

DESIGN OF A BIKE LIGHT FOR TECH GEEKS.

The project is divided into two different tasks. On the one hand, 3D modeling of an existing container and, on the other hand, creation, 3D modeling, analysis and 3D printing of a bicycle light for technology lovers.

Laura Belenguer Sanjaime



UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA





ASSIGNMENT 1.-

Packaging Modelling Exercise

Laura
Belenguer Sanjaime
2017 / 18

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1. Steps bottle and cap.

2. Dimensions:

-Bottle

-Cap

3. Renders.



BOTTLE

To start the bottle, pictures of it are placed and sketches of the contours are made. Then a surface is made, in which some lines are projected and the surface is cut with another surface.

Then, two other sketches are drawn and the gap is filled with surfaces. Once all the surfaces have the ideal curvature, fillets are made to soften the joints. Then, the top part is made and symmetry is made of everything. The propeller is made and the profile is swept as a solid.

Then the profiles of the protrusions of the body of the bottle are cut out and covered. Two planes are made to cover the top and bottom, knit everything and become solid. Then it is emptied and a dome is made at the bottom.

Finally, the reliefs are drawn and the stickers are added.

CAP

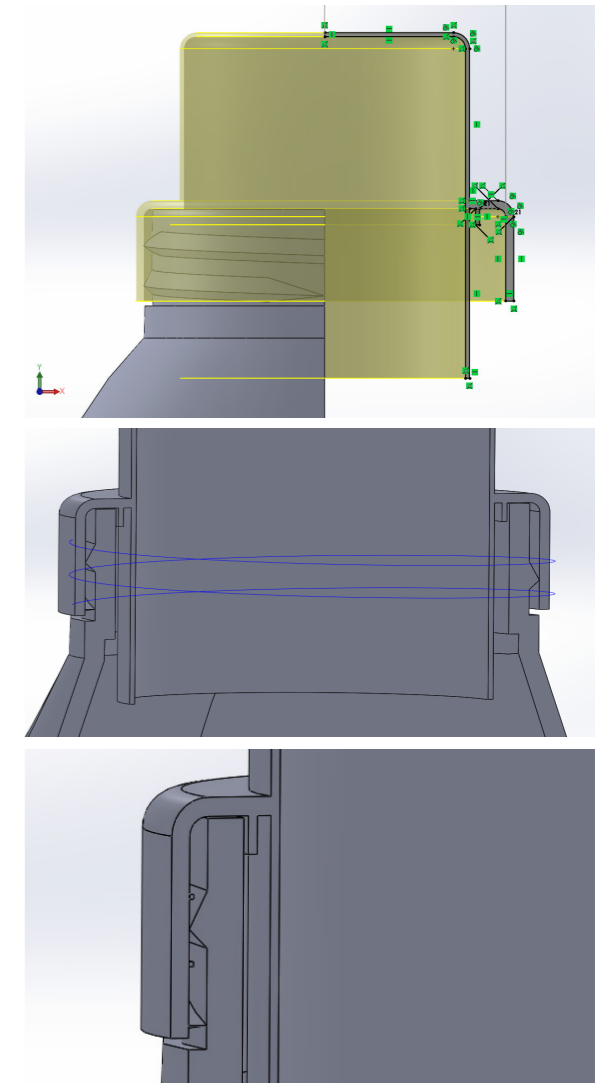
The first step is to draw the profile of the cap.

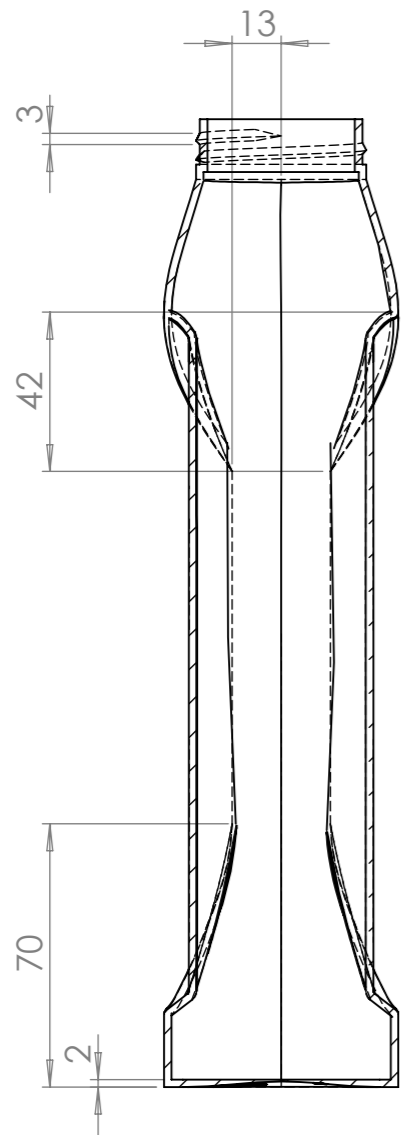
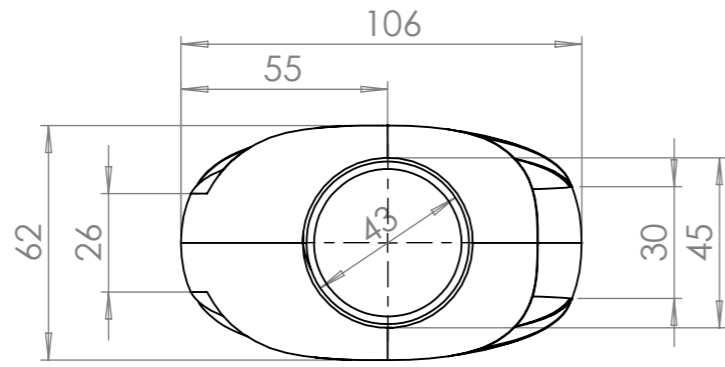
Then, the profile is revolutionized with the revolve parameter and a solid is obtained.

The next step is to create a plane and a sketch to make a helix.

Once done, draw the profile in the end of the helix and sweep.

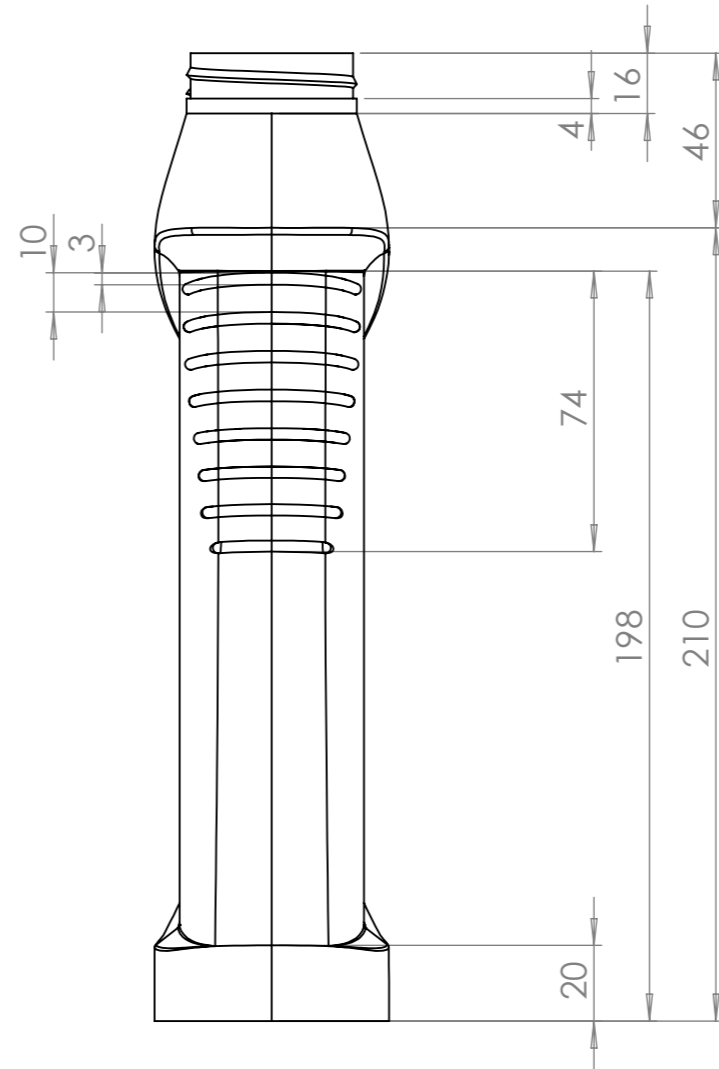
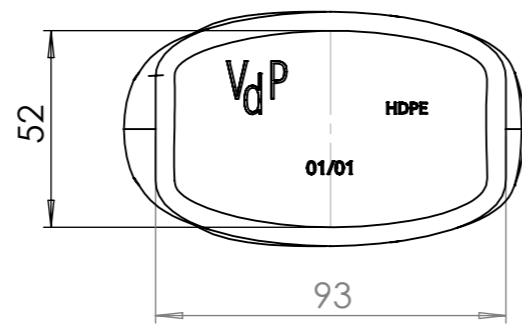
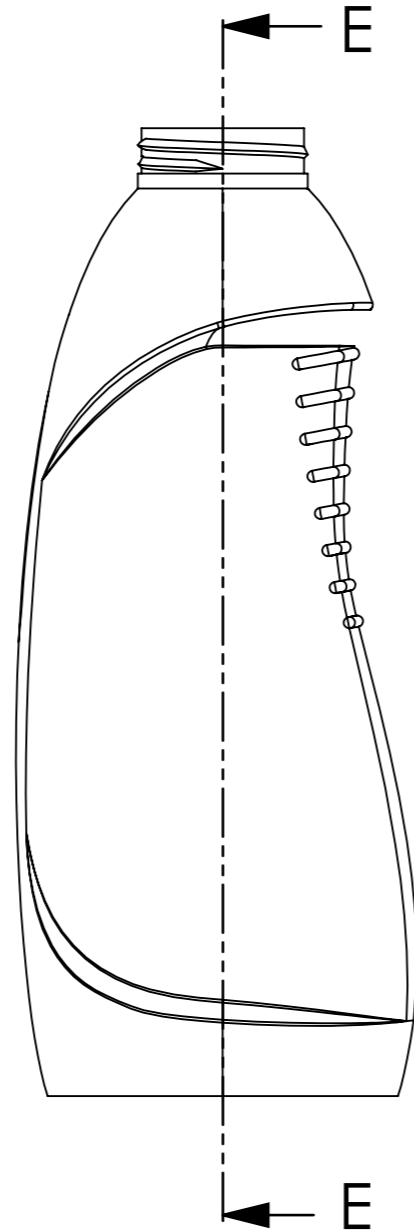
Finally, combine the two solids into one.





SECTION E-E

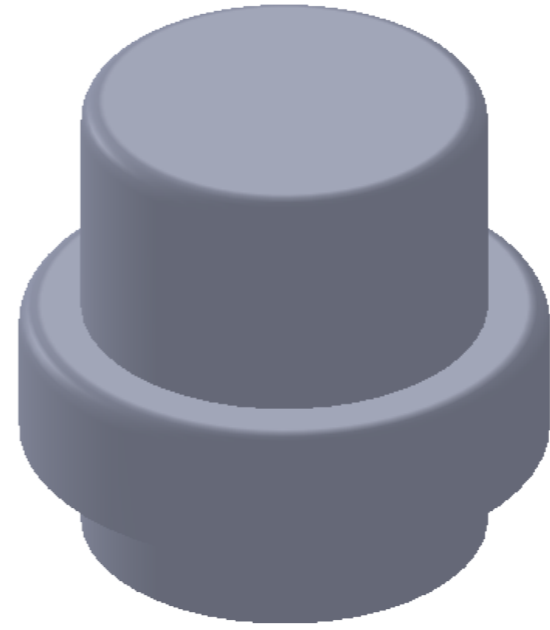
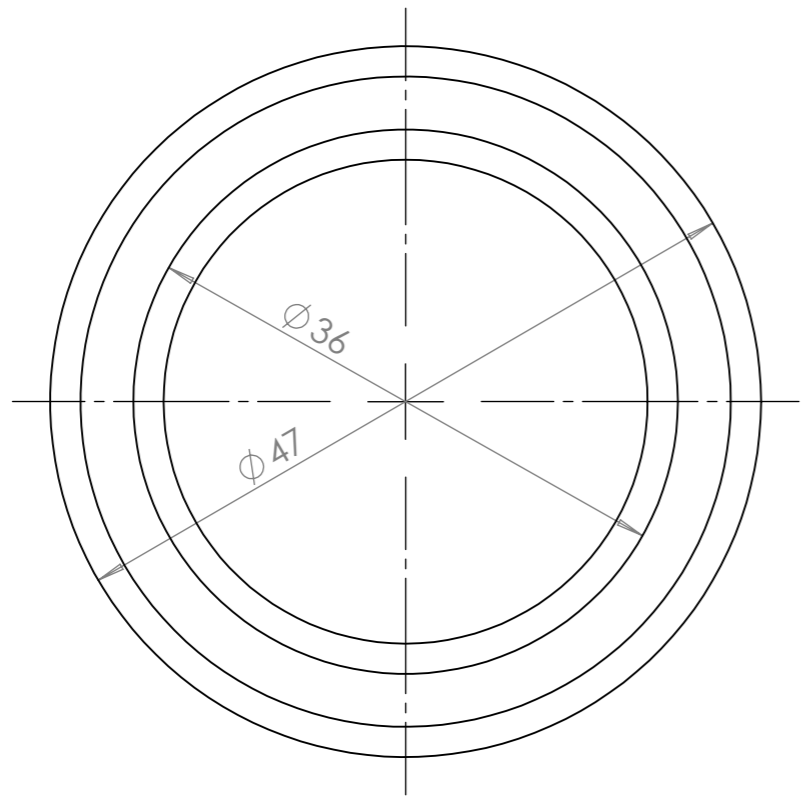
SCALE 1:2



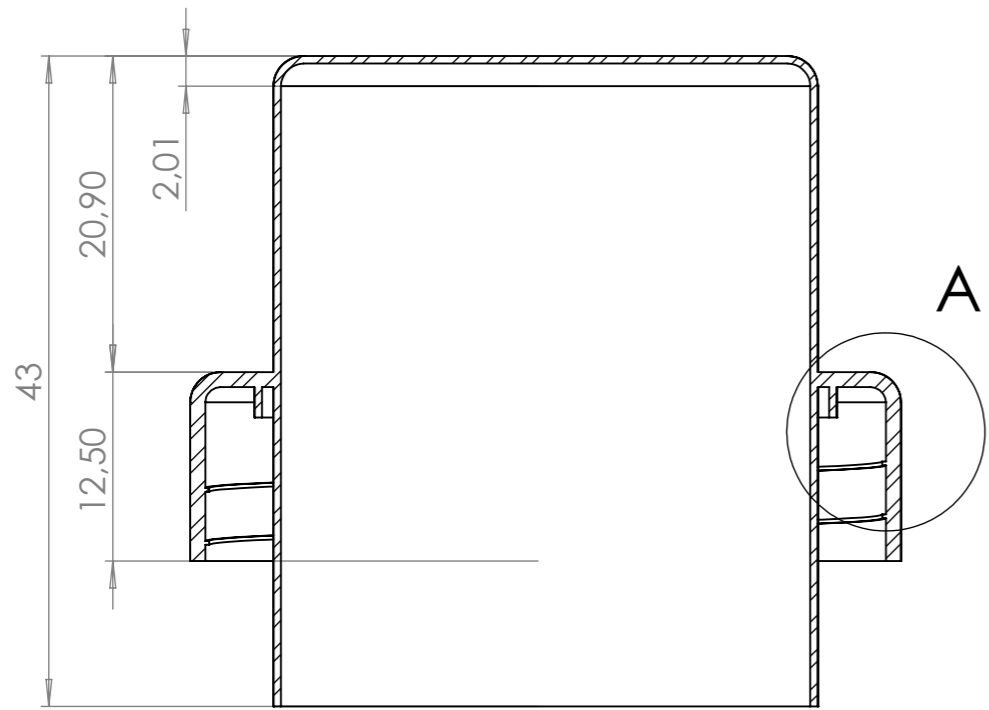
SCALE 1:3

SI NO SE INDICA LO CONTRARIO: LAS COTAS SE EXPRESAN EN MM ACABADO SUPERFICIAL: TOLERANCIAS: LINEAL: ANGULAR:			ACABADO:	REBARBAR Y ROMPER ARISTAS VIVAS	NO CAMBIE LA ESCALA	REVISIÓN
NOMBRE			FIRMA	FECHA	TÍTULO:	
DIBUJ.						
VERIF.						
APROB.						
FABR.						
CALID.				MATERIAL:	N.º DE DIBUJO	A3
				PESO:	ESCALA:1:5	HOJA 1 DE 1

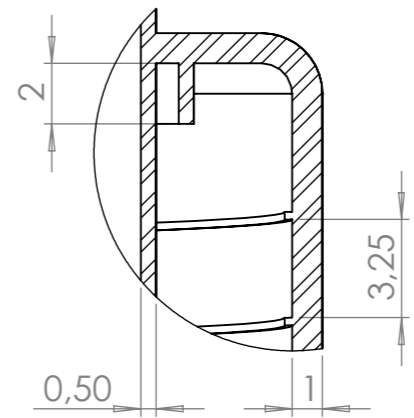
BOTTLE



SCALE 1.5 : 1



SCALE 2 : 1



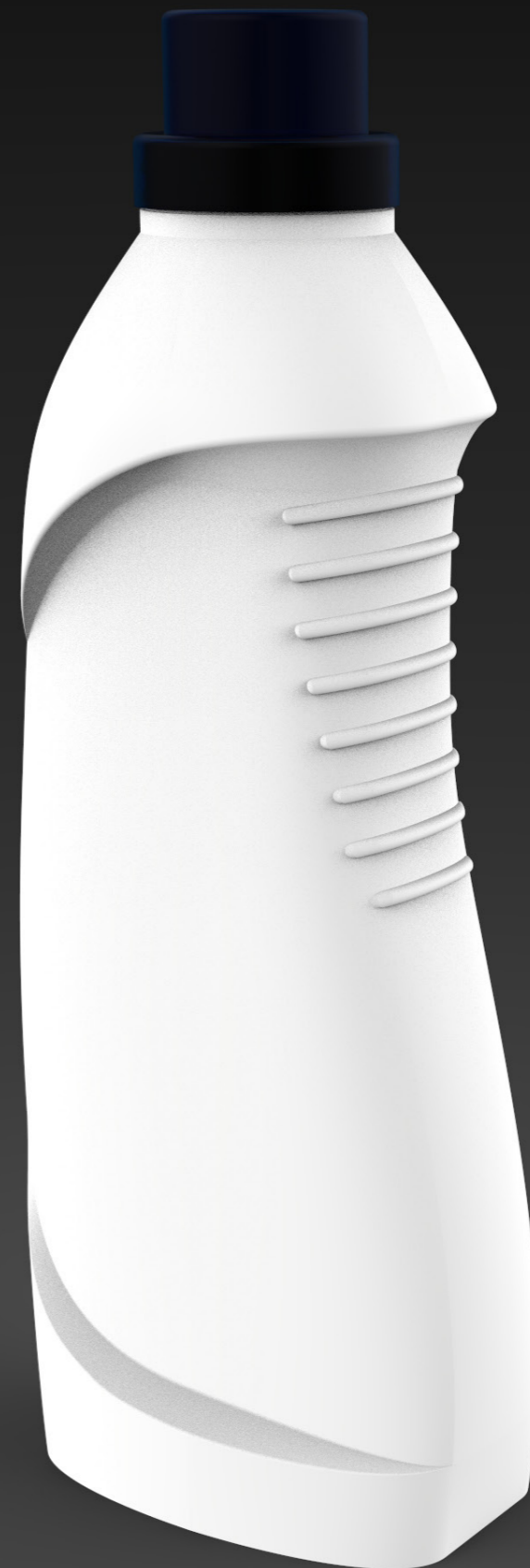
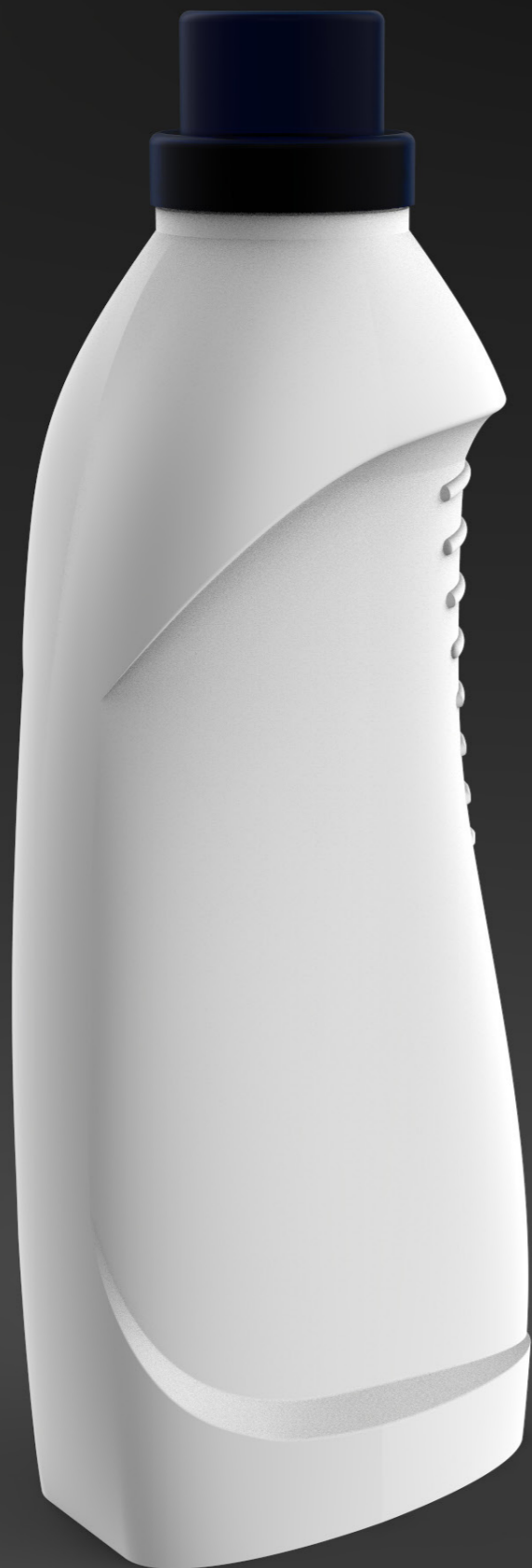
DETALLE A
SCALE 4 : 1

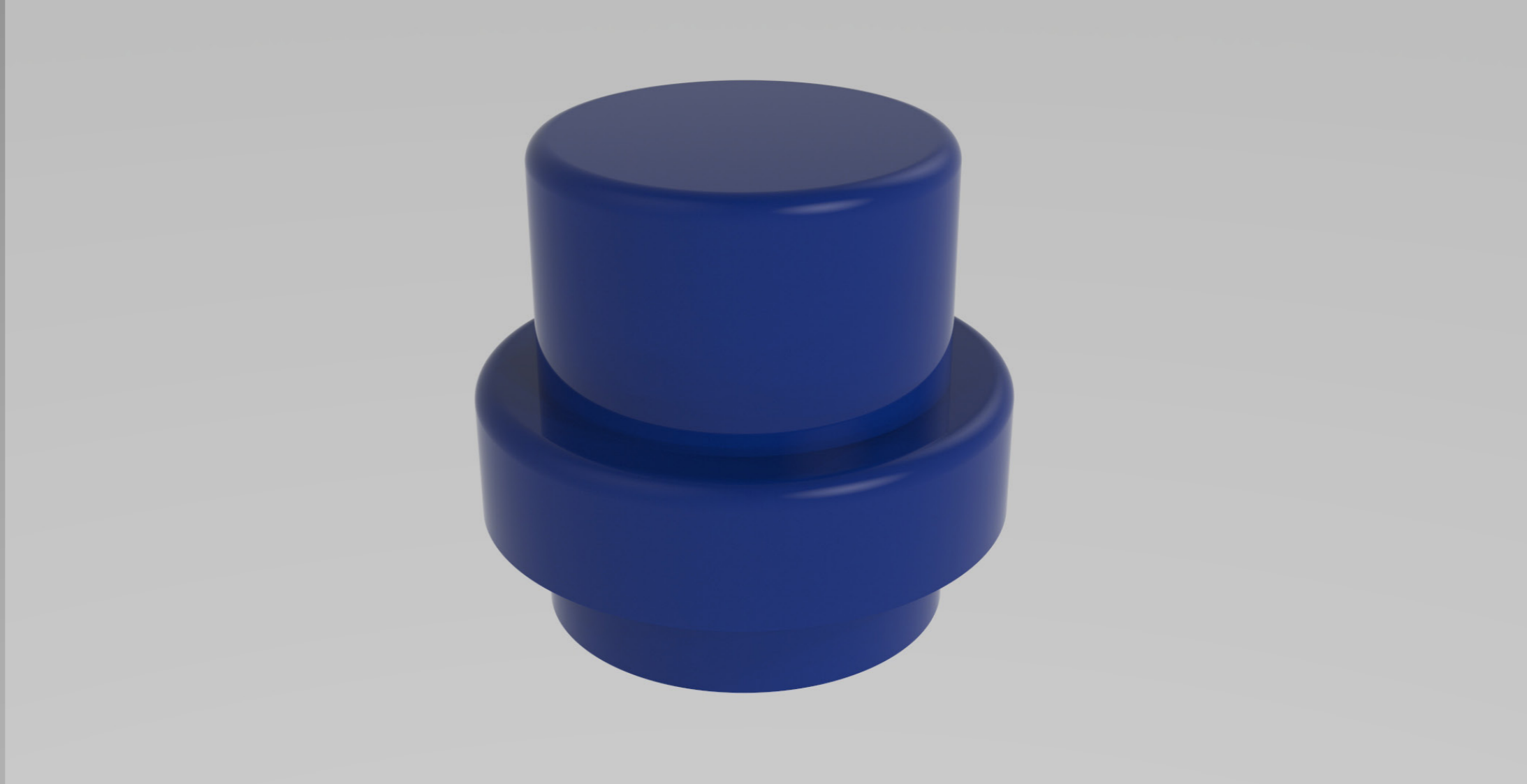
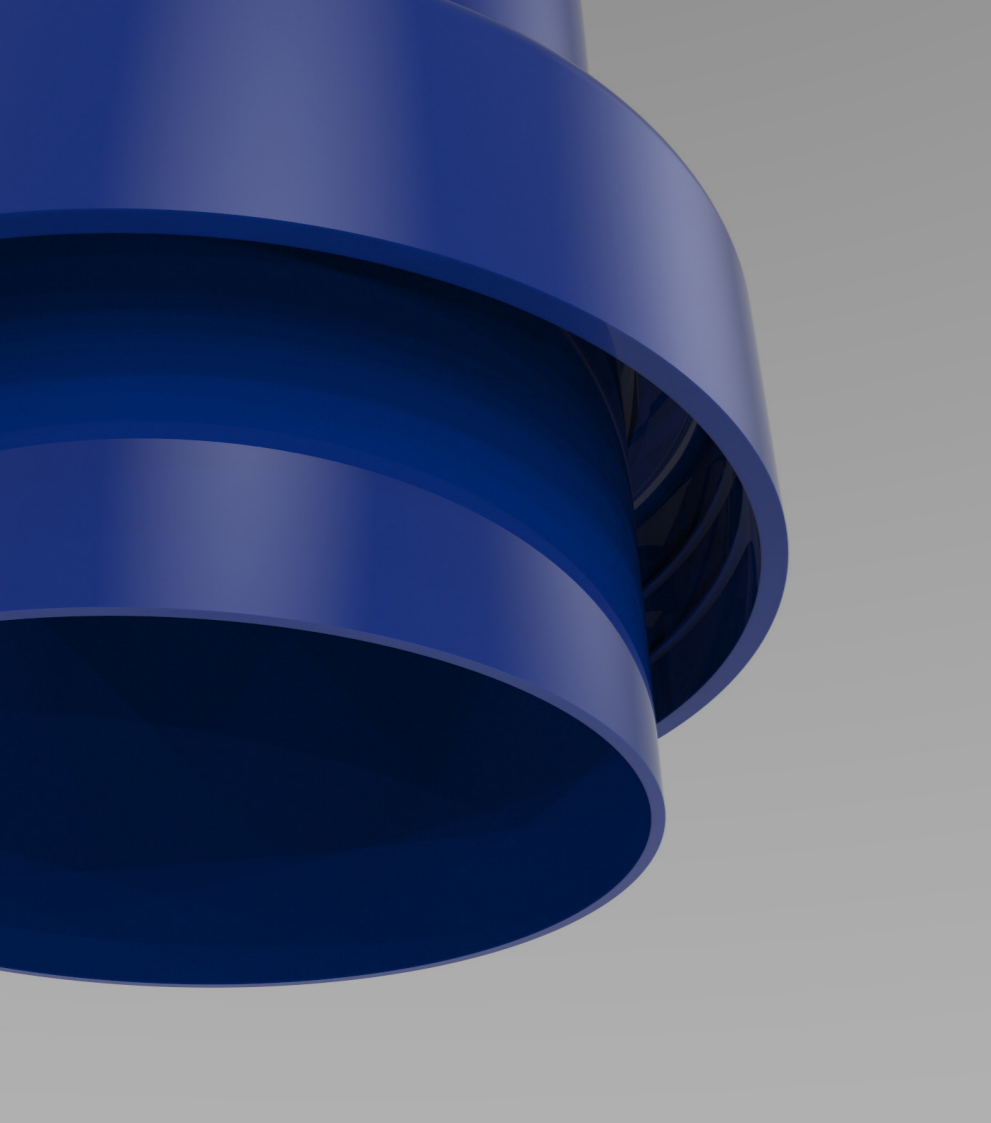
SI NO SE INDICA LO CONTRARIO: LAS COTAS SE EXPRESAN EN MM ACABADO SUPERFICIAL: TOLERANCIAS: LINEAL: ANGULAR:			ACABADO:		REBARBAR Y ROMPER ARISTAS VIVAS		NO CAMBIE LA ESCALA		REVISIÓN		
						TÍTULO:					
						N.º DE DIBUJO					
						ESCALA: 1:5					
						HOJA 1 DE 1					
NOMBRE			FIRMA		FECHA						
DIBUJ.			VERIF.		APROB.						
FABR.			CALID.		MATERIAL:						
					PESO:						

