

Windmills realizations





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CDROM CONTENTS

This project's CDRom is available in the A4 Company catalog (ref "CD-EOL-A").

It contains :

- The FreeHand version folder (modifiable with this software).
- The PDF version folder (readable and printable with the AcrobatReader software).
- Product's photos, synthesis images, DXF format perspectives.
- The full 3D product **modelling in its various** versions with **3D** SolidWorks, Parasolid and eDrawings format files.

This folder and CDRom are duplicable for students, for school internal use*

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Presentation

This windmill easy to perform is built around a mini sophisticated generator that can supply several DEL without using a gear set to increase the rotating frequency.

The “basic” light windmill module can be assembled on a support according to the function that you want to assign to the windmill.

The basic light windmill module realization kit (below) includes 3 high brightness DEL + all parts and materials needed, including a small aluminium plate for mounting on any support. Of course, all parts and materials are available at retail for achievements totally free, this folder is used as a simple guide around concrete realization examples.

The windmill realization proposed

We propose a realization of two subsets :

- the “basic” light windmill module :achievement highly controlled with just a few possible choices about the blades shape and the LED arrangement,
- the free achievement of a support designed according to the assigned function of this small windmill.



“The basic” light windmill module

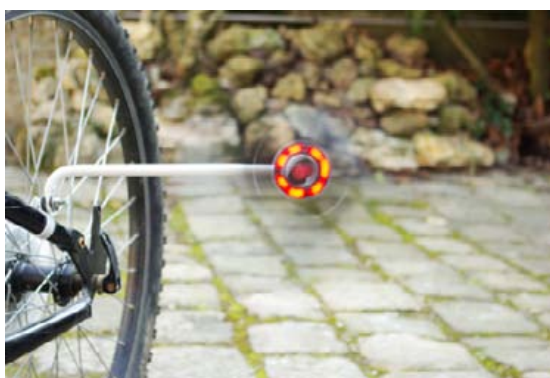
The three detailed applications in this folder

The parts and materials needed for these various applications examples are available in kits or elements at retail.

... But you can use these examples to modify them with your students or even to invent others.



Light toy



Bike light deport



Light vane

The folder

It contains the whole technical folder of the “basic” light windmill module + 3 technical folders of the supports for three various applications :

- light windmill toy,
- light windmill vane,
- light bike deport with windmill energy.

These three examples can be made so, our purpose is also to give ideas, to open lines of inquiry to modify them, or create new products with your students.

Educational interests

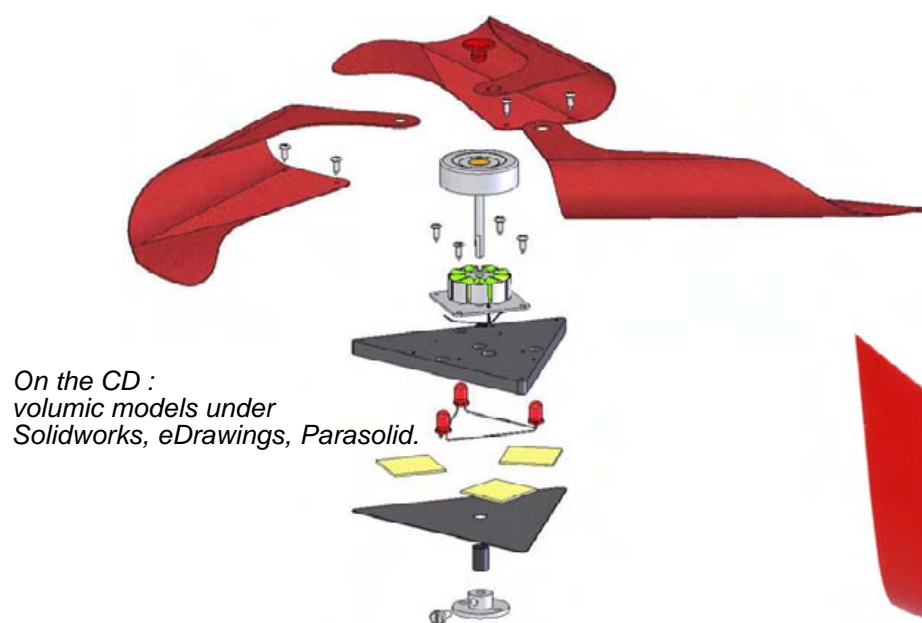
- Working on a renewable energy

- Working on an “open” product allowing students to engage in product design with their choices :

- several blades shapes are possible according to the defined operation conditions,
- the mini generator allows supplying up to 6 DEL to imagine other applications.
- It's possible with the mini generator to achieve an embedded electric circuit board on the blades (as proposed in the basic kit) or an electric circuit board attached on the fixed parts (base).

- Use the digital control

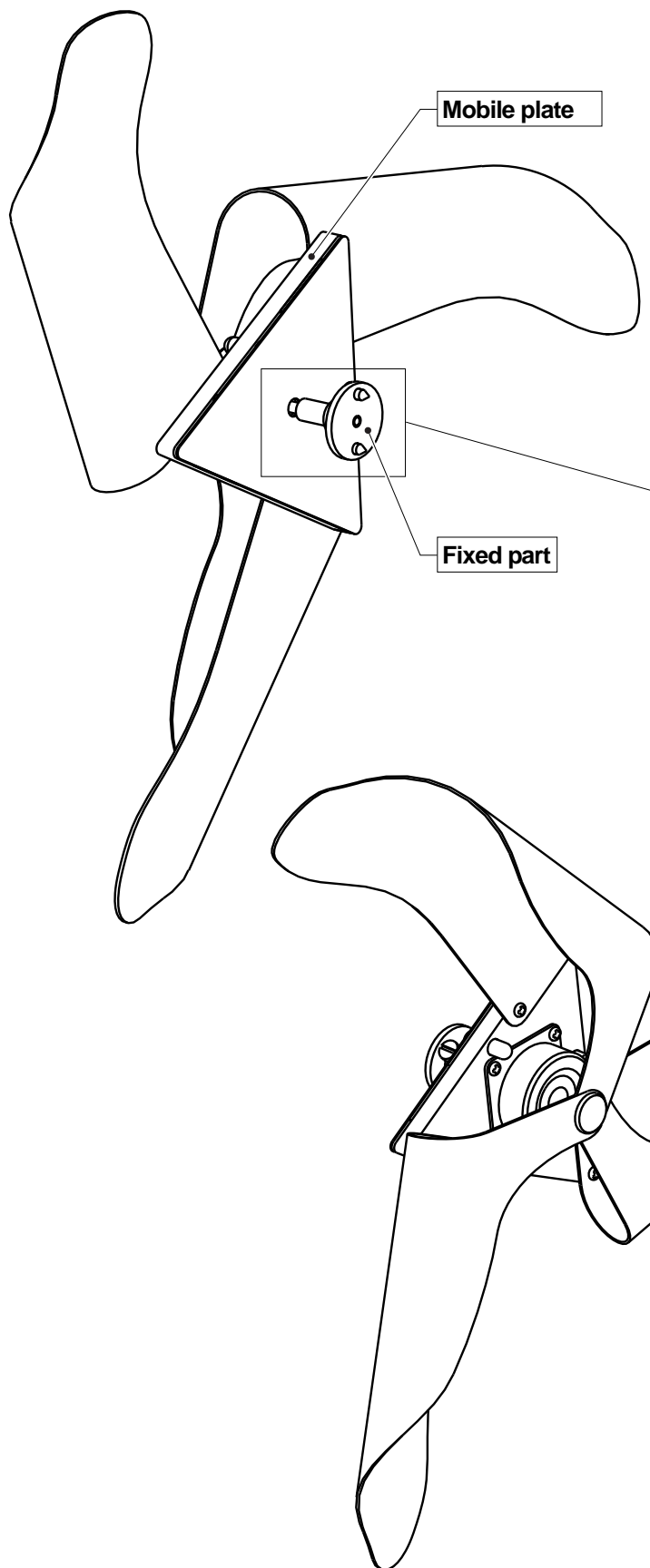
The simple design allows choosing to use or not the mini digital controlled milling cutter.



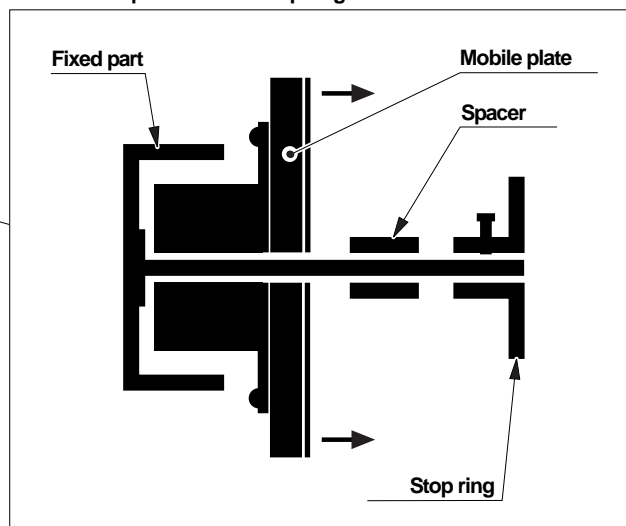
Only the mini generator is available at retail :
MOT-GENE-C

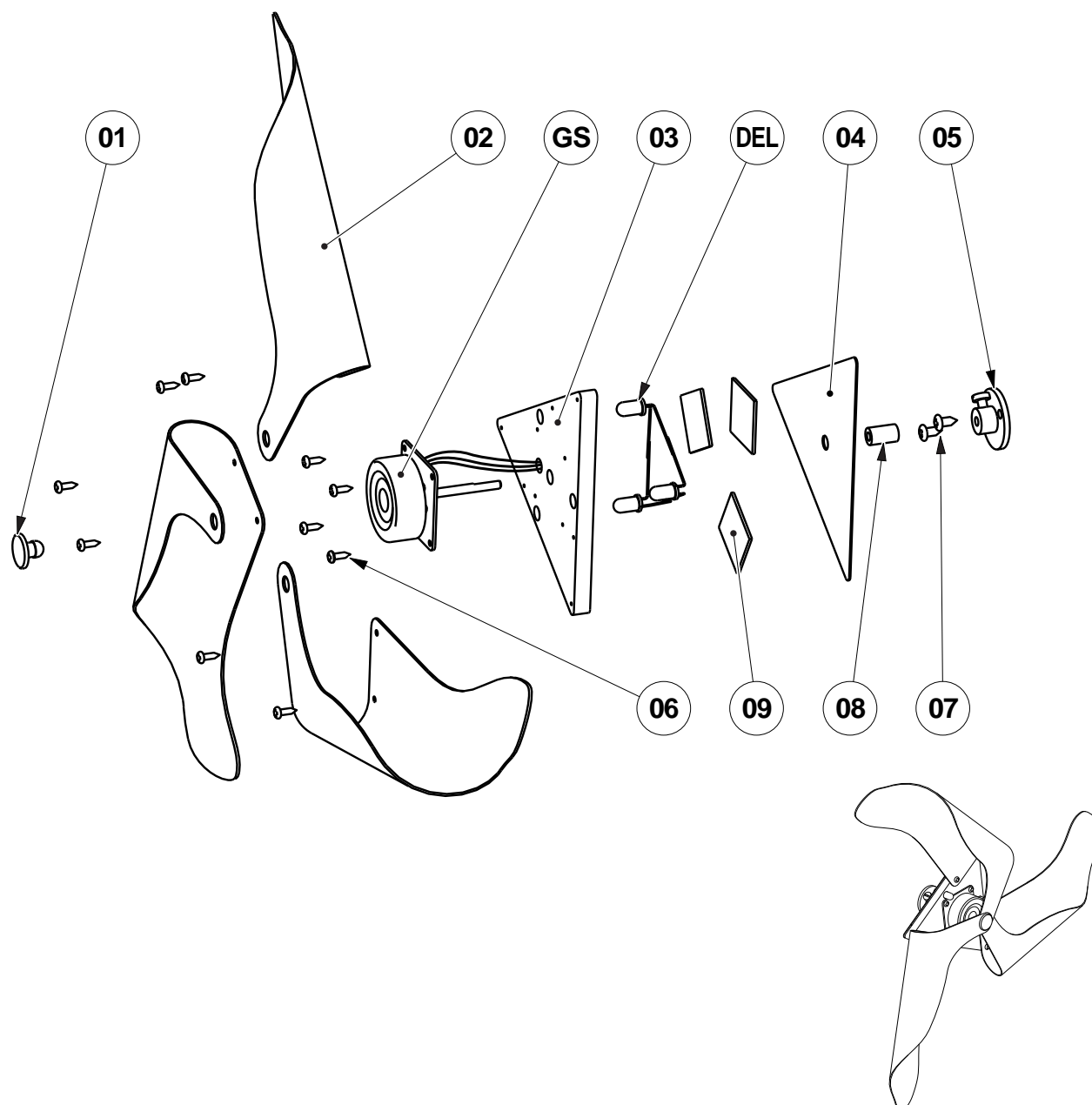



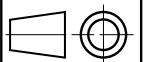

Example of a different assembly of this detailed in this folder : here the electric part remains fixed.
The DEL can then be fixed on the support or deported further to simulate a building power supply.



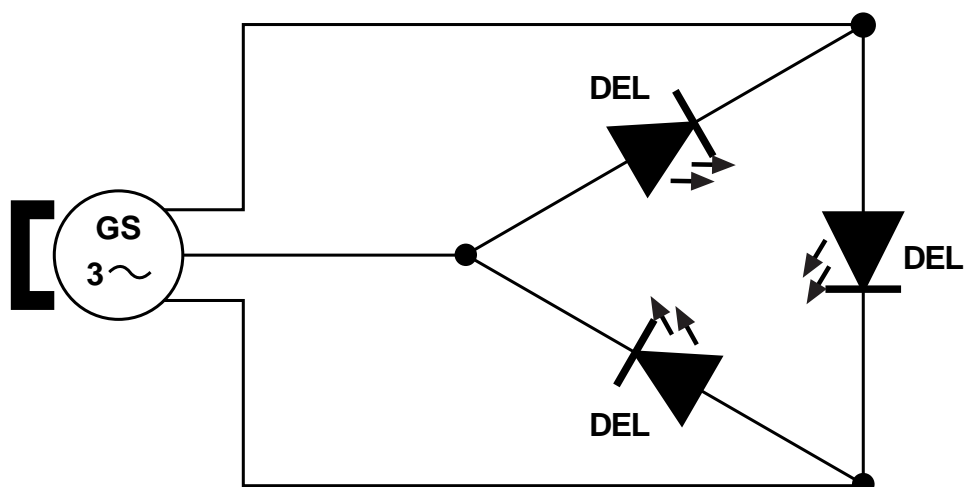
When the wind is too strong, the mobile part moves back. The spacer is used to limit this backing and to avoid the contact between the plate and the stop ring.





