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w Bydgoszczy

Design of passenger seat for bicycle

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RESUMEN

Se trata de diseñar un sillín de pasajero para bicicleta que sea acoplable al mayor número de modelos de bicicleta. Se pretende diseñar un objeto que pueda utilizarse como sillín o como portaequipajes trasero. Se llevarán a cabo las fases de "Iniciación" y de "Diseño del producto y del proceso".

En la fase de "Iniciación" se definirán los requisitos y restricciones de los diseños acordes al mercado, usos, usuario, procesos, materiales, normativa de seguridad y otros estudios específicos. Y en la fase de "diseño del producto y del proceso" se obtendrán soluciones viables especificando formas y dimensiones para albergar la mayor diversidad de bolsas dispensadoras de líquido existentes.

Si el tiempo y la magnitud de trabajo lo permite, se podrán llevar a cabo las fases de "implementación" y de "operación".

En la fase de "implementación" se pretenden construir los prototipos aplicando los métodos y procesos que se realizan en la industria manufacturera de este tipo de productos. Y, en la fase de "operación" se elaborará la documentación de soporte al producto como son el catálogo, vídeos de presentación y manual de instrucciones.

Palabras clave: Sillín de bicicleta; sillín de pasajero; portaequipajes bicicleta; bicicleta.

SUMMARY

It is about designing a bicycle passenger seat that can be coupled to the largest number of bicycle models. It is intended to design an object that can be used as a saddle or as a rear luggage rack. The "Initiation" and "Product and process design" phases will be carried out.

In the "Initiation" phase, the requirements and restrictions of designs according to the market, uses, user, processes, materials, safety regulations and other specific studies will be defined. And in the "product design and process" phase, viable solutions will be obtained specifying shapes and dimensions to accommodate the greatest diversity of existing liquid dispensing bags.

If the time and magnitude of the work allows it, the phases of "implementation" and "operation" can be carried out.

In the "implementation" phase, the aim is to build the prototypes by applying the methods and processes that are carried out in the manufacturing industry of this type of products. And, in the "operation" phase, the product support documentation will be prepared, such as the catalog, the presentation videos and the instruction manual.

Keywords: Bicycle saddle; passenger seat; luggage rack bicycle; bicycle.

1 DESCRIPTIVE MEMORY

1.1 BACKGROUND

The need is generated from the searching of some type of product that could satisfy the needs created from a specific problem described below.

The aim is to introduce a new concept of transporting people on a bicycle to the market, different from a tandem since the product I designed requires only the action of pedalling of one person.

This product can be used both for 6 years old children and for adults up to 80 kilograms in weight, at the same time, by people with characteristics of Down syndrome since the physical capacities are reduced. For this reason the present conceptual design is developed.

1.2 OBJECT OF STUDY

The objective of this study is the definition and description of the new possible product that opens the door to the disabled and non-disabled people, who will be able to enjoy the cycling activity, which in other cases would be impossible for them.

It involves designing a passenger bicycle seat that is adaptable to the greatest number of bicycle models. It is intended to design an object that can be used as a saddle or as a rear luggage rack.

1.3 JUSTIFICATION OF STUDY

The present study is carried out in order to obtain the final dimensioning of the proposed design, as well as to determine the final models of the prefabricated components that are part of the passenger seat for bicycles.

1.4 MARKET STUDY

The state of supply and demand of the product in the market, in terms of quantity, quality, price and time has been developed in the Market Study that is included in the annex. The result of it is the following:

In terms of quality and price, consumers prefer a good product paying a reasonable price.

In the field of use of the product, consumers want an object that serves both children and adults, since in terms of weight they are very different and it have to withstand great changes.

There are many different types of luggage racks, most of them are attached to the axle of the rear wheel and the front seat. This indicates that it is preferable to make the product in this way, for greater safety.

1.5 PROPOSED DESIGNS AND ANALYSIS OF INTERNAL ELEMENTS

INTERNAL ELEMENTS

- SADDLE



Image 1: Saddle

A bicycle saddle is one of the three points of contact on a bicycle. The saddle of the bicycle is commonly attached to the seatpost.

- SADDLE SUPPORT STRUCTURE



Image 2: Saddle support structure

Metal structure that joins the center of the wheel and the main saddle.

- BAR BETWEEN SEATS



Image 3: Bar between seats

Metal structure that join the front seat and the rear seat.

1.6 TECHNICAL AND PHYSICAL VIABILITY

MATERIALS SADDLE SUPPORT STRUCTURE

CARBON FIBER (1)



The carbon fiber is a synthetic fiber consisting in fine filaments of 5-10 μm in diameter. Each carbon fiber is the union of thousands of carbon filaments. It is a synthetic fiber because it is made from polyacrylonitrile. It has mechanical properties similar to steel and is as light as wood or plastic. Due to its hardness, it has greater resistance to impact than steel.

Image 4: Saddle support structure 1

STRUCTURE

The atomic structure of carbon fiber is similar to graphite, consisting in sheets of carbon atoms arranged in a regular hexagonal pattern. Carbon fiber is an amorphous material: the sheets of carbon atoms are placed randomly, tightly or together. This integration of the carbon sheets is responsible for its high strength.

DENSITY

Densidad/ $\text{g}\cdot\text{cm}^{-3}$	ISO 1183 A	1,656
Contracción/%	ISO 2577	0,0464
Módulo de tracción/ $\text{N}\cdot\text{mm}^{-2}$	ISO 527	7695 (317)
Módulo de flexión/ $\text{N}\cdot\text{mm}^{-2}$	ISO 14125	8517 (1422)
Resistencia a la tracción/ $\text{N}\cdot\text{mm}^{-2}$	ISO 527	87 (17)
Resistencia a flexión/ $\text{N}\cdot\text{mm}^{-2}$	ISO 14125	197 (32)
Resistencia al impacto/ $\text{kJ}\cdot\text{m}^{-2}$	ISO 179	98 (14)

Image 5: Density table

The isotropic fiber is commonly discontinuous fiber of 12 to 18 microns in diameter with 1.6 g / cm^3 of density, with a very low elastic modulus of 40 gigapascals, in addition to a weak strength and thermal conductivity due to its weak structural orientation of atoms of carbon and crystallinity of underdeveloped graphite.

PROPERTIES

- Very high mechanical strength, with a high modulus of elasticity.
- Low density, compared to other materials such as steel.
- High production price.
- Resistance to external agents.
- Great thermal insulation capacity.
- Resistance to temperature variations, conserving its shape.

The reasons for the high price:

- Reinforcement, fiber, is a synthetic polymer that requires an expensive and long production process. This process is carried out at a high temperature -between 1100 and 2500 ° C.
- The use of thermosetting materials hinders the process of creating the final piece, since it requires a complex specialized tooling, such as the autoclave oven.

PRICE

The average price of a kilo of carbon fiber costs about 100 euros, 20 euros correspond to material and the rest to labor.

MATERIALS SADDLE

ELASTOPOLYMER GEL (2)



Image 6: Saddle 1

For softer, comfortable and large saddles are usually made of a elastopolymer gel that conforms to the shape of the cyclist.

STRUCTURE

The skeleton or base can be made of fiberglass or carbon.

The padding, located in strategic locations, is manufactured with gel inserts.

The upholstery is usually made from synthetic materials.

1.7 SELECTION OF THE PROJECT CONCEPT

As part of several solutions obtained in the proposed designs, a selection process is required. The ergonomics of the bicycle saddle, all the joints of the parts of the saddle, as well as the dimensions of the same will be taken into account.

1.8 STRUCTURAL ANALYSIS

FEET BAR SCREW

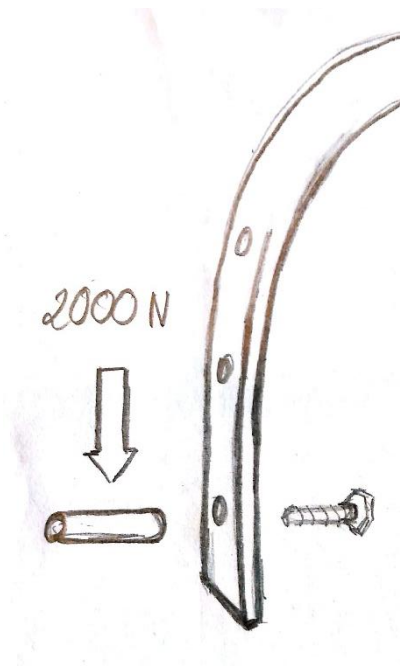


Image 7: Structural analysis

Security coefficient = 0.65

σ traction break = 400

$T_{max} = \text{Security coefficient} * \sigma \text{ traction break} = 260 \text{MPa}$

$$T_{cutting} = \frac{F}{S} \quad \frac{F}{S} < 260 \text{MPa} \quad S > \frac{1500}{260} = 7.69 \text{mm}^2$$

$$d1 > \sqrt{\frac{7.69 * 4}{\pi}} = 3.12 \text{mm}$$

Minimum screw (metrics 3- Doesn't exist)

The next metric would be 4, but for this project metric 6 has been chosen.

1.9 PREVIOUS DIMENSION

The order of development and exposure of the previous dimensioning of the elements is carried out based on the priority criterion of the most related element. The relations between elements are exposed in the systemic diagram exposed in ANNEXED 2.5

BRAND	DENOMINATION	KING	Nº RELATIONS	ORDER
1.1.1	Bridge	To manufacture	6	1º
1.1.2	Cylinder	To manufacture	3	2º
1.2	Screw	Normalized	2	3º
1.3	Feet bar	To manufacture	2	4º
1.4	Bicycle screw	Normalized	1	5º
1.1.3	Hitch	To manufacture	1	6º
2	Saddle	Normalized	1	7º

All type "To manufacture" elements are considered semi-finished, since they are based on a metal profile, which, after the sizing process, will be cut and, in some cases, bent and welded.

