

WINDING TO TORQUE

By Don Deloach

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This piece was excerpted by your editor from an excellent article that Don published in the Nov/Dec 2012 Flying Aces News. It's required reading for anyone unfamiliar with the use of a torque meter in Rubber Scale flying. Editor.

One of the biggest fallacies in rubber-powered Free Flight is winding to a particular turn count and expecting the same relative power from flight to flight. A real-world example: wind a brand new motor to 1500 turns—and note the reading on your torque meter — say 4.0 inch/ounces. Now unwind the motor and let it rest for a few minutes before rewinding. On the second winding to 1500 turns the motor will probably reach only about 3.5 inch/ounces. On the third and subsequent windings the torque yield will more than likely drop to 3.2 - 3.4 inch/ounces. Why?

There are volumes of technical articles on this subject in NFFS Symposium books and other sources, but the non-technical gist is this: as rubber is repeatedly wound it elongates and softens. This softening is a double-edged sword — it enables you to pack more turns in, but it also can mislead you into believing turns equals power. This is not the case. On the second winding motors need about 110% of the turns of the first winding to equal the torque of the first winding. On the third and subsequent windings as the rubber softens further motors need 111-115% of those turns to equal the first-winding torque.

The value of a torque meter should be evident now. When I wind for a mass launch I seldom keep track of turns. It is much easier and more valuable to have torque targets for each round. For example at Geneseo in 2012 my torque targets for the three rounds in WW I Dogfight were: 2.0, 3.0 and 4.5 inch/ounce. My notes indicate that the first round was a squeaker — I underwound, did only 61 seconds, and nearly got eliminated. Next time my target will be 2.5 inch/ounces in the first round.

For my 21-24" scale models I use a homemade torque meter with a range of 0-12 inch/ounces. One can be made in about an hour and will become an indispensable part of your winding equipment. Go to the Pensacola Free Flight Team's website and search for the article on Herb Kothe's torque meter. Follow his instructions on how to make the meter and calibrate it to inch/ounces or to another meter. There are also commercially available meters from BMJR Products in Florida and Gizmo-Geezer in Canada.

Here are my simple rules for winding rubber motors:

- (1) Don't bother with motor break-in for F/F scale, especially mass launches. Winding for the initial rounds serves as a perfect break-in for the last round.
- (2) Stretch that rubber way out before putting in a single turn. This is essential, and is something too few FAC'ers do. Tan Super Sport fails at about 10X its relaxed length. You should pull out four to five times the relaxed length before winding.
- (3) Once you've stretched the motor out begin winding fast. Fast

winding is not bad early in the turns count. Put in about 50% of the anticipated turns before progressively moving in. This is a critical process; too many guys start moving in too early and too quickly. Check your torque meter after every few cranks when you're above 50% turns. Ideally, the torque should not be dropping at all as you move in; if it is you are moving in too fast. Let the rubber pull you in.

(4) Your last few handle cranks should occur just as your motor hook or O-ring reaches the nose area. Watch your final torque here very carefully and slow down a bit more. Sometimes one more handle crank can mean the difference between 5.0 and 5.5 inch/ounces, which can be the difference between a safe flight and a dangerous one.

(5) Don't ever wind to a new, uncharted torque number in a mass launch final round expecting stellar results. If your motor is near its breaking point you might rekit your model in a torque roll/wingover.

Have total confidence that there is no bad rubber anymore. Ever since the switch to a new chemical additive in early 2009, all the Tan Super Sport batches have been consistently quite excellent. They have high energy return (within 5-10% of the best Tan II) but most importantly for scale flying they are extremely durable. If you have some Tan II stored away don't use it, especially for mass launches. It is getting too old and brittle, and this is exacerbated by warm temperatures (above 80 degrees F) at which we typically fly in summertime. Also, don't use Son of a Gun or Armor-All to lube your Tan Super Sport. It evaporates quickly and is too thin to stay on rubber without frequent reapplications.

I'm no master rubber scale flyer but I do possess a solid knowledge base when it comes to the fundamentals of rubber-power, props and trimming. That said, when it comes to mass launches I'm keenly aware that there is a lot of luck involved; namely avoiding mid-air, staying out of crops/trees, and numerous other screw-ups that can, and often do arise at the worst possible moments. I hope this article will help you in your quest to become a better rubber flyer ..