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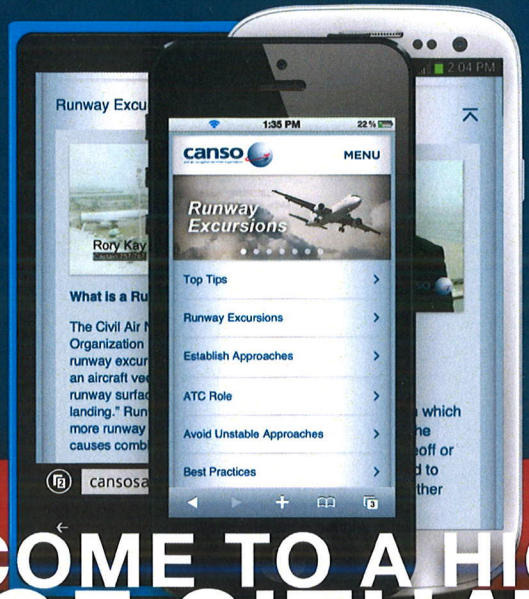

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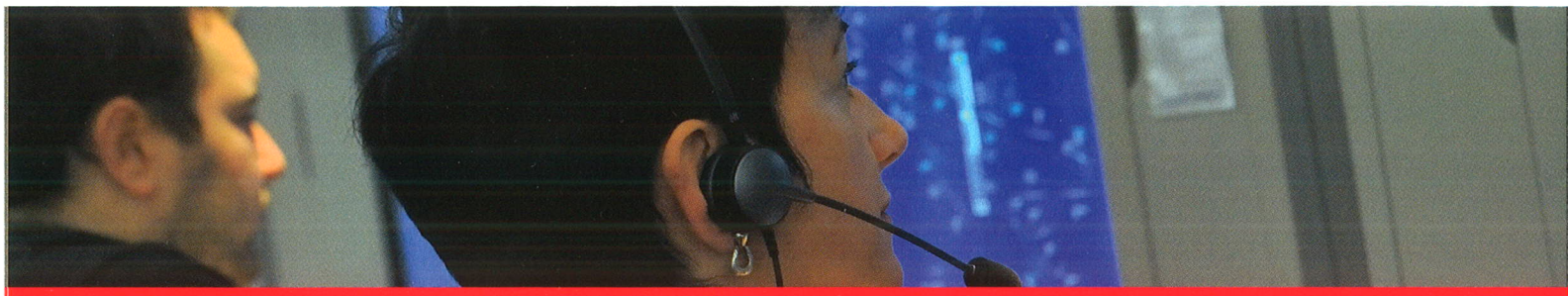


AVOIDING UNSTABLE APPROACHES

Important Tips for ATCOs

There are many contributing factors that may lead to a landing incident/accident, but one that ATC can have a major influence on is the development of an unstable approach. In general terms, if an arriving aircraft is too high or too fast, the approach will most likely become unstable.

- **Allow the arrival/approach procedure to be flown as published.** If at all possible, minimize or avoid the use of vectoring.
- **Avoid routine vectoring** of aircraft off an arrival course to shorten the flight path. Unexpected shortcuts may lead to insufficient time and distance remaining to maintain the desired descent profile, and cause the aircraft to be high on the approach. Avoid close-in turns to final.
- **When aircraft are being vectored, issue track miles to the airport** or approach fix in a timely manner, as appropriate.
- **Keep the pilot informed** regarding runway assignment, type of approach and descent/speed restrictions. That will allow for proper planning and execution of the approach. Stable approaches require predictability and planning. Avoid last minute changes and advise the pilot as early as possible when changes are anticipated.
- **Ensure the runway assignment is appropriate for the wind.** Wet or contaminated runways, combined with cross/tail winds are often associated with runway excursions.
- **Issue accurate and timely information** related to changing weather, wind and airport/runway conditions.
- **Apply appropriate speed control/ restrictions.** Assigning unrealistic speeds (too fast or slow) may lead to unstable approaches.
- **Give preference to precision approaches** over non-precision approaches. Precision approaches have vertical guidance which assists the pilot in maintaining the proper descent profile, resulting in stable approaches.
- **Avoid instructions that combine a descent clearance and a speed reduction.** Many aircraft can't descend and slow down simultaneously.
- **Comply with operational flight 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.
- **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 utilized. Even though a pilot may accept a runway change, the result may be an unstable approach.

