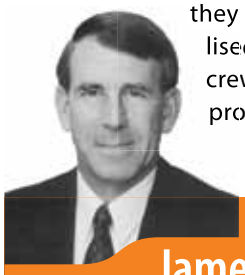
The role of ATM in reducing the risk of runway excursions

By Jim Burin, Flight Safety Foundation. Runway excursions are the most common type of accident in commercial aviation. One in three jet accidents is a runway excursion, and one in four turboprop accidents is a runway excursion.

The definition of a runway excursion is when an aircraft on the runway surface departs the end or the side of the runway. About one in every five excursions occurs on takeoff. There are two types of runway excursions, veer offs (going off the side of the runway) and overruns (going off the end of the runway). All organisations that are involved in aviation play a role in reducing the risk of runway excursions. These include aircraft manufacturers, operators, airports, regulators, and air traffic management (ATM). ATM plays a significant role in any issue dealing with the runway and runway safety. ATM has two primary roles in reducing the risk of landing runway excursions. First, they need to provide stabilised approach assistance to crews. Second, they should provide aircrews timely and



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Recommended Elements of a Stabilised Approach

All flights must be stabilised by 1,000 feet above airport elevation in instrument meteorological conditions (IMC) and by 500 feet above airport elevation in visual meteorological conditions (VMC). An approach is stabilised 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 VREF + 20 knots indicated airspeed and not less than VREF
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 stabilised if they also fulfil the following: instrument landing system (ILS) approaches must be flown within one dot of the glideslope and localiser; 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
9. Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilised approach require a special briefing

An approach that becomes unstabilised 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)

the most accurate information available concerning winds, weather conditions, and runway conditions.

Approach and landing is the highest risk phase of flight for all categories of aircraft. Data has shown that stabilised approaches are critical to all aspects of approach and landing accident reduction. A stabilised approach is defined by parameters established by operators that include the intended flight path, speed, power setting, aircraft attitude, sink rate, configuration, and crew readiness. An example of stabilised approach criteria are the ones recommended by the Flight Safety Foundation.

Stabilised approaches are particularly important in reducing the risk of a landing runway excursion. There are several reasons why an approach may be unstable. These reasons can be attributed to the aircrew, the aircraft, ATM, environment conditions, or a combination of these factors. As every pilot knows, ATM can destabilise any approach. For example, late runway changes and "slam dunk" approaches are two ways that ATM can cause an approach to become unstable. The important question is, do the ATM personnel know that these procedures can cause unstable approaches, and thus increase the risk during the approach and landing phase? Even more basic, do the controllers know what a stabilised approach is? Although pilots and controllers constantly work with each other, sometimes they don't fully understand each other's challenges.

An example of this is used in the Flight Safety Foundation's Approach and Landing Accident Reduction (ALAR) program. A major US airline was having an inordinate number of go-arounds at one of its hub airports. After reviewing FOQA data, the airline went to the local ATM organization and reviewed the go-arounds with them. The ATM personnel were not aware that some of the procedures they were using were causing the go-arounds. After a discussion of the issue, the procedures were changed. Also, a formal program was started with regular meetings between the airline and the local ATM personnel. ATM personnel were given simulator sessions with the airlines pilots to become more familiar with the pilots issues during approaches. In addition, the airline pilots went to the local ATM facility and observed the challenges the ATM personnel had to deal with. The result of these actions was the virtual elimination of preventable go-arounds at the airport. There are several similar pilot-controller programs around the world, designed to improve pilot-controller coordination and cooperation. Any program on pilot-controller communication should involve the pilots and controllers in joint meetings and in joint flight/ATC simulator sessions to promote a mutual understanding of each other's working environment. Discussions, for example, could include problems caused by late clearances and last-minute runway changes. In the end, these are challenges that effect both pilots and controllers, and these challenges need to be addressed in order to reduce the risk of runway excursions.

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Editorial note

A controller will not necessarily know exactly what criteria are being applied by each aircraft operator. Perhaps more importantly, they will also rarely know at what height above landing a mandatory 'gate' for application of the stabilised approach criteria has been set – both 500 ft and 1000ft are widely used. It is worth pointing out that, although the example quoted makes a distinction between whether an aircraft is in IMC or VMC in assigning the height of the mandatory gate, many operators do not do that. Also, some have found it useful to have two successive gates, the mandatory or 'must' one and a prior 'should' one, the latter typically set 500 ft higher.