



## Snow Landing and Take-off Techniques for Helicopters

Throughout the course of winter operations, helicopters face a significant hazard associated with takeoffs, landings and hovering when the ground is covered with fresh or light snow. The rotor down wash can produce a flurry of re-circulating snow, reducing local visibility and causing whiteout conditions. There seems to be limited reference material available on the subject, but the following techniques are used by the industry as standard practice.

### *The towering takeoff*

When conducting takeoffs in conditions conducive to re-circulating snow, apply enough power to get the snow blowing while keeping enough weight on the aircraft to prevent it from moving. Leave the power on as long as necessary to get good visual references. This could take up to a minute to accomplish.

Once good references are established, use a towering take-off technique (altitude over airspeed) to stay out of the re-circulating snow during the remainder of the departure procedure.

If the aircraft is equipped with a wheeled undercarriage and a runway is available, a rolling takeoff could be another option.

### *The rolling takeoff*

Prior to starting the take-off roll, apply power to blow the runway clear in the vicinity of the aircraft — this will give you some reference for the start of the take-off roll. When ready for takeoff, apply enough power to get the aircraft accelerating ahead of the re-circulating snow. When ahead of the snow, lift the aircraft into the air, accelerate to the aircraft's normal climb speed and follow the normal climb profile.

- Use this technique when the snow cover is light (less than approximately 5 cm), and the snow is relatively dry. Deep or heavy snow could impose excessive load on the landing gear.

### *Landing: high-hover technique*

Before using this technique, ensure that the aircraft is at a weight that will allow hover out of ground effect performance. If the aircraft is flying in clear air prior to the approach, activate the aircraft's anti-ice systems (if equipped) prior to entering the re-circulating snow.

Plan your approach to arrive in a high hover above the landing site. This hover could be several rotor diameters above ground depending on snow conditions, aircraft weight, rotor diameter, and aircraft type.

When in a high hover, the re-circulating snow will form beneath the helicopter, obscuring the landing site. This re-circulating snow will also rise; be sure to stay above the rising snow and wait until solid references appear beneath the aircraft. This could take up to a minute. These references are directly under the aircraft and within the diameter of the rotor disc. Once solid references have been obtained, a slow vertical descent to a touchdown is all that is required.

### ***Landing: no-hover technique***

This technique is generally used when aircraft do not have hover out of ground effect performance. The idea is to fly the approach fast enough to keep ahead of the re-circulating snow and complete a no-hover landing before the re-circulating snow engulfs the aircraft, causing local whiteout conditions.

Some of the negative aspects of this technique:

- Requires excellent timing—usually only one chance at getting it right.
- May not be able to get a detailed look at the touchdown area prior to landing.
- Not recommended for use at night helipads because of the reduced visual references required for judging the landing flare.

### ***The run-on landing***

A run-on landing could be another option, if your aircraft is equipped with a wheeled undercarriage and you are landing on a runway.

The technique is to fly the approach fast enough to keep well ahead of the re-circulating snow. On touch down, the aircraft has to have enough forward speed to stay ahead of the re-circulating snow and allow the collective to be fully lowered (lowering the collective reduces the re-circulating snow). Bring the aircraft to a full stop and taxi with caution.

- Use this technique when the snow cover is light (less than approximately 5 cm), and the snow is relatively dry. Deep or heavy snow could impose excessive load on the landing gear.

### ***Safety first***

Landings and takeoffs in re-circulating snow require skill, training, and adherence to the following safety points:

- Be certain you have sufficient power available to permit the manoeuvre.
- Ensure that the skids or wheels are not frozen to the ground prior to lift off to prevent dynamic rollover.
- Observe the flight manual and company operations manual limitations. In the transport category, the height-velocity diagram is a limitation and must be respected. In other helicopters, it should be considered in your planning.
- When using the towering takeoff or high-hover landing technique, be patient. Wait for solid references to appear before proceeding.
- Practice landings and takeoffs using references that are inside the diameter of the rotor disc.
- Obtain training from a qualified training pilot or flight instructor before using the techniques described here.

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