CAP

A3







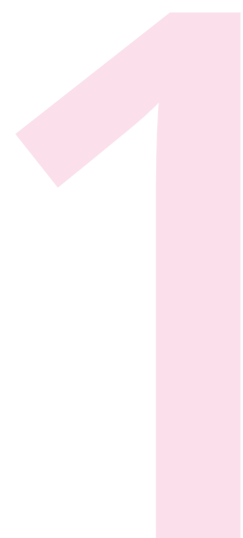
ASSIGNMENT 2.-

Bike
Light
Design

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Belenguer Sanjaime
2017 / 18

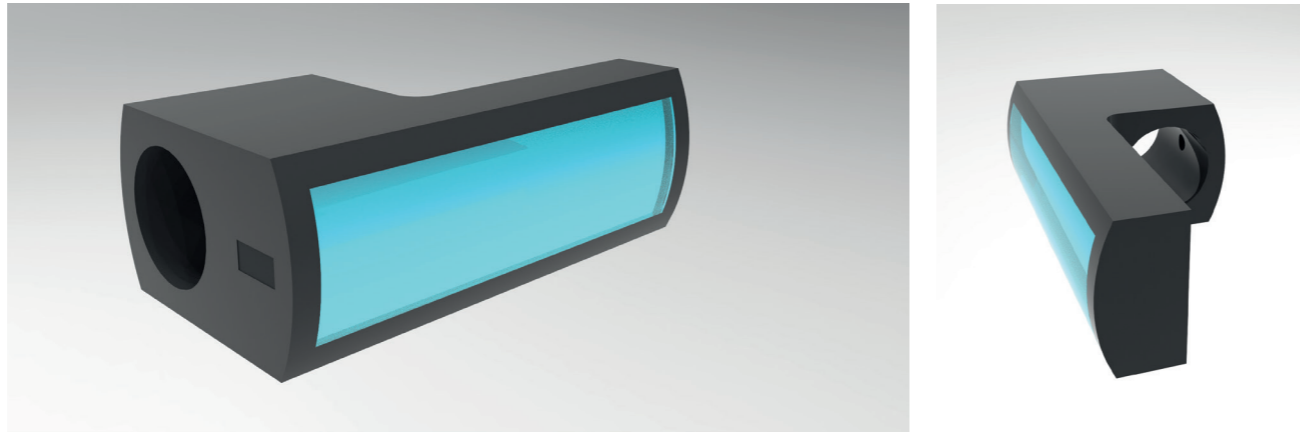
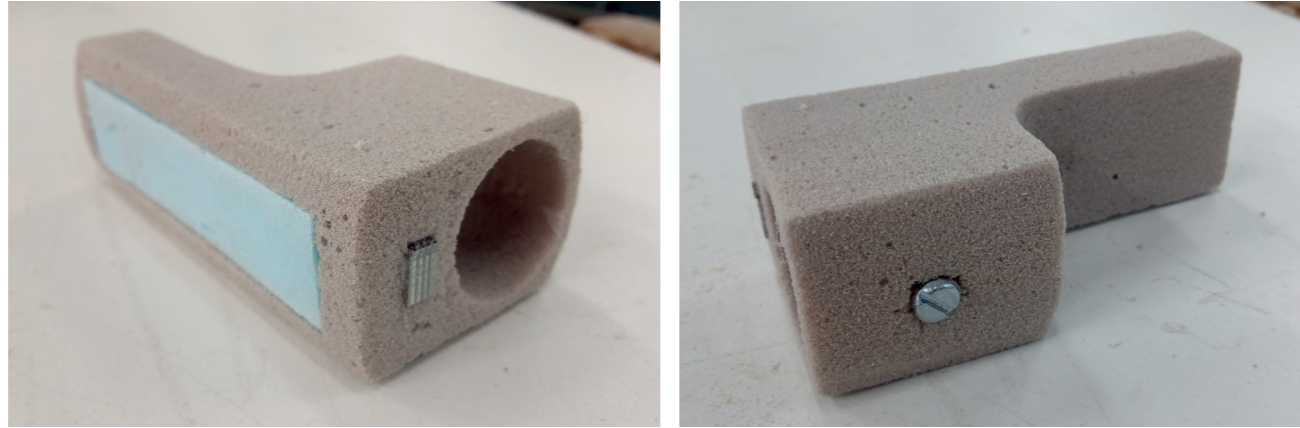
INDEX

1. Technical research and development of ideas.
2. Final prototype design.
3. Final prototype photographs.
4. Technical drawings.
5. Injection moulding.

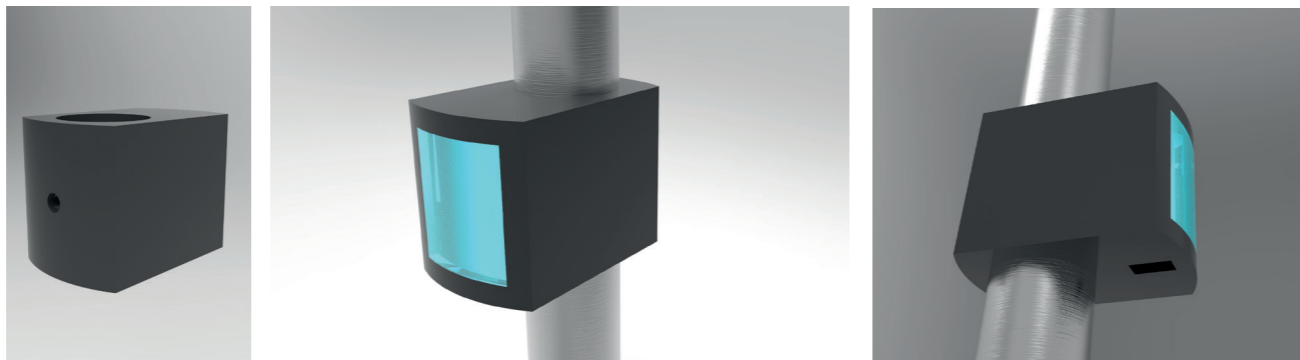
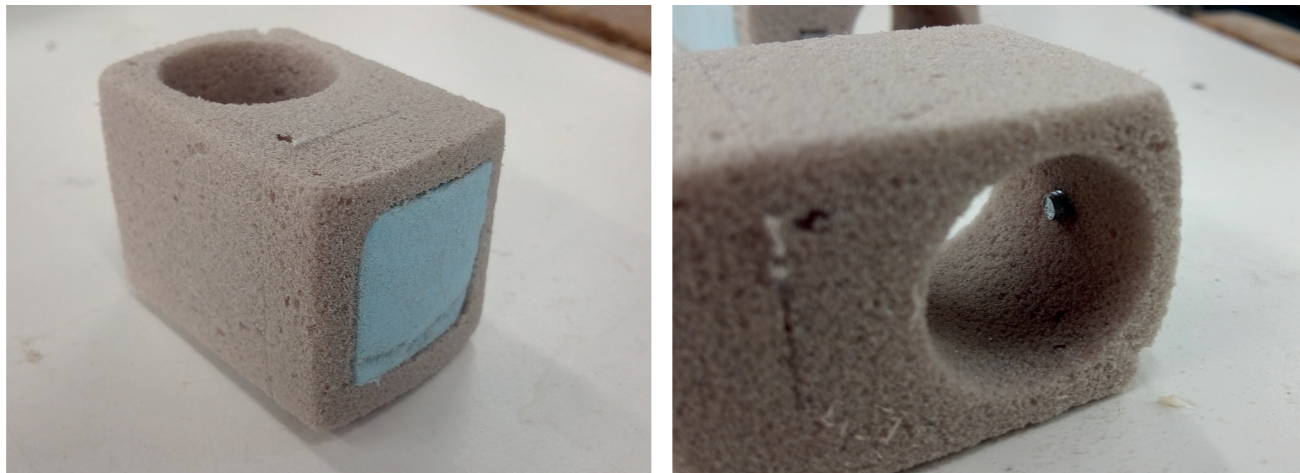


TECHNICAL RESEARCH AND DEVELOPMENT OF IDEAS

FRONT LIGHT



BACK LIGHT



INFORMATION

FASTENER: grub screw



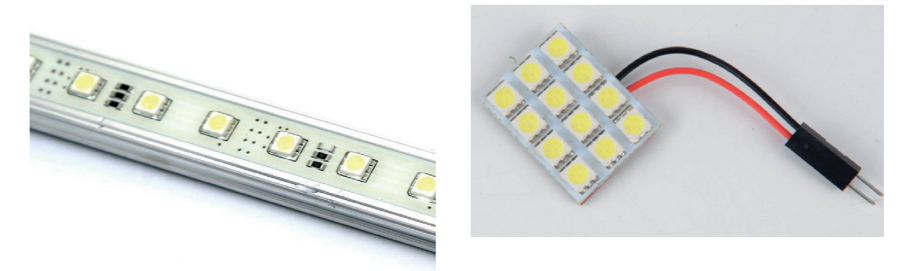
CHARGE: USB - battery



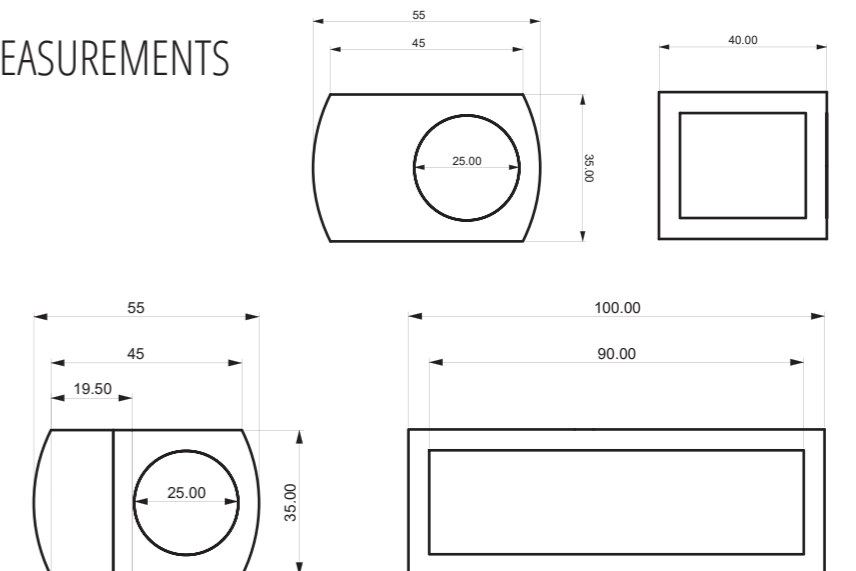
POWER: sensor x2

Equipped with an accelerometer that knows when you're moving and a light sensor that knows when it's dark, it turns on and off automatically. No buttons, no hassle, no chance to be left in the dark.

LIGHT: LED SMD 5050



MEASUREMENTS





LIGHT 1

1.- RED CASING

At the bottom it is provided with 4 catches for assembling with the black casing (5).



2.- SILVER REFLECTOR

It has three holes for the LEDs. It fits in the piece 1.



3.- RED RUBBER

It is fixed in piece 5 by 6 tabs and 3 holes.

it fits the profile of pieces 5 and 1. Its use is to make the light waterproof.



5.- BLACK CASING

It has 8 tabs to match pieces 1 and 2.

It contains the batteries.

4.- LED

It has two holes for attaching it with the screws.



LIGHT 2

1.- BLUE CASING

Flexible plastic that wraps the transparent casing and at the same time makes it attach to the bike.



2.- WITHE CAP

Closes the transparent case and prevents the batteries from falling.



3.- ELECTRONICS

It contains the PCB, the LEDs, the button and an metallic plaque that holds the batteries.

Its rounded shape makes the batteries fit inside.



When you press the button, the LEDs stay or flicker.

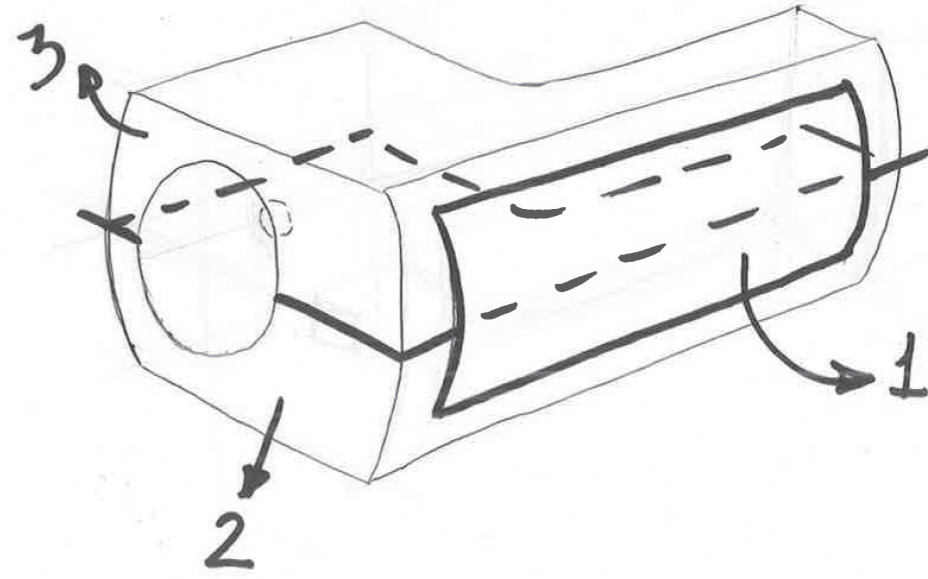
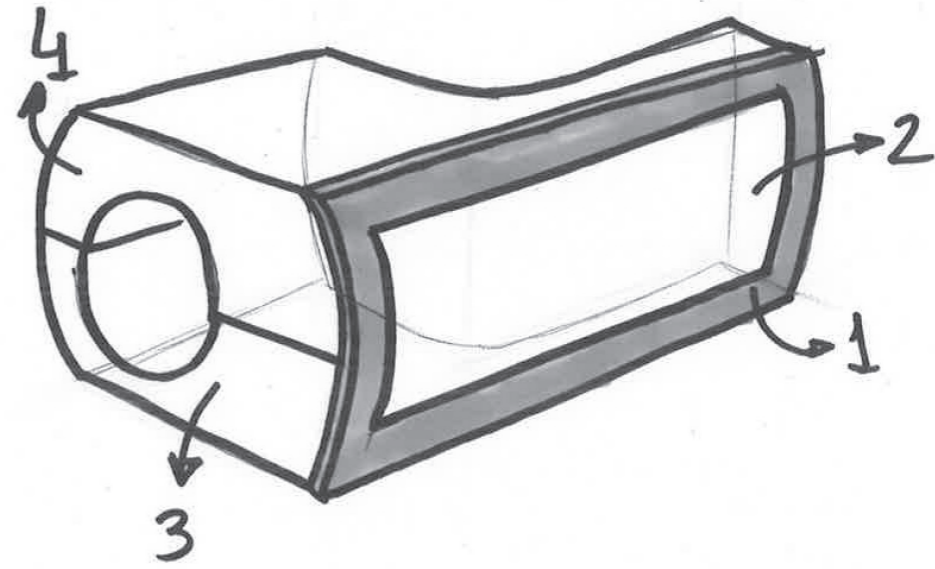
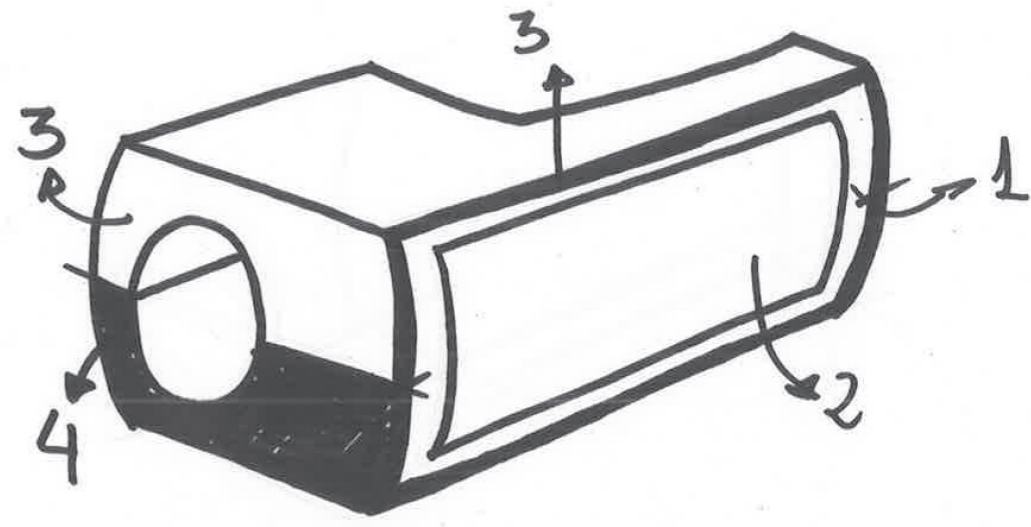
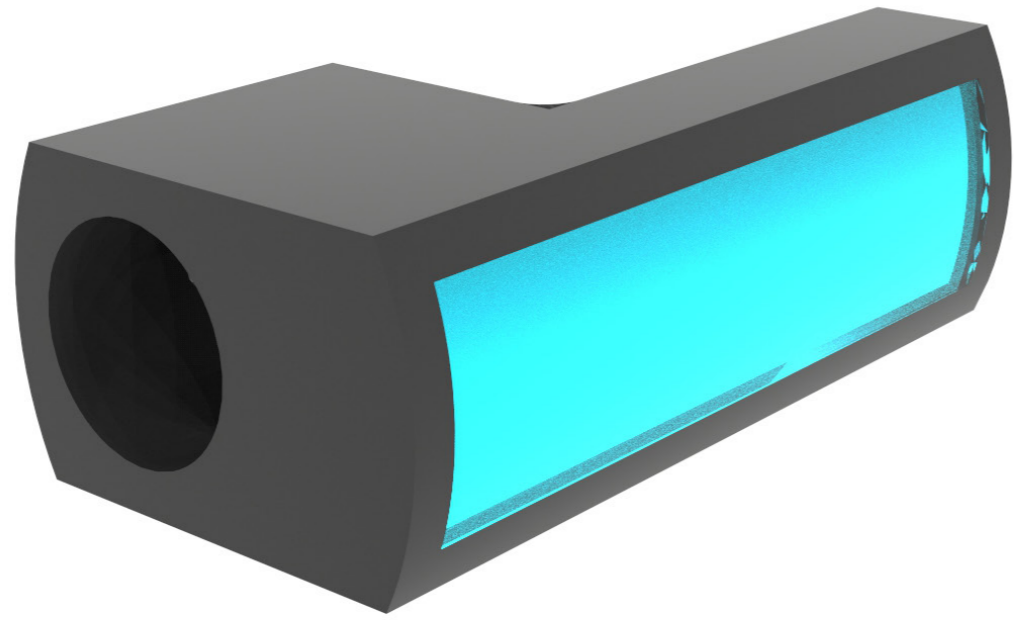
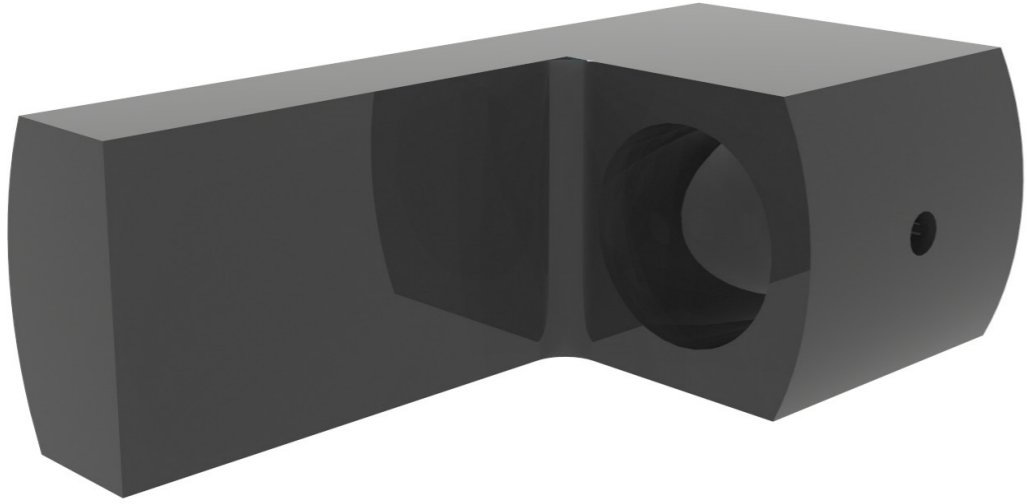
4.- TRANSPARENT CASING

