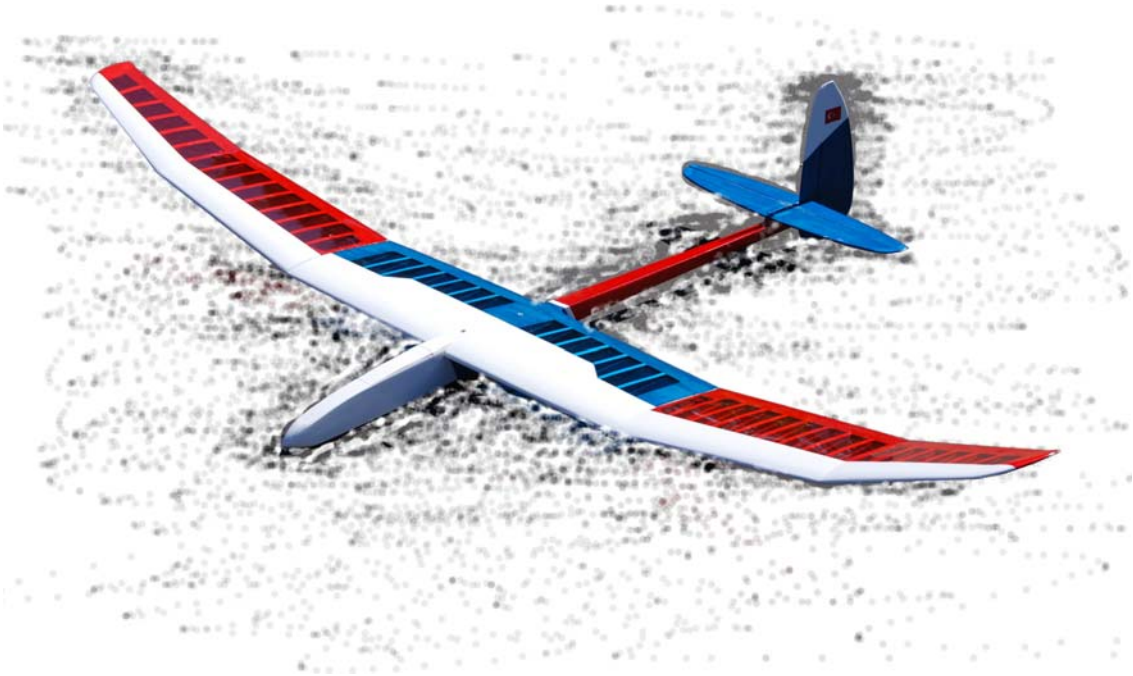
BUILDING INSTRUCTIONS FOR

FINEWORX



Miles

2M Class Competition Glider

Congratulations! You have purchased our " Miles, 2M Class Competition Glider".

The Miles is the first offering from FINEWORX, a new company from Turkey, offering the finest quality products for the serious sailplane competitor.

While the Miles appears similar to glider designs from years past, it is the culmination of the latest sophisticated aeronautical design tools, and modern production techniques that combine in a unique, eye appealing design that offers proven flight performance. Gifted

Miles designer Philip Kolb, has managed to deliver a glider that is easy to build, yet offers performance normally associated with much larger, more sophisticated gliders, and at the same time offers really sweet handling characteristics suitable for the beginner.

We hope that you enjoy building and flying your Miles as much as we have enjoyed sharing the Miles with the World. The Fineworx Design Team 2008.

In addition to the Kit you will need the following

1. A Flat Building Board 12”x 48” that will accept pins
2. T- Pins used to secure the parts to the building board during construction
3. A suitable 2-3 channel Radio system
4. Medium Viscosity Cyano-Acrylate adhesive
5. Aliphatic type wood Glue
6. 5 bottles of 30-minute epoxy
7. 2 Rolls of Mylar type covering material - Ora Cover typical
8. Various Sanding Blocks 100- 150-220 Grit Sand Paper typical
9. Various Hobby Tools including Scalpel type Knife and Hobby Saw
10. Monokote Iron and Heat Gun

Table of Contents

List of Figures

Lets get started!

