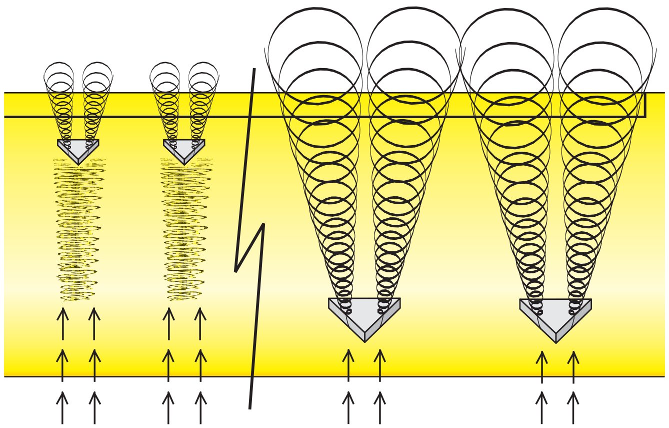
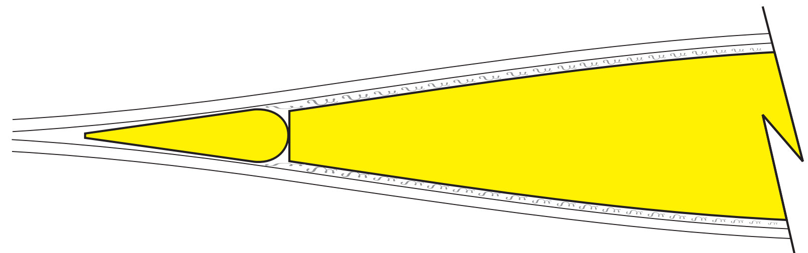
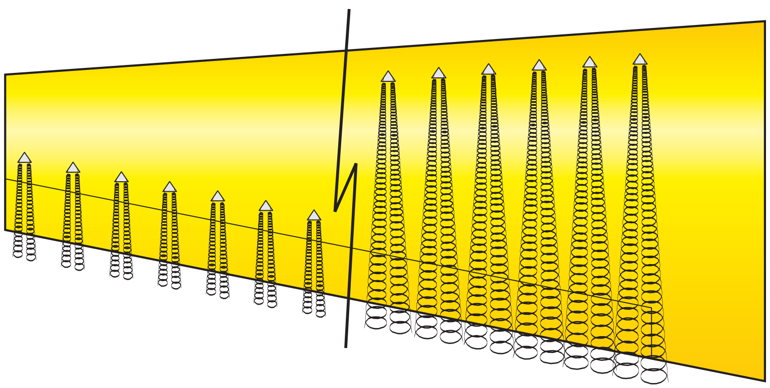
Handling Enhancements

