

TOTAL PERFORMANCE
VAN'S AIRCRAFT

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RV- Aerobatic Gross Weight

Builders of heavy RVs frequently seek relief from our aerobatic gross weight limitations. Their quest to justify higher weights occasionally gives rise to the theory that "Fuel isn't part of the gross weight when it's in the wings". So, if the aerobatic gross weight of an RV-7 is 1600lb, by this theory you can have an empty weight with passengers and baggage at 1600lb, add another 200lb of gas, and still be within the limits. It ain't so, folks!

Although it is possible in some airplanes that adding fuel in the wings can reduce the wing bending moment, this is more usual when the tanks are in the wing tips. If we could concentrate the fuel weight in the wing tips, then there would be enough relief on the bending moment at the wing root to offset the increased gross weight loading. However in RVs, the wing tanks are inboard, so close to the root that the moment arm is small, and therefore not that effective in relieving the stress at the root as fuel is added. In fact, the root stress will increase with the added fuel weight. Trust us, we've done the math.

Although not approved by Van's Aircraft, we are aware that some RV's have been modified with tanks in the outboard wing leading edge for extended cruise flight. Even if fuel was added only to this outboard location further from the root, it would not offset the overall stress increase.

For those of you now thinking - "Aha, I'll add tip tanks and use those for aerobatics!" - Don't do it. You will increase the empty weight (with the additional tank parts), and introduce higher inertial loads to the airframe, which will change the spin and roll characteristics - and not for the better. Consider spinning a long bar with weights at both ends, versus trying to spin a bowling ball of the same mass, at the same rpm (or trying to stop it spinning).

Bottom Line:

The weight of the fuel, whether it is in a wing tank or a fuselage tank, must be included in the aerobatic gross weight of all RVs.