

# Rubber: More Energy From Good Housekeeping

By Carl Bakay as published in INAV #102

The engineering field in general is famous for giant pendulum swings in the way it does things. Years of reliance on technology eventually lead to disaster, after which comes a swing of the bob "back to basics." So it is with these motors - there are some basics that just seem to make good sense to turn into habits, regardless of the quality of the batch or event being flown, and how technical the user might be.

The first "basic" might be cleanliness, and the second, lubrication. Dirt and the resulting scratches are the enemy. Wash the entire box of new rubber in a mild soap and warm water, and rinse many times before drying. Only then should you apply a lubricant. But Bud Tenny said it better in his November 1997 column in Model Aviation.

"To obtain this kind of performance from any motor made from Tan (I or II), the rubber must be kept scrupulously clean. Tan II's surface is so smooth and slick that the tiniest piece of grit will score the surface. I find that consistent use of Armor All during winding, and while stabilizing the final phase of knots during the winding, seems to minimize scuffing between strands. Several fliers have reported scuffing with most versions of Tan II, but I can't remember scuffing, even under the hardest use, with Armor All and similar lubes."

It was only a few years ago that rubber lube did only that, lubricated the strands so they moved freely past one another during winding and knot formation. Just mix up Ivory or green soap, glycerin, lanolin, petroleum jelly and water, or buy the stuff ready made. But auto lovers have always known that rubber parts dry and crack too, and now there are products such as Armor All 2001 and STP's Son-of-a-Gun that not only lubricate because they are soapy silicone emulsions, but also protect against UV light and ozone degradation. Dow Corning and others make similar products. Whether it is best to apply it right after washing for its protective qualities, or wait until it is to be wound, is up to you. Some evidence has been accumulating that soaking motors in Son-of-a-Gun for long periods increases softness and elongation, to the detriment of performance.

A third 'basic' would be proper labeling, and storage of your stockpile in the refrigerator, just above freezing, in airtight, Ziplock Freezer Bags. Jim Bethea from Baton Rouge told me, "Keeping the rubber in the fridge will definitely help hold the original properties. The reason for this is that the activation energy for crosslinking is temperature dependent: hotter is faster and cooler is slower. I have been keeping mine in the fridge for 15 years." We might add that it is also dark in there, and that is good, too. But make certain the bags are polyethylene or PE, and not polyvinyl chloride or PVC, which gives off toxic fumes that will degrade the rubber and defeat the whole purpose of storage. How do you know which is which? Submerge the empty bag in water. PE floats; PVC sinks.

A fourth basic habit to get into is breaking in all your contest motors. Fred Pearce has many tests listed in the Table of Energies in this article, and he found that two hard break-ins increased energy storage by 2 to 4 percent. The author has found the same, on the order of 100 to 200 ft-lbs/lb improvement (after an overnight rest) from the first break-in, and 50 to 100 improvement after the second. Even office rubber bands and golf ball thread show this. Of course, cheaper formulas will hold a 'set' and never

return to normal after a good pull, even if given a few days rest. But strips or thread made from all-natural latex rubber will. If you test your contest motors the night before in your motel room, you have accomplished three things: eliminated the loops prone to breakage before the contest, ranked your motors in order of performance, and broken them in, all at the same time. This kind of preparation is not a new idea, and is covered more in the last section.

The last basic habit may well be the best: keep good records. Buy some spiral notebooks or three-ring binders, and take them everywhere you fly. Study others and see what they do. Keep similar records as they do, and you will be able to compare notes one day. Then you will be standing on the shoulders of giants, and you will see a lot further. Carl