Air Force Aero Clubs,

Nearly 50% of all general aviation accidents/incidents occur during the landing phase of flight and many of these can be attributed to a loss of control due to a wide range of reasons. One of the best ways to combat getting into bad situations while landing is to establish a stabilized approach criteria and ensure when flying, you meet that set criteria or go around. Most of the big airliners and Air Force aircraft have published criteria that their pilots use to ensure they are stabilized while on final approach. There is a generalized concept for a stabilized approach which all pilots should use to set specific criteria for themselves and the airplane they are flying. This concept is to maintain a constant angle glide path toward a point on the runway (the aiming point) while maintaining the correct airspeed, descent rate, and configuration for landing. Depending on the airplane you are flying you are able to set specific parameters based off these criteria and ensure you are meeting them at a certain altitude above the runway (i.e. 500ft AGL, 1000 ft. AGL). If you don’t meet them your safest action to go around and re-try the landing because the more unstable your approach is to the ground there is a higher risk you will have something abnormal happen during landing.

Attached are two FAA documents for additional reference regarding stabilized approaches to assist in further discussion on the topic. Additionally, attached is a pilot statement from a 2018 incident found on the NTSB database where a student pilot lost aircraft control on the runway while landing causing significant damage to the aircraft. Use that statement to analyze the situation and draw your own conclusions on how that pilot setting and adhering to a stabilized approach criteria could have prevented the accident from happening.

Fly Safely,

Jonathan “SAS” Koch, Lt Col, USAF
Director of Operations & Safety USAF Aero Clubs
Jonathan.koch@us.af.mil
Stabilized Approach Concept

A stabilized approach is one in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway.

An airplane descending on final approach at a constant rate and airspeed travel in a straight line toward a spot on the ground ahead. This spot -- called the “aiming point” -- will not be the spot on which the airplane will touch down, because some float will inevitably occur during the roundout (flare). The aiming point is the point at which the airplane would strike the ground if it maintains a constant glidepath without being flared for landing. Since an object or point appears to be stationary when you are moving straight toward it, the aiming point will appear to be stationary.

One of the most important skills you must acquire is how to use visual cues to accurately determine the true aiming point from any distance on final approach.

The shape of the runway offers clues on maintaining a stabilized approach. A runway is an elongated rectangle. Viewed from the air during approach, the runway shape appears to be a trapezoid, with the far end looking more narrow than the approach end. If the airplane continues down the glidepath at a constant angle (stabilized), the image you see will still be trapezoidal, but of proportionately larger dimensions. In other words, during a stabilized approach the runway shape does not change.
Runway shape during stabilized approach.

If the approach becomes more shallow, the runway will appear to shorten and become wider. Conversely, if the approach is steepened, the runway will appear to become longer and narrower.

The objective of a stabilized approach is to select an appropriate touchdown point on the runway, and adjust the glidepath so that the true aiming point and the desired touchdown point basically coincide.
Stabilized Approach and Landing

Focusing on establishing and maintaining a stabilized approach and landing is a great way to avoid experiencing a loss of control. A stabilized approach is one in which the pilot establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway. It is based on the pilot’s judgment of certain visual clues, and depends on the maintenance of a constant final descent airspeed and configuration.

Maintain a Stabilized Approach

Have you heard these words before? Well, it’s not just a buzz term in aviation safety. It’s a critical lifesaving way to approach every flight. A pilot is flying a stabilized approach when he or she establishes and maintains a constant angle glidepath towards a predetermined point on the landing runway. Every runway is unique, but a commonly referenced optimum glidepath follows the “3:1” principle. The principle, also seen as a descent ratio, means that for every 3 nautical miles (nm) flown over the ground, the aircraft should descend 1,000 feet. This flightpath profile simulates a 3° glideslope.

Data Discourse

The Aviation Safety Information Analysis and Sharing (ASIAS) program, a collaborative government and industry initiative, recently completed a high-energy approach analysis by comparing actual stable and unstable approaches of business aviation operators to the common “3:1” descent ratio. The study looked at this relationship from four distinct distances from the runway: 20, 15, 10 and 5 nm from touchdown. The study highlights the importance of being aware of how you manage the aircraft’s total energy – kinetic (velocity) plus potential (altitude) – as you begin to fly the approach. Flights that were above the “3:1” descent ratio, and not stable, often had high rates of descent and high approach speeds.

A deeper look at the analysis shows that, even at 20 nm from touchdown, when a flight is above the optimum “3:1” descent ratio, the approach is more at risk of being unstable when closer to the runway (i.e., 500 feet to 1000 feet height above touchdown (HAT)).

