Aircraft Covering
Polyfiber System
How to Cover an Aircraft Using the Poly-Fiber System

By Jon Goldenbaum
Polyfiber Covering System

• Poly-Fiber is the world's best-selling fabric-covering system.
• For over forty years, the all-vinyl Poly-Fiber system has proven to be the easiest to use, most forgiving.
• The system is designed for first time users as well as experienced restorers.
• Poly-Fiber lasts over 25 years in outdoor storage, does not burn, and can be applied in high humidity and varying temperatures.
• Poly-Fiber comes with a choice of topcoat paints.
Poly-Tak Cement

USE:
A high-strength, fast-drying, one-part cement manufactured from a proprietary formula especially to attach polyester fabric to an airframe. It is FAA approved with the Poly-Fiber STC for use in making a 2" overlap cement seam on the wing leading edge and a 1" overlap cement seam on the balance of the aircraft, regardless of the wing loading or maximum speed (Vne). Poly-Tak is also an excellent cement for cotton, linen, and glass fiber and will adhere to most surfaces for shear load bonding. Add Methyl Ethyl Ketone (MEK) when necessary to reduce viscosity due to solvent evaporation from an open container.

SHELF LIFE:
Guaranteed two years unopened in protected storage under 100°F. Not affected by freezing. Do not use if appears dark or whiskey colored. Poly-Tak should be clear. Discolored cement has been heat damaged. Test adhesion of fabric to bare aluminum if storage temperature exceeds 100°F. for several months or guaranteed shelf life has expired.

PACKAGING:
One-pint, one-quart and one-gallon 50 plate tin-lined cans
Poly-Brush Coating

USE:
Poly-Brush is a high-solids, one-part, air-drying adhesive coating formulated for the first and second coats to penetrate and seal the fabric weave and attach all polyester finishing tapes and reinforcing patches. It provides twice the peel resistance as nitrate dope on polyester fabric.

Poly-Brush is thinned 3 to 1. We add a small quantity of red oxide pigment as a visual aid for application uniformity. The original untinted Poly-Brush is available on request and recommended in the cockpit or cabin areas where the backside of the fabric will be visible in normal operation. Red oxide tinted Poly-Brush will be shipped unless untinted is specified.
Poly-Spray UV block Coating

USE:
A high-solids, one-part aluminum-pigmented, air-drying coating used to protect the fabric from ultraviolet damage and as a sanding base to develop a smooth finish. Reduce 4 to 1 with Poly-Fiber Reducer. Refer to this manual for detailed application instructions.

COVERAGE:
Approximately 200 sq ft per gallon.

SHELF LIFE:
Guaranteed four years unopened in protected storage. Avoid long-range storage above 100°F. Not affected by freezing.
USE:
A durable one-part, air-drying flexible coating available in 50 popular aircraft colors. Poly-Tone is non-shrinking, non-bleeding, fire-retardant, chemical-resistant, and is used on both metal and fabric. It air dries to a satin gloss finish.

SPRAYING EQUIPMENT:
Poly-Tone may be sprayed with any equipment rated for lacquer and enamel. Clean the equipment with Poly-Fiber Reducer or Methyl Ethyl Ketone.

COVERAGE:
One gallon of Poly-Tone will cover approximately 200 sq ft (18m2) with one coat.

DRYING TIME:
Dust free in 20 minutes. Allow 12 hours drying before using masking tape.

THINNING:
Poly-Tone is always thinned 4 to 1 with Poly-Fiber Reducer R 65-75 in normal 65°-7 Retarder Reducer in temperatures of 85° and up. Add Blush Retarder BR-8600 as needed in hot humid weather.
FINISHING NEW FABRIC SURFACES:
After the Poly-Spray according and the last coat has dried approx. 1 hour, apply a minimum of 2 coats of Poly-Tone, allowing at least two hours drying time between coats. The fresh coat must remain wet for a few minutes to flow out and provide a satin gloss surface. Poly-Tone may be lightly wet sanded with 400-grit or finer wet-or-dry sandpaper between coats after drying 2 hours or longer.

FINISHING METAL SURFACES:
We recommend priming with EP-420 Epoxy Primer. Epoxy primer must be scuff sanded to provide tooth adhesion.

