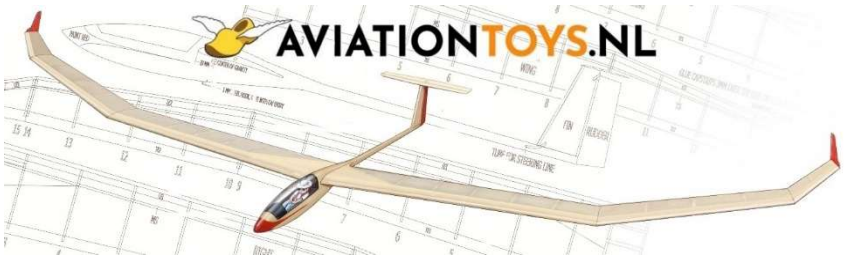


Merlino

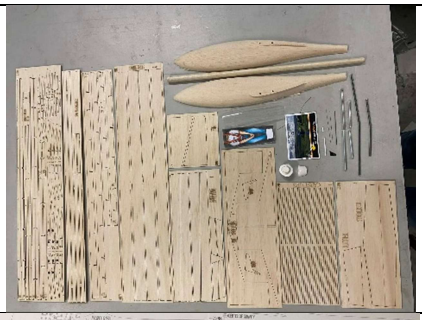
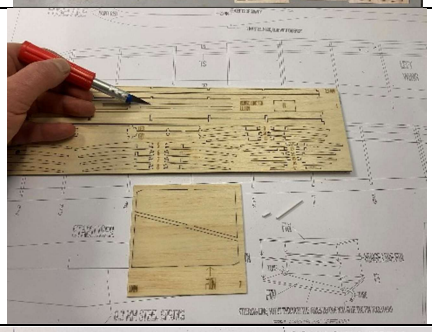
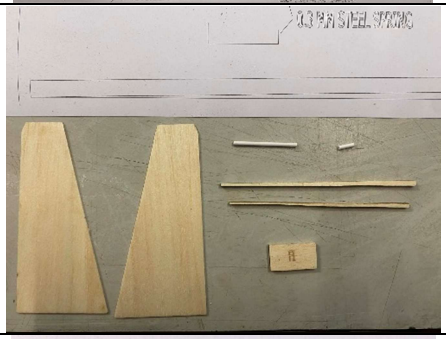
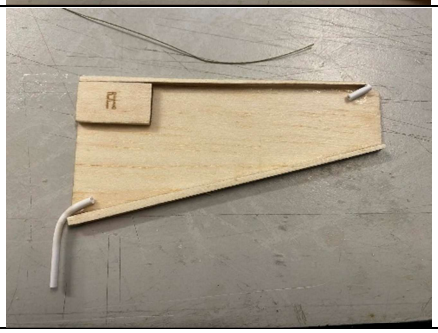
Light weight mini rc glider for calm conditions
2 channel, rudder and elevator
Balsa construction
Wingspan; app. 1.5 meter
All up weight; app. 100 grams
-cnc-ed fuselage pod
-pre rolled balsa/glass fuselage boom
-lasered parts for the wing and tail from top quality balsa
-transparent cockpit
-3d printed pilot
-small materials such as tubes, joiners, steering line etc.
-printed plan and instructions

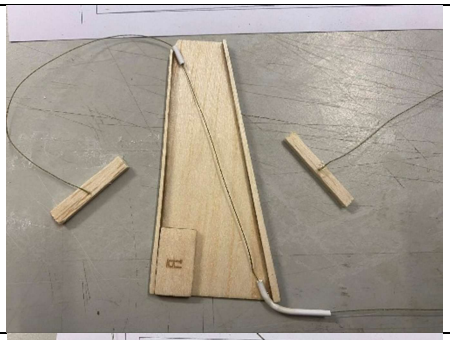
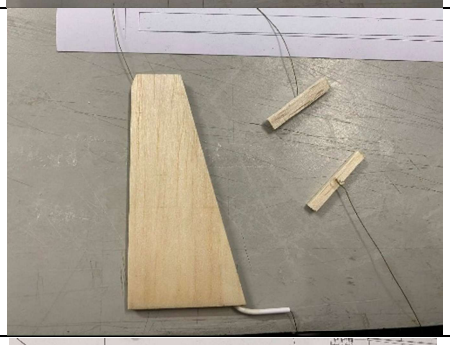
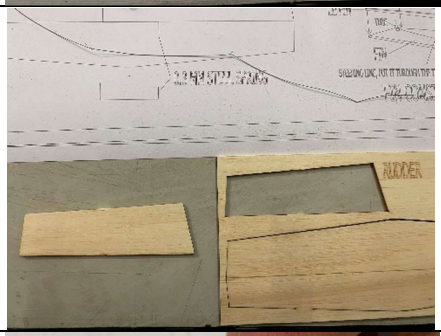
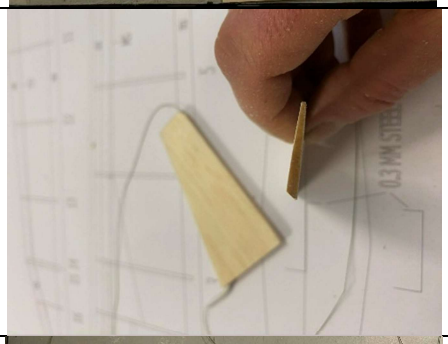
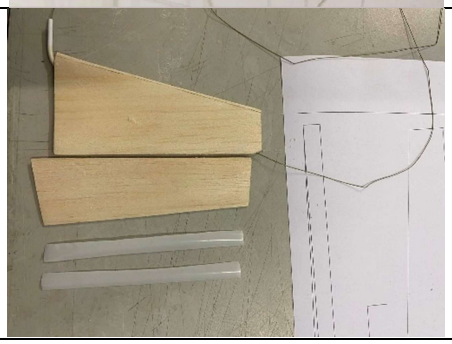
Merlino kit by aviationtoys.nl

