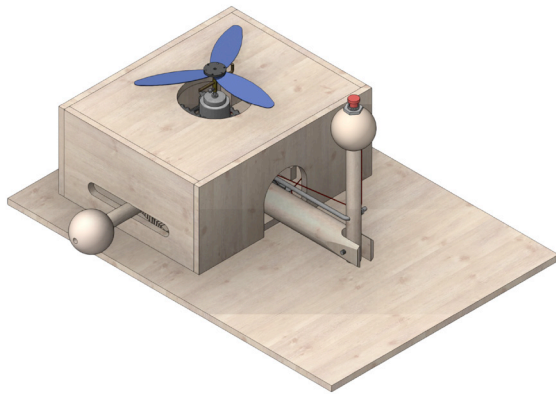
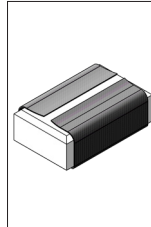


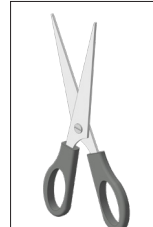
105.048 Highflyer



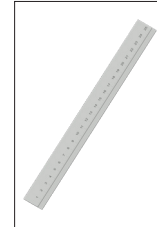
Required Tools:



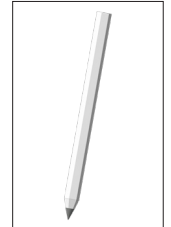
Sandpaper



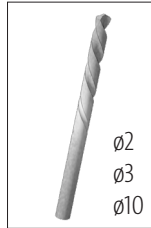
Scissors



Ruler



Pencil



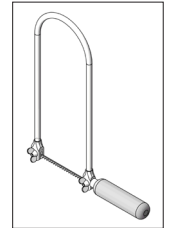
Drill Bits



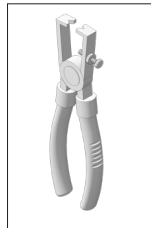
Pricking Awl



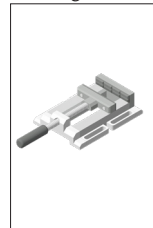
Craft Knife



Jigsaw



Wire Strippers



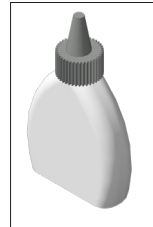
Machine Vice



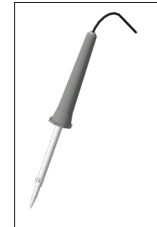
Wrench



Screwdriver



Wood Glue



Soldering Iron

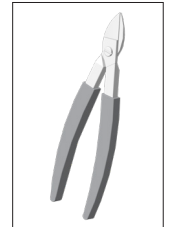


Plate shears

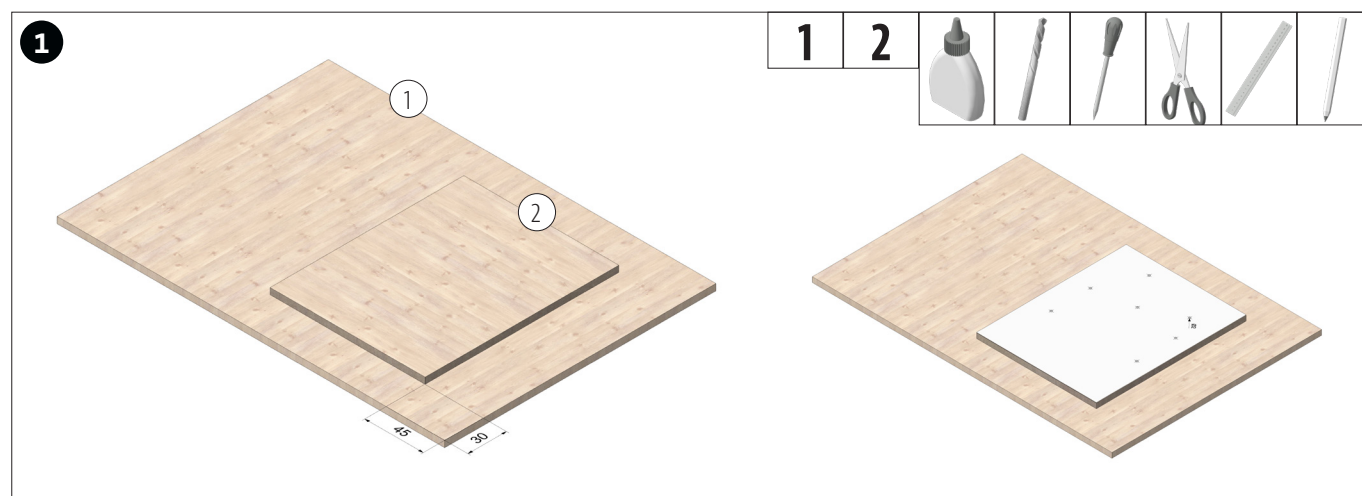
Please Note:

The OPITEC handcraft packs are not toys in a typical off-the-shelf sense, but rather additional teaching and learning material for educational purposes. This craft pack may only be constructed by children and adolescents under the guidance and supervision of experienced adults. Not suitable for children under 36 months. Choking hazard!

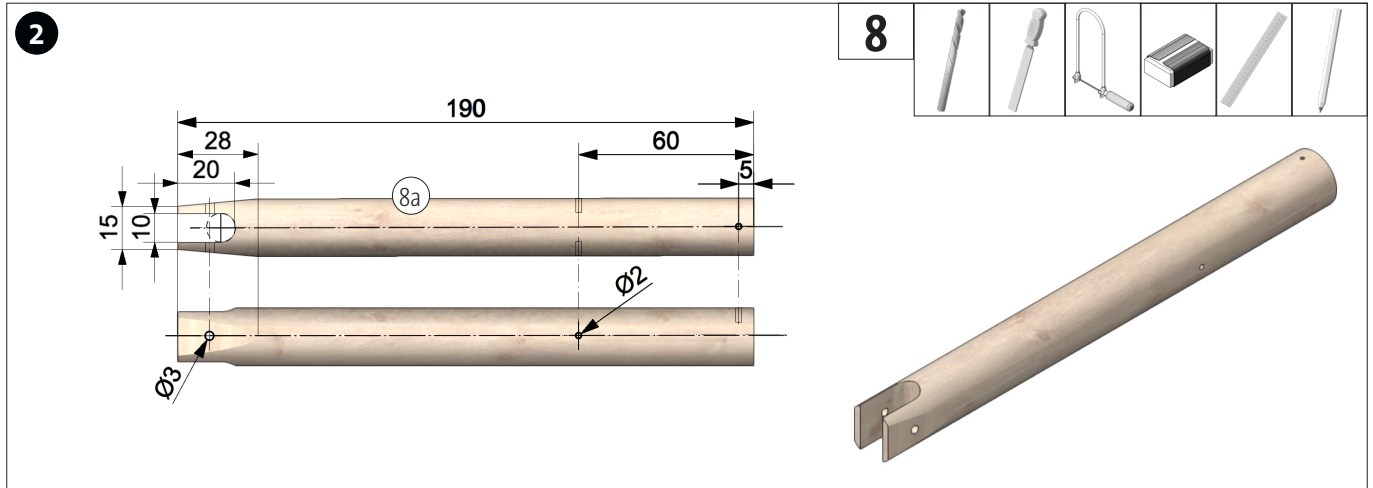
| Parts list | Quantity | Dimensions (mm) | Designation | Part No. |
|--------------------|----------|-----------------|---------------------|----------|
| Plywood | 1 | 300x210x5 | Base Plate | 1 |
| Plywood | 2 | 150x120x5 | Lid & Bottom Plate | 2 |
| Plywood | 1 | 160x160x5 | Frame | 3 |
| Plywood | 1 | 250x70x5 | Frame | 4 |
| Plywood | 1 | 70x20x5 | Resistance | 5 |
| Wooden Strip | 1 | 75x10x5 | Battery Holder | 6 |
| Wooden Strip | 1 | 250x10x10 | Frame Reinforcement | 7 |
| Round Rod | 1 | Ø20x200 | Control Shaft | 8 |
| Round Rod | 1 | Ø10x200 | Control Stick | 9 |
| 3-bladed Propeller | 1 | | Propeller | 10 |
| Motor | 1 | | Drive | 11 |
| Push Switch | 1 | | Start Button | 12 |