The normalization of the dimensions of the elements is done based on the standards, standard elements, tools and commercial elements that are described in ANNEXED 2.6 to 2.10

ELEMENT 1.1.1 - BRIDGE

Related elements	
Brand	Name
1.1.2	Cylinder
1.2	Screw
1.3	Feet bar
1.4	Bicycle screw



Image 8: Element 1.1.1

Standardized elements		
Brand	Name	Catalogue
1.1.1	Bridge	Pipe profile
1.1.2	Cylinder	Pipe profile
1.2	Screw	
1.3	Feet bar	
1.4	Bicycle screw	
2	Saddle	

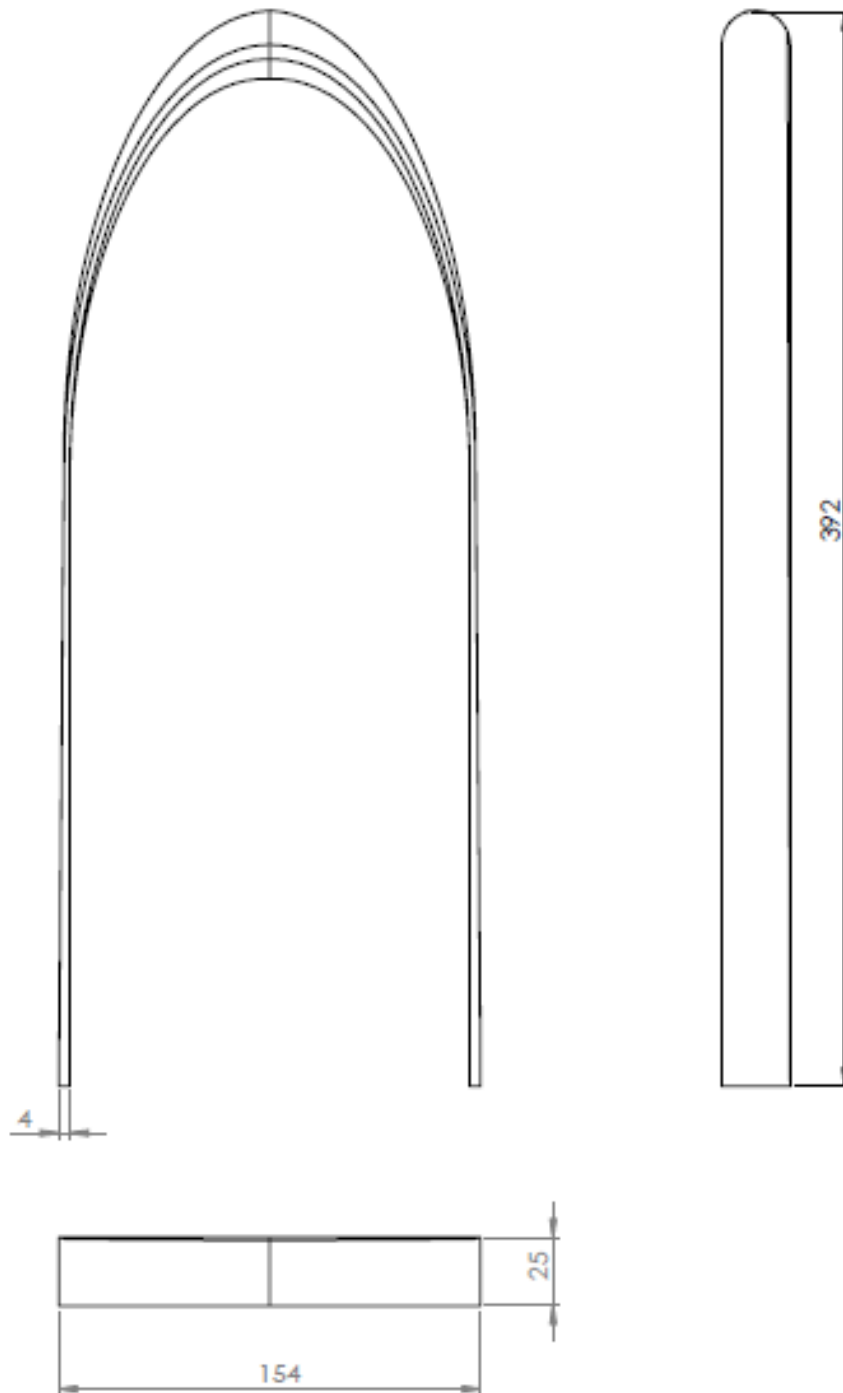


Image 9: Dimension Element 1.1.1

Piece of tubular structure that is supported on the bicycle next to the cylinder and the support for the feet are attached to it by means of screws. It is part of the subset 1.1

ELEMENT 1.1.2 – CYLINDER

Related elements	
Brand	Name
1.1.1	Bridge
1.1.3	Hitch
2	Saddle



Image 10: Element 1.1.2

Standardized elements		
Brand	Name	Catalogue
1.1.1	Cylinder	Pipe profile
1.1.2	Bridge	Pipe profile
1.1.3	Hitch	Pipe profile
2	Saddle	

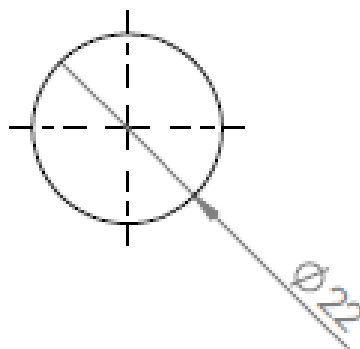
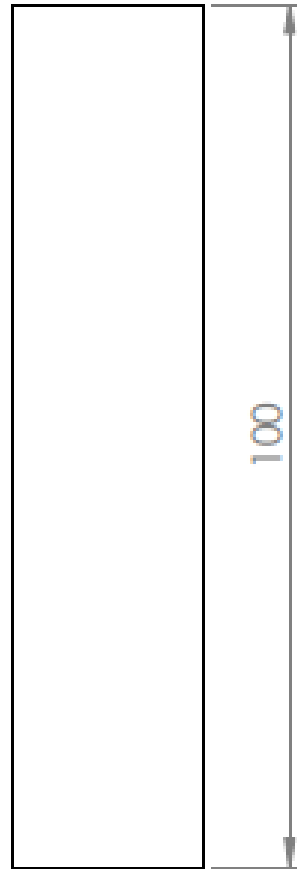
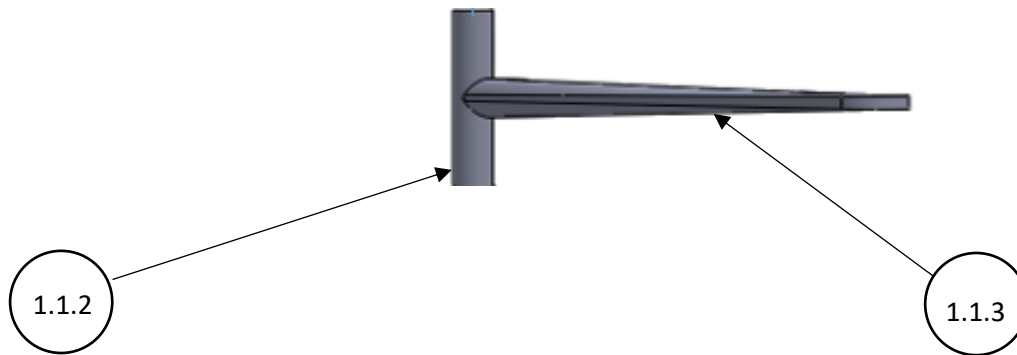


Image 11: Dimension Element 1.1.2

Part of tubular structure that is welded together with piece 1.1.1 Bridge and 1.1.3 Hitch to form the structure. Next to it is the seat. It is part of the subset 1.1

ELEMENT 1.1.3 – HITCH

Related elements	
Brand	Name
1.1.2	Cylinder

*Image 12: Element 1.1.3*

Standardized elements		
Brand	Name	Catalogue
1.1.1	Cylinder	Pipe profile
1.1.3	Hitch	Pipe profile

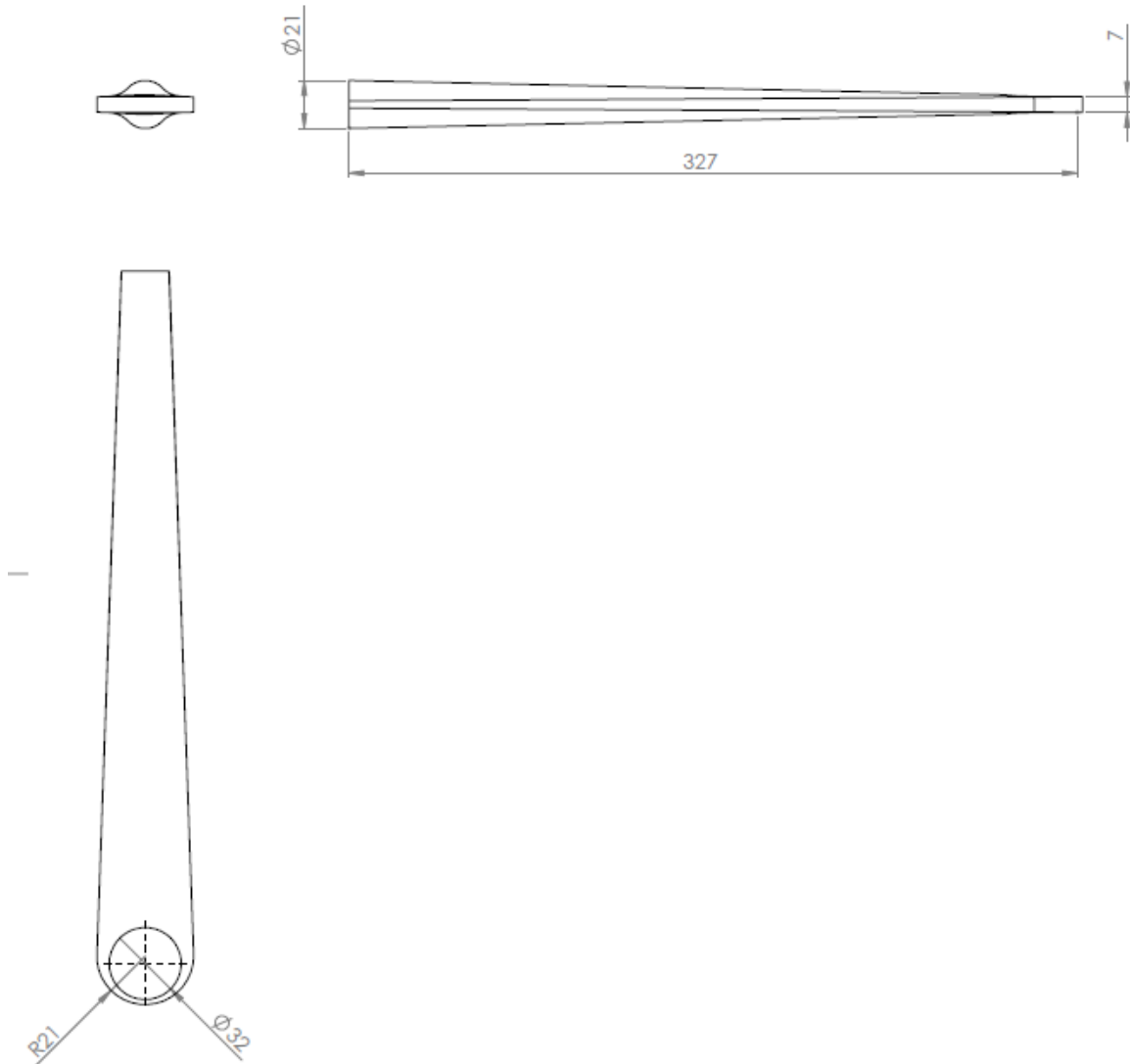


Image 13: Dimension Element 1.1.3

Piece of tubular structure that welds next to the piece 1.1.2 Cylinder to form the structure. This serves to attach the structure to the seat of the bicycle. It is part of the subset 1.1

ELEMENT 1.3 – FEER BAR

Related elements	
Brand	Name
1.1.2	Bridge
1.2	Screw
1.3	Feet bar



Image 14: Element 1.3

Standardized elements		
Brand	Name	Catalogue
1.1.2	Bridge	Pipe profile
1.2	Screw	
1.3	Feet bar	

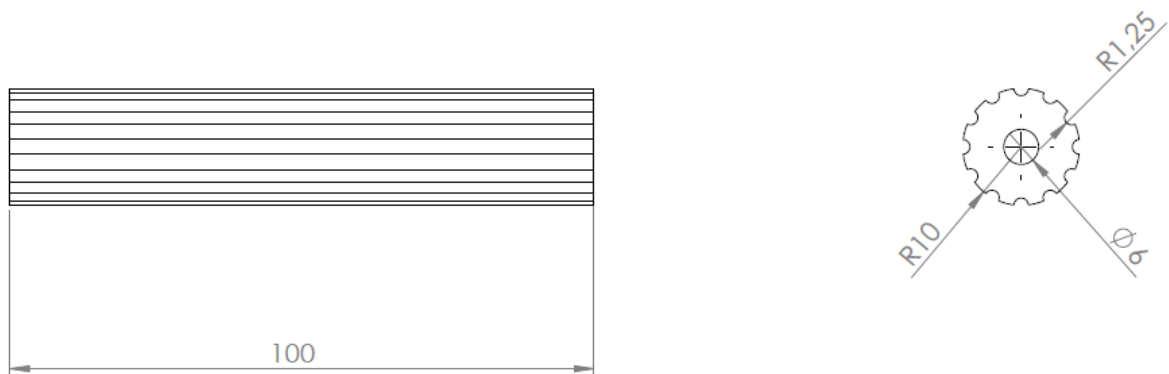


Image 15: Dimension Element 1.3

Cylindrical piece that collects the weight of the person when boarding the bicycle. It is attached to the structure by means of a screw. It is part of the subset 1.

