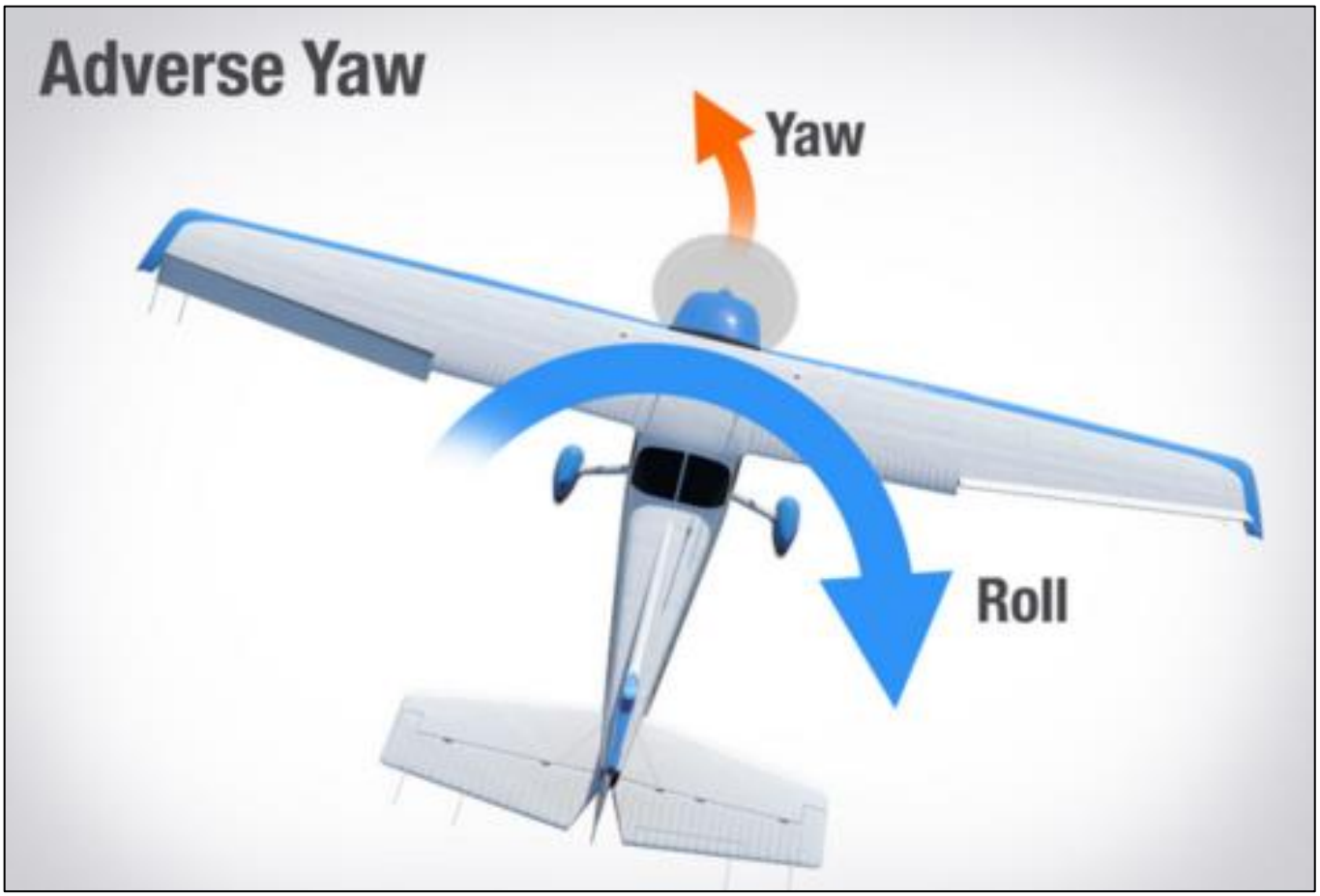
# Adverse Yaw: What Is it, And How Do You Prevent It?

boldmethod

Have you ever wondered why your airplane initially yaws to the left when you're trying to turn right? As you bank your airplane, your ailerons have one large defect: they create adverse yaw. So what is it? Here's what you need to know...

## What Is Adverse Yaw?

Adverse yaw is simply the tendency of an airplane to yaw opposite to the direction of the desired turn. For instance, as you roll to the right, your airplane may initially yaw to the left.