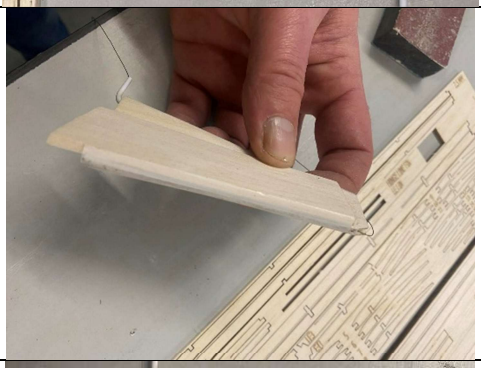
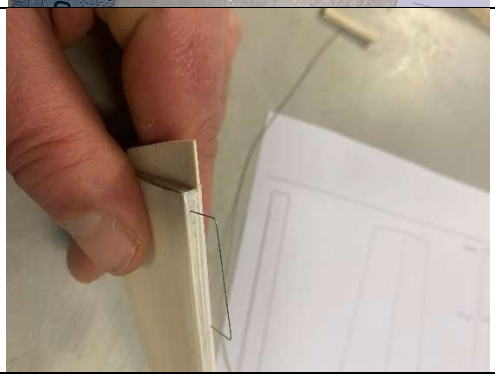
This is a light weight kit for advanced builders. Designed for calm weather conditions the Merlino is at his best with almost no wind and light thermals. It is a minimalistic design were simplicity rules, with only 2 channels, (rudder and elevator) a high aspect ratio wing and a own design airfoil, flying a glider is made easy and will give you a lot of simple fun. Her good looks will sure grab the attention of fellow rc pilots!

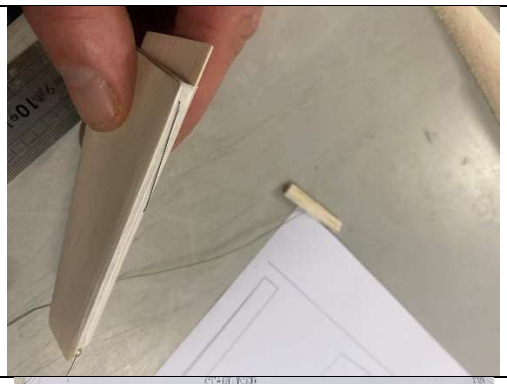
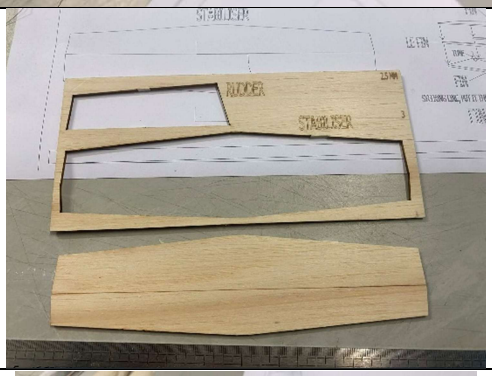
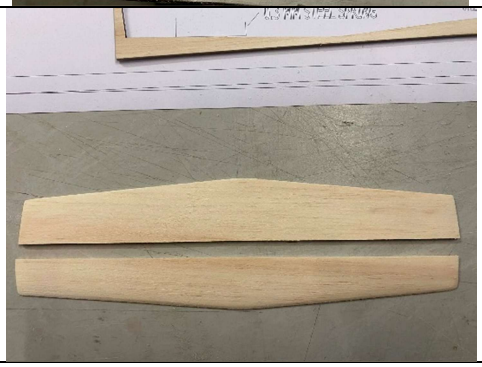
Important to know is that accuracy is needed when building a small glider like the Merlino, a mm more or less has a bigger effect on this size as when you're building a 2 meter RES plane for example. The same goes for weight, a few grams more or less will have a effect you will notice during flight. So take your time and be precise!

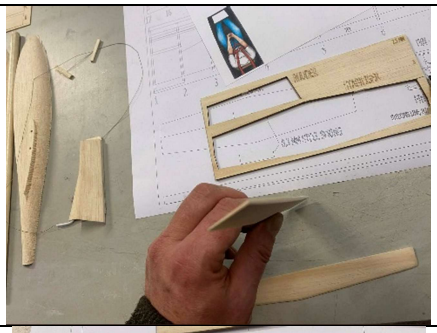
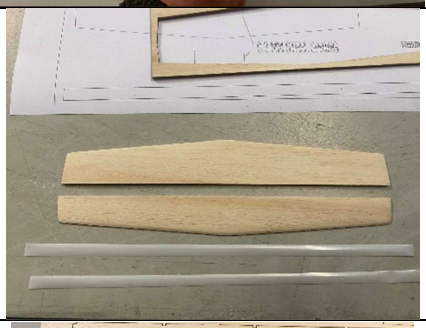
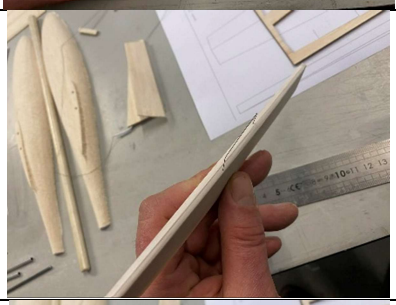
Flying the Merlino.
We already mentioned the Merlino is designed for calm conditions, the construction is light and not made for windy conditions; the model can easily be damaged, especially when using a hi- start/ tow line. Of course you can handlaunch the model but this will result in short flights, unless you are on a slope with very light winds. I recommend to make a simple hi-start/bungee from 1 x 4 mm thick rubber, 4-5 meters long and 20-25 meters of fishing line. Of course you can just take the fishing line and let somebody run, the old skool way. But also here; be carefull not to run to fast, to much tension on the line and therefore the wings, can result in a broken wing. the model is cute and delicate and should be treated in the same way.