Diameter 6mm = Screw hole

1.10 PROTOTYPE

1.10.1 CONSTRUCTION OF THE ELEMENTS

The construction of the elements is described in the Technical Specifications of this project.

1.10.2 SUBCONJUNDS ASSEMBLY

Next, we are going to explain the different sequences for the assembly of the subsets of the bike saddle design using text and graphic representations.

ASSEMBLY OF SUBSET 1.1

SUBSET 1.1

1.1.1 Bridge

1.1.2 Cylinder

1.1.3 Hitch

Sequence 1. First, the pieces 1.1.2 Cylinder and 1.1.3 Hitch are placed on the table and the wooden tool previously manufactured, ensuring the exact positions of the elements.



Image 16: Cylinder and Hitch

Sequence 2. Next, pressure clamps are placed to hold the work table with the wooden tool.



Image 17: Mooring with sergeants

Sequence 3. The assemblies are started by welding.

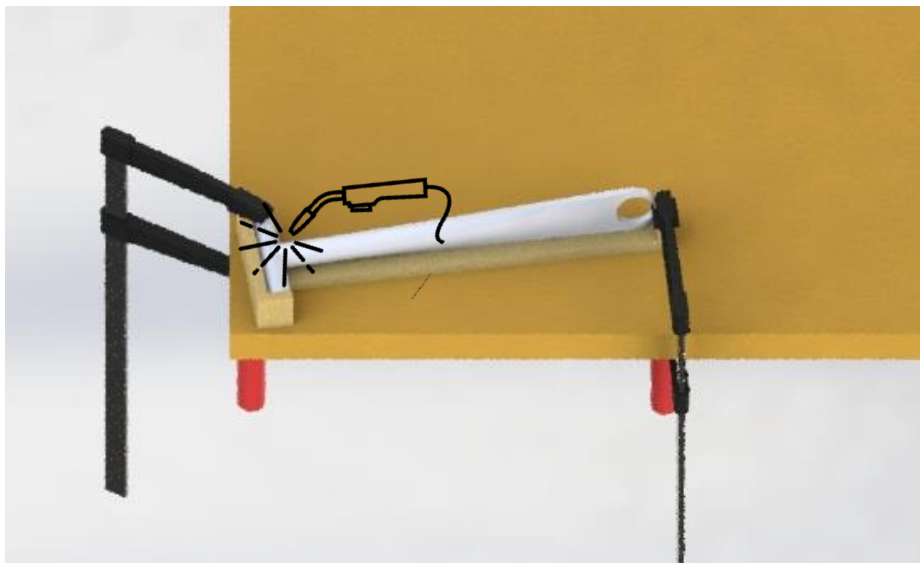


Image 18: Welding

Sequence 4. Place the pieces 1.1.2 Cylinder and 1.1.3 Hitch already welded on the table and the wooden tool previously manufactured next to the piece 1.1.1 Bridge ensuring the exact positions of the elements.

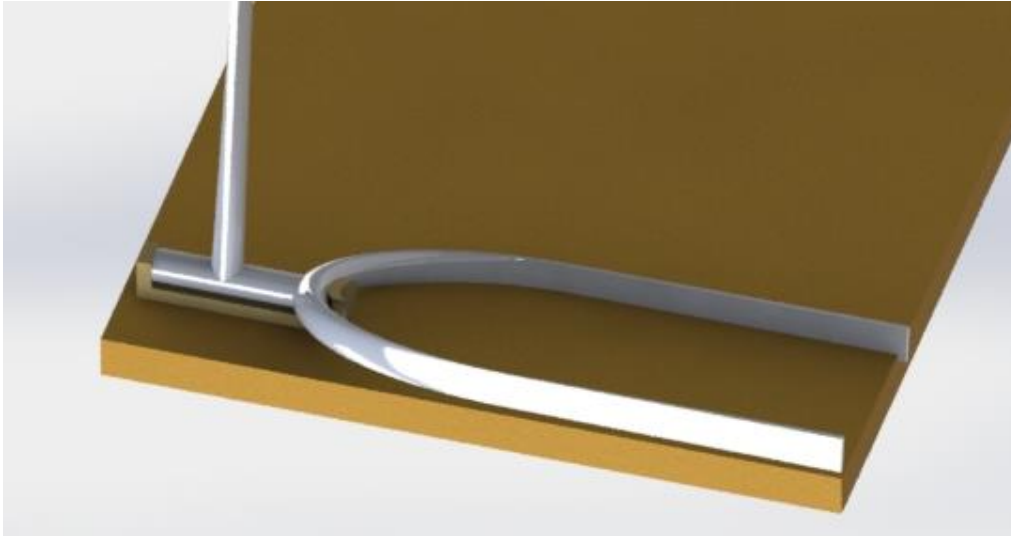


Image 19: Cylinder, Hitch and Bridge

Sequence 5. Pressure clamps are placed to hold the work table with the wooden tool.

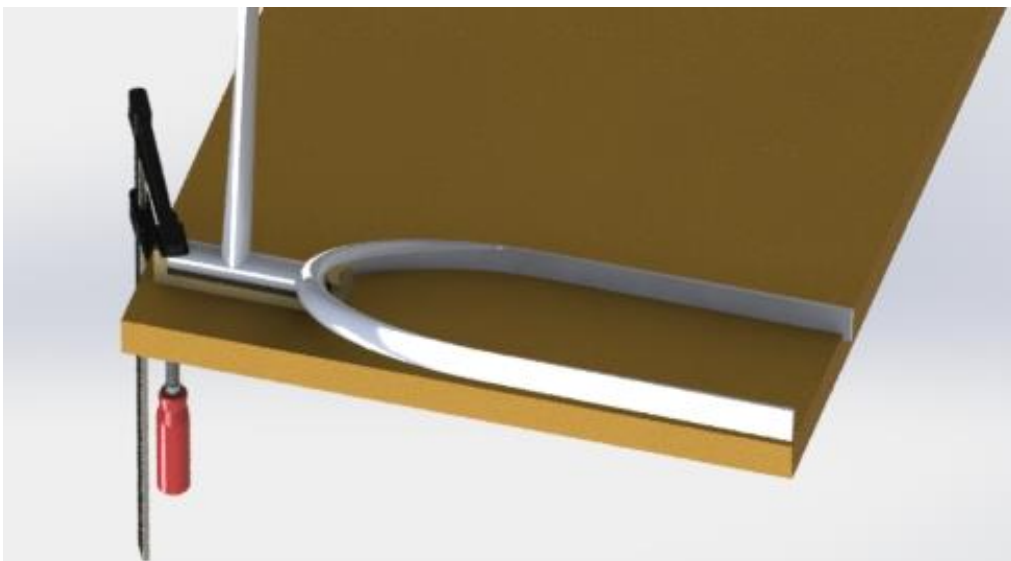


Image 20: Mooring with sergeants 1

Sequence 6. The assemblies are started by welding.

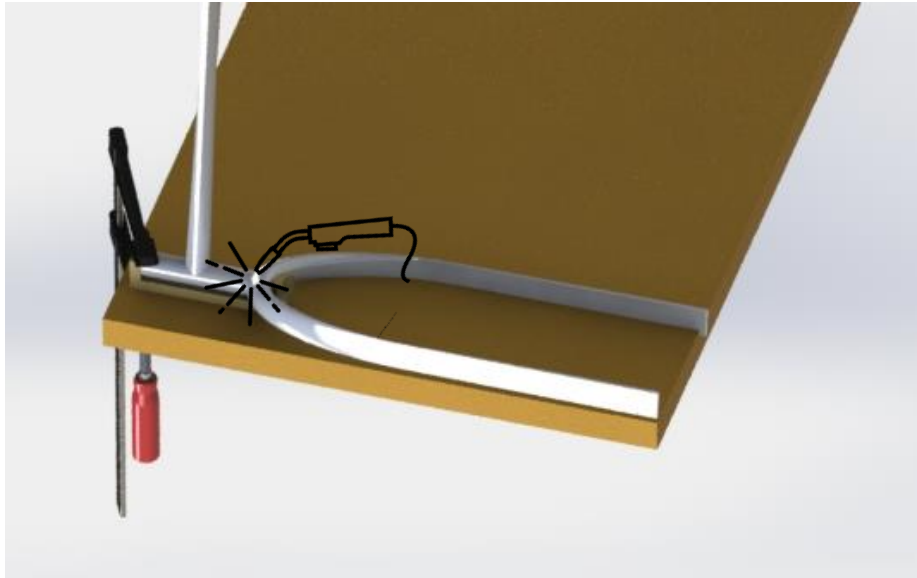


Image 21: Welding 1

Sequence 7. Subset 1.1 previously welded is placed on a metal hook, ensuring the exact positions of the elements to be painted.



Image 22: Placed on a metal hook

Sequence 8. Next, the compressor pressure is prepared to adapt it to the working gun and the subset 1.1 is painted



Image 23: Paint subset 1.1

1.10.3 SUPERFICIAL FINISH

The final design of the bicycle passenger seat design has no surface finish. However, the loose parts before assembly, they have surface finish and it is detailed in the Technical Terms and Conditions.

1.11 FINAL PRODUCT



1.12 INFORMATION SOURCES

The information that has been handled for the development of this study, classified according to its sources, is the following:

Sources internal to the project

INFORMATION SOURCE

Designer	Selected design
Suppliers	Tube catalogs Screw catalogs
Providers	Catalogs corresponding to the different machines, tools and necessary tools.