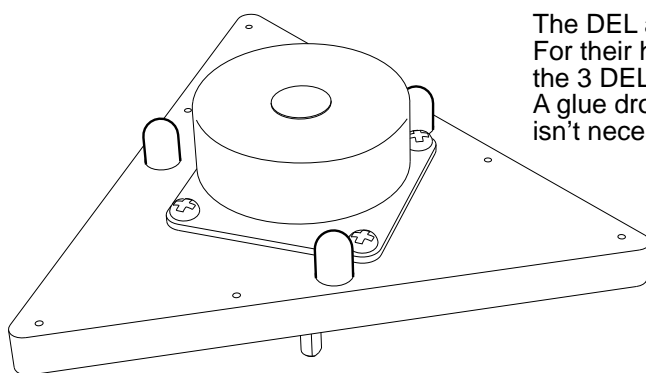
DEL	01	DEL	Red DEL Ø 5, high brightness transparent crystal or red housing
GS	01	Generator	Mini 3 phases generator for mini windmill, axle Ø 3 mm.
09	03	Double-sided adhesive pad	20 x 20
08	01	Spacer	Nylon, Ø 3.1 x 10 mm height, external Ø 6 mm.
07	02	2.9 x 6.4 screw	Galvanized steel, TC 2.9 x 6.4.
06	10	2.2 x 6.4 screw	Galvanized steel, TC 2,2 x 6.4.
05	01	Stop ring	Aluminium, for axle Ø 3 mm, external Ø 21 mm.
04	01	Back cover	Black polypropylene, 85 x 75 x thickness 0.5 mm.
03	01	Plate	Black expanded PVC, 85 x 75 x thickness 6 mm.
02	03	Blades	Black polypropylene, thickness 0.5 mm.
01	01	Rivet	Elastic rivet Ø 12, drilling Ø 5, thickness 4 mm maxi.
MARK	NUMBER	DESIGNATION	CHARACTERISTICS
			PROJECT  PART Light module
School _____ Class _____		DOCUMENT TITLE Exploded view and Nomenclature	
Name _____ Date _____			

Electric scheme



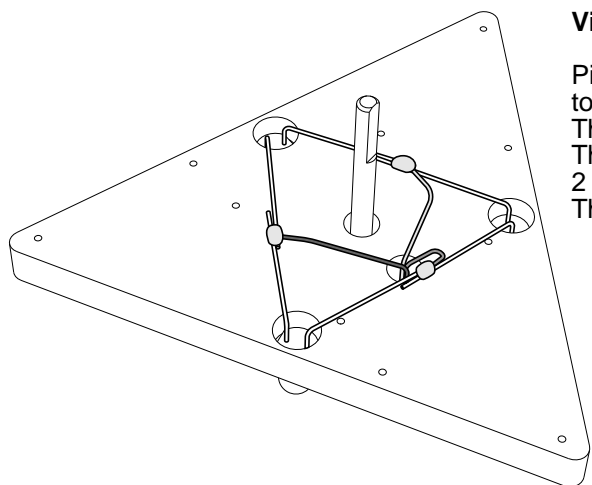
Wiring drawing on the plate

View from DEL side



The DEL are stuck in the plate hokes.
For their height position, the only constraint is that the 3 DEL are at the same height.
A glue drop (PVC or hot melt glue) on the back isn't necessary but strengthens the product.

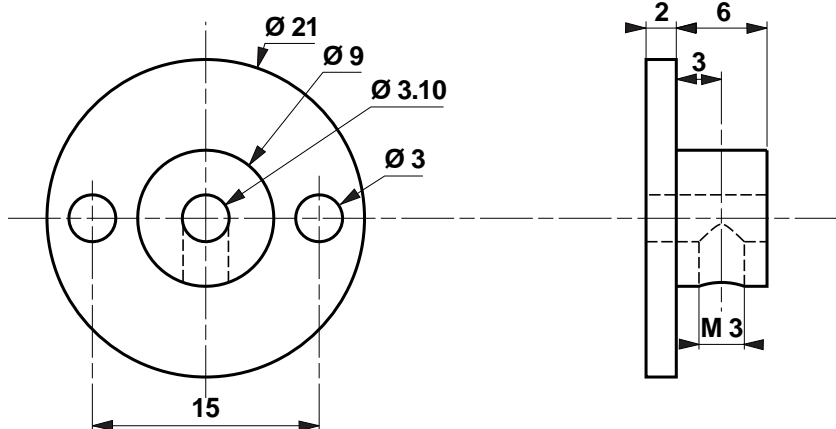
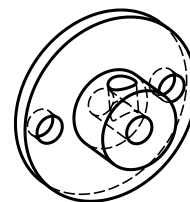
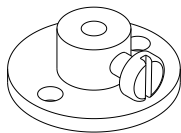
View from pins side



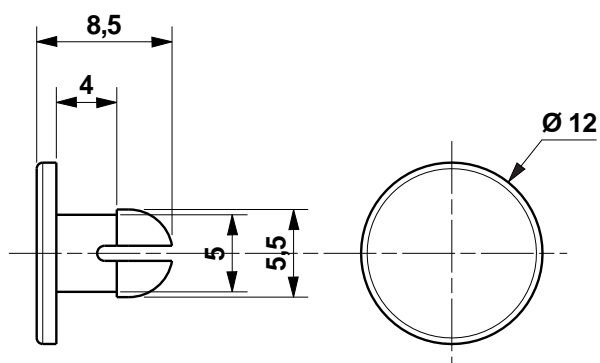
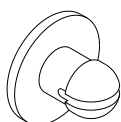
Pins are bent against the plate to form a triangle. they touch together anode against cathode.
The generator wires are cut quite short not to make loops.
There is 3 solder points to be made, each one connects 2 DEL and 1 wire.
The wiring thickness must be limited at maximum:

- avoid that wires overlap or make loops,
- place the pins side by side and not overlapping,
- limit the solder thickness.

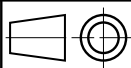
stop ring (05) - (BAG-ARAXE-D3)



Elastic rivet (01) - (SK-RIV-D5H4)



Scale 2 : 1



A4

PROJECT



PART

Light module

School

Class

DOCUMENT TITLE

Stop ring (05) and elastic rivet (01)
Definition Drawings

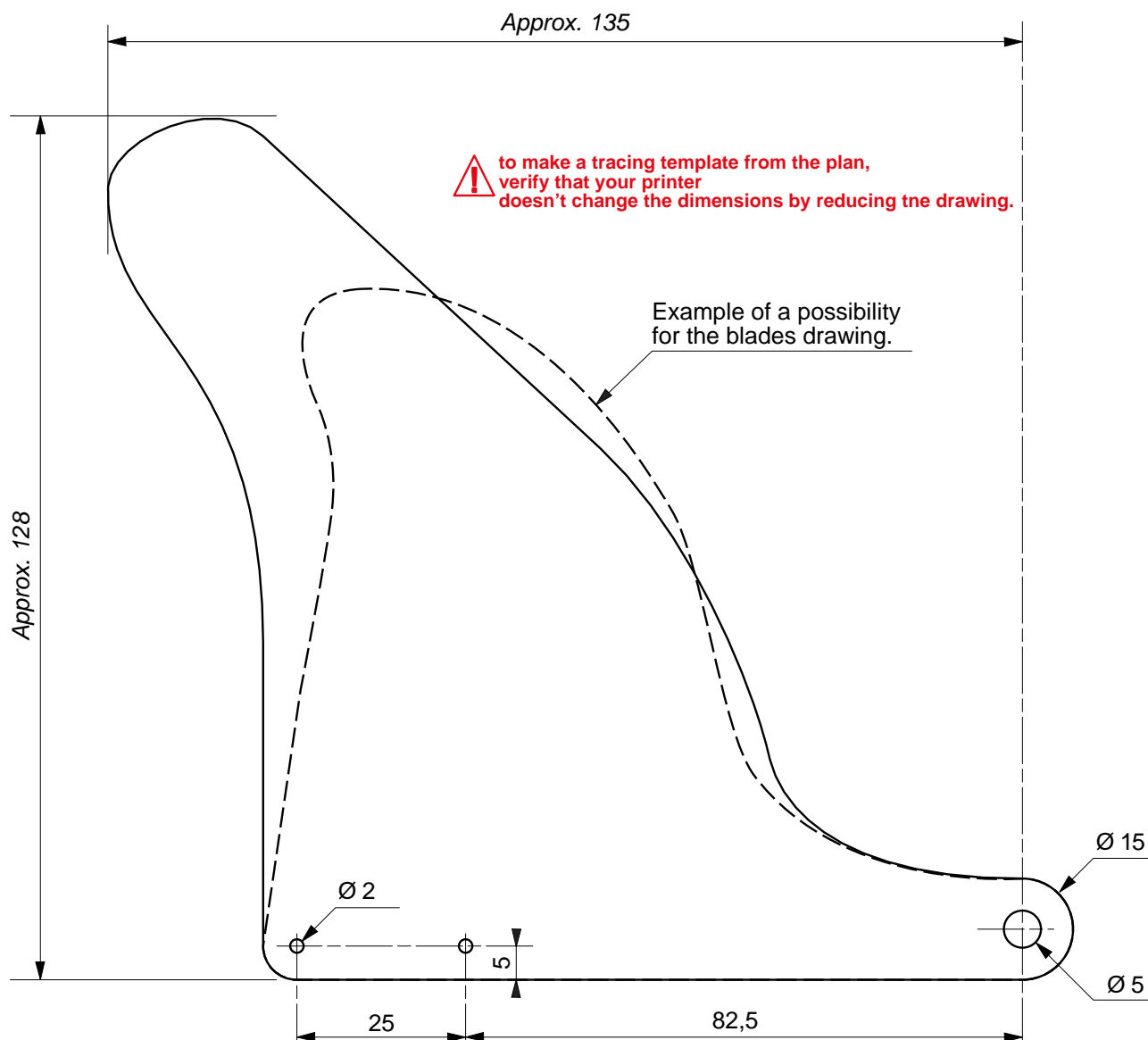
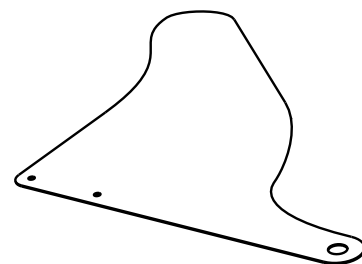
Name

Date

Propeller blade (02)

3 identical blades to be made by cutting a 0.5 mm polypropylene sheet.
The right base and the drillings relative positions must be absolutely respected.
Realization : CN or with scissors cutting from a plot
(make a card template for the plot) + drilling using a punch plier.
The blade shape can be modified according to the light module use :
larger blades will be better suited to light winds.

On the blade base drawing with the 3 holes and also the maximum dimensions
(128 x 143 imposed). This plan can be used as cutting template
or try other blade shapes.



Cutting : scissors or CNC machine.

Drilling : puncher or CNC machine.


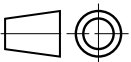

	Scale 1 : 1		PROJECT		PART
	School		Class		DOCUMENT TITLE
Name		Date		Blades (02) Definition Drawings	

Plate (03)

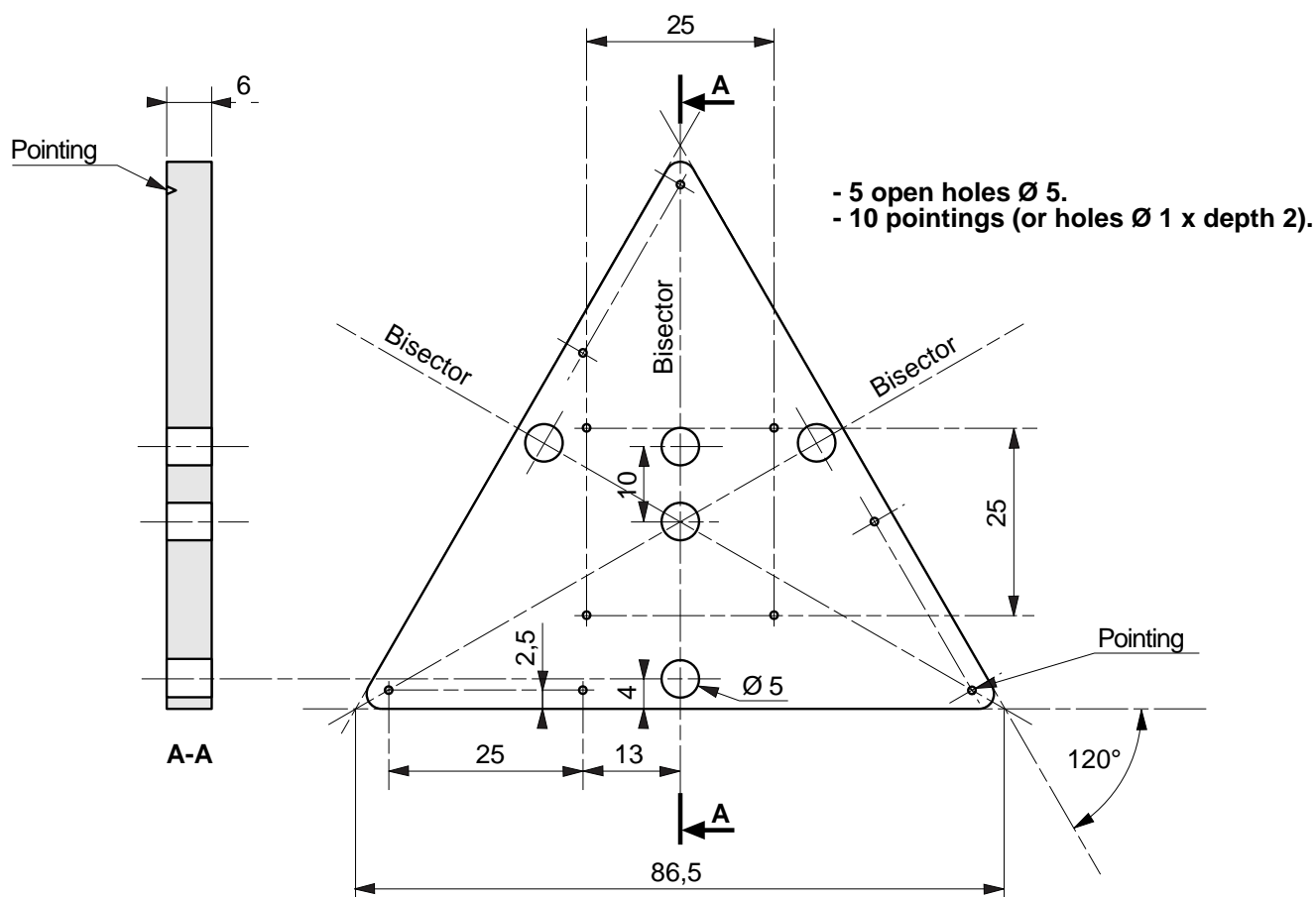
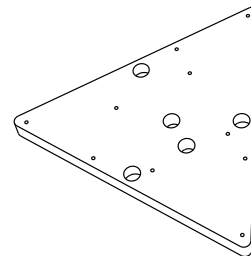
Expanded 6 mm PVC.

Drawn from an equilateral triangle of base 86.5 mm.

Hole of diameter 5 in the triangle center. A set of 5 holes of diameter 5.

10 pointing or pre-holes diameter 1 for the fixation screws

(4 for the mini-generator + 6 (2x3) for the three propeller blades).



! When using this plan as tracing template, verify that your printer hasn't modified the drawing dimensions.

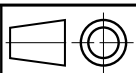
Control 180 mm

Cutting : saw or CNC machine.

Drilling : boring mill, hand drill or CNC machine.



Scale 1 : 1



A4

PROJECT



PART

Light module

School

Class

DOCUMENT TITLE

Name

Date

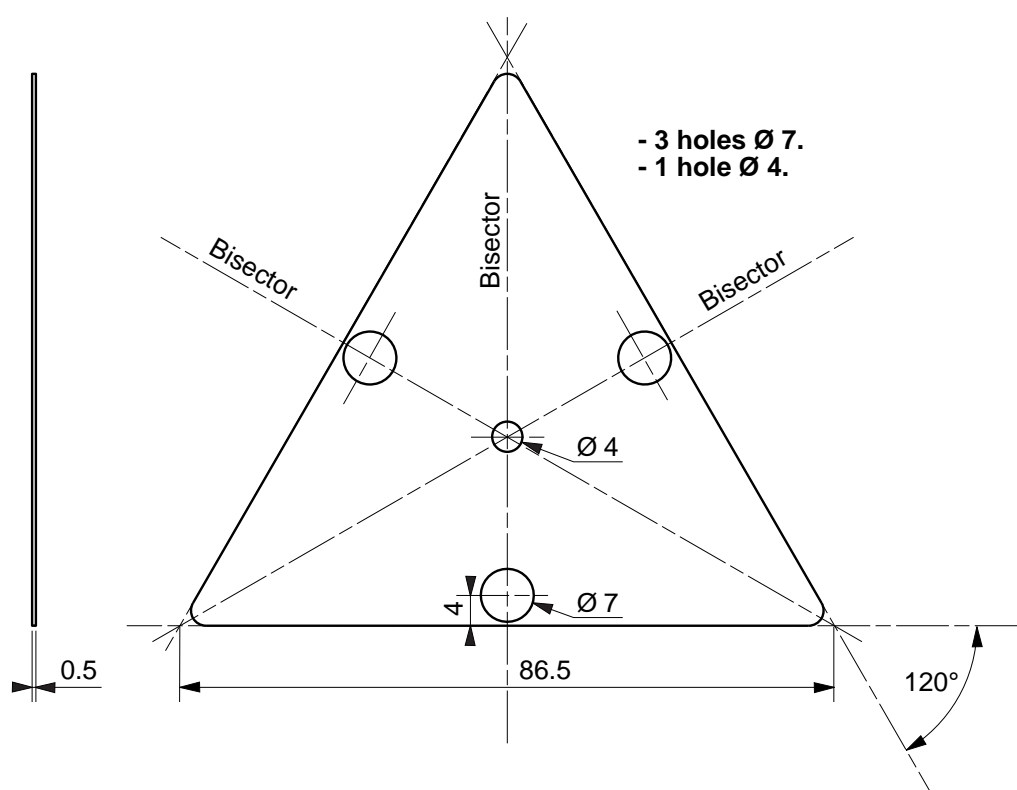
Plate (03)
Definition Drawings

Back cover (04)

Polypropylene 0.5 mm.

