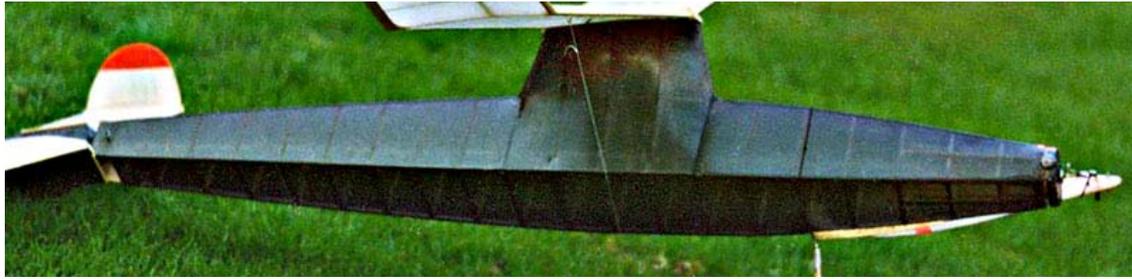


Covering a Fuselage with Silk using the Meniscus Method of Doping



A question frequently asked on the flying field is about my choice covering material for rubber model fuselages. It's not surprising because silk is an attractive medium with a slightly mythical status. Oiled silk was a covering of choice in a bye-gone era, later replaced by tissues like modelspan and jap, which in turn were outmoded by a variety of junk-spans that, for the most part, seem singularly unsuitable for rubber models, relying as they do on a tight covering to sustain torsional strength. Mylar has been used as a base since it became available with tissue or silk on top but it is a method I have not tried.

A couple of additional factors contributing to the myth are a) expense and b) difficulty. Well in the first case rubber models are not expensive to build and whilst silk is not cheap the cost per model is acceptable for vintage rubber fuselages for models from Lightweight up to (say) Wakefield size, or thereabouts. As for difficulty, it's not really a problem if one has a clear idea of the process, hence this essay.

In terms of expense, just a word on how I obtained a stock of Esaki Silk. When still gainfully employed by TI in 1990 I had a Japanese colleague who was in constant contact with his Tokyo office. I asked him to do some research on his next visit home and he took with him the cover sheet from a packet of silk. When I next saw him he told me he had ordered twenty yards for delivery to his "Japanese Lady" directly from Esaki because he could not locate the stuff in downtown Tokyo. A couple of weeks later the silk appeared on my desk with a note advising me of the cost, so I trotted over to his office to pay the chap and casually enquired how it had arrived in England. "Ah so", says he, "Japanese Lady secretly hide packets of silk in company diplomatic bag along with sensitive technical documents." The irony of this revelation was that my job at this time was UK Import/Export and Export Control Manager, wholly dedicated to ensuring that all international company shipments were legally organized and that nobody went to jail for avoiding duty and taxes on imported goods. So! Here was I, the unwitting recipient of an illegal import. Ho Hum! Anyway for a mere sixty quid I got twenty packets of hooky silk at about 40% of the then UK cost. Totally un-phased, I got him to repeat the transaction on his next visit home but could "Japanese Lady" please stay away from the diplomatic bag. This time they were secreted in the pages of his electronics trade magazines. Well, when there's a good thing going - why not? Since then of course the local price has increased quite a bit, so it was a fortuitous investment. Later, I even had the temerity to ask Mike Woodhouse to swap me some black silk for my unwanted colored packets that had come in the shipment. Nobody went to jail! Yet! So cost remains a non-issue for me and neither should it for anyone who really wants to add a touch of

class to their new rubber model. When one compares the on-cost to, say, to the price of petrol getting to the next flying meeting it's peanuts.

This is not the first time the process has been explained on the digital highway but perhaps not in this detail, so if you are easily bored, it's probably best to stop reading now and just look at the pictures. It is pretty much as I learned it from the great (and still great) Mike Kemp who first wrote about it in the August 1984 Sam35Speaks Rubber Column. Mike learned it from Peter Michel, who learned it from David Baker who learned it from Danny (two e's if you please) Sheelds who learned it from And now everybody can learn it from here. I would add however that your truly does not expect too many folks out there to actually try this method as there seems to be less and less interest in these esoteric art-forms. So why write the essay then, when some say I am already bonkers? Well, if I don't do it now, while I can remember, then posterity will blame me for the omission and anyway, how else will I be able to recall it when my marbles have been well and truly lost. Also included in the process is an amazing secret but, dear reader, for that it is essential to read on and just be patient.

Here then is the method I have used exclusively since 1984 on more than forty fuselages, some new and some rebuilds, or when damage gets so bad as to offend the eye.