1.13 CONCLUSION

After the previous dimensioning and the description of the prototyping carried out, the design will be ready for the realization of tests and consequent readjustments both in dimensions and geometric shapes, for its improvement in resistance and manufacture.

As for the saddles analyzed, it is observed that all of them use the same materials and can be used between the same ages.

The best model for a person to sit in the saddle, is to make a stable and resistant structure. This is why an intermediate bar has been designed between the bike saddle and the prototype. In this way the consumer looks more secure.

The material chosen for this design is considered the most appropriate since it is the most used among this type of products. Even so, the possibility of changing material could be studied if the consumer or the manufacturer sees it as appropriate.

For the choice of machines and tools, price and quality have been taken into account, since a very expensive machine means an increase in the budget that in the long term decreases due to amortization.

For the budget, all the material, machine tools and labor have been taken into account, obtaining a price of € 37.52 per unit. It can be considered a non-excessive price and the economic reach of the consumer.

2 ANNEXES

2.1 ANNEX MARKET STUDY

2.1.1 ANALYZED PRODUCTS

SADDLE 1



Image 24: Saddle 1

PRODUCT	MTB Saddle
BRAND	
PRICE	25 €
MATERIALS	Wood, sponge, leather

MAIN FUNCTIONS OF USE		
Be used by children	Age	From 5 years
Be used for adults	Weight	Up to 85 kg
Be used to sitting	Use ^o	

COMPLEMENTARY FUNCTIONS OF USE			
DERIVATIVE FUNCTIONS OF USE			
Be easy to manipulate	Ergonomics		
	Weight		
	Dimensions Saddle	Width	15.8 cm
		High	4.8cm
	Depth	34 cm	

RESTRICTIVE FUNCTIONS / REQUIREMENT OF USE		
FUNCTIONS OF USE		
Durability	Time	X years
SYMBOLIC FUNCTIONS		
Designed for all ages		
Represent a formal style	Shape	Rectangular
	Number of elements	12
	Color	Black White
Represent comfort	MATERIALS The upholstery has a pleasant touch and the foam adapts to the body, thus transmitting comfort to the user.	

https://www.ebay.com/itm/Montura-para-Ciclismo-Bicicleta-de-Carretera-Bicicleta-Ninos-Cuero-Cojin-Asiento-Trasero-posterior/152524248023?_ul=CO&nma=true&si=04NNTN2e%252B9khVMG42AKMA6Mck4w%253D&orig_cvip=true&rt=nc&trksid=p2047675.l2557

SADDLE 2



Image 25: Saddle 2

PRODUCT	Additional saddle to turn the bike into a two-seater.
BRAND	Sit Two
PRICE	25 €
MATERIALS	Steel

MAIN FUNCTIONS OF USE		
Be used by children	Age	From 5 years
Be used for adults	Weight	Up to 85 kg
Be used to sitting	Use ^o	

COMPLEMENTARY FUNCTIONS OF USE			
DERIVATIVE FUNCTIONS OF USE			
Be easy to manipulate	Ergonomics		
	Weight		
	Dimensions Saddle	Width	16.7 cm
		High	4.5cm
	Depth	32 cm	

RESTRICTIVE FUNCTIONS / REQUIREMENT OF USE		
FUNCTIONS OF USE		
Durability	Time	X years
SYMBOLIC FUNCTIONS		
Designed for all ages		
Represent a formal style	Shape	Simple
	Number of elements	11
	Color	Black
Represent comfort	MATERIALS The upholstery has a pleasant touch and the foam adapts to the body, thus transmitting comfort to the user.	

<https://www.eltiodelmazo.com/2016/06/13/sit-two-dos-personas-en-una-sola-bici/>

SADDLE 3



Image 26: Saddle 3

PRODUCT	Lump carrier
BRAND	
PRICE	30 €
MATERIALS	Steel

MAIN FUNCTIONS OF USE		
Be used to transport packages	Weight	Up to 40 kg

COMPLEMENTARY FUNCTIONS OF USE		
DERIVATIVE FUNCTIONS OF USE		
Be easy to manipulate	Ergonomics	
	Weight	
	Dimensions Saddle	Width 15 cm
		High 5cm
	Depth 31 cm	



RESTRICTIVE FUNCTIONS / REQUIREMENT OF USE		
FUNCTIONS OF USE		
Durability	Time	X years
SYMBOLIC FUNCTIONS		
Designed for all ages		
Represent a formal style	Shape	Simple
	Number of elements	3
	Color	Black
Represent comfort	MATERIALS Transmits security to the user	

<http://diariodeuncampista.com/2016/04/portabultos-para-bici-tipos-y-caracteristicas-principales/>

SADDLE 4



Image 27: Saddle 4

PRODUCT	Lump carrier
BRAND	
PRICE	25 €
MATERIALS	Steel

MAIN FUNCTIONS OF USE		
Be used to transport packages	Weight	Up to 15 kg

COMPLEMENTARY FUNCTIONS OF USE		
DERIVATIVE FUNCTIONS OF USE		
Be easy to manipulate	Ergonomics	
	Weight	
	Dimensions Saddle	Width 14.2 cm
		High 4.6cm
	Depth 31 cm	

RESTRICTIVE FUNCTIONS / REQUIREMENT OF USE		
FUNCTIONS OF USE		
Durability	Time	X years
SYMBOLIC FUNCTIONS		
Designed for all ages		
Represent a formal style	Shape	Simple
	Number of elements	4
	Color	Black
Represent comfort	MATERIALS Transmits security to the user	

<http://www.babaik.es/blog/portabultos-para-bicicleta-tipos-y-caracteristicas/>

2.2 PRODUCT DISASSEMBLY SCHEME

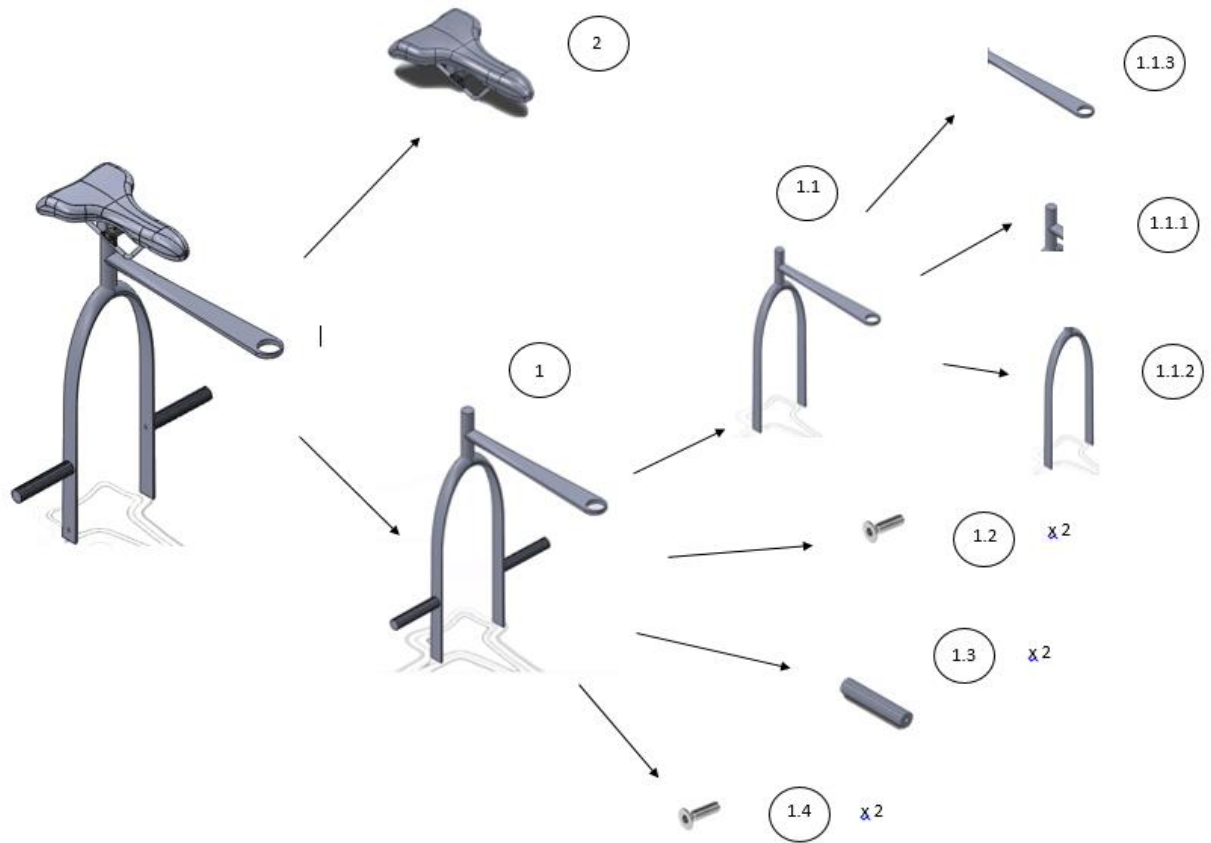


Image 28: Disassembly scheme

2.3 PRODUCT SYSTEMATIC DIAGRAM

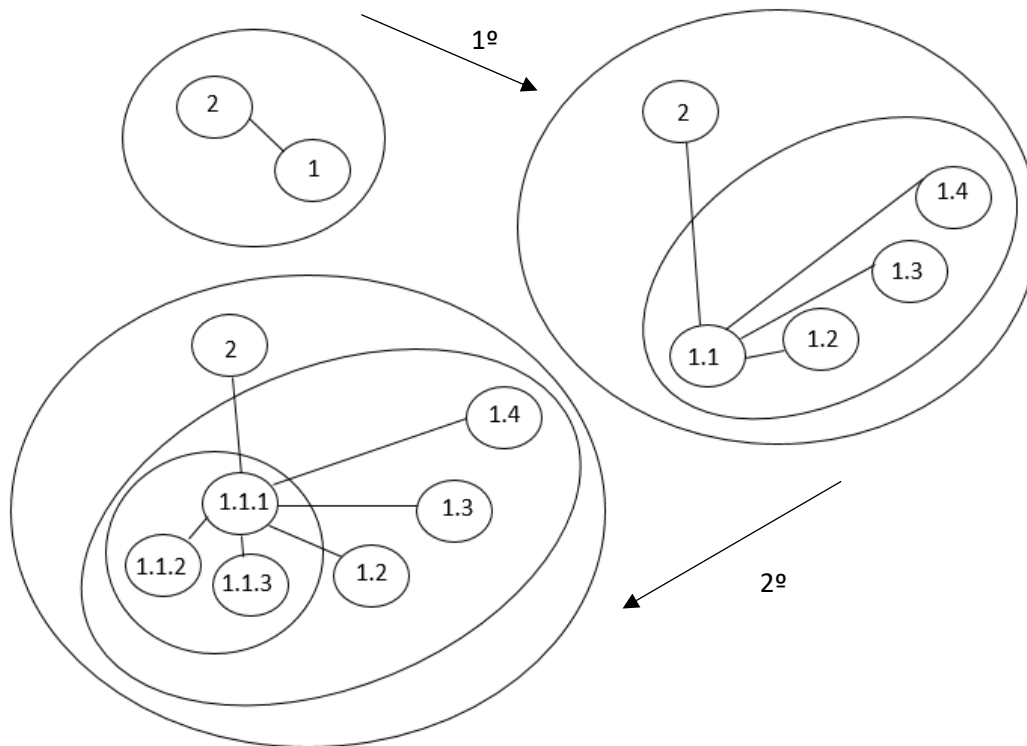


Image 29: Systematic diagram

2.4 NORMS UNE OF APLICATION

REGULATION OF NORMATIVE:

- UNE 1121
- UNE 1032
- UNE 1034
- UNE 1120
- UNE 1039
- UNE 1110
- UNE-EN ISO 6432
- UNE-EN ISO 7083

Normative ISO 2553:2013 Welding and related process.