Unroll the plans and familiarize yourself with the construction techniques used to build the Miles. Note that high-quality lasers have identified all of the parts. My suggestion is to leave the parts in their respective sheets until you are ready to use them. The parts are better protected in the sheets and it is easier to keep track of them.

The parts are easy to remove from the parts sheet by carefully slicing the tabs with a scalpel bladed knife when you are ready to use the part. I like to remove most of the ash residue from the gluing edges of the part with a 220 grit-sanding block. Get your building board arranged on a flat table or bench.

Make sure that you have it in area where you can leave the parts sitting undisturbed while the various components dry. Don't forget to cover the plans with a see through non-stick plastic film material. I like wax paper used in food preparation, but use what you find that will do the job, and protects your plans during the building process.

The Empennage

Building the Horizontal Stabilizer

It might have been sometime since you assembled a wood model, and building the Stab first will give you a chance to get back into the swing of this building technique. Look the plans over and cover the Stabilizer drawing with protective film. Check the part numbers and carefully collect them from their sheets. Apply a small coating of Cyano adhesive to both sides of E4 and E6 and pin them in place over the plan. Laminate the 2-E2 pieces with aliphatic wood glue, as well as where E1 and E2 join.

Now pin these pieces in place so they line up with E4 and E6. Using Cyano adhesive add E3 and E5 in their positions. Allow this assembly to cure before lifting it from the board. If you are careful with applying the adhesives, the stab will require only a small amount of clean-up sanding.

When the stab is cured, sand the seams flat, and carefully shape the leading edges and trailing edges, as shown on the drawings. Carefully sand the external edges of E7 and E8 so they fair in to the surface of the Stabilizer, before you glue them in place.

Be careful when you are sanding the parts and always use a Sanding Block. It can be quite easy to get carried away and remove too much material, or carelessly damage a part as you sand. Be cautious and check the work often as you proceed.

Building the Fin-Rudder Structure

Familiarize yourself with the Fin-Rudder Structure construction. In the same manner as the Stabilizer, carefully remove the parts from their sheets. Cover the drawing with protective film, and position the parts in their prospective locations. Glue balsa-to-balsa joints with Cyano adhesive, and laminate the spruce to plywood parts and join them to

the balsa components with aliphatic wood glue. When you are finished, let the unit cure, and then sand and shape the part when it is dry. You may need to hand sand the interior curve at the top of the trailing edge, at the top of the rudder, to get the right shape.

The Wing

Building the Wing Center Panel

Study the plans to see how the wing is constructed. Start construction by finding the 2 W35 and W42 lower and upper trailing edges. Notice the line designating the start of the taper that you must sand into the trailing edge sheets. Mark these lines and carefully taper the inside face of the trailing edges. Don't get carried away with the sanding block, you do not want to remove more than half the thickness of the wood at the very trailing edge. Cover the drawing with protective film, then find the leading edge bottom sheeting pieces W29, and pin them in place.

Now place the W27 Plywood wing seat and the 2 W35 trailing edges in place. Now trim each bottom cap strip and bond it in position with Cyano adhesive. Find the Bottom 3 x 10 mm spruce spar and glue and pin in position using aliphatic wood glue. Now find and remove ribs W2 thru W9. Look at the bottom of the rib.

