

## Plastic Films and How to Cover With Them

By  
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Now that plastic films are permitted in the Wright Stuff events, there need no longer be the frustration over tissue coverings shrinking in dry conditions or having to cover wings in three pieces or cutting wood outlines while trying to trim excess paper. Plastic films are perfectly stable, easy to work with and can be lighter than tissue. It is very important to choose the right kind of covering because there is a wide range of choices. Some are too heavy and others are much too light and fragile. In the table below, thickness is given in microns (1 millionth of a meter) and density is in grams per square meter. The first three are too light. The thinnest is no longer available. Y2K and SO film are too fragile and have a very high dielectric constant, so they get full of static electricity unless the humidity is above 50%. These thinnest films might save you 0.2 gram over the 1.4 micron film, but are so difficult to work with that they definitely are not worth using. Besides, they are very expensive. SSS film is better, but still a bit fragile for these models. The .9 and 1.4 micron films probably are the best choices; they are easy to work with and are strong, but light. The previous standard WS covering, Japanese Tissue is at least 5 times heavier than these films. Some heavier films also can be used, but they become stiffer and harder to use. Two films that are commonly available locally, dry cleaner bags and produce bags from supermarkets, are not included in the table because they are variable in thickness, depending on the supplier. They may be perfectly usable, but need their densities measured before trying them.

Product	Thickness um	Density g/m <sup>2</sup>	Source	Colors
Y2K2	0.3	0.54	No longer available	bright yellow, blue
Y2K	0.5	0.7	Gene Joshu	bright red, green, blue
O-S Film	0.5	0.8	Tim Goldstein	bright red, green
PPP Film	0.7	?	Roy White	bright red, green
Super Ultrafilm, Polymicro Ultrafilm	0.9 1.4	1.2 2.2	Ray Harlan, Indoor Model Supply, Micro X	streaky medium red, green blue
			Ray Harlan, Indoor Model Supply, Micro X, Model Research Labs, Tim Goldstein	very dull red, green; almost clear
2um Clear Mylar	2	3.1	WES-Technik, David Lewis	clear
.012 oz Condenser Paper	?	5.3	Ray Harlan, Indoor Model Supply	translucent off-white
Gampi Paper	?	6.4 to 9.4	Campbell Model Supply, specialty art stores	opaque off-white
.020 oz Condenser Paper	?	8.8	Indoor Model Supply	translucent off-white
5um Clear Mylar	5	7.1	WES-Technik, David Lewis	clear
Esaki Tissue	?	11	FAI Model Supply, Campbell Model Supply, Micro X	solid colors
Saran Wrap	?	20	Grocery stores	clear

Attaching films is easy with a spray cement. With proper care, they can provide a lighter, more uniform adhesive for films than any brushed-on coating. Brushed-on adhesives are difficult to control and take much longer to apply. One of the best features of spray cement is that it allows repositioning of the film if a mistake is made while covering. The greatest thing about films is that you can cover the wing flat and add dihedral later.

The first step is to choose the right product. Many spray cements (such as 3-M's Spray-Ment) produce a cream-colored lacy pattern that is too heavy and is not uniform. Much more suitable are 3-M's Super-77 or 75, and Grumbacher- 548 with fine, transparent sprays. The Super 77 is a high-tack adhesive that now comes with an extra fan-spray nozzle ideal for indoor models. For the lightest covering, the Super 75 is best. It has a lower but more than adequate tack, and is formulated for temporary bonds. The air loads on indoor models is so low that this adhesive is essentially permanent. Grumbacher-584 sprays uniformly, has moderate tack, but is heavier than Super-75. It has an orange tint that makes it easier to see.

When setting up to cover a model, it is very smart to spray the model frames outdoors. This is the safest and least messy way to do the job. The cement will stay tacky for a very long time, so rushing back to the building board isn't a priority. If you must spray indoors, do it only in a garage and be sure it is well ventilated. This means fresh-air circulation (i.e. open windows). Also, cover the floor where you will spray with lots of newspaper, at least ten feet square.

To help see where you are spraying, try this: shine a flashlight horizontally across the spray zone a few inches above the floor. Turn out all other lights (or spray outdoors at night) when you spray. The aerosol droplets will reflect light from the flashlight so you can see them more easily. This is a good way to estimate how much cement you are applying, and where. A black plastic background also helps you see the droplets and can be cleaned with paint thinner.