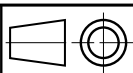
Drawn from an equilateral triangle of base 86.5 mm.

Hole diameter 4 in the triangle center. A set of 3 holes of diameter 7.



! When using this plan as tracing template, verify that your printer hasn't modified the drawing dimensions.

Control 180 mm

Cutting : saw or CNC machine.**Drilling** : boring mill, hand drill or CNC machine.**Scale 1 : 1****A4**

PROJECT



PART

Light module

School

Class

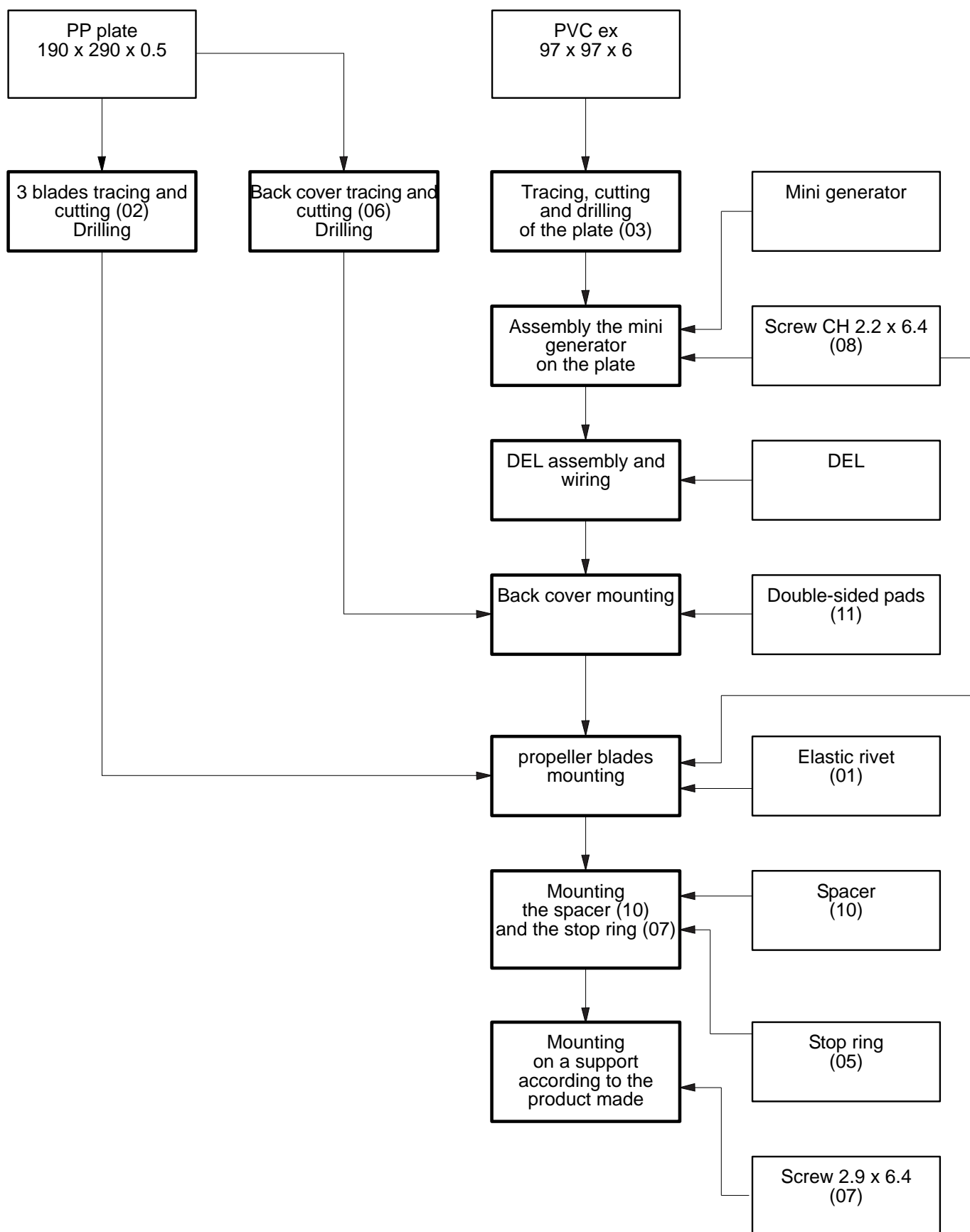
DOCUMENT TITLE

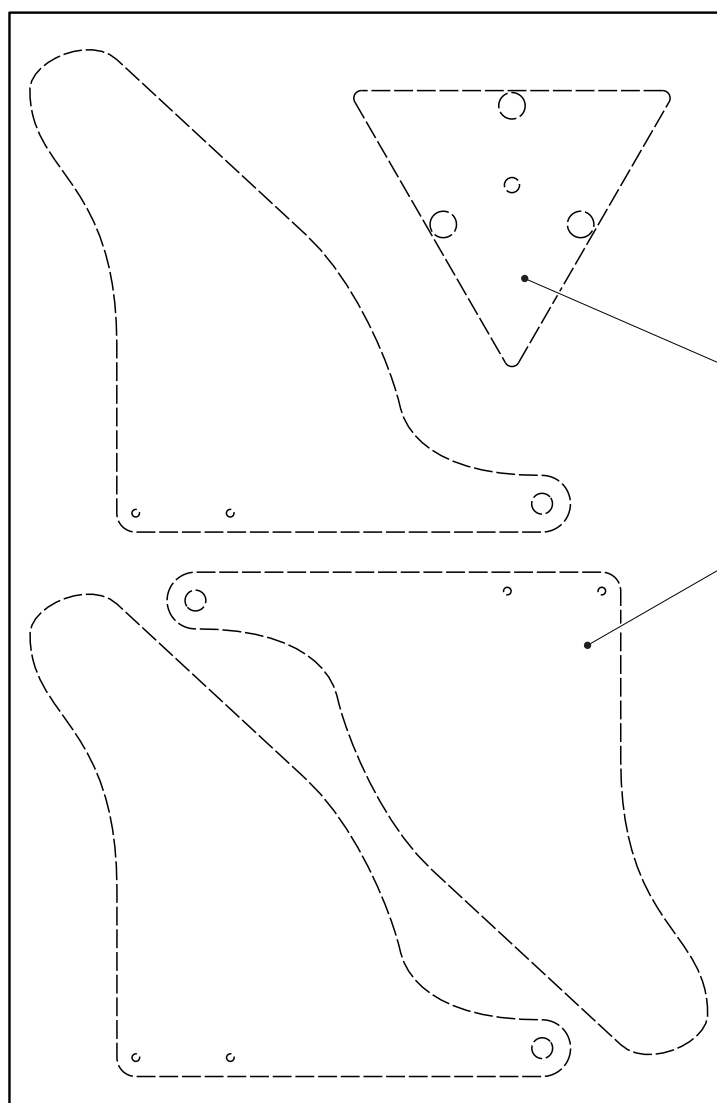
Name

Date

Back cover (04)
Definition Drawings

Light module - Flowchart of Fabrication and Assembly


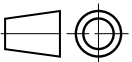





Polypropylene pieces arrangement
in the format 199 x 290 provided with the kit (K-EOL-A).

Cutting : scissors or CNC machine.

Drilling : puncher or CNC machine.

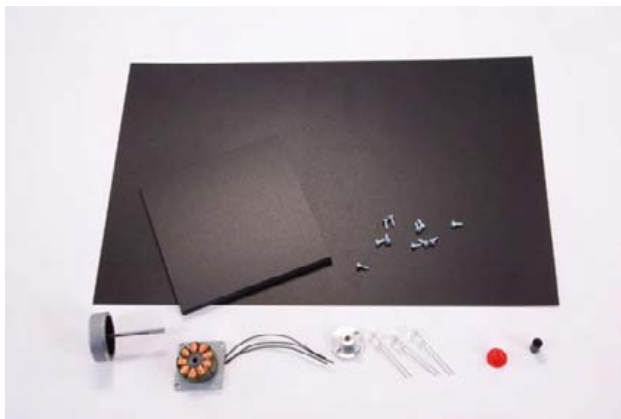
	Scale 1 : 2		A4	PROJECT 	PART Light module
	School	Class	DOCUMENT TITLE Cutting plan of polypropylene pieces		
Name		Date			

Kit description (K-EOL-A-01)

Basic kit contents

The K-EOL-A-01 reference kit contains all pieces and materials needed to the light module realization described above in this folder.

NOTE : for a total implementation freedom, all pieces are also available at retail.

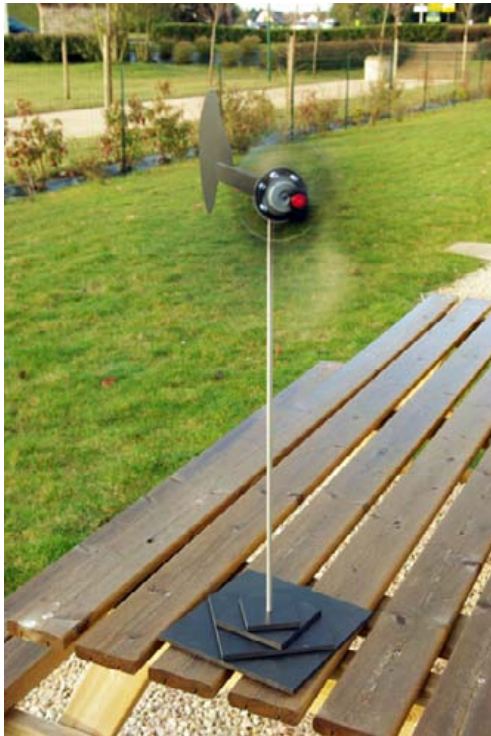


Windmill light module "K-EOL-A-01"

Designation and references A4	Quantity	Mark	Drawing
Black polypropylene 190 x 290, thickness 0.5mm. <i>PP-0M5-190X290-N</i>	01	02 06	
Black expanded PVC 97 x 97, thickness 6mm. <i>PVCEX-6-97X97-N</i>	01	04	
Mini generator 3 phases. <i>MOT-GENE-C</i>	01	03	
Red DEL Ø 5mm High brightness - Transparent crystal or red housing <i>DEL-5-R-HTL</i>	03	05	
stop ring for axle Ø 3mm (Ø ext. 21mm). <i>BAG-ARAXE-D3</i>	01	07 09	
Screw cylindrical head sheet metal type Ø 2.2 x 6.4. <i>VIS-TC-2M2X6M4</i>	10	08	
Screw cylindrical head sheet metal type Ø 2.9 x 6.4. <i>VIS-TC-2M9X6M4</i>	02	10	
Spacer Ø 3.1 x Ø 6 x H 10. <i>SK-005-3230</i>	01	11	