2.5 STANDARDIZED ELEMENTS

SCREWS

CELO Grupo CELO

Tornillos Rosca Métrica Ref. DIN 933

- Cabeza Hexagonal
- Forma Embutida (M4, M6, M8)
- Cabeza Recortada (M6, M8)
- Clase 4.8

Especificación	Medida	Precios (€/1000 u.)			Emvasado			Nota
		Cilindrada	Cilindrada	Normal (u/m)	Caja	Bulto (u)	Estimado	
M6	M6 x 8	-	-	-	-	-	-	-
	M6 x 10	20,20	-	-	1.000	4.000	16.000	-
	M6 x 15	23,30	-	-	-	-	-	1.000
	M6 x 20	23,30	-	-	1.000	4.000	16.000	-
	M6 x 30	28,45	-	-	500	2.000	8.000	-

M6 x 8	40,62*	-	-	250	2.000	8.000	-
M6 x 10	30,55	37,93	-	250	2.000	8.000	1.250
M6 x 12	38,50	-	-	250	1.000	4.000	-
M6 x 15	30,15	33,30	-	250	1.000	4.000	1.000
M6 x 16	30,35	-	-	250	1.000	4.000	-
M6 x 20	45,35	43,30	-	250	1.000	4.000	-
M6 x 25	50,00	48,50	-	250	1.000	4.000	-
M6 x 30	59,30	-	-	250	1.000	4.000	-
M6 x 40	78,05	-	-	250	1.000	3.000	-
M6 x 50	88,45	-	-	250	1.000	2.000	-
M6 x 60	103,05	-	-	500	200	800	-
M6 x 65	111,30*	-	-	500	200	800	-
M6 x 70	137,30	-	-	500	200	800	-

M6 x 50 88,45 250 1.000 2.000

Image 30: Screws

2.6 MANUFACTURING TOOLS

STEEL DRILL

BROCAS CON MANGO CILÍNDRICO

Referencia	HSS	HSS	HSS	HSS	HSS	HSS	HSS	HSS
4.95	86 X 52	3,00	-	-	-	-	-	-
5.00	86 X 52	3,79	2,89	3,99	5,49	5,49	10,23	13,38
5.10	86 X 52	3,80	3,52	5,72	5,43	5,43	10,04	-
5.20	86 X 52	3,93	3,52	5,84	-	-	12,15	-
5.25	86 X 52	2,76	7,52	-	-	-	-	-
5.30	86 X 52	3,97	3,52	6,10	-	5,94	11,15	-
5.40	93 X 57	2,04	-	6,68	-	-	11,38	-
5.50	93 X 57	2,07	3,94	3,01	6,25	6,25	12,21	6,02
5.60	93 X 57	2,28	-	7,00	-	-	13,57	-
5.70	93 X 57	2,28	4,20	7,22	-	-	13,57	-
5.75	93 X 57	2,95	10,97	-	-	-	-	-
5.80	93 X 57	2,28	-	7,48	-	-	13,71	-
5.90	93 X 57	2,30	-	7,61	-	-	13,00	-
6.00	93 X 57	2,26	3,94	3,07	3,37	7,37	13,71	6,05
6.10	101 X 63	2,49	-	8,02	7,86	-	14,08	-
6.20	101 X 63	2,91	-	8,33	12,13	-	14,55	-
6.25	101 X 63	3,43	11,67	6,60	-	-	-	-
6.30	101 X 63	2,38	4,79	8,64	-	-	14,66	-
6.40	101 X 63	2,48	4,96	8,77	-	-	15,24	-
6.45	101 X 63	3,62	6,07	8,62	6,67	6,67	14,35	16,20
6.60	101 X 63	2,81	-	9,21	-	-	17,20	-
6.70	101 X 63	2,56	3,14	9,35	8,63	-	17,20	-
6.75	101 X 63	3,97	-	-	-	-	-	-


6.60 101 X 63 2,81 9,21 17,20

Image 31: Steel drill

2.7 TOOLS FOR ASSEMBLY

FIXED KEY

LLAVES FIJAS
Llave fija de dos bocas, métricas



6M

6M	mm	mm	€	mm	mm
4x5	105	4,21	10	6M-4-5	
4.5x5.5	105	5,41	10	6M-4.5-5.5	
5x5.5	105	5,46	10	6M-5-5.5	
6.6x7	122	4,22	10	6M-6-7	
6x7	122	4,22	10	6M-6-7	
7x8	122	4,49	10	6M-7-8	
8x9	138	4,24	10	6M-8-9	
8x10	138	4,56	10	6M-8-10	
10x11	153	4,62	10	6M-10-11	
10x13	153	5,67	10	6M-10-13	
12x13	168	5,62	10	6M-12-13	
12x14	168	6,01	10	6M-12-14	
13x14	168	5,96	10	6M-13-14	
13x15	183	6,61	10	6M-13-15	

6x7 122 4,22 10 6M-6-7

Image 32: Fixed key

DRILL

		REFERENCIA	GRUPO DE BARRAS	POTENCIA	DESCRIPCIÓN	TIPO DE HERRAMIENTA
HERRAMIENTAS SIN BATERÍAS NI CARGADOR						
NOVEDAD		DCK232T-KJ 3035048693046 6.5mm/1/4" BARRAS DE ALUMINIO	3035048693046	18V	MARTILLO ELECTRONUMÁTICO SIN ESCOBILLAS XR SOS-Plus 18V 2.1J SIN CARGADOR/BATERIA. Con maletín TSTAK.	306,00 €
		DCK273N-KJ 3035048557334 6.5mm/1/4" BARRAS DE ALUMINIO	3035048557334	18V	MARTILLO ELECTRONUMÁTICO SIN ESCOBILLAS XR SOS PLUS 18V 2.1J SIN CARGADOR/BATERIA. En caja de cartón.	279,00 €
		DCK253B-KJ 30350481111 6.5mm/1/4" BARRAS DE ALUMINIO	30350481111	18V	MARTILLO ELECTRONUMÁTICO XR SOS PLUS 18V 2.1J SIN CARGADOR/BATERIA. En caja de cartón.	232,00 €
NOVEDAD		DCH132WT-KJ 3035048640565 6.5mm/1/4" BARRAS DE ALUMINIO	3035048640565	18V	MARTILLO ELECTRONUMÁTICO SIN ESCOBILLAS XR SOS-Plus 18V 2.1J SIN CARGADOR/BATERIA. Con maletín TSTAK.	204,00 €
		DC0798WT-KJ 3035048143376 6.5mm/1/4" BARRAS DE ALUMINIO	3035048143376	18V	TALADRO PERCUTOR COMPACTO SIN ESCOBILLAS SIN CARGADOR/BATERIA. Con maletín TSTAK.	171,00 €

Image 33: Drill

2.8 INTERMEDIATE OR SEMI-FINISHED PRODUCTS

TUBE

2 GAMA DE PRODUCTOS PRODUCT RANGE

2.1 / TUBOS REDONDOS 2.1 / ROUND TUBES



EN 10305-3 **TABLA DE PESOS POR METRO DE TUBOS REDONDOS (gr/m)**
ROUND TUBE WEIGHT TABLE (gr/m)

D (mm)	Tolerancias en diámetro Outside diameter Tolerances (mm)	Espesor de pared T (mm) Wall thickness T (mm)												
		0,8	0,9	1	1,20	1,50	2	2,50	3	3,50	4			
8	± 0,12 mm	142	158	173										
9,2		166	184	202	227									
9,4		170	189	207	243									
10		182	202	222	261	315	395							
11		201	224	247	290	352	444							
12		221	247	272	320	390	494							
12,7		235	262	289	341	415	528							
13		241	269	296	350	426	543							
14		261	291	321	379	463	593							
15		281	313	346	409	500	642							
16		300	336	370	439	537	691							
18		340	380	420	498	611	790	967						
19		360	402	444	527	648	840	1079						
20		379	424	469	557	685	889	1090						
21	399	447	494	587	722	928	1142							
22	419	469	519	616	759	988	1204	1407						

20		379	424	469	557	685	889	1090					
21		399	447	494	587	722	928	1142					
22		419	469	519	616	759	988	1204	1407				

Image 34: Tube

2.9 MACHINES, TOOLS AND SUPPLIES FOR MANUFACTURE

MÁCHINES

Column drill SNC 23 VM



Image 35: Column drill

Drill developed by Syderic. It has a SNT3 base and one unit of refrigerator liquid.

- Tension: 400 V
- Rotation speed: Mín.: 190 rpm Máx.: 5250 rpm
- Power: 1100 W, 520 W
- Drill depth: 140 mm
- Number of velocities: 12
- Velocities: 72/2600 rpm
- Distance shaft-column: 3400 mm
- Distance shaft-table: 650 mm
- Distance shaft-base: 1200 mm
- Column diameter: 130 mm
- Table dimensions: 500X450 mm
- Base dimensions: 400X410 mm
- Total height: 2120 mm

Curvator UNI42 de Tube



Image 36: Curvatore

Manual curvator of Tube UNI 42. It is a precise and powerful machine able to curve tubes of big diameter of a constant and óptimus radius. This machine doesn't deform the tubes while it is working.

- Aluminum body
- Iron tempered gears build on ball bearing
- Maximum curve of the angle 180° C
- Dimensions: length 400mm
- Width: 200mm
- Height: 250mm
- Weight: 18 kg (without support)

Autonomus compressor ACK 300 – 3.0 Hp KRAFTER



Image 37: Autonomus compressor

It is recommended for domestic use and for small workshop. It is used for applying varnish, enamel and latecs. It can blowtorching, inflating or whashing. It has double air exit eye level for oil revisión. It is portable, it has 4 wheels and a anti vibration support. The compressor allows an easy pressure regulation.

MODELO	ACK 300 - 3.0 HP
Potencia	2.2 Kw / 220 V 3 HP
Cilindro	65 x 2 mm
Velocidad	1050 r/min
Desplazamiento	250 L/min 8.8 CFM
Presión	115 Psi 8 bar
Ruido	91 dB (A)
Capacidad de estanque	300 Lts 52.84 Usgal
Peso	125 Kg
Medidas (LxAnxAI)	115 x 45 x 85 cm
Código	4449000030030

Image 38: Table autonomus compressor

Spray Gun Classic Pro – SAGOLA –



Spray gun with technology HVLP for interior or exterior. Power from 0 to 110 ml/min, 3 years of warranty and a maximum angle of application of 45 degrees. Measures: 24 cm x 22 cm x 10 cm (width + height x depth).