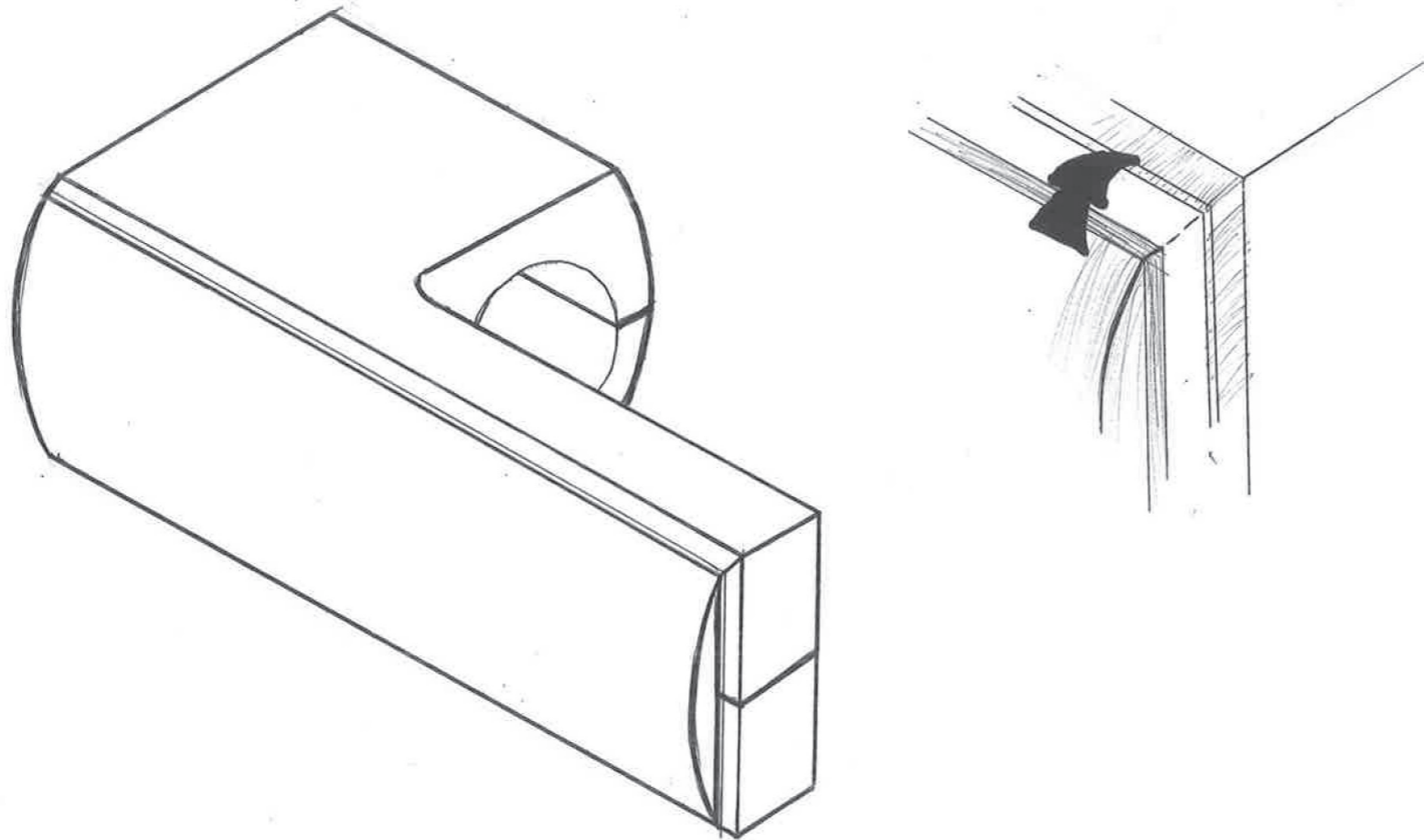
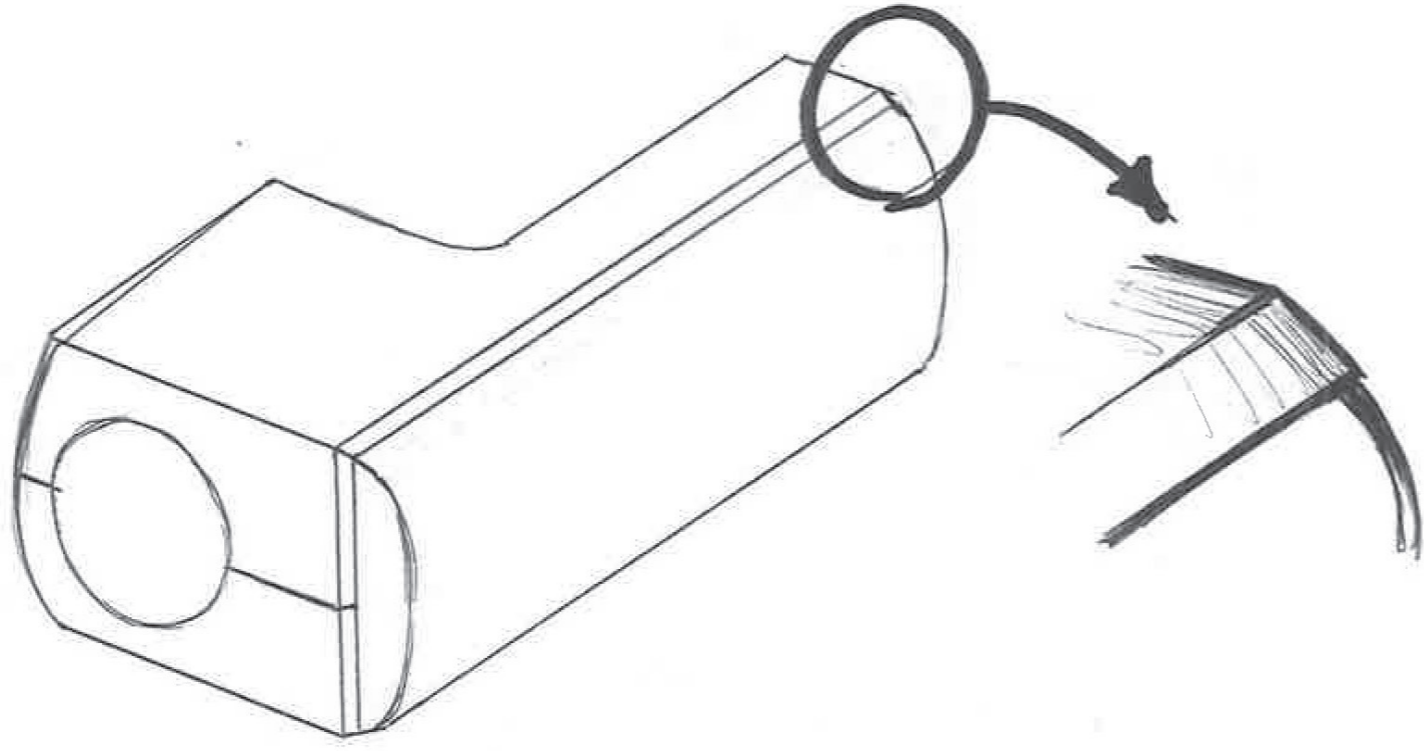
Hold all the pieces. It does not have tabs that fit with piece 3.



It fits exact.

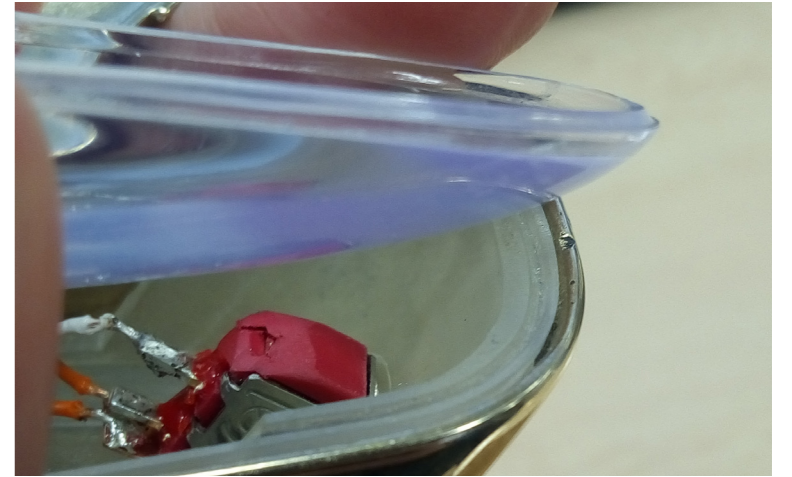
DEVELOPMENT: EXTERNAL PIECES

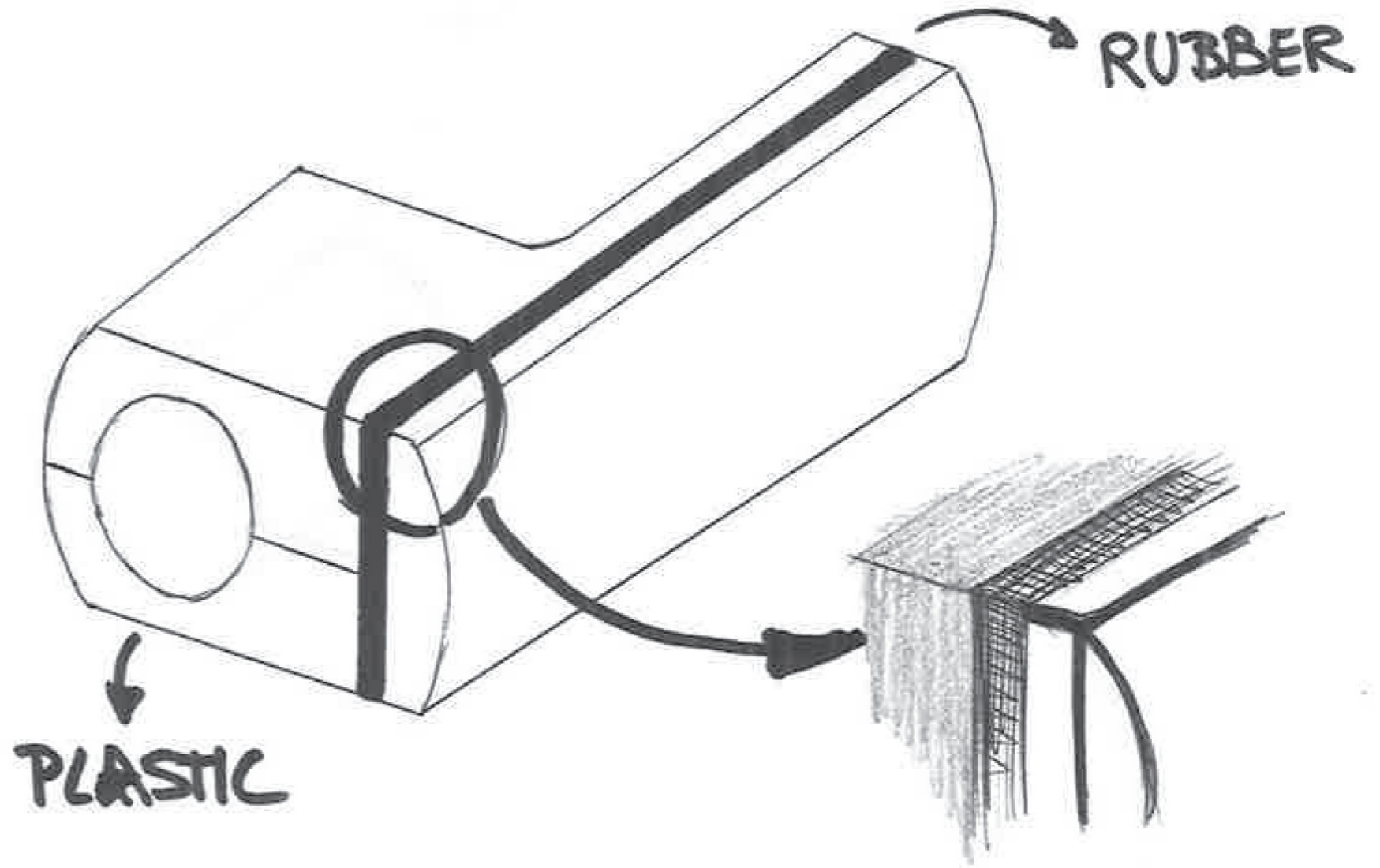
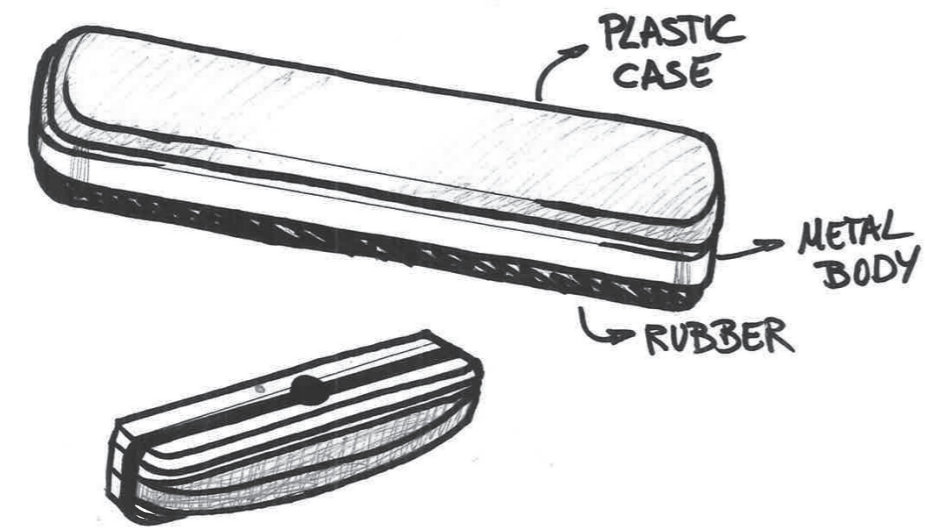




IDEA 1

The front piece fits into the case getting into it a bit. Like in the lights below.

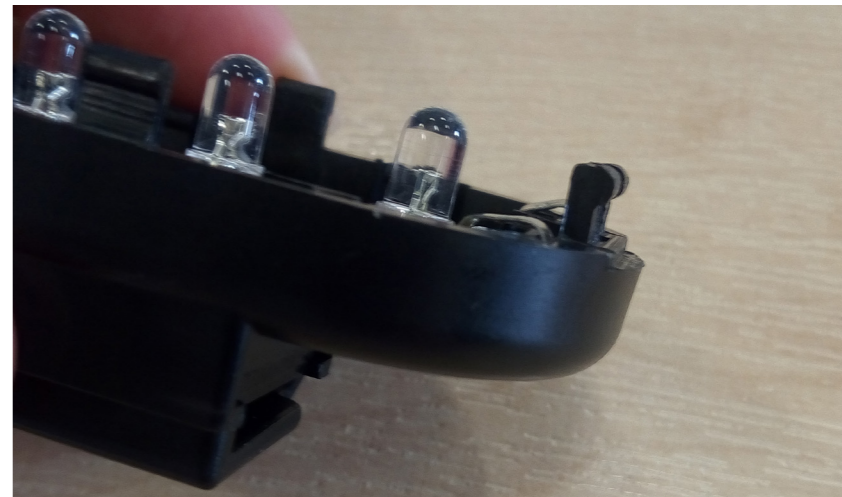
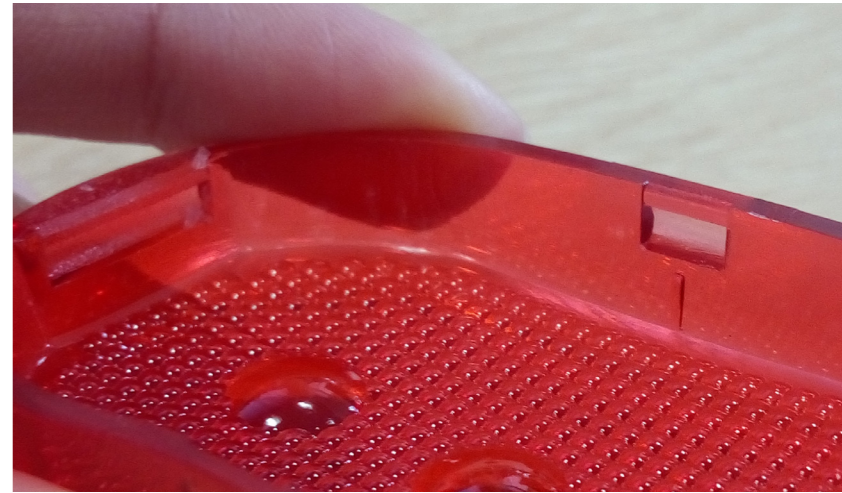
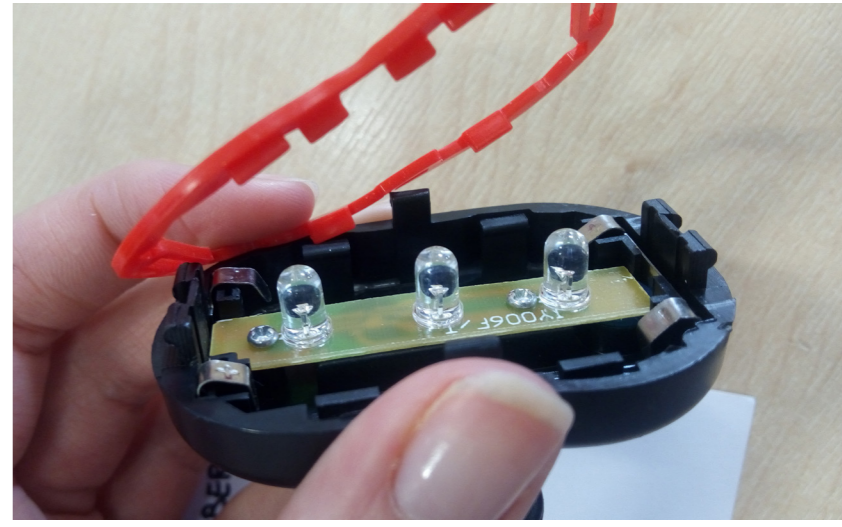
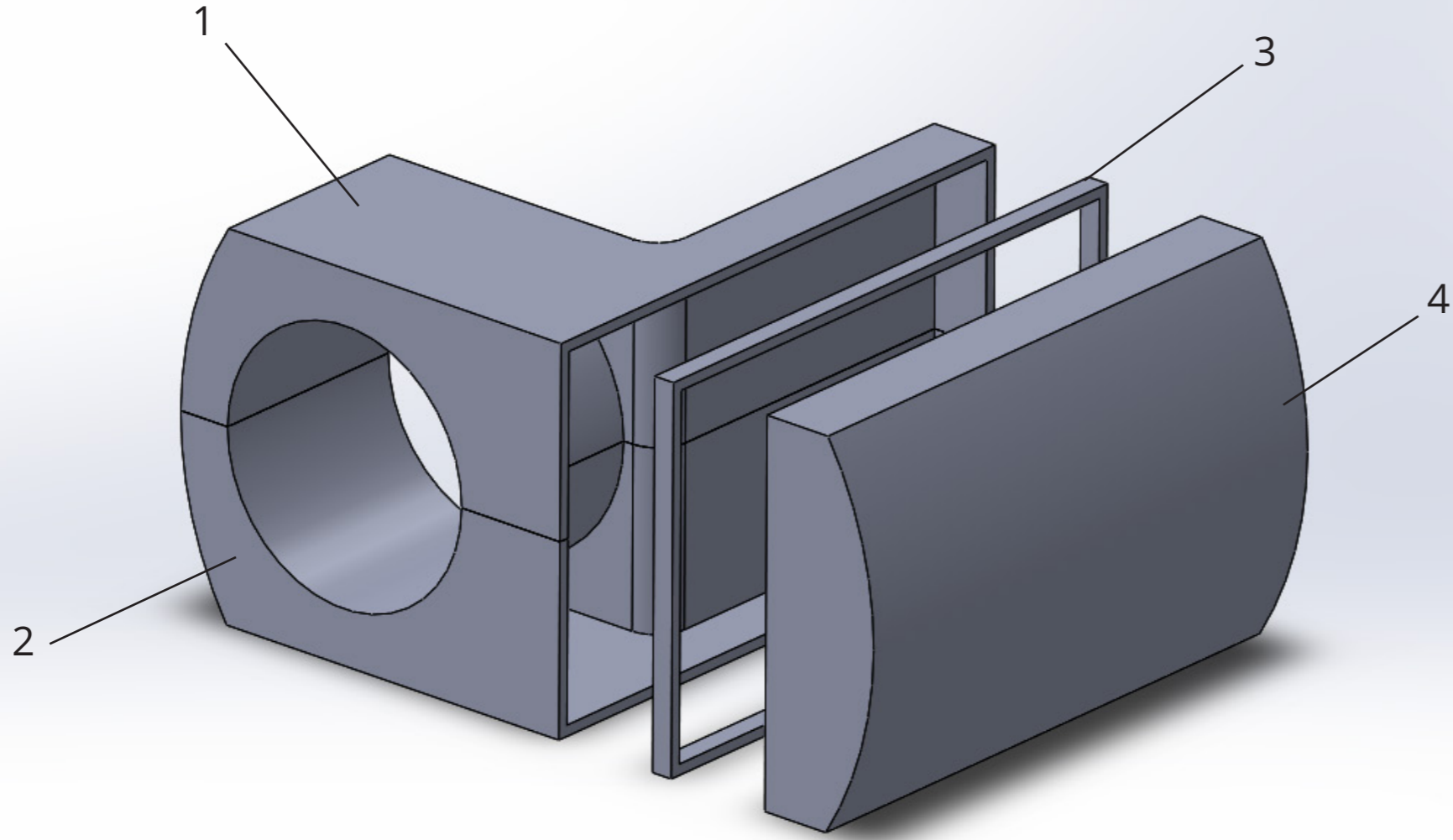
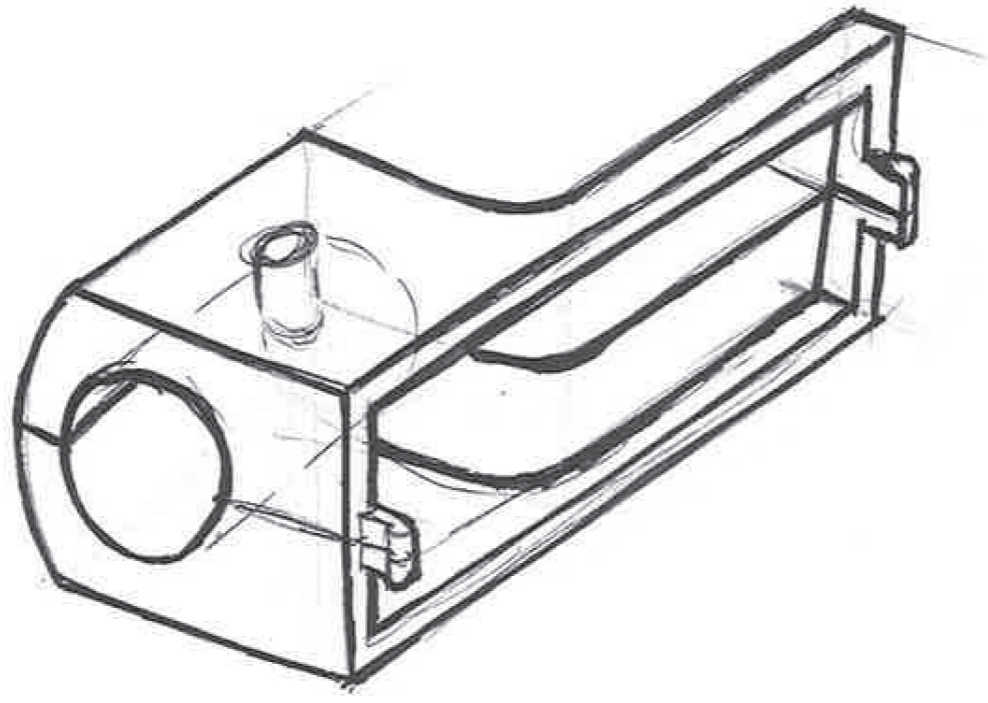




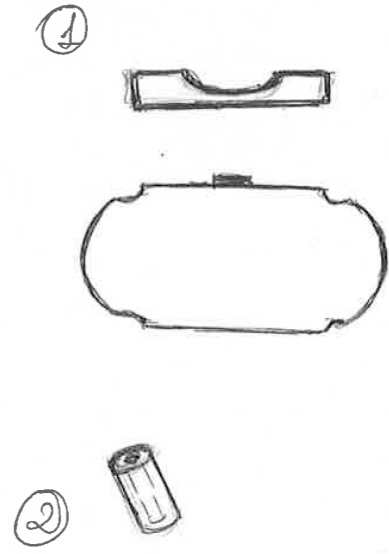
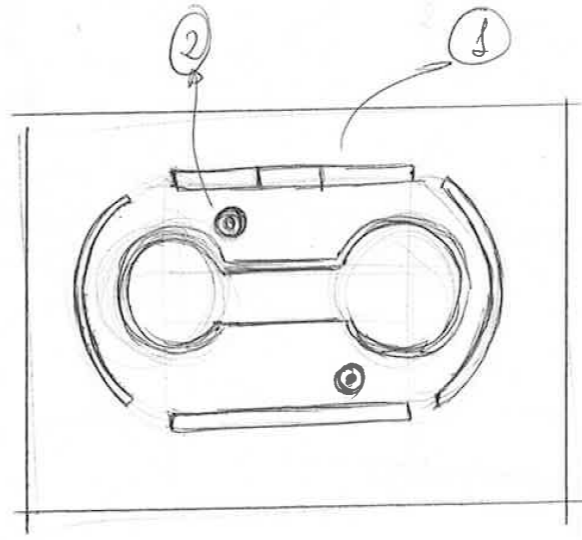
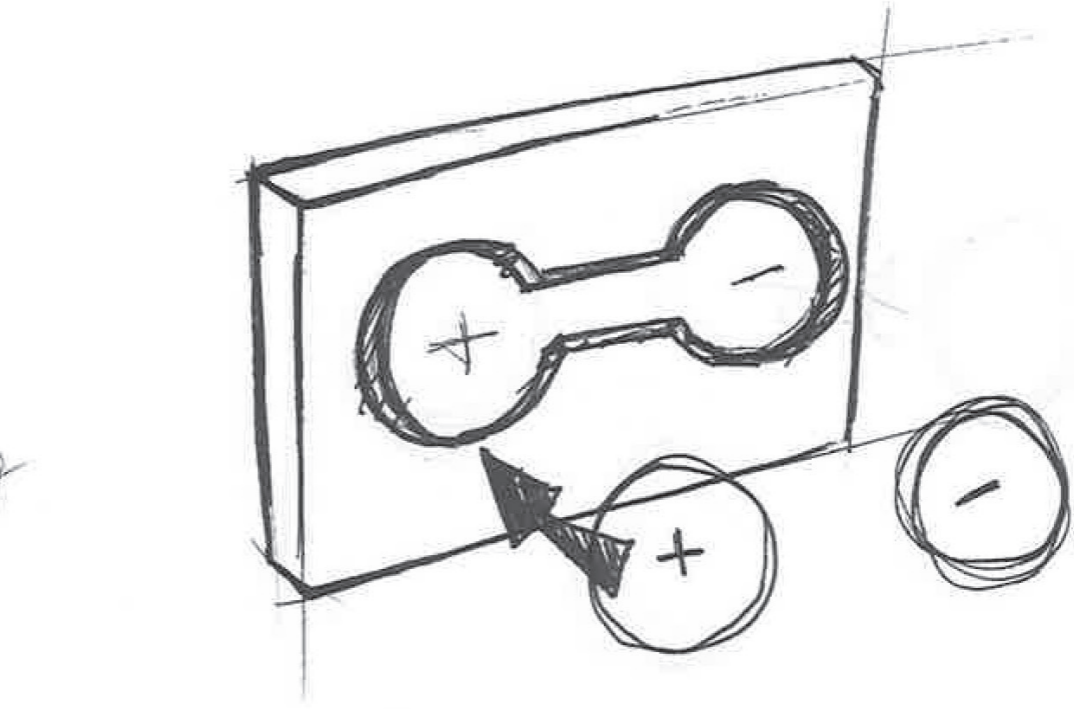
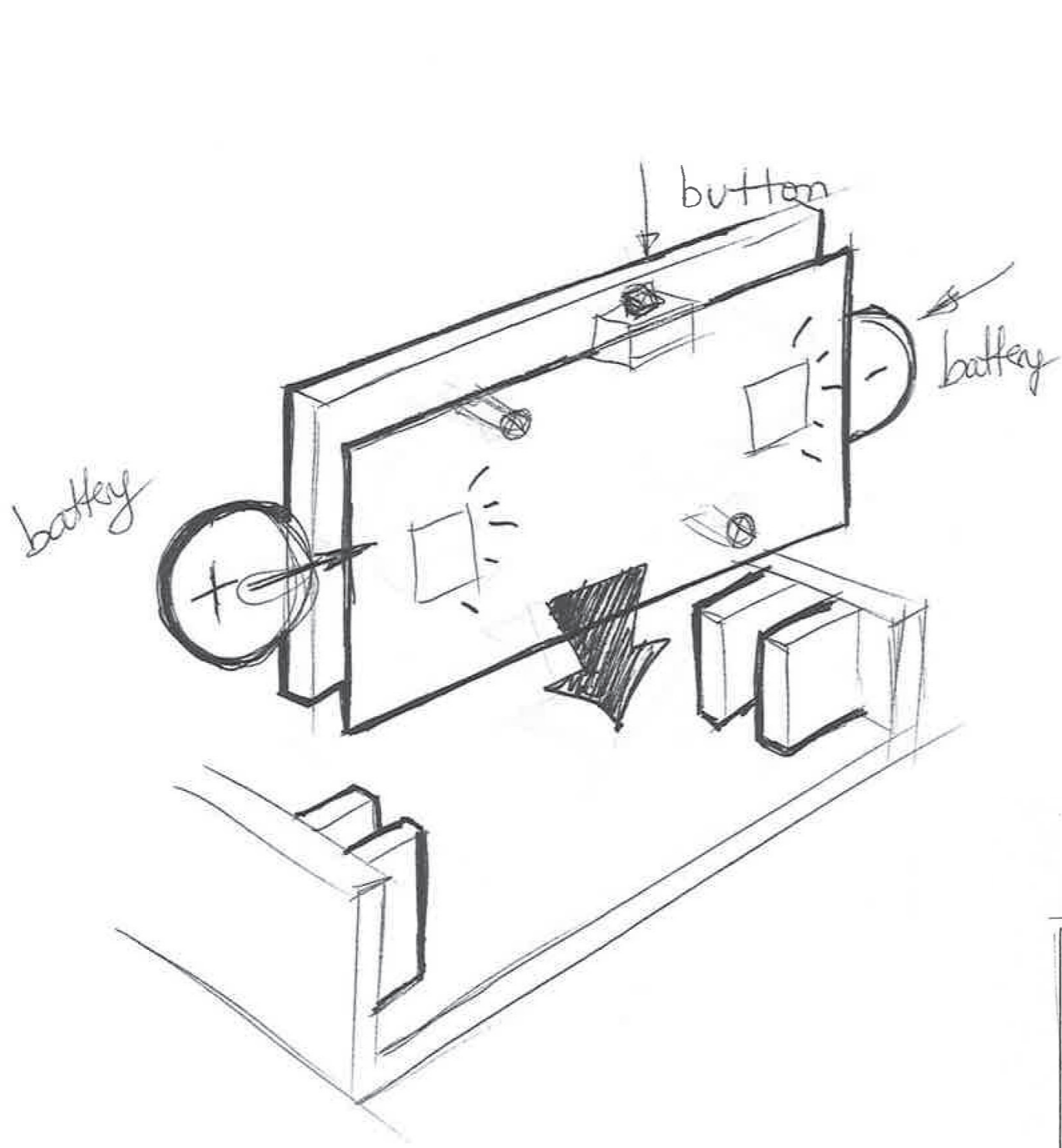
IDEA 2

The front piece is fitted to the case by hooks and having a piece of rubber between them.

