OPITEC

114.664

Savonius Wind Generator

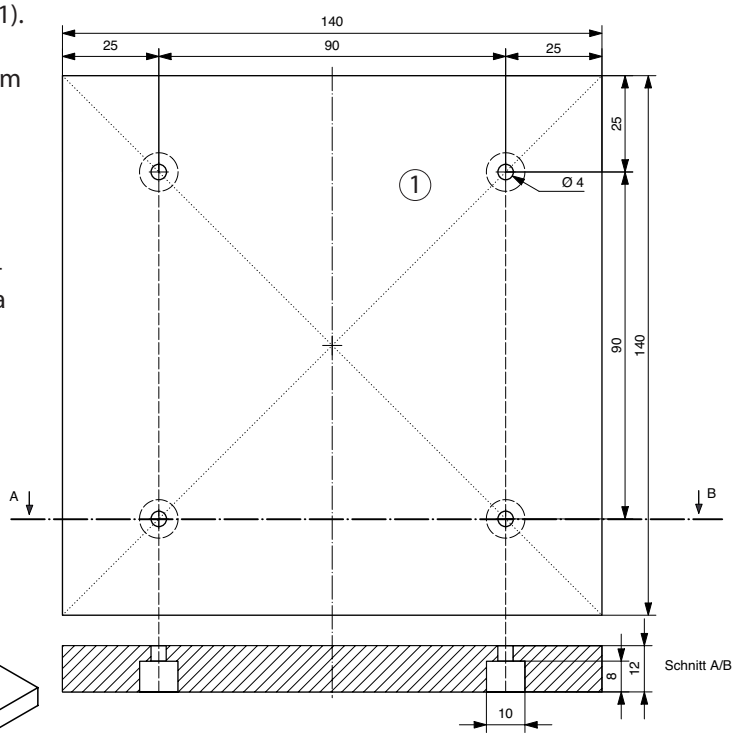
Please note:
The OPITEC handicraft packs are not toys in a typical off-the-shelf sense, but rather additional teaching and learning material for educational purposes. This craft pack may only be constructed by children and adolescents under the guidance and supervision of experienced adults.
Not suitable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

Tools required:
Fretsaw,
Drill Bit Ø2,4,5,6 mm,
Forstner Bit Ø10,
Workshop File,
Pricking Awl,
Screwdriver,
Open Wrench,
Stapler,
Scissors,
Edding,
Cable Stripper

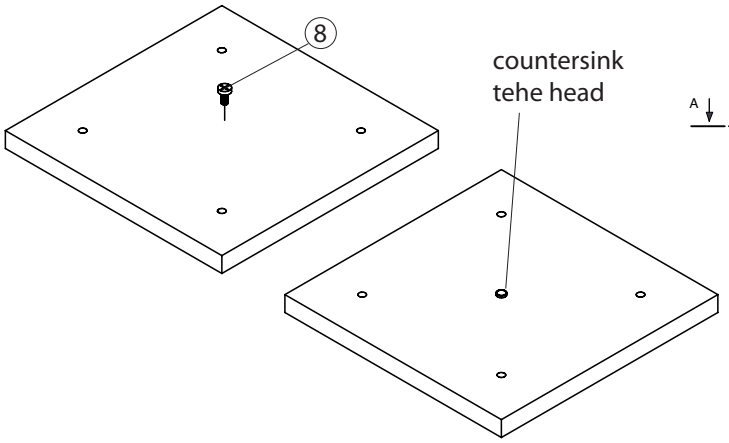
Stocklist				
	Quantity	**Size (mm)**	**Description**	**Part-Nr.**
Plywood (weatherproof	1	140x140x10	Base Plate	1
Plywood	1	260x120x8	Rotor	2
Threaded Rod	1	300x4	Axle	3
Plastic Sheet	1	100x100x2	Intermediate Shelf	4
Thermoforming Sheet	1	297x210x0,3	Rotor	5
Solar Motor FF 130	1		Generator	6
Low voltage LED 1,2 V	1		Lighting	7
Philips Tapping Bolt	1	2,9x9,5	Bearing	8
Cylinder Head Bolt	2	2x6	Fastening Generator	9
Cylinder Head Bolt	4	4x70	Fastening Intermediate Shelf	10
Nut	25	M4	Fastening	11
Washer	2	ø3,2/7	Fastening Generator	12
Washer	15	ø4,3/9	Fastening	13
Brass Tubular Rivet	1	ø5x7	Bearing	14
Cogwheel 58 Teeth	1	ø 60	Propulsion	15
Cogwheel 10 Teeth	1	ø 11,5	Propulsion	16
Reducer	1	4/2	Gear Motor	17