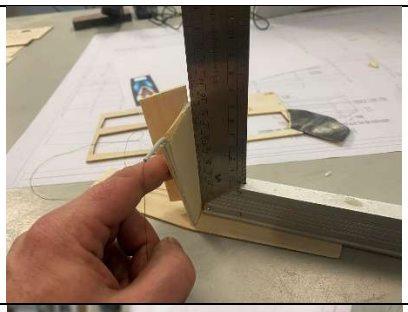
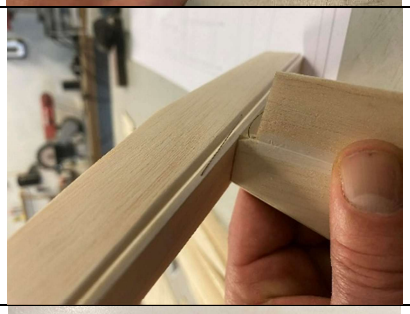
	Picture 1 ; all parts.
	Tail. Use white glue or CA. I recommend to use white glue on areas where you later have some sanding activities.
	We start with cutting out the parts as shown on pictures 2 and 3.
	Picture 4. The tube for the steering line, you can use a lighter to make it soft and bend it.
	Picture 5. How to glue the parts.

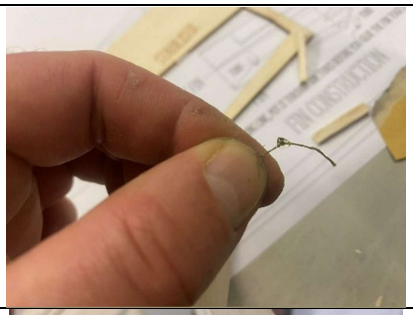
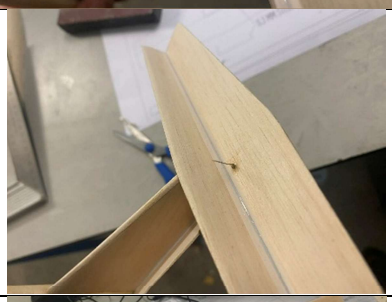
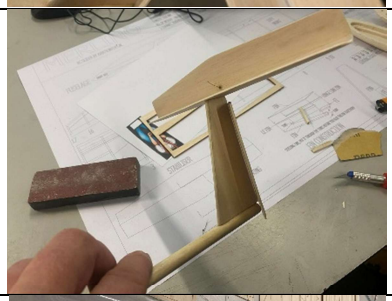
		Picture 6. Here we guide the steering line through the tubes, i have glued some pieces of balsa at each end to prevent the line from slidingout of the tubes.
		Picture 7. Glue the other side of the fin.
		Picture 8. Cut out the rudder.
		Picture 9. Sand the fin; trailing edge nice and thin, don't forget the hingeline.
		Picture 10. Hinge line fin/rudder. Use 2 strips of ora cover light.

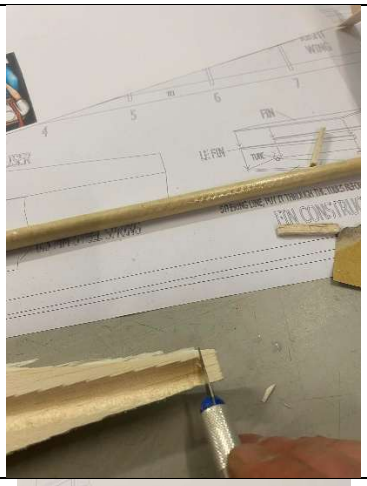
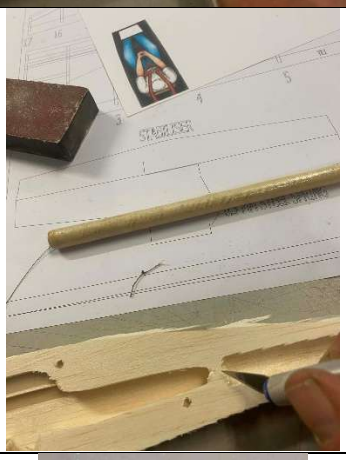
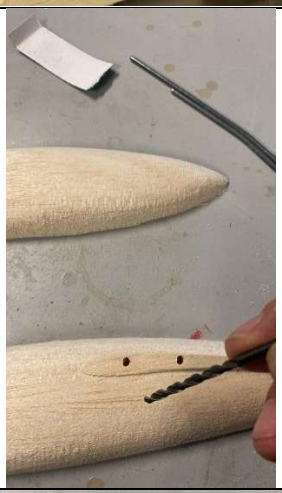
	Picture 11. Apply one strip as shown on the picture.
	Picture 12. flip the rudder all the way as shown on the picture, now the inner side of the hinge line can be seen. Apply the other strip of ora cover as shown on the picture.
	Picture 13. And this hinge line is done.
	Picture 14. The leading edge needs to be sanded round . You can also see the 0.3mm steel ''spring''.
	Picture 15. Flip the rudder again and push the spring into the fin and rudder as shown.

