SAFETY

FLYING HEAVY

Van

We tend to think that most accidents happen when pilots make a big mistake and do something dumb like low level aerobatics, flying into weather without sufficient preparation, or operating far beyond the C.G limits of their airplane. Oh, sure, there's always some poor schmutz who makes a little mistake under abnormal circumstances and pays the supreme price. But, take heart, that always happens to someone else. Or does it?

When we really analyze accidents we almost always find that they are a progression of little mistakes or bad decisions that culminate in final disaster. Rather than enumerate every possible contributing factor, let's consider just one...one that happens before the airplane ever leaves the ground.

One of the pet peeves of most designers, including myself, is that builders continually add what we consider unnecessary weight to the aircraft that we have designed. After 25 years of preaching this gospel to an apparent stone wall, I don't really expect to be listened to, but I have to try...:-)

Most builders feel, and rightly so, that a modest increase in the operating weight of their RV will not cause a catastrophic change in its performance, handling qualities, and safety. I could quote data on the exact impact which 50, 75, or 100 lbs of added weight would have on the take-off distance, climb gradient, or stall speed of your RV. It would not be dramatic enough to demand much of your attention. The RVs have a sufficient margin of performance that with a little care, they can be flown safely even when "a little" overweight. It could easily be argued that only in unusual or extreme circumstances could one get into serious trouble by operating "reasonably overweight."

When we read of the pilot who stalls and spins in while on landing approach, do you ever stop to think about all the circumstances which lead to this type of disaster? Was the victim a really bad pilot or was he just an average pilot flying an airplane that was just marginal? Would the accident have happened if aircraft's weight had been a bit less and thus the stall speed and rate of sink had been just a bit lower? Would it have happened if the pilot were "just a little" more skilled?

Little things can make a big difference when margins are small.

The following is a report of an actual case:

An RV-6 pilot was approaching to land at a 2500 msl airport with an OAT of 105 deg. F. This temperature caused a density altitude of 6000 ft. As he was turning from downwind to base leg, he realized that he had turned too soon and was high. So, he decided to extend his pattern and turned abruptly back toward a downwind heading. As he did so, he initiated an accelerated stall at an altitude of about 800' AGL.

Unfortunately, he did not recognize what was happening, and later mentioned that he did not know what an accelerated stall was. Thus, he continued pulling back on the stick to keep the nose from dropping further, thus holding it in the stall. (I don't know whether he added power or not.) The airplane continued to descend in a turn, completing about 360 degrees before hitting the ground. The pilot received significant injuries to his legs, but the passenger received only minor injuries. The plane was a total loss. The pilot attributes his and his passenger's survival to the RV-6's robust cabin structure. The fuel tanks were apparently ¼ full, but fortunately, there was no fire.

It is also fortunate that the pilot did not apply too much rudder pressure while in this out-of-control descent. That probably would have caused a snap roll into a spin; something unrecoverable and almost certainly fatal from that altitude.

The amazing thing about this accident is not that the pilot encountered an accelerated stall under the density altitude involved. Near the ground, most pilots fly largely by visual cues. His true airspeed (ground speed, assuming no wind) may have been well above normal stall speed in standard density air. But, at this density altitude, the airplane will stall at a higher true airspeed. In other words, his eyes may have told him that he had enough speed based on ground references, but true air speed requirements (because of density altitude) were higher. What is regrettably amazing is that the pilot had no apparent knowledge of, or experience with, accelerated stalls. I would like to believe that all private pilots had been trained in accelerated stalls, and any pilot who had flight tested his homebuilt plane would have practiced a full range of stalls in it, including accelerated stalls. This is one of the purposes for the minimum flight test time which the FAA assigns to new homebuilts.

My purpose is not to judge or condemn that pilot. I'll bet that he has since spent plenty of time judging himself, and has decided to learn more about accelerated stalls. But, accelerated stalls are just one of the many aerodynamic anomalies which can kill pilots.

Since I don't know the empty, and thus gross, weight of the above airplane, I have no way to know whether this was a factor in the accident. I also don't know if the pilot normally flew with the passenger and fuel load he had on this occasion. But suppose he didn't. Suppose, on this trip he was operating under the common hypothesis: a "little" overweight will never hurt anyone. Under normal conditions, when wide operating margins are maintained, this is true. But in this case, the conditions weren't normal.

Now the stall speed , sink rate, and stick forces are all altered "just a little bit" because of the "slight overweight" condition. Had the pilot been flying solo, or with a lower fuel load, or a lower airframe weight, the stall speed would have been lower, the elevator stick forces may have been different, and he may not have stalled. Little things can make a big difference when margins are small.

So, what's my point? Obviously, the immediate point is be sure that you can recognize and recover from an accelerated stall when landing at high density altitudes. Make yourself familiar with the handling qualities of your airplane under all possible conditions, not just perfect conditions. You must be able to maintain, or at least regain, CONTROL under all conditions. (Notice my favorite "C" word sneaking into the story again.)

But the lesson is much broader than that. Think ahead...and do everything you can to widen the margin between you and possible disaster. We can't control the wind or the temperature, but we can determine how heavy our airplanes are...and a light airplane gives you a wider margin than a heavy one. If the airplane is heavy or if you *ARE* going to make it heavy, be very aware of its reduced margins and learn to fly accordingly.