The Spray cement is applied to the convex side of the ribs (top of the wing or stabilizer) only. Use just one pass on a narrow wing, and no more than two on a wider wing (one each for the leading and trailing edges). For Super-75 and Grumbacher-548, hold the can 12 to 24 inches above the frame. For Super-77, use 24 to 36 inches. Spray about one foot per second. You will be surprised how little adhesive is required. Remember, less is lighter. Another way to get a light coating is to spray up in the air and waft the model frame through the fine droplets as they descend. Two or three passes this way will be enough. Test the stickiness with a clean finger in several places around the frame. Even if it barely clings to your skin, it is enough.

Wright Stuff frames are quite stiff and let you use one of several covering techniques. First, you can lay out the film on a smooth workbench. Don't use the dining room table because later you will cut the excess film off with a pencil soldering iron. The sprayed frame is set onto the film sticky side down. Push down on one spar, getting it to stick; then, push down on the other spar. Finally, push on the ribs. Another way to cover is to put the frame on the bench, sticky side up and have two people hold the film, one hand

at each corner. Lower the film onto the frame, being careful not to stretch it tight. And still a third way is to put the film on the bench, smoothing out any big wrinkles. Build a heavy balsa frame from  $\frac{1}{4}$ " square at least 2" larger than the wing in both directions. It can be glued together with superglue. Spray it and the wing frame. Place the heavy frame on the film and cut off the excess with a pencil soldering iron (see below). Place the sprayed wing frame on the bench and lower the film frame over it, touching the film along the spars and tips. If the ribs have a lot of camber, the frame may need to be squeezed chord-wise to loosen the film and allow it to go over the ribs. There are many ways to cover a wing. Keep it as simple as possible and avoid stretching the film which might pull on the structure, just like that nasty tissue used to do.

Cutting off the excess film is easy with a pencil soldering iron (a 23 to 47 watt iron with a thin chisel tip is good). Not only is this much easier than trying to use razor blades, it seals the film edge and prevents rips that might propagate readily. Be sure the iron is hot. Some irons take several minutes to heat up. The iron can be rubbed against the balsa spars or tips. Move smoothly around the frame. Sometimes melted film builds up on the iron and then leaves a black glob on the frame. Clean the goo off the hot iron with coarse sandpaper once per frame.

A technique that helps to keep the big wrinkles out, makes it easier to apply the film, and makes the models fly slower without sacrificing any performance is to roll the film into a tight ball a couple of times. This produces hundreds of tiny wrinkles and gives the film a hazy appearance. It also gives it some spring so that the covering goes on smoothly. The spring is weak enough to not pull the outlines. The same frame or four-hands covering techniques described above still apply. When you pull the film out from the ball, don't stretch it so much that those tiny wrinkles begin to disappear. Stretch it just enough to remove the big wrinkles.

Dihedral in wings can be added at this stage. Cut long scarf splices in the spars. Starting at the outside of a dihedral rib at the inside of a spar, cut diagonally outwards and towards the center of the wing to get an angled cut about  $\frac{1}{4}$ " long (for  $\frac{1}{16}$ " spars). Do this for all four joints. Prop the tips up the amount called for on the plans. Note that if you cut the way described, the film holds the tip spars in place. Carefully spread the joint a little and put some glue in the opening. Push the tip spar against the center spar and repeat for the other joints. This kind of joint is a bit ugly, but has a lot of gluing area and is very strong. Also, any glue shrinkage is mostly chord-wise and won't change the dihedral angle. After it has dried for a couple of hours, the bottom can be sanded to clean up the ugliest film near the dihedral ribs will loosen a little. For small dihedral angles, don't worry about it. For large angles where there is pronounced sag, wet a very small brush in spray cement (from a spot sprayed on paper) and lightly dot the film five or six places along the dihedral rib. You may want to thin the cement with some toluene (Elmer's contact cement solvent) to make brush easier. When the dots get tacky, gently nudge the loose film against it with a thin flat (but dull) tool, or balsa sliver, from below the wing. Be careful not to push too much film onto the cement strip or the dihedral rib will bow excessively. If this happens, pull the film apart and rework it. This technique requires some practice. But remember, loose film is not too detrimental to long flights.

These covering suggestions should get you well on your way to Wright Stuff modeling without the frustrations encountered with paper. Soon you will be devising your own special techniques to further simplify the job. Good luck!

Vendors:

Tim Goldstein

[www.fid.biz](http://www.fid.biz)

[www.indoorduration.com](http://www.indoorduration.com)

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Model Research Labs

[www.modelresearchlabs.com](http://www.modelresearchlabs.com)

WES-Technik

[www.wes-technik.de](http://www.wes-technik.de)

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