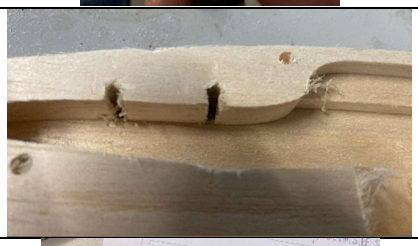
	Picture 16. All the way in, apply a drop of ca on both ends to hold the spring in place.
	Picture 17. Cut out the stabiliser.
	Picture 18. Sand the airfoil, you can see the shape of the airfoil on the plan. take notice; the biggest part is the elevator, so this side is the trailing edge.
	
	Picture 19 and 20. Cut the stabiliser and elevator.

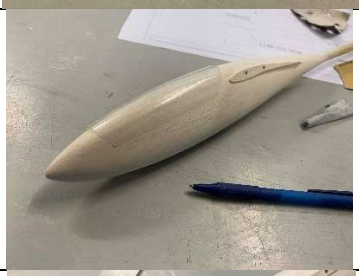
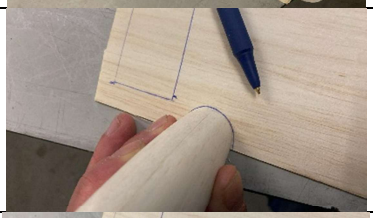
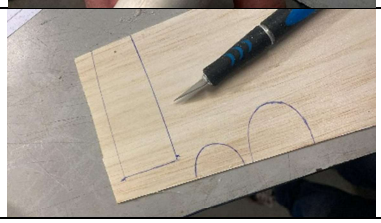
	Picture 21. Sand the hinge line.
	Picture 22. Again we need two strips of ora cover to make the hinge line.
	Picture 23. Apply the first strip on the top side first, then flip the elevator and apply the second strip on the inside of the hingeline.
	Picture 24. Also here we need a 0.3mm steel spring.
	Picture 25. Flip the elevator again and stick the spring into the stabiliser and elevator as shown on the picture.
	Picture 26. All the way in, again ca on both ends to keep the spring in place.

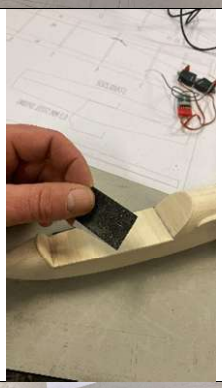
		Picture 27. Glue the stabiliser to the fin, take notice you glue the stabiliser and not the elevator!
		Picture 28. Here you can see the steering line coming out the fin. Later we will attach it to the elevator.
		Picture 29. We need a small 1-2 mm drill to make a hole in the fuselage boom.
		Picture 30. Make sure the hole is at the correct distance from the end of the boom, use the fin to measure the distance. The bend white tube at the bottom of the fin goes into this hole/slot we have made.
		Picture 31. First guide the steering line through the slot, then the white tube. Now glue the fin onto the fuselage boom.
		Picture 32. Now we attach the steering line to the elevator. With a needle we go through the elevator.

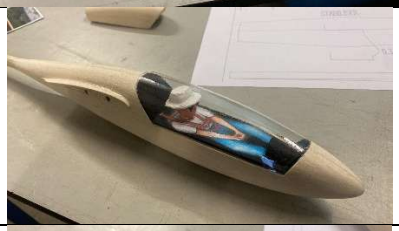
	Picture 33. When the steering line is through the elevator make a knot big enough so it can not slide back through the hole we made with the needle. Apply a drop of CA onto the knot and pull the steering line from the bottom of the elevator so the knot is glued onto the top side of the elevator.
	Picture 34. Also put a drop of ca at the bottom side of the elevator as shown on the picture.
	Picture 35. Cut the excessive piece of steering line at the top.
	Picture 36. looks good like this, the springs make the elevator and rudder of center.
	Picture 37. We start with the fuselage pod.

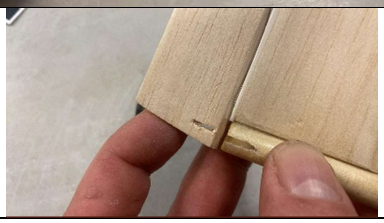
	Picture 38. Cut of the piece of balsa at the back that closes the gap for the fuselage boom.
	Picture 39. Cut away the piece of balsa as show on the picture; the steering lines must go through here.
	Picture 40. take a 2.5/3mm drill for clearing the holes for the wing joiners.
	