SHELF LIFE:
Guaranteed four years unopened in protected storage. Avoid long-range storage above 100°F. Not affected by freezing.

PACKAGING:
One-quart and one-gallon cans.
NEVER ORDER BY NAME ALONE! Paint companies often use the same name for different colors. For example, Poly-Fiber Juneau White and Randolph Juneau White DO NOT MATCH! Use the color chips from the appropriate company to select your paint. Our chips are actual paint sprays and represent the actual colors. Gloss levels vary among products.
<table>
<thead>
<tr>
<th>Covering System</th>
<th>STC #</th>
<th>Allowable Fabrics</th>
<th>Base</th>
<th>Cement</th>
<th>Filter</th>
<th>UV Block</th>
<th>Topcoats</th>
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<tbody>
<tr>
<td>Air-Tech</td>
<td>SA7965SW</td>
<td>Ceonite™ Poly-Fiber™ Superlite™</td>
<td>Urethane</td>
<td>UA-55</td>
<td>PFU 1020</td>
<td>PFU 1020</td>
<td>CHSM Color Coat</td>
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<td></td>
<td></td>
<td></td>
<td>Water</td>
<td></td>
<td>PFU 1030</td>
<td>PFU 1030</td>
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<tr>
<td>Ceconite™/Randolph System</td>
<td>SA4503NM</td>
<td>Ceonite™</td>
<td>Dope</td>
<td>New Super Seam</td>
<td>Nitrate Dope</td>
<td>Rand-C-Fill</td>
<td>Colored Butyrate Dope Ranthane Polyurethane</td>
</tr>
<tr>
<td>Stits/Poly-Fiber™</td>
<td>SA1008WE</td>
<td>Poly-Fiber™</td>
<td>Vinyl</td>
<td>Poly-tak</td>
<td>Poly-brush</td>
<td>Poly-spray</td>
<td>Vinyl Polytone, Aero-Thane, or Ranthane Polyurethane</td>
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<td>Stewart System</td>
<td>SA01734SE</td>
<td>Ceonite™ Poly-Fiber™</td>
<td>Water-borne</td>
<td>EkoBond</td>
<td>EkoFill</td>
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<td>EkoPoly</td>
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<td>SA00478CH</td>
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<td>Urethane</td>
<td>U-500</td>
<td>Dacproofer</td>
<td>SrayFill</td>
<td>Tinted Butyrate Dope Superlite™ CAB</td>
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<td>• System I and others</td>
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<tr>
<td>• System VI</td>
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<td>Urethane</td>
<td>U-500</td>
<td>SF6500</td>
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<tr>
<td>Fabric Name or Type</td>
<td>Weight (oz/sq yd)</td>
<td>Count (warp x fill)</td>
<td>New Breaking Strength (lb) (warp, fill)</td>
<td>Minimum Deteriorated Breaking Strength</td>
<td>TSO</td>
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<tr>
<td>Ceconite™ 101</td>
<td>3.5</td>
<td>69 x 63</td>
<td>125,116</td>
<td>70% of original specified fabric</td>
<td>C-15d</td>
<td></td>
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</tr>
<tr>
<td>Ceconite™ 102</td>
<td>3.16</td>
<td>60 x 60</td>
<td>106,113</td>
<td>70% of original specified fabric</td>
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<tr>
<td>Polyfiber™ Heavy Duty-3</td>
<td>3.5</td>
<td>69 x 63</td>
<td>125,116</td>
<td>70% of original specified fabric</td>
<td>C-15d</td>
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<tr>
<td>Polyfiber™ Medium-3</td>
<td>3.16</td>
<td>60 x 60</td>
<td>106,113</td>
<td>70% of original specified fabric</td>
<td>C-15d</td>
<td></td>
<td></td>
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<tr>
<td>Polyfiber™ Uncertified Light</td>
<td>1.87</td>
<td>90 x 76</td>
<td>66,72</td>
<td>uncertified</td>
<td></td>
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<tr>
<td>Superflight™ SF 101</td>
<td>3.7</td>
<td>70 x 51</td>
<td>80,130</td>
<td>70% of original specified fabric</td>
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<td>Superflight™ SF 102</td>
<td>2.7</td>
<td>72 x 64</td>
<td>90,90</td>
<td>70% of original specified fabric</td>
<td>C-15d</td>
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<tr>
<td>Superflight™ SF 104</td>
<td>1.8</td>
<td>94 x 91</td>
<td>75,55</td>
<td>uncertified</td>
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<tr>
<td>Grade A Cotton</td>
<td>4.5</td>
<td>80 x 84</td>
<td>80,80</td>
<td>56 lb/in (70% of New)</td>
<td>C-15d</td>
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</table>