Technical folders

supports proposed for various applications
around the light module



Light vane



Light deport for cycle

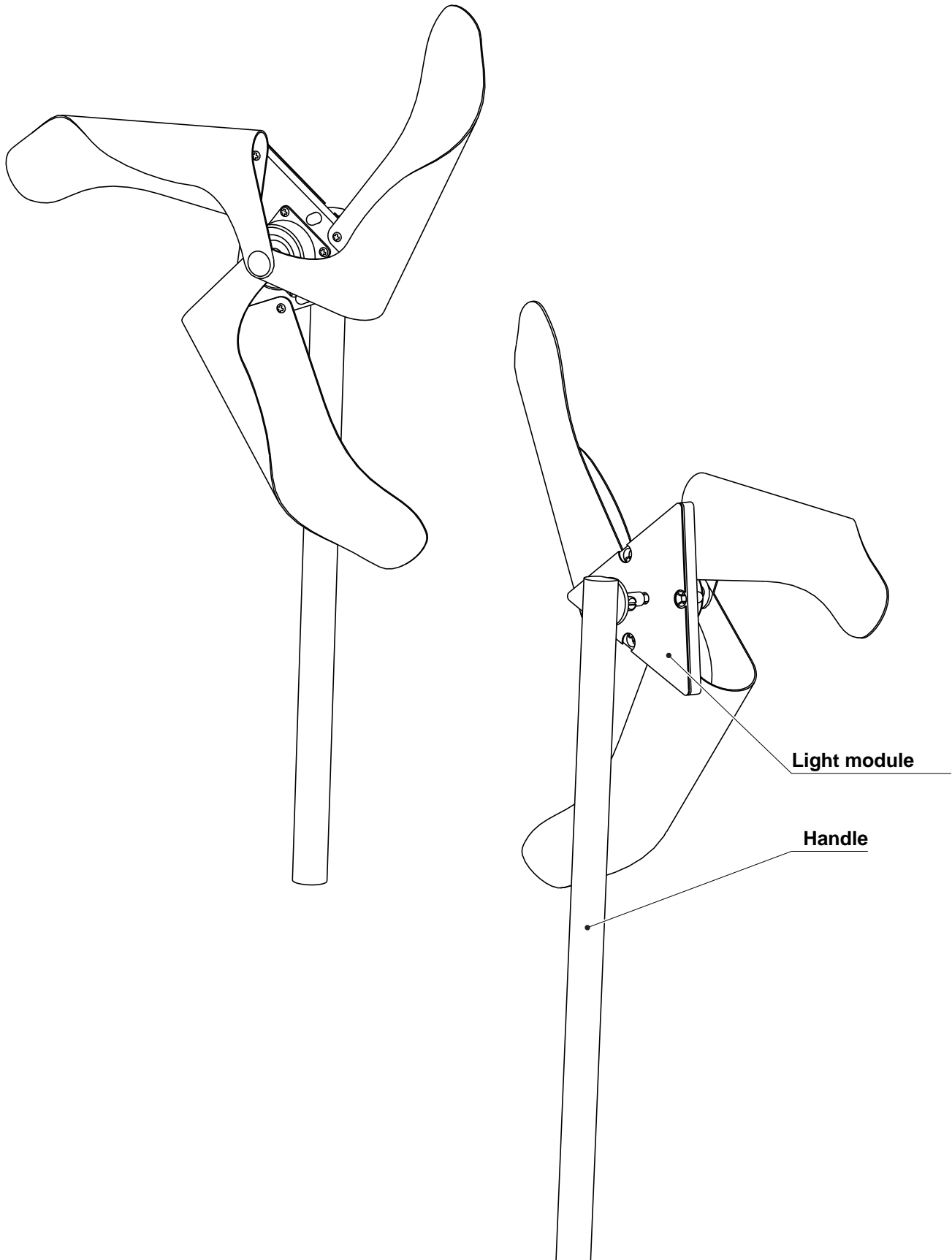


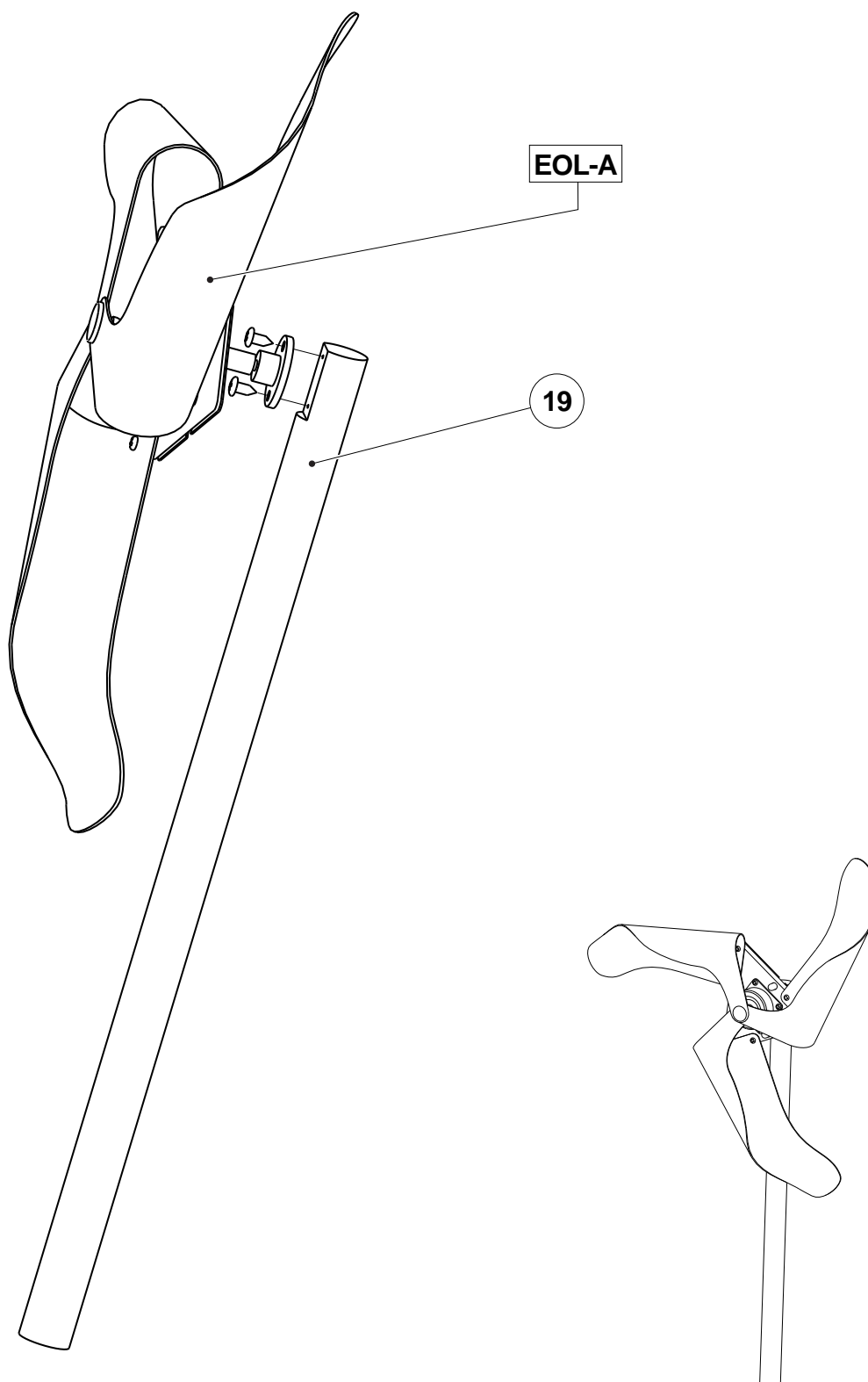
Light toy


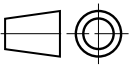

Windmill toy - Presentation

Windmill toy

Made from the light windmill module mounted on a stick or a rod in wood or plastic.

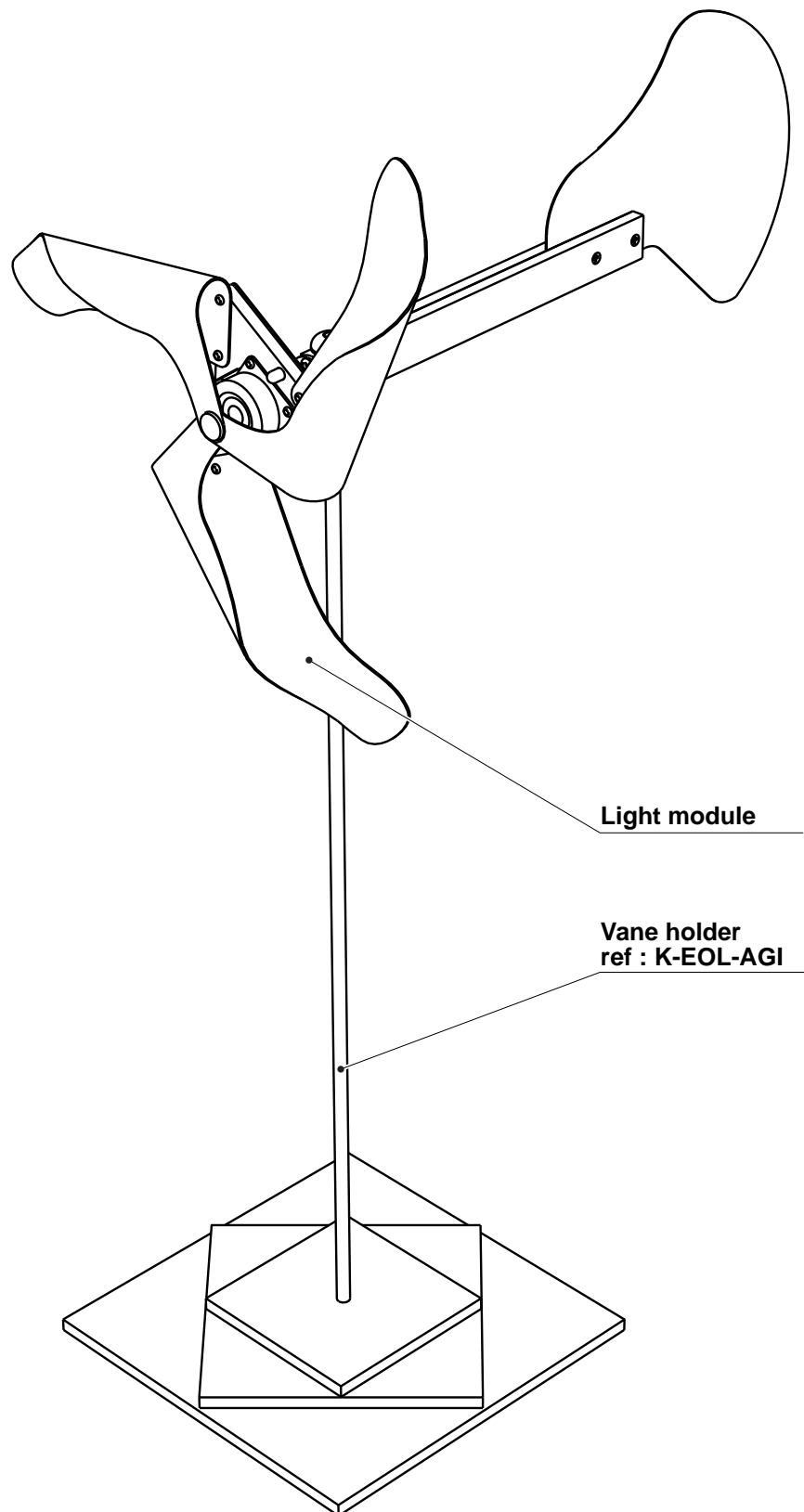




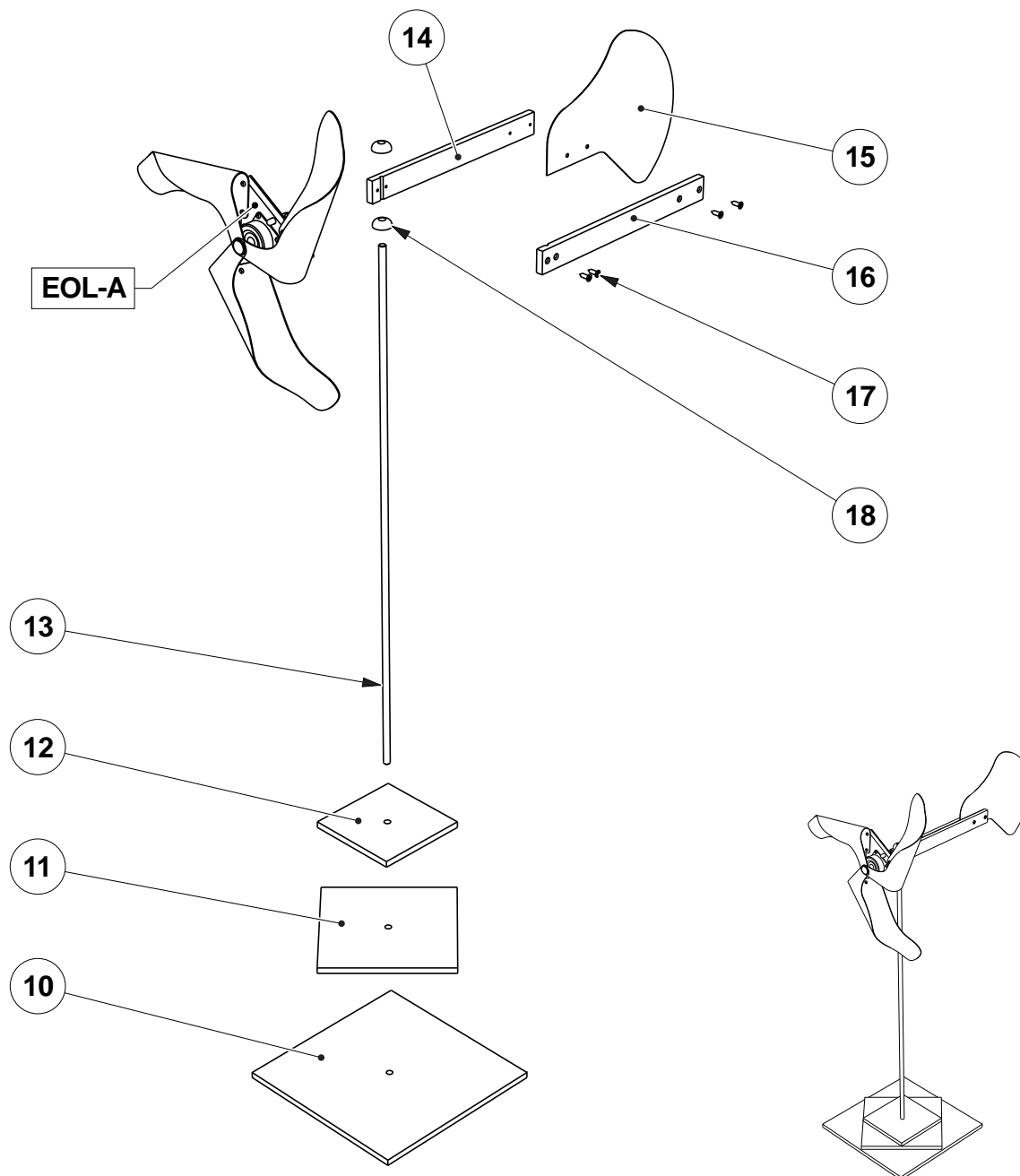
19	01	Handle	Wood or plastic	
EOL-A	01	Windmill light module	K-EOL-A-01Light module	
MARK	NUMBER	DESIGNATION	CHARACTERISTICS	
		Scale 1 : 1		PROJECT 
		School	Class	PART Windmill toy
Name		Date	DOCUMENT TITLE Exploded view and nomenclature	


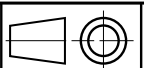

Light vane - Presentation

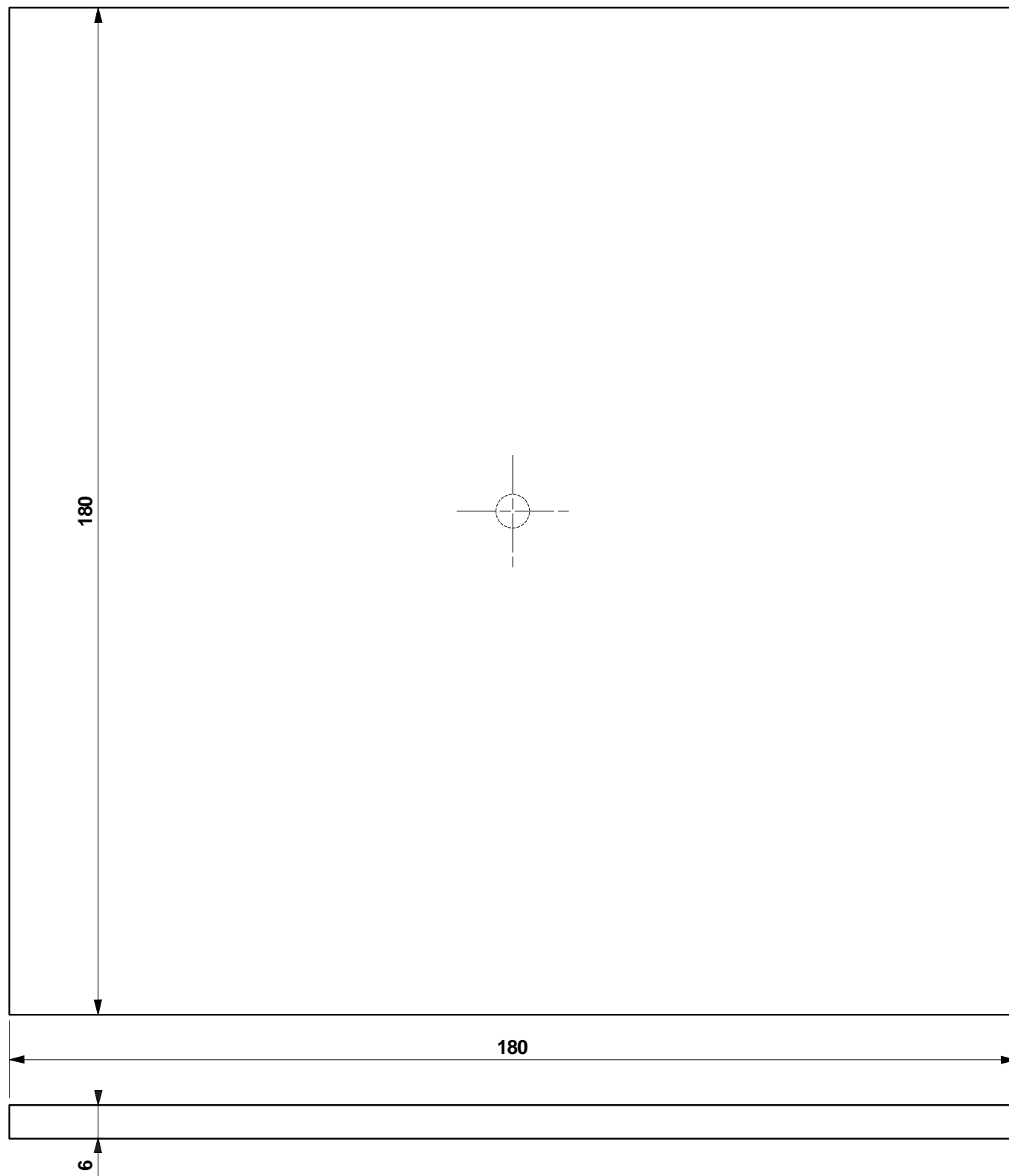
Light vane
for the garden or the terrace.