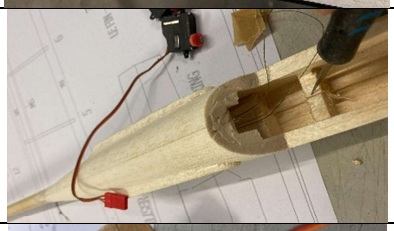
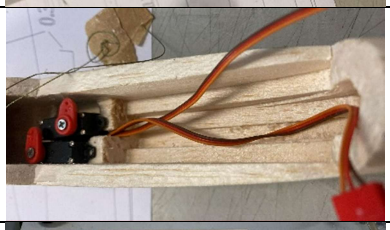
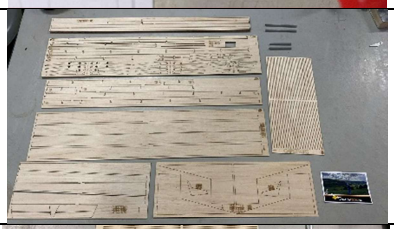
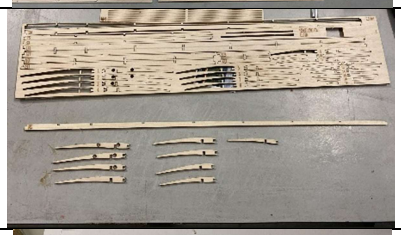
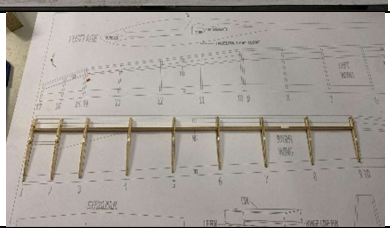
	Picture 41 and 42. After clearing the holes, cut away the balsa at the bottom side of these holes.
	Picture 43. We need these gaps to give some space for the joiners.
	Picture 44. Now we place and glue the fuselage boom to one side of the pod.
	Picture 45. Make sure the boom is glued so that the tail is centerd and straight.
	Picture 46. Glue the other half of the fuselage pod. Make sure the steering lines are not stuck between the sides. I used some tape to stick them to the hollow part of the pod.
	Picture 47. put some tape around the fuselage boom, just behind the pod.

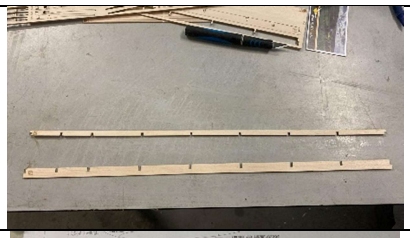
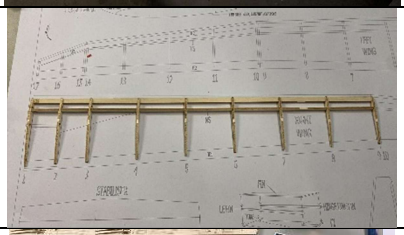
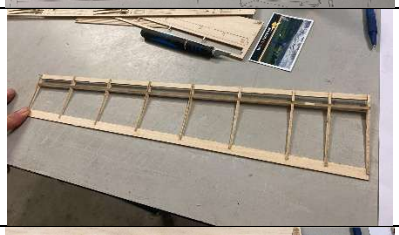
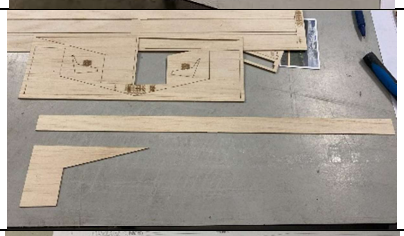
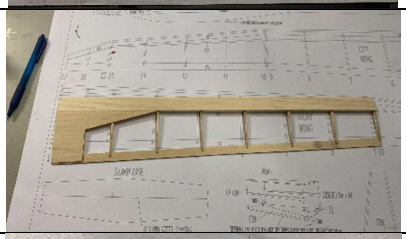
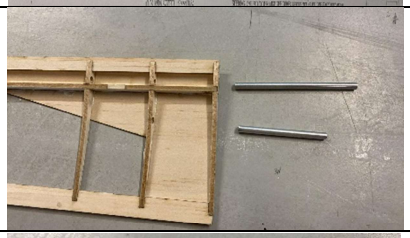
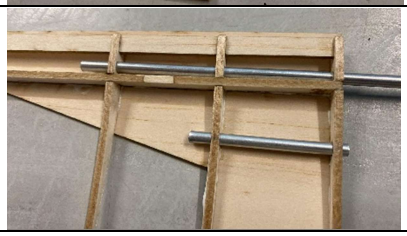
		Picture 48. Sand the pod so it fluently follows the fuselage boom as shown on the picture.
		Picture 49. After sanding the entire fuselage pod it is time to measure the canopy.
		Picture 50. Cut out the canopy with a sharp knife, take your time and be precise.
		Picture 51. Here we go, one canopy is cut out.
		Picture 52. Now we use the cut out part for taking measurements, here you see the bottom of the cockpit.
		Picture 53. Front side of the cockpit.
		Picture 54. Back side of the cockpit.
		Picture 55. Cut them out.

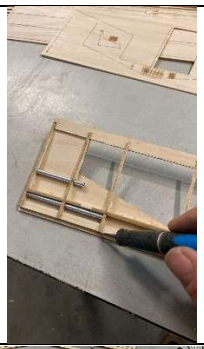
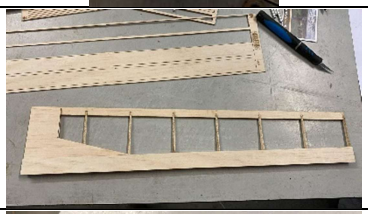
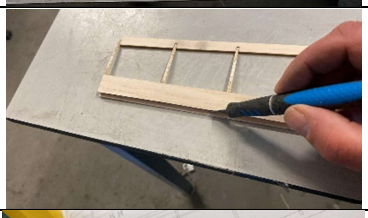
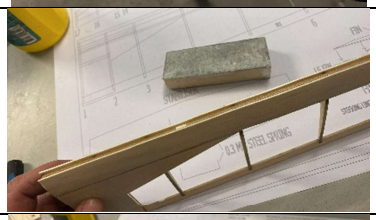
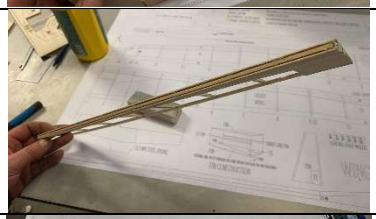
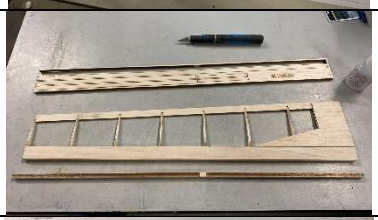
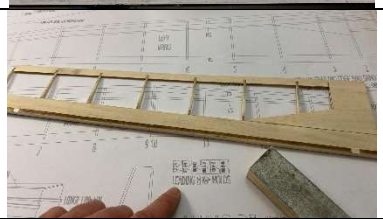
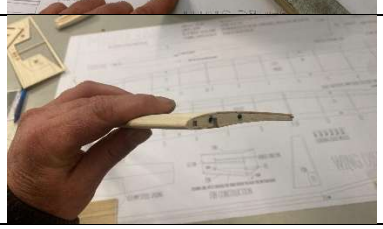
	Picture 56. The 3 parts we need next.
	Picture 57. Glue the parts together so that the whole fits perfect in the fuselage pod.
	Picture 58. Now use sanding paper to make the fit perfect.
	Picture 59. This looks like it.
	Picture 60. Measure the thickness of the sides as shown on the picture.
	Picture 61. After measuring the thickness of the sides, draw these lines on the bottom of the cockpit base.

