Scale rib-stitching on models

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SCALE RIB-STITCHING ON MODELS

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The earliest aircraft wings were designed with highly under cambered bird-like airfoils and the established way to maintain that airfoil was to 'sew' the fabric to every rib every few inches. Long needles were used to puncture the surface of the Irish linen covering and pull waxed thread through the wing, around the rib and back to the starting point where a special knot was tied before moving on to the next 'stitch'. Rib stitching was also used to fasten fabric covering to aerodynamic tail surfaces like vertical stabilizers, rudders, elevators, and horizontal stabilizers.

When aircraft construction and repair was codified, or certified, comprehensive rules for rib stitching were laid out that are still used on modern aircraft with fabric covering. Why do we care? Well, the rib stitching can be very visible and any meticulous builder will be concerned with replicating visible details to impress judges, or casual observers. The obvious work involved shows a serious effort has been made to present a really well done scale model.

Rib stitching is most effective on larger scale models because on models in the 1:6 scale and smaller the stitches and 'pinked' (serrated) edges of the reinforcing tape are too small to be seen at a reasonable viewing distance of, say, 10 feet. That would be like viewing the full-scale aircraft at 60 feet and small detail just can't be seen. A 1:3 scale model would be the equivalent to seeing the full scale from only 30 feet so small detail might be obvious.

We don't need to sew our covering on because model coverings are held on by heat activated adhesive combined with colors in Monokote type covering, or the finishing material used on the fabric covering. Even under cambered airfoils can be attached safely in this way.

There are three components needed to apply scale rib stitching to a model wing or tail surface. On a full scale aircraft fabric 'tapes' are applied to each wing rib, the covering is slipped over the surface, attached at the edges and shrunk to a smooth surface. Then more reinforcing tape is applied over the covering at each rib and the stitching is done in a prescribed spacing using a prescribed method. A coat or two of 'dope' (paint) would then be applied to partially seal the covering.

Aircraft mechanics would follow the manufacturers spacing for the stitching, or would look in the FAA Advisory Circular AC 43.13-1 titled Approved Aircraft Maintenance practices for an approved spacing. In the aircraft's slip stream the spacing would be no more than 2" apart with all other spacing dependant upon the aircrafts maximum approved airspeed.

There are a number of ways to simulate the stitching, including white glue stitches or bits of thread glued down on the simulated tape which can be cut from paper or plastic for ease of application.

Only the surface tape over each rib, the stitching, and the reinforcing 'pinked' tape overall is needed for models. Two inch wide pinked tape is normal on wing ribs with three inch or four inch tape reinforcing trailing edges and tips. For a 1:5 scale model two-inch wide tape would be 0.4" wide and 1:4 scale would be 0.5" wide.

Modern pinked tapes have six to eight 'pinks' per inch while WWI tapes were usually just 'frayed' along the edge to keep edges under control. In-between years used simple straight cut edges to further confuse the issue. For smaller scale edges just use straight cut tapes. At 1:4 scale

six pinks per inch would scale at 24 pinks per inch. Too small to be practical, but fifteen to sixteen pinks seem to look ‘right’ on a model to the untrained eye.

Hand operated pinking shears were first patented in 1893 to provide a fray resistant zigzag edge to cloth but not used for aviation until approximately the 1930’s, A later patent was issued to the Wiss Cutlery company but I do not know the difference between the two designs. There is a modern paper cutting pinking scissors but that tool does not work well on fabric at all.

I know of three sources for model-sized tapes. For years modelers have used paper curling tape designed to help women curl their hair. It is inexpensive but has a rough ‘furry’ texture that requires some effort to fill with paint.

F & M Stits Enterprises offers real polyester cloth pinked tape in several widths and it matches the cloth type model coverings very well. The 0.5” width tape can be pulled across a hot Monokote iron so it shrinks to 0.4” for 1:5 scale models. The web site for Stits is www.stits.com and materials can be ordered on-line along with paints and instructions.

A newer source is Pink-It at www.poink-it.com where they offer 0.4” wide 180 ft rolls of tape in six foot lengths for $56.00. The site is informative.

In the end, pinked tapes on models are almost always not in scale, but, they do add a degree of realism to a model of the older aircraft designs. Oh, by the way, many WWII military aircraft used fabric covered control surfaces to keep the surface lightweight and flutter resistant. Many of them also used wire ‘clips’, wires, or screws in place of the thread stitching although the protective pinked tape was applied.

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