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COMMENTARY / THE CLASSIC INSTRUCTOR

Crosswind Takeoffs 2.0

Understanding the factors

BY STEVE KROG

I'VE PREVIOUSLY WRITTEN ABOUT crosswind operations, but I feel it necessary to expand on these maneuvers.

Our airport, HXF, underwent major changes this past summer. Gone is the old 3,000-foot, hard-surface Runway 11/29, and in its place is the 3,400-foot, hard-surface Runway 09/27. The new runway required our turf runway, 18/36, to be closed, regraded, and reseeded.

Consequently, we've been limited to the new hard-surface runway since the airport reopened. Mother Nature hasn't cooperated since the opening, and we've experienced near direct 90-degree crosswinds in many of the following days. Nearly every training flight has resulted in both a crosswind takeoff and landing.

The result is that many of our flight students have become quite proficient in handling crosswind operations. But crosswinds continue to cause a bit of indigestion among many pleasure-flying pilots. Consequently, they are not often practiced because of trepidation. Certainly, these operations do require a bit more pilot skill but shouldn't be a deterrent to flying on an otherwise beautiful, sunny day.

To help overcome the apprehension about crosswind operations, let's discuss some of the factors that have an influence either positively or negatively.

DEMONSTRATED CROSSWIND COMPONENT

How familiar are you with your aircraft? Do you know the demonstrated crosswind component for the aircraft that you most often fly? Can you legally fly your aircraft in winds exceeding the crosswind component?

The demonstrated crosswind component is just that, demonstrated. It is the highest velocity of the crosswind encountered for which adequate control of the airplane during takeoff and landing was demonstrated during certification tests. This number does not reflect the actual crosswind velocity the aircraft can handle, but only the greatest velocity experienced during certification testing. The value published, usually in the pilot's operating handbook, is not considered to be limiting.

Yes, you can legally fly your aircraft in winds exceeding the published crosswind component, but this is dependent on your capabilities as a pilot. For example, the demonstrated crosswind component for the Piper J-3 Cub is about 12 knots at 90 degrees. However, I, as well as many others, have performed takeoffs and landings in much greater wind velocities.

Several years ago, I was working with a 500-plus hour pilot toward getting a tailwheel endorsement. He was only able to fly one weekend due to his schedule and then was acquiring a J-3 Cub. Insurance required that he obtain 10 hours of dual instruction. Saturday was quite breezy but a little more than five hours of instruction were completed. We were back at it early Sunday morning, but the breeze was beginning to increase. We began the flight on Runway 18, a turf runway of 2,000 feet. The wind was from 100 degrees at approximately 22 knots with gusts to 28 knots. We focused only on crosswind wheel landings due to the gusty strong wind.

Progress was being made. After nearly two hours, we took a short break. While on the ground, we checked the updated weather and wind conditions only to learn that the wind was increasing. During the next two hours, we continued our crosswind work until the peak gust exceeded 30 knots. Anything beyond 30 knots proved to be more than the Cub could handle using full aileron deflection and full opposite rudder. Under this wind condition, we could not hold the aircraft straight after the right main touched down and right brake was applied.

The pilot handled these conditions quite well and proved to me he was safe to handle stiff crosswinds. The last hour was used to try different situations pilots might find themselves in when experiencing crosswinds well beyond their comfort level. In our situation, we practiced extreme short-field landings, landing across our 200-foot wide turf runway. Done properly, we would easily touch down and roll to a stop well before using the full width. I'm not advocating that pilots should go out and do this, but in an emergency situation, pilots need to study the situation, look at and evaluate all possibilities, and then execute the best option as calmly as possible if flying to another airport is not an option.

The tail has been raised creating a neutral angle of attack while airspeed is being increased. Note the deflection of the ailerons and rudder.