### Fabric Performance Criteria

<table>
<thead>
<tr>
<th>Loading</th>
<th>$V_{NE}$ Speed</th>
<th>Type</th>
<th>New Breaking Strength</th>
<th>Minimum Breaking Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 9 lb/sq ft</td>
<td>&gt; 160 mph</td>
<td>≥ Grade A</td>
<td>&gt; 80 lb</td>
<td>&gt; 56</td>
</tr>
<tr>
<td>&lt; 9 lb/sq ft</td>
<td>&lt; 160 mph</td>
<td>≥ Intermediate</td>
<td>&gt; 65 lb</td>
<td>&gt; 46</td>
</tr>
<tr>
<td>&lt; 8 lb/sq ft</td>
<td>&lt; 135 mph</td>
<td>≥ Lightweight</td>
<td>&gt; 50 lb</td>
<td>&gt; 35</td>
</tr>
</tbody>
</table>
A light weight polyester is 1.7 ounces per square yard of material and is good for very light and slow aircraft.

Heavier cloth, at 3.4 oz./sq. yd., is suitable for faster aircraft. It's marked for reference, but the feel is distinctive.

<table>
<thead>
<tr>
<th>Fabric Type</th>
<th>Weight</th>
<th>Thread Count</th>
<th>Breaking Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>1.7 oz./sq.yd.</td>
<td>92 x 76/in.</td>
<td>67 lb./in.</td>
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<tr>
<td>Medium</td>
<td>2.7 oz./sq.yd.</td>
<td>68 x 62/in.</td>
<td>102 lb./in.</td>
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<tr>
<td>Heavy</td>
<td>3.4 oz./sq.yd.</td>
<td>68 x 56/in.</td>
<td>125 lb./in.</td>
</tr>
</tbody>
</table>

Medium Poly-Fiber Fabric Measured 70 Wide with a Weight of 2.8 Oz. It is a Heavier and Stronger Fabric Style for Normal Service on Aircraft.
PolyFiber Fabric MEDIUM-3 grade

Considered our standard fabric, it is recommended for normal service and is widely used on all types of aircraft, regardless of wing loading or horsepower.

**Recommended Aircraft:**
All classics, antiques, and contemporary designs that anticipate normal on-airport operations.

**Specifications:**
- Thread Count -- 73 x 65/in
- Breaking Strength -- Avg 105 lbs/in
- Weight -- 2.79 oz/sq yd
- Tear Strength -- Warp 98 lbs, Fill 113 lbs
PolyFiber Fabric HEAVY DUTY-4 grade

Our extra heavy-duty fabric recommended for the most severe operating conditions and very high-wing loading aircraft. Its large filament size and high strength provide excellent resistance to rock penetration and tearing, characteristics required for trouble-free bush and agricultural operations. It is suitable for all aircraft where a very tough, durable, low elongation, high-tension fabric is required.

**Recommended Aircraft:**
Aerobatic and bush planes, ag aircraft, and warbirds.

**Specifications:**
- Thread Count -- 144 x 57/in
- Bursting Strength -- 279 psi
- Weight -- 3.4 oz/sq yd
- Tear Strength -- Warp 108 lbs, Fill 119 lbs
- Breaking Strength -- Avg 113.5 lbs/in
PolyFiber Fabric (uncertified) LIGHT grade

Our light-weight fabric is recommended for covering plywood surfaces on any aircraft and any ultralight aircraft that is not certified. **On certified aircraft, it is only approved for covering plywood surfaces.** This fabric will be unstamped.

**Specifications:**
- Thread Count -- 90 x 76/in
- Bursting Strength -- 156 psi
- Weight -- 1.87 oz/sq yd
- Tear Strength -- Warp 66 lbs, Fill 72 lbs
- Breaking Strength -- Avg 69 lbs/in
Tapes

TapeMedium 2 inch & 4 inch Poly-Fiber - 50 Yard Roll
Straight Medium Tape;
Standard Width for Ribs and Longerons.

