

Clued^{up}

GA Update

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REJECTED TAKEOFFS





GO OR NO-GO?

Most, if not all, pilots will be prepared for an engine failure on takeoff, but not all issues are so clear cut

It happens very quickly, though it can actually feel as if time has slowed right down... You open the throttle, speed starts to build, your thoughts are ahead for rotation into the air and then something just isn't quite right or, worse, starts going badly wrong — do you carry on, or stop?

Sitting on the ground reading this you'll instinctively say "You stop if there's room, that's obvious...". That's true in the cool, calm of home or the briefing room, but in a busy (and possibly noisy) cockpit with things starting to happen quite quickly it can be completely different as precious runway distance is eaten up while your mind is trying to decide what's going on and what to do about it.

Take this extract from a recent AAIB report. 'The pilot reported that after applying full power to depart from the grass runway the aircraft yawed left "slightly more than usual" [There was a crosswind at the time].

'He countered it with right rudder

and brake, expecting rudder would compensate for the yaw as airspeed increased. However, later in the takeoff roll, even with full right rudder and right brake applied, the aircraft began departing left of the runway surface.

'The pilot described reaching a "critical point" whereby to avoid damage related to a runway excursion, and with the aircraft "nearing its takeoff speed", he stopped applying right brake and rotated the aircraft into the air. It became airborne briefly but touched down adjacent to the runway and struck a raised earth bank.'

Thankfully the pilot was uninjured, though that can't be said for the aircraft which had a fractured fuselage, a damaged prop and main wings that had twisted on the spar.

The report goes on to say: 'The wet and cool weather conditions preceding the accident may have meant the grass was unexpectedly wet, affecting the aircraft's handling characteristics. If, as the pilot suggested, the left brake was binding,



Are the spats clear of grass and mud, or might they slow the takeoff roll?

the left yawing tendency may have exceeded the available aerodynamic control.

'In order to prevent a runway excursion, the pilot rotated the aircraft before its takeoff speed had been reached, probably causing one or both of the wings to stall. He had not considered stopping.'

That last sentence is crucial. The pilot had, as the full report points out, 'habitually considered his actions in the event of an engine failure after takeoff. However, like others consulted during



the investigation, he had not recently considered the decision-making aspect of the takeoff roll, or his intended actions for rejecting a takeoff. He could not recall any training he may have received in those areas'. During the investigation the AAIB interviewed a number of PPL holders, Flight instructors and Flight Instructor/Examiners and it became apparent that training and awareness of rejected takeoffs and related decision-making 'was variable'. Several long-term PPL holders couldn't recall initial rejected takeoff training, nor refresher training for it. All of the instructors interviewed indicated that pilots commonly focus on "getting into the air", rather than considering a rejected takeoff when preparing to takeoff. You can read the full accident report referred to, here [AAIB](#).

Abandoned takeoffs are of course taught in the PPL syllabus in Exercise 12/13: Emergencies: (A) abandoned take-off; (B) engine failure after takeoff; (C) mislanding and go-around and (D) missed approach, but training can be varied and you might not choose to cover it in your biennial check.

So where does all that leave us? The first and perhaps most important point is to have a 'go, no-go' point, appropriate for the conditions of the day, on or to the side of the runway, that leaves enough room to stop if things aren't working out.

The CAA's 'Safety Sense Leaflet 7c Aeroplane Performance', Section 6 'Takeoff - points to note' says: 'Decision point: you should work out the runway point at which you can stop the aeroplane in the event of engine or other malfunctions, e.g. low engine rpm, loss of ASI, lack of acceleration or dragging brakes.

'Do not mentally programme yourself in a go-mode to the exclusion of all else. If the ground is soft or the grass is long and the aeroplane is still on the ground and not accelerating, stick to your decision-point and abandon takeoff. If the grass is wet or damp, particularly if it is very short, you will need a lot more space to stop...'

Here's another example, not from the AAIB report but from a highly experienced Flight Instructor/Examiner: 'We taxied out with the power checks and vital actions all done. The FISO advised "Take off at our discretion" and the aircraft seemed a little sluggish to move on brake release but rolled at a sedate pace, so we carried on and lined up. With full power applied the acceleration was less than expected but takeoff



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Above: Not what you want to see during the takeoff roll... Inset: Structured self-briefing is essential to plan the takeoff, the departure and eventualities for stop or continue Right: Go, no-go point selected?



