

## Stretched Moose!!!

It has come to my attention that a number of Moose owners are having their aircraft stretched. I would like to talk about some of the pitfalls of doing this. I say possible because all or none could happen. Compared to designing a new aircraft, stretching an aircraft is a relatively simple procedure. Many Aircraft have been successfully stretched but usually with a corresponding weight increase. A weight increase for the Moose is not possible without a redesign of the wing. Also, in Canada we are now at the maximum wing loading allowed for an experimental to be flown with a standard PPL.

The most obvious problem is, of course, the effect on the weight and balance. The weight increase for such a modification is probably 30-40 lbs. Not a lot for the Moose but the problem is where the weight is added. The complete cone and tail section going back say 20" and the additional 30-40 lbs structural weight added in front of the cone is going to have a huge adverse effect on the balance of the aircraft. This adverse effect can be balanced out by moving the engine, prop, firewall, passengers, etc. forward, but again you are adding more structural weight.

When designing Taildragger aircraft, the goal is to have the main wheels contact the ground just before the tail-wheel touches during landing. By moving the cone straight back 20" on a stretched Moose the tail-wheel will be approximately 3 1/2" lower in relationship to the main wheels of a standard Moose in a three-point stance. It may be possible that the tail-wheel will contact the ground on an aggressive take-off rotation. This is even more possible with the increased elevator authority due to the extra moment arm-length. On landing if the tail-wheel hits first it will drive the main wheels down on the ground and at the same time reduce the angle of attack of the wing causing it to create lift again. This combination of the tires hitting the ground at higher than normal loads and the wing again producing lift could be quite entertaining for those watching from the coffee shop. Of course longer landing gear could be installed (more weight) or larger tires (more weight) and a longer boarding step will probably be required (more weight).

Most pilots are familiar with the common reasons for Taildraggers to sometimes be difficult to land in crosswinds, but one characteristic seldom mentioned is the ratio of "the moment of areas" fore and aft of the main landing gear. "Moment of area" in this case can be defined as the surface area multiplied by the distance of the centroid of that area to the landing gear. The larger the rear "moment of area" is to the forward "moment of area", the greater the tendency for aircraft to weathervane (ground loop). Stretching the Moose by 20" would greatly increase the rear moment of area. Again, great entertainment for the 'Coffee Shop' crowd.

Moment of inertia in the longitude direction is another thing that should be considered. Banking the aircraft should not be a problem and pitch authority should also be ok with the increased elevator arm although it should be explored cautiously. Yaw, however could be a problem and spins should be approached very slowly and cautiously. The reduced sensitivity in yaw might actually be beneficial on floats.

How the prop wash and wing downwash meets the tail planes can have an effect on the handling of the aircraft which may require adjustments to the engine mount or tail plane settings.

Lastly, the bending loads on the fuselage are going to be increased considerably, and any problems may not show up for some time.

My thoughts are that the stretched aircraft, with its loss of 30-50 lbs useful load and other problems discussed could be a less practical aircraft than the standard Moose. I don't bring up these points to prevent people from experimenting with their aircraft. After all, they are called "Experimental". I believe each of the possible problems mentioned can be overcome, but I do think it would be prudent to wait for one to fly and see what the results are.

I was certainly caught unaware at the interest in the M14-powered Moose. Should I be thinking there is a market for an even larger aircraft? Hmmmm.

Cheers,

Darryl