

## ***Pre-Paint>Wings>Fit ailerons***

### **Objectives of this task:**

In this task the ailerons and the pre-mould strips will be sized and trimmed, then flocked onto the wings and glassed in place, and the next day the ailerons will be fitted to the wings.

### **Materials and equipment required:**

Card #5JT "Aileron" for the hinges

Epoxy resin and flock

Length of flat timber 150m x 1250mm, one side covered in brown packing tape

Pavers or half bricks for weights to hold the pre-mould strip in place while the flock cures

### **Size the ailerons and pre-mould strips**

For this step you will need to work on both wings together.

Mount the flaps temporarily with just the bolts and spacers, holding them in the fully retracted position with strips of tape over the top of the flap onto the wings.

Check the distance from the inside of the wing tip to the outboard end of the flap: the distance should be very close to equal for both wings, and in the range of 1215mm to 1220mm. If the distance is not equal for each wing then it may be necessary to trim the end of one flap slightly, but check the aileron lengths first.

With each wing right side up, lay the aileron in place on the wing and use a ruler or straightedge to line the aileron drive arm up with the aileron cable slot that was cut previously in the [Pre-Paint>Wings>Cut aileron cable inspection opening](#) task. The drive arm should very slightly (~1-2mm max) overlap the slot.

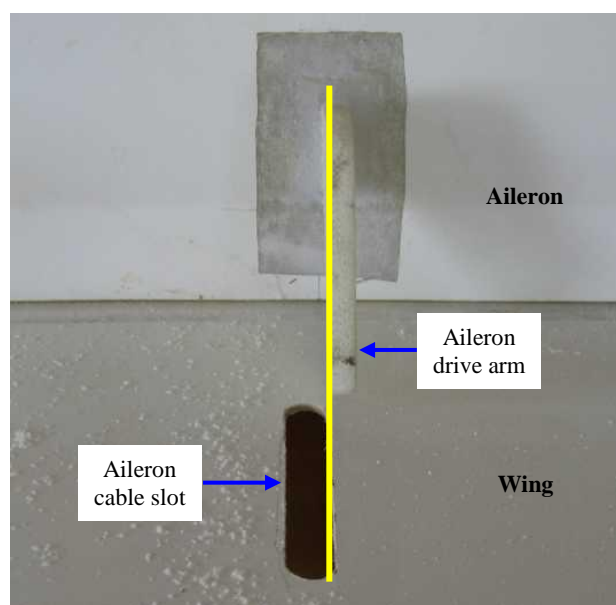
With the aileron held in this position mark the outboard end of the aileron where it touches the wing tip/winglet and mark the inboard end where it touches the flap.

Repeat the process with the other aileron on the other wing. Both ailerons should now be marked to an equal length in the range of 1215mm to 1220mm, ideally 1218mm overall, with the aileron drive arms both located either outboard or inboard of the slot.

At this point if the aileron or flap needs to be trimmed then you can make adjustments as required to equalise the length, mark carefully and trim with a hacksaw or jigsaw and sand to a smooth finish. Take care to make accurate cuts that exactly match the adjoining surface.

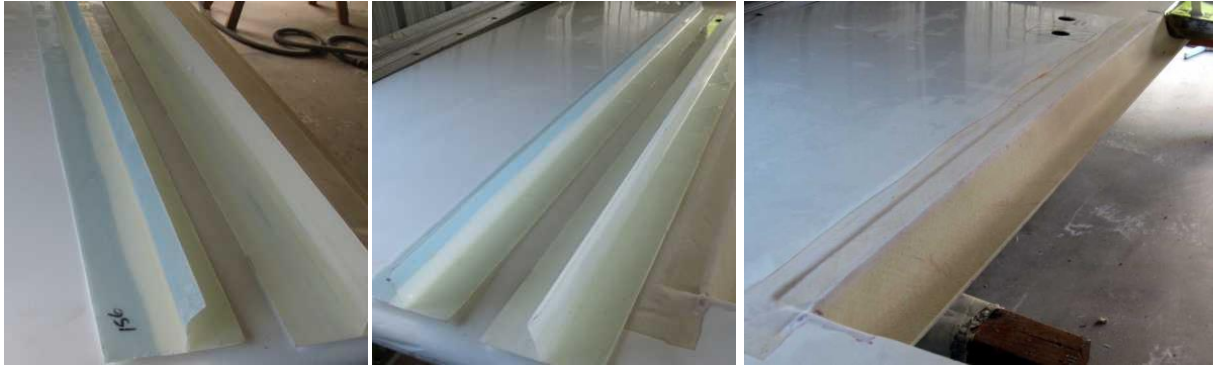
At this stage each aileron should fit snugly into the gap between the wing tip and the flap with very little or no clearance at each end: when the ailerons have been finally fitted into place then the finished clearance can be adjusted with a sanding block.