Instructions 105048
Highflyer

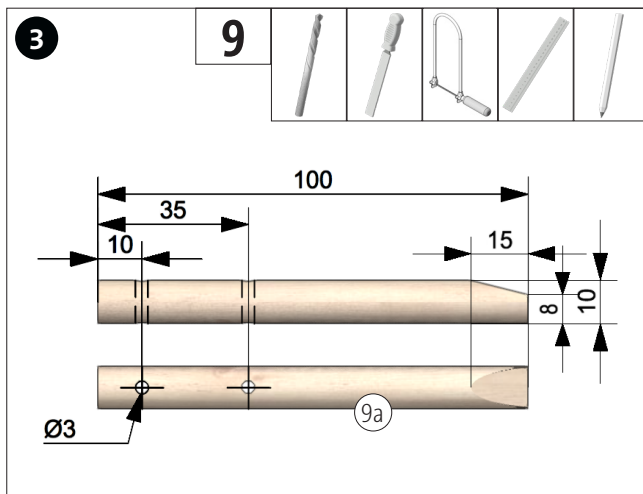
| Parts list | Quantity | Dimensions (mm) | Designation | Part No. |
|------------------------------|----------|-----------------|--------------------------------|----------|
| Fastening Brackets | 2 | 21 | Guide Control Shaft | 13 |
| HO Connector with Cross Hole | 1 | | Carrier | 14 |
| Perforated Plate | 1 | 100x50x0,8 | Motor Bracket | 15 |
| Wooden Balls | 2 | ø30 | Speed Controller/Control Stick | 16 |
| Welding Wire | 1 | ø2x50 | Carrier | 17 |
| Spacer Rolls | 1 | ø10/7 | Spacers | 18 |
| Drilled Brass Strips | 1 | | Speed Controller | 19 |
| Threaded Rod | 1 | M3x150 | Control | 20 |
| Resistance Wire | 1 | ø0,28x1000mm | Speed Controller | 21 |
| Cylinder Head Screw | 3 | ø3x30 | Motor Bracket | 22 |
| Cylinder Head Screw | 1 | ø3x20 | Fastening Control Stick | 23 |
| Phillips Panhead Screws | 10 | ø3x9,5 | Fastening | 24 |
| Phillips Panhead Screw | 1 | ø3x25 | Fastening Speed Controller | 25 |
| Nuts | 10 | M3 | Fastening | 26 |
| Electrical Wire | 1 | 1000 | Wiring | 27 |
| Washers | 10 | 7/3,2 | Fastening | 28 |



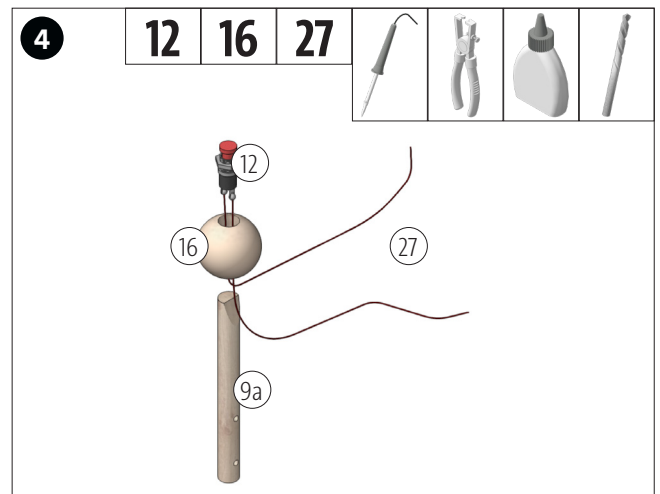
Glue one of the two plywood panels (2) onto the base plate (1) as shown, according to the dimensions. Then cut out the template (A) for the holes in the base plate and fix it on the base plate (2). Mark the position of the holes with a prick and then drill a ø2 mm hole approx. 5 mm deep.



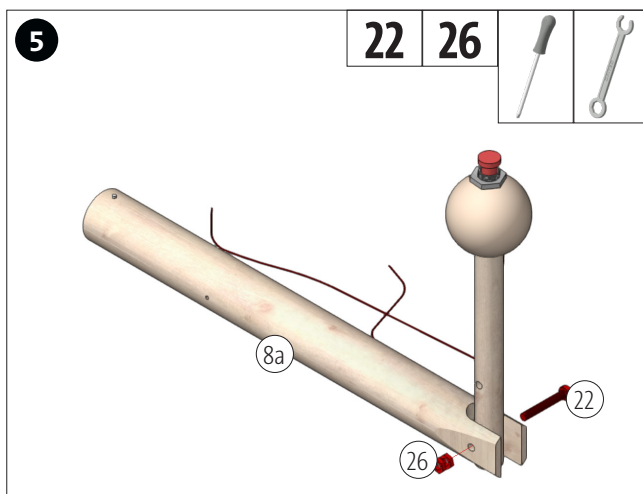
Cut the round rod (8) to 190 mm. Then drill the $\varnothing 10$ mm hole for the U cutout. Saw out the U cutout with the fretsaw. Drill the cross hole $\varnothing 3$ mm through the cutout. Drill the remaining holes $\varnothing 2$ mm. Finally, flatten the side surfaces of the U cutout with a file and sandpaper.



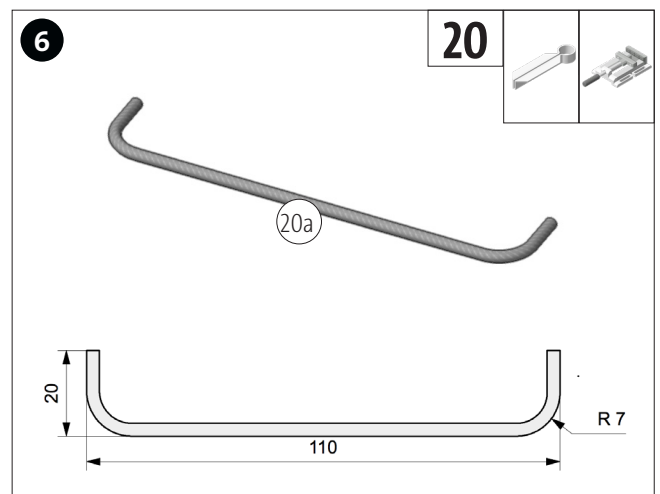
Cut the round rod (9) in half. Then measure the position of the two $\varnothing 3$ mm holes and drill them. Afterwards, flatten the end of the rod with a file.



