

## Better Landings – Every Time

Wayne Pratt CFI 1473091

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Why are consistently good landings so difficult? There seems to be as many explanations for how to master the landing as there are instructors. Take a look at the FAA's **Airplane Flying Handbook** – the bible of flying techniques. It says very little about how to do it, but does a good job in describing instead what should happen – it's up to you to figure out how to make it happen.

Let's assume that you can consistently arrive on final at the nominal altitude, the chosen airspeed, and distance for a good approach. Landings then from that point are, like life, you have to have a goal – in this case an *Aiming Point*. As you complete the turn onto final set the aircraft configuration (**specific flaps, airspeed, power**) select the *Aiming Point*. The picture below shows the pilots view and the *Aiming Point*.

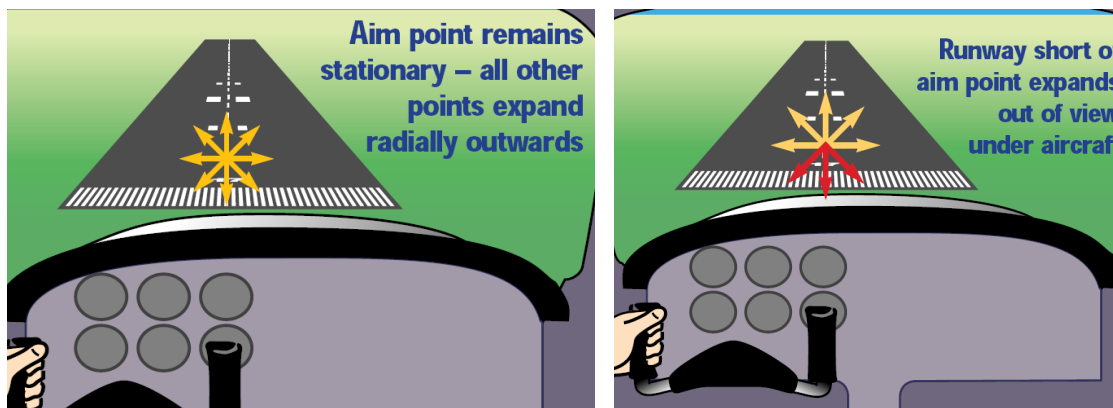


Notice the *Aiming Point* is a spot – not an imaginary line crossing the runway. In fact, it should be offset about 2 ft to the left of the centerline (assuming you are sitting in the left seat). Why a spot – because it will put you on the centerline even in a cross wind. More on that subject, later. Now drive the airplane to the spot. Right here is when all the flight instructors in the room stand up and start shouting and waving their arms. But, hold on a minute. Flying the ILS we are taught to fly the Glide Slope needle with

the elevators and keep the airspeed in the bracket with the throttle. But, we've taught our beginning students to control the airspeed with the elevators and the altitude with the throttle with little reference to an *Aiming Point*.

We all know that airspeed (pitch) and descent rate (throttle) are *closely coupled*. So we should be teaching that from the very beginning. If the *Aiming Point* seems to be rising in the windscreen you'll need to bring the nose up with back pressure you need to add a bit of power to hold the airspeed – should be an automatic response. Conversely if the Aiming Point is lowering and you push forward a bit to hold it and corresponding throttle response is a power reduction. I fly gliders and this technique works perfect without engine power. You just use the dive brakes like a reverse throttle. In a powered aircraft with idle power use a slip the same as a dive brake.

What you should see as you close in on the *Aiming Point* is shown below.



It's perfectly natural to focus your vision on the *Aiming Point*. After all that is where you and the rest of your aircraft are actually going. It should be a predetermined point on the runway centerline. If you are holding a constant view on the Aiming Point and using pitch and throttle control you going to be at the right airspeed approaching the next landing phase – the start of the flare.