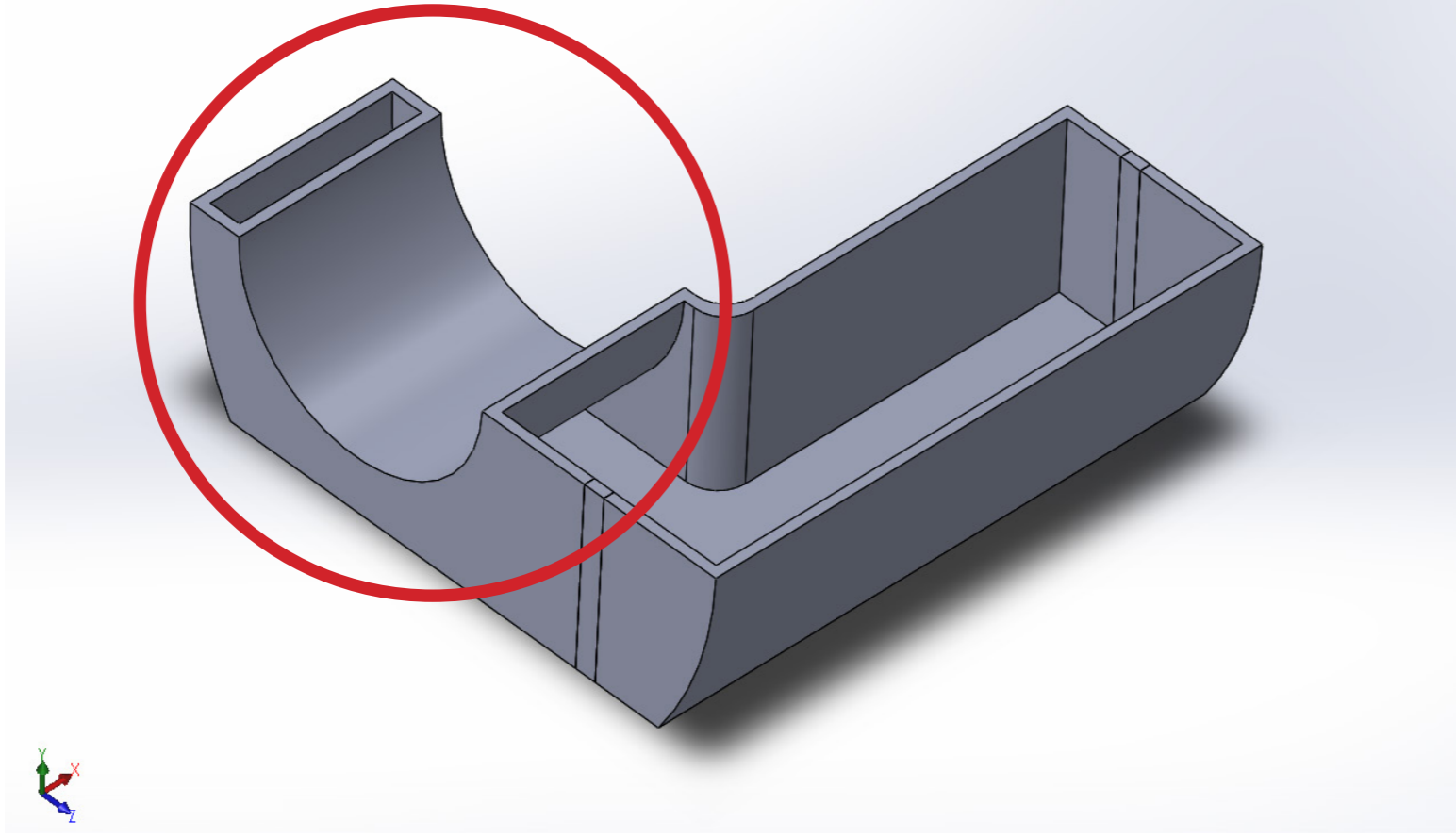
DEVELOPMENT: EXTERNAL PIECES



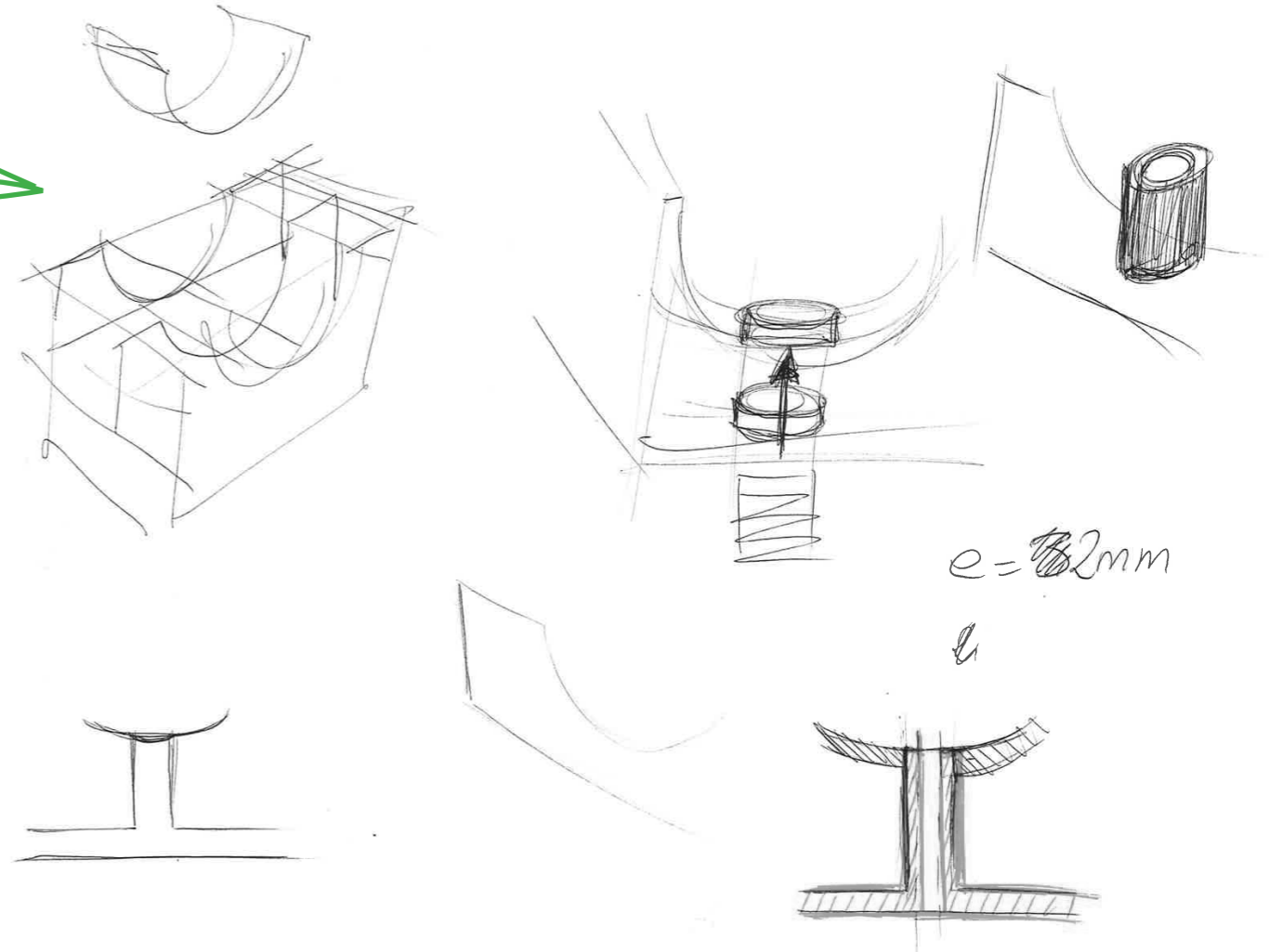
DEVELOPMENT: INTERNAL PIECES

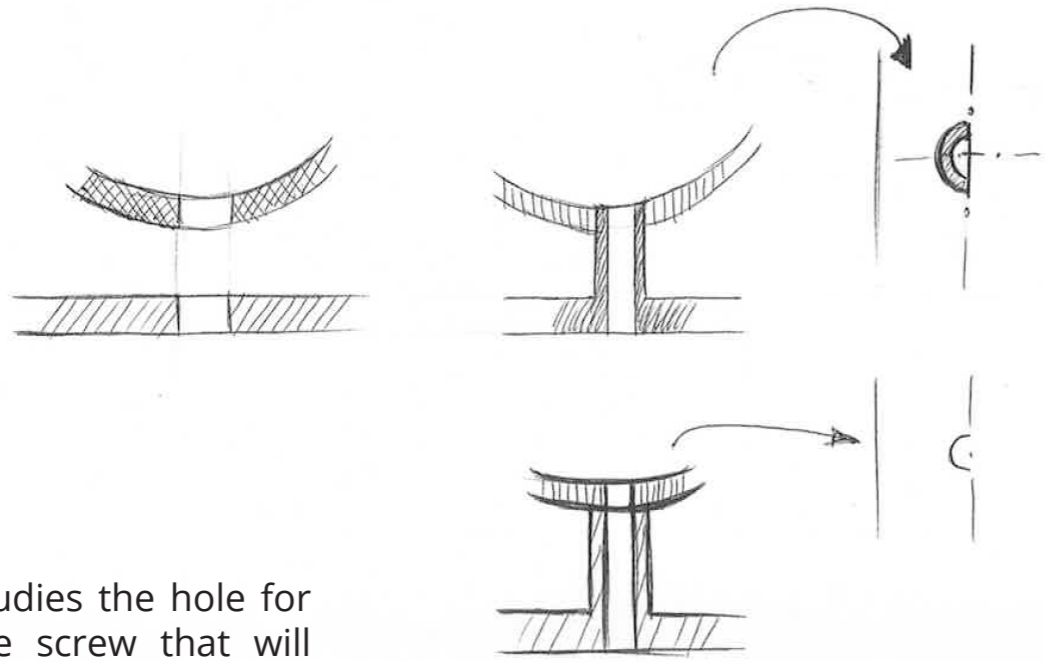


PCB + button on top

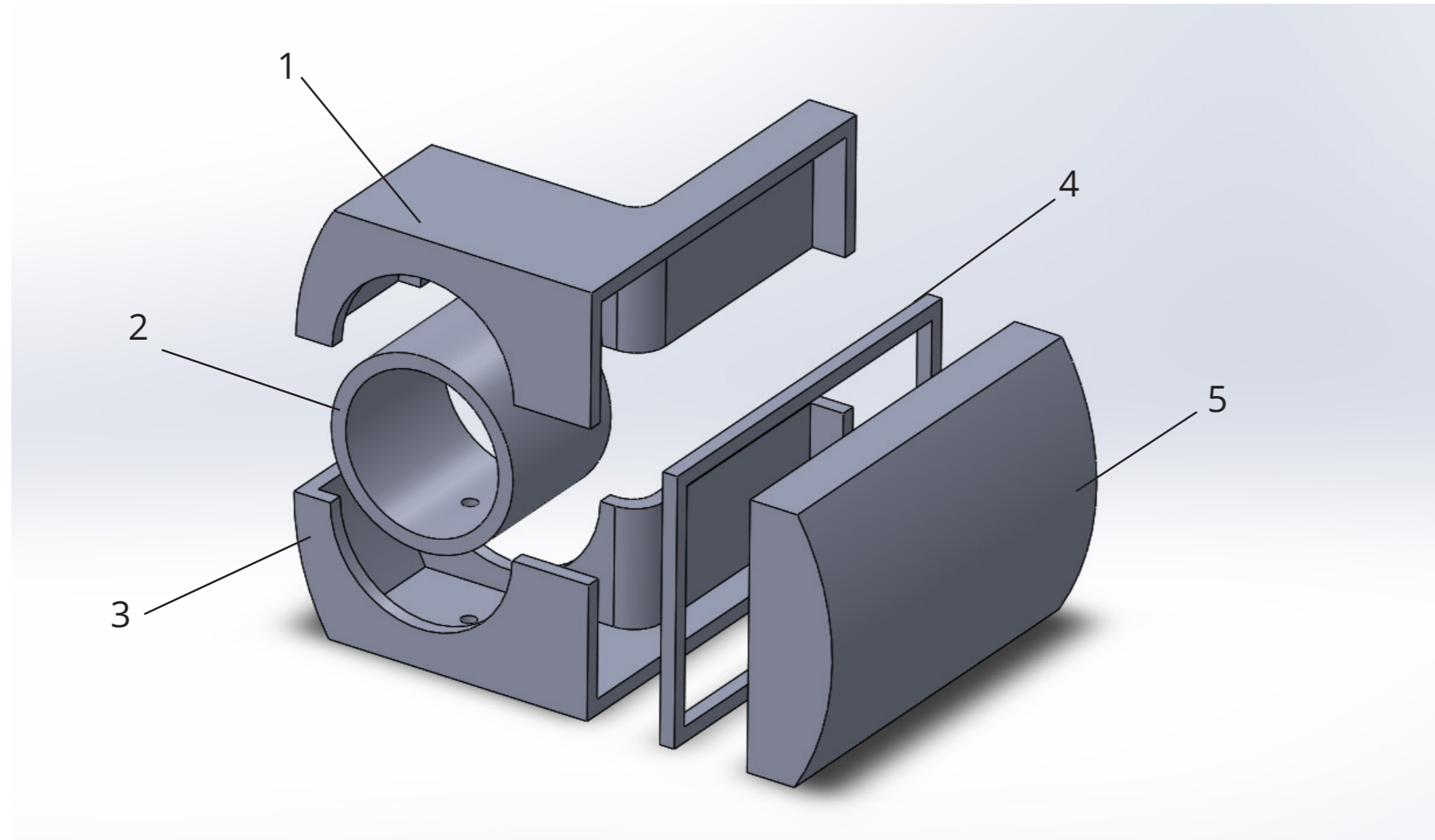
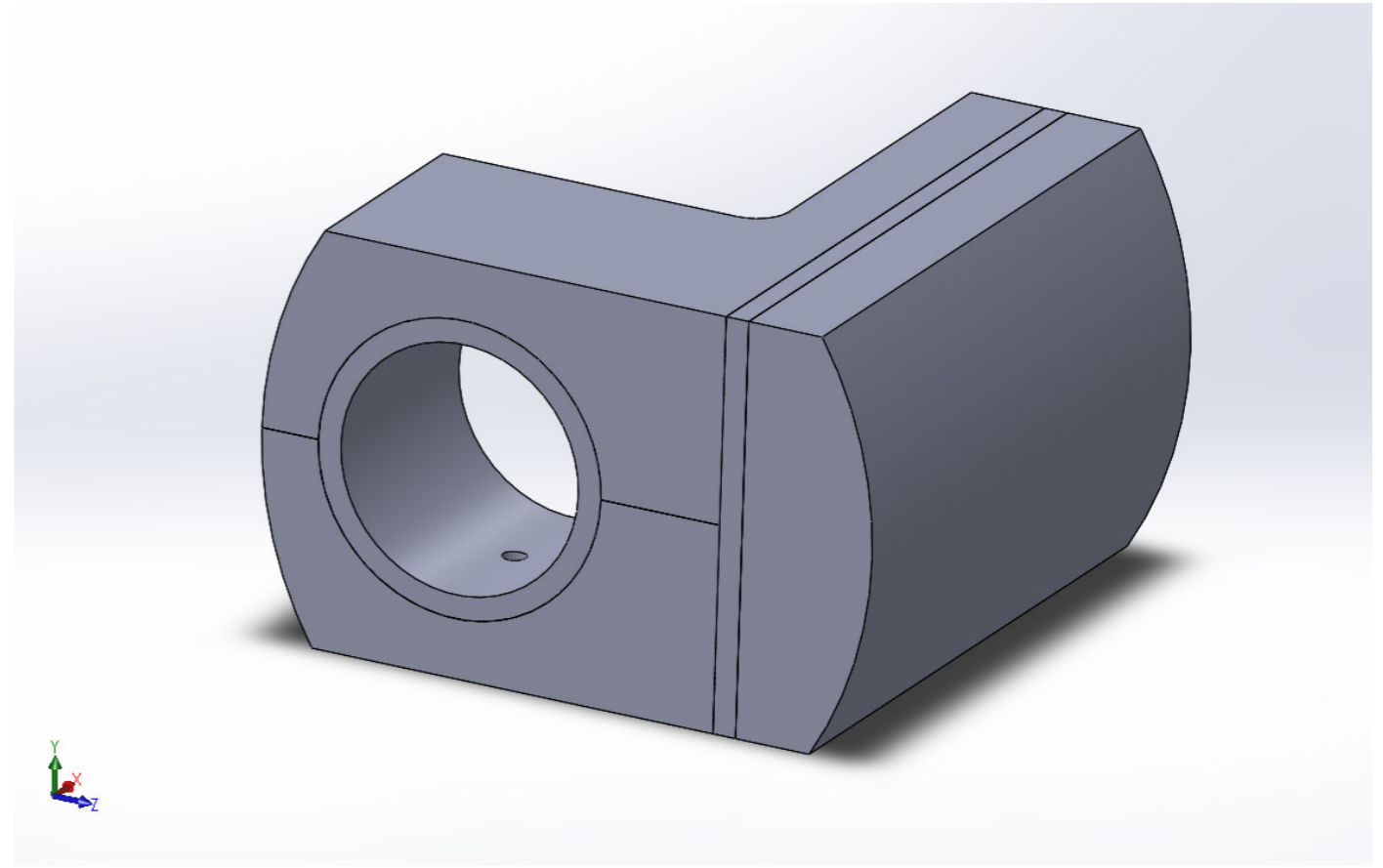


In the image, the light case is divided into four parts. It is impossible to create the piece that is inside the red circle by injection.

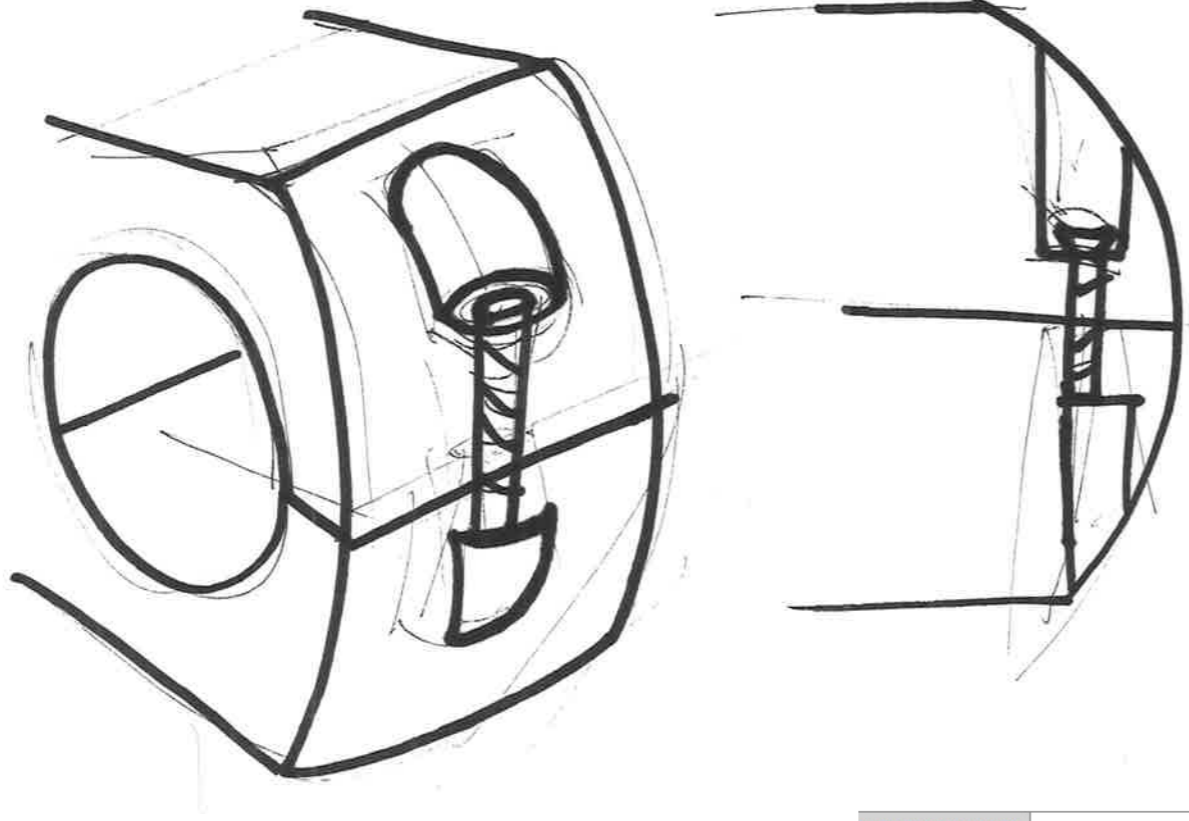




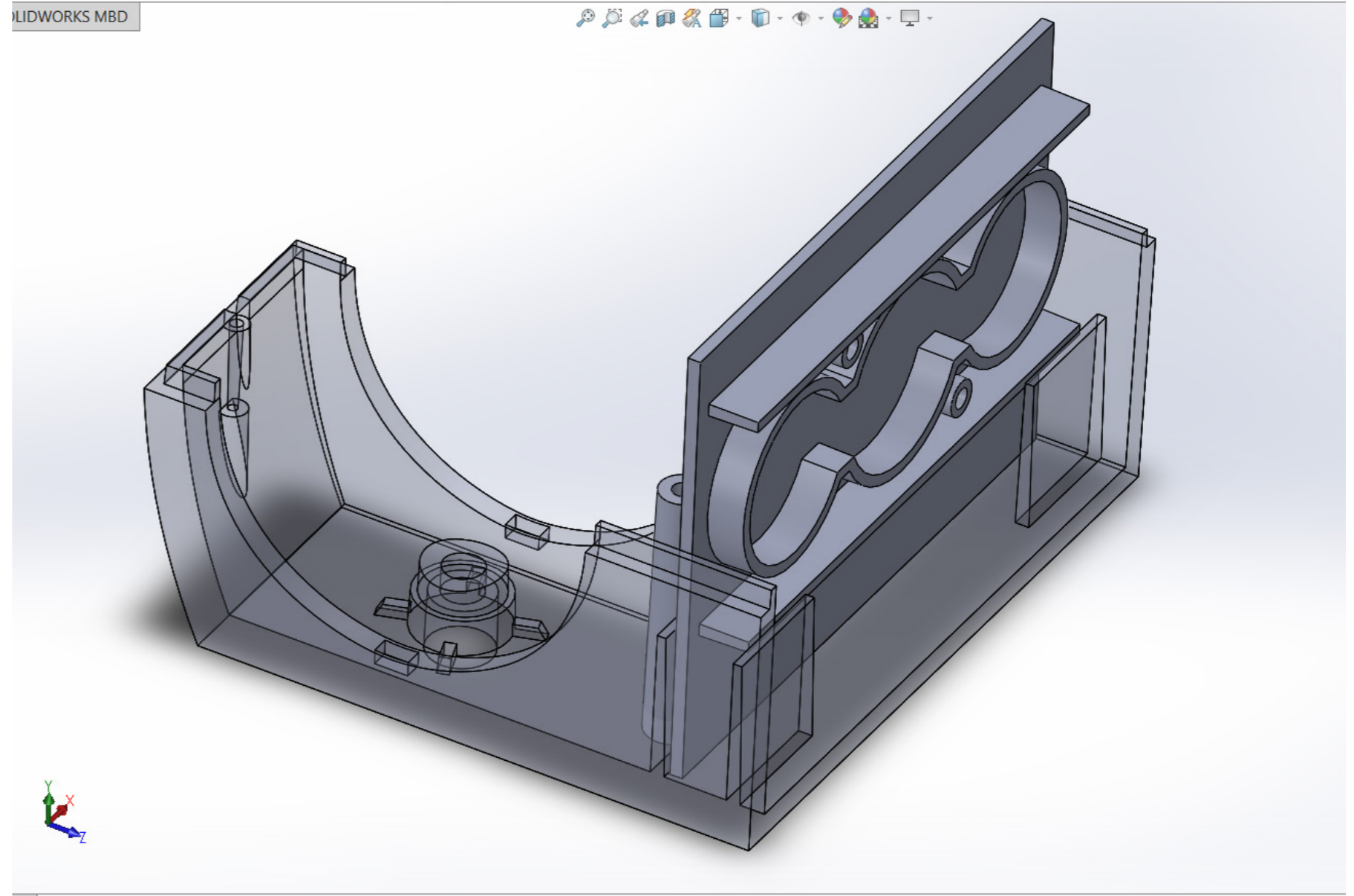
Studies the hole for the screw that will hold the light to the handlebar.

