



## Wind strategies

### Tips for handling blustery breezes

*By Bruce Landsberg*

A standing joke in the Great Plains is that windsocks are made of 8-foot lengths of logging chain, and unless links of chain are snapping off in the breeze, the wind is probably not much to worry about. I've never figured out exactly how much wind that would take and suspect that most of us have a somewhat lower tolerance, but the question is where to draw the line.

During a particularly windy trip up the East Coast, I had ample time to consider the effects of wind on airplanes and how it is involved in accidents. In reviewing the records in the AOPA Air Safety Foundation's Emil Buehler Center for Aviation Safety, some interesting facts came to light: 1,155 accidents had wind listed as a probable cause. This represents about 6.5 percent of the accidents recorded so far in the database.

Not surprisingly, among aircraft under 12,500 pounds, larger ones had fewer accidents. (The foundation doesn't keep records on aircraft weighing more than 12,500 pounds.) Only 25 multiengine aircraft crashed with wind as a cause, and single-engine retractables accounted for another 101 accidents. The overwhelming majority was represented by single-engine fixed-gear airplanes. This seems logical for two reasons. Lighter aircraft are more affected by the wind, and they are frequently flown by less experienced pilots who may not have perfected the techniques of coping with drift correction and wind shear. Tailwheel airplanes were a significant portion, reflecting their more demanding ground-handling characteristics compared to nosewheel airplanes.

High-wing airplanes had 2 percent more wind-related accidents than low-wing aircraft. While it could be speculated that a high wing presents more opportunity for the wind to get beneath it and perform mischief, there are many factors that could contribute to this finding. They involve exposure, wing loading, pilot experience and proficiency, and many other variables that should also be considered.

Takeoffs and landings were the most frequent phases of operation, accounting for more than three quarters of the mishaps. Once airborne, we seem to manage reasonably well. It's just at the point of leaving or coming back into ground contact that wind most frequently challenges the pilot.

Some examples: At the time the Cessna 172 pilot received his weather briefing, the wind was variable 230 to 250 degrees at 20 knots. The 800-hour pilot started the takeoff roll on Runway 24 and began to rotate at 55 knots just as a strong gust struck the aircraft from the left. The aircraft departed the runway to the right side, and the nose gear failed. Right after the accident, flight service reported the wind from 230 degrees at 27 knots, gusting to 37 knots.

The 300-hour Beech Bonanza pilot reported encountering severe downdrafts and turbulence at the runway threshold. Full throttle was applied, but the aircraft touched down prematurely and was angled about 30

degrees to the right of runway heading. The aircraft came to rest in some brush beside the runway, and the nose gear collapsed. Epilogue to the story: 1 hour 20 minutes later, the FAA investigator landed at the airport. During the approach, at about 100 feet agl, he encountered an abrupt loss of airspeed while the nose and right wing dropped. He applied power, but the aircraft settled another 50 feet before recovering for a normal landing. Presumably, the investigator was sympathetic to the pilot's report of wind shear and severe turbulence.

Wind does not seem to play a large part at night or in instrument meteorological conditions. There were only 33 and 17 accidents, respectively. There may be a pilot experience factor here, as well as reduced exposure, because there is much less night and IFR flying compared to daytime VFR operations. Also at night, as any sailor who is trying to get home will tell you, the wind tends to die out.

As is true with other takeoff and landing accidents, wind-related accidents tend to be of the "fender bender" variety. Less than 10 percent of these accidents resulted in fatalities or serious injury, which is well below the average of about one in four accidents being serious.

In avoiding the winds of catastrophe, there are several risk management strategies that will keep you from getting blown away:

There must be enough fuel to compensate for reduced groundspeed when flying into a headwind. We won't dwell on this now because fuel management is a topic unto itself, but I suspect that many accidents blamed on fuel exhaustion had their genesis in a wind related encounter.

There has to be enough airspeed to maintain controllability during takeoff and landing. As seen from the accidents cited earlier, we've got to have enough response from the flight controls to overcome the swirls and eddies in the atmosphere that will want to drop a wing here or slide the nose down or sideways there. There's a wonderful line in John Hoyt's book, "As the Pro Flies," that talks about being "disgusted." That's when a gust of wind gives us extra lift when we really don't need it and then abruptly stops. Frequently, the result is a stall, and the cure is adequate airspeed and power to overcome that sudden sinking feeling that is likely to follow.

The pilot's operating handbook for the Cessna 172N recommends a normal rotation speed of 55 knots under calm conditions. In the expanded description under crosswind takeoffs, the handbook suggests, "With ailerons partially deflected into the wind, the airplane is accelerated to a speed slightly higher than normal, then pulled off abruptly to prevent possible settling back to the runway while drifting." So how much more speed does "slightly" imply? The rule of thumb is half the gust factor (in the case of the 172 example mentioned earlier, the gust factor was 10 knots, so add 5 knots to the normal approach speed) or, in the case of the 172 takeoff accident above, 5 knots. If it's really gusty, add more to be sure that when you pull the airplane off the ground, it will fly even if a gust hits at just the wrong time.

Full-stall landings are a joy to behold in light winds but not the best way to handle a gusty touchdown. The nosewheel still needs to be clear of the runway, but we need higher speeds and lower angles of attack to maintain controllability.

A Mooney pilot with more than 1,000 hours total time and 250 in type and another pilot were preparing to land when suddenly the aircraft was blown into the trees. The effective crosswind component, estimated by the accident investigator, was about 10 knots. The pilot stated that after approach with full flaps, the speed was bled off for an intended full-stall landing. Just prior to touchdown, the pilot reported a gust that shifted 90 degrees to the runway and exceeded the crosswind capability of the aircraft. The pilot added full

power, but the aircraft could not fly out of the stall. It drifted to the left side of the runway during the attempted go-around, and when the other pilot attempted to turn right, the left wing struck a tree, and the right wing tip contacted the ground.

While the following quote is again from the 172 handbook, the principles apply to most aircraft: "When landing in a strong crosswind, use the minimum flaps setting required for the field length. The maximum allowable crosswind is dependent upon pilot capability as well as aircraft limitations. With average pilot technique, direct crosswinds of 15 knots can be handled safely."

My personal experience is that flaps make high-wind landings more difficult, and I avoid short runways in strong crosswinds if the flaps are needed to get the speed down to get the machine stopped. Then it's getting to be more like work than fun.

Cessna's comment about 15-knot direct crosswinds should not be taken out of context. We might want to add that a competent and current pilot who is used to flying the 172 in strong winds can handle 15 knots of direct crosswind safely, which brings up another important point. Pick airports with runways closely aligned with the wind if it's really strong. This seems purely logical, but general aviation pilots sometimes will pass up an easy landing at a nearby airport to challenge a nearly impossible crosswind, with resultant damage.

Remember that the flight controls should be positioned properly to minimize the effect of wind while taxiing. A wind coming from ahead or from one side can be countered by keeping the elevator neutral and turning the ailerons into the wind. If the wind is from behind, position the controls to "dive away" from it; i.e., elevator down and ailerons opposite to the wind. In a howling gale, we may need to get "wing walkers" to hold the aircraft down while getting to a tiedown spot. How frustrated the pilot of a 172 must have been after altering his destination to a large airport with runways aligned into the wind, only to be blown over while attempting to taxi to the ramp. That's an ill wind.

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