without corrective rudder input, a high speed veer-off and crossing a deep open ditch followed causing nose landing gear collapse and detachment of both engines and main gear assemblies. When the aircraft finally stopped, all occupants evacuated before a fuel-fed fire completely destroyed it.⁴
- In 2022, Boeing 737-800 being used for First Officer line training departed Brisbane without either pilot having read an applicable NOTAM advising of a reduced runway length, only becoming airborne within the closed section after scattering cones marking the end of the available runway length.⁵
- In 2023, a Boeing 737-800 departed Toulouse in day VMC from the wrong intersection without ATC or either of the pilots noticing. Rotation occurred with insufficient runway ahead to reject the take-off - the intersection used was not available for use by large jet aircraft. The aircraft operator accepted that its operational model had "resulted in expeditious mindset for the Captain".⁶
- In 2024, a Boeing 737-800 departing Bristol experienced an uncommanded A/T disconnect as TOGA thrust was set. Re-engagement attempts failed and both the 60 knot thrust-set and 80 knot speed cross-

¹ https://jtsb.mlit.go.jp/eng-air_report/JA11FJ.pdf

² <https://www.dgca.gov.in/digigov-portal/Upload?flag=iframeAttachView&attachId=epCNI9S4ZSXHI3w86IsA%3D%3D>

³ https://www.bfu-web.de/EN/Publications/FinalReports/2024/Report_21-0555-2X_A320_Kavala.pdf?__blob=publicationFile&v=4

⁴ An unofficial summary translation is at <https://skybrary.aero/accidents-and-incidents/a319-chongqing-china-2022>

⁵ https://www.atsb.gov.au/publications/investigation_reports/2026/report/ao-2022-064

⁶ <https://www.gov.uk/aaib-reports/aaib-investigation-to-airbus-a320-214-g-ejci>

checks were missed. The take-off continued with insufficient thrust set. The runway end was only crossed at 10 feet agl with the crew still unaware of why this had happened.⁷

- In 2024, a Boeing 767-300 departing Milan Malpensa could not be rotated at the calculated speed because the take-off weight used was for 100 tonnes less than the actual weight. Rotation led to a significant tail scrape and runway damage with a return to land following. The flight was being used for line training and the crew consisted of three similarly experienced Captains.⁸
- In 2024, a DeHavilland DHC8-300 departing Timaru New Zealand marginally overran the runway after the PF First Officer, seeing a flock of birds ahead as rotation was commenced, had reduced pitch slightly. The Captain, perceiving this as an intention to reject the take-off had immediately reduced power and commenced hard braking causing the aircraft to marginally overrun the end of the runway.⁹

Discussion

The underlying key to a successful take-off is a sufficient pre-departure briefing based on both pilots independently satisfying themselves that they initially have a correct understanding of the take-off performance figures and the potentially relevant part of the airport layout before taxi or pushback commences. The time this takes should be the minimum necessary for the least experienced pilot to be fully 'in-the-loop' - it is the underlying prelude to a safe departure.

Preventing a take-off runway excursion also requires strict adherence to all SOPs, a focus by both operating pilots and any relief pilots present on situational awareness prior to the point where take-off thrust is about to be applied and - perhaps most important of all - a recognition by an aircraft commander that the effective monitoring of their own actions when PF is crucial. A junior pilot acting as PM must not be rushed or overloaded in respect of their actions during the taxi to the runway and must have time to monitor all ground manoeuvring of the aircraft from gate to line up relative to clearances given and acknowledged. A PM who is significantly less experienced overall and/or on aircraft type than the PF may well mean that the elapsed time prior to reaching the correct runway at the correct intersection is more than the usual average. Inexperience with use of the now widespread EFBs in place of old-style paper charts can also result in a little more head-down time when changing from a taxi chart to a SID chart at the very time when the priority should be confirming that the correct runway is being entered. Any take-off by an inexperienced PF must be carefully monitored and an aircraft commander's response to inappropriate rudder should result in either a low speed rejected take-off or a precautionary takeover of the PF role well before V_1 to avoid complications if inappropriate inputs are made at high speed.

Finally, it should always be remembered that whilst trying to keep to or regain the schedule is commercially important, facilitating safe operations is paramount and this imperative must never be overlooked.

Safety Recommendations

To Aircraft Operators

- Risk avoidance/recovery both rely on effective flight deck CRM. Initial and recurrent training must emphasise this in respect of both experience gradient and overriding authority of the aircraft commander.
- Debrief of an unexpected potential or actual runway excursion in recurrent training must cover any signs that the junior pilot's performance was compromised by an unduly rushed departure.
- Hard or soft copy data sources used for take-off performance calculations must be current and SOPs must ensure that the output from independently derived take-off safety speeds is always cross checked.
- A formal cross-check that the aircraft position immediately prior to entering the departure runway that at least the TORA on which thrust/power and speeds have been based might be worth considering.

To Aircraft Commanders

- Independent take-off performance data calculations must be compared and agreed recognising that differing total/aircraft type experience may affect the time needed to check and resolve any differences.
- If an expeditious pre-departure preparation and taxi-out is likely to maintain/recover the schedule, an aircraft commander must still ensure the other operating pilot (and any relief pilots present) independently monitor the taxi route and runway entry position given or requested and approved).
- Departing an airport unfamiliar to one or both pilots requires extra care and the avoidance of one pilot's over-confidence relative to the other based on familiarity. Relief pilots present should be involved.
- A relatively less experienced colleague must never be subjected to a rushed departure without an objective assessment of the potential consequences by the aircraft commander.

⁷ <https://www.gov.uk/aaib-reports/aaib-investigation-to-boeing-737-8k5-g-fdzs-4-march-2024>

⁸ <https://ansv.it/wp-content/uploads/2026/02/PT-MUG-english.pdf>

⁹ https://taic.org.nz/sites/default/files/reports/2026-05/AO-2024-001%20Final%20Report_0.pdf