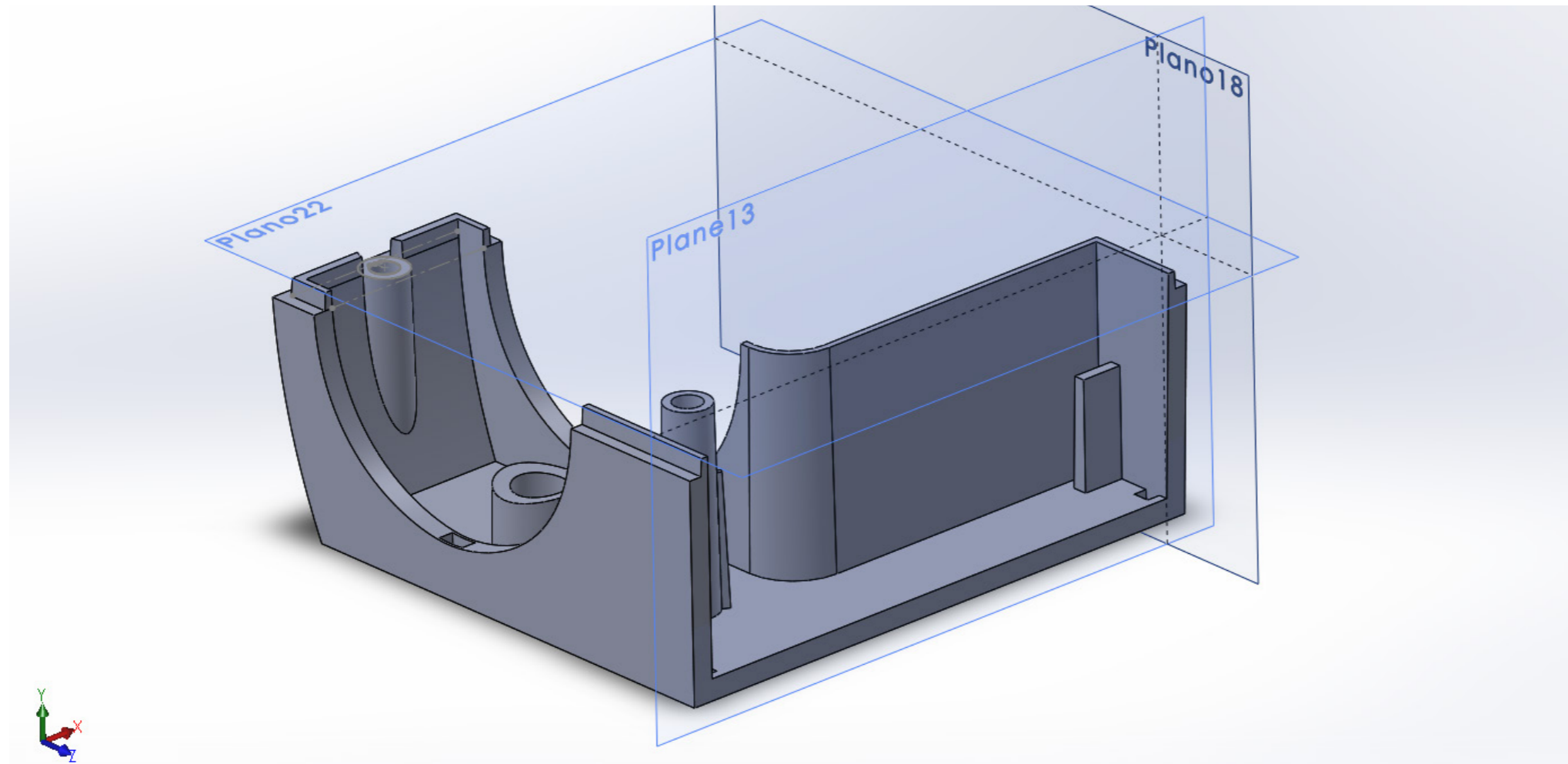


The solution is to create the cylindrical part independently. Thus, the light would consist of five external parts and one internal.



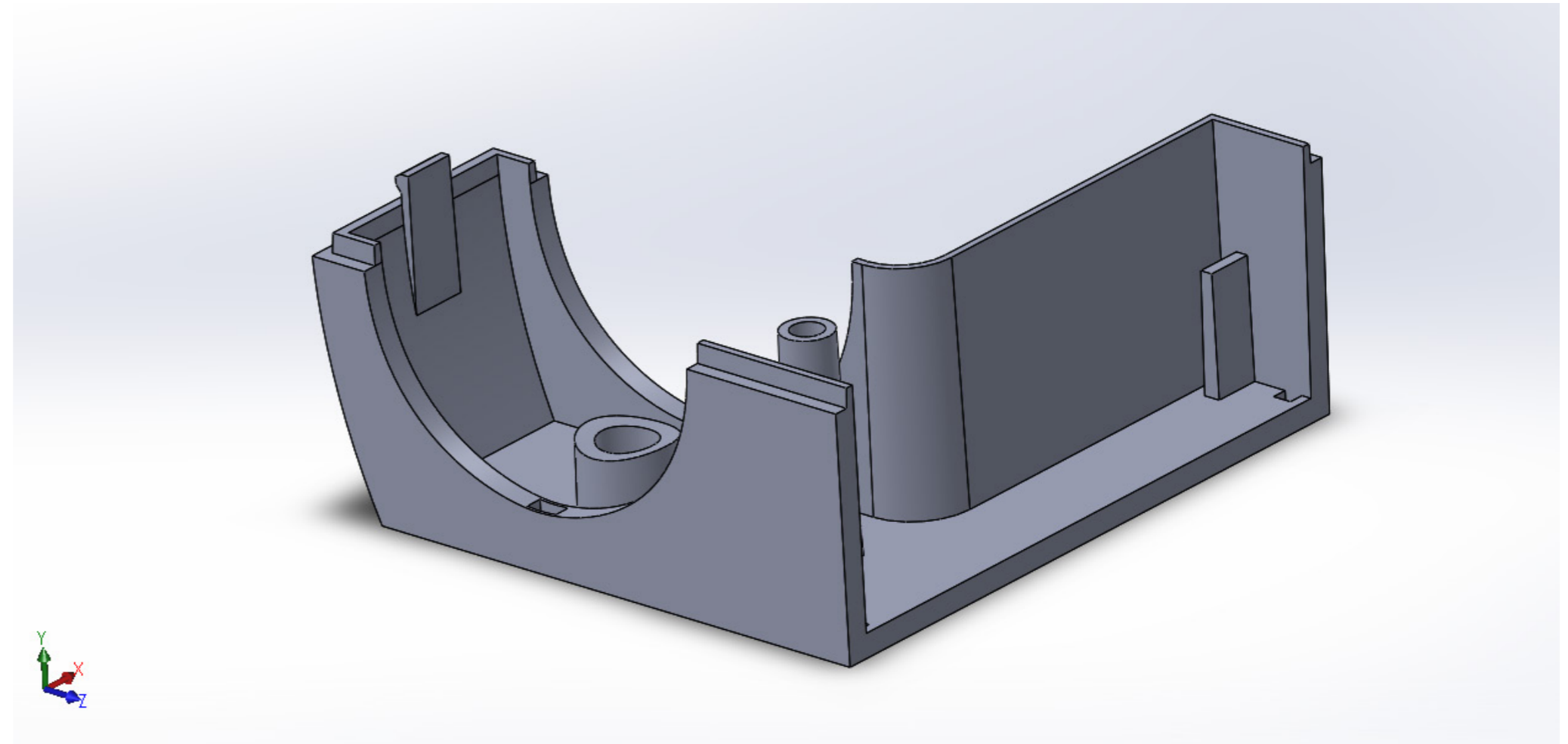
For the pieces to be fixed correctly, it was thought to use a screw.





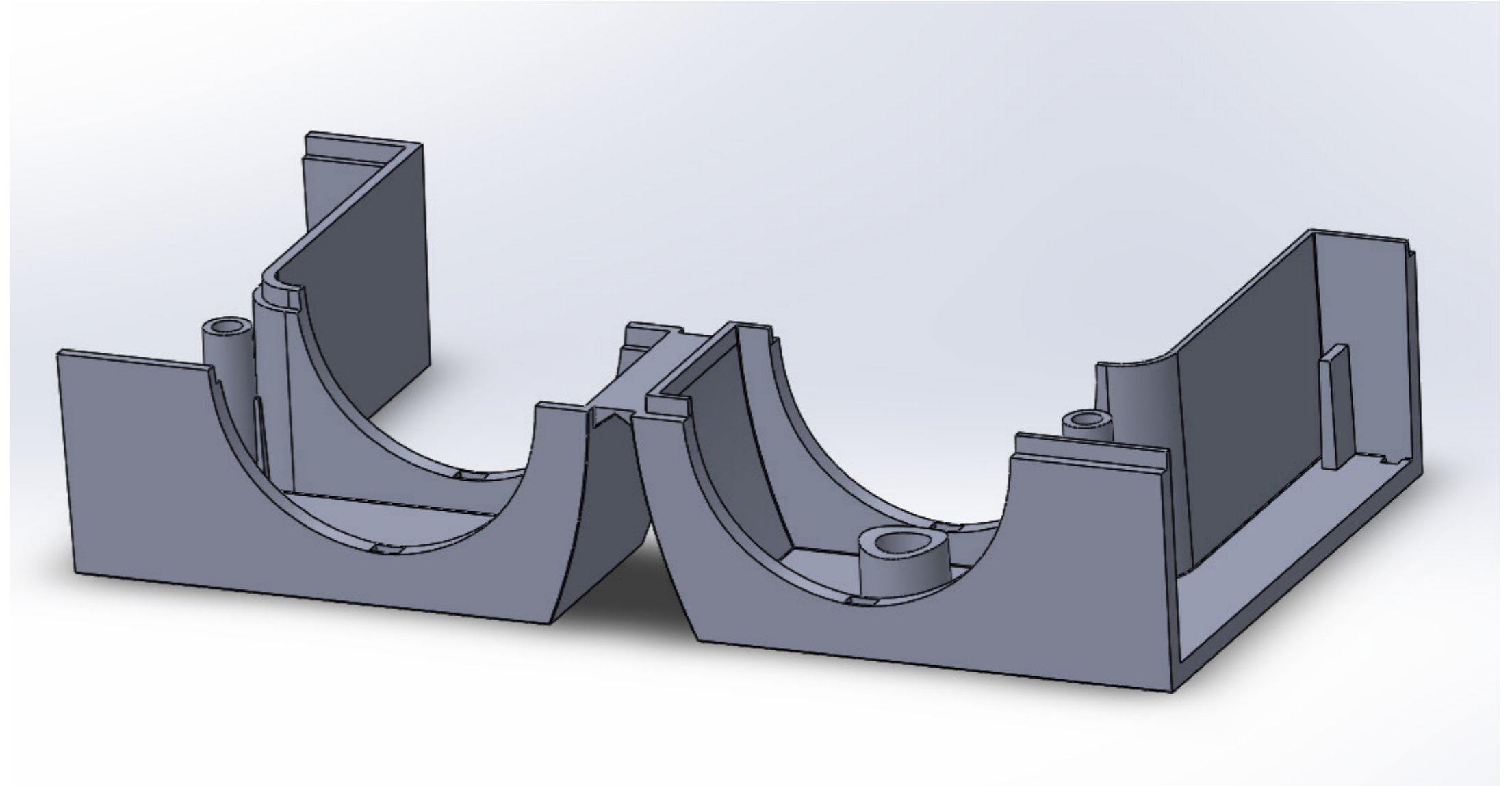
To make sure that the pieces were fixed, it was thought to add another screw.

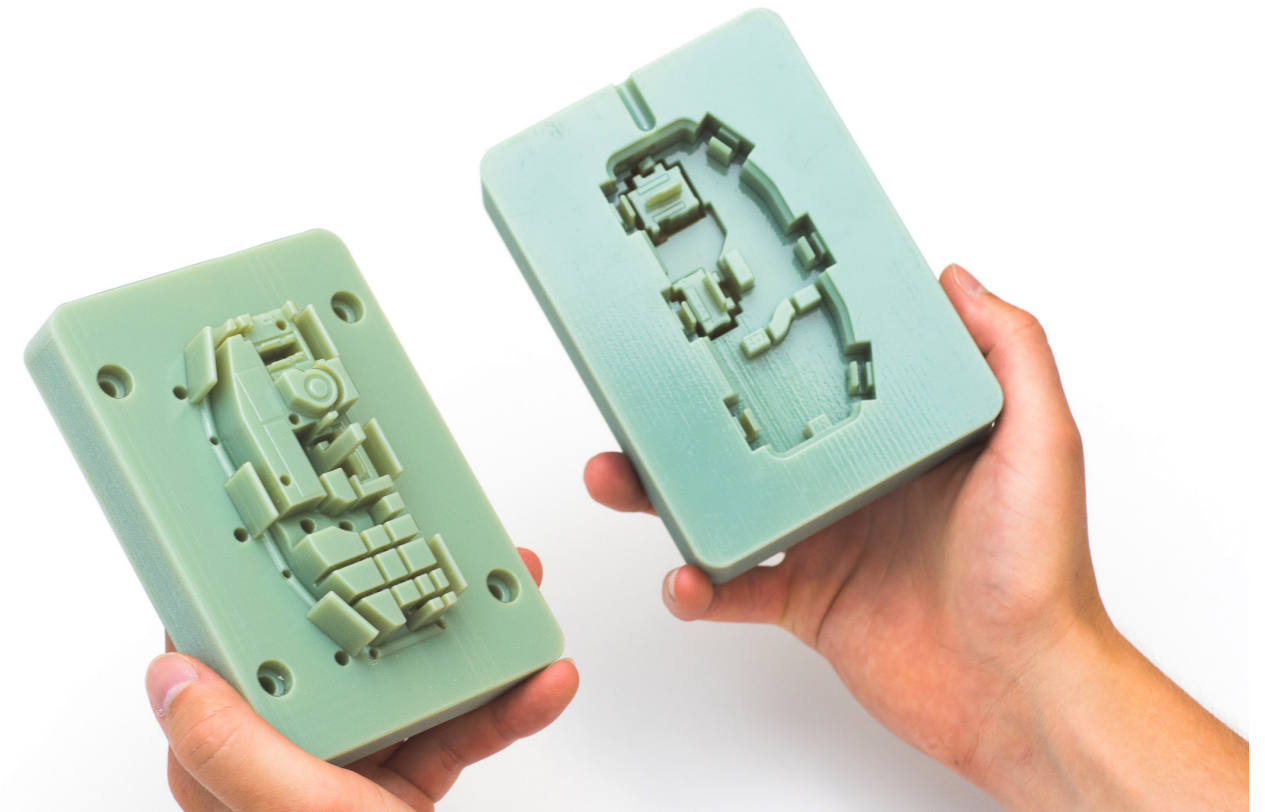
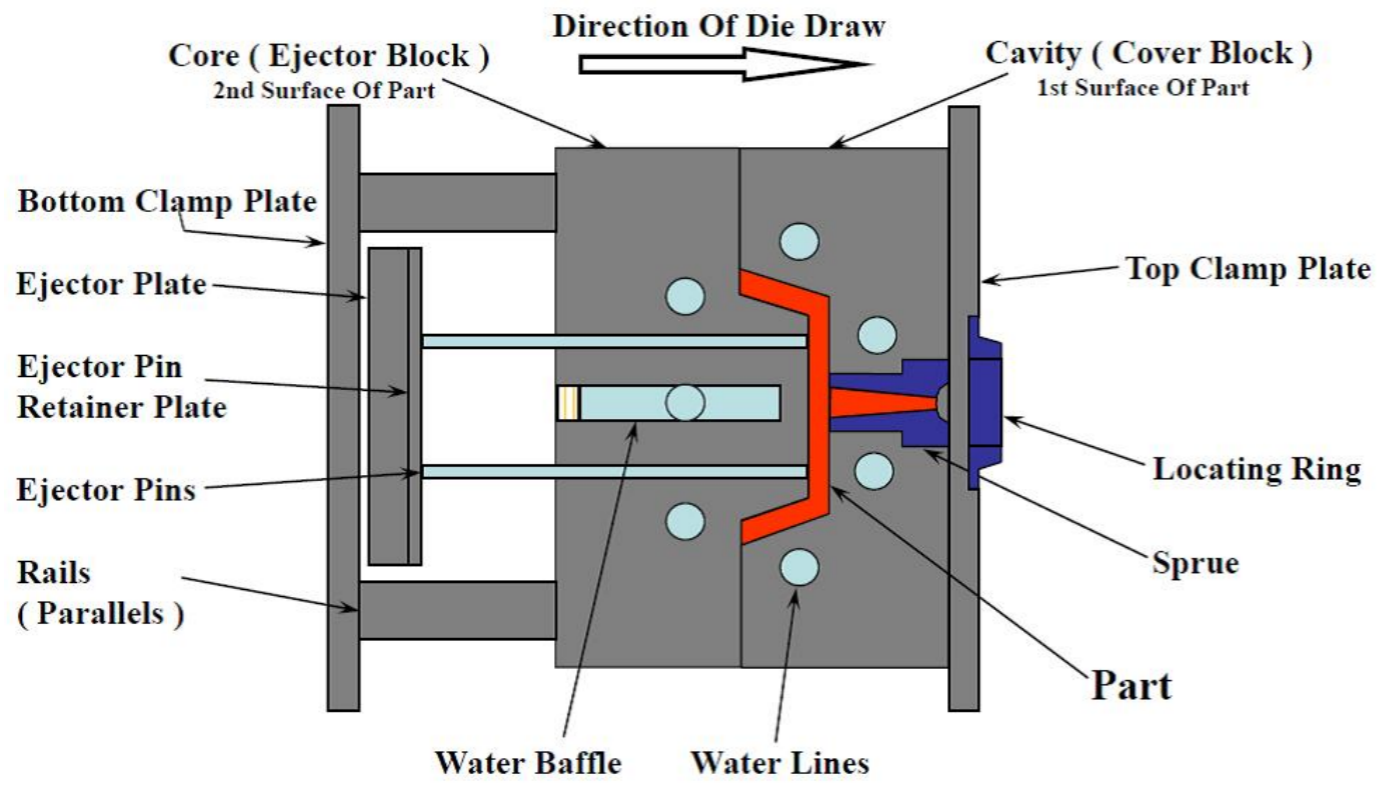
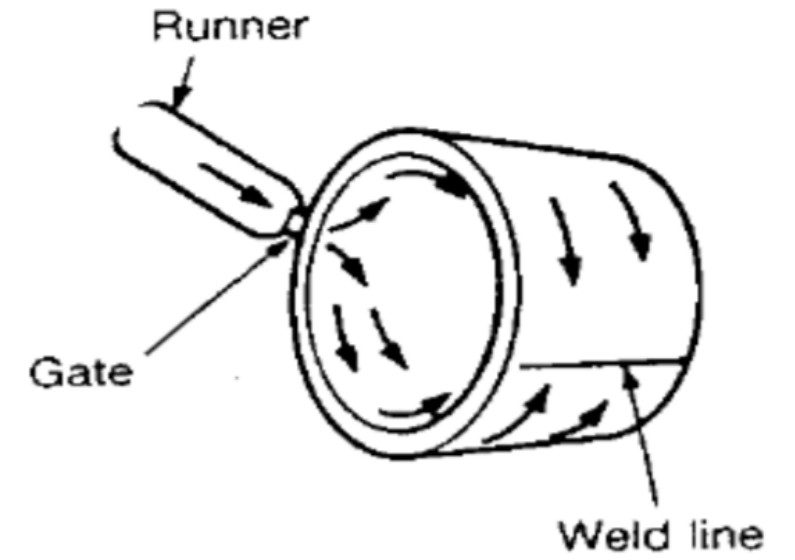
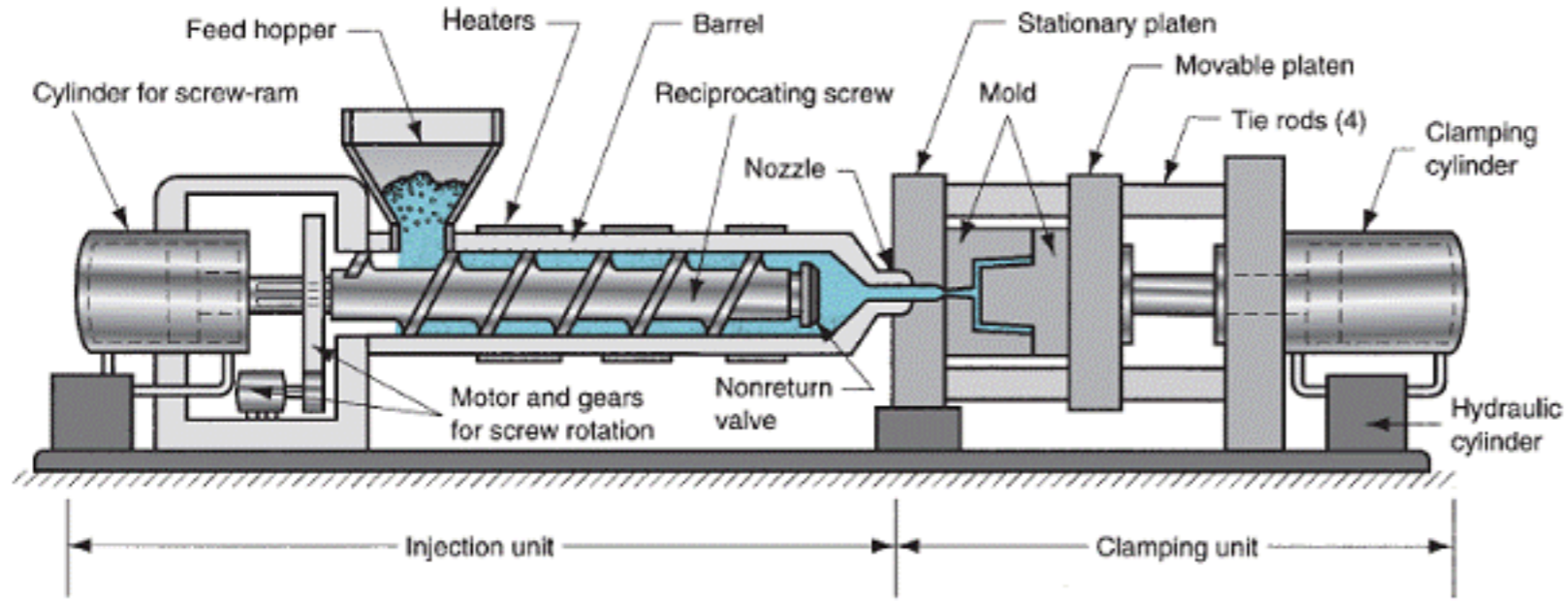
As we could print several pieces it was thought to change one of the screws for a snapfit.





Looking for inspiration in other products and thinking about reducing the number of pieces, it was concluded to join two pieces in one as in the image.





A large, light pink number '2' is positioned on the left side of the page, serving as a visual element for the section header.

FINAL PROTOTYPE DESIGN

FINAL MODEL

The final model is the result of a first idea of design aimed at a geek person of technology, and the changes made for its possible production.

HOW DOES IT WORK?

The light is adjusted to the handlebar of the bike by means of a grub screw.

