

TISSUE ISSUES

Which tissue to use on a rubber model?

by Mike Isermann

In this article I'm only talking about **tissue**, not any of the synthetic materials. Having said that, what should you look for in a covering material? I guess it all comes down to what's important to you. Color, weight, wet strength, cost, availability and sheet size are probably the primary tissue issues you will consider before proceeding with your project. All are valid concerns, but I think it is important to look at each of the concerns and make sure you are clear about what you may be giving up when you choose one type of tissue over another.

First, let's list the types of materials available today that are typically used to cover a rubber model, be it endurance, old-timer or scale. You have domestic tissue, Japanese tissue, Easy Built Lite tissue, JCI tissue and silk span. I'm sure there are others, but these are the most common types I have come across. Now let's look at each type and list their attributes and their drawbacks.

Domestic Tissue -This type of tissue is one of the most common types of covering material on the market today. It is readily available and comes in a multitude of colors. You can even find it with a large variety of printed patterns; however, I'm not sure they are valuable to the rubber modeler. There are many manufacturers of domestic tissue and, as you would suspect, some are better than others. Fade resistance is one characteristic I have noticed with some tissues. I have seen some brands of domestic tissue that appear to have a shiny side much like Japanese tissue. Most brands have no distinguishable grain making application less of a guessing game (grain refers to the direction in which the tissue will tear in a relatively straight line). And it's cheap. You can get domestic tissue for 10-20 cents a sheet if you buy in bulk.

Domestic tissues offer modelers a number of valuable characteristics that solve some of the problems that plague our hobby. However, there are some problems with domestic tissue that I think are important to discuss before you go running out and buy a lifetime supply. The color in most colored domestic tissues tends to run when too much water is applied and it possesses a poor to nonexistent wet strength. Simply put, wet strength is the tissue's ability to resist tearing after becoming wet either by water or alcohol. This is an extremely important characteristic for my money. This factor alone can mean the difference between a wrinkle-ridden or wrinkle-free covering job. Bottom line is that you have no ability to adjust the tissue once it is tacked down. In other words, you had better be one of those do-it-right-the-first-time guys or you will be in trouble.

The other concern I wanted to point out is that domestic tissue is relatively heavy (about 1.68 grams/sq. ft.) In a hobby where tenths of an gram count, I would take this factor seriously if I was trying to build a plane that will fly well. I would say this is much more critical on planes in the 24-inch wing span and smaller range. It's not quite as important on the larger ships where structure is the weight control point.

Because rubber modelers try to minimize weight in every area possible, we tend to use Krylon or light coats of dope to seal tissue. This becomes problematic on humid days where domestic tissue is used. I live in Houston where humidity is like a sucker fish on a shark's back. No matter where you go, humidity is there. As with most tissue, moisture causes the tissue to slacken, making the domestic tissue susceptible to damage due to poor wet strength. Ask me how I know this! You don't want to brush off grass bits from your covering while it is wet! Sure, you can seal the tissue with several heavy coats of dope or Krylon. But then your plane may serve you better as a paper weight.

Easy Built Lite Tissue – This product has been around for about 6 or 8 years and offers a number of characteristics that are favorable to the rubber model builder. The tissue itself reminds me more of a cross between domestic tissue and a very lightweight wrapping paper. It tends to work a bit stiffer both when wet and/or dry. One of the most unique things about this tissue is that it comes in gold and silver. I would venture to say that the gold color is the best version of gold tissue I have ever seen. Color selection in general is outstanding (28 colors to choose from) with some versions of common colors being exceptional with regard to color accuracy and aesthetic impact. Color fade resistance seems to be above average as well.

EBL tissue is a bit harder to cover with because of its stiffness and can be a chore to form around rounded edges and corners. Again, this tissue (about 1.54 grams/sq. ft.) is a little on the heavy side for smaller subjects. Wet strength, although better than most domestic tissues, is not where I like it to be, but then each person has his or her own preference. I like to have time to work the tissue and correct mistakes without the worry of having to start over. Again, If you can work a semi-fragile tissue with confidence then I would highly recommend you give this tissue a try. I have seen some beautiful, wrinkle-free models wearing Easy Built Lite tissue. And at \$.50 a sheet, the price is right as well.

Silk Span – Silk span has been around for more years than I can remember. There are three common weights available: heavy, double 0 and triple 0. Triple 0 silk span is the first covering material I was introduced to in the mid-70's and I have to admit it was the only material I used until the early 90's. I spent many a night dying silk span with Rit dye. The best thing about silk span is that it has superior wet strength and is easy to use. It is the strongest covering material listed in this article. Despite silk span's great workability, structural support and wet strength, it is best used for very large scale, old-timer and duration models with heavy, durable structures. The primary concern here is silk span's shrink rate. Silk span will shrink to the point that it will severely warp and/or break apart lightweight structures. Triple 0 silk span is lighter than (1.29 grams/ sq. ft) domestic and Easy Built Lite tissue but requires a considerable amount of dope to seal properly. I would not recommend the use of silk span on small to medium-sized (13" to 30") model aircraft. And yes, I know this from experience. Silk span goes for about a buck a sheet these days.

