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By Jason Blair

Flying Over Max Weight

Many pilots push the limits on loading. Some thoughts on this all-too-common but hazardous practice.

Okay, even the least risk-averse, crazy pilot generally knows we probably can't load up our plane with lead bricks and still manage to defy gravity successfully. But where is the limit?

Every day, general aviation pilots succumb to the pressure or temptation to "just put one more person" or "one more bag" into their plane when it will put them over the allowable gross weight for the aircraft.

Sometimes it is justified through what seem to be "careful calculations," such as "going up to 10 percent over gross weight as long as you allow for a 30 percent increase in required runway takeoff calculations." Yeah. I have heard that used a lot. Well, as long as we add the caveat that you still land "under gross" or any other required landing weights prescribed, right? Nope, that isn't okay either, and I certainly haven't seen that recommendation by the FAA published anywhere. It doesn't mean you won't get away with it sometimes, but it isn't really allowed, either, and in some cases it can go tragically wrong.

Why is this such a big deal? Well, let's talk about a few potential negative impacts of flying beyond gross weight limits in an aircraft.

Operating over weight will cause the aircraft to not meet the climb rates published in POH/AFM data, require longer runway distance for takeoff, lessen single-engine performance in a multi-engine aircraft, reduce glide distance in an emergency, and contribute to poor stablity if a stall is encountered, potentially causing it to be unrecoverable, and it will increase load factor on the aircraft during maneuvers, to name just some of the major adverse effects of loading up your plane beyond its design carrying ability. Unless you are an aeronautical engineer who has done the math and understands all of the stress and aerodynamic principles associated with your aircraft, you really don't know how much each of these negative impacts is, and even *then*, you still don't know. You are basically acting as a test pilot and hoping it goes well.

In addition to operational considerations, overweight operations can have negative physical effects on your aircraft. Many aircraft have landing weight restrictions, with landings over that weight potentially causing damage over time to the landing gear or other stress points in the aircraft. Increased weight and load factor can even cause additional stress on an aircraft during flight if not designed for that level of weight. I have personally seen aircraft end up at maintenance due to continued overweight landings that caused cracking on landing gear components. Sure, it's probably not going to hurt anything if every landing you make is a perfect greaser, but a couple of harder landings in a stiff crosswind, and you may find yourself breaking components that will either cost you to fix them, or worse, fail on a future landing.

So what should we do when we want to carry a couple extra bags, an extra passenger or more fuel?

Well, that is where our mitigation of risks needs to dive a little deeper and requires us to plan ahead.

With summer flying season now in full swing, many of us use our aircraft more, take more friends with us or take longer trips. When we do this, there are a few things we can do to mitigate the temptation, and the risk, associated with overweighting our aircraft.

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SACRIFICE FUEL FOR WEIGHT

The biggest thing that we can sacrifice to get us under prescribed weight limits is fuel quantity. That does, however, limit the distance range we can fly. Thankfully, here in the United States, we have lots of airports where you can stop and get fuel! While we have get-there-itis many times, planning for that four-hour leg can be tempting. Especially if we think we will be taking off over gross weight but know that we will land under any weight limits since we will be burning a bunch of fuel along the way. But that won't help if we have to divert early for something like weather or even just a passenger who forgot to use the restroom before the flight and now needs an unscheduled stop.

If we imagine an aircraft with a 100-gallon capacity that burns 15 gallons per hour, we might find that we could fly approximately 6.5 hours. I know this is longer than I want to sit in the plane at one stretch most of the time, and it would also represent a weight of 600 pounds. If we decided instead to fly with 60 gallons, we would still have four hours of fuel and an extra

240 pounds of usable weight. This might be that extra person you want to bring along or a few bags, or both if both are light-ish.

I know many pilots who just don't keep their fuel tanks full and plan for legs of approximately two hours at the maximum with an hour of fuel beyond that as a reserve for safety. It gives them the room to take more people and stuff but still a good leg length. Stop an extra time or two in those long-distance flights, and you can increase your load utility plus get to see a couple new airports along the way.

One potential difference when flying really heavy is a dramatic rearward shift in the center of gravity.

TAKE MULTIPLE TRIPS

We all like flying, right? So, is it really so bad if you make two trips back and forth to haul the four people you want to bring along on the golf trip you have planned? Instead of loading five people into your six-person aircraft with baggage and golf clubs, load two passengers per trip with some baggage, and make a couple round trips to ensure you aren't flying over weight. Plus, there is a good chance they will be more comfortable than holding their clubs in the backseat while you try to cram everyone into one trip. I get it, this doesn't work for that long cross-country family vacation, but it can work for many trips where each leg is only a couple hours each way.

DO THE PERFORMANCE CHART CALCULATIONS

Even when we operate within maximum gross weight limits, the aircraft we all fly perform differently based on weight and density altitude. An aircraft that required 1500' of runway to take off at 5 degrees Celsius in the winter at 1000' MSL is certainly going to require more runway distance to take off in Cheyenne, where the ground elevation is 6160', on a 30 degrees Celsius (85 degrees Fahrenheit) day where even under standard pressure conditions the density altitude would be more like 9185' MSL. Ever wonder why most of the runways where ground elevations are higher are so much longer? It is because the aircraft need this distance to make it into the air!

Some aircraft that have more robust POH/AFM materials will give different performance data for different weights, and most have different data for various density altitude considerations. Your weight will directly affect whether or not you will have enough runway in some cases. So, you might find that taking off at gross weight in your aircraft won't give you enough of a safety margin, but taking off at half tanks will. In this case, topping the tanks off at your destination may not be advisable. How will I fly home, then, you might be thinking? Fly from that airport downhill to something in a valley a few miles away when you leave, top off there, and then head home. That could certainly be one way to mitigate the risk of a high-altitude, maximum gross weight takeoff attempt.

Get familiar with your POH/AFM material, and you might find there are some great options if you think about how you will set yourself up for your desired operational environment.

There are certainly other ways you can mitigate some of the risks of flying overweight, but I would be remiss if I didn't mention the biggest one.

Be willing to be the Pilot in Command and say no. Attitudes about safe operation are the biggest thing that can keep us safe. It's okay to tell a passenger to wait for you to come back for them on a second trip. There is nothing wrong with telling your spouse they need to pick which extra bag of camping food they are going to leave at home. And it is perfectly acceptable to stop a couple extra times along the way to stretch your legs, grab some lunch and fuel up to stay within limits for your aircraft.

Now that you have a couple options to consider to help you stay within the operating limitations of your aircraft, you may be wondering, does it really matter that much? I know people who get away with flying at higher-than-approved weights all the time.

Still, every year the FAA and the NTSB investigate and detail fatal accidents that are caused at least in large part due to pilots overloading their aircraft. There are numerous, easy things you as pilot in command can do to stay legal, cut the risk and increase the margins, three things you want to do on every flight anyway. **PP**