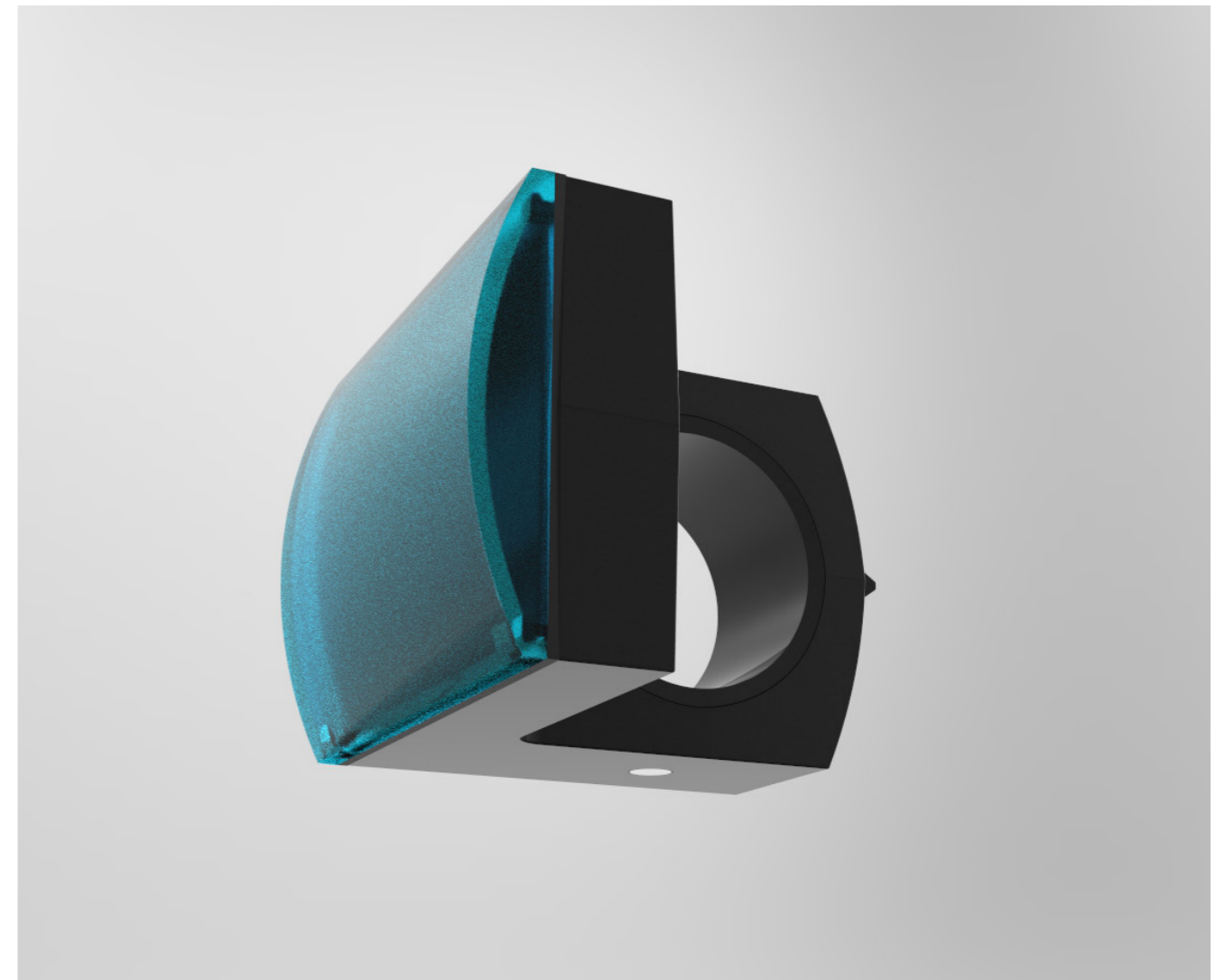
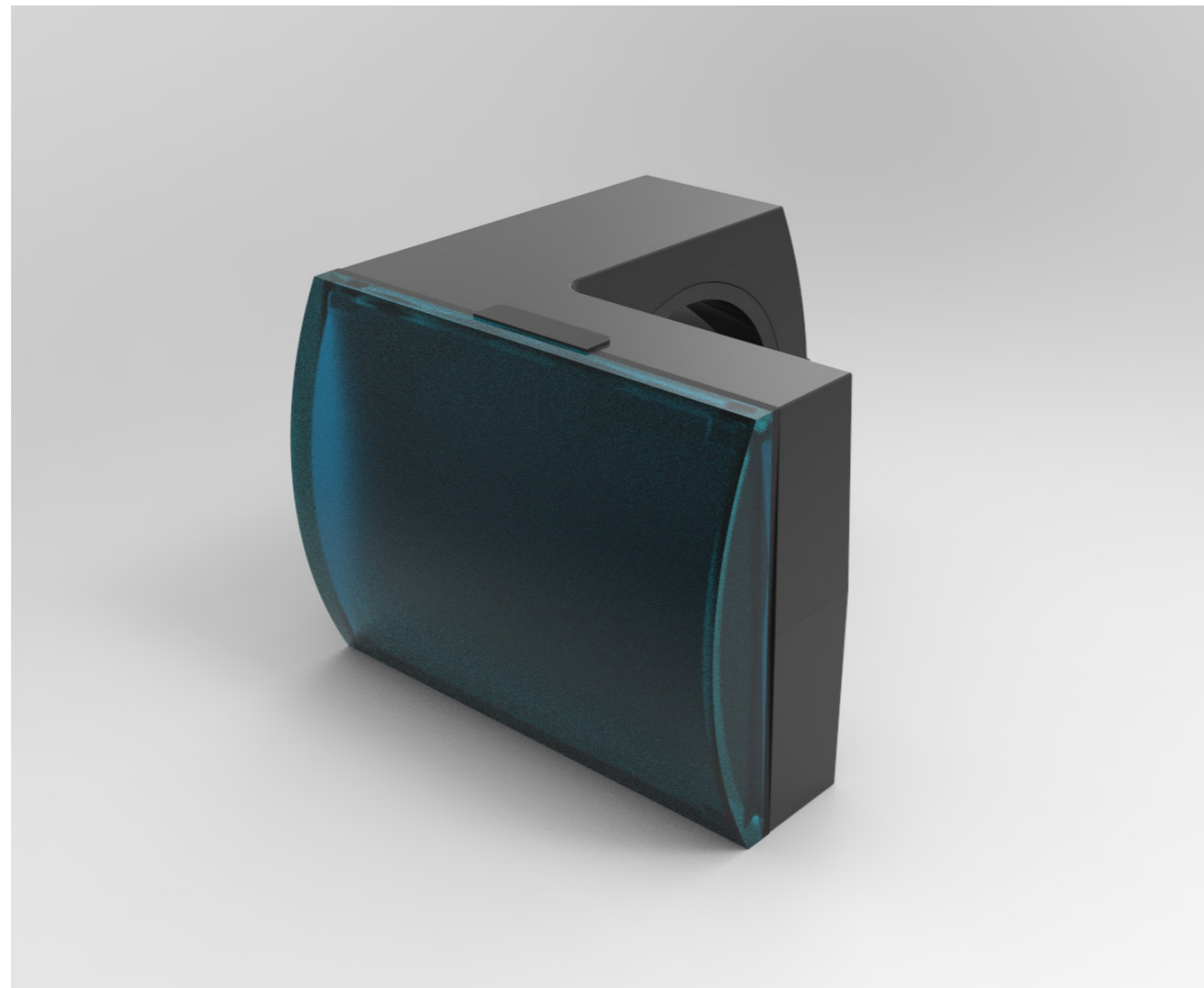
To turn it on or off, the light has of a button at the top.

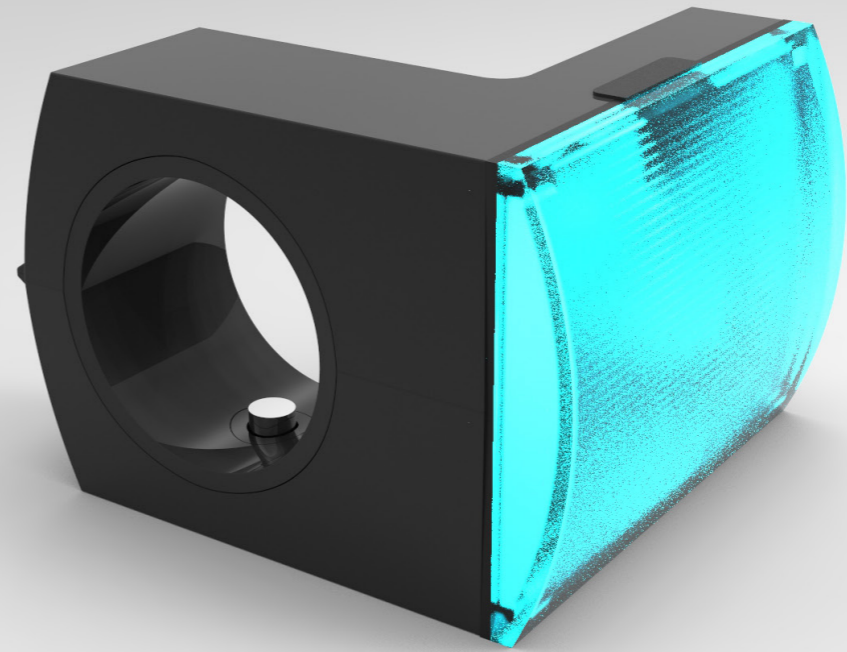
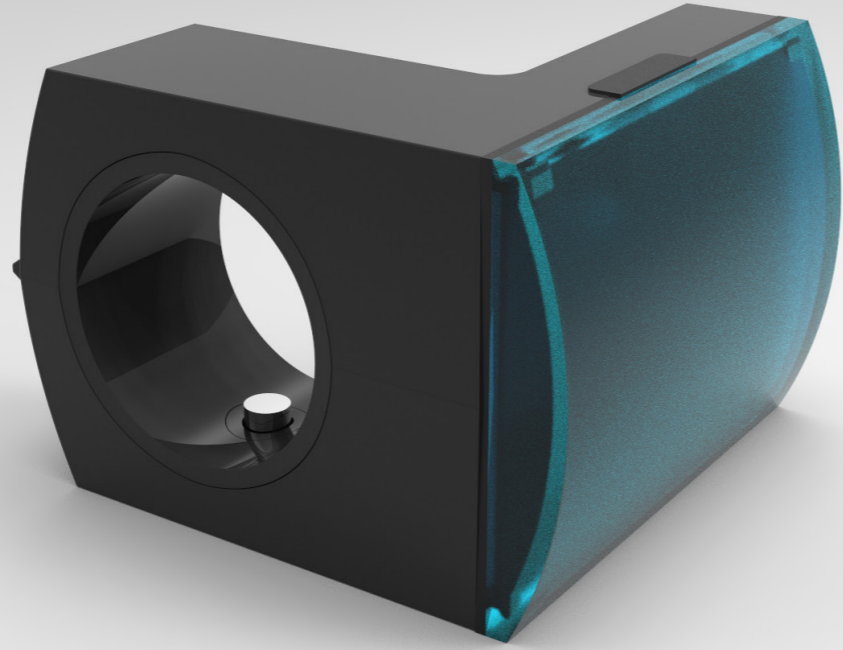
MANUFACTURING AND ASSEMBLY

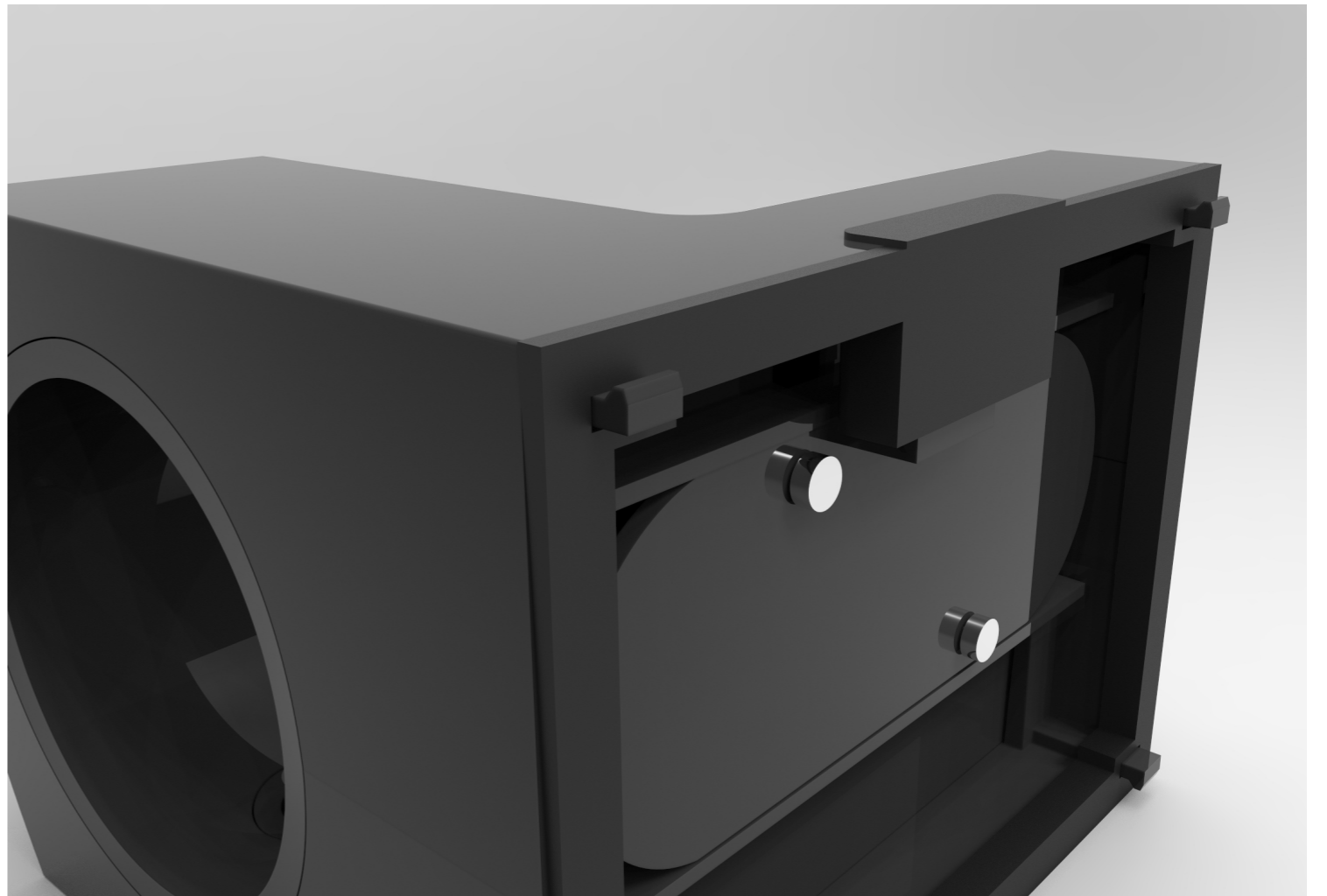
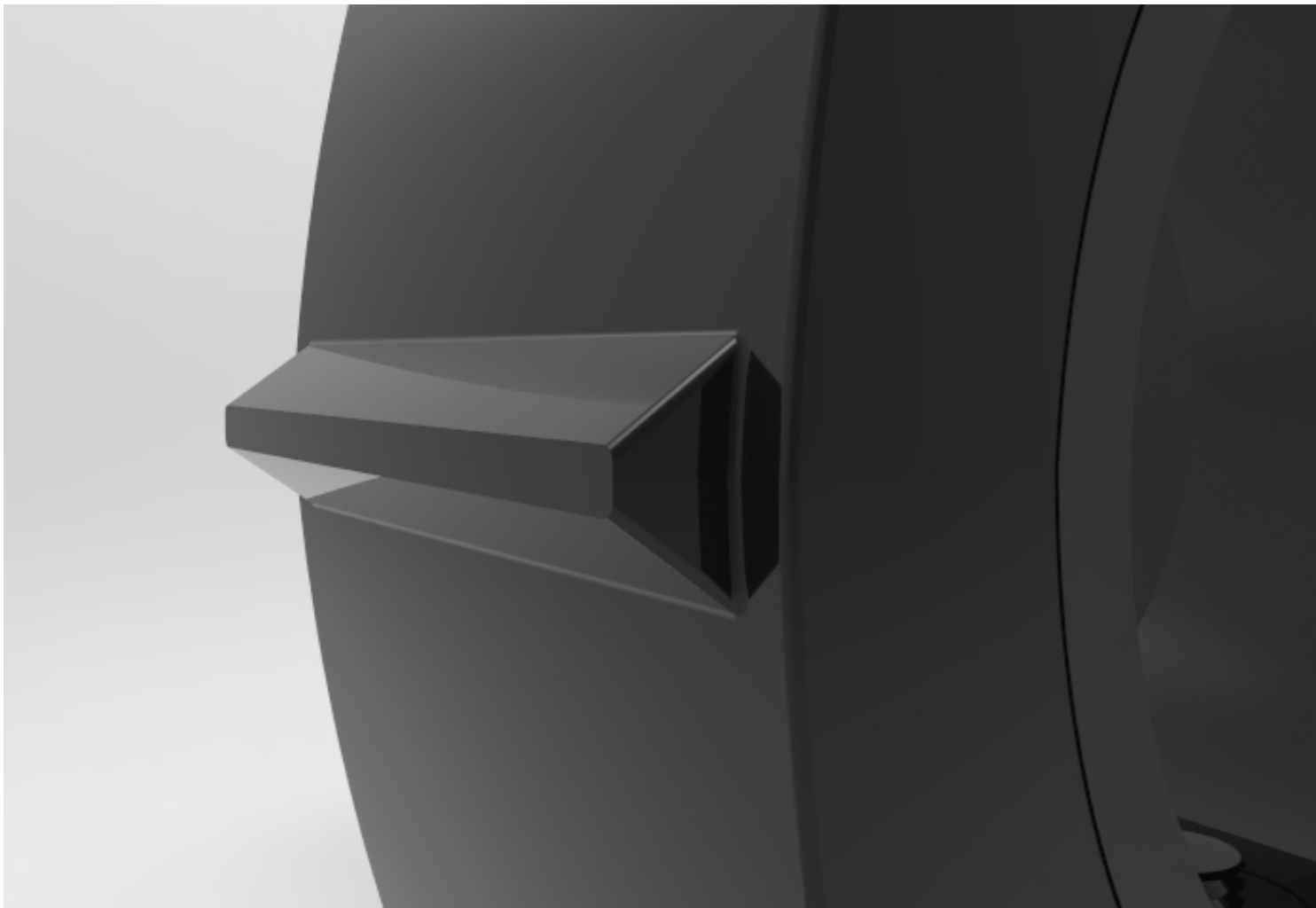
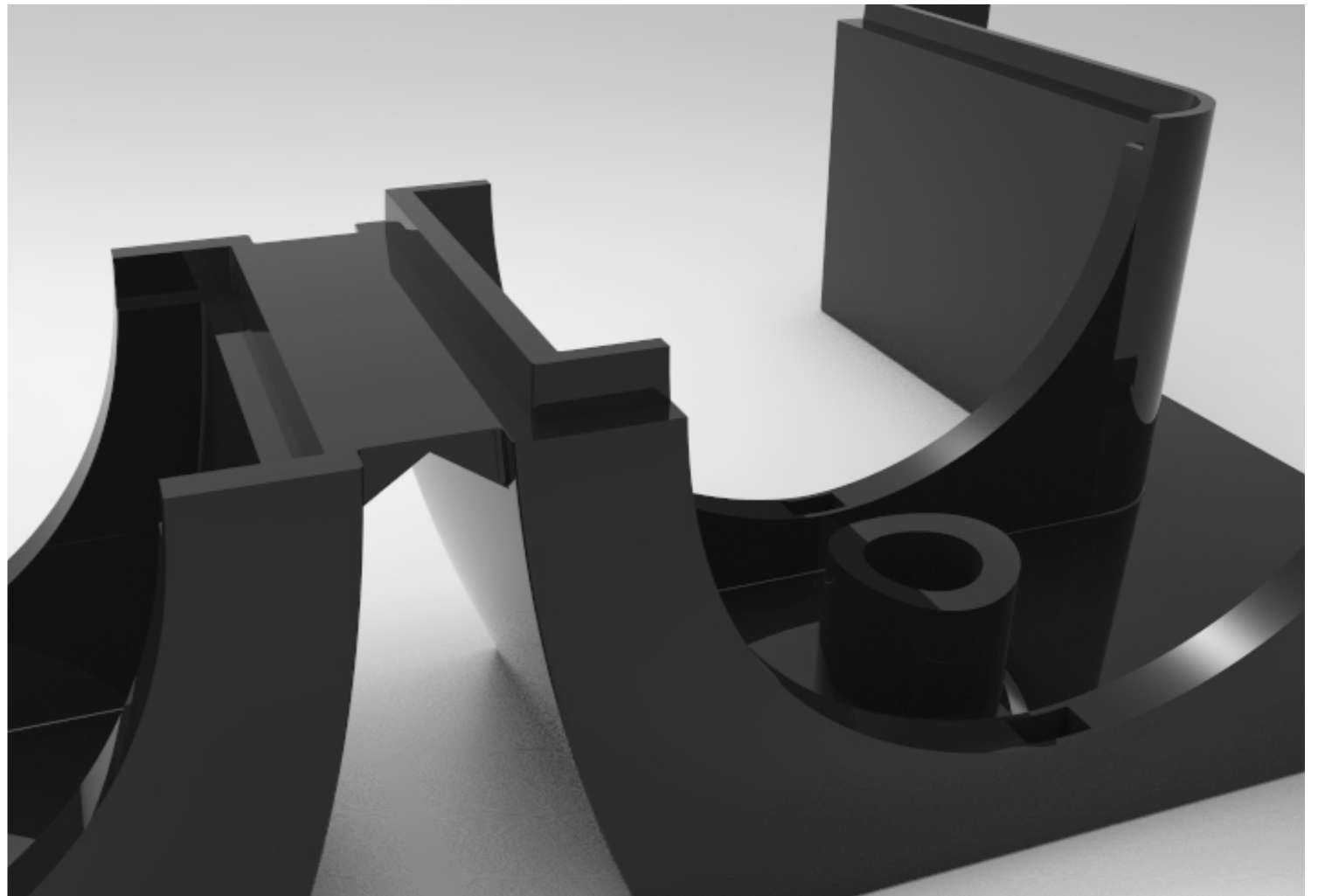
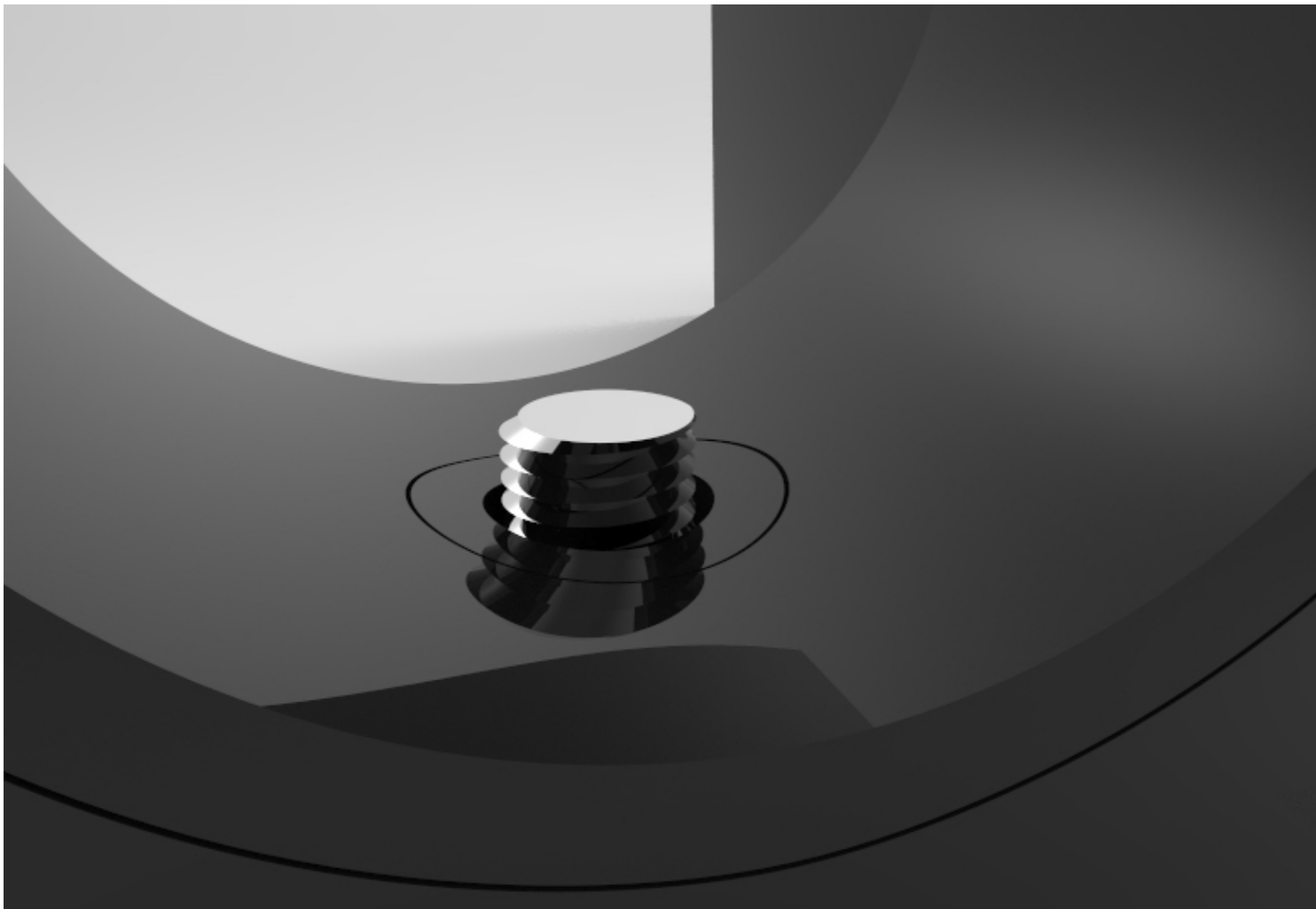
The light consists of five pieces that fit perfectly and is mounted intuitively. Only screws are needed to hold the pcb to one of the pieces, and the light to the handlebar.

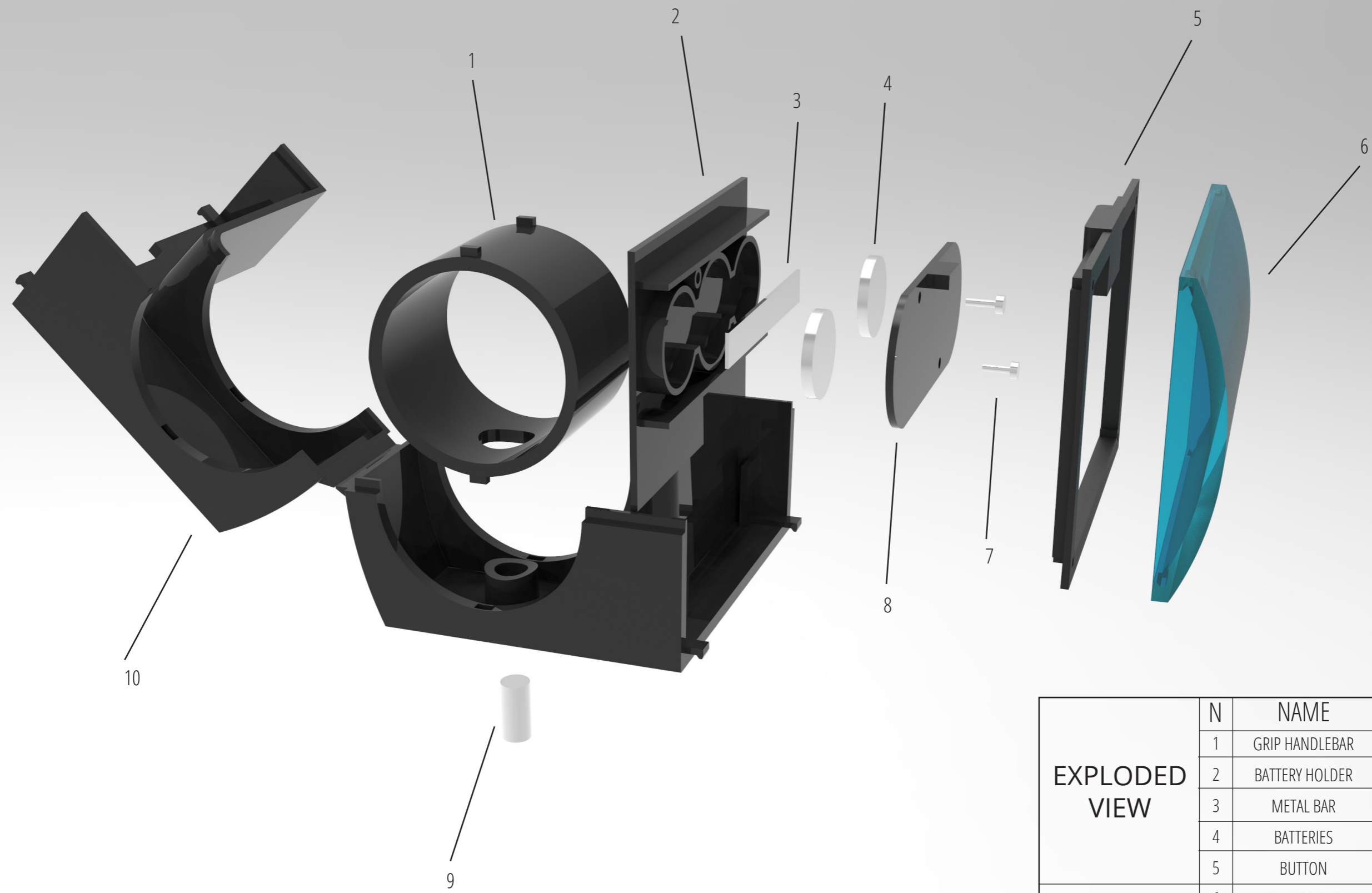
All the pieces are designed to be made by molding and injection. A very simple design that allows the light of the bicycle to be compact, modern, minimalist and of good quality.

This report contains renders, technical drawings and materials of the whole light, and the analysis of one of the designed pieces.