Photo: Terry Kent

continued. The engine power was enough to overcome what we thought was brake drag but we lifted off a couple of hundred metres further down the runway than expected.

'Mulling this over en route to our destination, a check around the cockpit revealed that although the parking brake knob was in the 'off' position the brakes had failed to release fully. A quick stamp on the brake pedals cured the situation which could have led to a noseover on landing as this was a tailwheel aircraft. The moral is – if something doesn't seem right don't press on regardless, stop and check it out.'

But rejecting a takeoff isn't always an easy decision as the above incident shows, so how, or when, do you make that decision and the correct actions to take — remember what we said at the start about time appearing to elongate when it's actually passing quickly?

So here we need to dive into a bit of human psychology — much of what we do in life is controlled by three main human behaviours, skill-based, rule-based and knowledge-based. As you'd

expect, **skills-based** performance is essentially automatic from practice, as in normal flying by a competent, current pilot and which requires little conscious thought; **rule-based** performance applies when you can't rely on your skills in an unfamiliar situation so written or memorised 'rules' come into play and, finally, there's **knowledge-based** performance which is the most complex; for example, when a person encounters novel and unanticipated situations where there are no skills- or rule-based cues to direct the actions, the person has to fire up the brain to problem-solve which, of course, takes time.

In commercial air transport flying is very much 'rule-based' with pre-packaged guidance to provide timely action for many issues a pilot might face. While many commercial flying procedures or 'rules' might not necessarily be suitable in private flying, academic works do indicate that a simple, rule-based structure for decision-making would be appropriate for the takeoff roll, during which decisions

GO

What does good look like today (good aircraft, runway, weather, weight, wellbeing)?

NO-GO

What would make it no good today?

IT'S MY DECISION

Where will I stop if it's not looking good today (could be before I even get in the aircraft)?

What's the runway surface condition? What difference could it make to the takeoff?

and resulting actions must be clear and prompt.

Put more simply — given that an abnormal event during takeoff might surprise a pilot, having a pre-decided 'rule' ("if I'm not airborne with full power by point X, I'll reject the takeoff") helps to avoid an unreliable automatic response ('It'll be okay, it always has been before') and reduces the conscious effort (and time) a more knowledge-based response might require as you flick through your mental files to find a solution.

So, for example, if an aircraft isn't tracking down the centreline or accelerating as it should, then rather than just trying to keep on figuring out the issue the rule comes into play and might say, for example, 'reject the takeoff' at or before the (preselected) decision point. For this to work correctly, structured self-briefing before takeoff is essential by providing clear decision-making and prompt action if things aren't going normally.

While many pilots do brief themselves for different 'eventualities' on takeoff not everyone does. Threat and Error Management (TEM) should be part of the preflight brief — in other words, 'what could go wrong and what am I going to do about it if it does', thus helping to create a 'rule'.

Nobody's suggesting a pilot should sit

at the hold making a long list of 'rules' just before flight, but a self-briefed 'threat' evaluation should help to make some 'rules' to cope with eventualities and could be something like:

- **Takeoff runway — What's the surface condition, length available, weather, hazards (trees, bushes, birds etc)?**
- **Wind information — Wind speed and direction (is it gusty, a crosswind is it within limits)?**
- **Relevant airspeeds for takeoff and climb (are they correct for the conditions)?**
- **Where should the 'stop or continue' decision point be on that day?**
- **Actions to take in the event of stopping**
- **Actions in the event of a minor or a major problem after becoming airborne**
- **Departure information in the event of a normal takeoff**

- **As the throttle is advanced is the aircraft tracking straight and accelerating as expected? RPM correct at full throttle and, as speed builds, the ASI reading.**

If the safest course of action is to reject the takeoff, appropriate actions to stop safely within the remaining runway for most aircraft are: close the throttle levers, maintain the runway centreline using the rudder pedals, brake as appropriate (all the way up to maximum if required), bring the aircraft to a stop and, if you can, notify ATC that you are stopping, then clear the runway if it's safe to do so.

A good, structured pre-takeoff 'threat analysis' with a predetermined 'stop' or 'continue' point is an invaluable tool, because by mentally rehearsing possible scenarios and your actions, there's much less chance of being caught unawares and more likely for there to be a successful outcome to any issues.

So, go or no-go — it's your decision.



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