Applying the Silk

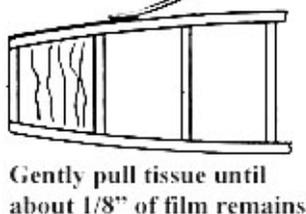
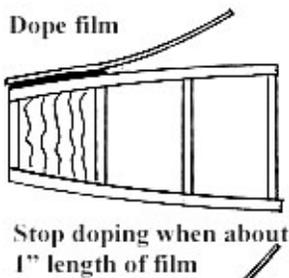
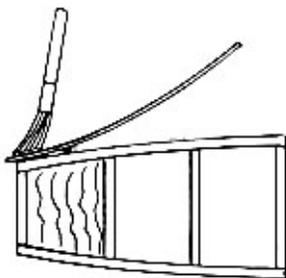
- For a start-off, silk hates snags as much as it loves sharp scissor and sharp blades.
- Liberally soak or dope the whole fuselage inside and out with 20% to 30% strength dope to provide a degree of proofing against any water based rubber lubricants (my choice).
- Lightly sand the outside of the framework sufficient to remove any snags and expose the wood fiber again.
- Cut the silk slightly oversize for one side of the fuselage with the warp (as opposed the weft) running along its length (In tissue terms warp = grain).
- Place the dry silk over fuselage and lightly pin each end. Don't over-handle the silk, it spoils its nature.
- Using 50% dilution of water soluble, white PVA with a fine artists brush, starting at a central spacer, paint the adhesive onto the silk above spacer just enough to wet surface and run through to the spacer below. For a simple slab-sided fuselage this is the only spacer so treated. For complex shapes such as pylons or bumps, treat these as individual sections as one would with tissue covering.
- Wipe gently with a finger from centre to edge to ease out local wrinkles.
- It will grab in 30 seconds but needs a little longer to "go off".

- If wrong, wet it slightly (I use saliva) and gently re-position.
- Because of the secure grab at the central spacer, the silk can be pulled lengthwise to eliminate any creases and working forwards, away from the centre, apply adhesive only to the longerons (not the spacers), two bays at a time.
- Use both thumbs to gently ease out the wrinkles until it grabs. Move on, two bays at a time and fix to the nose by folding over the front spacer.
- Turn the fuselage around and work rearwards using identical process.
- As work progresses concentrate on eliminating wrinkles, getting the silk tight and keeping the warp straight. Don't "thumb" the threads too hard or they will distort and spoil the effect.
- Mistakes or wrinkles may be gently eased away by local wetting. If the grab is weakened, apply a touch more PVA.
- When the glue is dry, after a few minutes, use a "scary sharp" blade to slice off the waste. Do not wrap edges around the longerons, it's ugly and inhibits repairs.
- Repeat the above on all four sides, slicing off the waste as each side is completed.
- Do not water shrink yet.
- Use a small brush apply 30/40% dope, or better still banana oil, to all longerons and any midsection joins. This is a key step, ensuring the PVA is protected from the water shrinking process otherwise the silk will come off for sure.
- When the dope has dried gently start the water shrinking process by soaking the whole fuselage with fine spray of warm water containing a trace of washing up detergent to help the silk get properly wetted.
- Gently draw a leaf of newspaper or paper towel over the surfaces to remove the excess liquid. The combination of warm water and detergent thoroughly wets the silk leaving no partially dry fibers.
- Allow this bag of damp silk and balsa to dry naturally hanging at room temperature. Heat is not desirable as it causes uneven shrinking.
- After shrinking, ease away any snags between the silk and the frame-work, check for areas of poor adhesion and correct if necessary with a touch of PVA or dope, gently rubbing with a finger to generate "grab" and maintain tautness. Lightly twist the framework to ease away any unwanted warps and restore its true shape.

- Even before the next stage of applying the dope, the covered fuselage is now a veritable work of art that deserves nothing less than mounting on a plinth for display in a local gallery.

The Meniscus Method of Doping (drawing courtesy of Mike Kemp)

- Now to the tricky part where all previous work can be either spoiled or enhanced but in order to avoid spoiling a perfectly covered fuselage with poorly applied dope set up a trial on a dummy frame in order to establish the process.
- Place the fuselage on a smooth working surface so that it cannot move lengthwise using a couple of fixed stops, pegs or balsa blocks.
- Prepare the shrinking dope to about 70% viscosity in a short, wide bottomed jar and use a medium to large doping brush. This very much depends upon the raw viscosity, but it will need to be a little thicker than for normal tissue doping.
- Make up a “Tee-Bar” from scraps of TE section such that the bar is just wider than the maximum fuselage width and the tapered edge is away from the handle. This is the Meniscus Brush and it will be your best friend for the next hour or so.



