Turbulators,
one flyer's thoughts

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Taken from The Turbulator, the newsletter of the Thermaleers MAC of St.Louis, MO, Chris Matsuno and Bob Klipp, editors.

Never having seen a copy of Schmidt's classic, "Aerodynamick Des Flugmodels," I never understood turbulators and could not figure how you could improve performance by adding drag to a wing. Then I read that fine article by Henry Jex in "Soaring" and it all became clear. Immediately I rushed out and strung cord in front of my old Wakefield wing, with a fairly thick 6412 section and a sheeted leading edge.

Right from the start it was obvious that something had happened. The model previously had been prone to stalling, assumed a nose down trim and needed 1/8" under the tail to bring up the nose. From the attitude on the glide, it seemed as though the stall had been delayed some 4 - 5 degrees. The extra lift slowed her down, but there was drag there too, and she seemed to be mushing. Overall performance was only slightly up but more consistent. As a check, we removed the cord, whereupon, she stalled right out of the sky.

The obvious deduction was that the turbulator had moved the center of pressure back, and I remember Ellila making a similar observation. My own explanation for this is as follows:

Most of the lift comes from the upper surface. With laminar flow at low (sub critical) Reynolds Number, separation occurs well forward, near the point of maximum camber. With a turbulator, the flow "sticks" to the upper surface much longer, the back of the wing produces more lift and the center of pressure moves back (see sketch).

After this, I set out to build a wing to Jex' recommendations, using a B6356b section and multispars for turbulators...Jex insists that here must be no upper spar or bump aft of 40% as it might promote separation. The wing showed anti stall characteristics typical of turbulent flow, and the glide is quite outstanding. With it, I have won four contests out of five entered, including the last two National Wakefields.