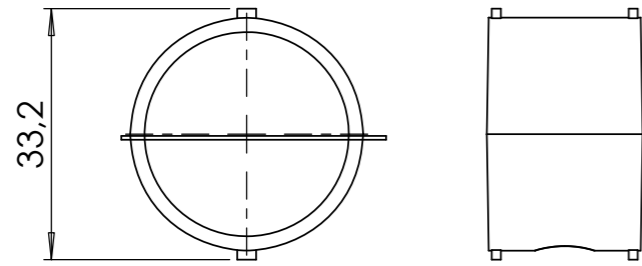


	N	NAME	MATERIAL
EXPLODED VIEW	1	GRIP HANDLEBAR	ABS PLASTIC
	2	BATTERY HOLDER	ABS PLASTIC
	3	METAL BAR	STEEL
	4	BATTERIES	-
	5	BUTTON	SILICONE (LSR)
LAURA BELENGUER SANJAIME	6	FRONT PIECE	ABS PLASTIC
	7	SCREWS	ALLOY STEEL
	8	PCB	-
	9	GRUB SCREW	ALLOY STEEL
	10	MAIN BODY	POLYPROPYLENE (PP)

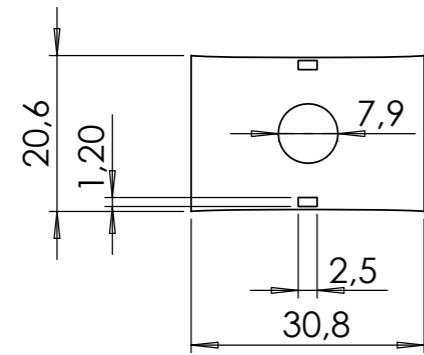
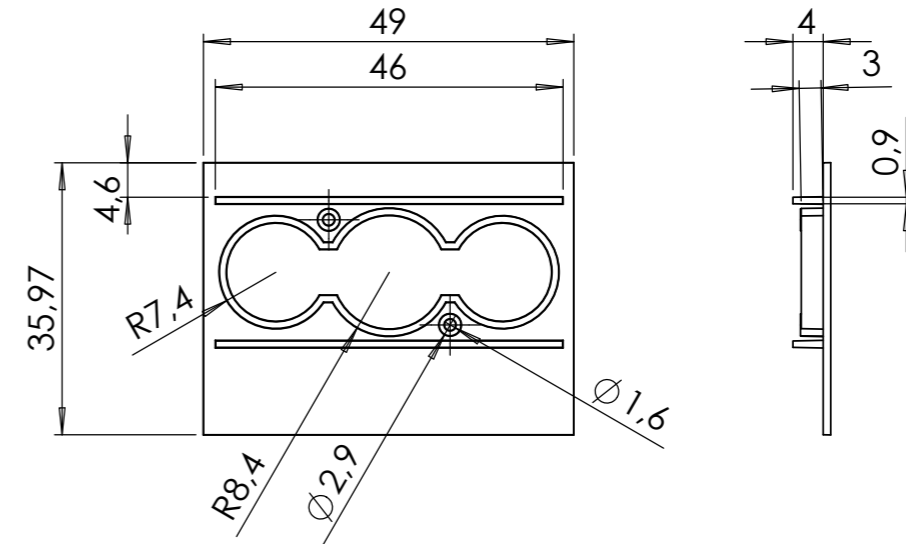
3

TECHNICAL DRAWINGS

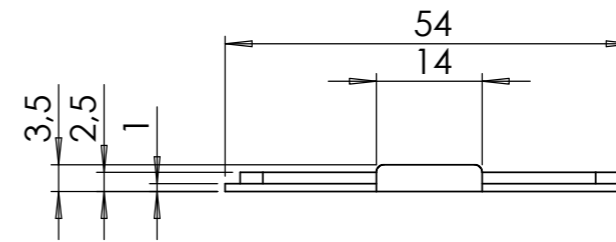
PIECE 1.- GRIP HANDLEBAR



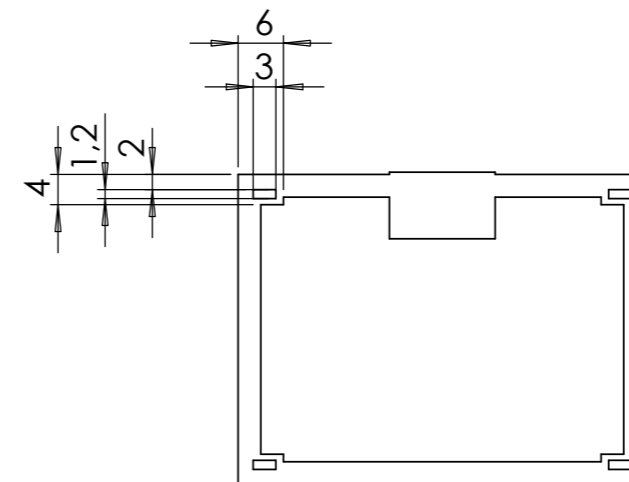
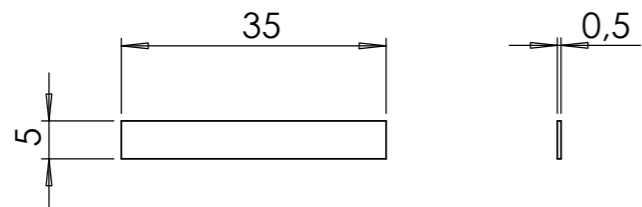
PIECE 2.- BATTERY HOLDER



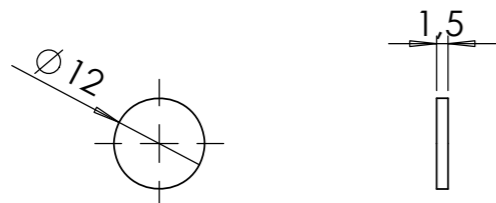
PIECE 5.- BUTTON



PIECE 3.- METAL BAR



PIECE 4.- BATTERY X2



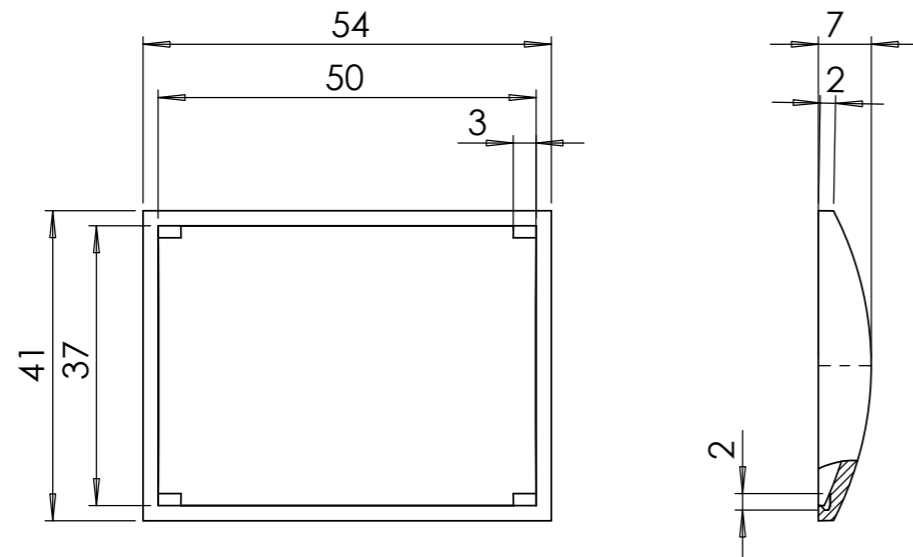
PIECES 1, 2, 3, 4 & 5

TECHNICAL DRAWINGS

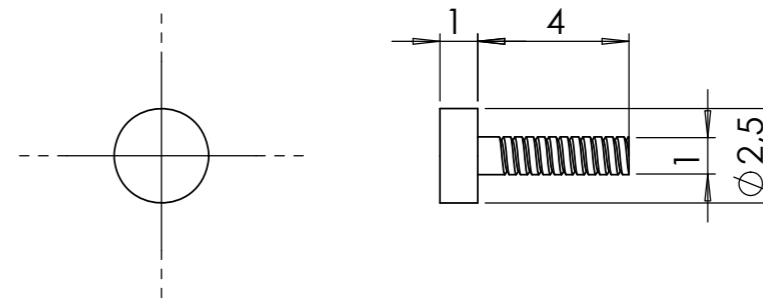
LAURA BELENGUER

A3

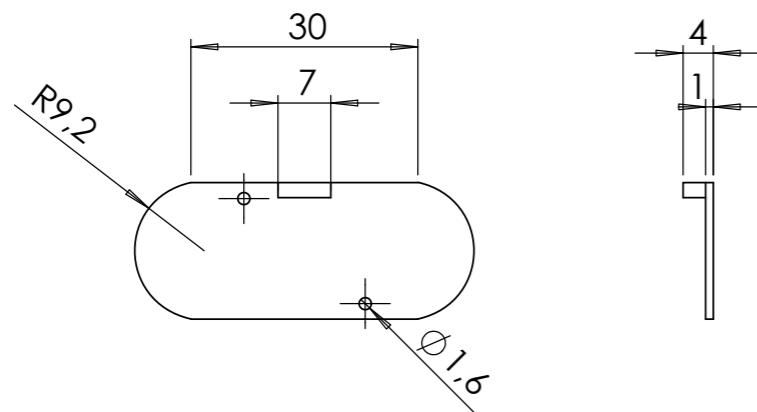
PIECE 6.- FRONT PIECE



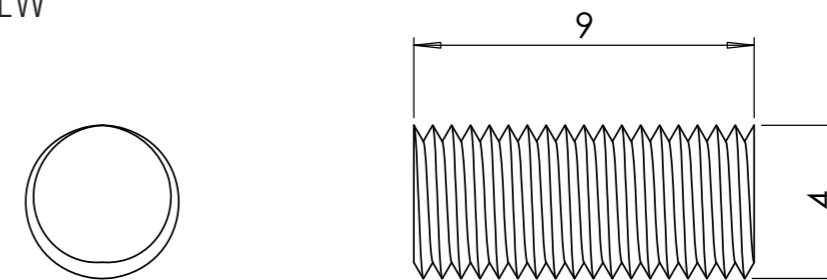
PIECE 7.- SCREW X2
SCALE 5:1



PIECE 8.- PCB



PIECE 9.- GRUB SCREW
SCALE 5:1



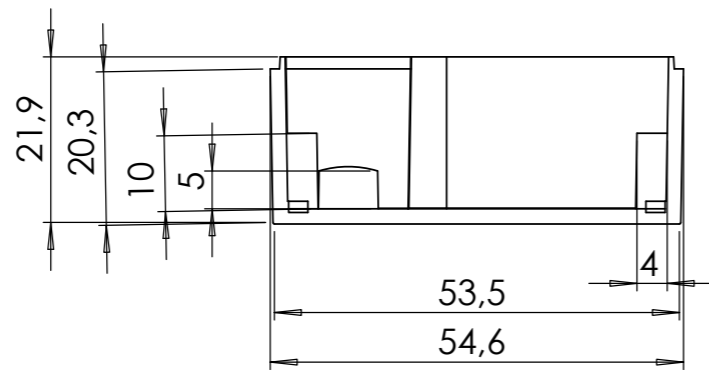
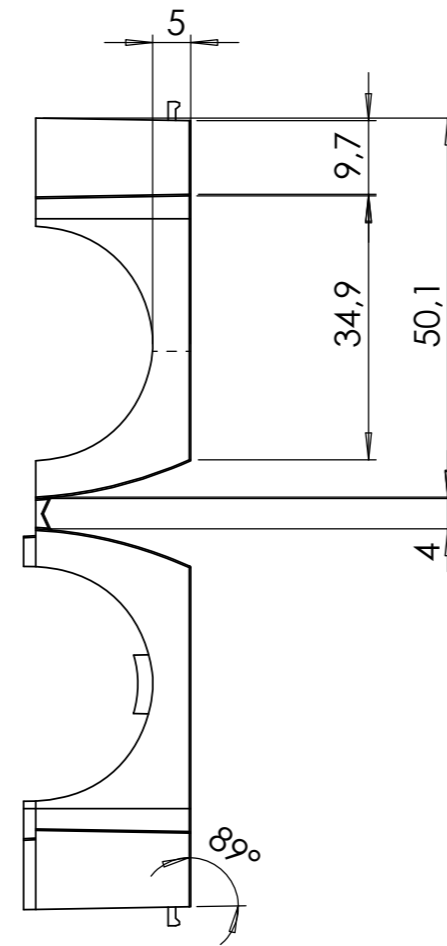
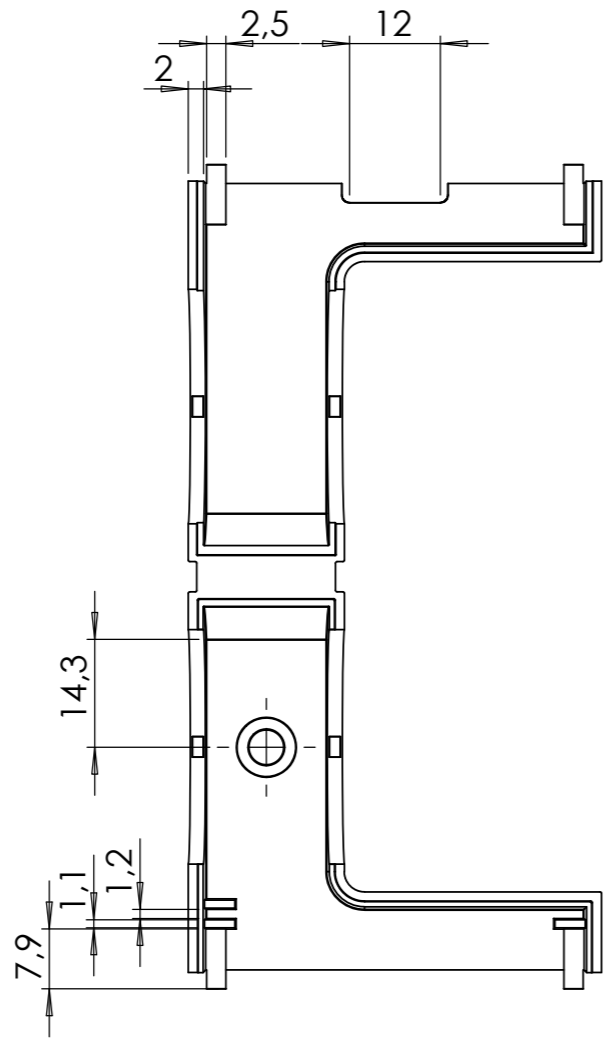
PIECES 6, 7, 8 & 9

TECHNICAL DRAWINGS

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A3

PIECE 10.- MAIN BODY



PIECE 10

TECHNICAL DRAWINGS

LAURA BELENGUER

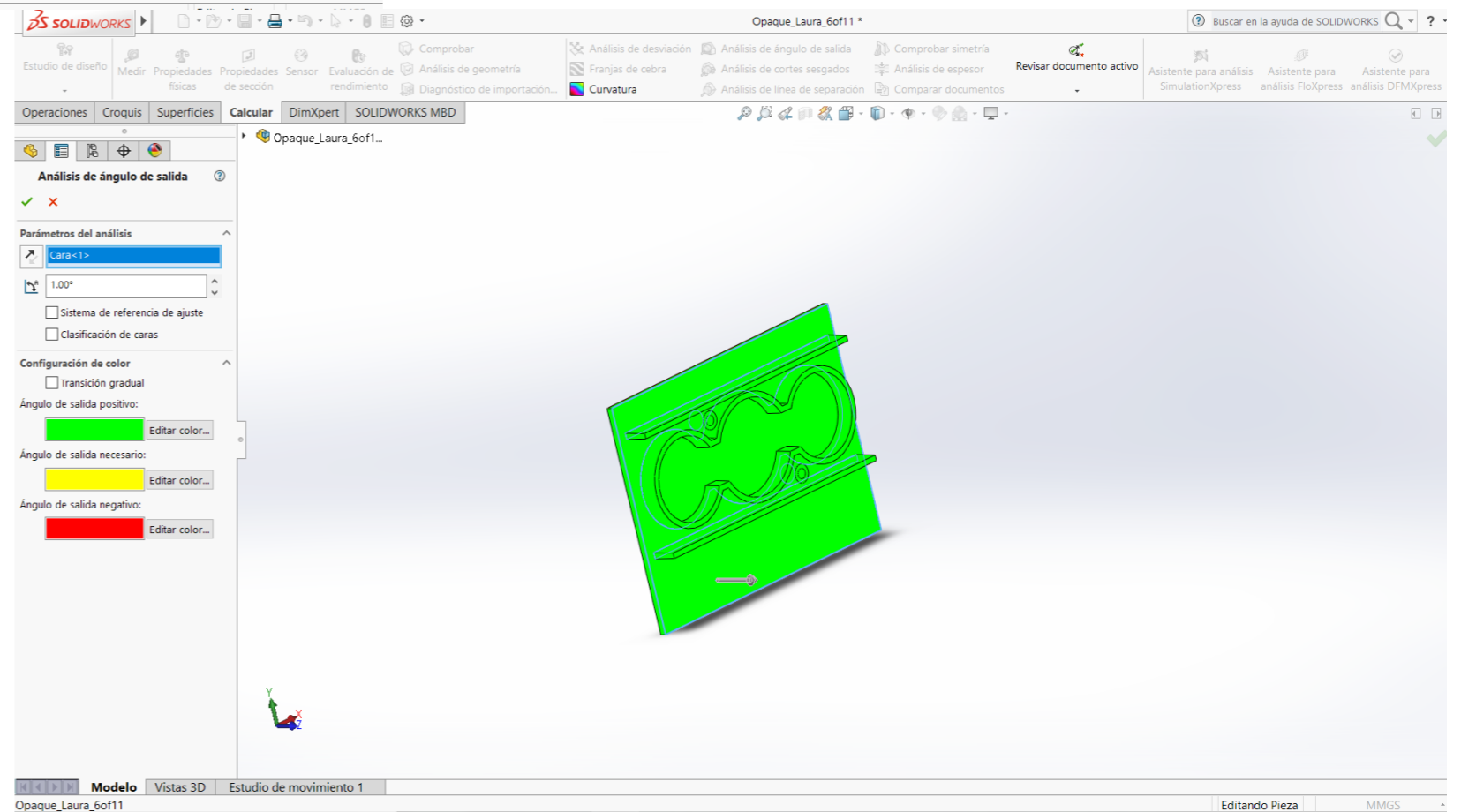
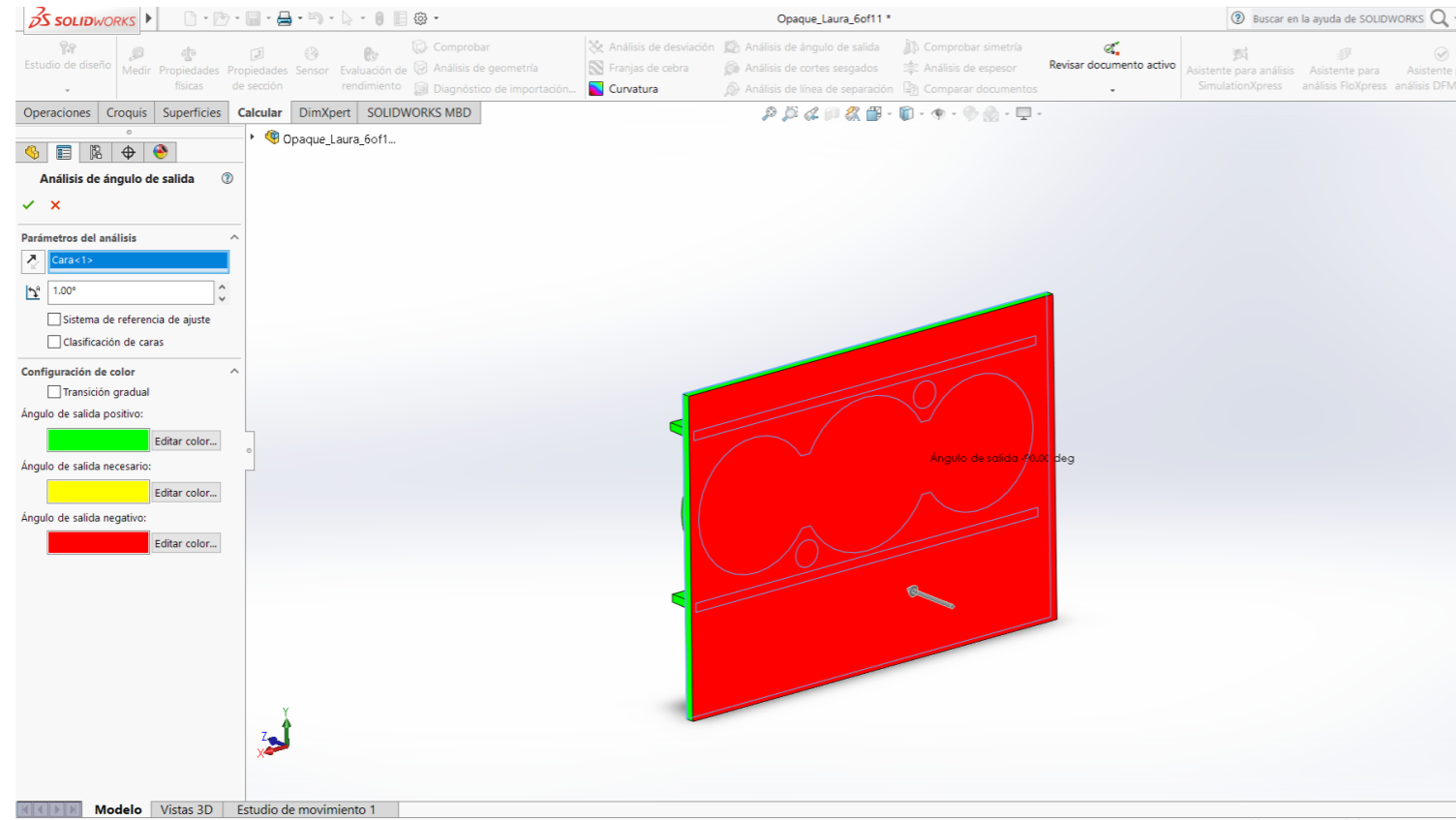
A3

4

INJECTION MOULDING

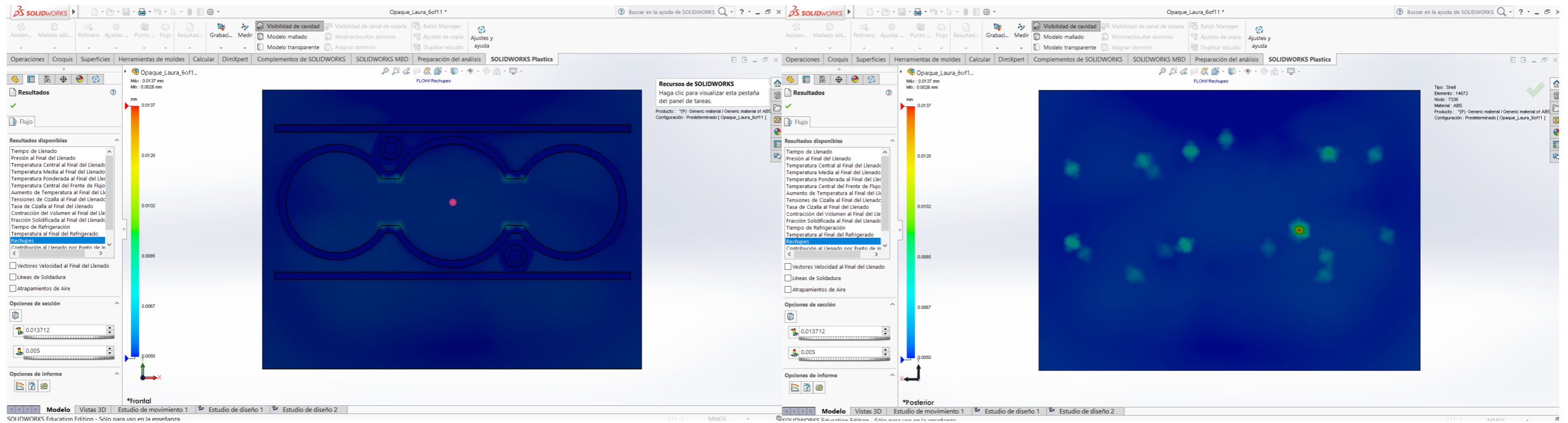
DRAFT ANALYSIS

All the pieces of my light are designed to be produced by injection moulding. For the analysis I have decided to use piece 2.

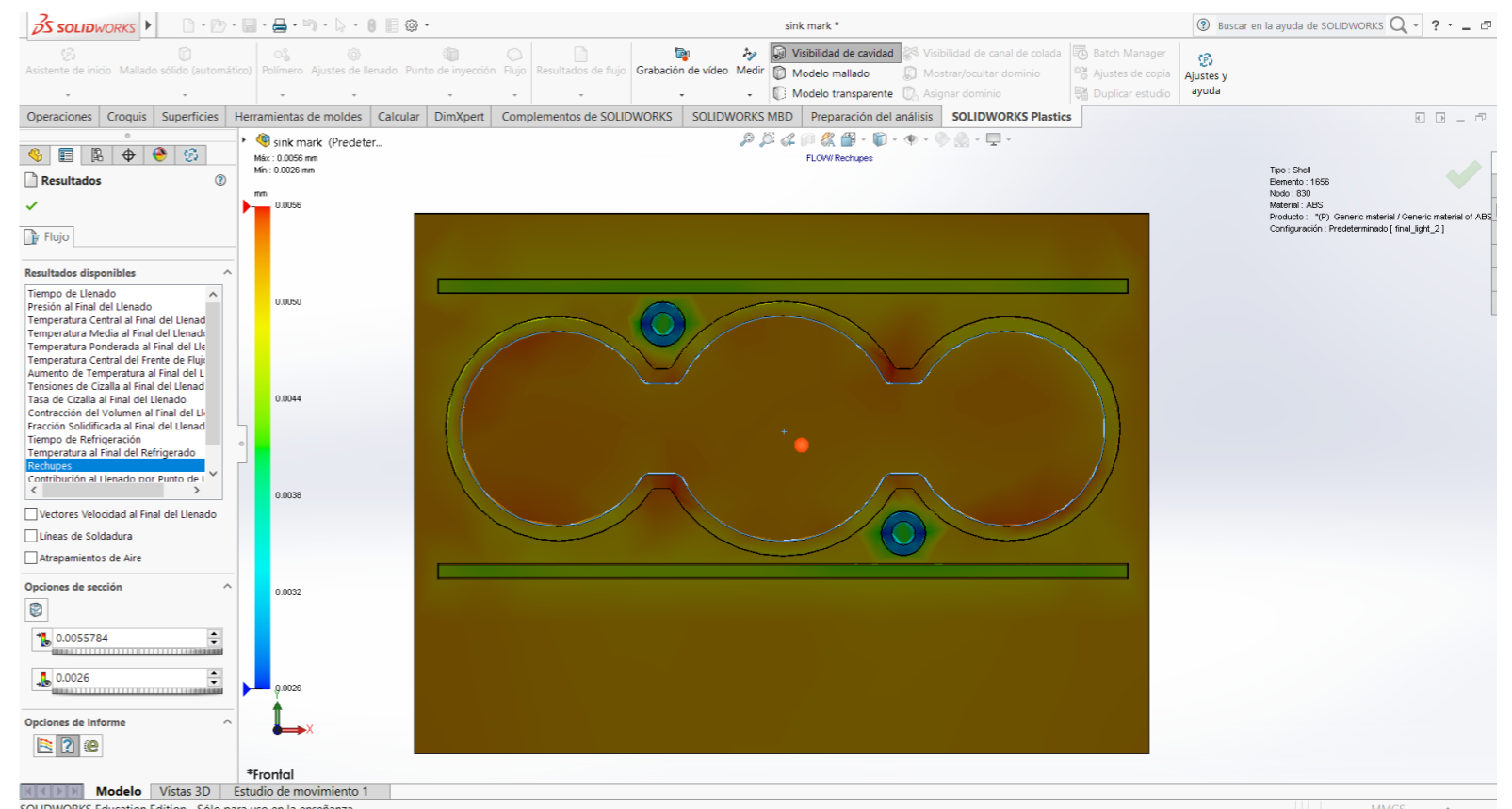


SINK MARKS

When analyzing the sink marks on my piece the maximum number was 0.0137 and the minimum 0.0026 (two first photos).