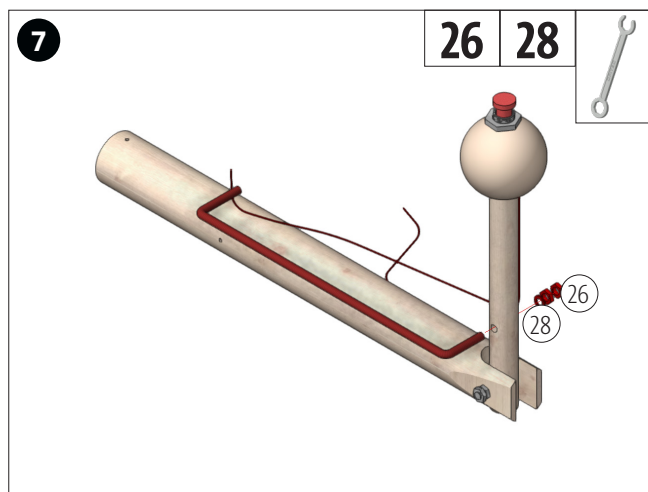
Drill the $\varnothing 10$ mm hole of a wooden ball (16). Cut 2 pieces of 250 mm each from the electrical wire (27), strip both sides, coat them with tin and solder one end to the control connections. Then glue them together as shown.



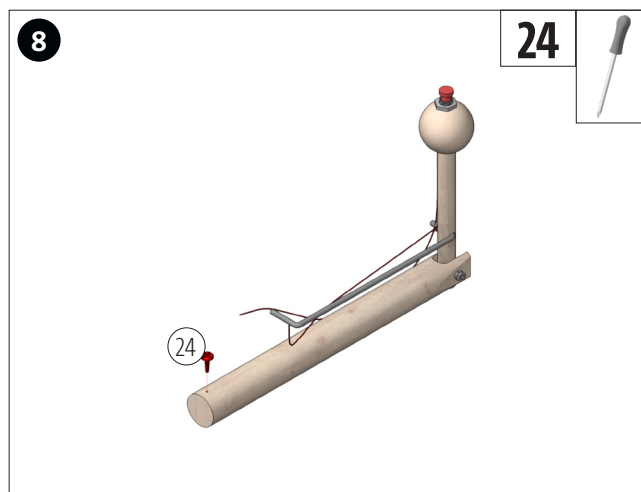
Now connect the control stick to the control shaft (8a) using the cylinder head screw (22) and two nuts (26).



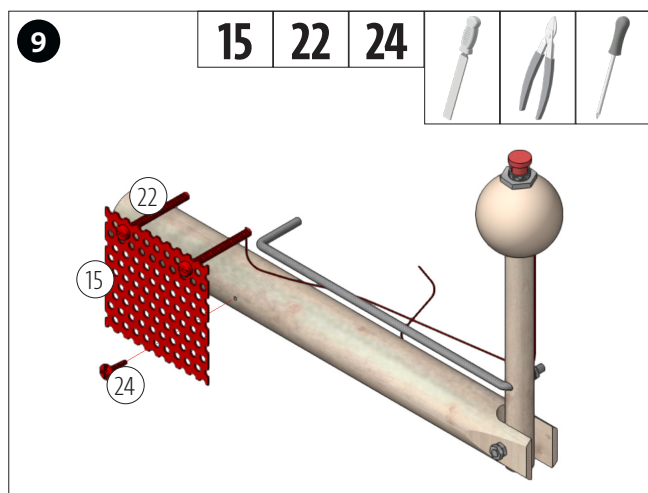
Carefully bend the threaded rod (20) in the vice according to the bending template (D) as shown.



Insert the threaded rod into the hole in the control stick as shown and fasten it with a washer (28) and two nuts (26).

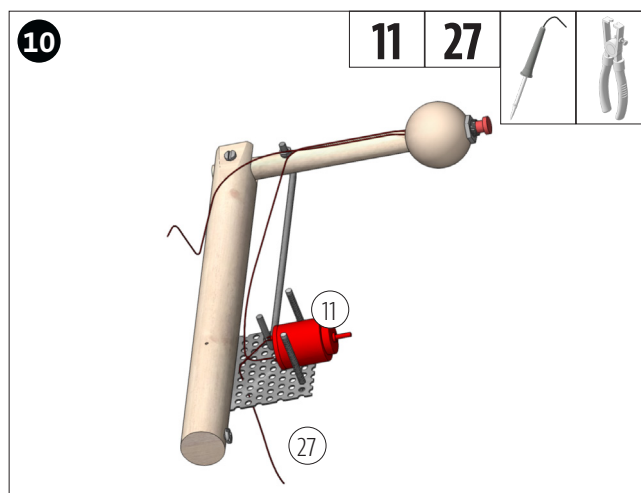


Insert a screw (24) into the hole at the end of the control shaft as shown (this will later fasten the shaft).

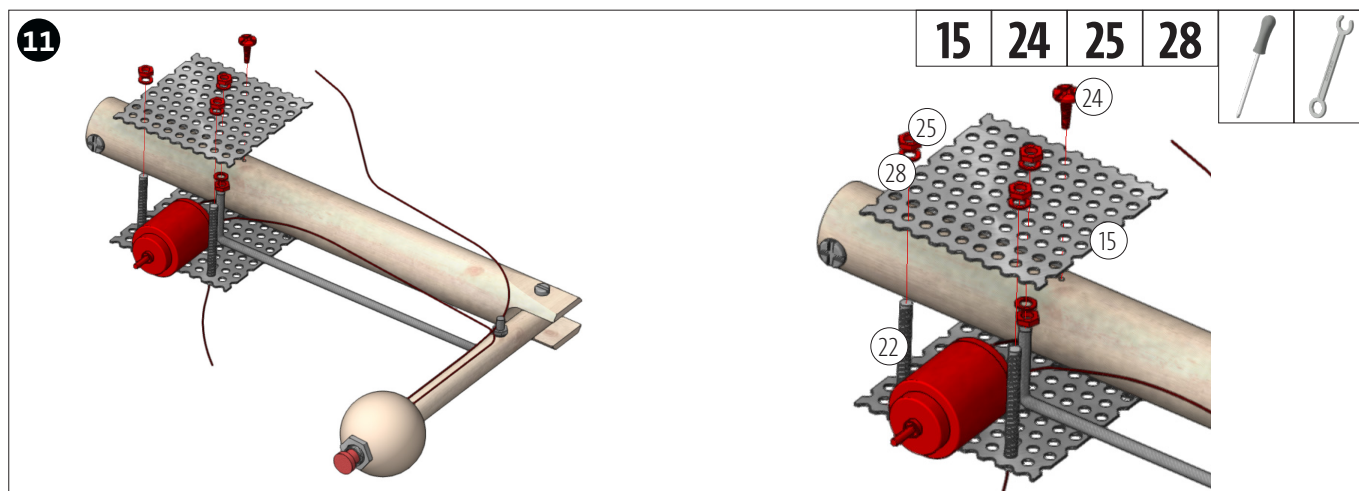


Cut the perforated plate (15) in half and cleanly deburr it. Fasten it with a screw (24) to the side hole of the control shaft. Insert two cylinder head screws (22) on the upper edge of the perforated plate.