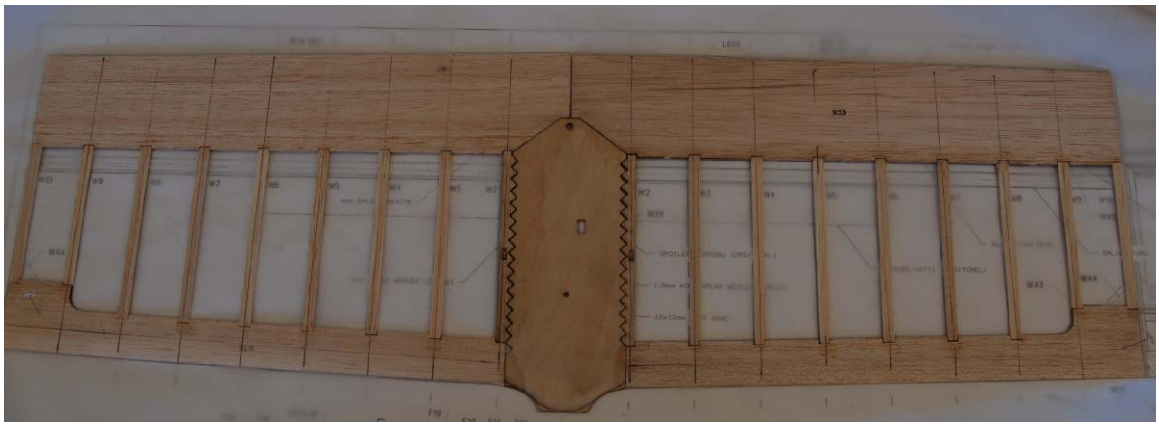


Figure 1. Center Wing Panel Construction

Note the bottom of the rib is flat at the back, and the front contours up away from the building board. This means that you must either block up the leading edge sheet so that the rib contour fits, or you must glue the back flat part of the rib down and then go back and glue the front contour later. You choose whichever method works for you, but be careful that the rib fits with no gaps or you will distort the finished airfoil, and likely the way the wing tip matches up against the center panel.

Now glue each rib in its proper position. If you find that the rib has a little fore-aft play where it touches the spar, offset all ribs in the same direction either fore or aft. It makes little difference, which way you choose, but keep the placement consistent through out the assembly of the wing panels.

Now carefully add ribs W10 at each end of the wing panel. Please note that the rib is slightly canted inward so that the tip panel matches up clean. Use the plywood doublers W45 to get W10 set at the right angle. Be careful that the rib does not curve when viewed from above.

Now place the upper 3 x 10 mm spar in place, and see how much you need to trim off the end so it is the right length. Trim the top spar to length and glue it in place with Cyano adhesive. Using a straight edge pushed down gently on the top of the spar will help keep it straight and ripple free while the glue dries.

Now carefully fit and glue W46 and the two W47's between the spars in the center of the panel, as well as W30, the plywood center braces. Find the sheet marked B8; this is the shear web sheet. Note that there are shear webs on either side of the spar, and that for maximum strength the shear webs must fit exactly between the ribs and must be well glued to the top and bottom spars. This is the point where the wing can fail if the wing is overloaded. Be very careful fitting each shear web and do a very good job of assembly. Take your time. Now add the center rib and hard wood blocks for the wing mounting screws. You should now have a wing center panel without the top sheeting, cap strips, trailing edges, and joiner tubes. Put the center panel aside in a safe place, while we build the wing tips.

Building the Wing Tips

Outer Tip Panel

I suggest that you build the outer wing tip panel first. Start construction the same as you did with the center panel. Find the 4 pieces of W41 and sand the taper on the trailing edges. Pin W39 and W41 in place. Now trim each cap strip to length and glue in place.

Figure 2. Outer Tip Panel Construction

Next find and remove ribs W20-W25, and glue them in place. Be careful to keep them straight, using the lines on the drawings as a guide. Add the top spar, being careful that the spar is in the right place, and wave free.

Now add the shear webs from rib W20 to W25. You can now glue the top W41 trailing edge in position, as well as the top leading edge sheeting W40, and the top cap strips from W20 to W25.

At this point lift the panel from the board and trim up the spars so that it all fits flush outside of W25.

You can now laminate the wing tip, and glue it in place. It might be helpful to trace the approximate tip profile on the tip Block and pre shape it before gluing it in place. The next step is to block the panels you just built up to the finished dihedral angle of 43 mm and build the inner tip panel directly on to it.