- Maximum ergonomics
- Unique shaft design, unlike others
- Minimum fog
- High velocity
- Low consumption of air
- High quality of pulverization

Image 39: Spray Gun Classic Pro

Plastic hybrid injector Allrounder



Image 40: Plastic hybrid injector

The Allrounder 570 hybrid of high performance has the clamping force of 2.000 kN and a unit of injection which has a 800 size. It is equipped with a mold of two cavities.

A part made of PP, with a weight of 15,6 g, will be made in a work cycle of 3,5 seconds. The Hidrive high performance machines have the capacity of maximum production, short work cycles and a reduced energy consumption.

Consequently, they are perfectly equipped for applications for all types of parts.

TOOLS AND SUPPLIES

Meter bit 4 and 6 Dimameter 4,40 mm and 6,60 mm for metal

l = Length of cut

L = Total length

Referencia	5811316 DDDA0310	5811314 DDDA0320
Calidad	METAL DURO	METAL DURO
DIN	6537	6537
Ángulo	140°	140°
Acabado	ALCRONA	ALCRONA
Aplicación	≤ 60 HRC	≤ 60 HRC
Tolerancia Mango	h6	h6
Tolerancia Corte	m7	m7

Ø mm	L	l	D	€	€
3,00	20	62	6	27,99	36,47
3,10	20	62	6	27,99	36,47
3,20	20	62	6	27,99	36,47
3,30	20	62	6	27,99	36,47
3,40	20	62	6	27,99	36,47
3,50	20	62	6	27,99	36,47
3,60	20	62	6	27,99	36,47
3,70	20	62	6	27,99	36,47
3,80	24	66	6	27,99	36,47
3,90	24	66	6	27,99	36,47
4,00	24	66	6	27,99	36,47
4,10	24	66	6	27,99	36,47
4,20	24	66	6	27,99	36,47
4,30	24	66	6	27,99	36,47
4,40	24	66	6	27,99	36,47
4,50	24	66	6	27,99	36,47
4,60	24	66	6	27,99	36,47
4,70	24	66	6	27,99	36,47
4,80	28	66	6	27,99	36,47

Referencia	5811316 DDDA0310	5811314 DDDA0320
Calidad	METAL DURO	METAL DURO
DIN	6537	6537
Ángulo	140°	140°
Acabado	ALCRONA	ALCRONA
Aplicación	≤ 60 HRC	≤ 60 HRC
Tolerancia Mango	h6	h6
Tolerancia Corte	m7	m7

Ø mm	L	l	D	€	€
4,90	28	66	6	27,99	36,47
5,00	28	66	6	27,99	36,47
5,10	28	66	6	27,99	36,47
5,20	28	66	6	27,99	36,47
5,30	28	66	6	27,99	36,47
5,40	28	66	6	27,99	36,47
5,50	28	66	6	27,99	36,47
5,60	28	66	6	27,99	36,47
5,70	28	66	6	27,99	36,47
5,80	28	66	6	27,99	36,47
5,90	28	66	6	27,99	36,47
6,00	28	66	6	27,99	36,47
6,10	34	79	8	44,39	59,98
6,20	34	79	8	44,39	59,98
6,30	34	79	8	44,39	59,98
6,40	34	79	8	44,39	59,98
6,50	34	79	8	44,39	59,98
6,60	34	79	8	44,39	59,98
6,70	34	79	8	44,39	59,98

Image 41: Diameter tables

The bit of Ø 4,40 mm is used to make holes on the subset 1.1 for joining the bicycle structure in order to possibilite that it can assemble in the element 1.4

The bit of Ø 6,60 mm is used to make holes on the SUBSET 1.1 in order to possibilite that it can assemble in the element 1.2 and 1.3

Screw of pressure

Universal clamp with rotatory base



MODELO	MU125	MU150	MU200
CÓDIGO	1000524	1000525	1000526
ANCHO BOCA (MM)	125	150	200
ALTURA BOCA (MM)	37	40	58
APERTURA BOCA (MM)	85	114	150
LONGITUD TOTAL (MM)	370	462	620
ALTURA TOTAL (MM)	128	145	202
PESO (KG)	17	28	58

Image 42: Screw of pressure

The screw of pressure de bancada is used to hold pieces at the drill and allow a better grip and fastening. This fact avoid the movement of the pieces

2.10 MACHINES, TOOLS AND SUPPLIES FOR ASSEMBLY

MACHINES

Weld equipment INVERTER MMA – PLUS 140 GE - MONTEC

INVERTER MMA - PLUS 140 GE / S35.13

VENTAJAS

- Capacitado para soldadura TIG.
- Doble ventilación para óptima refrigeración.
- Ligeros y portátiles (1.5 kg).

DOTACIÓN STANDARD

- Cable de cobre para conexión a red 2 m. x 1.5 mm².
- Cable de cobre polo negativo con pinzas 2 m. x 16 mm².
- Cable de cobre con portaelectrodo 2 m. x 16 mm².
- Martillo y máscara.
- Molino.

Voltaje	V	230
Intensidad	A	140
Generador	KVA	2.4
Factor de marcha	%	35
Electrodo	mm	3.25
Peso	kg	1.5
Dimensiones	cm	11.5x26x17.5

Image 43: Weld equipment

TOOLS AND SUPPLIES

Sergeant



Special tool for fastening and squeezing in order to do different tasks. 160 mm of crush.

Image 44: Sergeant

Electrode base 100 – LINCOLN ELECTRIC –



- Basic electrode of low hydrogen content (HDM < 5 ml/100 g)
- It is recommended for transformer with tension **en vacío bajo**
- Cord well wet
- Impact properties at -20°C
- Weld position: All, instead of vertical descendent
- Diameter Ø2,5 x 350 mm.

Image 45: electrode base

Wooden supplies

Previously made for the Weld support SUBSET 1.1



Image 46: Supplie 1



Image 47: Supplie 2

Lufa hook

Shutterstock



Image 48: Lufa hook

High carbón steel hooks, with a high resistance, and a corrosión resistance
The object will arrive in a security packaging, in order to avoid injuries.

Size: 4.8-12.8 mm, # 1- # 13, you can choose the optimal size.

3 SHEET CONDITIONS

3.1 SHEET TECHNICAL CONDITIONS

Then, necessary technical conditions for the construction of the saddle prototype for each piece, subset and final assembly are exposed:

Piece 1.1.1 (Bridge)

Starting material: Steel Tube E-260 (889 x 25 x 2 mm)

Operation	1 ^a	Tube cutting
- Machinery	Circular saw of 19 "	
- Workforce	The relation of the cutting work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Not precise	
- Tools	circular saw blade of 19 "	
-Form of relation:		
1 ^o -	Placement of the bar in a given machine	
2 ^o -	Placement of the saw blade to measure (90 ^o)	
3 ^o -	Start-up of the machine	
4 ^o -	Cutting of the material to the determined extent	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the condition and placement of the saw blade	
3 ^o -	Check the measurement of the tube to be placed	
4 ^o -	Check the perpendicularity of the cut	
5 ^o -	Check the final dimensions of the piece	
- Tests	Not precise	

Operation	2 ^a	Obtaining holes
- Machinery	Column drill	
- Workforce	The relation of the drill work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Bench pressure screw, flexo-meter	
- Tools	Drill for metal diameter 4mm	
-Form of relation:		
1 ^o -	Fixing of pressure screw in bedplate	
2 ^o -	Placement of Ø 4 mm drill bit in the drill	
3 ^o -	Mark centers of holes and punch before the placement of piece in pressure screw	
4 ^o -	Placement of part in pressure screw in bench: it is seen the face of greater length and the mark of the hole of Ø 4 mm aligned with the bit	
5 ^o -	Hole drilling	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the good condition and placement of the pressure screw	
3 ^o -	Check the condition and placement of the drill bits	
4 ^o -	Check and adjust machine speeds	
5 ^o -	Check the final dimensions of the holes made in the piece	
- Tests	Not precise	

Operation	3 ^a	Curvature of the tube
- Machinery	Bending machine	
- Workforce	The relation of the curvature work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Not precise	
- Tools	Not precise	
-Form of relation:		
1 ^o -	Bending adjustment	
2 ^o -	Metal tube fitting	
3 ^o -	Bent by bending machine	
4 ^o -	Piece removal	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the good condition and placement of the metal tube	
3 ^o -	Check the entered data	
4 ^o -	Check the final dimensions of the bending done on the piece	
- Tests	Not precise	

Piece 1.1.2 (Cylinder)

Starting material: Steel Tube E-260 (100 x 22 x 2 mm)

Operation	1 ^a	Tube cutting
- Machinery	Circular saw of 19 "	
- Workforce	The relation of the cutting work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Not precise	
- Tools	circular saw blade of 19 "	
-Form of relation:		
1 ^o -	Placement of the bar in a given machine	
2 ^o -	Placement of the saw blade to measure (90°)	
3 ^o -	Start-up of the machine	
4 ^o -	Cutting of the material to the determined extent	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the condition and placement of the saw blade	
3 ^o -	Check the measurement of the tube to be placed	
4 ^o -	Check the perpendicularity of the cut	
5 ^o -	Check the final dimensions of the piece	
- Tests	Not precise	

Operation	2 ^a	Obtaining holes
- Machinery	Column drill	
- Workforce	The relation of the drill work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Bench pressure screw, flexo-meter	
- Tools	Drill for metal diameter mm	
-Form of relation:		
1 ^o -	Fixing of pressure screw in bedplate	
2 ^o -	Placement of Ø 21 mm drill bit in the drill	
3 ^o -	Mark centers of holes and punch before the placement of piece in pressure screw	
4 ^o -	Placement of part in pressure screw in bench: it is seen the face of greater length and the mark of the hole of Ø 21 mm aligned with the bit	
5 ^o -	Hole drilling	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the good condition and placement of the pressure screw	
3 ^o -	Check the condition and placement of the drill bits	
4 ^o -	Check and adjust machine speeds	
5 ^o -	Check the final dimensions of the holes made in the piece	
- Tests	Not precise	

Piece 1.1.3 (Hitch)

Starting material: Steel Tube E-260 (400 x 22 x 2 mm)

Operation	1 ^a	Tube cutting
- Machinery	Circular saw of 19 "	
- Workforce	The relation of the cutting work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Not precise	
- Tools	circular saw blade of 19 "	
-Form of relation:		
1 ^o -	Placement of the bar in a given machine	
2 ^o -	Placement of the saw blade to measure (90°)	
3 ^o -	Start-up of the machine	
4 ^o -	Cutting of the material to the determined extent	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the condition and placement of the saw blade	
3 ^o -	Check the measurement of the tube to be placed	
4 ^o -	Check the perpendicularity of the cut	
5 ^o -	Check the final dimensions of the piece	
- Tests	Not precise	