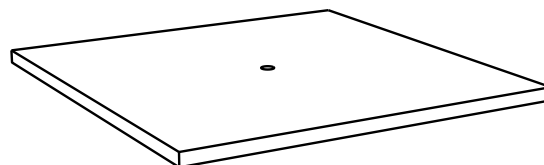
K-EOL-AGI


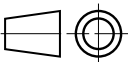



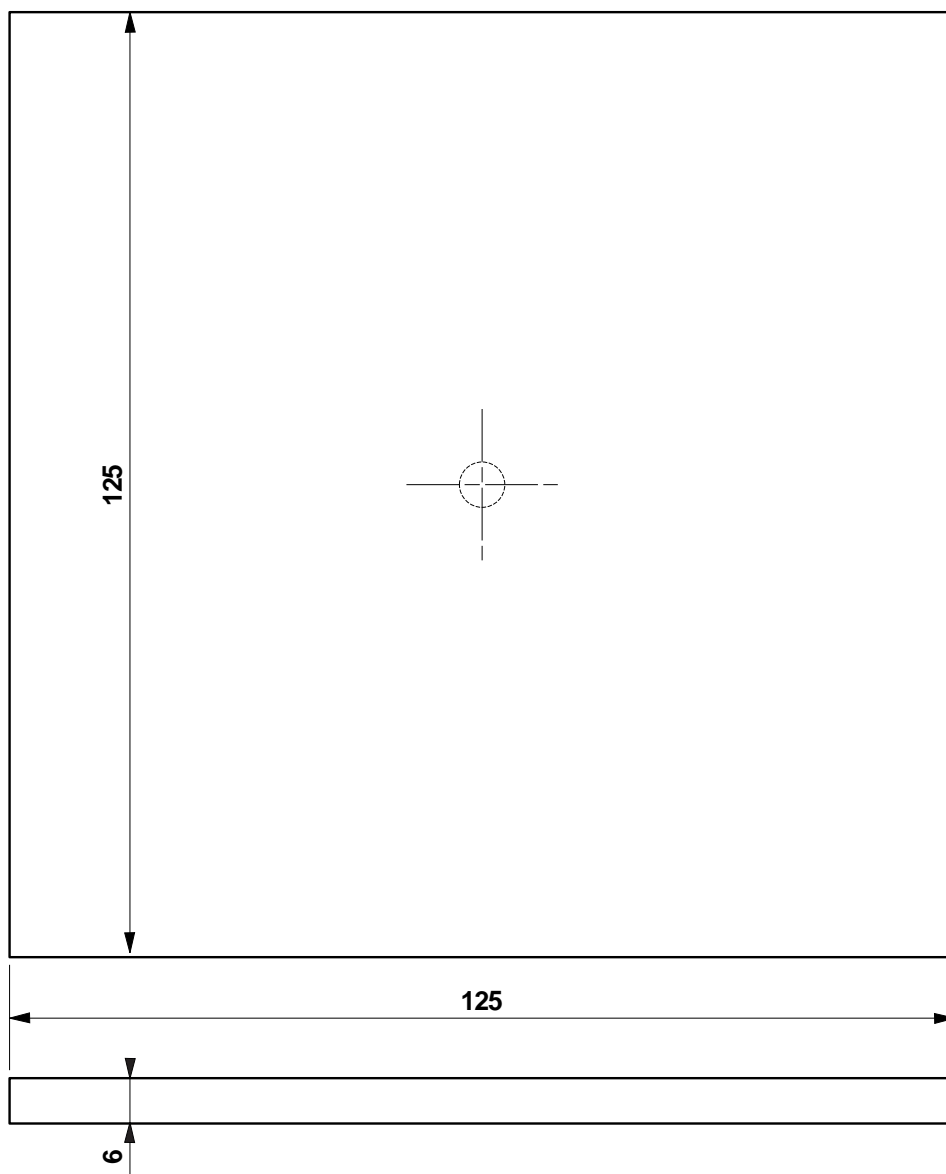
18	02	Stop washer	Half round for ring Ø 6 mm.
17	04	Screw	Galvanized steel, FH 2.9 x 9.5 pozi.
16	01	Half beam B	Black expanded PVC, 195 x 20, thickness 6 mm.
15	01	Drift	Black polypropylene, 160 x 143.5, thickness 5 mm.
14	01	Half beam A	Black expanded PVC, 195 x 20, thickness 6 mm.
13	01	Mast	Aluminium ring Ø 6 x 500 mm.
12	01	Base 3	Black expanded PVC, 88 x 88, thickness 6 mm.
11	01	Base 2	Black expanded PVC, 125 x 125, thickness 6 mm.
10	01	Base 1	Black expanded PVC, 180 x 180, thickness 6 mm.
EOL-A	01	Light windmill module	Light module K-EOL-A-01
MARK	NUMBER	DESIGNATION	CHARACTERISTICS
			PROJECT
			PART
Name		Date	DOCUMENT TITLE
			General nomenclature

**Base 1 : PVC ex 6 x 180 x 180.**

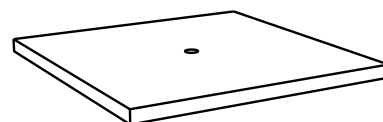
The central hole (for fixing the mast) will be drilled once the 3 plates assembled (bonded).


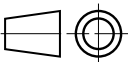



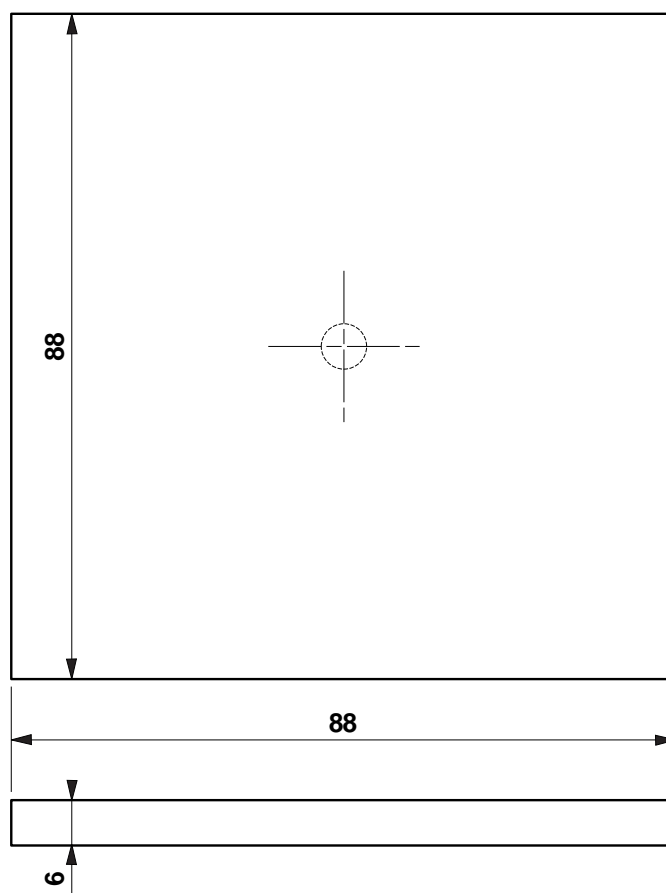
	Scale 1 : 1		A4	PROJECT 	PART Light vane
	School	Class	DOCUMENT TITLE Base (10) Definition drawing		
Name		Date			


Base 2 : PVC ex 6 x 125 x 125.

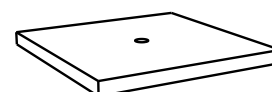
The central hole (for fixing the mast) will be drilled once the 3 plates assembled (bonded).


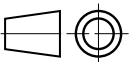



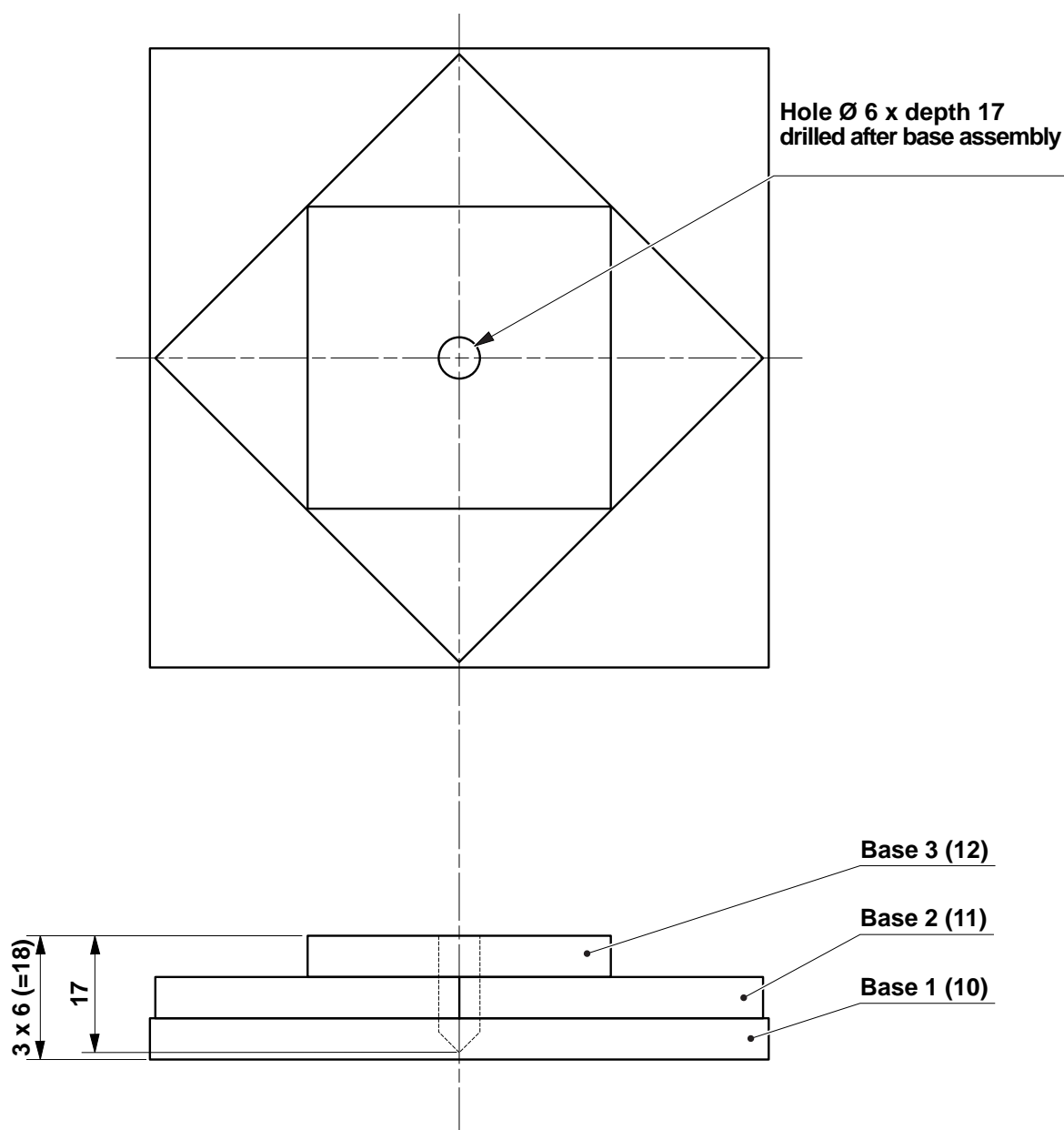
	Scale 1 : 1		A4	PROJECT 	PART Light vane
	School	Class		DOCUMENT TITLE Base (11) Definition drawing	
Name		Date			


Base 3 : PVC ex 6 x 88 x 88.

The central hole (for fixing the mast) will be drilled once the 3 plates assembled (bonded).


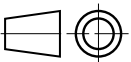



	Scale 1 : 1		A4	PROJECT 	PART Light vane
	School	Class	DOCUMENT TITLE Base (12) Definition Drawings		
Name		Date			

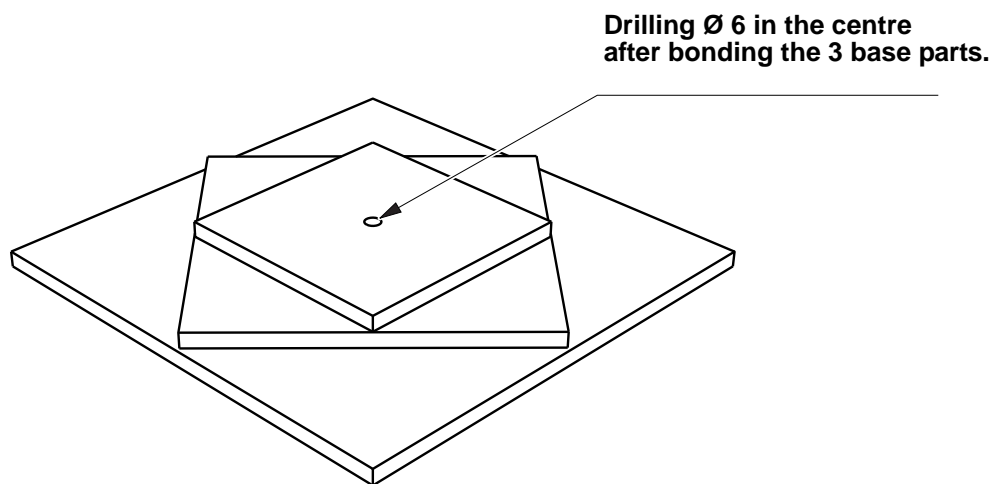
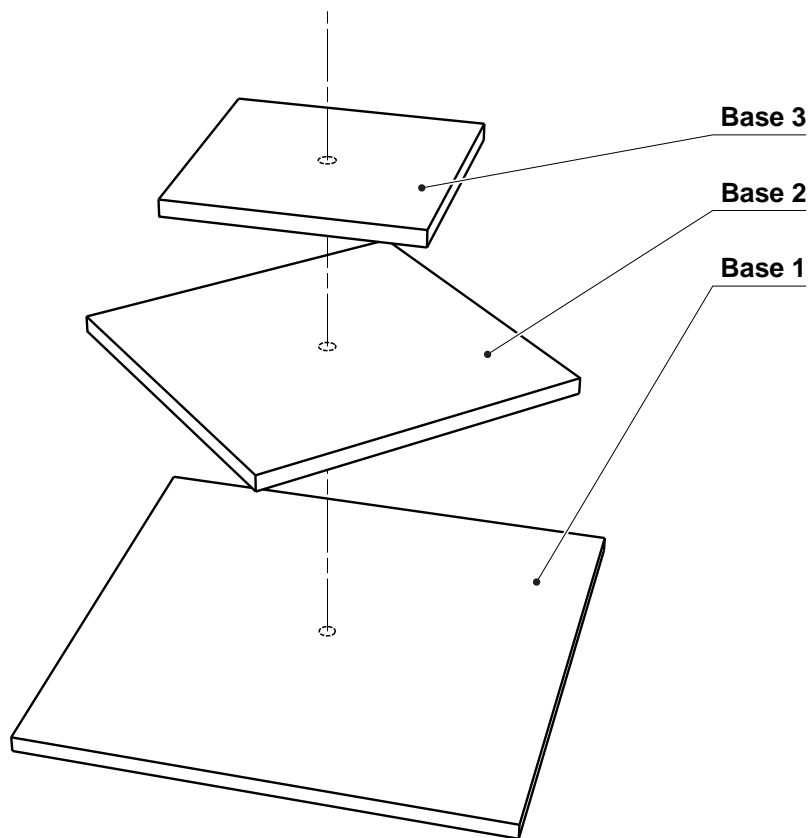
**Whole base.**

Made by assembly (bonding - PVC glue) of the 3 parts (base 1, base 2, base 3).