TapeBias Tape Poly-Fiber - BIAS2 - 2 inch
- 25 Yard Roll
Bias Cut Tape; The Weave of Bias Tape is Aligned at 45 Degrees from the Edge.
Bias Tape Forms Around Curves Only!
Inter-Rib Bracing Tape Poly-Fiber - IRT - 36 Yard Roll

Poly-Fiber reinforcement tape ½ & ¼”-
Curved Tip Rib Needle 18 - RNC18

Straight Rib Needle 18 - RN18

Rib Stitch Needle 3 - CN3

Round Rib Lace Cord Poly-Fiber - TS
STEPS OF FABRIC COVERING

Most methods of fabric covering will enlist essentially the same steps. The following are found in a typical fabric covering process:

- Removal of old fabric (restorations)
- Preparation of surfaces
- Inspection of surfaces
- Selection of fabric type
- Attachment of fabric to structure
- Shrinking fabric
- First chemical coat
- Securing fabric to wings and control surfaces
- Taping, inspection holes, and drain grommets
- Spraying initial coats of chemicals
- Protecting fabric from UV rays of the sun
- Application of color coats & trim
There are seven major problems encountered in covering.

These problems include:

1. Inadequate preparation of surfaces to be covered
2. Selecting the wrong weight of fabric for the airplane
3. Improper tautness of the fabric after it has been applied
4. The 1st chemical coat improperly applied
5. Inadequate protection from the UV rays of the sun
6. Topcoat problems
7. Not following the procedure manual
- At 250° F [120° C] the fabric will shrink about 5%
- At 350° F [175° C] the fabric will shrink around 10% – 15% (the maximum obtainable)
- At 375° F [190° C] the fibres start to soften and the fabric starts losing tension.
- At 450° F [230° C] the fibres are nearing the melt point.
Tools You'll Need

Let's Start With an Ideal List

- Fuselage holding and turning jig. We'll talk about this in a minute.
- Sturdy sawhorses, about 3' high; pad the tops with carpet scraps; great for wings and tail surfaces. We'll go into detail about this later.
- A nice big sturdy snug-free table will make handling and cutting fabric much easier.
- Drop cloths to protect floor, cover airframe parts, etc.
- An electric clothing iron. Don’t use your wife’s!
- A small “sealing” iron. Great for tapes, patches, and hard-to-reach areas.
- Thermometers to calibrate irons.
- Heat sink compound.
- An effective respirator, plus extra replacement filters.
- Brushes: 1”, 2”, 3”, and 4”.
- Glue brushes, 1/2” wide (acid brushes are good).
- Sandpaper: 400-grit wet or dry.
- Two 12” straight and two 12” curved rib lacing needles.
- Sharp scissors; polyester fabric dulls them quickly, so buy several pairs of cheap ones.
- Pinking shears. Buy a good pair and wear them on a cord around your neck while using them; if you drop them, they’re ruined.
- Sharp X-Acto or other knife.
- Paint spray gun and accessories.
- Cotton rags. Do NOT use shop rags; they aren’t clean enough and residual silicon will ruin your work.
- Paper towels.
- Scotch-Brite pads, ultra fine.
- Single-edge razor blades. Big box.
- Chalk snap line.
- Measuring tape.
- Paint stirring paddles.
- Paint filter cones. 60x48 mesh.
- Soup ladle.
- Lots of clean soup and coffee cans with tight lids.
- Small wide-neck container to use as a glue pot.
- Craft masking paper (don’t use newspaper).
- Six spring clamps with 2” throats for holding fabric.
- Wooden spring clothespins. Great for fabric work.
- T-head pins.
- Tack cloths - for cleaning just before painting.

Fuselage Holding & Turning Jig

You can make a simple jig from two by-fours, as shown here. The center square of the two-by-four “T-tac-Tac” grid bolts to the front of the fuselage using the engine mount bolt locations. Make the legs long enough for the fuselage to sit level with the tail resting on one of your sawhorses. You and your helper can then turn the fuselage whenever needed.

Inter-Rib Bracing

This bracing keeps the ribs straight up and down when the fabric is heat tightened over them. It is nothing more than twill tape to provide stability for the ribs while covering. As the drawing shows, the tape is looped around the top capstrip of the first rib halfway between the front and rear spars. Then it loops the bottom capstrip of the next rib, and then back to the top capstrip of the next rib, and so on until the whole wing is braced.