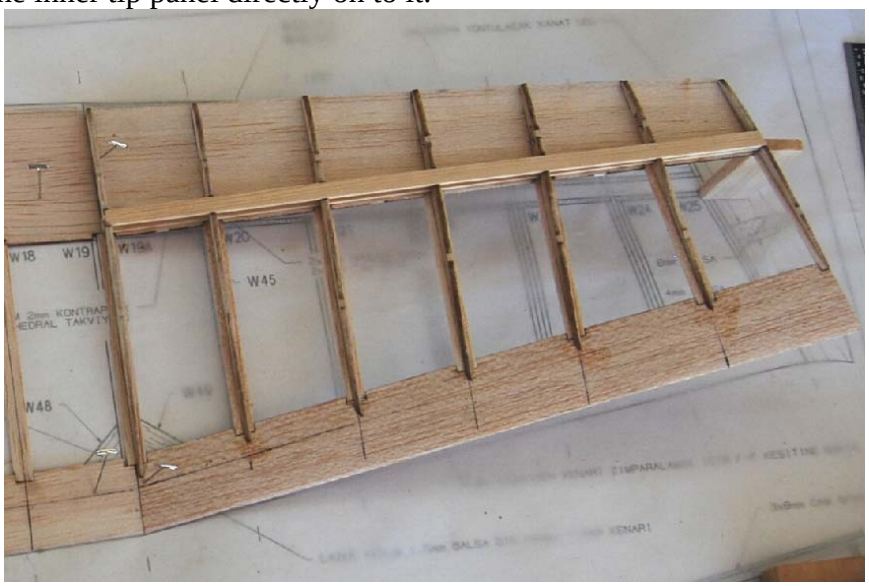


Figure 3. Outer Tip Build

Inner Tip Panel

Start Construction of the Inner Panel the same way as you have done on the previous assemblies. Find the 4 pieces of W36 and sand the taper in to each one. Pin and glue W37, the bottom leading edge sheet, W10, W48, and W36 over the plan. Now trim and glue the bottom cap strips in position.

Now add the bottom 3 x 8mm spruce spar. Find and add ribs W11-W19A, as well as the plywood dihedral braces W52. Check the top spar for fit, and if all is well, glue the top spar in place. Now fit and glue all shear webs from W11 to W20.

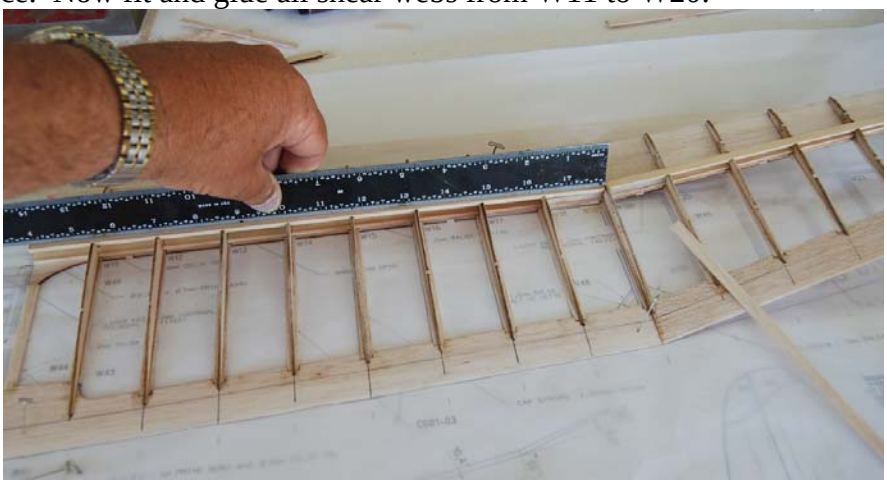


Figure 4. Wing Tip Build-Up

Put this tip Panel aside and now assemble the opposite tip Panel to the same state of completion. You should now have the basic wing structures ready to have the wing joiner

systems installed. Be careful in the next steps, as these panels must be lined up perfectly for best structural considerations and final appearance of your Miles.

Joining the Panels

Start the installation of the Joiners by pinning the Center wing Panel to the drawings. Now choose one of the wing tips and place it in position so the wing roots line up. Now block the wing tip up 65 mm as shown on the dihedral detail on the plan. Double check that the spars and other components are trimmed so that the joint is square and perfect.

