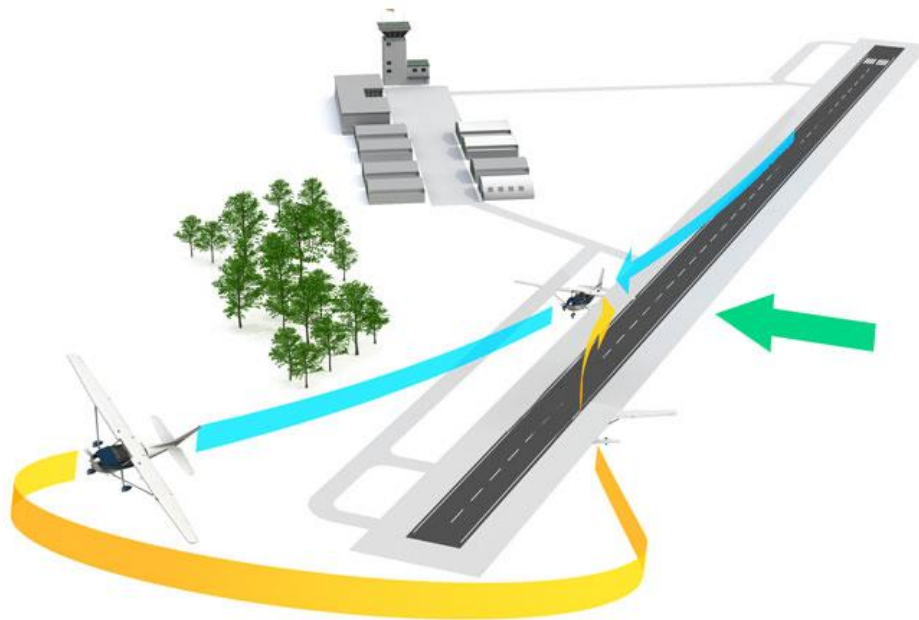


Why Not Turn Back To The Airport

By Will Fox – November 2015

There I was, a few hundred feet high, just past the end of the runway when the engine lost power. For a few seconds, I just pushed on the throttle harder, my lizard brain responding to the situation the best it could. Then my training kicked in and I got the nose down and started a steep left turn back to the runway. As I came around, I realized that there was no way I was going to make it. I was going to either crash into the buildings off the departure end of the runway or hit the retaining wall that was slightly beyond them. I had no choice but to turn into the heavily forested canyon below me and hope I could make the emergency landing strip.

Things happen fast in an emergency and if you aren't ready for it, you probably won't react the way you should. Such is the case with an engine failure on takeoff. What should you do? Look for the most favorable spot and land straight ahead? Make a turn back to the runway and try to land somewhere on the airport? Try to get the engine running again? The answer depends on many things, including your proficiency, the type of plane you are flying, your altitude, and how strong the wind is. Every situation is different so the right answer depends on the situation.



The turn back to the runway is more than 180 degrees. It is closer to a 180 followed by two 45 degree turns.

What you need to know is what is the right answer for your situation and that depends on your capability and the performance of the aircraft.

For example, to complete a turn back to a runway that you have just departed, you need a certain amount of altitude to be successful. If you don't have that altitude it simply ain't gonna work and you will need to land pretty much straight ahead instead. The minimum altitude you need depends on the type of aircraft you are flying. An aircraft with a light wing loading like a Cub or a Taylorcraft, might only need 500 feet AGL, whereas an aircraft with a high wing loading like a Mooney or Bonanza might need 1000 feet AGL. A headwind or a tailwind on takeoff makes a big difference as well. With a headwind you may not need as much altitude and with a tailwind you will need more. It also depends on how far off the departure end of the runway you are when the engine quits. If you have been flying for a couple of minutes and then the engine quits, you probably won't have any trouble getting turned around and headed back to the runway, but will you still be high enough to glide all the way back? It depends on what your climb rate was. If your climb rate is less than your descent rate at best glide, you probably won't make it.

How about you as a pilot? Are you proficient at power off approaches? Are you comfortable with making steep turns close to the ground? Have you practiced these maneuvers recently? If not, you probably don't want to try the turn back to the runway at minimum altitude. The steep bank angle combined with a steep approach can result in a ground rush that can be disconcerting and lead you to inadvertently pull back on the yoke and rudder the turn around. This is a perfect scenario for a stall/spin accident. You wouldn't be the first either. If you are not on top of your game, you probably want to land pretty much straight ahead, because a stall/spin at low altitude will kill you for sure, whereas a very rough landing under control is much less likely too.