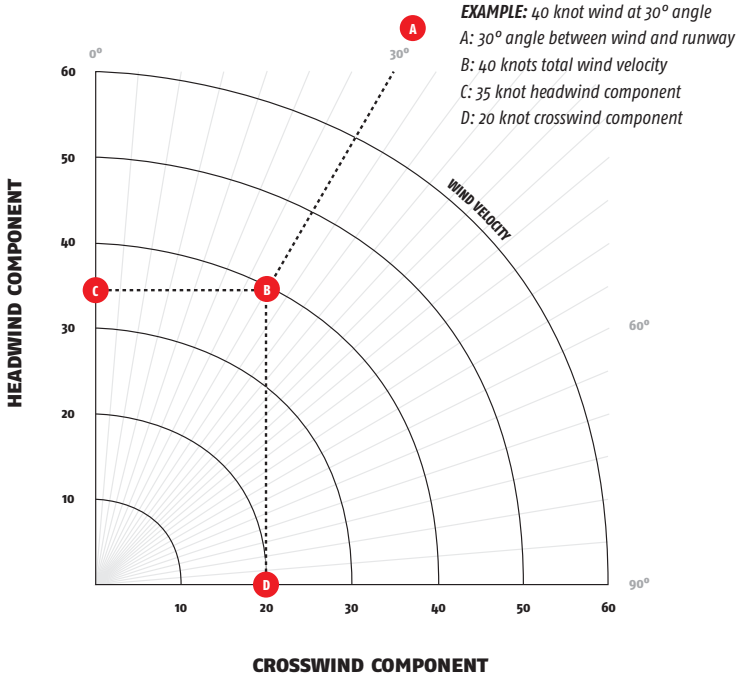
DETERMINING THE CROSSWIND COMPONENT

Before you sit down to calculate the crosswind value for your flight today, remember these rules:

- If the crosswind is obtained by ATC, ATIS, or looking at the windsock, the direction is magnetic.
- If the crosswind is obtained by looking at a METAR or a TAF, the direction is given based on true north and will need to be converted to magnetic.
- When calculating the crosswind, always use the full gust component. If ATIS is telling you the surface winds are 270 degrees at 18 knots, gusting to 25 knots, use the gust value of 25 knots for your calculation.

You can determine the crosswind component you're facing several ways, but there are two methods that I find easy to understand and use. The first method is using a crosswind chart. Plot the number of degrees of crosswind off the runway you intend to use. If you plan to take off on Runway 27 and the wind is reported at 280 degrees and 20 knots, the degree of crosswind is 10 degrees. Next, plot the wind velocity on the chart. Where the two lines meet is the crosswind value of the wind. In this example, the crosswind value would be 16 knots.

CROSSWINDS COMPONENT CHART



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The second method I find easy to use and teach is the sixths rules of thumb. It's quite simple:

- If angle = 10 degrees, then crosswind component = 1/6 wind strength
- If angle = 20 degrees, then crosswind component = 2/6 (1/3) wind strength
- If angle = 30 degrees, then crosswind component = 3/6 (1/2) wind strength
- If angle = 40 degrees, then crosswind component = 4/6 (2/3) wind strength
- If angle = 50 degrees, then crosswind component = 5/6 wind strength
- If angle = 60+ degrees, then crosswind component = wind strength

If the crosswind you're dealing with is 20 degrees off the runway and the wind is 15 knots, the crosswind component is 5 knots, or well within most all demonstrated crosswind component parameters for the types of aircraft we generally fly for pleasure.

CROSSWIND CONTROL DYNAMICS

We've all been taught the proper positioning of the ailerons and elevator when taxiing in wind of any substance. The longtime rule of thumb is "climb into the wind and dive away from the wind."

When ready for takeoff, the upwind wing aileron is fully deflected upward, causing a downward force on the wing. This counteracts the lifting force of the crosswind and prevents the wing from flying or lifting well before the aircraft is ready to fly. For a tailwheel aircraft, the control stick or yoke should be all the way back, fully deflecting the elevator upward.

As power is applied and speed increases, the controls become more effective. Less windward aileron is needed to prevent the wing from lifting while the downwind aileron is slightly down creating more lift. Slight but near-constant rudder input is needed for a smooth, straight takeoff. When dealing with a gusty crosswind, raise the tail as soon as the elevator becomes effective, positioning the aircraft in a near-neutral angle of attack. When adequate airspeed is achieved, apply slight stick back-pressure to create a positive angle of attack. If the wind is quite gusty, hold the aircraft in the neutral angle of attack attitude until achieving a speed 5-10 mph above normal liftoff. Just as the aircraft lifts off the runway, position the aileron and rudder in neutral, allowing the aircraft to weathervane or establish its own crab angle. Once stabilized, slight but constant right rudder is applied, which prevents the airplane from drifting off the centerline as well as offsetting torque and P-factor during the climb-out.

COMMON CROSSWIND TAKEOFF MISTAKES

- Forgetting to begin the takeoff roll without full aileron deflection, causing the windward wing to lift well before the aircraft is ready to fly.
- Attempting to force the aircraft into the air before obtaining proper airspeed, causing the aircraft to side-skid.
- Forgetting to lessen aileron inputs as they become more responsive with increasing speed, causing the airplane to sharply dip in the direction of the windward wing.
- Not allowing the aircraft to establish a crab angle after lifting off, causing the aircraft to drift away from the runway and perhaps near other aircraft on the ground.

Crosswinds are not inherently dangerous. All pilots should challenge themselves and practice them from time to time. Practice creates proficiency and proficiency creates both confidence and safety. Let's all do a little practice and become better pilots. EAA

Author's note: Next month we'll look at tips, hints, and helpful aids to perform crosswind landings proficiently and safely.

Steve Krog, EAA 173799, has been flying for more than four decades and giving tailwheel instruction for nearly as long. In 2006 he launched Cub Air Flight, a flight training school using tailwheel aircraft for all primary training.