When complete, the inter-rib brace looks like a series of “Xs” in each rib bay. It is important to only loop the inter-rib bracing without tying it to each rib, except at the very ends. If you tie it, the ribs won’t be able to move and readjust their positions during the tightening process. This bracing is not removed.
- All seams require at least a 1” overlap of the two pieces of fabric.

- Wing leading edge seams require a 2” fabric overlap.

- Wing trailing edge seams require a 1” fabric overlap.

- Cement the trailing edge as before. For the best overlap seam, heat-form the top fabric around both sides of the trailing edge, and cement it to both sides. That will give you more than the required 1” overlap and a very strong seam.

If your trailing edge fairing is at least 1” wide, you can simply cement the fabric to the top of the trailing edge and trim the fabric off flush without wrapping it around. That would make a legal 1” overlap also.
Starting at the butt rib, brush a strip of Poly-Tak about 2" wide (1" each side of the center line) and 12" to 24" long along the leading edge where the fabric will be attached. Line up the fabric edge with the appropriate cement line.

Cement the leading edge, aligning it to the lowest chalk guide line.

That line is now covered by the bottom fabric and may be hard to see. If so, re-chalk it.
Here is an example of properly protecting the fabric from sharp edges; use only enough tape to do the job.

This picture illustrates fabric cement being applied just prior to placing the fabric onto the structure.

After gluing the fabric to the structure, you can carefully trim it using a single edge razor blade.
Now start rolling and heat-forming the fabric around the tip bow with the iron set at **225 to 250°**. Roll and form the fabric as far as you can to the inside of the bow.

Place the ironing board under the fabric about a foot in from the bow. Tighten this area first at **250°**. This will help the heat-forming of the fabric at the tip. If you tighten the center of the radius, it makes it easy to make the curve at the bow.

When you have the fabric well formed to the inside of the bow, cement it down. Try to cement it in one application, rather than in short sections. You have to work fast, but you'll get fewer wrinkles.

**A neat way to trim** is to use single edge razor blade. Hold it firmly on the surface, and pull the fabric into the blade. Don't slice with the blade; you could cut the primer or fabric below.

Pull hard on the fabric around the bow and apply heat. The trick is to get the fabric wrapped around the bow at least an inch. More is even better. Whenever you can, wrap all the way around to the inside of the tube so the seam won't show.

At some point, you'll have to turn the wing right side up to wrap the bottom fabric around the bow tubing.
3. Tune Up Your Iron!

From this point on you will be using your iron to install fabric and smooth out any wrinkles that appear. Now’s the time to prepare your iron for use.

The only authorized heat source for accurate control of the temperature transferred to fabric is a CALIBRATED CLOTHING IRON. Period.

Heat Guns? No!

How come you can’t use your heat gun? Because there’s no way to calibrate it, and the temperature changes as the gun’s distance from the fabric changes. You run a tremendous risk of permanently loosening your fabric and ruining all your nice work. Leave the heat gun for removing paint and for emergency corn popping.

The Right Iron

Avoid Any Iron With an Automatic Shutoff!

Understand that individual irons vary. It helps if your iron is rated at 1100 watts or higher.

There may be some non-load carrying areas that can’t be reached with a standard size iron, places where exact fabric tension is not important as long as the wrinkles are removed. For these areas we recommend a small 150-watt heat sealing iron.

It’s available through Poly-Fiber distributors. It should be calibrated the same as your large iron and used only to smooth the edges of trim tapes and patches and in areas not subjected to flight loads because these little irons can’t maintain their temperature in contact with a large heat sink area.

Why Calibrating Your Iron Is So Important

Polyester fabric does different things at different temperatures, and we take advantage of this to make the fabric do what we want when we want it.

- 225°F is used to smooth the edges of finishing tapes and patches, heat form fabric around corners, and remove fold creases.
- 250°F is used for the initial tightening and to smooth wrinkles from seams before final heat tightening.
- 350°F is for the final tightening.
- Above 350°F the fabric gets looser, permanently looser!

At about 375°F polyester filaments start to thermo-soften and lose all measurable tension. At 415°F they start to disintegrate. Not good at all. You can see why calibration is so important. Don’t just guess or assume your iron’s dial is accurate.