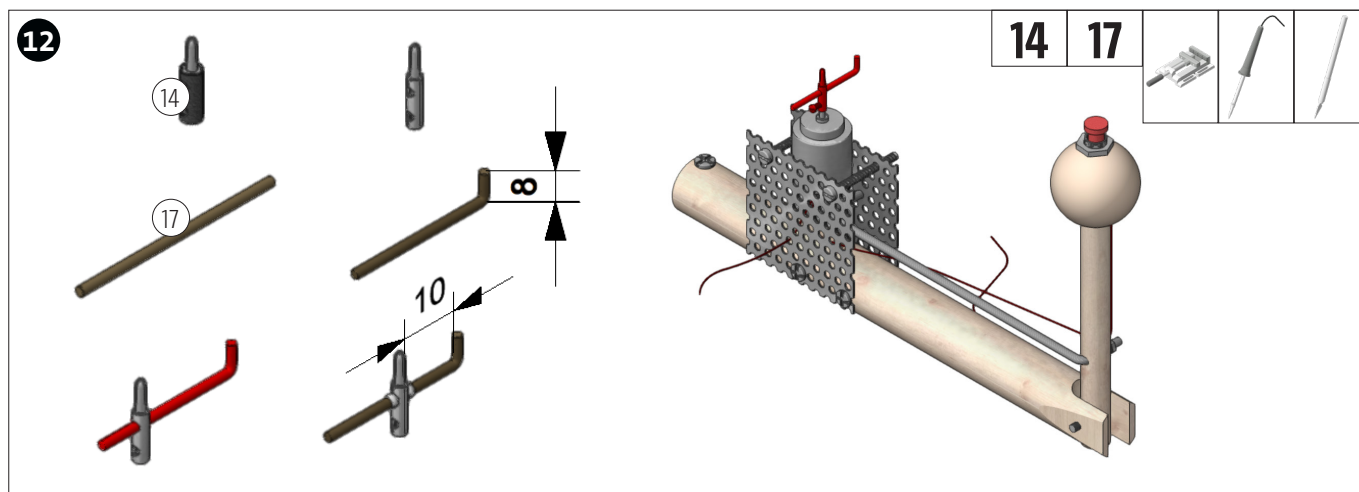
NOTE: The space between the screws should be approx. 30 mm!



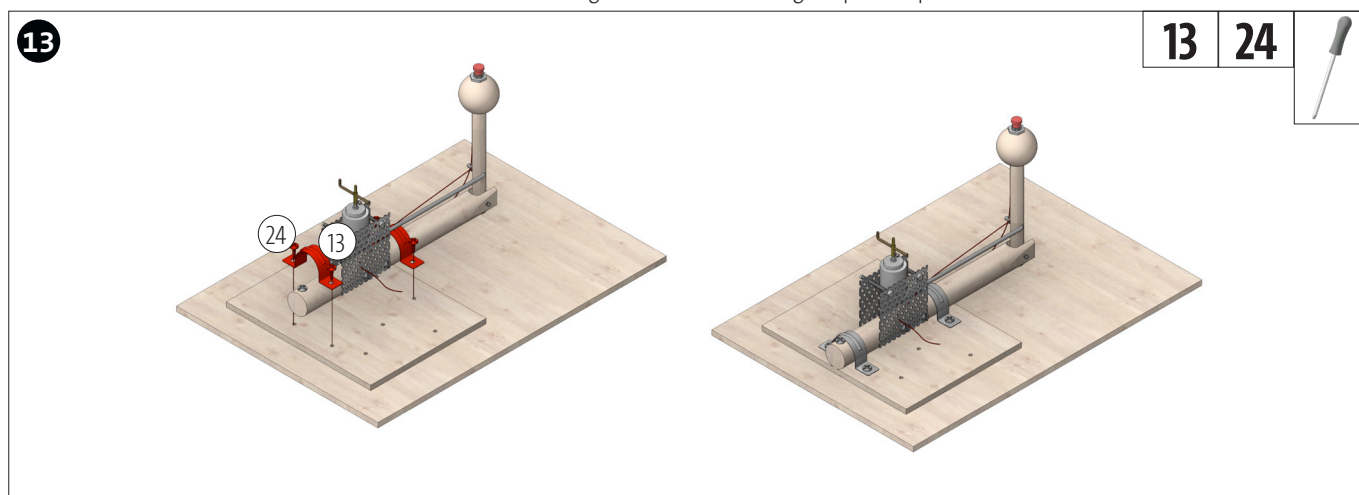
Cut an approx. 100 mm long piece from the electrical wire (27) and strip it on both sides. Solder one end to the right motor connection and pull it out through the fastened perforated plate. Then solder one of the wires from the switch to the second motor connection.



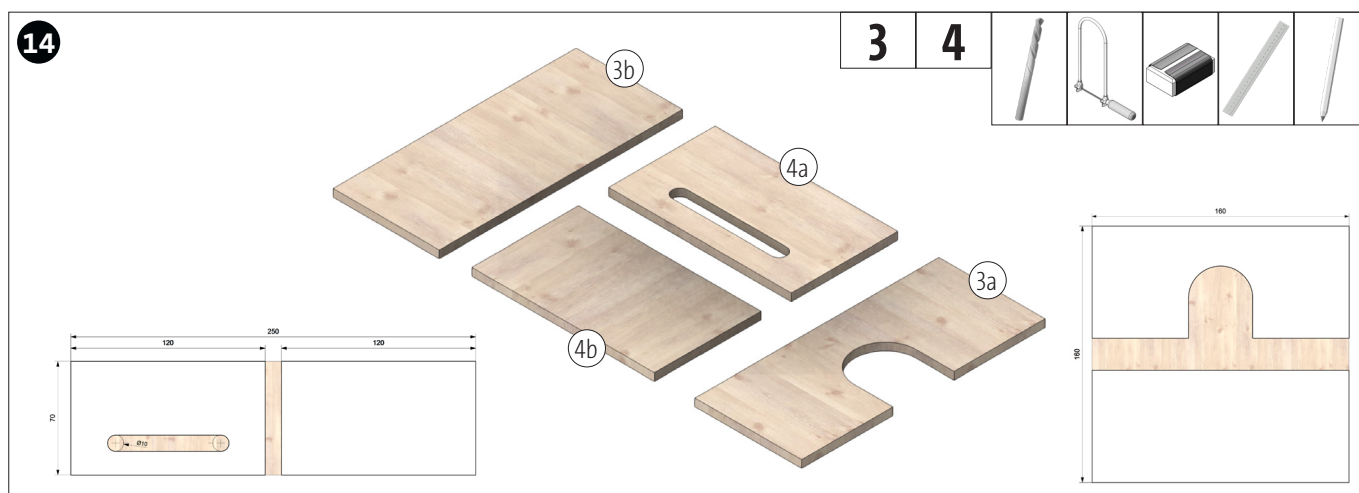
Fasten the second perforated plate (15) and screw it to the control shaft with a screw (24) so that it can rotate. Fasten the screws (22) and the threaded rod (11) with nuts (26) and washers (28). This will clamp the motor in place.



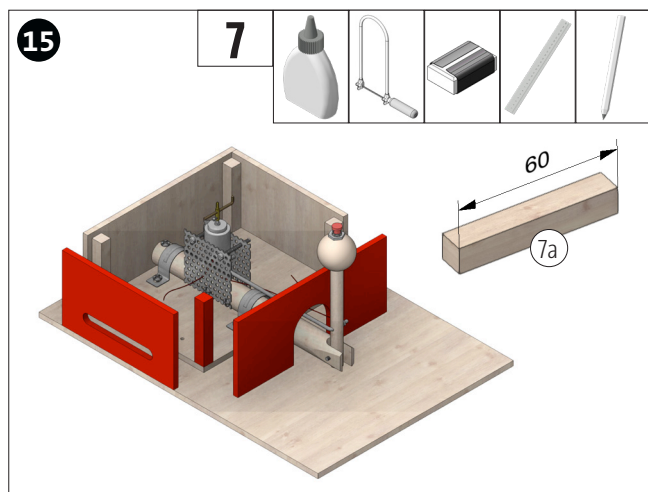
Remove the plastic cover of the HO connector (14) for the carrier. To do this, unscrew the screw and remove the plastic cover. Deburr the welding wire (12) and bend one end 8 mm by 90°. Then insert it through the cross hole of the HO connector and solder it 10 mm overhanging as shown. Attach the carrier on the motor shaft and fix it with the screw. Note: the angled end of the welding wire points upwards!