Carefully remove wing Ribs W10A from sheet B7. You will see that the rib is very delicate and must be handled with care. With the two panels still in the joined position slide the rib through the spar opening and rotate it in to its proper place. Carefully glue W10A in place so that the panels butt up perfectly and at the same time be careful that you don't glue them together.

While the wing panels are still in their rigged position glue the plywood braces W45 in place on both the center and tip panels. With this finished, move on and replicate these steps to the opposite tip.

Figure 5. Wing Assembly

Find the brass joiner tubes in the small parts bag. Trial fit the joiner rods, and make sure they fit. Now cap the open end of the brass tubes with 1.5mm balsa so that epoxy will not fill the tube during the next step. Wax the wire joiner so that it will not stick in the brass tube. Now scratch the brass tubes with heavy sand paper to help the adhesive stick in the next step. Carefully slide one brass tube in to each wing tip passing through the hole in W10A and W11.When the tube extends out from W10A about .05 mm it is located properly. Now tag-glue the tube in place with Cyano adhesive. Look down from above and check the joiner for alignment, as it should run exactly parallel with the spar.

If all looks good move on and complete the opposite wing tip. Now find and fit the shear web that completes the spar covering over the brass tube joiner (?). Mix a small amount

of epoxy to fill the cavity around the brass joiner tube. Position the wing tip so that you can tell when the cavity is full. Now cap the joiner tube with the last shear web. Clamp or hold the shear web tight until the epoxy cures.

Now measure the location of the 2 mm alignment wire pin on both W10 and W10A, and then drill the 2mm hole. Pin the center panel back to the board. Prepare the 2 remaining brass joiner tubes by capping one end with balsa, and scuffing it with sand paper. Now slide the wire joiner in one of the tips followed by one of the brass tubes on the joiner. Carefully slide the brass tube through W10 and W9 in the center panel. Jig the wing tip back up to 65 mm. Check that the brass tubes extend from both wing panels .05mm, and that both panels line up with a 1 mm gap between them. When all looks good tag-glue the joiner tube in to the center panel with Cyano adhesive.

Figure 6. Wing Joiner Alignment Pin

If your work area allows for it, jig up the opposite tip panel and follow the same steps. Next slide the 2mm alignment wire through the hole in W10 and W10A. Slide the joiner tubes onto the wire, put W43's and W44's in place and secure everything with Cyano adhesive. If the tubes will not lay down flat on the bottom sheet adjust the bend in the 2mm wire until they will.

Now carefully remove the wing tips from the center panel. Carefully fit the final front shear webs between W9 and W10. When all is correct fill the cavity with epoxy and cap the void with the shear web. Make sure that the shear web fits true and flush.

Finishing up the Wing

We can now move on to finishing up the wing. Complete the wing tips by adding the W38 top sheeting, and the rest of the upper cap strips. After the sheeting has cured remove the panel from the board and lightly sand the front face of wing sheet so that the balsa leading edge fits properly up against the front of the ribs. When you are satisfied with the fit, glue the leading edge in position.

After the leading edges are glued in place use a sanding block and carefully shape the leading edges to their proper shape. Be very careful sanding on the wing. It is very easy to over sand the wing and ruin it. Check often and work slowly. Ideally you will be only sand the leading edge itself and try not to sand further up on the wing sheeting.

It is not a bad idea to make a small leading edge template to help you gauge your progress. BE CAREFUL, and try to shape it to the same contours as those shown on the

drawings. Add the W51 plywood cap ribs, and perform finish sanding of the wingtips, getting them smooth and ready to cover.