- Cut some oblong pieces of medium weight modelspan tissue the longest edge being the same width as the tee bar. Fix a piece of tissue to the bar with dope and let it dry. Just to clarify, modelspan is porous and allows dope to filter through.
- Position the dope jar and brush near, but behind, the nose of the fuselage.
- In a warm ventilated room place the meniscus brush over the nose of the fuselage and using the dope brush, ladle on a generous helping of dope.
- Gently spread it across the fuselage until the dope film is about 1" long and slowly draw the meniscus brush along fuselage until the dope film diminishes to about 1/8".
- To avoid interference, for the right-handed, it's best to have the fuselage nose to the right and draw the brush to the left, doping with the right hand.
- Do not push the dope through, just let it "run onto tissue" and spread it out gently. No pressure at all.

- Work continuously, dragging the meniscus brush at about 10 to 15 seconds per bay until the other end of the fuselage is reached. For 20 bays, that's 3 to 5 mins.
- Keep the dope jar near the area being worked on by just sliding it along the smooth work surface behind the fuselage, each time the brush is recharged.
- Keep the width of "dope film" between silk and tissue between 1" and 1/8" (say average of 1/2") but do not let it go to nothing until the end of the fuselage.
- Do not tilt the fuselage until the dope is nearly dry or it will "run". Discard the meniscus tissue and fix a fresh piece onto the tee-bar.
- When the first side is dry enough to handle, move on to the remaining surfaces until the job is done. Complex shapes can be tackled with the same process, but just treat it like eating an elephant. Do it in stages.
- It is an empirical process. Too thick and the dope will not spread easily across the meniscus brush. Too thin and it will fall through the silk and blob. It will also dry with a mass of pinholes. Being too heavy handed when spreading the dope will also cause it to blob.
- Eliminate minor groups of pinholes by drawing a wide dope brush over the local area with the same strength dope or use small tissue oblong to do the same using the meniscus method.
- When this first coat of shrinking dope is dry the fuselage can be waterproofed using a 30% banana oil wash applied with a wide flat brush. Only "lay off" in one direction and work very quickly to remove the excess. Do not scrub or dwell.
- Allow the whole kit'n'kaboodle to cure in a dry atmosphere and use 1000 wet and dry paper to remove any roughness caused by silk fibers at the edges of the structure. Don't overdo the abrasion or it will expose the wood.
- If subsequently, damage is incurred, to repair, cut a rectangular hole around a punctured area. Cut a patch of silk 1/16" larger all round and position it over the hole. Touch the silk with a fine brush of neat thinners and let it dry. Water shrink and dope, using the techniques already described. It's not invisible but it's very neat and adds no significant weight.

Summary

So what is happening here? The action of drawing the doped tissue across the surface of the silk keeps the applied dope on its upper surface without it falling through the open weave of the fabric. It's a scientific thing due to surface tension which is similar to the effect seen in a glass of water when the surface tension pulls the water upwards at the edge of the glass.

As mentioned in the text it's easy to set up a dummy trial in order to establish a working process to prevent spoiling a perfectly covered fuselage.

Now for the amazing result! The finished article is very, very strong, virtually impossible to twist, is waterproof and has tremendous resistance to damage due to the combined effects of the supreme strength of silk fibers, the powerful forces of water shrinking and the equivalent of only one coat of full strength dope (70% dope plus 30% banana oil). There is a small weight penalty of about 5 to 10 grams on a Vintage Wakefield fuselage compared to covering with jap tissue but repairing is a doddle.

So there you have it, as already mentioned, a thing of beauty deserving no less than being placed on public display. But hey, it's a real model airplane and no-one in the civilized world would appreciate it anyway! This thing of beauty has no place in the modern world of fast cars, computer games and ipod things which so dominate our habitat. Our lost arts will only emerge triumphant when the world comes to its senses and rejects the satanic advance of technology and reverts to sanity. In the meantime I'm using this confounded technology to spread the word.



Oh Yes! I nearly forgot the amazing secret? When the time comes for a complete strip down to restore the covering, go for a nice hot bath and take the fuselage with you. When you have finished bathing, swish the fuselage to and fro' in the warm soapy water for a few minutes and leave it to soak for about an hour. Don't try to lift it though; the water is too heavy for that. Just like magic all the soluble PVA adhesive will have melted from the longerons and the odd central spacer too and the old covering will peel easily away from the undamaged framework. Be careful peeling the silk from the spacers where the dope will try to resist, but away it will come – No Problemo!

However, there is one snag! Do not try this trick if PVA was used to build the fuselage in the first place, otherwise the end result is a wet silk bag full of balsa sticks. Tee Hee!

Ramon

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