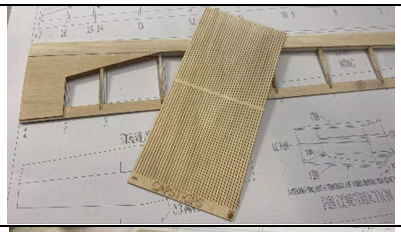
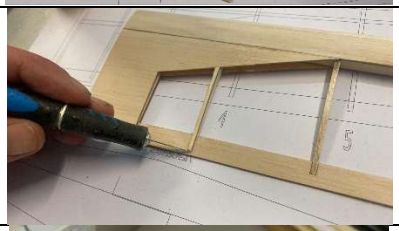
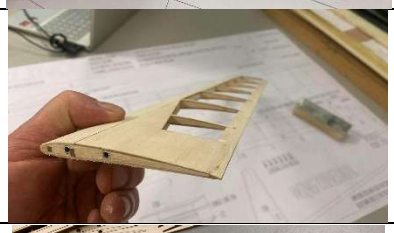
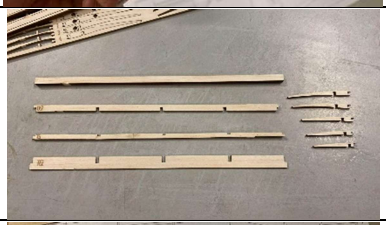
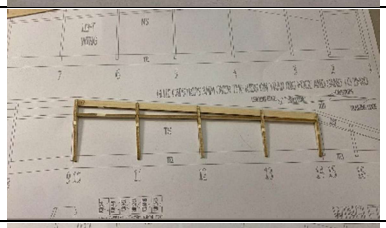
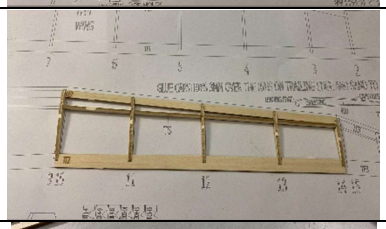
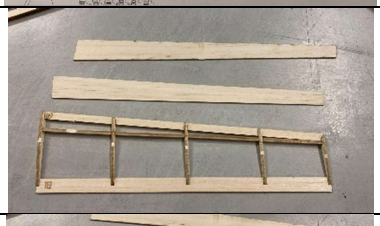
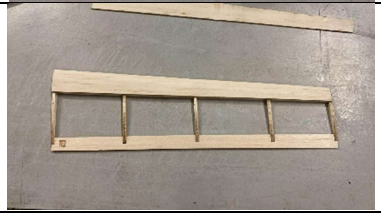
	Picture 62. Glue some 1mm strips of balsa as shown on the picture. Use some scrap balsa to make the strips.
	Picture 63. Time for some cockpit details.
	Picture 64. Be creative with some paint for a nice effect.
	picture 65. Ready to put things together.
	Picture 66. Glue the piece paper with print, pilot and instrumentpanel on the cockpit base.
	Picture 67. Place the base on the fuselage pod and put the glass over it for a test fit.
	Picture 68. After testfitting, apply some uhu por glue on the cockpit's base sides, front and back, then put on the glass.