Drilling : boring drill.

	scale 1 : 2		PROJECT		PART
	School		Class		DOCUMENT TITLE
Name			Date		
			Whole base Definition Drawings		

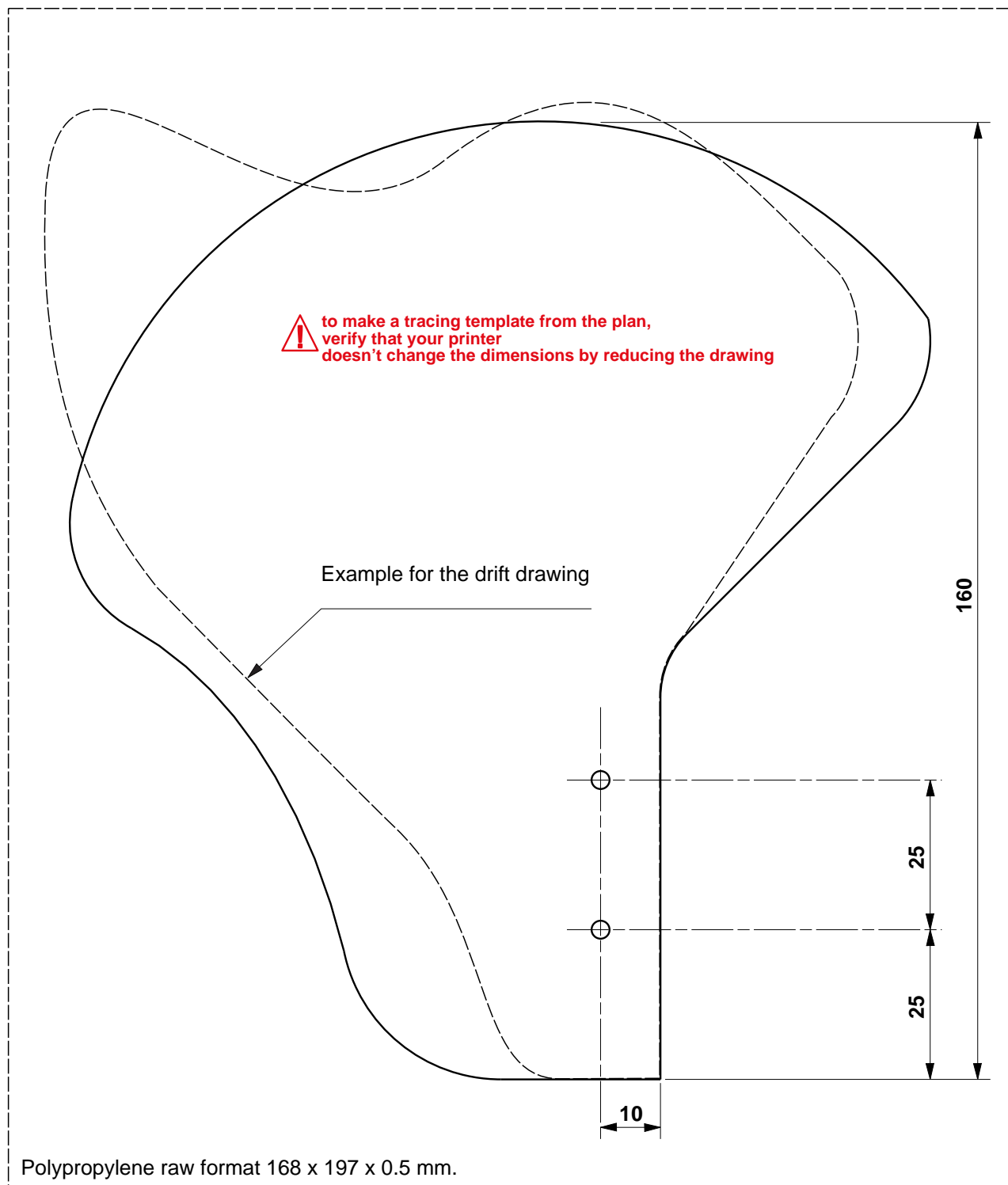
Base assembly



Bonding : with PVC glue (COL-PVC-200GR)

Drying : under press

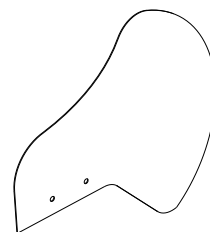
Drilling : boring drill


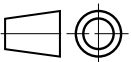



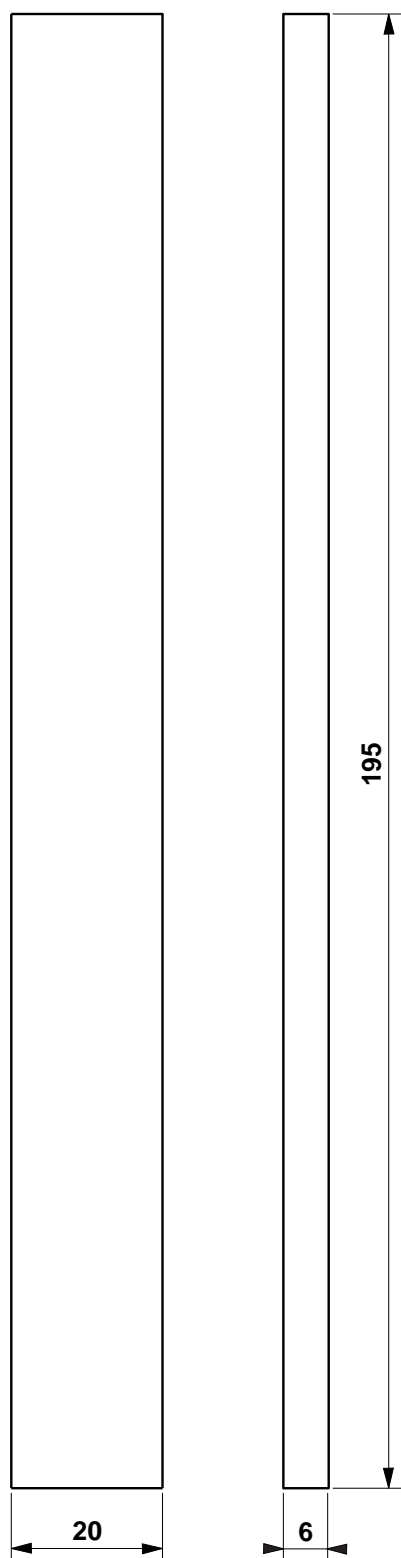
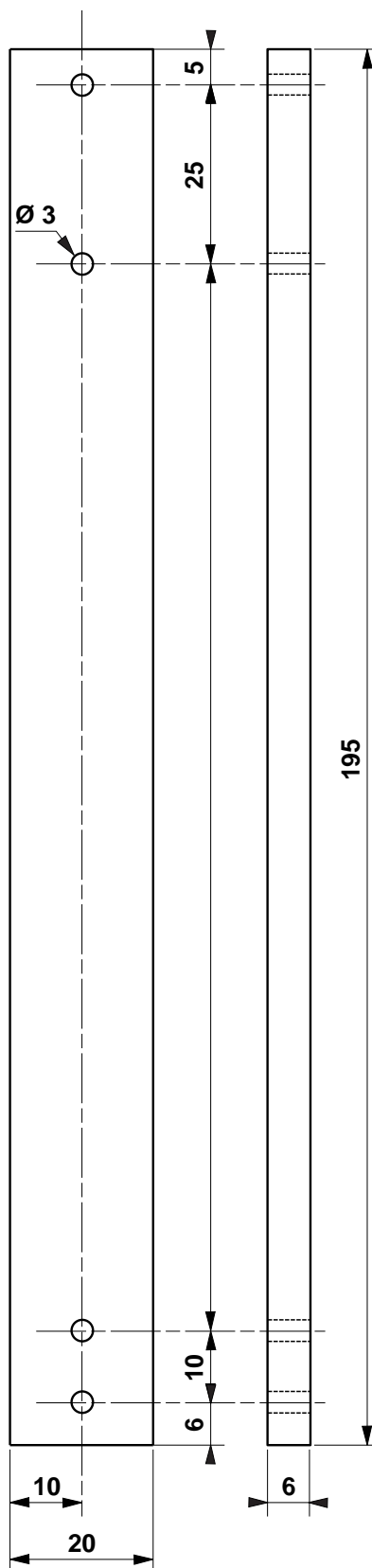
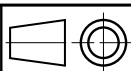
Only the 25 mm distance between the 2 holes and also the maximum dimensions (168 x 197) are imposed.
The plan can be used as cutting template or draw other drift shapes.

Cutting : scissors or CNC machine.

Drilling : puncher or CNC machine.



	Scale 1 : 1		A4	PROJECT		PART	Light vane
	School	Class	DOCUMENT TITLE				
Name		Date		Drift (15) Definition Drawings			

1/2 beam A (14) PVC ex 6 x 20 x 195**1/2 beam B (16)** PVC ex 6 x 20 x 195**Scale 1 : 1****A4**

PROJECT



PART

Light vane

School

Class

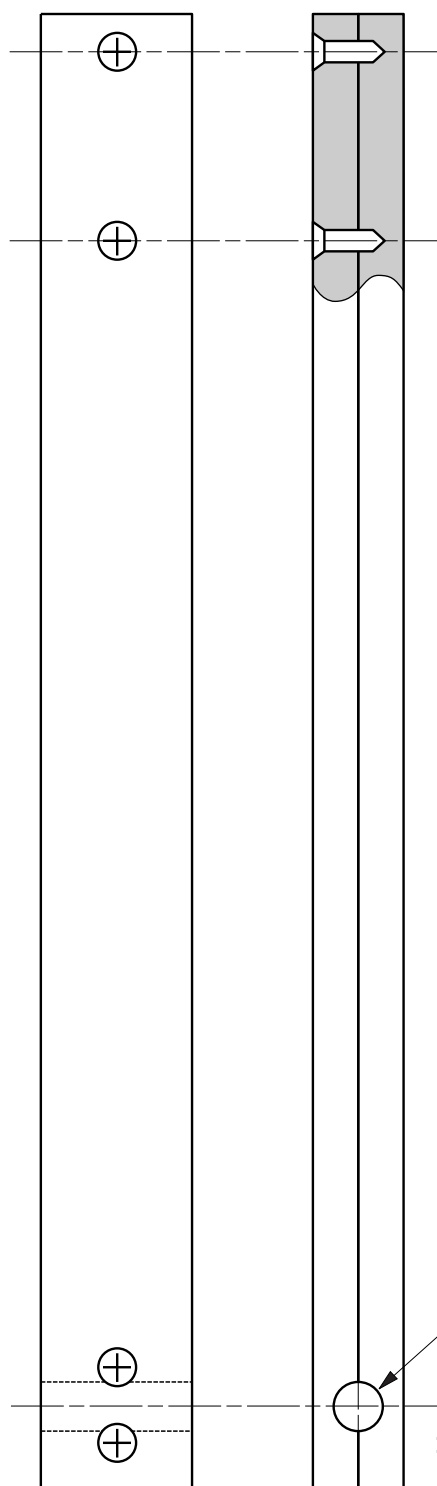
DOCUMENT TITLE

Name


Date

**The 2 A and B half-beams
Definition Drawings**

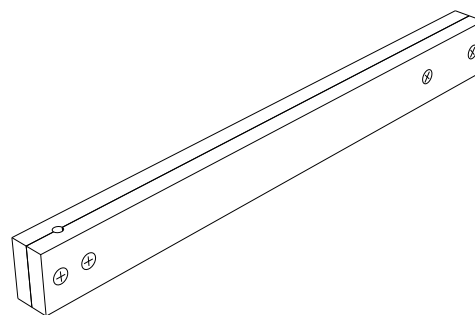
Bond and screw together the 2 1/2 beams. Use 4 screws VBA TF 3 x 9.5.



Partial sectional drawing :
detail of screwed-assembly.

 Insert the drift between the 2 1/2 beams
when assembling (see next page).

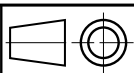
Opened hole Ø 6.5 drilled after assembling
the 2 1/2 beam A and B.



Drilling : boring drill o hand drill.
Bonding : use a PVC glue.



Scale 1 : 1



A4

PROJECT



PART

Light vane

School

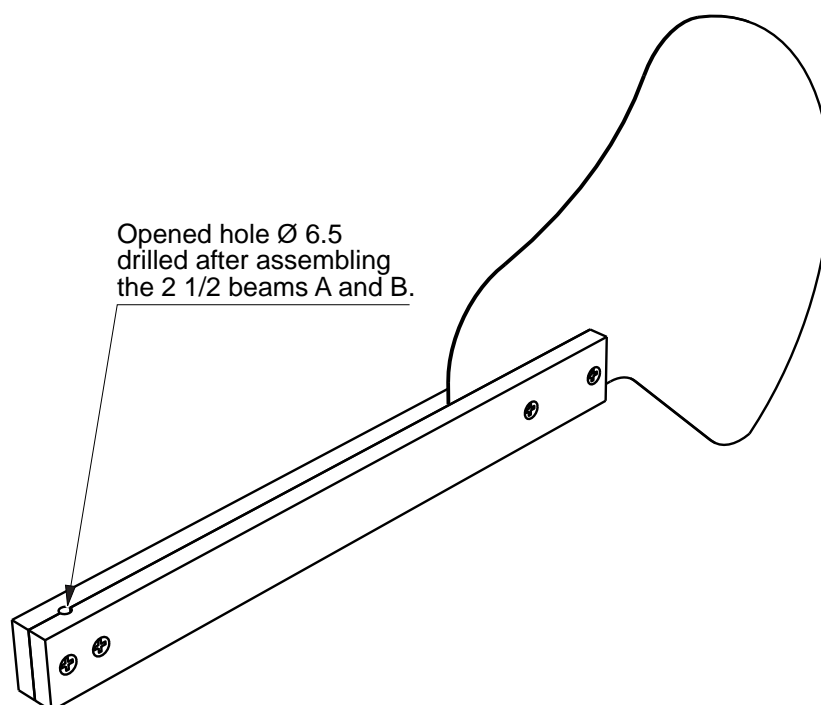
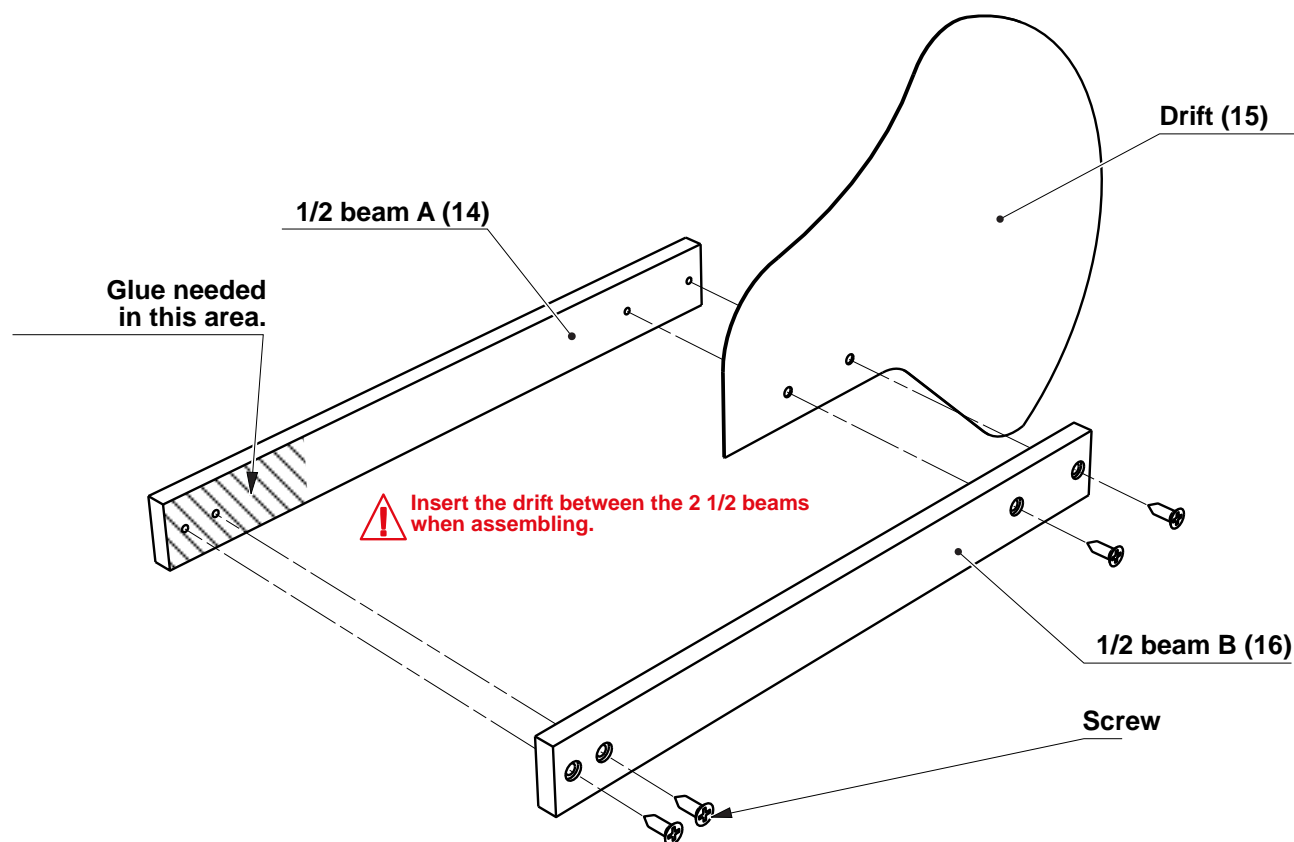
Class

DOCUMENT TITLE

Name

Date

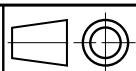
Vane body
Definition Drawings



Drilling : boring drill o hand drill.
Bonding : use a PVC glue.