Now cut the ends of the pre-mould strip so that it fits snugly between the wing tip and the flap. You may need to trim the lower outboard end of the curved "T" rib slightly.



## Prepare and fit the pre-mould strip

Turn the wing upside down and wedge the wing so that the top surface is level and solid.



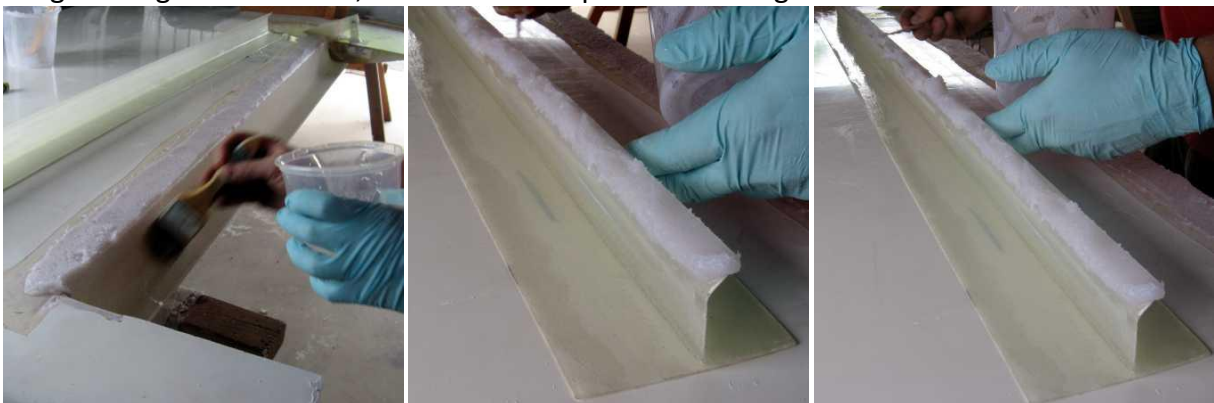
Remove the peel cloth from the pre-mould strip (front of the flat part and both sides of the curved rib) and sand lightly. Remove the peel cloth from the wing recess in front of the aileron and sand carefully. Remove all dust from the area.

Protect the outboard end of the flap from any excess resin or flock by covering it in brown packing tape. For each wing, mix a 280g batch of resin, and divide into a 240g batch and a 40g batch. Add flock to the 240g batch of resin and mix it in thoroughly.



Apply a layer of flock to the recess on the wing – the layer should be around 3 to 5mm above the level of the wing.

Using the 40g batch of resin, coat the curved part of the wing and the front of the curved rib



on the pre-mould strip, then apply a D-shaped layer of flock to the bottom of the curved rib – the layer should be as wide as the bottom of the curve and about 10mm deep.



Fit the pre-mould strip into place – position carefully slightly above the final location and then press gently forwards and then down into place. Wipe away any excess flock.



Place the tape-covered board on top of the pre-mould strip and weight with several paving blocks or half-bricks. Wipe away any excess flock along the bottom of the curved rib, then brush on 3 layers of glass fibre cloth around the gap at the wing tip end of the pre-mould strip as circled in the photo at above right.



Apply a coat of resin to the back of the curved rib/wing joint and lay in a single length of glass fibre cloth (from the Wing bag). The lower edge should be slightly in from the trailing edge of the wing. Brush the layer in carefully taking care to avoid any bubbles or gaps. Leave the wing/pre-mould assembly for 24 hours to cure before continuing with this task.

## Check and cut the aileron recess

Next day turn the wing right side up.

Lay the aileron on top of the wing and align the rear edge of the aileron with the rear edge of the flap and the rear edge of the wing tip/winglet and check that the pre-marked aileron recess on the top of the wing is parallel to the front edge of the aileron.

Make any required corrections to the markings.

Put the aileron to one side and cut out the recess with a jigsaw, then sand to a smooth finish with a long sanding block.

