

A Weight Comparison of Some Lightweight Coverings

Building a light airframe is as much a concern to the SAM (Society of Antique Modelers) flyer as it is to the electric flyer. SAM competition rules stipulate a minimum wing loading of 10 oz/sq.ft. for most classes (8 oz/sq.ft. for 1/2A Texaco) and many competition flyers, myself included, try to build to minimum weights. Among other strategies, this means using light covering materials.

The "ideal" covering for SAM power models would be a light material, smooth for easy cleaning (power models are messy!), resistant to puncturing and tearing (models often land in stubble), with enough stiffness and skin strength to withstand the stresses imposed by a big overpowered Class C ship screaming skyward, offered in colours that are visible at great heights, and easy to repair. In the distant past I have covered models with silkspan, silk, jap tissue, and nylon, and some of these coverings do exhibit the desired characteristics, but more recently I have succumbed to the convenience of the modern heat-shrinkable coverings in the form of Micafilm, Litespan, Polyspan, Airspan, and most recently, Ultracote Lite.

For my last sixteen airplanes, I have developed a habit of keeping copious notes during construction, with detailed records of weights of materials used. These include weights of my wing and other frameworks prior to and after covering. Several of my colleagues have asked me which covering I found the lightest, so I decided to do a quick analysis of the weights of the coverings for which I have some recorded data. But first, my comments on the four coverings that I compared.

Micafilm (by Coverite): A very strong covering, impregnated with omnidirectional mica fibers, smooth on one side and fibrous on the other, applied with Balsarite adhesive. I used only clear Micafilm (hard to find in stores): the transparent colours are heavier, and solid colours heavier again, and the addition of the colour layer kills the shrinkability of the film. This leaves the problem of how to colour the clear film. Dope will stick only to the fibrous side, leaving an outside surface that is impossible to clean. (A colleague of mine colours and trims the covering backwards before applying it to the aircraft. Then he applies the covering coloured side in, smooth side out!) Micafilm also has a nasty habit of wrinkling in strong sunlight. Sometimes it de-laminates under stress.

Litespan (by Solarfilm): A good-looking covering (looks like silk), good choice of colours, easy to trim by covering dark colours over light. It has a definite grain, and is applied with Balsaloc or Balsarite cement (I have also used Weldbond, and Uhu glue stick). Light colours have good shrinkability, darker colours lousy! Not a very stiff covering, so doesn't contribute much to torsional stiffness of the structure. Also tends to wrinkle in strong sunlight, but this can be reduced somewhat by adding a couple of coats of butyrate dope to the final covering. Puncture resistance is poor, but it is easy to make near-invisible repairs.

Polyspan (Starline International): Looks and feels very much like silkspan, except it is a heat-shrinkable, waterproof polyester fiber. Very strong along the grain, weak across the grain until you get the dope on. Applied with Balsarite, Balsaloc, or conventional clear dope. Comes in

white only so you have to dope it, and I find it needs at least 8 thin coats to fill the grain, but it is tight and really strong after doping, adding a lot of torsional rigidity to the structure. I use about 5 coats of clear nitrate, 1 coat of colour, and 2 coats of clear butyrate, but you can also add colour with aniline dye in the dope. I use dark Litespan for trim over the Polyspan.

Ultracote Lite (Goldberg): Thermal shrink film, complete with adhesive, approx. 60% of the weight of Ultracote. Comes in transparent colours only (I use only transparent white and violet). Applied in the same way as Ultracote. Covering is tight and stiff, adding considerable torsional strength to the structure. Smooth, easy to clean, relatively puncture resistant, but once a tear starts it keeps going. Does not wrinkle in the sun.

For weight comparisons, since three of the coverings involve adding adhesive and dope, I decided to look only at the weight of the total covering job after all trimming and finishing, on 16 wings in my records. I subtracted the ready-to-cover framework weight from the final wing weight in each case (in grams), doubled the wing area (wings are covered top and bottom) and calculated the final covering weight in grams/100 sq.in. for each wing. The results are as follows:

Model	Covering	Wing Area sq inches	Total Covering Weight ~grams	Covering Aerial Density			
				Grams/ 100 sq in.	Grams/ sq meter	Ounces / sq foot	Ounces / sq yard
Baby Playboy	Ultracote	288	14.1	2.45	38	0.15	1.36
Thermal Magnet	Ultracote	636	33.1	2.6	40	0.16	1.44
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Spirit	Polyspan	677	37.9*	2.8	43	0.17	1.55
Lanzo Bomber	Polyspan	1260	114.2	4.53	70	0.28	2.51
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Kerswap	Litespan	288	19.1	3.32	54	0.20	1.84
Puddle Master	Litespan	396	33.6	4.24	66	0.26	2.35
Hornet	Litespan	564	47.4	4.2	65	0.26	2.33
Buccaneer	Litespan	635	42.8	3.37	52	0.21	1.87

Std.							
Brooklyn Dodger	Litespan	375	24.6	3.28	51	0.20	1.82
Westerner	Litespan	245	22.3	4.55	71	0.28	2.52
Jr. Playboy	Litespan	430	34.9	4.06	63	0.25	2.25
Cabin Playboy	Litespan	475	33.6	3.54	55	0.22	1.96
Miss Canada	Litespan	329	26.8	4.07	63	0.25	2.25
Speedy Bee	Litespan	475	37.4	3.94	61	0.24	2.18
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Jr. Playboy	Micafilm	430	27.4	3.19	49	0.20	1.77
Flyabout	Micafilm	310	17.1	2.76	43	0.17	1.53
(*note: this weight includes only the first 4 coats of dope, and no trim.)							

Average weights from the data above are:-

Ultracote Lite	2.53 gm/100sq.in.
Polyspan	3.67 gm/100sq.in.
Litespan	3.86 gm/100sq.in.
Micafilm	2.98 gm/100sq.in.

However the data seem to show that the Ultracote Lite comes out as the lightest of these covering jobs, so that is what I am continuing to use for my competitive endurance ships. It has the added advantage of a smooth surface for clean up, the transparent white colour aids visibility against a blue sky (it glows as the sun penetrates it), and the covering stays taught in the sun.