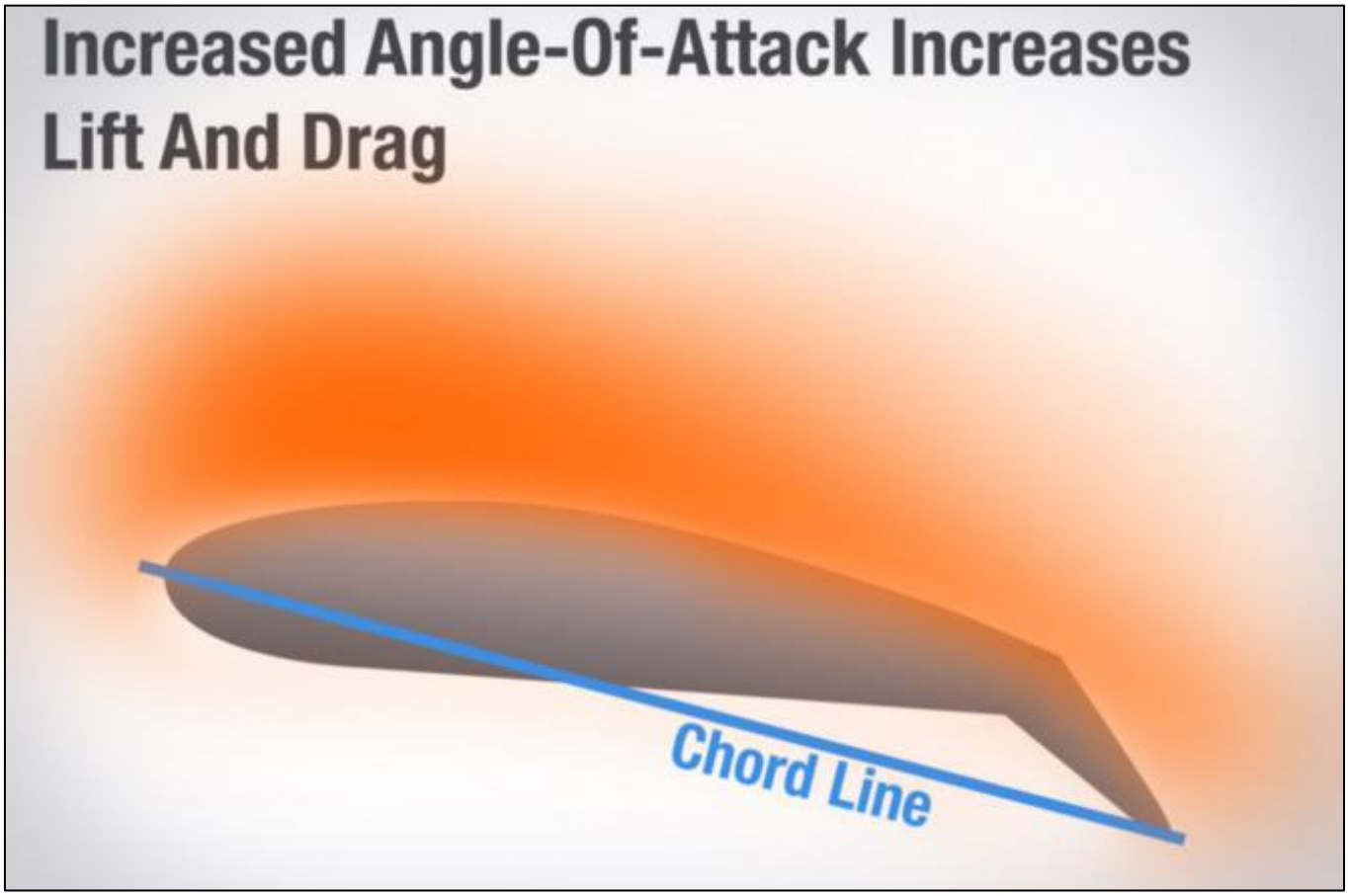



When you roll your airplane to the right, your right aileron goes up and your left aileron goes

down. The aileron in the upward position (the right aileron in this example) creates less lift and less drag than the aileron that is lowered. The aileron angled downward (the left aileron in this example) produces more drag and more lift, initially yawing the airplane in the opposite direction of your roll.


Try imagining the aileron as a miniature flap. When you lower flaps, your wings produce more lift and more drag. So when one of your two ailerons is lowered, the total lift and total drag acting on that wing increases, yawing the plane into that wing.