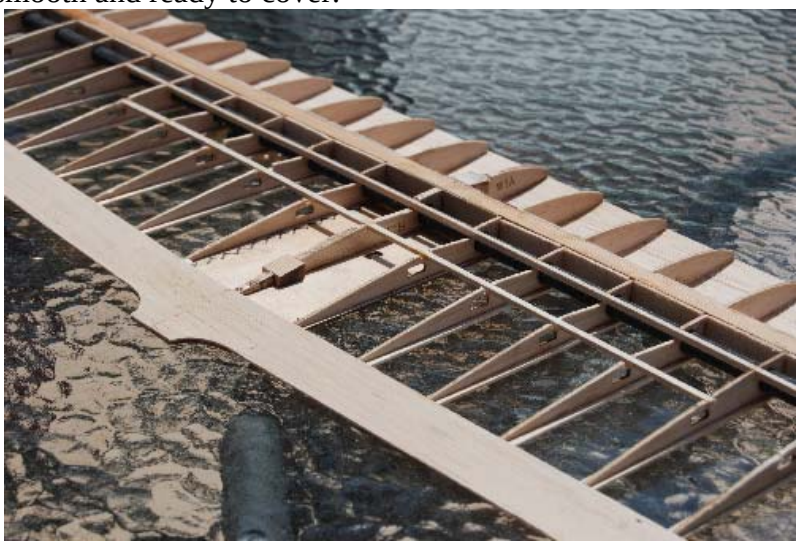


Figure 7. Center Panel Modified for Spoiler

Moving on to the Center Panel, you have to decide if you will use the optional spoiler or go with out it. If you will use the Spoiler, then start by modifying ribs W1-W6. You will see the areas denoted that have to be removed. You should also modify the ribs so that you can add a 3 x 3mm balsa spar to the front and rear of the spoiler to form the spoiler box.

Now you will move on to adding the top leading edge sheeting W31's, the trailing edges W42, the sheeting around the spoiler box if, used, W31 and W32, and the balsa cap strips. When the center panel is dry, remove it from the board, and slide the ballast tube into position. When you have it centered, secure it with Cyano adhesive. Sand the front of the leading edge sheeting so that the balsa leading edge fits properly and secure it in place.

Now add the plywood cap ribs W51. Sand the leading edges to their proper shape and the finish sand the center panel making it ready for covering. You must drill the wing mounting screws through wing from the bottom side. Start with a small drill and drill from the bottom side. Be careful to keep the drill straight so that it stays normal to the bottom face of the wing. Finally, finish the hole to accept a 4mm bolt.

The Fuselage

Fuselage Construction

Building the Sides

Start the Fuselage construction by joining the plywood fuselage sides F2A and F2B over the plans. When you have both a left and right side finished, and they are dry, position them so that the bottoms face each other, and pin them back to the board. Now laminate the balsa F1A and F1B with Cyano adhesive. After the glue has dried thoroughly, pin them to the board, plywood side up, and add the 3 x 3 mm balsa longerons on the bottom and top of the fuselage from the wing to the aft. Laminate the fuselage formers F5's, F6's, and F7's together.

Servo Tray

Decide which servo tray fits your servos best, and mount them in place. Now construct the tray with its side runners and cross pieces. When the tray is finished remove the servos.

Joining the Fuselage Sides

In the next phase of construction you are going to join the fuselage sides. You must be diligent and work carefully to keep from building a twist in the fuselage. The first step is to choose one fuselage side and position and glue F6, F7, and F9 in place. These pieces are glued so that they are 90 degrees to the fuselage side.

When the formers are secure, join this assembly to the second fuselage side. Place the fuselage over the drawing and check it for square. Tape the very tips of fuselages together at the tail. Now position and glue the servo tray and F5 in place. Find F4 and laminate the balsa stock F25 to each side.

Now glue the nose block assembly in place. Find the two F14 cross braces and 4 mm captive nuts - gently tap them securely, and then glue the nuts in place. Study the drawings and then assemble and glue in place F15A and 15B, the hatch assembly and F21 and F22. Find F8 and F23, and the 2-3 mm nuts.
Laminate F8 and F23, and then securely glue the nuts in place. It might be a good idea to run a metal 3 mm bolt through the nuts to make sure they are clear of glue.