Construction Manual

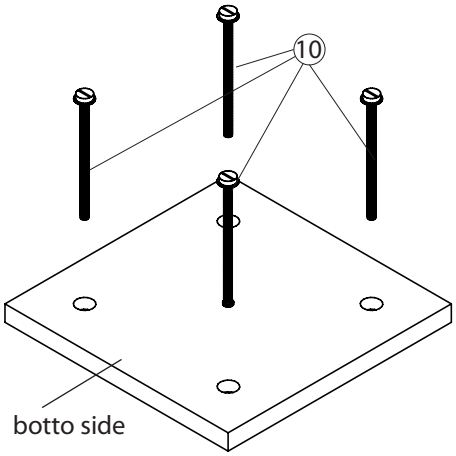
1. Transfer the template for the base plate onto the plywood (1). Mark the centre with a pricking awl. Drill the ø 4mm holes. Countersink the holes 8 mm deep from below with a ø 10mm Forstner bit.



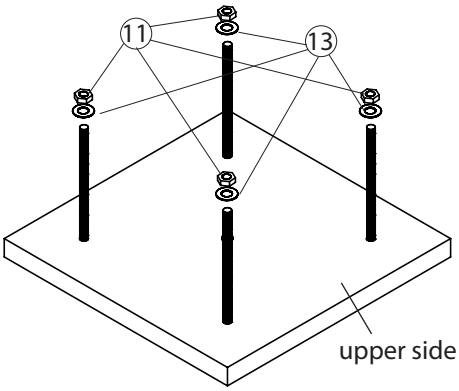
2. Screw the tapping bolt (8) in the centre as illustrated. Countersink the head of the bolt with a ø 4mm bit so much that a conical bearing develops!



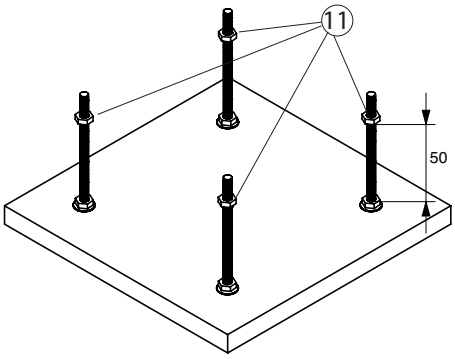
3. Turn around the base plate and put the 4 cylinder head bolts + 4 washers in the countersunk holes



4. Turn around the base plate and put 1 washer (13) + 1 nut (11) on each of the 4 bolts. Then tighten the nuts

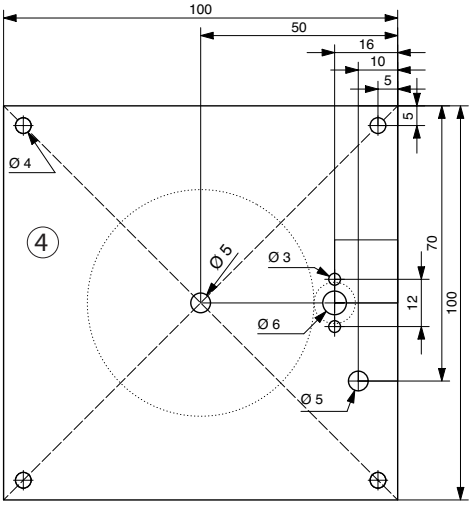


5. Put another nut on each bolt and make sure that the distance between the first and second nut is 50mm. See illustration below!



6. Drill the plastic sheet (4) as per template on page 7. Drill a ø 5mm hole in the centre for the brass tubular rivet. Drill through the ø 5mm hole for the LED (7) based on dimensioning. Then drill the ø 4mm holes for the bolts (10). Eventually, drill the ø 3mm and ø 6mm holes for the generator as per dimensioning.

Please note:
Stick exactly to the dimensions!



