

JW

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Posts: 195

Discussion - Wing servo installation

After reading about and seeing various mishaps due to "wing" flutter (most likely control surface flutter instead), I thought that it might be a good thing to pass along my solutions to increase control system stiffness.

Things to work on:

- 1) mechanical advantage - use the smallest horn possible on the servo and the largest possible on the control surface that gets you the throw that you need.
- 2) eliminate any free-play or slop in the linkage
- 3) use the best servo you can that fits
- 4) maximize the system stiffness

#1 helps the system stiffness as well as control resolution, and allows you to get the most mechanical advantage (force) out of the servo. You might have to do a few trial & error attempts on the horn lengths, and you might have to do some relief cuts on the clevis to get clearance on the servo around the portion of the horn that pushes on to the spline. It is worth it though.

2 gets rid of hysteresis issues, and improves the aircraft response and efficiency. I tend to use a little bit of CA on the threaded rod at the clevis to ensure that there is no slop there, and also put a small drop of CA on to the clevis pin area after attaching to the control horn. After kicking with accelerator, I'll move the control surface. This results in a CA bushing in the control horn hole around the clevis pin. It is amazing as to how much this can tighten up things.

3 gets you increased stiffness and resolution, as well as reducing the odds that you will be replacing servos and/or gears. Also, you will get better response in high load situations (launch and higher speeds).

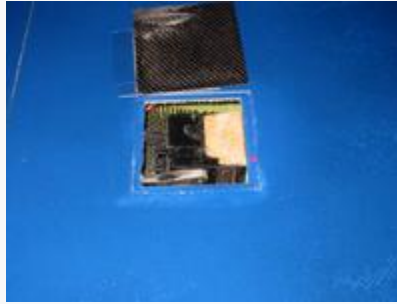
4 really helps in reducing flutter. It is painful to see people spending lots of money on the latest planes only to see them shred the plane in flutter due to a sloppy installation. Recently I've seen a few planes get hurt or destroyed due to what I feel is preventable flutter. Most people install the servos by just attaching them to the wing upper surface (the bottom of the servo pocket for servos installed from the bottom of the wing). This is not the stiffest installation, as now you are relying on the wing skin to react a bending load. My solution is to tie the servo to the lower wing skin to eliminate the bending loads on the wing upper skin. See the attached pictures for some details on how I have done it on my Supra. I do something like this on all of the planes that I build, and it is surprising as to how much this improves the stiffness of the control surface.

Joe
Attached Thumbnails



Aileron installation for Supra. Pre-

cured carbon piece glued to servo and inside of wing lower skin 67.5 KB · Views: 40



Flap installation for Supra. Balsa

wedge glued to servo and inside of wing lower skin. 70.1 KB · Views: 41