AVOIDING UNSTABLE APPROACHES

Important Tips for PILOTS

"Keep it standard, keep it simple, keep it safe"

Maintain a mental picture of the required descent profile.

- Request distance updates from ATC if required.

Advise ATC as soon as possible if descent is required or additional track miles are needed to execute a stable approach.

- The sooner ATC knows, the greater is the probability that the request can be accommodated.

Be aware of published local ATC procedures/airspace restrictions that impact the approach.

- Airspace constraints may result in route and altitude restrictions.

Make requests for operational requirements, not for convenience.

- The earlier you tell ATC the easier it is to accommodate any request.
- Understand that you are part of a tightly integrated system with lots of arriving/departing aircraft and many operational variables (traffic patterns, airspace and airport design restrictions, noise restrictions, possible emergency operations on a different frequency), so ATC may not always be able to accommodate requests.

If you can't comply with an instruction, let ATC know early.

- Don't accept clearances that could put you into a situation leading to an unstable approach. The worst thing to do is to accept an instruction and then not comply with it.
- It's OK to say "UNABLE". Better still, say "UNABLE" and suggest an alternative.
- Use extreme caution when accepting visual approaches at unfamiliar airports.

Be predictable,

As far as possible, minimize differences (ATC can't be aware of all the variables e.g. aircraft performance, airline SOPs, etc).

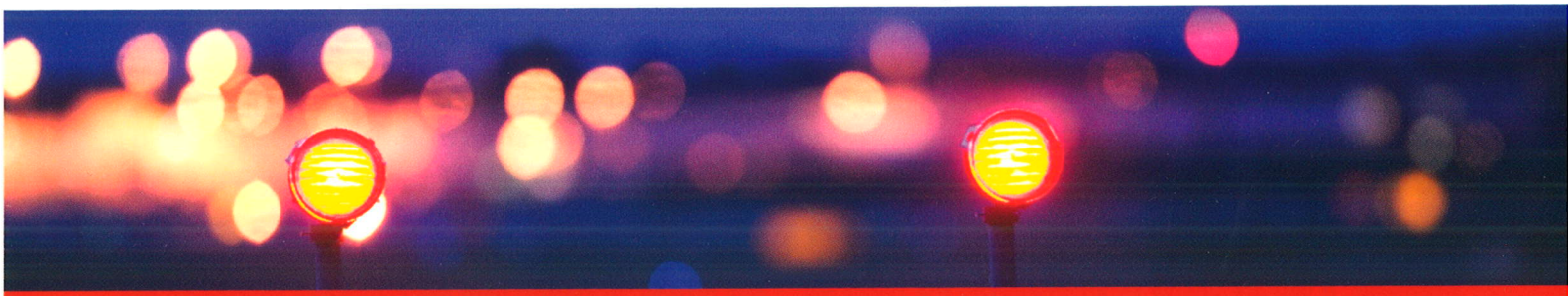
When departing,

- Tell ATC if you're likely to need further time on the runway, before accepting a clearance to enter the runway. ATC might be making their plans for the arriving aircraft around you starting your take-off roll without delay.

If you have an emergency situation,

- Let ATC know as soon as is practicable, either by selecting the appropriate Mode A or using the standard phraseology. Once ATC are aware of your situation, they will **LEAVE YOU ALONE** and can start making preparations to accommodate whatever **YOU** may request, when **YOU** are ready.

According to IATA, almost 30% of all accidents, 1995-2009, were due to runway excursion.
Most of these occurred following an unstable approach.