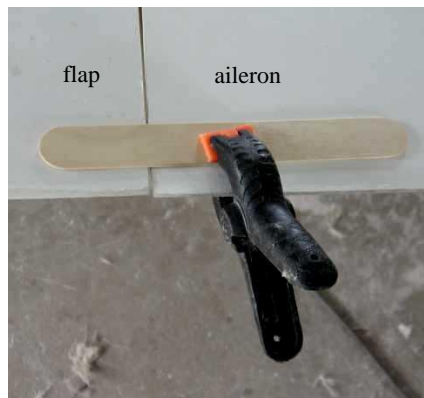


## Fit the aileron

Turn the wing upside down again and wedge the wing so that the top surface is level and solid.

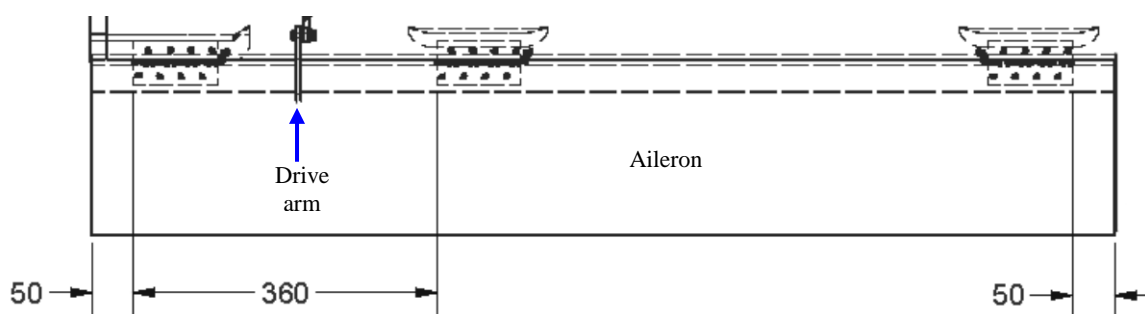
Fit the aileron in place and clip the trailing edge of the aileron the flap and the wing tip/winglet. The front edge of the aileron should be sitting on top of the pre-mould strip.

Check that the trailing edges are lined up correctly and then mark the pre-mould strip along the front edge of the aileron with a felt marker pen.



Remove the aileron and cut along the marked line with a jigsaw then sand to a smooth finish with a long sanding block.

Refit the aileron and align the trailing edges again.



There are 3 hinges per aileron: 1 at each end of the aileron and 1 inside of the drive arm.

Mark the hinge locations – the outside of the end hinges should be 50mm in from each end of the aileron and the distance from the end of the aileron to the nearside of the inner drive arm hinge should be 360mm as shown above.

Mark each hinge location and identify both sides of each hinge: Hinge "A", Hinge "B", etc.



Place the aileron hinges in those locations with the flat side of each hinge facing upwards and the hinge pin aligned in the centre of the ~1mm gap between the aileron and the wing.

Do **not** place the hinge flat side down – if you do then the holes will not line up correctly when you come to fit the hinge.

Use a 3/32" drill to make a pilot hole opposite the pin side of each rivet hole, check that the hinge and hole positioning is correct and then carefully expand to 3/16" holes.

Test fit each hinge with 4 Clecoes and fit the hinge pin into place as shown above. Each hinge pin is inserted from the inside towards the outside of each hinge. Mark the location of the end of each hinge pin (circled at above right). Number each hinge and its location.

Check that the aileron to pre-mould strip gap is even along the full length then remove the aileron and hinges.

Sand the flat side of each hinge and the locations where they will be fitted, then mix a small batch of resin and coat each area. Add flock to the remaining resin and apply a 2mm layer of flock to each hinge and flock into place using clean Clecoes in the outer holes as before.



Using a 120° countersink bit carefully countersink the 4 inner holes just enough so that a countersunk rivet head will sit flush with the surface when fitted and rivet the 4 inner holes with countersunk rivets. Now remove the Clecoes from the outside holes one at a time, countersink each hole and fit a countersunk rivet until each hinge has 8 countersunk rivets. Take care to keep flock away from the hinge pins during this step: clean the hinges while the flock is still wet then leave both parts (wing and aileron) separate and leave overnight to cure, then store the ailerons for later painting. Clean the Clecoes in acetone after use.