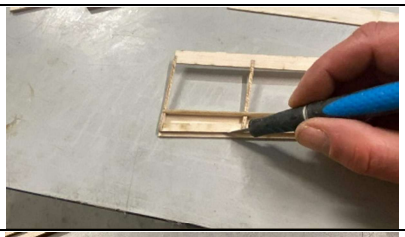
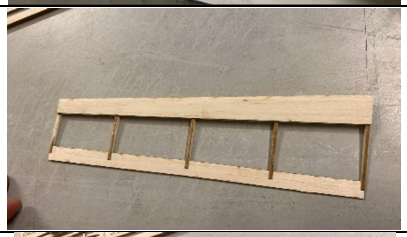
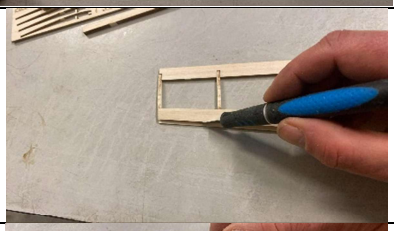
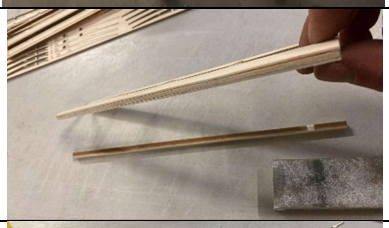
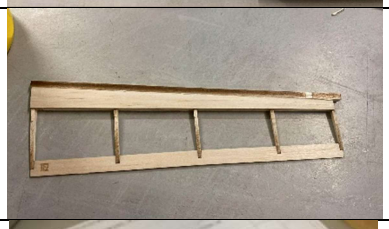
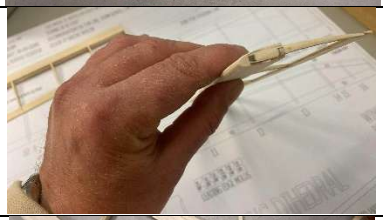
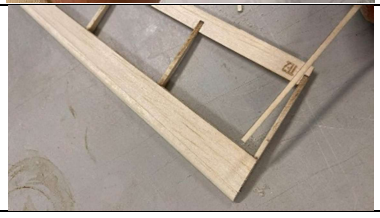
	Picture 69. Cut off excessive plastic from the clear canopy glass.
	Picture 70. I have used a drill for a rod that will keep the cockpit in place. of course you can think of your own system.
	Picture 71. here you can see the rod, it could also be a piece of plywood for example.
	Picture 72. There are many ways, but one of them is to use a magnet at the back side of the cockpit to keep it in place.
	Picture 73. Next; plywood root ribs and joiners.
	Picture 74. first slide in the joiners through the fuselage pod, then glue the plywood ribs onto the pod. Make sure the joiners are placed square when looking from above, also check the view from the front; dihedral must line up nice.
	Picture 75. Horn for the rudder.
	Picture 76. Make a slot in the rudder and in the fuselage boom as shown on the picture.

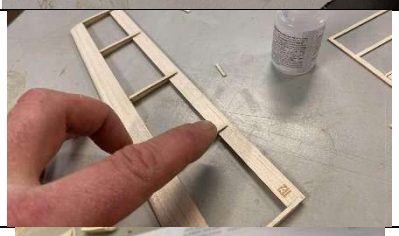
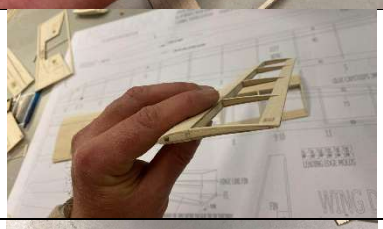
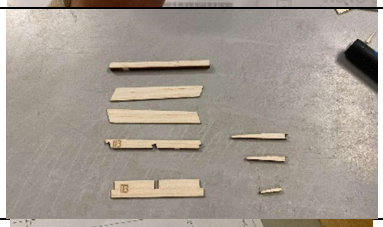
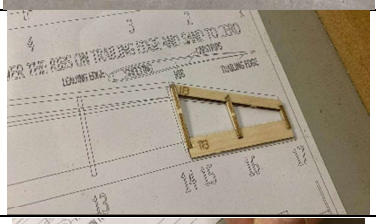
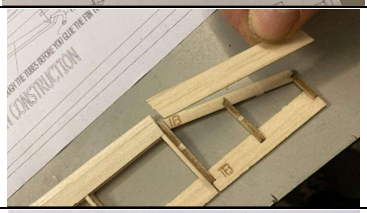
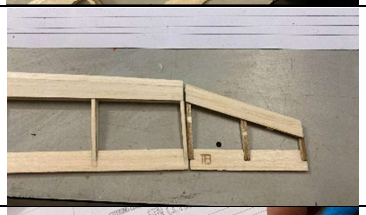
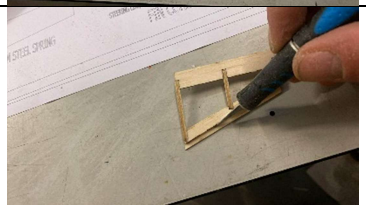
	Picture 77. Glue in the horn with ca.
	Picture 78. Attach the steering line to the horn.
	Picture 79. Guide the steering line through the fuselage boom and pod.
	Picture 80. Cut away a thin strip of balsa from the middle of the servo beds.
	Picture 81. The gap we've just cut out is for the servo wires. Install the servo's as shown on the picture. make sure the horns are under the cockpit line, it can be so you have to adjust the beds a few mm to make it fit.
	Picture 82. Parts for the wings.
	Picture 83. We start with the center panel of the wing.
	Picture 84. Slide the ribs onto the main spar. When glueing make sure you glue all 4 contact sides.