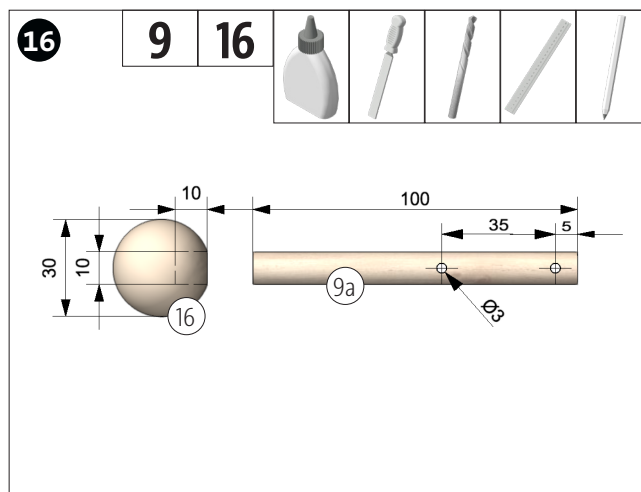
Now fasten the control shaft with the two fastening brackets (13) so that it can rotate on the base plate. Make sure that the screw of the shaft is positioned in front of the fastening bracket as shown.



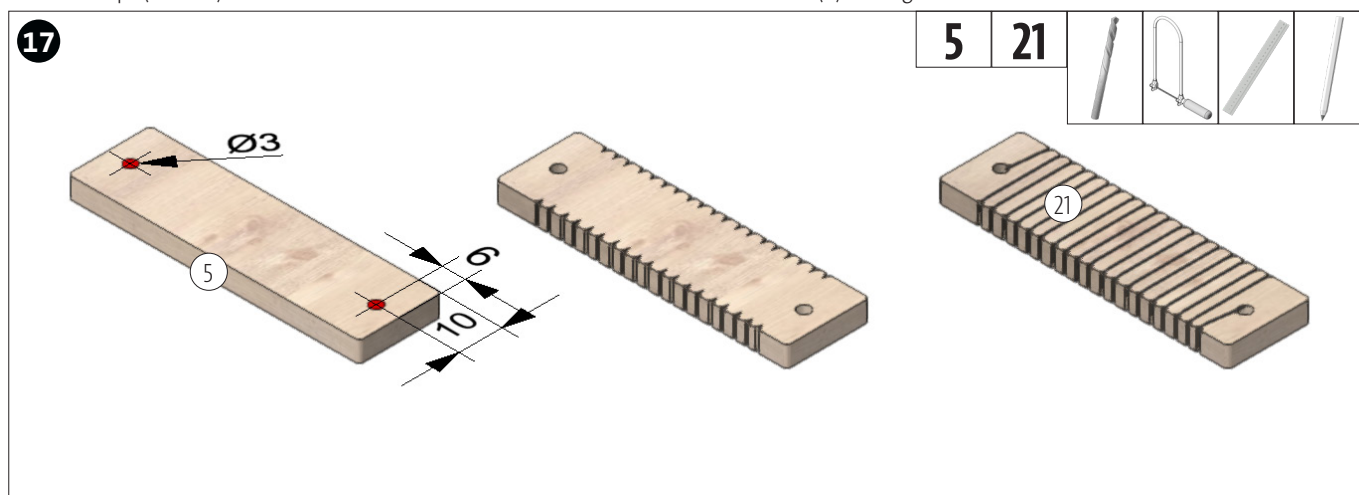
Transfer the templates for the frame (B/C) to the two plywood panels (3/4), drill, saw out and clean the saw cuts.



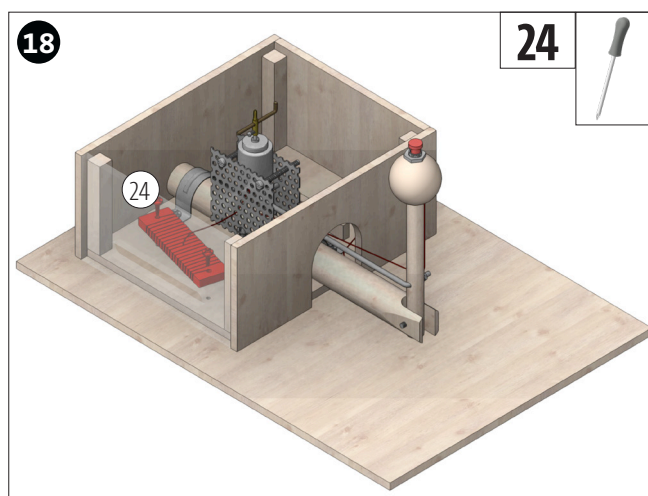
Cut 4 pieces of 60 mm each from the wooden strip (7) and clean the saw cuts. Glue the frame around the base plate as shown and glue the wooden strips (60 mm) into the corners as reinforcement.



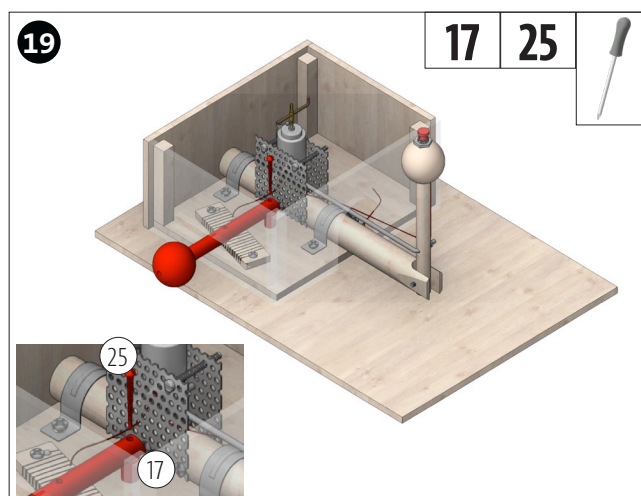
Drill a blind hole ($\varnothing 10\text{mm}$) approx. 10 mm deep into the second wooden ball (16). Mark and drill the two $\varnothing 3\text{mm}$ holes on the remaining round rod (9). Then glue the rod into the hole.



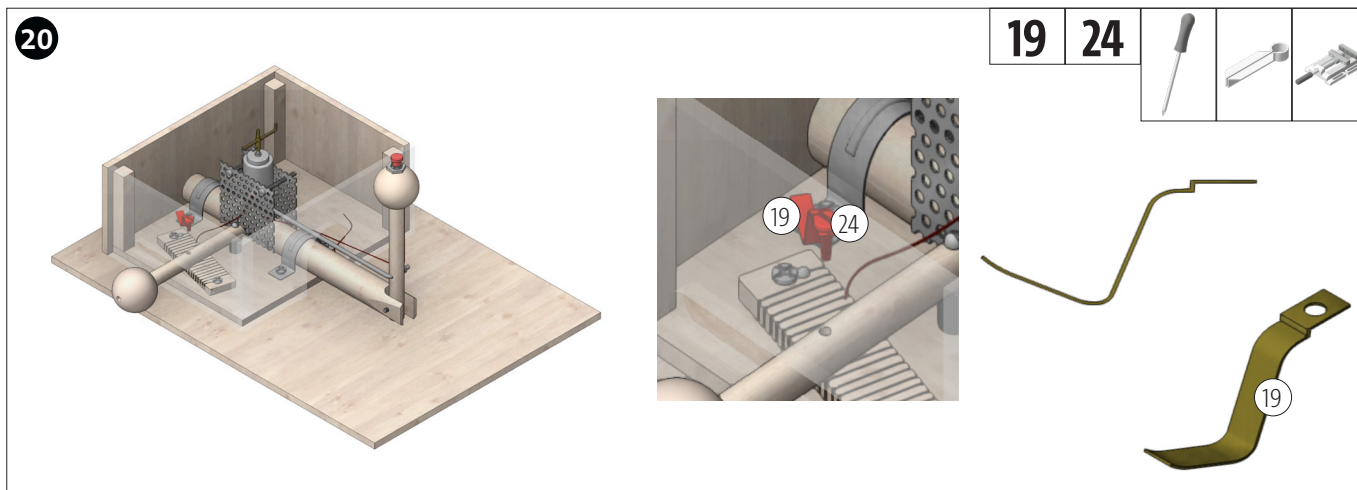
Transfer the position of the $\varnothing 3$ holes on the plywood strip (5) and drill them. Saw notches in the side edges as shown. Wrap the resistance wire (21) around the wooden strip as shown (approx. 18-20 turns).



