Partial Power

Many occurrences result in fatalities or serious injury due to pilots losing control of their aircraft after an engine partial power loss, especially in the takeoff phase of flight.

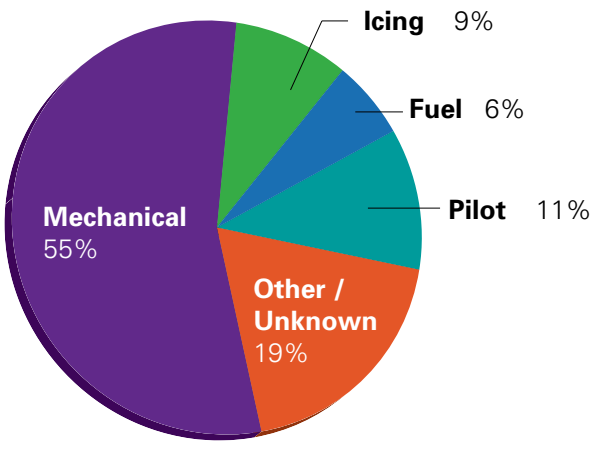
A partial power loss is where the engine is providing less power than that commanded by the pilot, but more power than idle thrust. This presents a more complex scenario to the pilot than a complete engine power loss.

With a partial power loss, there are strong influences working against you, simply because the engine is still providing some power, but this power may be unreliable. For example, in the takeoff phase, this may lead to a strong desire to return the aircraft to the runway rather than land ahead.

From 1 January 1995 to 31 December 2012, there were 59 occurrences of engine power loss, with 3 fatalities and 12 serious injuries recorded, that were reported to the Civil Aviation Authority. A further 71 persons sustained minor or no injuries.

As occurrences of partial power loss occur three times more often than a total power loss, your preflight planning should consider a partial power loss event as much as a total power loss.

With over 30 per cent of recorded partial power loss incidents happening during the takeoff and climb phases, let's look at options you can use to prepare for a possible power reduction.



Graph of reported causes of engine partial power loss

Preflight Planning

By considering the many factors involved in the takeoff, such as wind strength and direction, runway direction, terrain and obstacles, and landing options on and off the airfield, you will reduce the mental workload required to handle a loss of power. This can also help you with decision making under stress or a high workload in an emergency.

Getting this plan together before you leave, will give you the confidence to carry out timely and positive actions if required.

Preflight Checks and Inspection

The preflight inspection is a vital action for any flight and can reduce the likelihood of a partial power loss occurring after takeoff. See *Vector*, "Before You Go", March/April 2013.

Ensure the engine starts easily and runs smoothly, and allow an adequate warm-up time.

Conducting a thorough engine run-up is an important step. Testing fuel flow from the selected tank (fullest or takeoff tank), checking for correct operation of the carburettor heat control, and checking and comparing individual magnetos for a specified RPM drop range is vital. Engine oil temperature and pressures, fuel pressure, and other engine or systems gauge indications should be within accepted aircraft operating limitations.

Allow plenty of time to conduct the engine run-up check to help show any abnormalities with both the engine and fuel


Photo: ©istockphoto.com/Damian Gil

system, and never attempt to take off when the engine continues to misfire or is running rough.

Fuel

Fuel starvation, exhaustion, or contamination, also rate highly as causes of partial power often leading to total power loss. The following checks may help prevent this happening:

» Know your aircraft fuel system and how and when to operate associated controls such as fuel caps, fuel drains, fuel primer, fuel pumps, fuel selector and mixture control.

» Always ensure there is sufficient fuel for your flight, including reserves and diversion allowance, and that you use the dipstick to visually check fuel levels. Crosscheck the dipstick level with the fuel gauges for accuracy, and never rely on a single source of information about the fuel reading.

» Have a fuel plan even when operating in the circuit. Engine power loss occurrences have occurred during a 'touch and go' often as a result of a vigorous application of full throttle in a sometimes stressful situation. Also, fuel consumption will be higher in the circuit than when operating with a lean mixture in the cruise at altitude.

Induction Icing

Carburettor icing is a major factor in loss of engine power.

Remember that induction icing can occur at temperatures of -10° C to +35° C and above 50 per cent humidity. Also, know your aircraft systems, especially the use of carburettor heat or alternate air for fuel-injected engines in the case of restricted induction airflow.

Pre-flight Self-briefing

All single-engine aircraft pilots, just like multi-engine aircraft pilots, should 'self-brief' before each and every takeoff. It helps you keep ahead of the aircraft, and keep control.

This brief is generally conducted once all engine and systems checks are complete, just prior to the holding point for takeoff. It serves as a reminder of your planned actions in the event of an emergency.

Here is an example of a self-brief:

> *Engine failure before rotation point, I will abort the takeoff, close the throttle and stop on the remaining runway.*
>
> *Engine failure after rotate, runway remaining, I will lower the nose, close the throttle, land in the remaining runway available.*
>
> *Engine failure in initial climb, I will lower the nose, close the throttle, select the best option, and execute trouble checks if time permits.*

On the takeoff run, we wisely choose to use the full length of the runway available, and on application of full power we check the static RPM to confirm engine performance.

With the brakes off we check the acceleration of the aircraft, and the performance of the engine for any signs of power loss and/or rough running.

After rotation and in the initial climb, any partial engine power loss that degrades performance to the extent that you cannot maintain height can be treated as a complete engine failure with a potentially extended glide distance.

At this point, you might hear your instructor reminding you to, "lower the nose to the gliding attitude, maintain speed, carry out trouble checks if you have time, and fly the aircraft to a landing."

You can now also consider how best to use the partial power you might have available.

At a reasonable height, and with power that is sufficient to maintain height, a turn back to the recently departed runway may be an option, but it has a number of considerations attached. The overriding thought is that the engine could fail at any time.

Accidents occur when control is lost, especially when the pilot attempts to turn back to the runway at low level and low speed, or does not maintain control in the glide.

Plan, inspect, and brief for a safe outcome after partial engine power loss, but remember to fly the aircraft! ■