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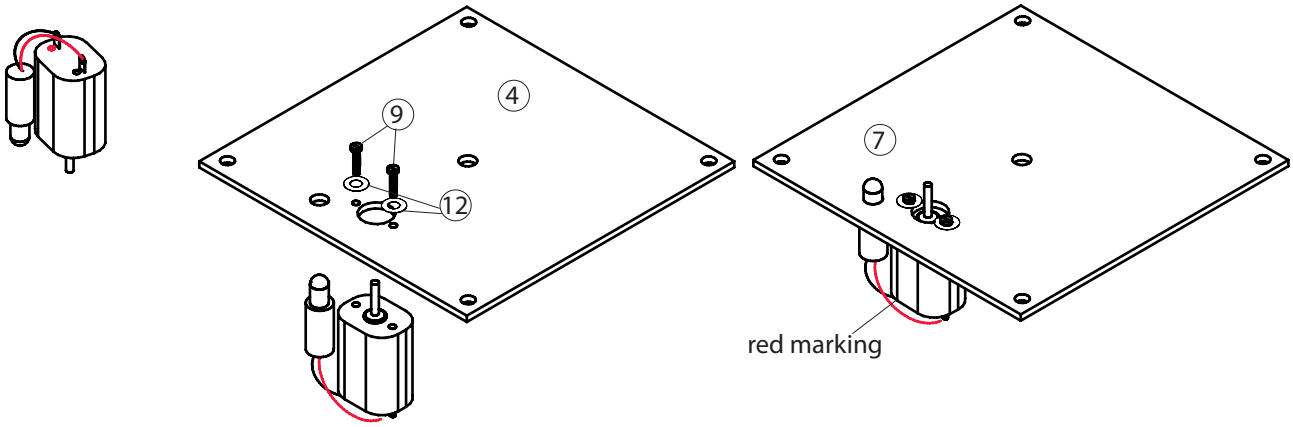
7. Connect the connecting wires of the LED (7) to the motor as illustrated. To do this, connect the black wire of the LED (7) to the red-marked pole of the motor (6). Then, connect the red wire of the LED (7) to the unmarked pole.
Please note:
Connections can also be soldered.

8. Insert the motor from the bottom of the intermediate shelf into the ø 6mm hole and fasten it with m2x6 bolts (9) + washer (12).
Please note:
The washers must not be forgotten! Otherwise, the motor could be blocked. The red mark of the motor points towards the ø 5mm LED hole..

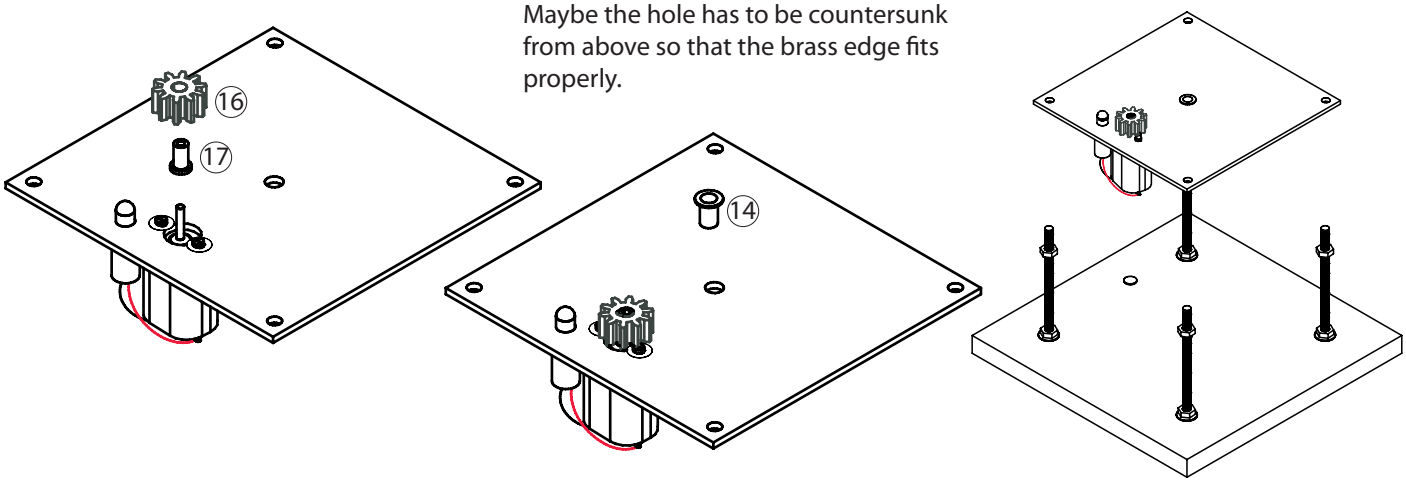
9. Glue the LED into the appropriate ø 5mm hole.