Figure 8. Fuselage Assembly Detail

Next glue the stab mount into place along with F24 and F26. Make sure the fuselage does not take a twist, as you glue these parts together.

Now is the time to install and secure the pushrods. Route the pushrods as shown on the plans and then glue them in place. Check that the pushrods run free with minimum drag as you tag them in place. When they are installed to your satisfaction remove the wire inner part from the aft end.

Fuselage, Wing, and Empennage Fit

Now trial fit the center wing panel to the fuselage. Be careful that the fuselage side does not mar the wing at the front. Relieve the fuselage side with a file as necessary. When the wing fits, try installing the wing bolts. When everything lines up apply wood glue to the faces of the F14's and use the bolts to draw them up in to place.

Now try mounting the stabilizer in its place on the stab mount. Sight from the front looking aft and check the wing and stab for alignment. If the alignment is good proceed with gluing the 2mm balsa sheeting on the top of the fuselage. Start at the front and work back checking the stab alignment as you proceed. Now turn the model over and add the bottom plywood floor F3 and then work aft, gluing the bottom sheet, checking for alignment as you go.

When you have finished the fuselage sheeting, remove the wing and stab from their mounts. Using a sanding block, shape the fuselage as shown on the plans. Assemble the magnetic hatch hold down as shown, and then fine sand the fuselage to make it ready to cover.

Prepare the tow hook block by drilling a hole smaller than the tow hook in the center of it. Using pliers twist the hook in to the mount. when finished remove the hook. Next using the plans as a guide, mark the location of the tow hook on the bottom of the fuselage. Drill a hole in the floor the same size as the tow hook. Using the tow hook as a guide install the tow hook mount through F9 and glue in place.

Figure 9. Miles Prior to Covering

Covering the Miles

Before you proceed, give the Miles a good inspection to make sure that all rough areas have been sanded smooth. Next, clean up the model, and remove all dust prior to covering your Miles.

Apply the covering as described on the manufacturer-supplied instructions. You will find that your knife blade dulls quickly. For the best and straightest seams, replace your knife blade often. The normal technique is to cover the bottom of a flight surface and trim the edges flush. The top surface is then covered and an overlap of 6 mm ties the covering together. The material is then shrunk to fit.

Final Assembly

Tape-hinge the rudder to the fin, and the elevator to the stabilizer. Install the plywood control horns in the position indicated, and use epoxy to bond in place; if these come loose, it could be a tragedy.

If you opted for the spoiler configuration, check that it fits the spoiler bay with a good margin of slop. A binding spoiler blade is a nuisance, so make right. When it fits correctly, tape the spoiler in position. Install the center wing panel, and the horizontal stab assembly, and double-check their alignment.

Trial fit the fin in position in the aft fuselage. Check the drawings for proper placement. If it looks good, remove the covering from the fin where it will glue to the fuselage. When all is ready, glue the fin to the fuselage, checking the alignment often as it cures.

When the fin has cured, remove the wing from the fuselage. Make up the aft ends of the pushrods by soldering clevises on them. Install the pushrods from the rear and check for easy control actuation. Now install the rest of the radio equipment.

Try to plan the installation so that you will need to add a minimum amount of ballast to the nose. Make sure that when you add the ballast, and CG the model, that you keep a small part of the ballast removable so that you can easily adjust for the final optimal CG to suit your flying style. Install the tow hook as shown on the plans.

Now assemble the complete model and check that all flight surfaces are straight, with no warps; the CG is within limits; and that the controls operate freely and in the right direction. Make sure that you charge and check the batteries before you attempt flight.

Flying the Miles

Assemble your Miles at the flying field and conduct a controlled range test of the radio system. When all is ready, gently hand launch your Miles into the wind. Try to guide the model straight ahead for a gentle landing. Adjust the model as necessary for proper trim.

The Miles is a delight to fly, so I expect that the model will trim up in short order. You are now ready to put the model up a high start and begin to really enjoy its performance. I am going to let you take over from here; I hope you thoroughly enjoy your **FINEWORX Miles.**

Good Luck
Larry Jolly – 2008