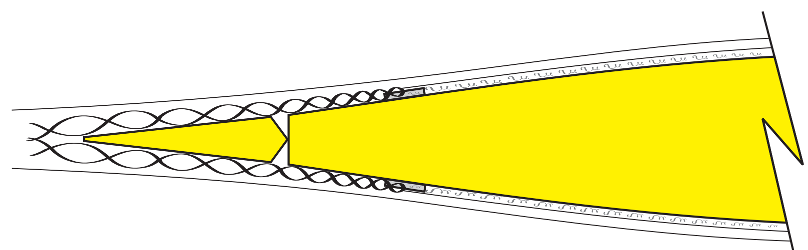




Vortex Generators

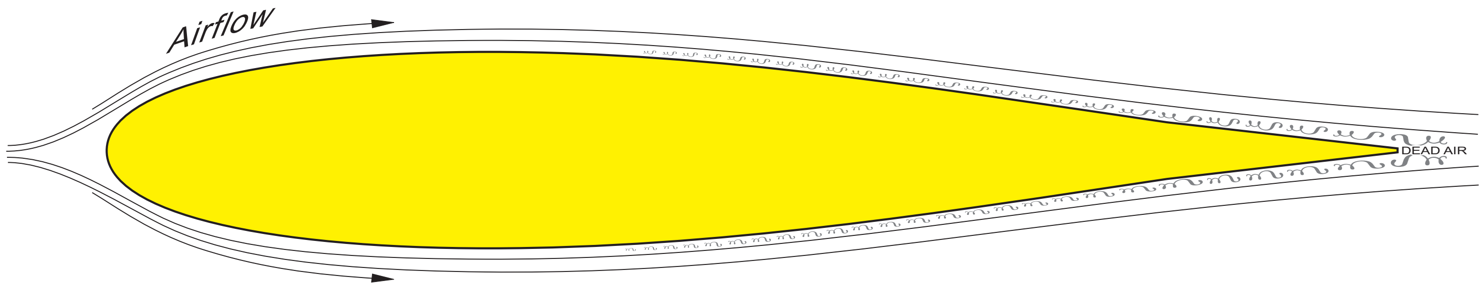
Thicker Control Surfaces



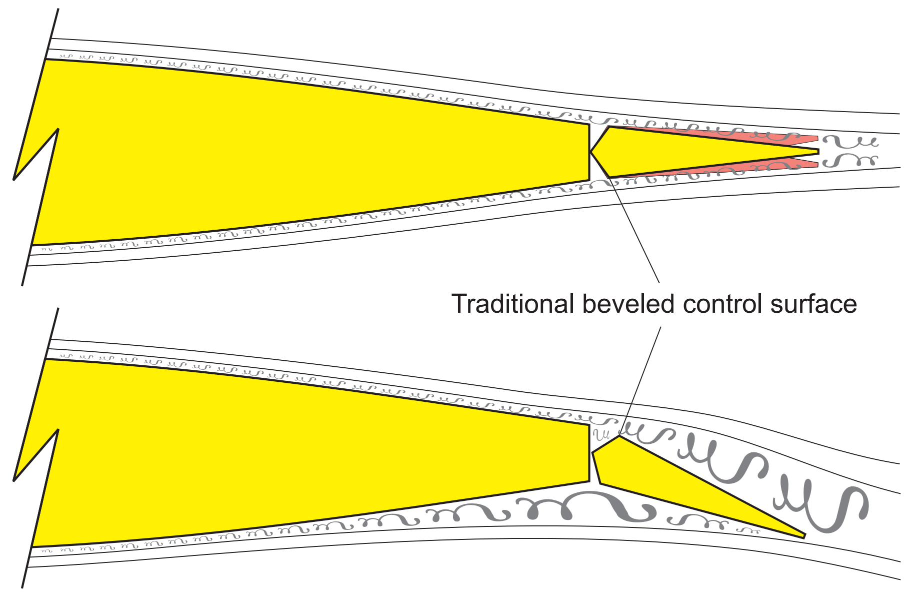


Stall Strips

Skin Friction Airflow Disruption Influence



Surface friction causes the airflow over the wing, tail, etc., to become stagnant and/or turbulent where the air comes into contact with the surface. As the airflow progresses aft, the turbulent boundary layer becomes progressively thicker and more unstable.



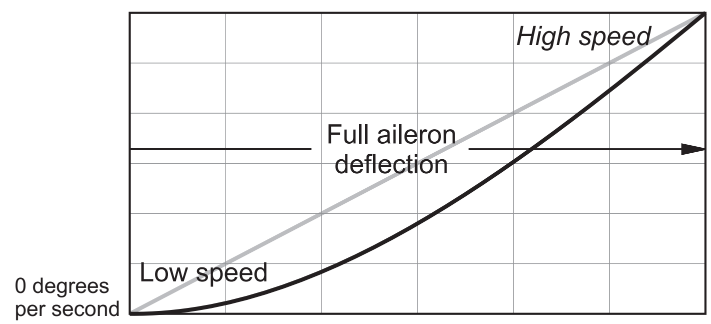
Small control surface deflections within the area of turbulent air tend to produce sluggish and/or erratic responses, particularly at slower airspeeds. In order to begin achieving positive control, pilots must apply larger inputs to deflect the surface into smoother air, resulting in an exponential increase in the rate of response.

Traditional beveled control surfaces further disrupt the already turbulent airflow as a result of the air tripping over the bevel's sharp corners.

The most noticeable aspects of flying with conventional beveled control surfaces are difficulties keeping the wings level, i.e, making fine adjustments, and response rates that exponentially speed up and slow down with airspeed changes -- thereby interfering with the pilot's ability to precisely predict the effects that his control inputs will have on the airplane.

Both tradition and ease of manufacture are the reasons that this primitive design continues to be used. It's also because of this design that many manufacturers have to resort to sealing the gaps to try to limit some of the airflow disruption and potential for flutter.

Conventional non-linear control rate response



KPTR: Traditional beveled surfaces impair a pilot's ability to predict how the plane will respond to commands.

Thicker Control Surfaces = Positive (Linear) Control

The airflow is smoother slightly away from the surface of the wing or tail. Incorporating slightly thicker control surfaces places the physical surface of the ailerons, elevator, and rudder flush with the smoother airflow, resulting in a full range of improved control. A round leading edge applied to a control surface further improves control by providing a smoother contour for the airflow to pass over the surface without becoming turbulent.