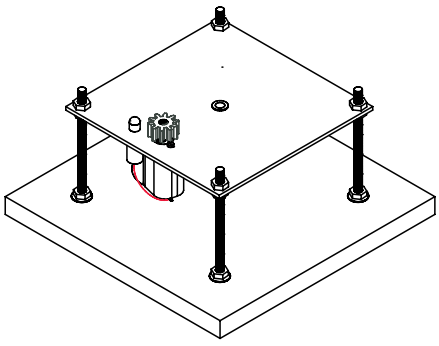
10. Put the reducer (17) into the cogwheel (16). Then place the cogwheel onto the motor axle. Glue it if necessary.

11. Glue the brass tubular rivet (14) into the mid-hole of the intermediate shelf (4) from above as illustrated.
Please note:
Maybe the hole has to be countersunk from above so that the brass edge fits properly.

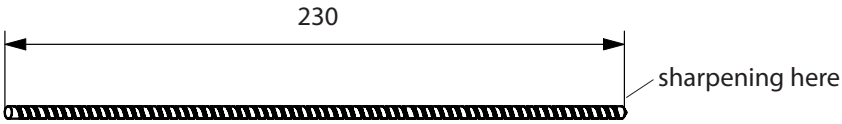
12. Fit the intermediate shelf (4) onto the bolts of the base plate (1).



13. Tighten the nuts (11).



14. Cut the threaded rod (3) to 230mm. Deburr sawn edges. Subsequently, sharpen one end with a file.



15. Screw a nut 60mm onto the sharpened end (see illustration!).

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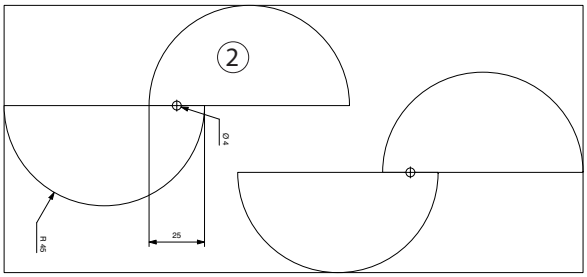
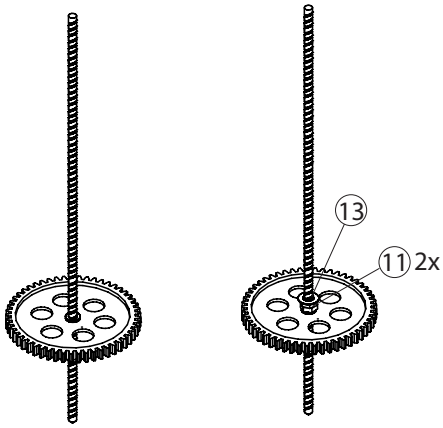
16. Transfer the template (page 9) to the plywood 260x180x8 (2).Drill the ø 3mm hole and saw out the two pieces for the rotor with a fretsaw. Smoothen the sawn edges.

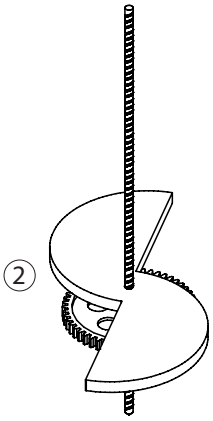


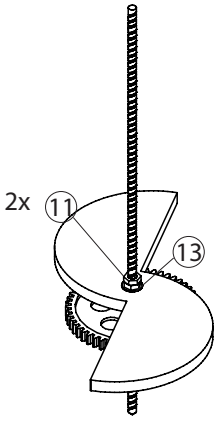
17. Put the cogwheel (15) onto the screwed nut (11) as illustrated and fix it with another two nuts so that the cogwheel is connected firmly with the threaded rod. Fit a washer (13).

