

Vortex Ring State

Vortex ring state is a serious hazard all helicopter pilots need to be aware of.

Vortex ring state occurs when a recirculation vortex envelops a helicopter's rotor system, causing significant loss of lift.

This can occur when the helicopter is descending at a reduced airspeed, and is most at risk of happening during downwind approaches. The likelihood of vortex ring state is increased with a helicopter at a heavier weight due to a higher power setting requirement.

The condition can be sudden, and it results in a rapid increase in rate of descent. Any increase in rotor thrust to reduce this further energises the vortices and increases the rate of descent.

The standard vortex ring state recovery technique requires pilots to reduce power by lowering the collective and accelerating forward away from the downwash. However in the low level environment this may not always be possible as it consumes valuable height.

Alternatively, the Vuichard Recovery technique can be used to move out of the vortex ring. This involves increasing collective to climb power, applying the appropriate pedal (generally left in American helicopters, and right in European helicopters)

to keep the nose straight, and applying the appropriate cyclic (opposite to the pedal used).

Of course, avoiding vortex ring state is the best course of action. This requires pilots to:

- » Remain alert to the conditions conducive to the formation of vortex ring state
- » Closely monitor the airspeed and rate of descent during the final approach
- » Initiate recovery action at the first indication that they may be approaching vortex ring state.

More information

For more information on helicopter performance, see CAA's Good Aviation Practice booklet, *Helicopter Performance*. It's available on www.caa.govt.nz, "Quick Links > Publications > Good Aviation Practice booklets".

You can also order a free printed copy by emailing info@caa.govt.nz. ■