Operation	2 ^a	Obtaining holes
- Machinery	Column drill	
- Workforce	The relation of the drill work can be carried out by an operator with a minimum category of " Official 3 "	
- Auxiliary means:		
- Supplies	Bench pressure screw, flexo-meter	
- Tools	Drill for metal diameter 32 mm	
-Form of relation:		
1 ^o -	Fixing of pressure screw in bedplate	
2 ^o -	Placement of Ø 4 mm drill bit in the drill	
3 ^o -	Mark centers of holes and punch before the placement of piece in pressure screw	
4 ^o -	Placement of part in pressure screw in bench: it is seen the face of greater length and the mark of the hole of Ø 32 mm aligned with the bit	
5 ^o -	Hole drilling	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the good condition and placement of the pressure screw	
3 ^o -	Check the condition and placement of the drill bits	
4 ^o -	Check and adjust machine speeds	
5 ^o -	Check the final dimensions of the holes made in the piece	
- Tests	Not precise	

Subset 1.1 (Bridge + Cylinder+ Hitch)

Operation	1 ^a	Weld
- Machinery	Coated electrode welding equipment	
- Workforce	The relation of the weld work can be carried out by an operator with a minimum category of " Official 1 "	
- Auxiliary means:		
- Supplies	Wood support	
- Tools	Coated electrode, sergeants	
-Form of relation:		
1 ^o -	Placement of pieces in wooden tool	
2 ^o -	Mooring of piece to work surface with sergeants	
3 ^o -	Start-up of welding equipment	
4 ^o -	Soldier of pieces	
5 ^o -	Removal of weldment	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the arrangement of the pieces and the mooring	
3 ^o -	Check the weld	
- Tests	Not precise	

Operation	2 ^a	Paint
- Machinery	Compressor	
- Workforce	The relation of painting work can be carried out by an operator with a minimum category of " Official 1 "	
- Auxiliary means:		
- Supplies	Hook	
- Tools	Paint gun	
-Form of relation:		
1 ^o -	Placement of parts in hook	
2 ^o -	Start-up of the compressor	
3 ^o -	Painted parts with gun	
4 ^o -	Drying of pieces	
- Security	Gloves, goggles, mask, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the arrangement of the parts and their subjection	
3 ^o -	Check the paint	
4 ^o -	Check the paint after drying	
- Tests	Not precise	

Piece 1.3 (Feet bar)

Operation	1 ^a	Injection
-Machinery	Plastic injection molding machine	
- Workforce	The relation of the injection work can be carried out by an operator with a minimum category of " Official 3 ^a "	
- Auxiliary means:		
- Supplies	Mold	
- Tools	Not precise	
-Form of relation:		
1 ^o -	Placement of the granza in inyectora machine	
2 ^o -	Placement of the mold	
3 ^o -	Placement of parameters of the machine	
4 ^o -	Start-up of the machine	
5 ^o -	Pick up piece	
- Security	Gloves, goggles, work clothes and safety shoes.	
-Controls		
1 ^o -	Check the good condition of the machine	
2 ^o -	Check the good condition and placement of the mold	
3 ^o -	Check the parameters of the machine	
4 ^o -	Check the final dimensions of the piece	
- Tests	Every 100 units resistance and hardness	

4 MEASUREMENTS AND BUDGETS

For the preparation of the MEASUREMENTS AND BUDGET chapter, information is needed on the duration and cost of work, machinery and tooling.

ESTIMATED TIMES

According to the Technical Office of Methods and Times, the estimated time in each operation is as follows:

Operation: Metal tube cutting = 0.10h

Operation: Perforated in tube = 0.20h

Operation: Curved tube = 0,30h

Operation: Cut tubular structure = 0.20h

Operation: Perforated in tubular structure = 0.10h

Operation: Plastic injection = 0.10h

Operation: Soldier of structures = 0.20h

Operation: Painted structures = 0.20h

Operation: Piece Assembly = 0.20h

UNIT COSTS

According to the Commercial Department, the costs of labor and the prices of machinery and tools used, as well as their amortization or useful life, are the following:

MATERIAL

Tube 889 x 25 x 2 mm (€ 1.4 / m)

Tube 100 x 22 x 2 mm (€ 1.4 / m)

Tube 400 x 22 x 2 mm (€ 1.4 / m)

M6x50 bolt = bag 250 units = 22.11 €

Plastic in pellets (piece 2.2) (10gr) = 1.5 € / Kg

MACHINERY (Estimate a use of 2000 h / year)

Column drilling machine = € 1000. Amortization in 15 years.

Bending machine = 6000 €. Amortization in 20 years.

Welding equipment = € 1000. Amortization in 10 years.

Compressor and pistol = € 300. Amortization in 5 years.

Plastic injection machine = € 30000. Amortization in 10 years.

AUXILIARY MEANS

Drill 10 €. Life of 100h

Bench pressure screw 500 €. Life of 20000 h

Electrode 5 €. Perform 1 Unit

Paint gun 150 €. Life of 1000h

Mold for injection 3000 €. Realize 4000 units

Nylon hammer € 20. 2000h life

WORKFORCE

Official 3rd = € 20 / h

Official 2nd = € 25 / h

Official 1st = € 30 / h

UNIT OF WORK	MEASUREMENT		DESCRIPTION	UNIT PRICE	AMOUNT (EUROS)	TOTAL (EUROS)
	QUAN.	Un.				
1.1.1	1	Un.	Bridge			
			Material			
	0,784	m	Steel pipe E-260 889 x 25 x 2 mm	1,4	1,097	
			Jobs: CUT			
			Machinery			
	0,1	h	Cutter	0,2	0,02	
			Workforce			
	0,1	h	Officer de 3ª	20	2	
			Auxiliary means			
	0,1	h	Tools: Circular saw	0,4	0,04	
			Supplies: Not precise			
			Trabajos: DRILL			
			Maquinaria			

	0,2	h	Column drill	0,034	0,0068	
			Workforce			
	0,2	h	Officer de 3ª	20	4	
			Auxiliary means			
	0,2	h	Tools: Metal drill diam. 4.40mm	0,1	0,02	
			Supplies: Bed pressure screw	0,025	0,005	
			Jobs: CURVATURE			
			Machinery			
	0,3	h	Curvature	0,034	0,0034	
			Workforce			
	0,3	h	Officer de 3ª	20	6	
			Auxiliary means			
			Tools: Not precise			
			Supplies: Not precise			
						13,18€

UNIT OF WORK	MEASUREMENT		DESCRIPTION	UNIT PRICE	AMOUNT (EUROS)	TOTAL (EUROS)
	QUAN.	Un.				
1.1.2	1	Un.	Cylinder			
			Material			
	0,100	m	Steel pipe E-260 889 x 25 x 2 mm	1,4	0,14	
			Jobs: CUT			
			Machinery			
	0,1	h	Cutter	0,2	0,02	
			Workforce			
	0,1	h	Officer de 3ª	20	2	
			Auxiliary means			
	0,1	h	Tools: Circular saw	0,4	0,04	
			Supplies: Not precise			
			Trabajos: DRILL			
			Machinery			
	0,1	h	Column drill	0,034	0,0034	
			Workforce			
	0,1	h	Officer de 3ª	20	2	
			Auxiliary means			
	0,1	h	Tools: Metal drill	0,1	0,01	
			Supplies: Bed pressure screw	0,025	0,005	
						4,22€

UNIT OF WORK	MEASUREMENT		DESCRIPTION	UNIT PRICE	AMOUNT (EUROS)	TOTAL (EUROS)
	QUAN.	Un.				
1.1.3	1	Un.	Hitch			
			Material			
	0,327	m	Steel pipe E-260 889 x 25 x 2 mm	1,4	0,4578	
			Jobs: CUT			
			Machinery			
	0,1	h	Cutter	0,2	0,02	
			Workforce			
	0,1	h	Officer de 3 ^a	20	2	
			Auxiliary means			
	0,1	h	Tools: Circular saw	0,4	0,04	
			Supplies: Not precise			
			Jobs: DRILL			
			Machinery			
	0,1	h	Column drill	0,034	0,0034	
			Workforce			
	0,1	h	Officer de 3 ^a	20	2	
			Auxiliary means			
	0,1	h	Tools: Metal drill	0,1	0,01	
			Supplies: Bed pressure screw	0,025	0,005	
						4,54€

UNIT OF WORK	MEASUREMENT		DESCRIPTION	UNIT PRICE	AMOUNT (EUROS)	TOTAL (EUROS)
	QUAN.	Un.				
1.3	2	Un.	Feet bar(10gr)			
	4	kg		0,015	0,3	
			Jobs: INJECTION			
			Machinery			
	0,1	h	Plastic injection molding machine	1,5	0,15	
			Workforce			
	0,1	h	Officer de 3 ^a	20	2	
			Auxiliary means			
	0,1	h	Tools: Mold	0,75	0,075	
			Supplies: Not precise			
						2,53€

UNIT OF WORK	MEASUREMENT		DESCRIPTION	UNIT PRICE	AMOUNT (EUROS)	TOTAL (EUROS)
	QUAN.	Un.				
1.1	1	Un.	Cylinder			
			Jobs: WELDING			
			Machinery			
	0,2	h	Welding equipment	0,05	0,01	
			Workforce			
	0,2	h	Officer de 1ª	30	6	
			Auxiliary means			
	0,2	h	Tools: Electrode	5	1	
			Supplies: Not precise			
			Jobs: PAINTING			
			Machinery			
	0,2	h	Compressor	0,03	0,006	
			Workforce			
	0,2	h	Officer de 1ª	30	6	
			Auxiliary means			
	0,2	h	Tools: Metal drill	0,15	0,035	
			Supplies: Not precise			
						13,05€

UNIT OF WORK	DESCRIPTION	AMOUNT (Euros)
1.1.1	Bridge	13,18
1.1.2	Cylinder	4,22
1.1.3	Hitch	4,54
1.3	Feet bar	2,53
1.1	Subset	13,05