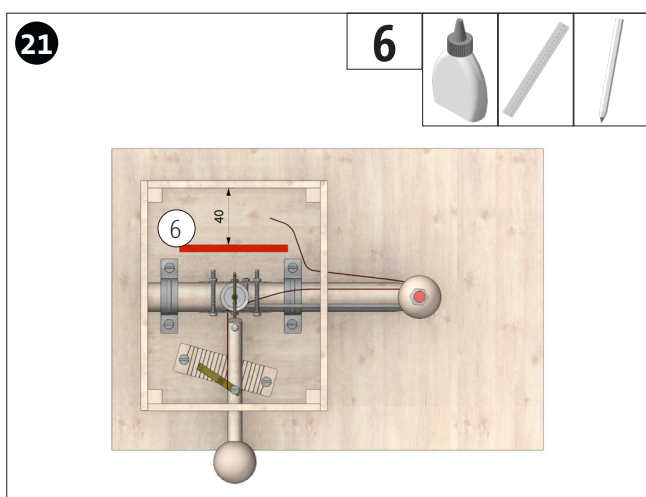
Fasten crosswise the resistance piece with 2 screws (24) on the base plate in the 2 holes provided!



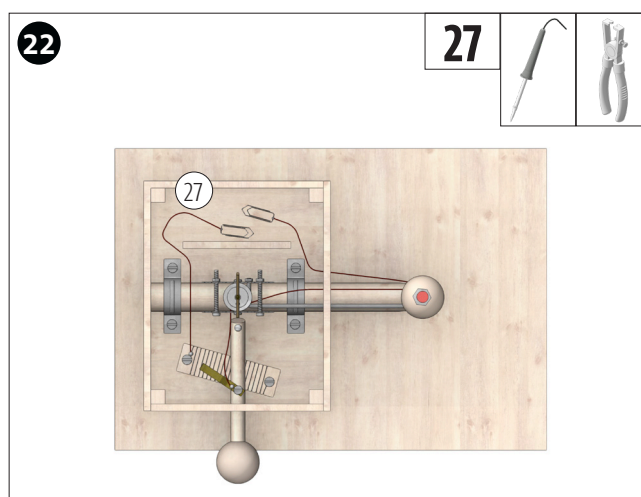
Insert the speed controller through the long hole in the frame and place it together with the screw (25) and the spacer roll (17) on the remaining hole.



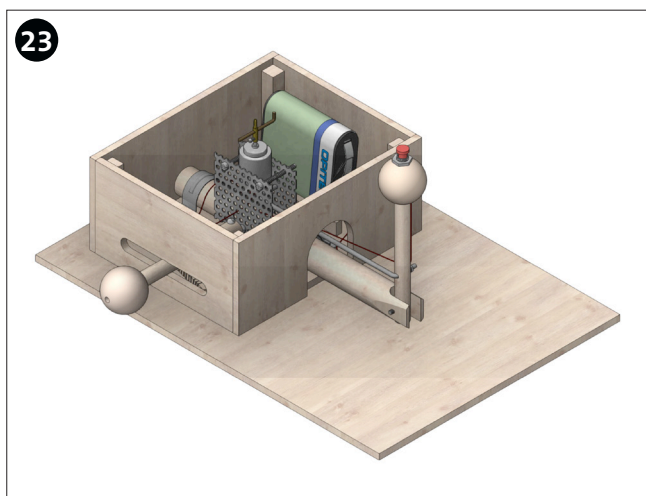
Bend the drilled brass strip (19) as shown above. Then fasten it to the speed controller with a screw (24).



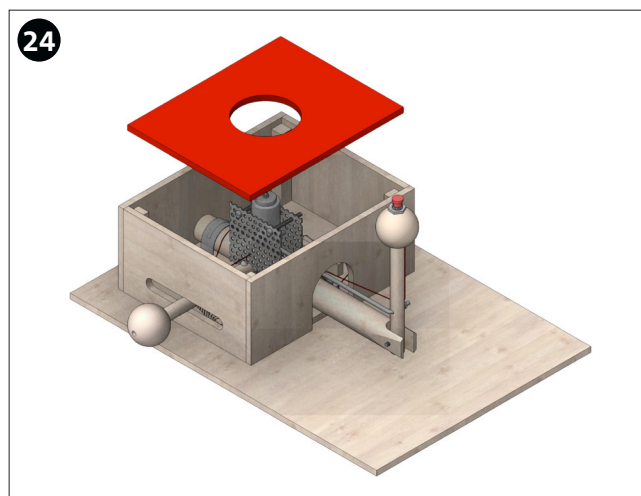
Glue the wooden strip (6) to the base plate at a distance of 40 mm from the outer frame as shown.



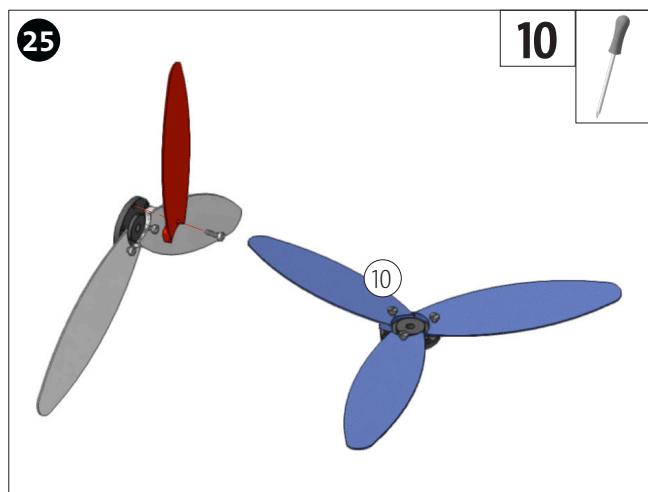
Strip an approx. 200 mm long piece of the electrical wire (27) on both sides, coat it with tin and solder it to the wire end of the resistance piece as shown. Then solder a paper clip to the other end. Solder the end of the wire coming from the motor to the brass strip (19). Solder a paper clip to the remaining wire end of the control stick.



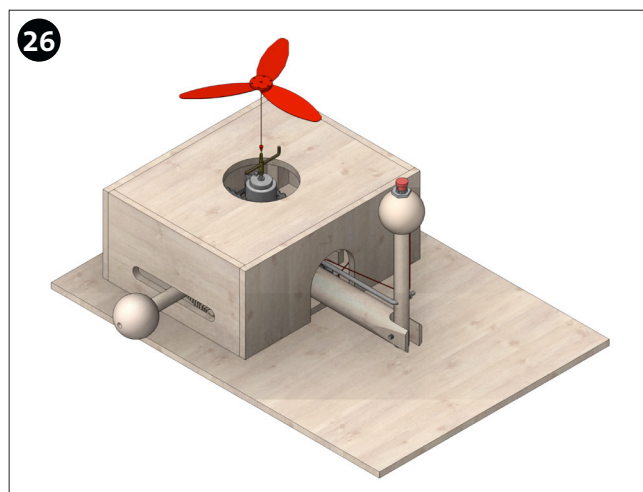
Insert a 4,5 volt flat battery as shown above and attach (connect) the two paper clips to the poles of the battery.