But why does lowering an aileron increase drag? Just like flaps, when you lower the aileron, you change the chord line of the wing, creating a higher angle of attack (AOA). As AOA and lift increase, induced drag also increases. A common misconception is that aileron movements create added form or parasite drag, but that's not the case. The drag created as an aileron is lowered is induced drag.




**Countering Adverse Yaw.**

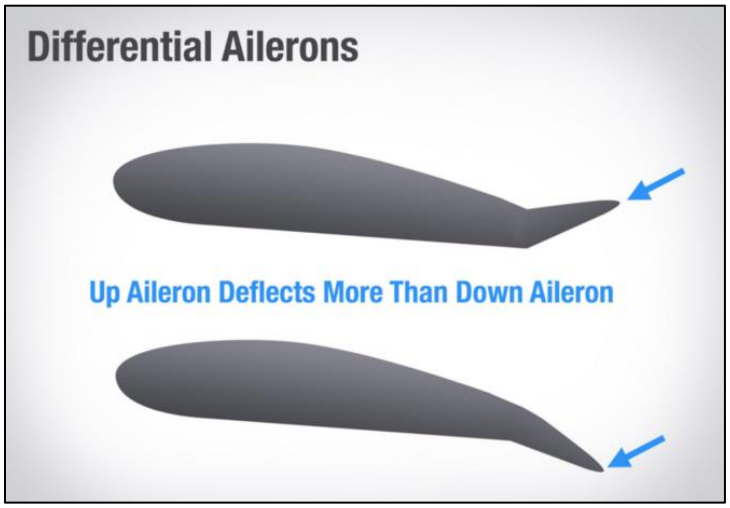
In a coordinated turn, adverse yaw is effectively countered by the use of the rudder. When you add rudder input, you're creating a side force on the vertical tail that opposes adverse yaw. In adding rudder, you create a yawing moment that helps turn the airplane in the desired direction. Remember to look at the slip indicator on your instrument panel to make sure you're flying a coordinated turn to best counteract adverse yaw.

The rudder doesn't balance out the drag by creating more form drag opposite to the wing. Instead, the rudder creates lift (like a wing) to yaw the nose directly into the relative wind and counter the downward aileron's drag moment.

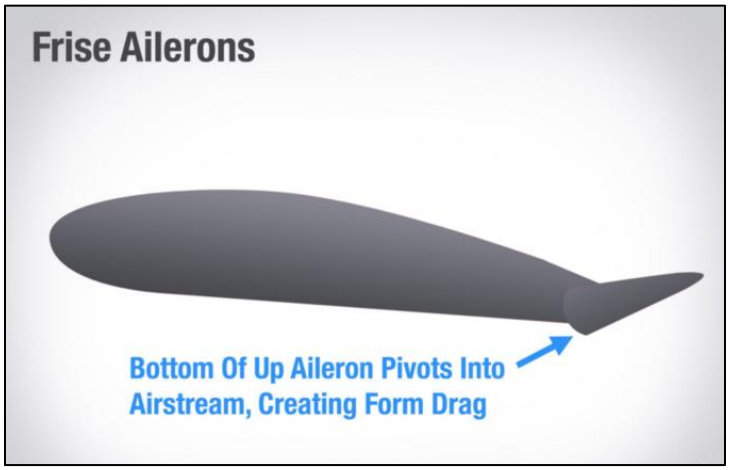

**Types Of Ailerons.**

To counter the effects of adverse yaw, you'll find a few different aileron designs commonly found on many airplanes.

**1) Differential Ailerons:** One aileron is raised a greater distance than the other aileron is lowered. The extra upward aileron movement produces more drag change than an increase in angle of attack (AOA) on the downward aileron. This produces an increase in drag on the descending wing, which reduces adverse yaw.




**2) Frise Ailerons:** The aileron being raised pivots on an offset hinge. The leading edge of the aileron is now pushed into the airflow creating drag, which reduces adverse yaw. In this case, frise ailerons are using form drag to counter induced drag.




And some airplanes have more adverse yaw than others. Look at the size and amount of deflection of the aileron to determine adverse yaw effect. In general, the slower the plane, the more aileron is needed to bank the airplane, so you can expect to find greater adverse yaw tendencies. On many airplanes, you can find a combination of differential and frise style ailerons.

In all, it's pretty important to understand adverse yaw so you can be an awesome, smooth-flying pilot. It'll make all the difference if you're carrying passengers and want them to stay comfortable. Once you see how ailerons create adverse yaw through added drag and lift, it'll be easier to anticipate and react to the turning tendencies of your airplane.