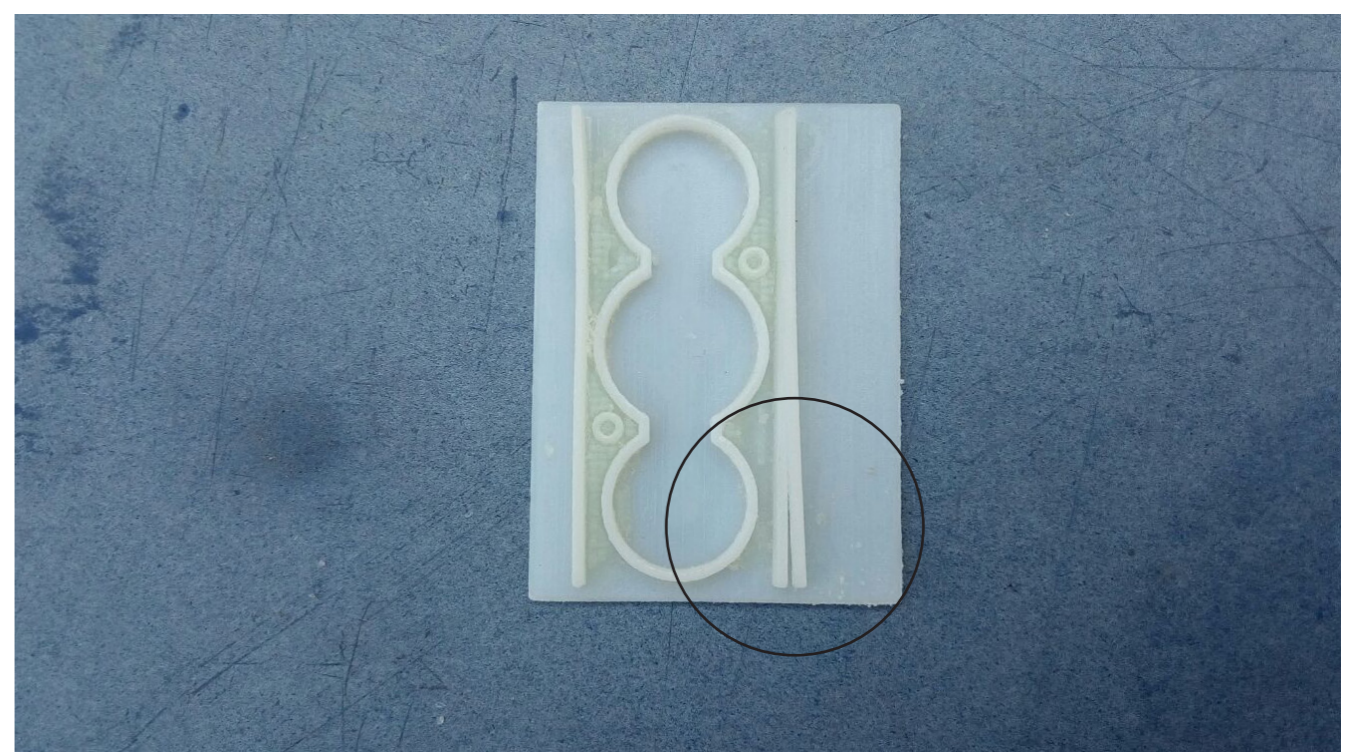
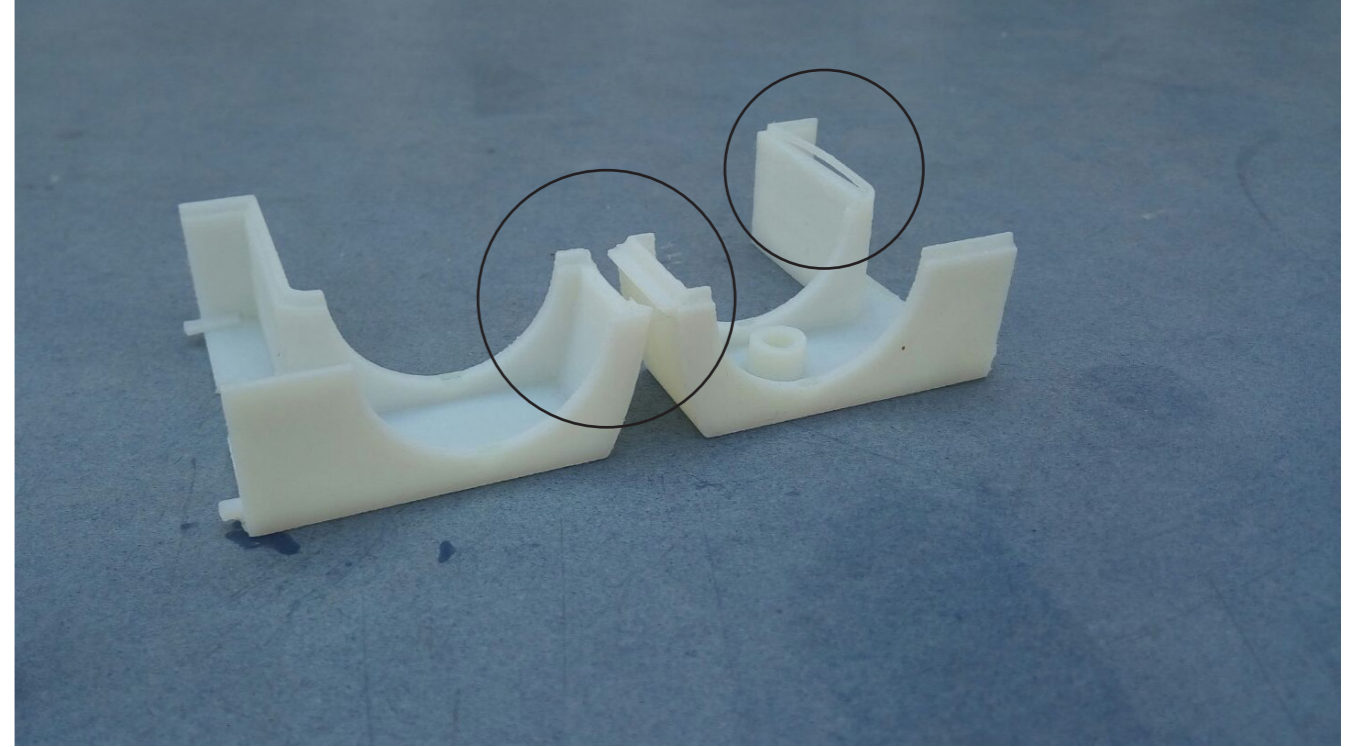
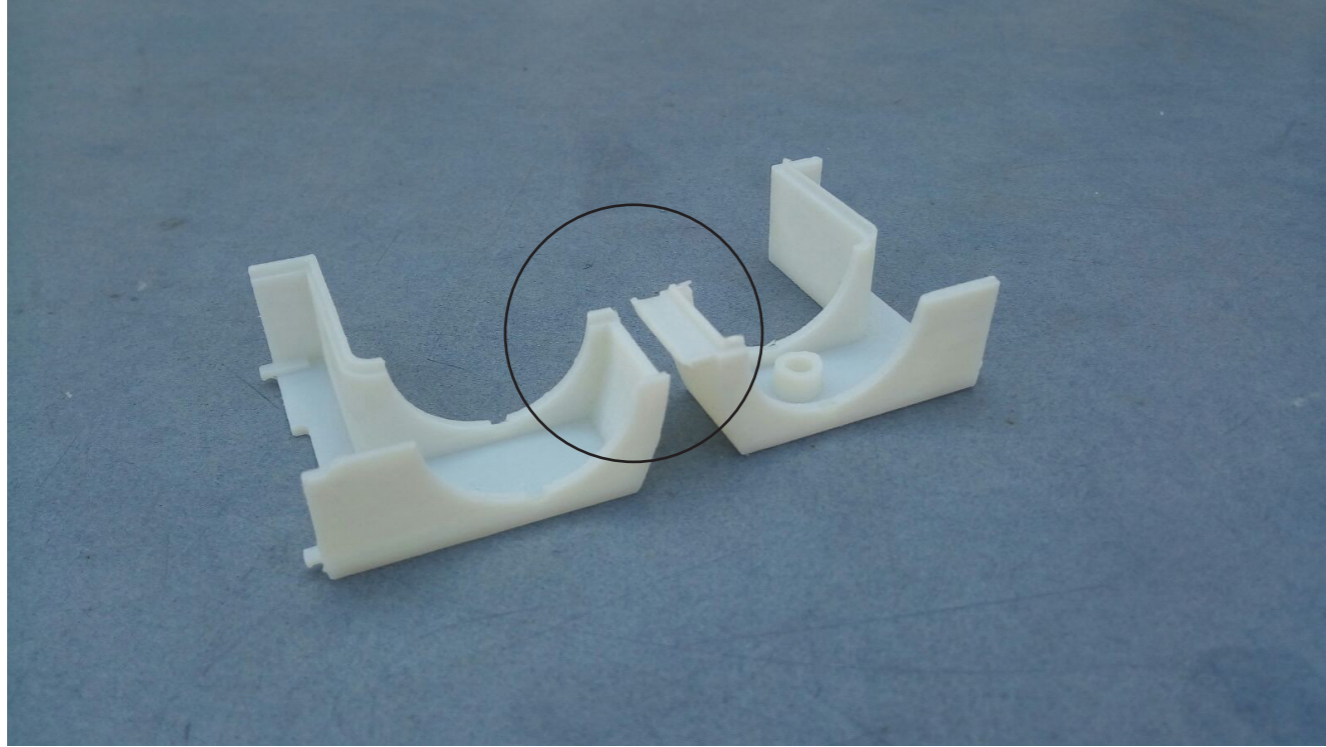


After the first trial, the sink marks on my piece could not be reduced more. The minimum number was 0.0026 and the maximum 0.0056. What I needed to change was the length of the piece with arcs and round its corners.



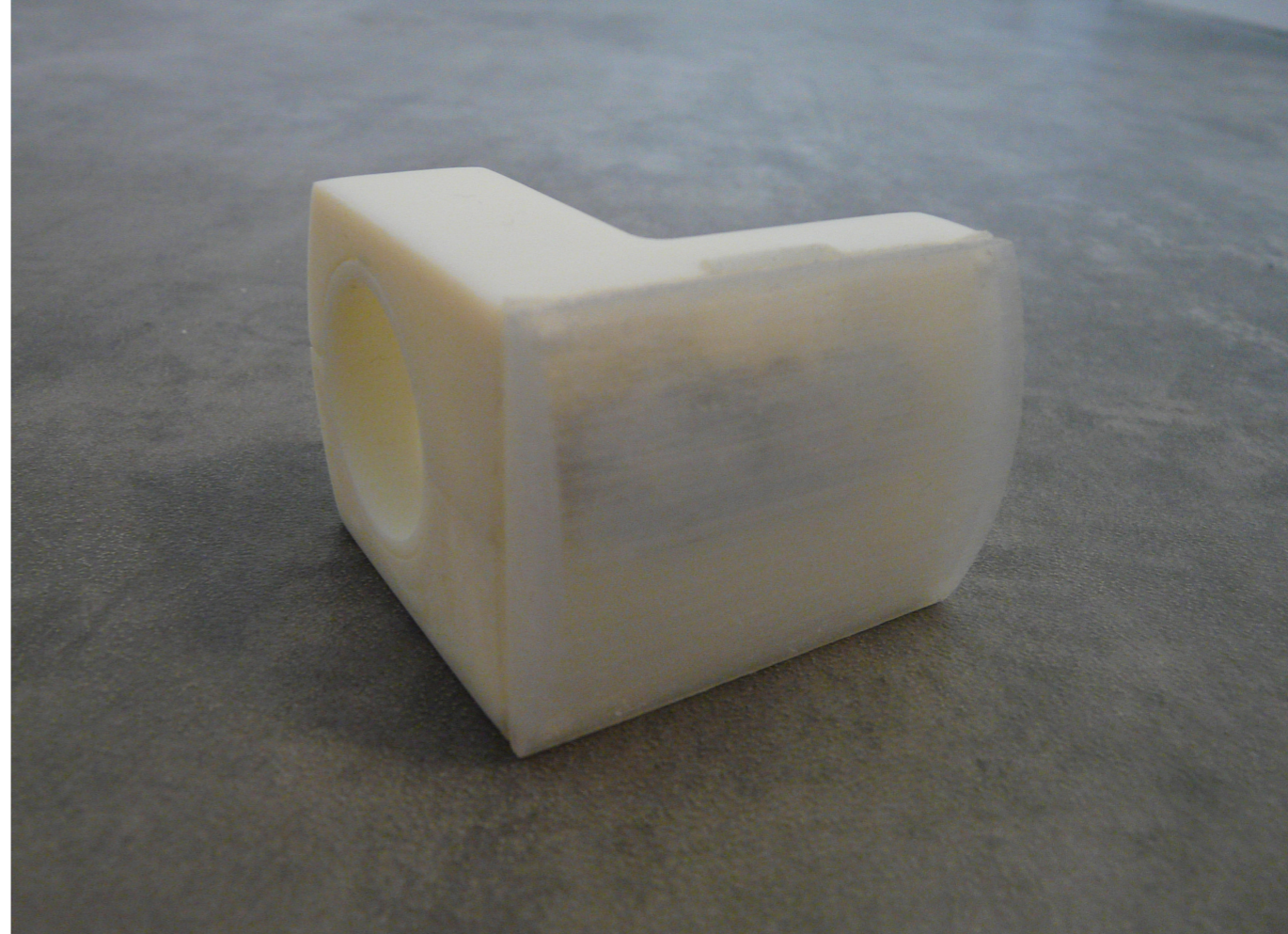
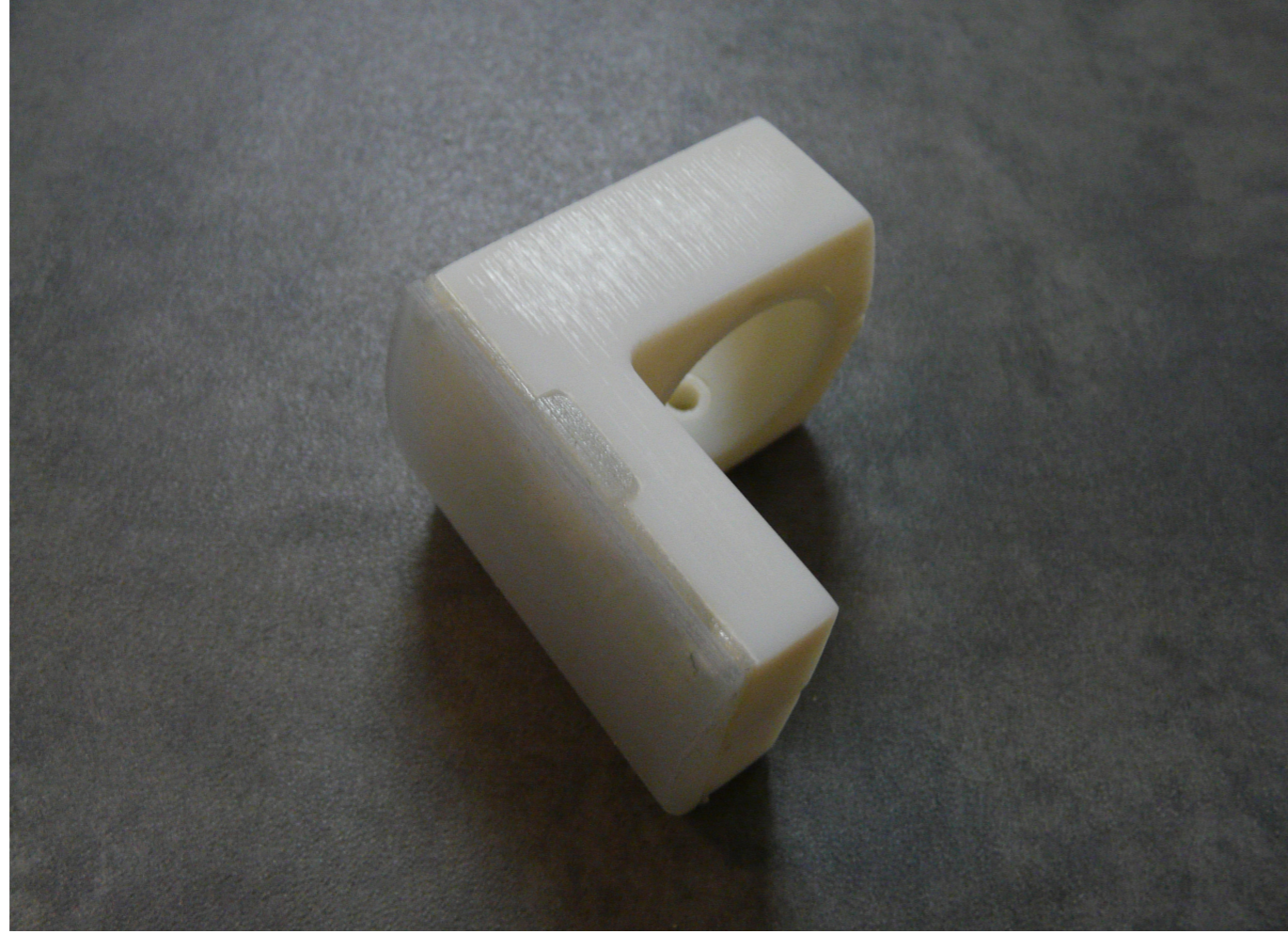
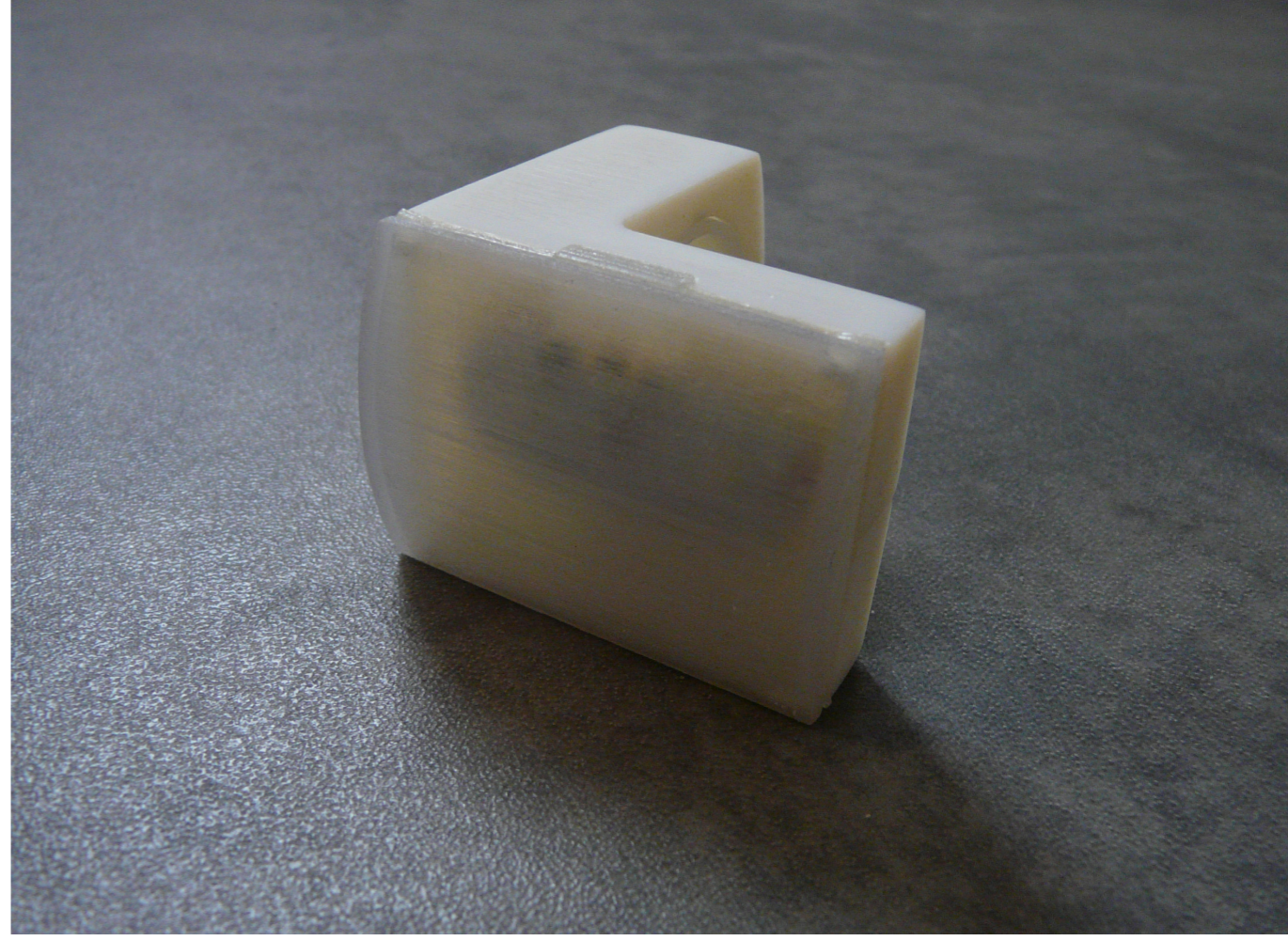
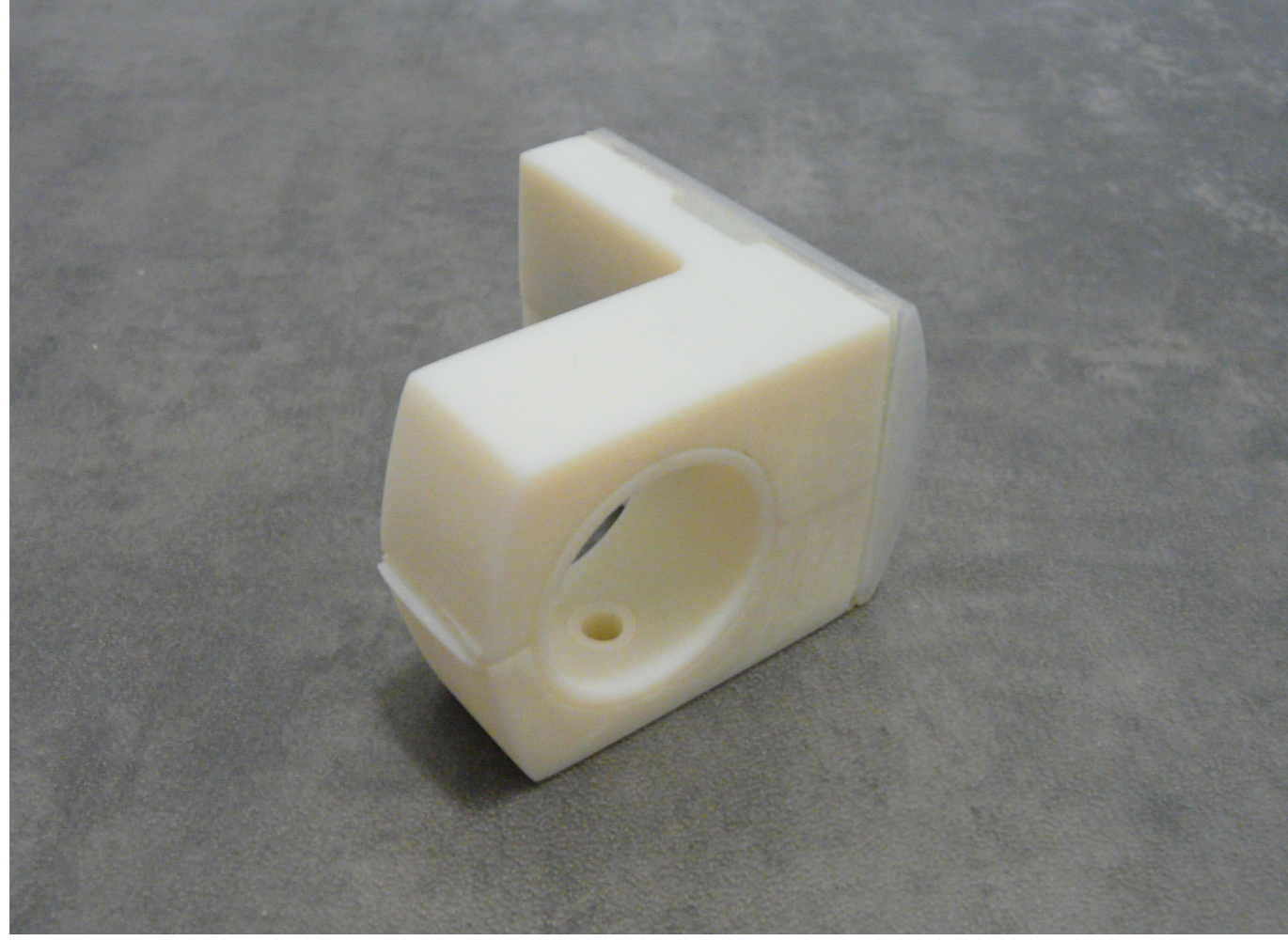
3D PRINTED PIECES

- The vast majority of pieces that I printed came to me broken. I have managed to fix the ones I need for my prototype.
- The piece "main body" breaks when bending it. Using the material of the snapfit has not worked, it breaks before it gets to bend 10°.



5 FINAL PROTOTYPE PHOTOGRAPHS

PROTOTYPE PHOTOGRAPHS



PROTOTYPE PHOTOGRAPHS