Japanese Tissue – Commonly known as Esaki tissue, this material dates back to the pre-World War II days and is still one of the most popular tissues used by serious scale modelers today. After being taught how to cover with Esaki tissue back in 1992, I have to admit I have become partial to this material and seldom consider any other type of tissue. Esaki has excellent wet strength and is extremely light. One 18”x24” sheet weighs 3.5 grams or 1.1 grams/ sq. ft. I have found Japanese tissue to be very easy to work with and the results can have you questioning whether or not *you* actually did the covering job. As my modeling buddy, Bob Isaacks, used to tell me, “Once you understand the techniques of covering with Esaki tissue, you will be able to cover a round ball with it.” You can expect to pay an average of \$1.25 a sheet for Japanese tissue. You pay for what you get!

As with all of the materials we have discussed, Esaki tissue has its drawbacks as well. This tissue fades quickly in the sun and can shrink a great deal. Usually the shrinkage occurs in one direction and the results can often be extreme. When using Esaki tissue, care must be taken during the covering process. If you plan to cover wet, make sure you keep from pulling the wet tissue too tight over the structure. Can you spell ‘potato chip’? Give the tissue enough room to shrink the wrinkles away. Another technique I use to minimize wrinkles is to preshrink the tissue on a frame. This has worked well for stabs and rudders.

Like silk span, Esaki tissue has a grain. The easiest way to determine the grain is to tear the corner a bit. If the tear runs true you have found the grain. If the tear is jagged you are tearing across the grain. Always cover your flying surfaces and fuselage with the grain running parallel with the long dimension. This minimizes sagging between ribs and/or stations.

Color-fading is a problem and can be very frustrating, but since the arrival of artist chalk and color printing on the modeling scene, this issue has become less of a deterrent and more of an opportunity to explore new color schemes. Prior to the development of tissue chalking and printing techniques, the airbrush was the only alternative a modeler had at his disposal. The new coloring techniques offer an infinite number of options with minimal weight gain.

I prefer this tissue option over the others discussed because I like the way Japanese tissue looks when it is applied. It has a very clean traditional look and a translucent quality that I love. There is nothing like looking up in the sky and seeing the sun glistening through a framed balsa structure covered with Esaki tissue. George, get me some Kleenex please.....Okay, I’m better now -

JCI Tissue – Although JCI is not available at the moment, the makers of this fine product plan to offer it again in the future. There is not much difference between Esaki and JCI, primarily because it is the same product. The only difference is that JCI tissue is white Japanese tissue that has been colored using a highly-guarded dyeing technique. I was once chastised by JCI owner James Caley for publicly stating that JCI tissue was chalked tissue. Well, regardless if this was true or not, it was an assumption based on the residue that came off on my hands when using it. Sure looked like chalk to me. In fact, it is my understanding that Chris Parent thought the same

thing, which gave him the idea to try artist chalk in the first place. This information has not been authenticated as of yet, but I plan to ask Chris this question at the 2006 FACNATS.

Whether or not chalk is the key ingredient, JCI is a wonderful tissue and several of the colors are some of the best I have ever used. Dark blue is the first color that comes to mind. This is truly an outstanding color for all Grumman Navy aircraft. Actually, all of the JCI colors are really nice looking. The best thing about JCI is that it is Japanese tissue that maintains its color well in the sun. I think it looks even better as this tissue ages. And the weight penalty as compared to Esaki is only an additional 2/10ths of a gram/sq. ft.! There is not much wrong with this stuff. I will say that the silver tissue has historically been harder to use than the other colors. Wrinkle-free covering is not easily obtained. The real down side is that JCI goes for \$2.25 a sheet. That can add up in a hurry if you are not careful.

All of the covering materials “covered” in this article have their place in our hobby. Each of them has attractive attributes as well as a few negative traits. I know there are many other considerations modelers look for when choosing a covering material, but I think the primary concerns are those we have discussed. When reviewing the tradeoffs for each material, make sure you focus on overall wing loading and consider which material is the easiest and most sensible to use for the given project. Be mindful of the structural limitations of your subject and look for the attributes that work best for you. You want your covering experience to yield a nice looking, light aircraft. Be sure you know what you are getting into before you start. Know your tissue’s grain direction and wet strength.

These facts will help you avoid any issues with your tissue.

Smooth covering jobs to all,
OOSMIKE