18. Put one of the two rotor pieces (see step 16) onto the threaded rod and fit a washer.

19. Fit a washer and two nuts. Tighten the nuts.



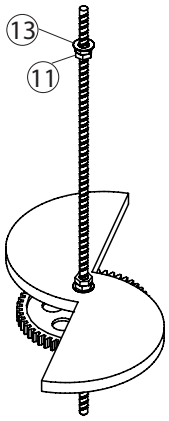


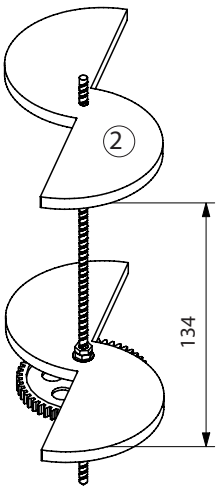


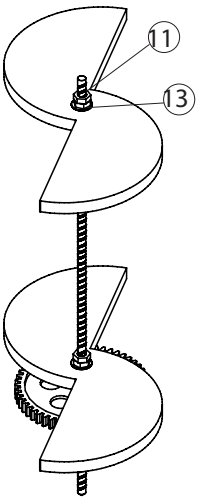
20. Screw two nuts (11) from above and fix a washer (13).

21. Put the second plywood piece onto the washer (13) as illustrated and set the distance at 134mm.

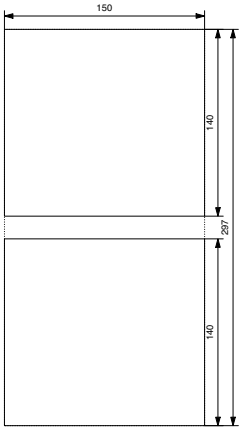
22. Put another washer (13) as well as two nuts (11) on top and tighten them.



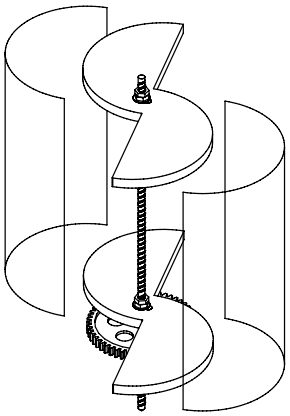




23. Cut the thermoforming sheet (5) as per template on page 7.



24. Put glue along the edge of the circular arc. Subsequently, place the sheet cuts as illustrated and staple them to the circular arc.



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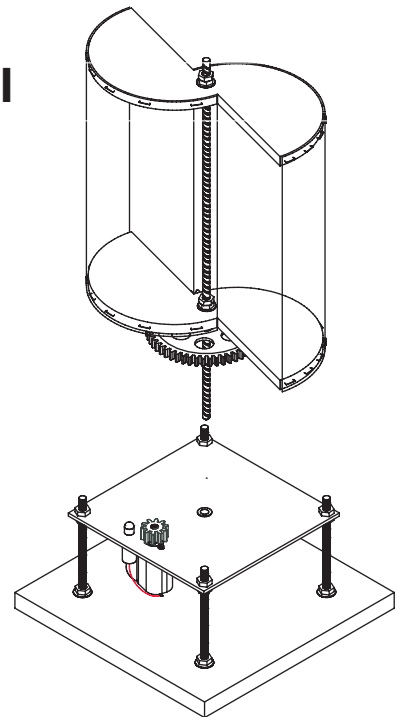
25. Insert the finished rotor through the centre hole of the brass rivet (14) as illustrated. Fix it to the axle bearing.