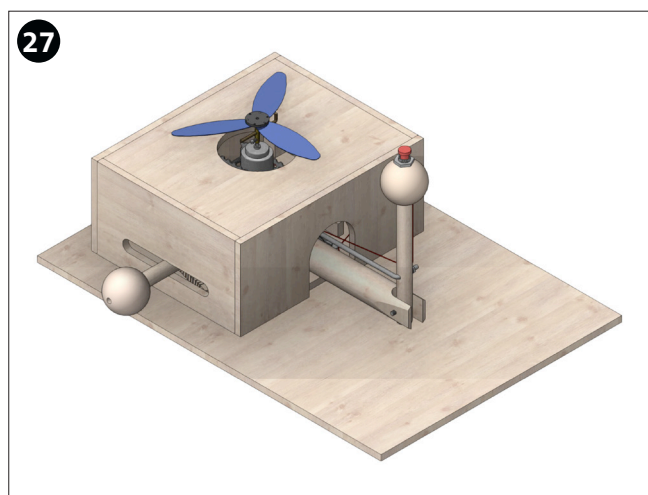
Drill the cover according to template (D) and then put it on.



Assemble the propeller (10) as shown.



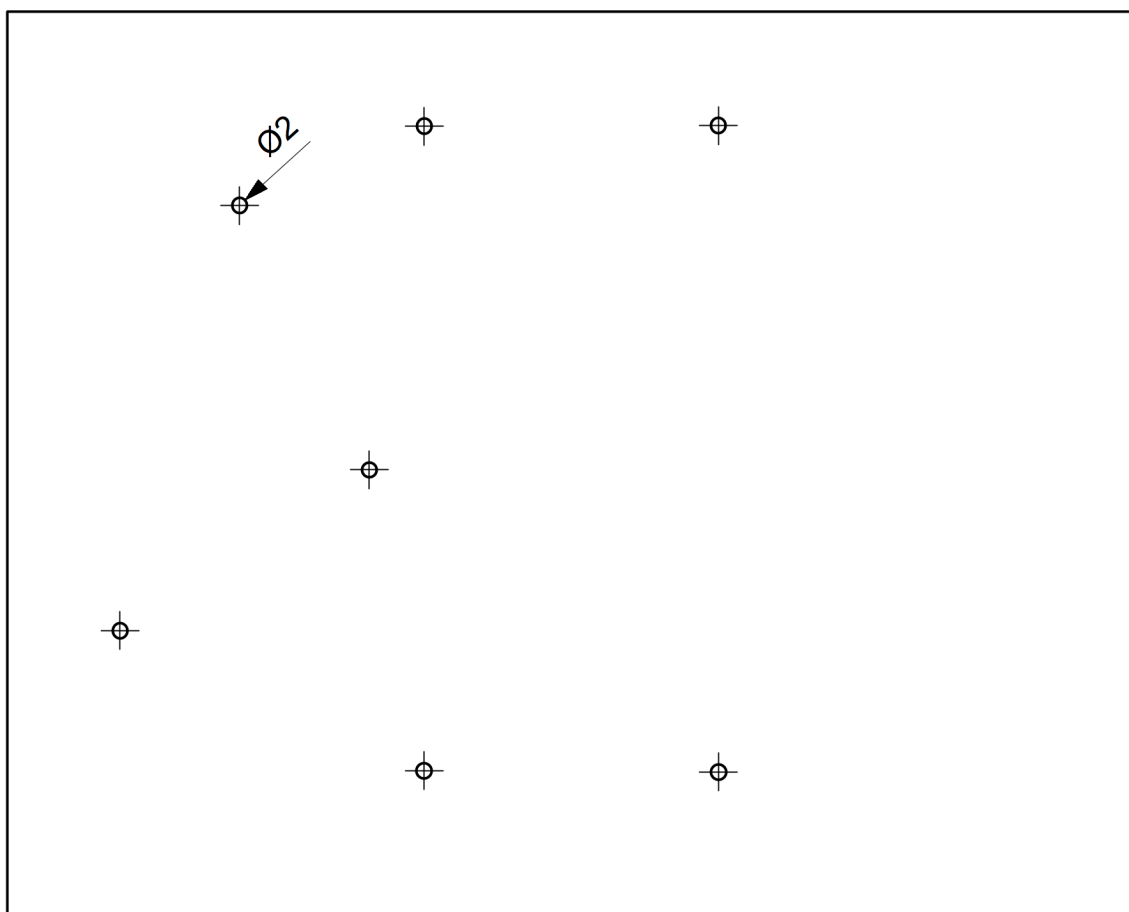
Place the propeller on the carrier.



DONE!

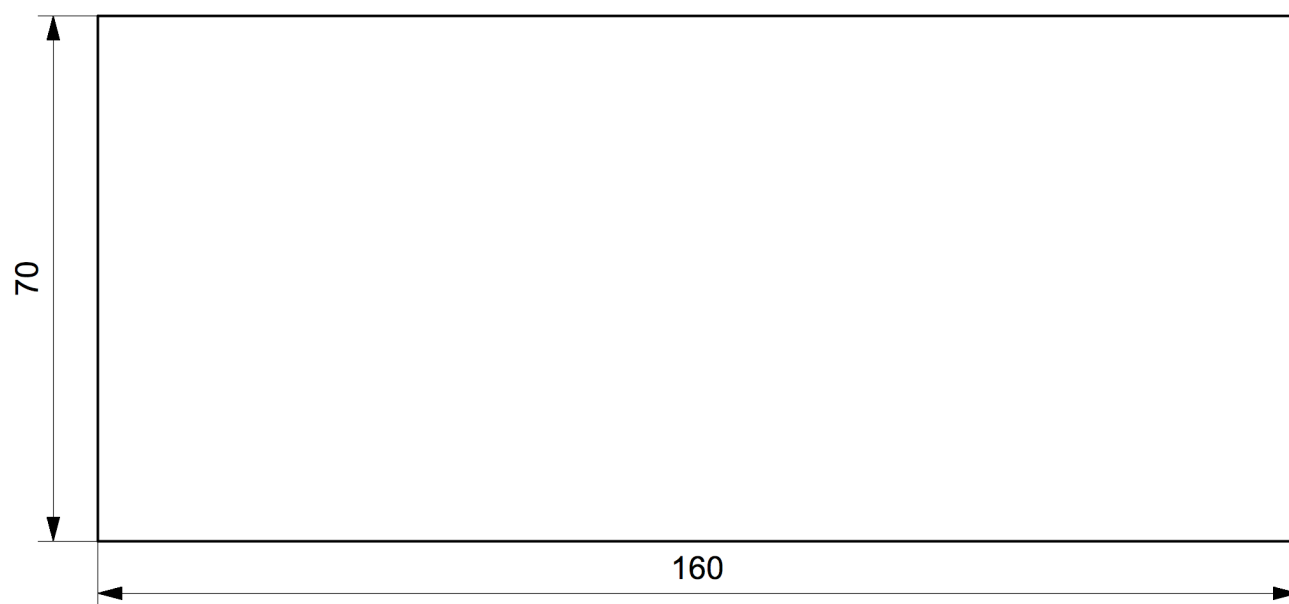
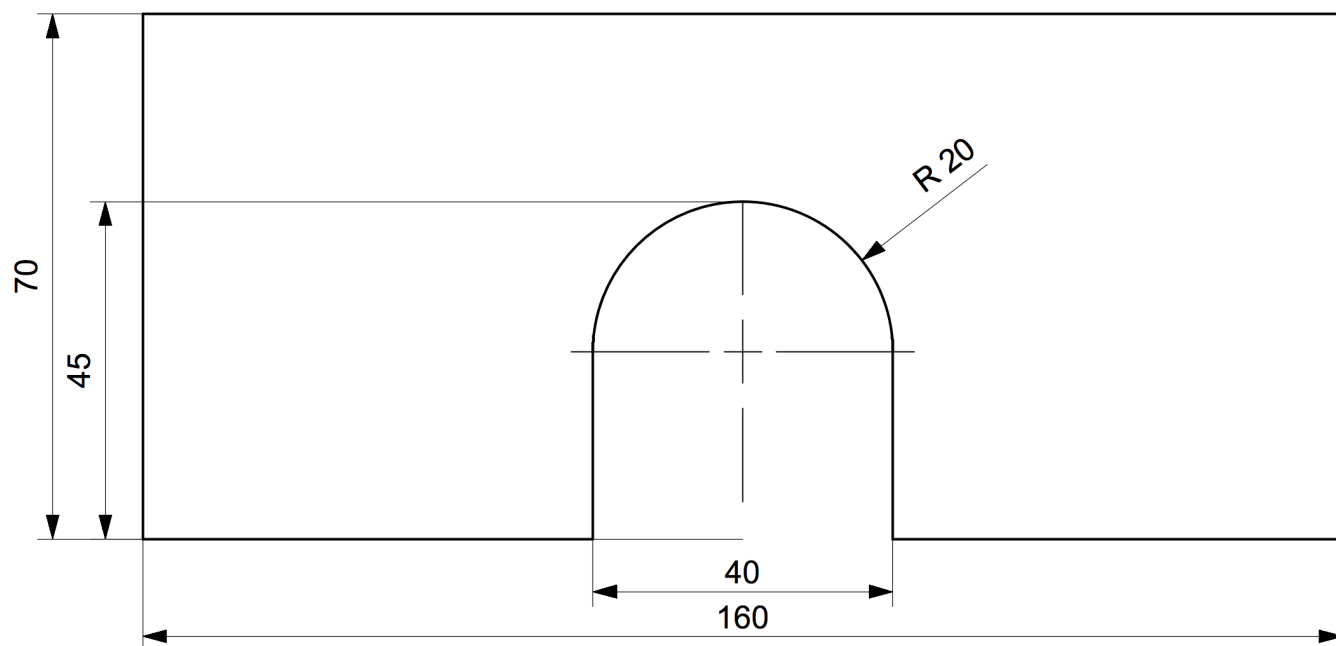
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A (1:1)



