Managing Landing and Departing Traffic

During your Tower Controller training you learned a little bit about when to clear an aircraft to takeoff or land in relation to other traffic using the runway. The intention of this article is to take this to the next level and improve our runway efficiency by expanding on our knowledge of aerodrome separation standards. It is not an exhaustive guide and in the real world there are all sorts of exceptions based on the aerodrome in question, size of the aircraft and length of the runway, that this article will not address. This article will however provide a realistic guide to improving your use of the runway in the online environment.

It is often difficult to assess whether or not a departing aircraft can be issued a takeoff clearance when another aircraft is established on final approach. In the online environment, aircraft are often subject to unnecessary delay while an approaching aircraft is cleared to land from up to 10 or 12 miles away. There are a couple of separation standards that exist to guide us in making this determination, as well as some simple rules of thumb that allow us to judge whether we can maintain these standards. These standards can be heavy reading, but they provide the background of the conclusions below.

Standards (Reference: CASA Manual of Standards Part 172 - 10.13.2):

10.13.2.1 Lateral separation is considered to exist between an arriving aircraft that subsequently commenced final approach, and a departing aircraft that has been cleared on a segregated flight path.

10.13.2.2 For this purpose, a segregated flight path is considered to exist when the departing aircraft will not be maneuvering within 45 degrees either side of the reciprocal of the final approach path while the arriving aircraft is on the final approach track.

For example, an aircraft arriving Melbourne Rwy34 and an aircraft departing Runway 34 for Sydney easily satisfies this criterion.

We will skip 10.13.2.3 as it talks in general terms. Our online environment falls under one of the following standards.

10.13.2.4 A departing aircraft may commence take-off before an arriving aircraft on final approach passes a point 5 NM from the landing threshold as determined by 1 of the following:

(a) ATS surveillance system;

(b) GNSS report;

(c) DME report adjusted for the distance between the landing threshold in use and the DME site.

10.13.2.5 In the application of this standard, the controller must estimate that the required separation will exist at the time the take-off is commenced.

That is, if the aircraft is holding short, we must allow enough time for the departing aircraft to maneuver onto the runway and commence its takeoff roll before the standard is breached.

10.13.2.6 When an ATS surveillance system suitable for 3 NM separation is used to determine aircraft position, the controller must ensure that an arriving aircraft is not closer than 3 NM from the landing threshold at the time a departing aircraft:

(a) commences take-off on the runway to be used by the landing aircraft; or

(b) crosses the intersection of the runway to be used by the landing aircraft.

This last one is important as it applies to our online environment more closely.

Let's put this together for VATSIM use:

In 10.13.2.1 and 10.13.2.2 we describe a segregated flight path. In most cases online, this is what we'll have due to SID and STAR tracks providing this for us.

10.13.2.4 talks about 5nm from the landing threshold. Conservatively this is our standard and it applies to a couple of scenarios, those being a procedural tower and a Centre Controller providing Top-Down coverage of the aerodrome. A little bit more buffer is required in these situations.

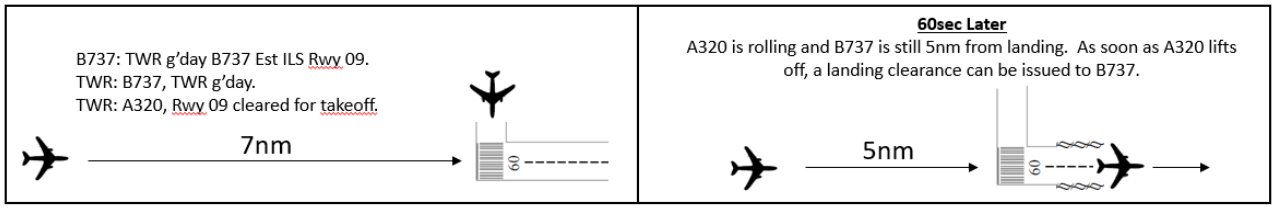
10.13.2.6 can be used when an Approach or Tower controller is monitoring the runway, as they have a somewhat higher resolution view of what is going on and can monitor these distances more closely.

Remember that as per 10.13.2.5 we must ensure this minimum distance is present when the departing aircraft commences its roll. Our takeoff clearance must come sometime before this.

When can I clear an aircraft to takeoff? Well how long is a piece of string? It depends on how fast the approaching aircraft is, and how quickly the departing aircraft can be reasonably expected to commence its takeoff roll. Let's look at an example.

A common scenario is a narrow body jet (B738) on approach, with a narrow body jet (A320) waiting at the holding point. The 737 on approach is likely doing about 150kts, or 2.5nm per minute. If we conservatively expect the A320 to take 1min to position on the runway and start its takeoff, we should not clear them for takeoff unless the aircraft on approach is at least 5.5nm from the threshold (our 3nm minimum plus the 2.5nm we expect the aircraft on approach to travel in the time it takes the A320 to line up and start rolling). How about we round it up to 6nm to be safe?

Nobody expects you to use these standards exactly. A good controller will add a reasonable amount of extra space for comfort. In the scenario above, let's say the B738 is at 7nm and you clear the A320 for takeoff. The A320 takes 30seconds to position and another 15sec to start rolling. In this 45sec the B738 on approach has travelled a further 1.9nm and is now comfortably at 5nm (2nm more than we need) when the takeoff commences.



The same principle applies to aircraft waiting to cross the active runway, except you have even more time as a runway crossing typically takes less time. Remember the rule of thumb, and aircraft on approach roughly covers 2.5nm per minute. So an aircraft at 6nm leaves you a over a minute to get traffic across the runway.

What's the take home message?

There is no need to clear an aircraft to land at 8,9 or 10nm out when there is a potential to get a takeoff or runway crossing done in the time we have.

Come up with your own rules based on the ones above. Adjust these rules based on the aircraft in question, how busy the aerodrome is and your assessment of how quickly the departing or arriving pilot can respond to your instructions.

There is always a temptation to clear the aircraft on approach to land (and often the pilot will be on the radio asking for a landing clearance because online pilots are so used to getting this early), but resist this temptation. Think about whether someone else can safely and efficiently use the runway first.

There are few things more satisfying than making a sequence work with maximum efficiency and safety.

If you have any questions regarding this article, please contact the VATPAC Training department, or post your question on the forums.