Runway Excursion Risk Awareness Tool

Elements of this tool should be integrated, as appropriate, with the standard approach and departure briefings to improve awareness of factors that can increase the risk of a runway excursion. The number of warning symbols (⚠) that accompany each factor indicates a relative measure of risk. Generally, the higher the number of warning symbols that accompany a factor, the greater the risk presented by that factor. Flight crews should consider carefully the effects of multiple risk factors, exercise appropriate vigilance and be prepared to take appropriate action.

Failure to recognize the need for and to properly execute a Rejected Takeoff (RTO). Failure to recognize the need for a go-around and to conduct a go-around at any time during an approach, flare or touchdown is a primary factor in runway excursions.

Type of Operation	
Nonscheduled/air taxi/freight	⚠⚠
Training/observation	⚠
Flight Crew	
Reduced state of alertness — long duty period, fatigue	⚠⚠
Single-pilot operation	⚠⚠
Airport	
No current/accurate weather/runway condition information	⚠⚠
Unfamiliar airport or unfamiliar procedures	⚠⚠
Familiar airport — potential complacency	⚠⚠
Inadequate/obscured runway markings	⚠⚠
Excessive rubber/no porous friction coating or grooves on runway surface	⚠
Minimal or no approach/runway/taxiway lights	⚠
Air Traffic Services	
No airport traffic control service	⚠⚠⚠
Late runway change/unreasonable clearances	⚠⚠
Expected Approach	
No vertical approach guidance — e.g., ILS, RNP, VASI/PAPI	⚠⚠⚠
Nonprecision approach, especially with multiple step-downs	⚠⚠⚠
Visual approach in darkness	⚠⚠
LAHSO/partial runway closure	⚠
Planned long landing	⚠

Environment	
Visibility restrictions — e.g., darkness, fog, IMC, low light	⚠⚠⚠
Contaminated runway — e.g., standing water, snow, slush, ice	⚠⚠⚠
Tail wind greater than 5 kt	⚠⚠
High crosswinds/gusty winds	⚠⚠
Heavy rain/thunderstorm on field	⚠⚠
Aircraft Equipment	
No wind shear warning system	⚠⚠⚠
Inoperative braking system — e.g., wheel brakes, anti-skid, spoilers, thrust reversers	⚠⚠
Operating Procedures	
Cockpit distractions/non-sterile cockpit	⚠⚠⚠
Absence of no-fault go-around policy	⚠⚠⚠
Schedule pressures/delays	⚠⚠
Absent/inadequate descent/approach briefing(s)	⚠⚠
Absent/inadequate briefing/planning for braking management after touchdown	⚠⚠

Definitions:

ILS = instrument landing system

IMC = instrument meteorological conditions

LAHSO = land and hold short operations

PAPI = precision approach path indicator

RNP = required navigation performance

VASI = visual approach slope indicator

Runway Excursion Risk Reduction Strategies

Flight Planning

Flight crews and aircraft operations staff can mitigate some of the risk of a runway excursion by increased planning and vigilance. For example, when adverse environmental factors are present, such as a contaminated runway or a strong crosswind, the selection of the longest runway with the most favorable wind conditions should be considered. The use of maximum thrust for takeoff, instead of reduced thrust, will reduce risk on a contaminated runway.

In many cases, delaying a takeoff or landing by just a few minutes allows for unfavorable weather conditions to improve and/or allows the airport to better treat a contaminated runway and measure braking action on the runway.

Takeoff

Crews should carefully review all aircraft loading computations and be alert for flight management system (FMS) data entry errors (e.g., weights, speeds, trim settings, runway length and takeoff thrust). The effects of all environmental conditions on aircraft performance must be evaluated (e.g., temperature, pressure, wind, runway contamination and slope, obstacles, etc.), and the effects of inoperative aircraft systems (e.g., wheel brakes, anti-skid, thrust reversers, spoilers) must be considered. Adequate takeoff performance safety margins should be applied.

Directional control issues should be discussed, especially during strong or gusty crosswinds. Application of power should be in accordance with the aircraft manufacturer's recommendations, and a rolling takeoff should be made when appropriate.

Planning and training for a rejected takeoff are essential.

Landing

Planning for the landing should start before takeoff. Risks can be reduced by selecting a runway that either has a precision approach or other means of vertical guidance and provides the most favorable overall performance. At critical airports (e.g., those with contaminated runways, short runways, adverse wind conditions, etc.), consideration should be given to not scheduling aircraft with inoperative braking systems (e.g., wheels brakes, anti-skid, spoilers, thrust reversers), and extra weight (e.g., tankered fuel) should be minimized.

Accurate weather information and timely runway condition information are essential.

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Crews should consider flying the full instrument approach at unfamiliar airports and during darkness instead of electing to conduct a visual approach to expedite arrival. Use should be made of all raw data to enhance position awareness and ensure a stabilized approach (Table 1, below).

Table 1
Recommended Elements of a Stabilized Approach

All flights must be stabilized by 1,000 feet above airport elevation in instrument meteorological conditions (IMC) or by 500 feet above airport elevation in visual meteorological conditions (VMC). *An approach is stabilized when all of the following criteria are met:*

1. The aircraft is on the correct flight path;
2. Only small changes in heading/pitch are required to maintain the correct flight path;
3. The aircraft speed is not more than V_{REF} + 20 knots indicated airspeed and not less than V_{REF};
4. The aircraft is in the correct landing configuration;
5. Sink rate is no greater than 1,000 feet per minute; if an approach requires a sink rate greater than 1,000 feet per minute, a special briefing should be conducted;
6. Power setting is appropriate for the aircraft configuration and is not below the minimum power for approach as defined by the aircraft operating manual;
7. All briefings and checklists have been conducted;
8. Specific types of approaches are stabilized if they also fulfill the following: instrument landing system (ILS) approaches must be flown within one dot of the glideslope and localizer; a Category II or Category III ILS approach must be flown within the expanded localizer band; during a circling approach, wings should be level on final when the aircraft reaches 300 feet above airport elevation; and,
9. Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

   An approach that becomes unstabilized below 1,000 feet above airport elevation in IMC or below 500 feet above airport elevation in VMC requires an immediate go-around.

Source: Flight Safety Foundation Approach-and-landing Accident Reduction (ALAR) Task Force (V1.1, November 2000)