Benefits of thicker control surfaces with round leading edges are:

- Pilots experience a more predictable linear 1-to-1 correlation between their control inputs/intentions and the response of the plane, especially when making smaller inputs.

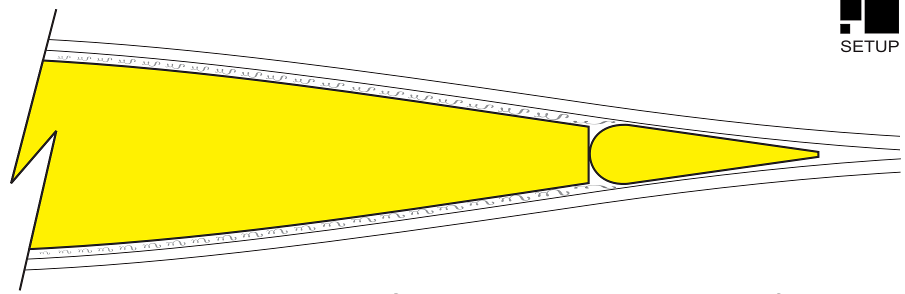
- The minimum controllable airspeed (MCA) is lowered on all models, thus expanding their flight envelopes.

- Greater stability in turbulent air and smoother control responses both during aerobatics or when low and slow during landing.

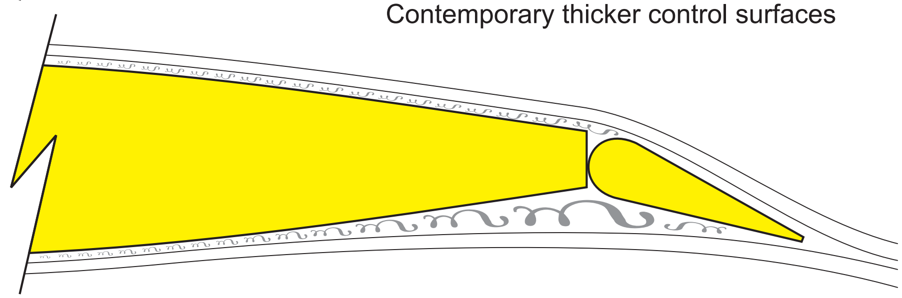
- The potential for flutter is significantly reduced (making sealing the gaps unnecessary).

Thicker control surfaces are utilized on nearly every full-scale aerobatic aircraft designed since the 1980’s, including every full-scale Extra, Edge, MX, Cap, modern Pitts, etc., and have helped these aircraft dominate World Aerobatic Championships and individual competitions ever since!

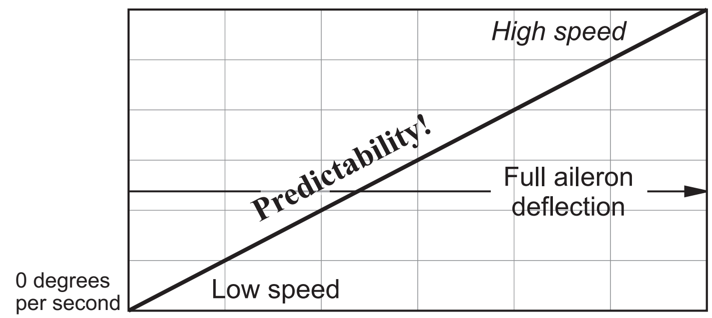
Thicker control surfaces all around would be optimum, but the ailerons, i.e., control of the wing, is the most important. To achieve the increased thickness, you can either purchase thicker balsa stock, or, build up the leading edge of the provided ailerons with strips of balsa on one side and re-center the hinges, or, add balsa to both sides.

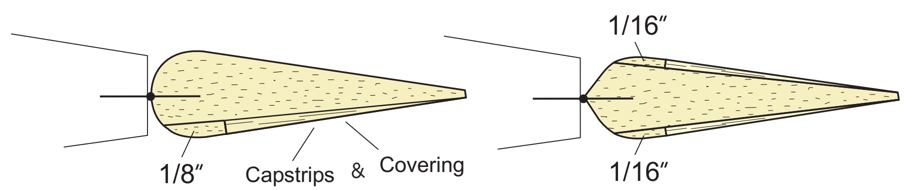


Contemporary thicker control surfaces



Optimum linear control rate response





Rule-of-thumb: Raise the aileron, elevator, and rudder approx. 1/16" each side - 3/32" to 1/8" thicker overall.

KPTR: Thicker control surfaces supply precise linear control throughout the entire flight envelope.