Scale 1 : 1



A4

PROJECT



PART

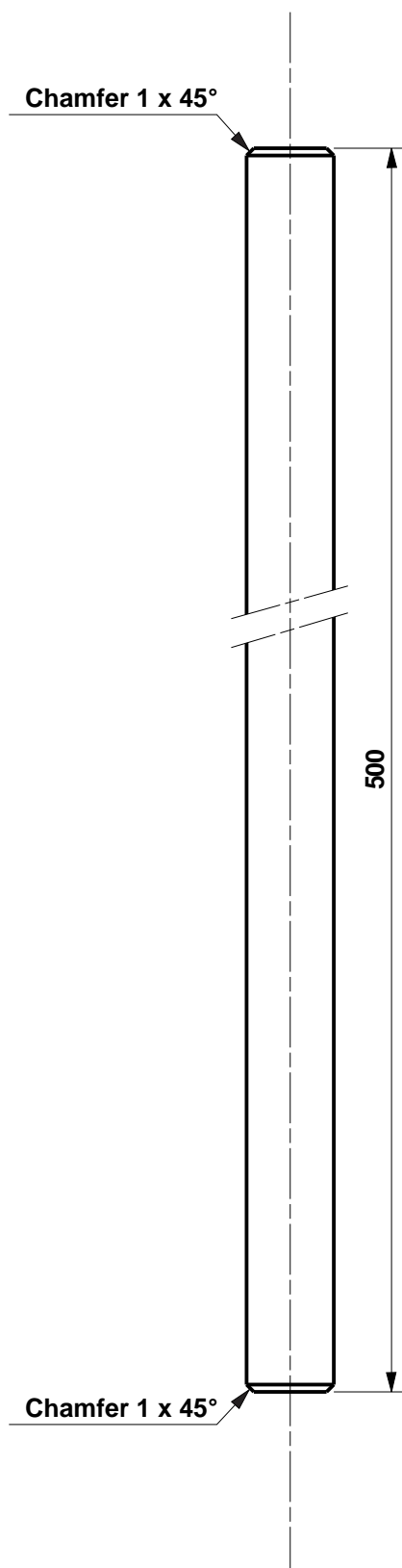
Light vane

DOCUMENT TITLE

Vane body
assembly

Name

Date

Mast (13) Aluminium ring Ø 6.**Cutting** : scissors or CNC machine.**Drilling** : puncher or CNC machine.**Scale 2 : 1****A4**

PROJECT



PART

Light vane

School

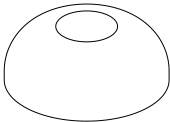
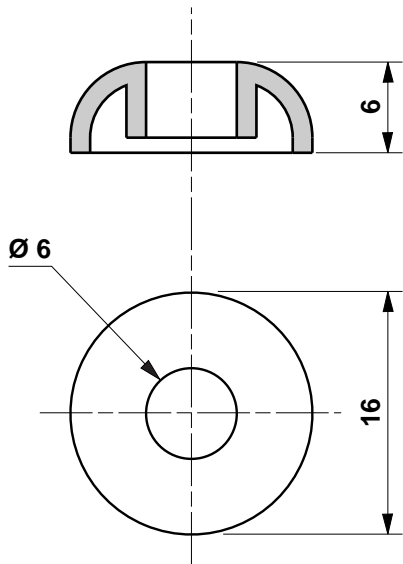
Class


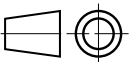

DOCUMENT TITLE

Name

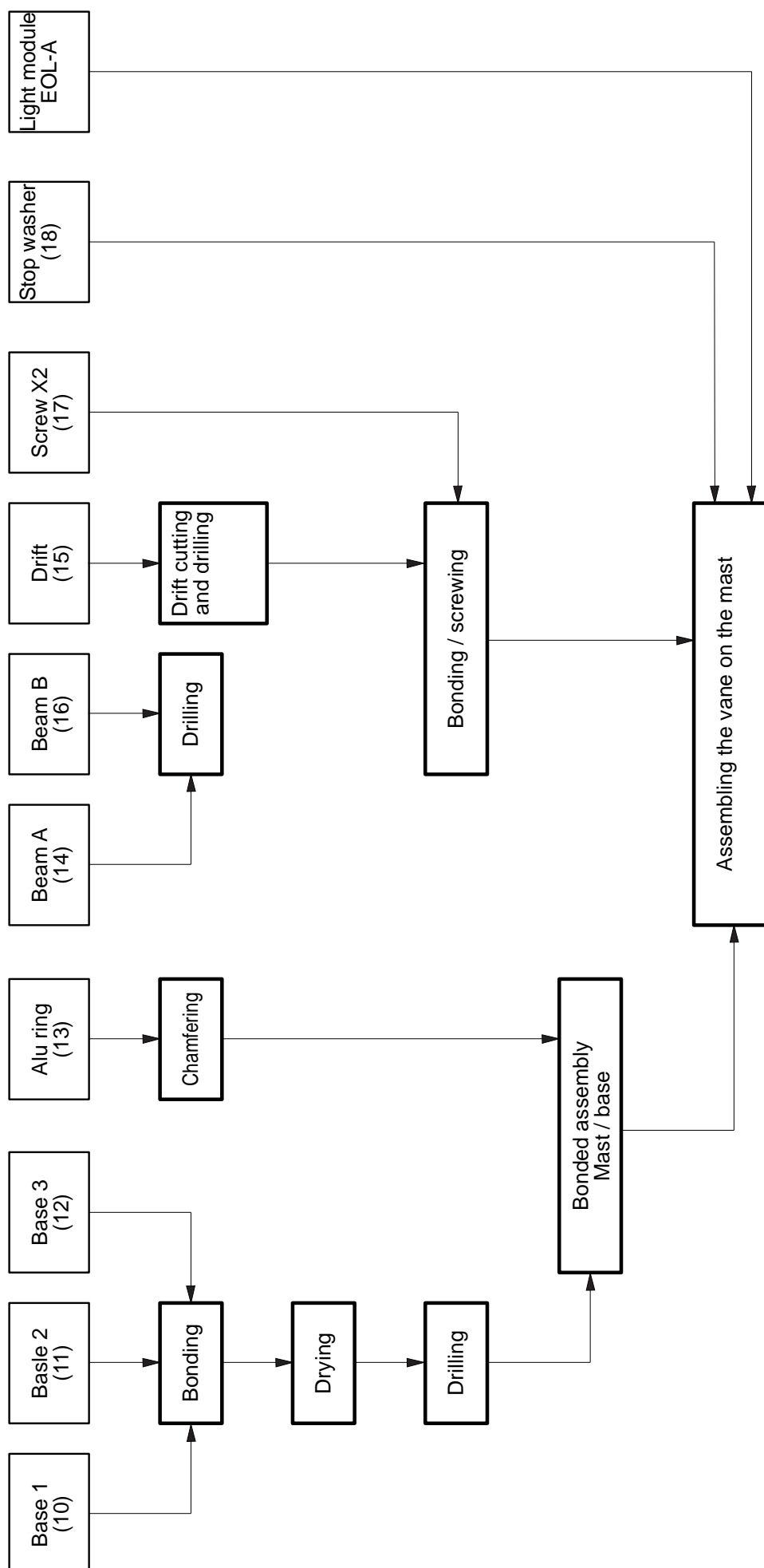
Date

Mast (13)
Definition Drawings



 www.a4.fr	Scale 1 : 1		A4	PROJECT 	PART Light vane
	school	Class	DOCUMENT TITLE Stop washer (18) Definition drawing		
Name		Date			

Light vane - Flowcart of fabrication and assembly



Kit description (K-EOL-AGI-01)

Basic kit contents

The K-EOL-AGI-01 reference kit contains all pieces and materials needed to the light module described above in this folder.



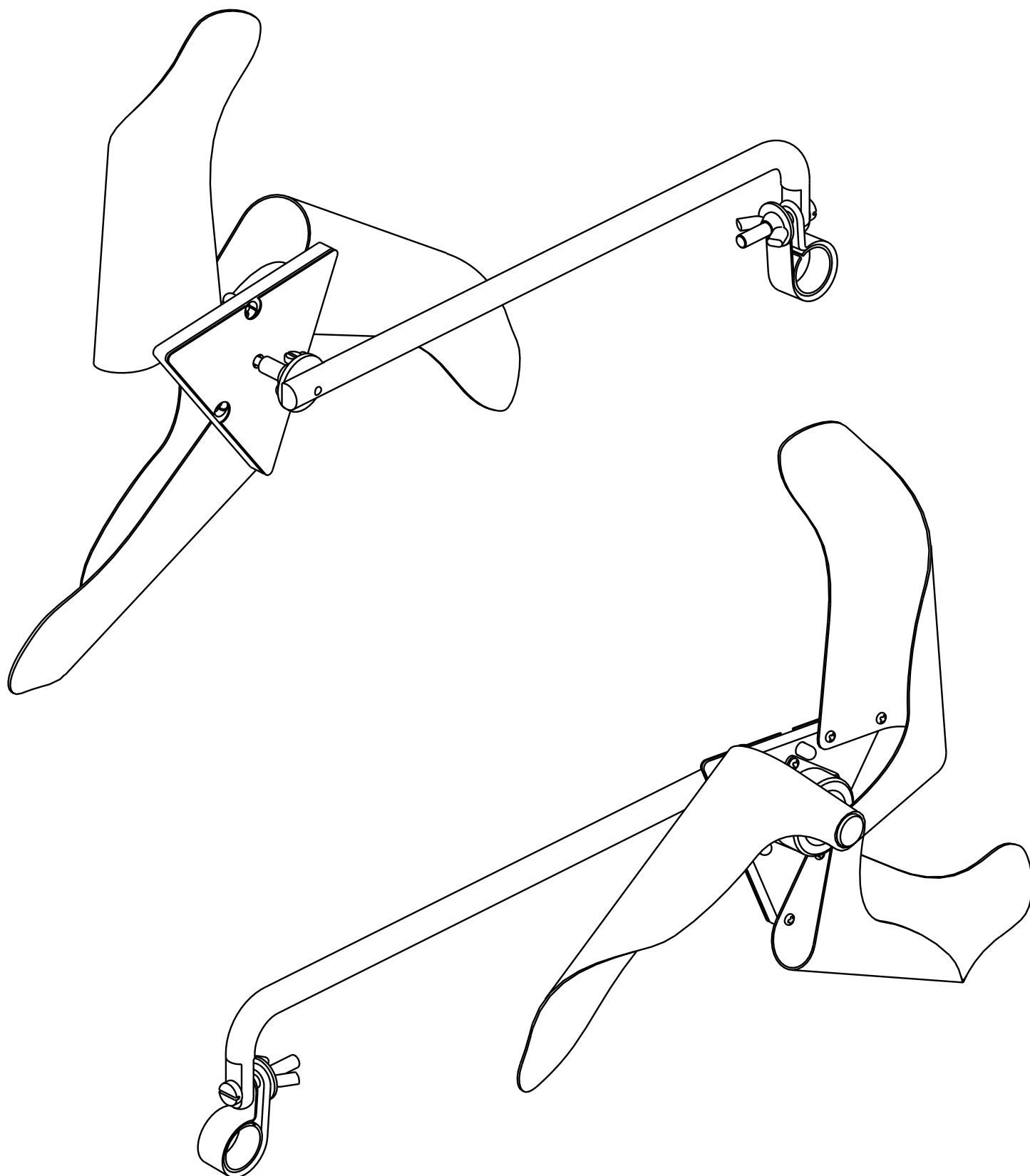
All pieces are available at retail for a complete freedom of realization.

Light vane

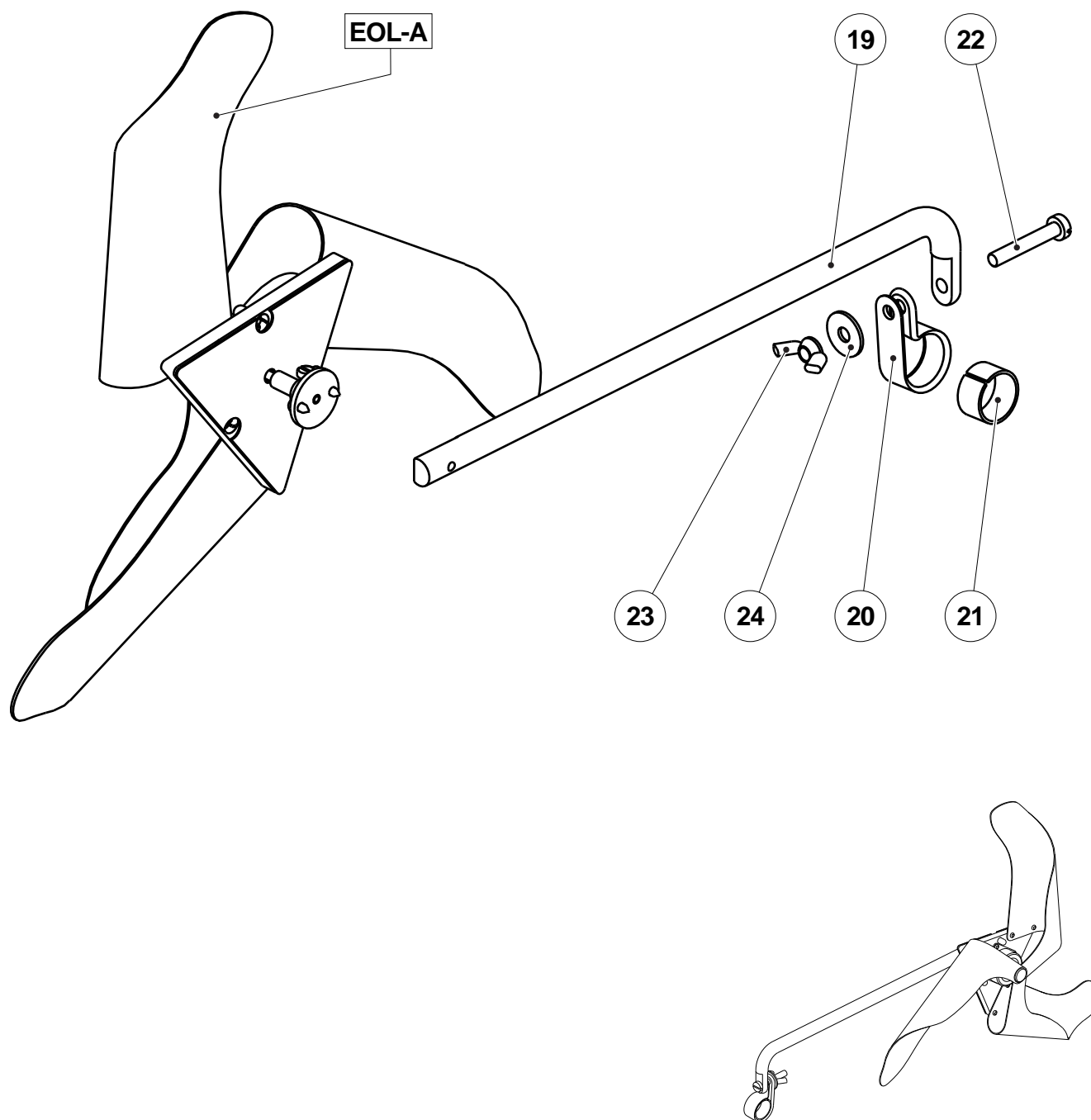
Designation and references A4	Quantity	Mark	Drawing
Black polypropylene 168 x 197, thickness 0.5mm. <i>PP-0M5-168X197-N</i>	01	18	
Black expanded PVC 180 x 180, thickness 6mm. <i>PVCEX-6-180X180-N</i>	01	13	
Black expanded PVC 125 x 125, thickness 6mm. <i>PVCEX-6-125X125-N</i>	01	14	
Black expanded PVC 88 x 88, thickness 6mm. <i>PVCEX-6-88X88-N</i>	01	15	
Black expanded PVC 20 x 195, thickness 6mm. <i>PVCEX-6-20X195-N</i>	02	17 19	
Aluminium ring Ø 6mm x 500. <i>JALU-6-500</i>	01	16	
Red half round stop washer PA6 for axle or ring of Ø 6mm. <i>SK-011-0060</i>	01	21	
Flat head screw 2.9 x 9.5 - pozi. <i>VIS-TF-2M9X9M5</i>	04	20	