So you can see that there are a few things you need to know beforehand if you want to successfully deal with an engine failure on takeoff. The first thing to figure out is what is the minimum altitude you need for your aircraft to complete a successful turn back to the runway. You can get an approximate idea of what that altitude is by doing the following calculation that is based on making your turns at a 45 degree bank angle:

Minimum Altitude = (Best Glide Speed in knots)² / Best Glide Ratio.
(Remember to use True Airspeed for your best glide speed).

In the case of my Pegazair:

Best Glide Speed = 60 knots
Best Glide Ratio = 7.5
Minimum Altitude = $60^2 / 7.5 = 480$ feet

This will give you a starting place and then you can go out and fly your plane to see what it really is. To do this, initiate a climb over your favorite road at your normal climb speed. When you hit a predetermined safe altitude to execute the maneuver, reduce your

power to simulate an engine failure and count to three before doing anything (a pilot typically takes 2-3 seconds to react to an unexpected power loss). Then pitch the aircraft to best glide speed and roll into a 45 degree bank to the left or right, your choice. Make sure that you keep the aircraft coordinated to minimize your descent rate and to avoid a spin entry should you accidentally stall the aircraft. Also, maintain your best glide airspeed throughout the maneuver. Finish the turn such that you are lined up with the road again and note that you actually made a 180 degree turn followed by two 45 degree turns. Also note your altitude loss. Do the maneuver a few times to come up with an average altitude loss and then add 25% to it for a safety margin. Now you have a number to use for your minimum altitude for a turn back to the runway.

Next, go practice the maneuver. First, try it in the pattern using your predetermined minimum altitude on a close-in downwind to the runway you want to use. Then reduce power to idle abeam the numbers and after a count of three start a turn for the runway. You should have no problem making the runway because you are only doing a 180 degree turn instead of a 270 degree turn. When you become proficient at this, you can try it over the runway. Of course, you will need the tower's approval to do this at a controlled airport, or in the case of an uncontrolled field, no traffic. Just fly over the runway at the predetermined minimum altitude and when you reach the end of the runway, reduce power to idle, count to three, and then initiate the maneuver. You will find that your touchdown will likely be well down the runway due to the need to correct the offset and realign yourself with the centerline. Try flying a little farther out at your minimum altitude before you start the turn if you want to land closer to the approach end of the runway. If you are uncomfortable doing any of this by yourself, ask your favorite CFI to go along with you. Also try the maneuver in different wind conditions to get a feel for how the wind affects you.

Well, I need to get back to my "there I was story", but first let me give you a little background information. Los Alamos has an emergency landing field adjacent to the airport that is in the bottom of a five hundred foot deep canyon. The field is the only option a pilot has in the immediate vicinity of the airport, should an engine problem occur immediately after takeoff or during an approach to landing. Legend has it that the strip had been used more than once in the early days of aviation at Los Alamos. However it had not been maintained for many years and small trees and heavy brush had overrun it. The local pilot community and the airport manager got together and decided make the strip useable again so they cut down the trees, knocked down the brush, and dragged the field. I wanted to see how the option of landing in the emergency field would affect my minimum altitude requirement since it was 500 feet below the runway, so I took the trusty Pegazair out and gave it a shot. The Minimum Altitude for a turn back to the runway for the Peg is around 450 feet AGL. I decided to see what would happen if I tried it at 300 feet, and then upon realizing that I wasn't going to make it back to the runway, determine if I could still make the emergency field.

"So there I was", headed into the canyon for the emergency field but going the wrong way for the approach. I immediately rolled into a steep right turn to enter a modified downwind-to-base entry for the field. My altitude was dropping fast with the

steep turns I was making and I had to have enough to clear the tall trees on the approach end of the field. As I turned final and my glide flattened out, I knew I had the field made with altitude to spare. The field is only 1800 feet long though, so you don't want to overshoot and end up in the trees at the other end. Fortunately, the Peg slips like a banshee, so losing altitude was no problem. I needed to touch down as close to the approach end as I could to have plenty of room to stop. Turned out, stopping wasn't a problem. The field slopes uphill to the west and with the knocked down brush still on it, the Peg decelerated rapidly, even with the 26" Bushwheels. The field rolls off downhill to the right as well and I noticed on the rollout that I had to crab to the left a bit to stay in the center but it wasn't too much of a problem. I got stopped with plenty of room to spare. I taxied to the west end of the field turned around and took off. I had no problem clearing the trees on departure with the Peg's STOL capability.

It is nice to have another option at Los Alamos in the event of an engine failure on departure or even approach for that matter. Knowing what to do ahead of time, staying proficient, and having a clear set of minimums to help you decide what action to take will make dealing with any emergency much safer. Happy Flying.

P.S. If you would like to see a video of my approach to the Los Alamos emergency field, here it is.