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

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 utilized. 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 surfaces 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 o 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

About CANSO

CANSO is the global voice of the companies that provide air traffic control, and represents the interests of Air Navigation Service Providers worldwide. CANSO Members are responsible for supporting 85% of world air traffic, and through our Workgroups, Members share information and develop new policies, with the ultimate aim of improving navigation in the air and on the ground. CANSO also represents its members' views in major regulatory and industry forums, including at ICAO, where we have official Observer status.

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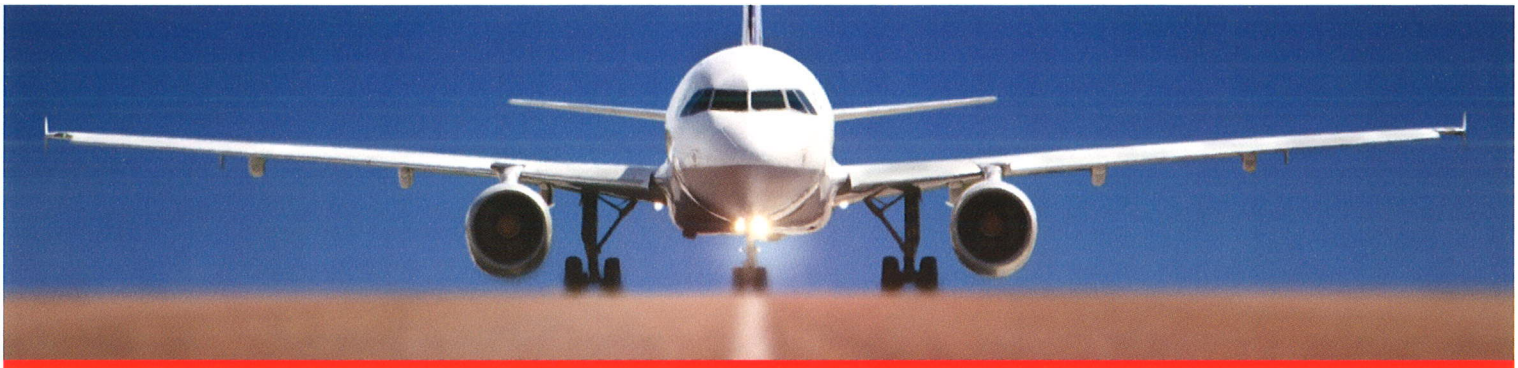

RUNWAY SAFETY MATURITY CHECKLIST

Enhancing runway safety is a top priority for the International Civil Aviation Organization (ICAO) and the aviation industry as a whole. With this in mind, the Civil Air Navigation Services Organisation (CANSO) has developed an array of materials designed to aid runway safety improvement. One of these materials is the **Runway Safety Maturity Checklist**. The checklist is designed for use across the industry, including:

- Air Navigation Service Providers (ANSPs)
- Airlines
- Airport Operators
- Regulators
- Aeronautical Telecommunication and Radio Navigation (ATEL/ANAV) Providers

The checklist is a tool to benchmark these entities' respective maturity levels with regard to **managing runway safety risks**. It identifies key risk elements and uses a series of questions calling for evidence on each element. For example:

- Is there a process in place? Is the process documented?
- Are employees trained, checked and assessed?
- Is the process working? How do you know?
- How could you improve on this element?

Designed to assist organisations in identifying and prioritising areas for **runway safety improvement** from all angles, the checklist uses the Analytical Hierarchy Process, taking into consideration the numerous focus areas required for success, including safety benefit, financial and stakeholder impact, complexity and dependencies. Industry-wide accessibility has also been prioritised, and the checklist is currently being migrated to a web-based application.

Implementation of the techniques contained in the CANSO materials will be disseminated and driven through respective peer organisations and their associated industry bodies:

CANSO	**ANSPs**
ICAO	**Regulators**
IATA	**Airlines**
ACI	**Airport Operators**

The checklist can be accessed and downloaded via the **CANSO Safety web page**.

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