How to Calibrate Your Iron Correctly

You need an accurate thermometer with a stem that can be placed in contact with the plate of your iron, plus some silicone heat sink compound, available from Poly-Fiber distributors.

An accurately calibrated low-cost glass thermometer is available through Poly-Fiber distributors. A deep fry, candy and jelly thermometer, available at hardware stores, is another economical choice.

Remove the protective glass shell, check the calibration in boiling water (212°F at sea level), then secure the calibration card with cement.

- Put a nice big blob of heat sink compound on the bulb end of your thermometer.
- Build a ½-inch-thick stack of dry paper towels on your workbench.
- Lay the thermometer bulb in the center of the paper towels. Place your iron on top of the thermometer bulb and the towels. Make sure the bulb is in contact with the plates of the iron.
- Advance your irons heat control knob and watch the thermometer. Give your iron time to change temperature, and give the thermometer time to react.

When the thermometer has settled down at 225°F, mark your iron’s dial. Use something visible and removable. You’ll probably have to change your calibration marks at some future time.

Now do 250°F and 350°F.

Your iron should hold the desired temperatures, ±10°F. It should be recalibrated at the start of each new covering project or if it is dropped.

Always use the same extension cord.

SUPER IMPORTANT!

After calibrating is finished and your iron has cooled, carefully remove all traces of silicone heat sink compound from the sole of your iron!

The latest and quickest (although more costly) way to calibrate your iron is with a temperature sensing gun, available through Poly-Fiber distributors. You simply point the laser beam at the sole plate of the iron for a quick and accurate reading of the iron’s temperature. Then record 225°F, 250°F, and 350°F temperatures on the tape-covered dial.
The iron is being used to smooth out wrinkles in a tape that is covering a curved surface.
Applying Poly-Brush to the leading edge of a control surface. Note how the brush is being held.

When applying Poly-Brush, be sure to use a good quality brush, and use even strokes. It is not necessary to continue over the same area more than once.

Care must be taken when applying Poly-Brush around the leading and trailing edges to avoid getting a large buildup on these areas.
The completed surface shows tapes in place. Note the areas of excess Poly-Brush that appear to be runs beneath the fabric. This is normal, as the liquid will collect on the bottom side of the fabric. Do not allow it to drip to the other side, however.

Use a cardboard template to help locate the rib spacing on the bottom of the wing. This is necessary because most wings are not symmetrical.
After laying the tape in place, you can go back over the tape lightly with a brush to make it smooth and brush out wrinkles.

Tapes come in several widths. The most common widths are pictured: 2 inch, 3 inch and 4 inch.
Application of a tape on a leading-edge area is very similar to taping a wing rib.
Again, coat the area with thinned Poly-Brush and work the tape on both sides of the leading edge.

You can use straight tape or biased tape on a curved surface. Again, cut the tape to roughly fit prior to beginning the application.
After applying the tape, it can be formed to the curve using heat smoothing with an iron set at 225°.
Make sure your iron is calibrated, as any hotter will deform the tapes.

You can work a straight tape around a curved area as shown.
The advantage of a linear or straight tape, as opposed to a bias-cut tape, is that there are no seams to deal with during the application.
Place a piece of smooth fabric over each inspection ring. Cut to fit using pinking shears. You can trace the outline of this patch using a 1-gallon can as a pattern. Place the can on the fabric and trace around the bottom of the can. The size will be just right to cover the inspection plate.
The edges of a patch on fabric covering can be smoothed using an iron set at 225° F.

The initial shrinking of a fabric surface is done at 250°. After this ironing, a final shrinking should be accomplished using 350° F.
Allow each cross coat to dry thoroughly before applying the next one. If too much time has passed between coats, you may need to do a light sanding of the surface before spraying.

Fix any problem areas or imperfections that show up after the initial coat before applying subsequent coats. You will almost certainly have to sand between coats to accomplish a nice finish.
Using cement alone is a recent idea that came out of the ultralight movement. The theory was that since the speeds and wing loadings were low, you didn’t need mechanical attachments. However, many kit planes have evolved from enclosed ultralights to high-horsepower firebreathers. Some have 180 HP! **They need to be rib laced!** Additionally, any ultralight or very light aircraft you plan on keeping for more than just a couple of years needs **RIB LACING.**

Aircraft fabric cement is made for shear loads, not peel. But in flight, an aircraft is subjected to constant peel loads from the center of lift on the top of the wing. The giant vacuum cleaner called *lift* is always trying to peel your wing fabric off the top surface.