Continued on Next Page
Moreover, the **probability of being unstable can DOUBLE as you increasingly fly above a “3:1” flight path profile.**

In addition, the data shows that at each of the distances (20, 15, 10, 5) when flying a “3:1” descent ratio, there is generally a 50/50 chance of being stable when reaching 500 to 1,000 HAT. Why 50/50? This is because your descent ratio is only one of many factors (such as aircraft configuration) that determine whether your approach will be stable or not.

Similarly, it’s important to recognize high kinetic energy states close-in to airports or near a final approach fix. Similar to descent ratios, the data demonstrates an increased risk potential if speeds during final vectors or approaches are not managed appropriately.

**Bottom line:** Be mindful of how you are flying an approach before you commence the approach, not just when you are close to the runway. Remember, one of the most effective ways to prevent becoming a statistic is to **GO AROUND** if something’s is not right at any time. If you choose to continue with an unstabilized approach, you risk landing too high, too fast, out of alignment with the runway centerline, or otherwise being unprepared for landing. These situations can result in loss of control of your aircraft or a runway excursion.

**Important Tip:** The further from the runway that you establish a “3:1” flight path profile, the greater your probability of successfully flying a stable approach. **NOTE:** Every runway is unique and the published glideslope should be flown when available.

**Tips for Staying Stable**
- A method to estimate the appropriate descent rate in feet/minute to maintain a 3° glideslope is to multiply the groundspeed in knots by 5.
- When available, use a visual approach system such as a VASI or PAPI, or precision instrument approach to help maintain glideslope.
- Increase your knowledge on stabilized approaches. Some resources include the [GAJSC website](http://www.GAJSC.org), Chapter 8 of the FAA Pilot’s Handbook of Aeronautical Knowledge, [Advisory Circular 91-79A](http://www.FAA.gov), and a recent FAA FlySafe notice.
On March 2nd at approx. 1230 I made my approach to KVRB after receiving clearance from KVRB ATC. I was at 1000 feet AGL 4 miles out from the airport descending from 4000 feet as I returned from a solo cross-country flight from La Belle, FL (X14). ATC cleared me to come straight into Runway 4 on a 5-mile final. They noted that there was traffic ahead of me and I would be second in line. I acknowledged the command with a read back and continued with my approach. As I approached the airport I slowed my airspeed to 83 KIAS to initiate 10 degrees of flaps approx. 3 miles out and trimmed forward but added more power to maintain 1000 feet. At approx. 2 miles out I slowed my airspeed to 83 KIAS and initiated 25 degrees of flaps, trimmed forward and dropped down to approx. 800 feet. At approx. 1 mile, I initiated 40 degrees of flaps and reduced airspeed, in addition I trimmed for 63 KIAS. This caused considerable floating, but put me above the glide slope. So, I reduced airspeed once again to descend and I pushed the nose forward to lose altitude and touch down just passed the number “4” on the runway. The info via ATIS was reporting winds out of 360 @ 9. I brought a little more speed than intended into the ground effect and as I flew in ground effect the A/C yawed to the left and I over corrected to the right thus causing a bigger Yaw and as the A/C touched down, it touched down on the right side of the center line with the nose pointed at a 45-degree angle to the left. It felt like the right main gear touched down first, the left, then the nose wheel. The A/C was going faster than anticipated, so my rudder inputs/ brake inputs upon touch down may have exacerbated the issue. I attempted to keep the A/C on the runway but it was carrying too much speed so I ended up off runway, in the grass, and in the process the right wing struck a runway sign and caused some damage mid wing and underneath to the aluminum alloy. I was able to control the A/C to a stop and maintained contact with ATC. ATC gave me clearance to get back onto the runway and hold short of taxiway Charlie. A/C was maneuverable to its parking spot. Once I received clearance from ground control, I continued to the parking spot and commenced my shutdown procedures.

Looking back on it, the main issues that led to the incident were: I brought too much speed with me into ground effect and I did not remain in ground effect long enough to let some of the speed dissipate before I touched down. Also, I gave too much rudder input to counter the initial rudder input given in an attempt to stay on the centerline. Having said that, if I could go back in time, the best option, given the exact same approach, is to do an immediate go around.

Since the incident, I have been educating myself further on crosswind landings and different techniques that are out there via the internet, in addition to performing remedial touch and go’s with a qualified instructor on board. These remedial sessions have increased my confidence and have been of great help in an attempt to improve my crosswind landings.

Mario De Vesta