



# RUNWAY EXCURSIONS

## AN ATC PERSPECTIVE ON UNSTABLE APPROACHES

### What is a Runway Excursion?

The Civil Air Navigation Services Organisation (CANSO) defines a runway excursion as “An event in which an aircraft veers off or overruns the runway surface during either take-off or landing.” Runway excursions lead to more runway accidents than all the other causes combined.

### What causes a Runway Excursion?

There are many factors that may cause a runway excursion, including runway contamination, adverse weather conditions, mechanical failure, pilot error and unstable approaches. This briefing will focus only on unstable approaches.

### What is an Unstable Approach?

An unstable approach is simply an approach that does not meet the criteria for a stable approach established by the aircraft operator. As an illustration, Flight Safety Foundation defines a stable approach in the following terms:

On the correct flight path:

- ILS Approach – ILS within 1 dot of the localiser and glide slope.
- Visual Approach – Wings level at 500 feet AGL.
- Circling Approach – Wings level at 300 feet AGL.
- Only small heading and pitch changes required.
- Speed within +20/-0 kts of reference speed.
- Aircraft must be in proper landing configuration.
- Maximum sink rate of 1,000' per minute.
- Appropriate power settings applied.
- Briefings and checklists complete.
- During IMC – Stable by 1,000 feet AGL.
- During VMC – Stable by 500 feet AGL.

If the approach is not stable by 1,000 feet AGL or 500 feet AGL (depending on weather conditions), or if the approach becomes unstable below these altitudes, the pilot should initiate a missed approach/go around. The pilot may initiate a go around at any time above or below these altitudes if deemed necessary. It is possible for a pilot to initiate a go around even after touchdown on the runway, but not after the thrust reversers have been deployed.

For ATC purposes, in the most basic terms, if an arriving aircraft is too high or too fast, the approach will most likely be an unstable one.

### What Role does Air Traffic Control play?

ATC can influence the safety and stability of an approach in two general areas. First, the instructions and clearances that are issued to the pilot can be significant factors in determining if an approach will become unstable. For example, if a descent clearance is delayed and the aircraft is close-in to the runway, the aircraft may be high on the approach, leading to a flight profile that is both above the glide slope and at a high sink rate.

Second, ATC plays a critical role in providing information to the pilot. For example, if the surface winds suddenly shift from a headwind to a tailwind, the aircraft’s flight profile may be significantly affected. If the wind information is promptly and accurately relayed to the pilot by ATC, the pilot would then be able to anticipate and compensate for the effects of the wind, making the necessary corrections to ensure a stable approach or request an alternate runway.

### ATC Best practices to Avoid Unstable Approaches

A stable approach ends with the successful completion of the landing and rollout. The stable approach may begin, however, 100 miles or more from the airport. En-route control and terminal approach control both play key roles during the initial descent phase and in positioning the aircraft on the final approach. The tower local control also has a very important role in determining the outcome of the approach and landing.

## General ATC Best Practices

**Inform the pilot what to expect** regarding runway assignment, type of approach and descent/speed restrictions so the proper planning and execution can be conducted. Stable approaches require predictability and planning. Avoid last minute changes unless absolutely necessary, and advise the pilot as early as possible when changes are anticipated.

**Ensure the runway assignment is appropriate for the wind.** Excessive tailwinds or crosswinds can lead to unstable approaches, and especially when the runway is wet or contaminated, are often associated with runway excursions.

**Issue accurate and timely information** related to weather conditions, wind and airport/runway conditions. When conditions are rapidly changing, promptly inform the pilot of all significant changes. Keep the overlying control facility (approach control or en-route) advised of changing conditions as well.



**Apply appropriate speed control/restrictions.** Assigning unrealistic or improper speeds, both fast and slow, or assigning speed control close-in to the runway may lead to unstable approaches.

**Be responsive to pilot requests,** especially those involving speed assignments, descent requests or runway/approach assignments. If you are unable to accommodate the pilot's request, advise the pilot of the reason, and if able, offer an alternative.

## Arrival and Approach Best Practices

**Avoid routine vectoring** of aircraft off a published arrival procedure to shorten the flight path. Unexpected shortcuts may lead to insufficient time and distance remaining to maintain the desired descent profile, and causing the aircraft to be high on the approach. Avoid close-in turns to final.

**Give preference to approaches with vertical guidance** over approaches with only lateral guidance. Approaches with vertical guidance (ILS, GBAS, LPV, Baro-VNAV) assist the pilot in maintaining the proper descent profile, resulting in stable approaches.

**When smaller aircraft are sequenced behind** larger aircraft the pilot of the smaller aircraft may elect to stay above the glide slope in order to maintain wake turbulence separation from the larger aircraft. Controllers should be aware that this combined with an ATC higher speed instruction may lead to an unstable approach.

**Avoid instructions that simultaneously combine a descent clearance and a speed reduction.** Many aircraft are not capable of performing a simultaneous descent and speed reduction while maintaining a stable approach profile. Specify which action you expect to be performed first.

**Issue appropriate and accurate track mile information** from the airport or approach fix in a timely manner, as required.

**Comply with requirements** related to capturing the glide

slope from below. Vectoring for an approach that places an aircraft on the final approach course above the glide slope is a leading cause of unstable approaches.

## Tower Best Practices

**Avoid close-in, last second runway changes,** even to a parallel runway. To comply with the company's operational procedures and requirements, the flight crew must have time to properly brief the approach and missed approach procedure to the runway being utilised. Even though a pilot may accept a runway change, the result may be an unstable approach.

**Avoid pattern entry instructions** that require the pilot to turn final close-in to the airport, especially with turbojet aircraft. For example, instructing an aircraft to enter on a close-in base leg may result in an unstable approach.

**Issue timely weather information.** When the surface winds are rapidly changing, ensure the pilot has the most current information. Solicit pilot reports on weather conditions and runway braking action and disseminate the information in a timely manner.

**Be alert for signs of an unstable approach.** For example, if an aircraft is above the glide slope altitude at the final approach fix, then an unstable approach is likely. When a possible unstable approach is detected, query the pilot and then be responsive to the pilot's requests.

## Summary

Many factors can lead to an unstable approach, which in turn, may lead to a runway excursion. While a large number of these are beyond the control of ATC, controller involvement can play an important role in contributing to safe, stable approaches and reducing the risk of runway excursions. Recognising and identifying unstable approaches, issuing proper clearances and providing timely and accurate weather information are important actions that ATC can perform to significantly reduce the risk of runway excursions.

## Related documents

<http://www.canso.org/cms/streambin.aspx?requestid=995DAE36-F6B0-4388-9360-606A9739EA83>

### Unstable Approaches: ATC Considerations

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