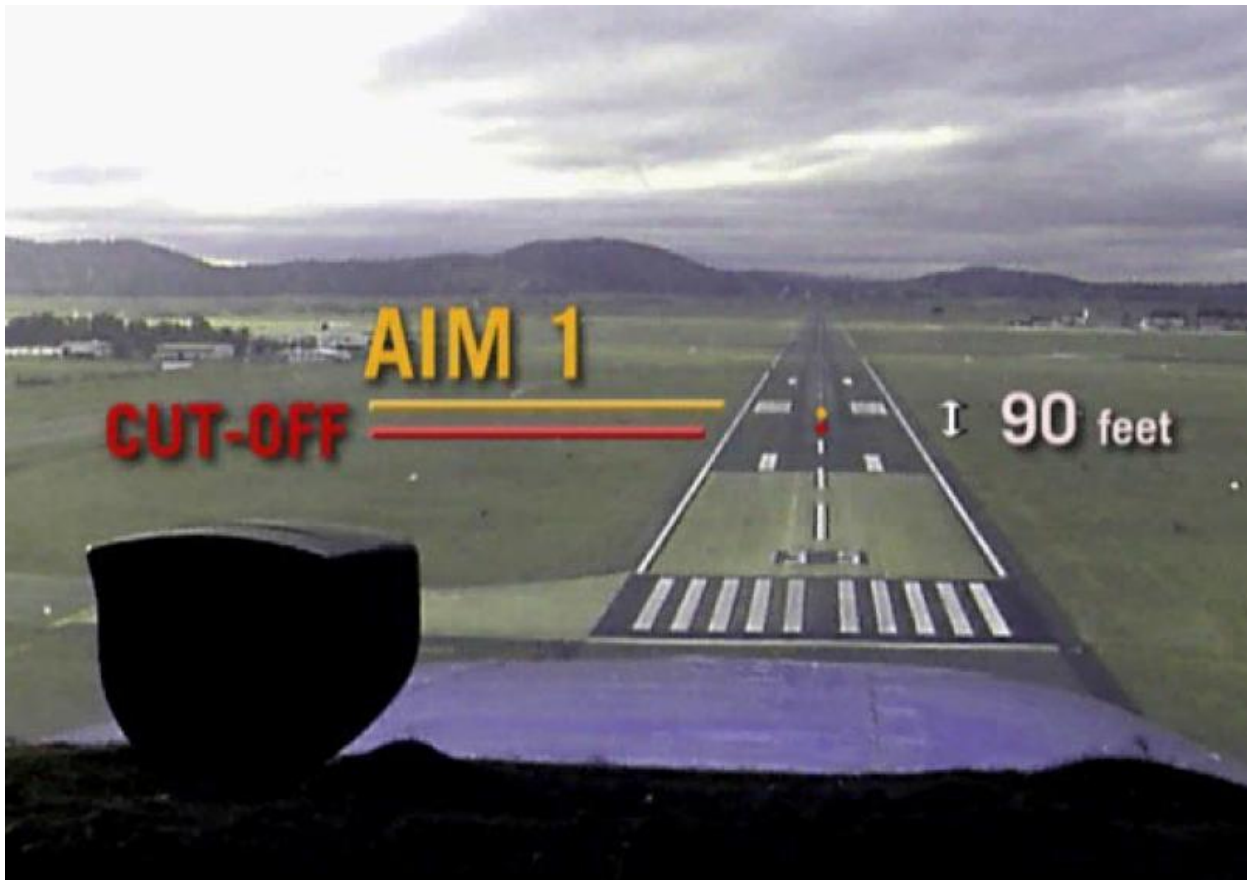
In the past you've been taught to start the flare at one of the following points.

When you are about here....

When you hear your instructor gasp for breath...

When it feels right...

Obviously, none of these give the student much reliable information. David Jacobson, an Australian pilot and flight instructor and has developed the math behind a precise view point as to when to start the flare. See his web site at <http://www.jacobsonflare.com>. He has numerous papers that you can download and review in detail. Essentially, what he teaches is that you should start your flare at the point that a second spot, labeled the *Cut Off Point* in the picture below, passes out of site below your view.



His math is long and detailed, but all you need to know for most general aviation aircraft is start the flare when you see about 100 ft of runway between the edge of the cowling and the *Aiming Point*. The Runway centerline stripes are 120 ft with 80 ft gaps – how convenient.

This will vary according to how high your eye ball is located in the windscreen and the aircraft decent angle, I.e. aircraft configuration – airspeed, flaps, and power going into that point. For now, let's make it simple, stable descent at 70 kts, ½ flap, power about 1000 RPM (Cessna 172, DA-40). Start the flare when you have a gap of 1 strip in your view before the *Aiming Point*. Now you have a visual sight picture of where to start the flare.

Now that you have started the flare process what next. I've observed several methods employed by begging as well as experienced pilots.

Pump it on, or yank and push – a trial and error of many over corrections.

Get it level and hold on until it settles in

Big pull, then once you are climbing away stop until settling starts then rescue the landing

There are many descriptions as to how to smooth this out into a uniform process. Most focus on corrections to mistakes with the aim to converge on the runway by reducing the sink rate to zero. But

David Robinson (**Gentle Touch**, 1987) teaches to raise your line of sight (using pitch) from the focus on the *Aiming Point* to the center line at the far end of the runway steadily over the next 3 to 4 seconds (you will have to sight a bit over the edge of the cowl to be able to see the far runway end). This has some automatic side effects that are just what you need for a good landing.

1. It keeps you aligned. Even in cross winds.
2. Too much flare and the nose obscures the end.
3. Too little your flare early on and you are still looking at the near runway.

Conventionally we are taught, as well as teach, to look at the far end of the runway, but when and how quickly to shift your focus is rarely discussed. But, by consciously making the shift over a defined time frame we assure the aircraft to be in a position where at least an acceptable landing is going to happen. Sure you can continue to hold it off and probably slick it on, or plant it a little early with a thump, but at least you have a landing that is going to be safe.

In summary, good landings are made by driving down final at a fixed configuration (stable airspeed, flap, and power) to the *Aiming Point*. I can hear all the purists screaming at the usage of the “d” word, but that is what you do, and that is what we teach on the ILS. Once you see the *Cut Off Point* falls below the glare shield start the flare out. Flare out by shifting your view point with the pitch (while retarding the throttle to idle) over the next 4 seconds. Count off the seconds if it helps, but be aware of the timing. After that you can play with the hold off and smooth out the actual touchdown, but at a minimum you are in the right position (altitude and attitude) to complete a decent landing.