Next day use a rat tail file to make a slot into the wing at each hinge pin mark (example circled at above right), fit the hinge pin and the hinge pin retainer, mark the retainer screw hole and drill a 3/32" hole. Pop rivet a captive nut under each retaining screw hole using 2 3/32" countersunk rivets.

## Fit the hinge gussets

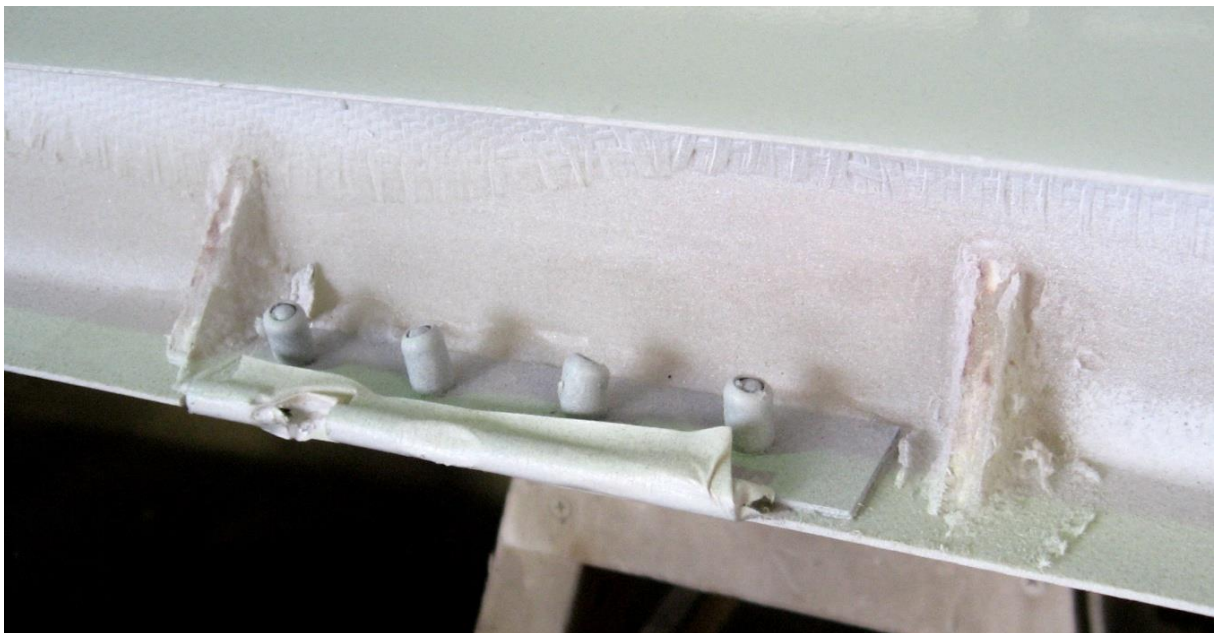
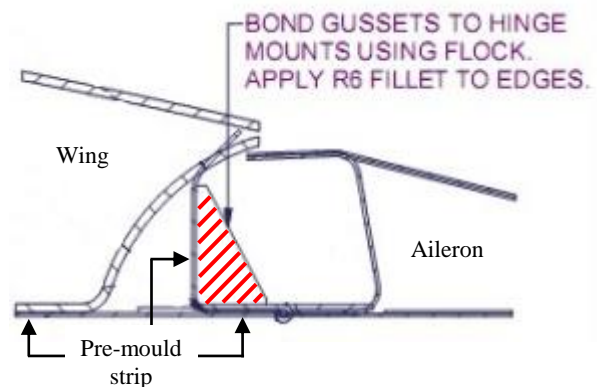
Turn the wing right side up for this final step. The hinge gussets provide strength and prevent flexing of the pre-mould strip around the aileron hinges. Each hinge will have a gusset flocked in place at each side.

Cut 6 gussets per wing (for a total of 12 gussets) and fit each gusset to the pre-mould strip as shown in the drawing at right:

Each gusset will need to be sanded to a good fit, then flock one gusset in place at each side of each hinge – refer to the photo below for an example of gusset placement.

Position each gusset carefully into place on a bed of flock, then use a clean mixing stick dipped in resin to round the flock off to a smooth R6 fillet.

An R6 fillet is about a “finger wipe” radius. Do not wipe away any more flock or the load will not be transferred correctly and the gusset may break away in use.



The photo above shows a typical gusset fitting. Leave the gussets overnight to cure.

This completes the *Pre-Paint>Wings>Fit ailerons* task.