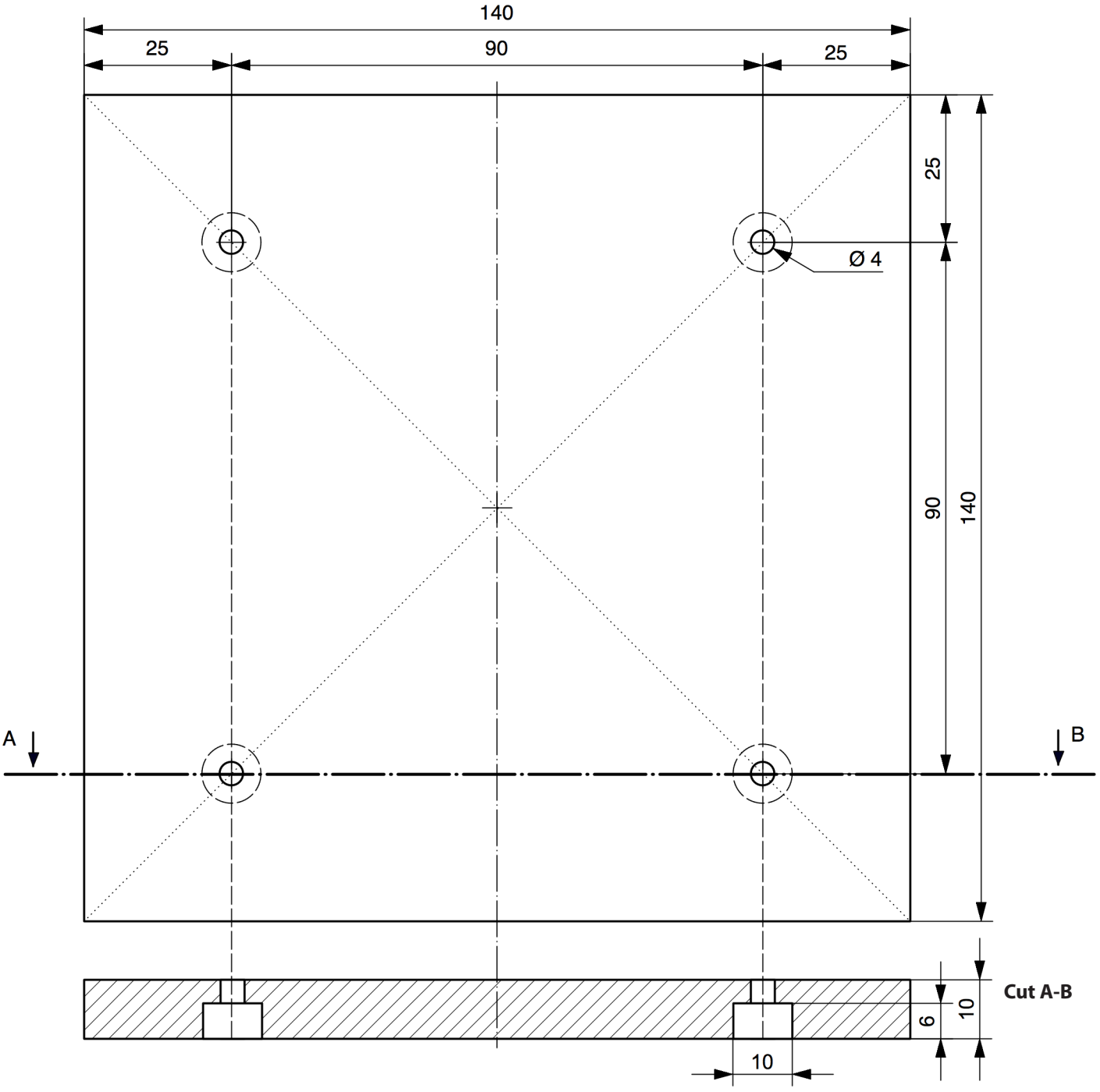
    Done!



26. Oil the bearings and put the Savonius generator into the wind (fan).

    Please note:
    If the LED does not illuminate, reverse polarity of the motor!