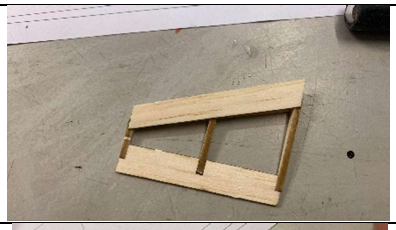
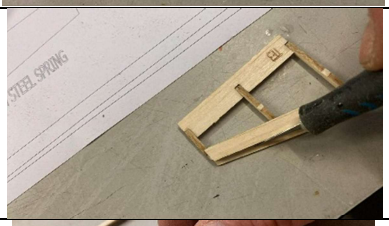
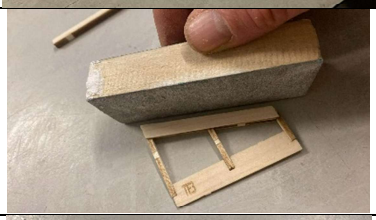
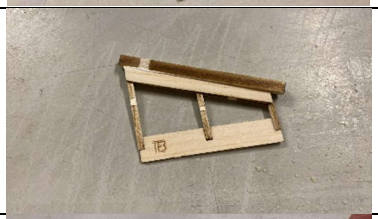
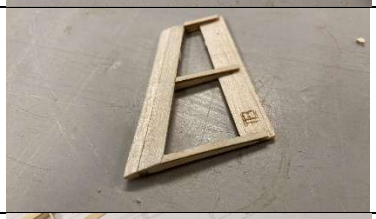
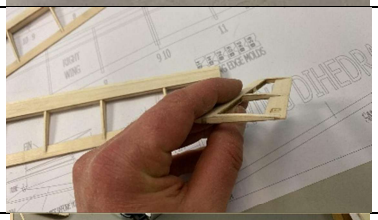
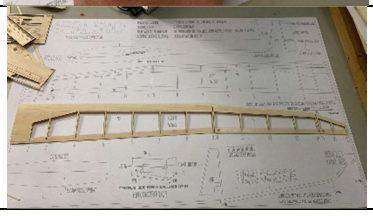
		Picture 85. Leading and trailing edge.
		Picture 86. First slide in the leading edge, also here; make sure to glue all contact sides.
		Picture 87. Flip the wing up side down and slide in the trailing edge. Glue the trailing edge in the same angle as shown on the picture.
		Picture 88. Sheeting for the center panel.
		Picture 89. Start with the top side, make sure to glue the sheeting perfectly. The sheeting has a very important structural fuction in the design and it is very important to glue all contact sides.
		Picture 90. Before we glue the bottom sheeting we have to place and glue the aluminium tubes for the joiners.
		Picture 91. The tubes into place. Glue them very well with ca.

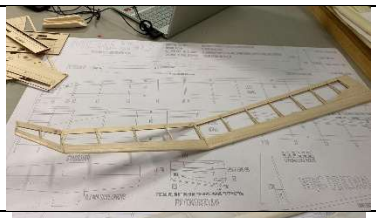
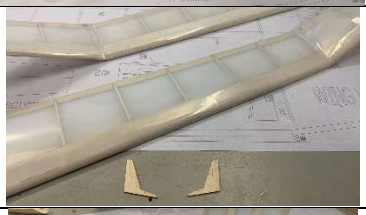
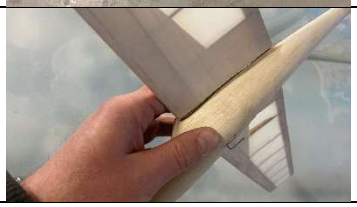
	Picture 92. Cut of excessive balsa from the top sheeting.
	Picture 93. Glue the bottom sheeting.
	Picture 94. Cut the excessive balsa from the bottom sheeting.
	Picture 95. Time for sanding the leading edge.
	Picture 96. Make sure it is nice and straight like on the picture.
	Picture 97. The actual leading edge from 5mm balsa.
	Picture 98. Leading edge glued into place. There are plywood molds for sanding the leading edge into the correct shape.
	Picture 99. Leading edge sanded.

		picture 100. Capstrips, glue them on top and bottom of the ribs.
		Picture 101. Glue the capstrips on the ribs, cut the strip just behind the ribs as shown on the picture.
		Picture 102. Sand the sheeting and cap strips down at the trailing edge as shown on the picture.
		Picture 103. Big wingtip panel is next, here you see the parts.
		Picture 104. Also her we slide the ribs on the main spar, then slide in the leading edge. Glue all contact sides.
		Picture 105. Now we do not flip the this wing panel when glueing the trailing edge.
		Picture 106. Sheeting.
		Picture 107. Top side sheeting glued on.

	Picture 108. Cut off excessive balsa from the top sheeting.
	Picture 109. Bottom sheeting glued on.
	Picture 110. Cut of excessive balsa from the bottom sheeting.
	Picture 111. Also here we sand the leading edge nice and straight before we glue the 5mm leading edge.
	Picture 112. looks good.
	Picture 113. Leading edge glued on.
	Picture 114. Also for this panel there are molds for sanding the leading edge into the correct shape.
	Picture 115. Capstrips again.

	Picture 116. Cut the capstrips just behind the ribs.
	Picture 117. Now sand them down to zero at the trailing edge.
	Picture 118. Like this.
	Picture 119. Parts smal wing tip.
	Picture 120. glue all together as shown on the picture.
	Picture 121. Top sheeting small tip.
	Picture 122. Make sure the sheeting lines up with the sheeting of the big wing tip.
	Picture 123. After glueing the sheeting on, cut off excessive balsa .

	Picture 124. Glue on the bottom sheeting.
	Picture 125. Cut off excessive balsa.
	Picture 126. Sand leading edge nice and straight.
	Picture 127. glue on the 5mm leading edge.
	Picture 128. After sanding the leading edge it is time again for the cap strips.
	Picture 129. Like this.
	Picture 130. Sand the capstrip down to zero at the leading edge as shown on the picture.
	Picture 131. Complete wing, time for the other side!

	Picture 132. Glue the wingpanels together, the correct angles for the dihedral can be found on the plan.
	Picture 133. After covering the wings with ora cover light, it is time for the winglets.
	picture 134. Here the winglets are glued on, they have mostly a esthetic function, but i'd like to believe they actually help performance.
	Picture 135. Congrats, you have now a finished Merlino glider! Well, almost..
	Picture 136. the tow hook, made from 1mm steel wire.
	Picture 137. You can just stick it in the balsa, the correct position can be seen on the plan. Glue it with ca or a little bit of epoxy.

Congratulations with your Merlino!
We hope you have enjoyed the building process and you have a lot of fun flying it!