Aircraft fabric cements were never designed to resist this peel force. And certainly not for the long service lives fabric covering jobs can last today.

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**How Far Between the Laces?**

Let’s start with how to plan and lay out rib lace spacing. This works for screws and rivets, too.

Take a look at this chart:
A. Start by inserting the threaded needle into the pre-punched hole on the right side of the reinforcing tape. Guide the needle through the wing and out the bottom pre-punched hole directly below the top hole.

B. Leaving a tail of thread on the top of the wing, pull the needle out the bottom. Cross to the left of the bottom reinforcing tape, insert the needle into the pre-punched hole on the left side of the tape. Push the needle and thread all the way back up inside the wing and out through the pre-punched hole on the left side of the top reinforcing tape.

C. Pull the needle out with thread attached, but don't pull all of the thread out. You will have a short end of the thread (about 4 to 5 inches) on the right side of the top reinforcing tape and a lace of thread running from the top through to the bottom on the right side of the rib and back up to the top on the left as illustrated.

Now you're ready to tie the **Starter Knot**.

**The Starter Knot**. This handy knot is used when you start a sequence of rib lacing. It is simply a square knot with a half hitch on each side.

1. Tie a square knot by passing the short end of the cord through the folded back loop.

2. Look the tightened square knot with a half hitch on each side.

3. Route the needle back through the starting hole. Bring it back out through the next hole all on the same side of the rib cap. Pull the square knot inside the wing.

4. Route the needle back in through the same exit hole, and then cut again through the corresponding hole on the opposite wing surface. Leave about a 3' loop when the needle is pulled clear.

5. Cross over the rib cap, and return the needle. As the needle emerges, orient the loop as shown and pass the needle up through it. This is the beginning of the modified sennit knot.

The starter knot can also be used as a single lace in places where you cannot tie continuous sennit knots. If you have a lot of tape, you could lace your entire airplane with starter knots.
6. Pull the needle clear. Use the tip of the needle to reach under part B of the loop, hold part A, and pull it toward your starting point.

7. Rotate the needle clockwise, twisting the captured part A. Route the needle tip over part A, then under part B.

8. Now pass the needle over cord part C and pull it through. Hold part C perpendicular to the fabric while you pull to keep the cord from getting tangled.

9. Pull part C perpendicular to the fabric to remove all slack in the lacing cord back to the last rib lacing knot, while working the loose knot over to the right side. Do not pull on part D.

10. With all slack removed by pulling part C, hold the loosely-formed knot with your thumb. Pull firmly on part D, perpendicular to the fabric surface, to secure the finished knot.

11. After completing an entire rib, tie off the last modified scene knot with a half-hitch.

What if you run out of cord halfway through the rib? Tie it off with a half-hitch, and start again at the next set of holes with a starter knot and a new length of cord.

Sometimes you can’t get through the entire strap to rib lace normally. Hidden structure, fuel tanks, etc. may preclude tying around the whole rib.

In this case, you can lace to just the cap. Use a curved needle to be a single starter knot.

A. Go in on one side of the rib cap, and come out on the other.

B. Go back in through the exit hole, then come out opposite the first entry hole.

C. Now you can tie a starter knot.
Figure 2-6: Standard single-loop lacing.
Pull cord section "D" perpendicular to the fabric surface to remove all slack in the cord back to the last nb facing knot while working the loose knot to the right side. Do not pull cord section "E."

After all slack is removed by pulling cord section "D," switch hands and place a thumbnail on the loose knot formed on the right-hand side, then secure the knot by pulling firmly perpendicular to the fabric surface on cord section "E."
Alternative covering systems

Eko Primer/Sealer is a high quality water based primer/sealer for use on many substrates.

EkoFill serves four (4) purposes.
1. EkoFill is a fabric sealer
2. EkoFill fills the weave of the fabric
3. EkoFill is a UV Block
4. EkoFill is a primer coat.

EkoBond is a revolutionary water based cement for the application of fabric.