Template base plate
S 1:1



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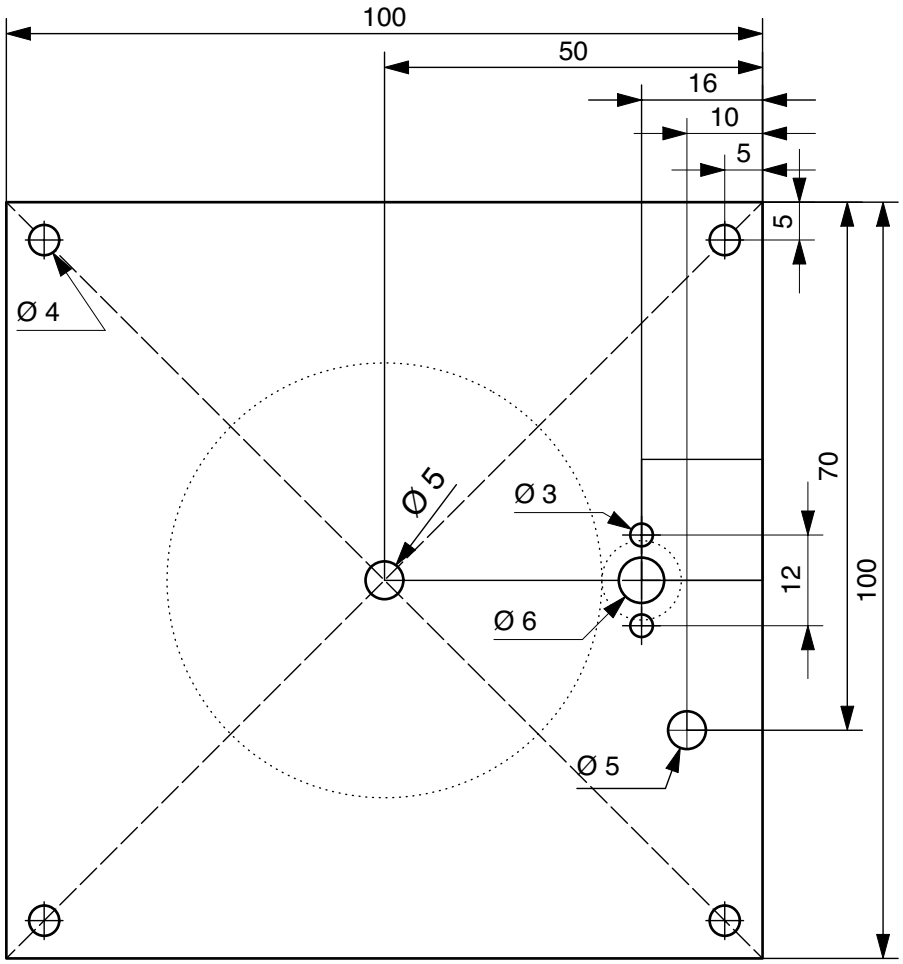
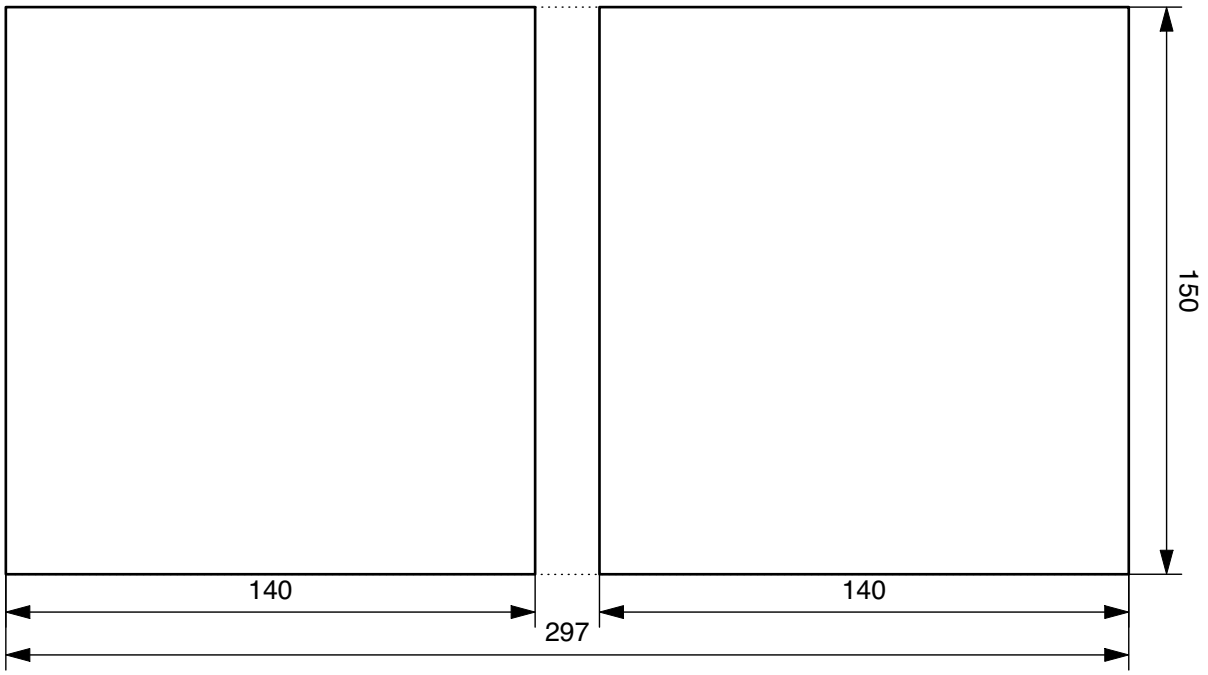
Template intermediate floor
S 1:1



Cutting plan: Vacuum forming foil
S 1:2



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Template plywood
S 1:1

Please note:
For the plywood to be weatherproof, treat with varnish.