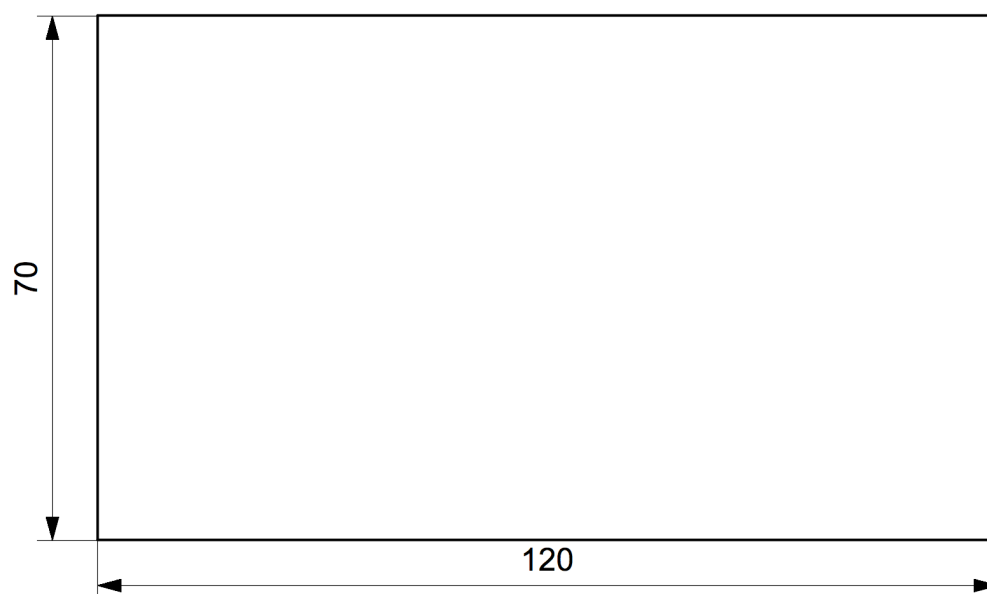
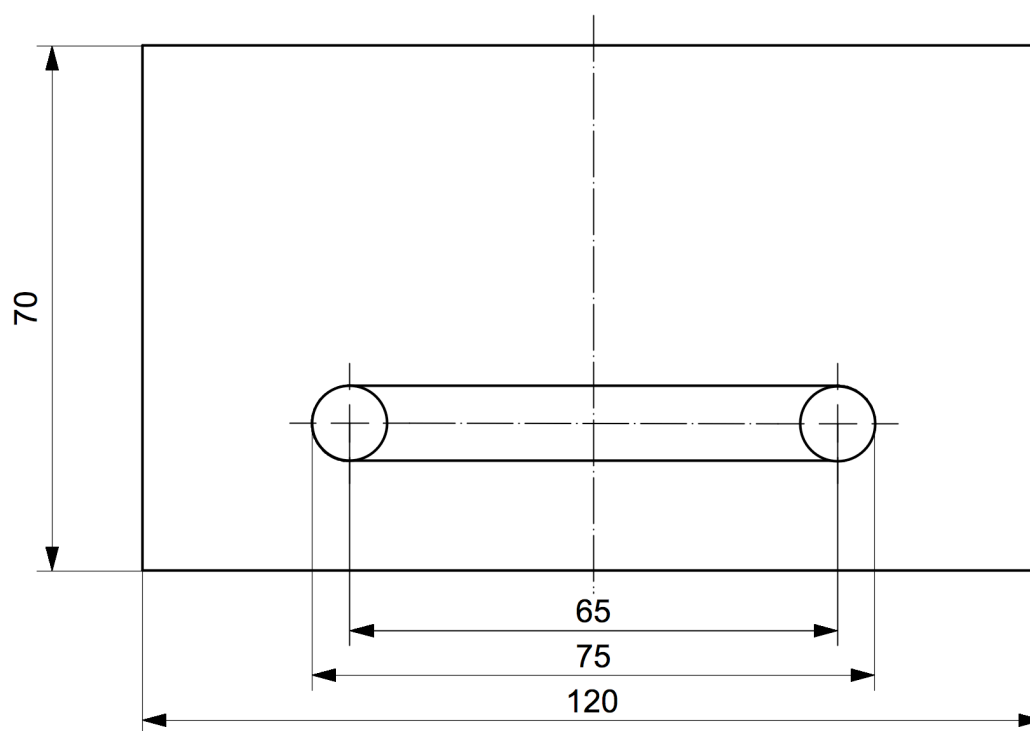
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B (1:1)

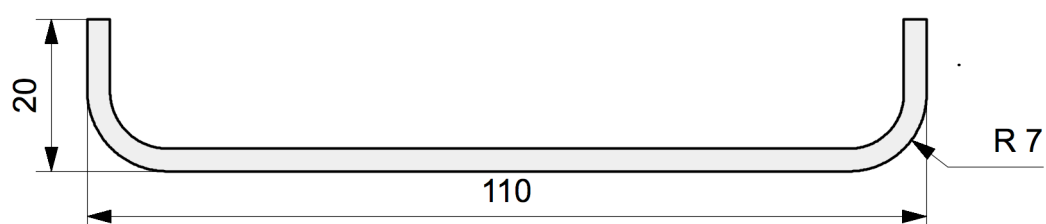


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C (1:1)



D (1:1)



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E (1:1)