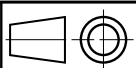



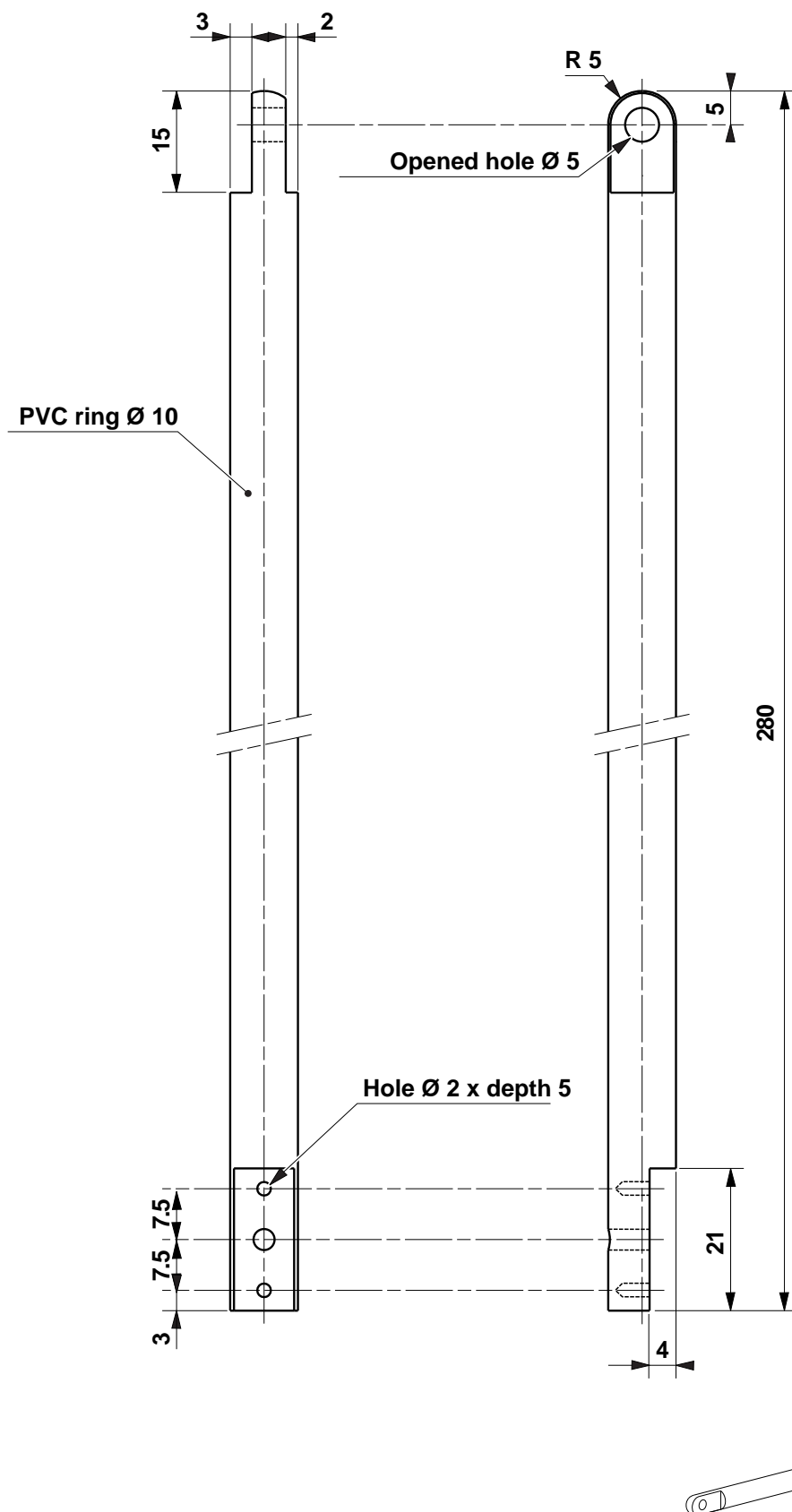
Deport for cycle - Presentation



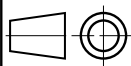
K-EOL-AEC



24	01	Washer	Galvanized steel Ø int. 5, ext. 15 mm.
23	01	Fly-nut	Galvanized steel M5.
22	01	Screw	Galvanized steel CH splitted M5 x 30 mm.
21	01	Anti-slip rubber	Black elastic bracelet 50 x 8 mm.
20	01	Collar in P	Collar in P for tube of Ø 17 to 21 mm.
19	01	Arm	White ring PVC blanc Ø 10 x 280 mm.
EOL-A	01	Light windmill module	Light module K-EOL-A-01
MARK	NUMBER	DESIGNATION	CHARACTERISTICS
		 A4	PROJECT 
		School	PART BYKE DEPORT
Name		Date	DOCUMENT TITLE
			Exploded view and Nomenclature



Scale 1 : 1

**A4**

PROJECT



PART

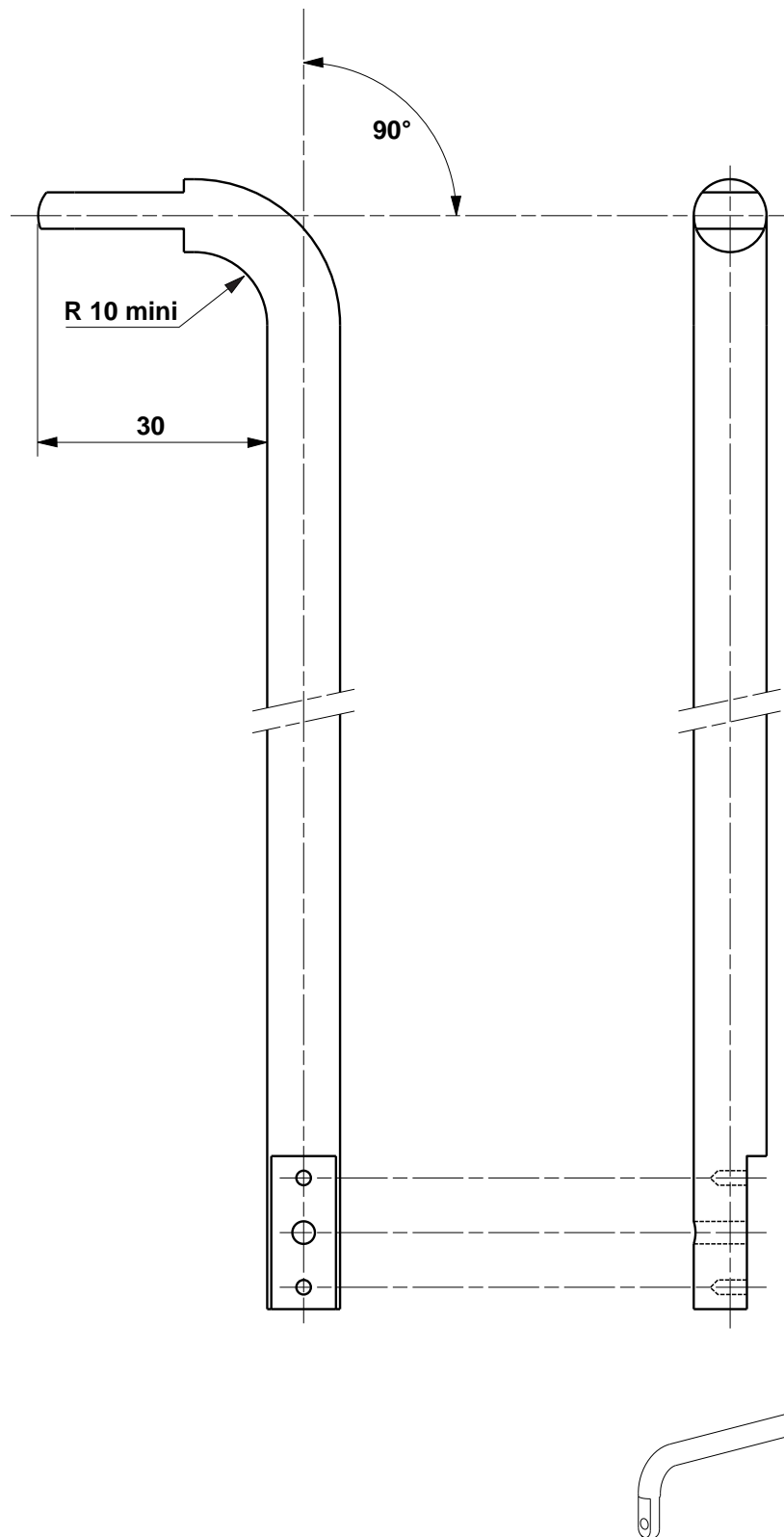
BIKE DEPORT

DOCUMENT TITLE

Name

Date

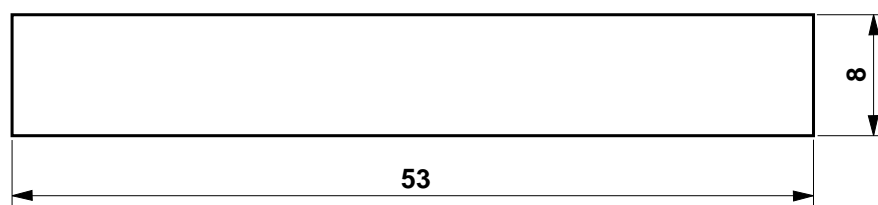
Arm before folding



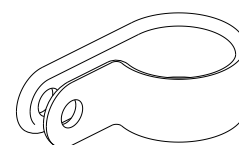
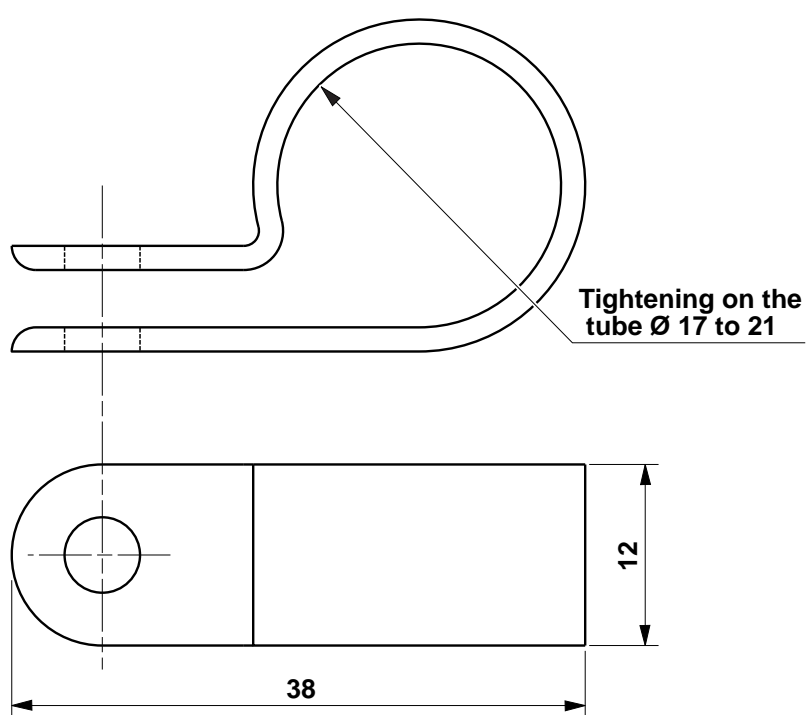
Anti-slip collar (21)

Rubber 1 x 8 x 53.

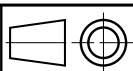
To be cut in the elastic bracelet 50 x 8 provided in the kit (K-EOL-A-01).



Collar in P (20)



Scale 2 : 1



A4

PROJECT



PART

BIKE DEPORT

School

Class

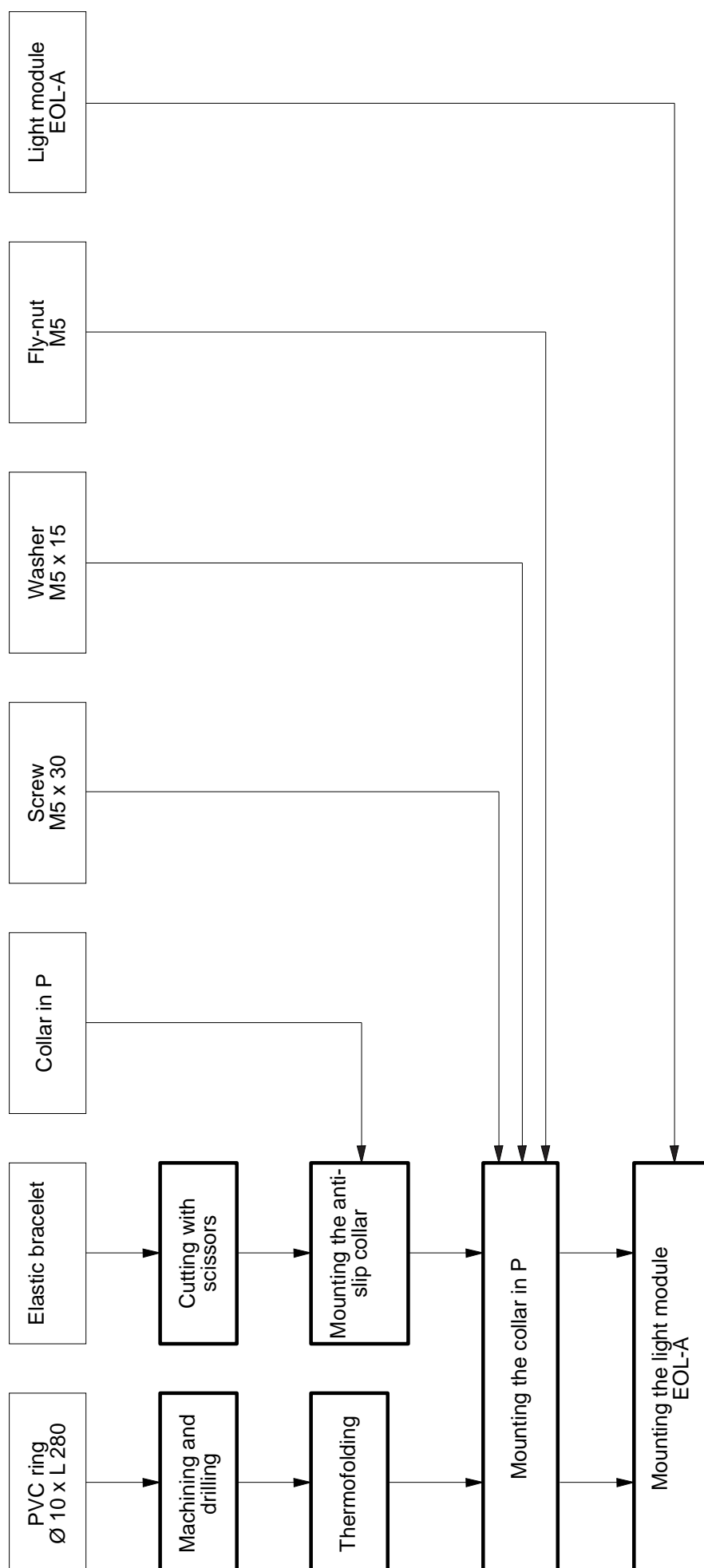
DOCUMENT TITLE

Name

Date

Anti-slip collar (21)
and collar in P (20)

Report for cycle - Flowchart of fabrication and assembly



Description du kit (K-EOL-AEC-01)

Basic kit contents

The K-EOL-AEC-01 reference kit contains all pieces and materials needed for the light module realization



All pieces are available at retail for a complete freedom of realization.

Option “Bike deport”

Designation et references A4	Quantity	Mark	Drawing
White PVC ring Ø 10 x 330 mm. <i>JPVC-D10-330-BC</i>	01	22	
Collar in P for tubes Ø 17 to 21 mm. <i>SK-445-0040-BC</i>	01	23	
Black elasdtic bracelet 50 x 8 mm. <i>BRAELA-50X8-N</i>	01	24	
Galvanized steel fly-nut M5. <i>ECR-PAP-ACZ-M5</i>	01	26	
Wide steel washer 5 x 15. <i>ROND-LA-ACZ-M5</i>	01	27	
Splitted cylindric head screw M5 x L30. <i>VIS-ACZ-M5X30</i>	01	25	