TOTAL	37,52€
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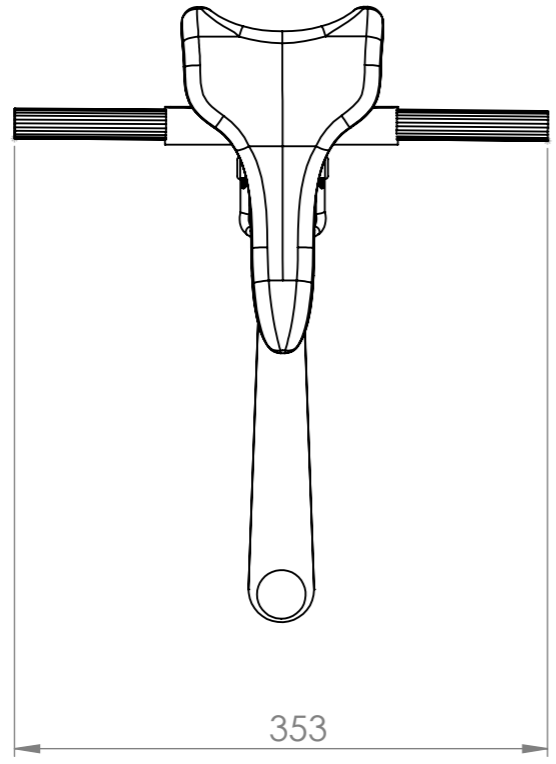
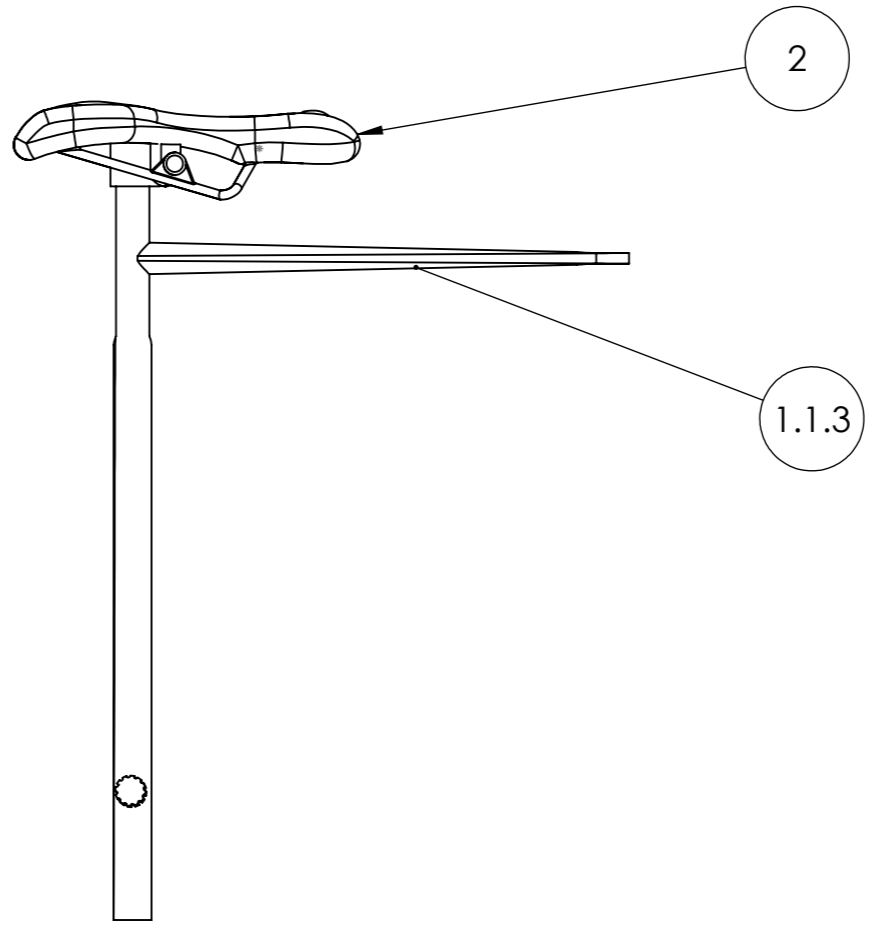
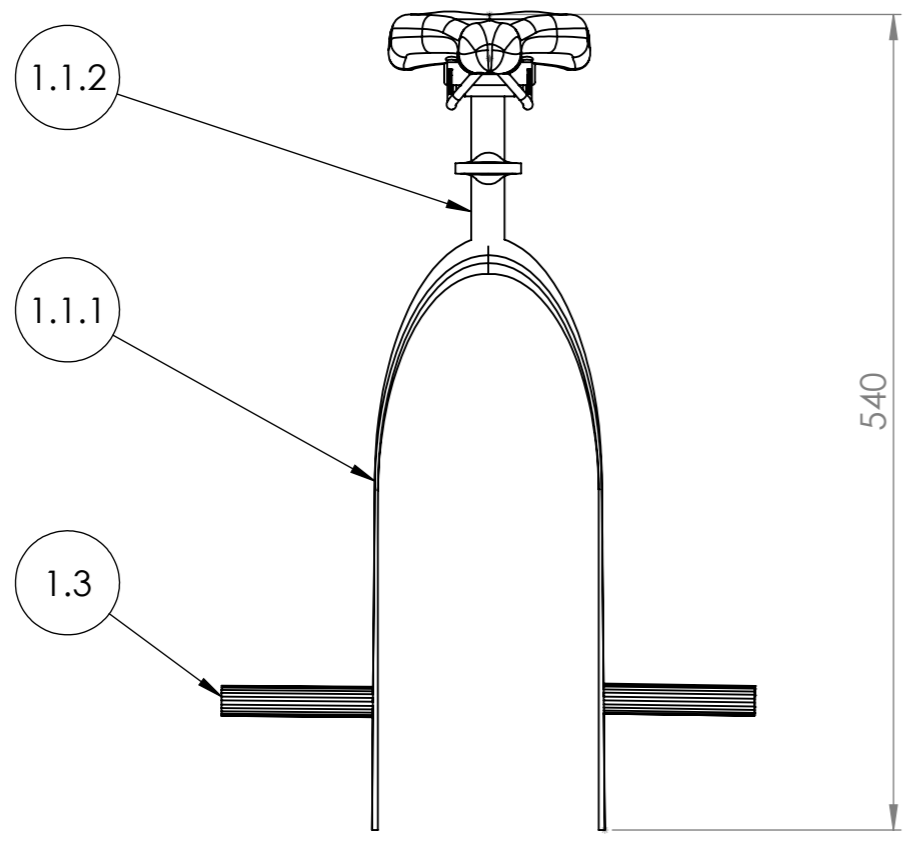
5 PLANS

5.1 DEFINITION PLANS

SET PLANS

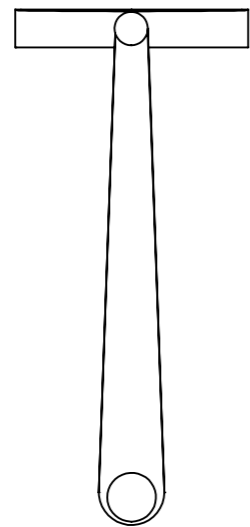
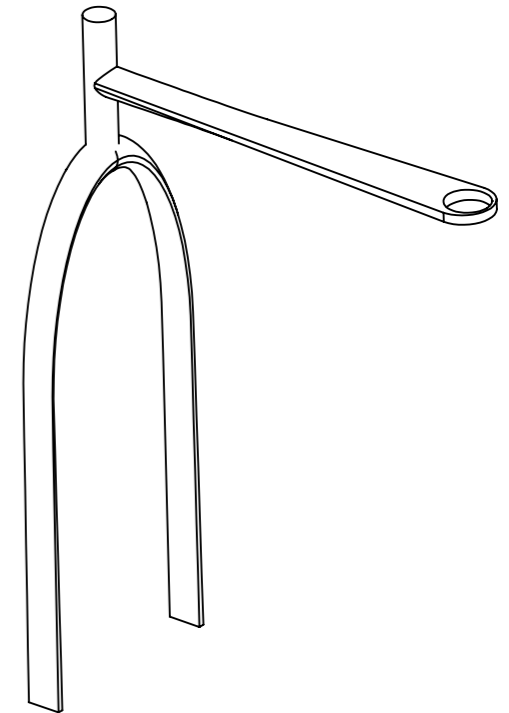
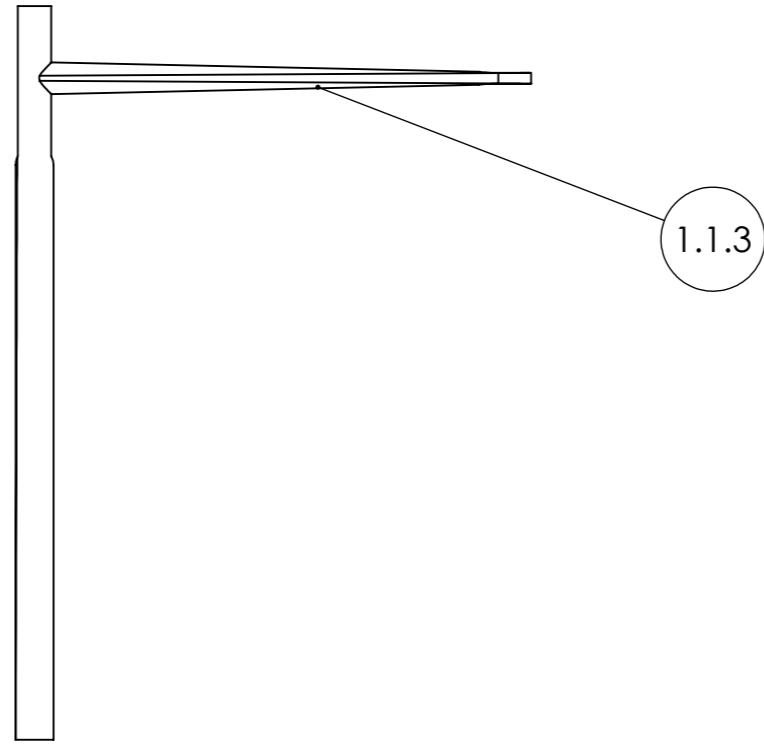
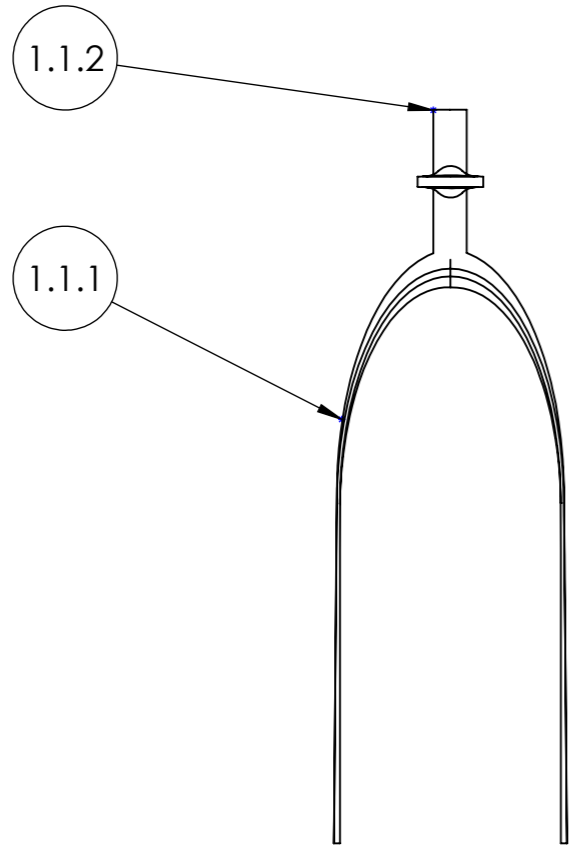
SUBSET PLANS

CUTTING PLANS



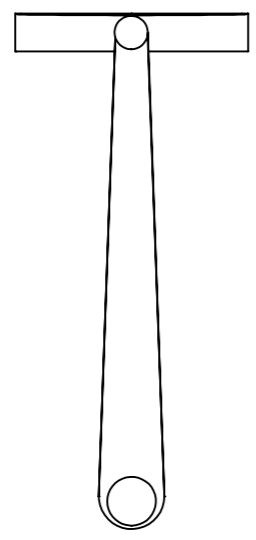
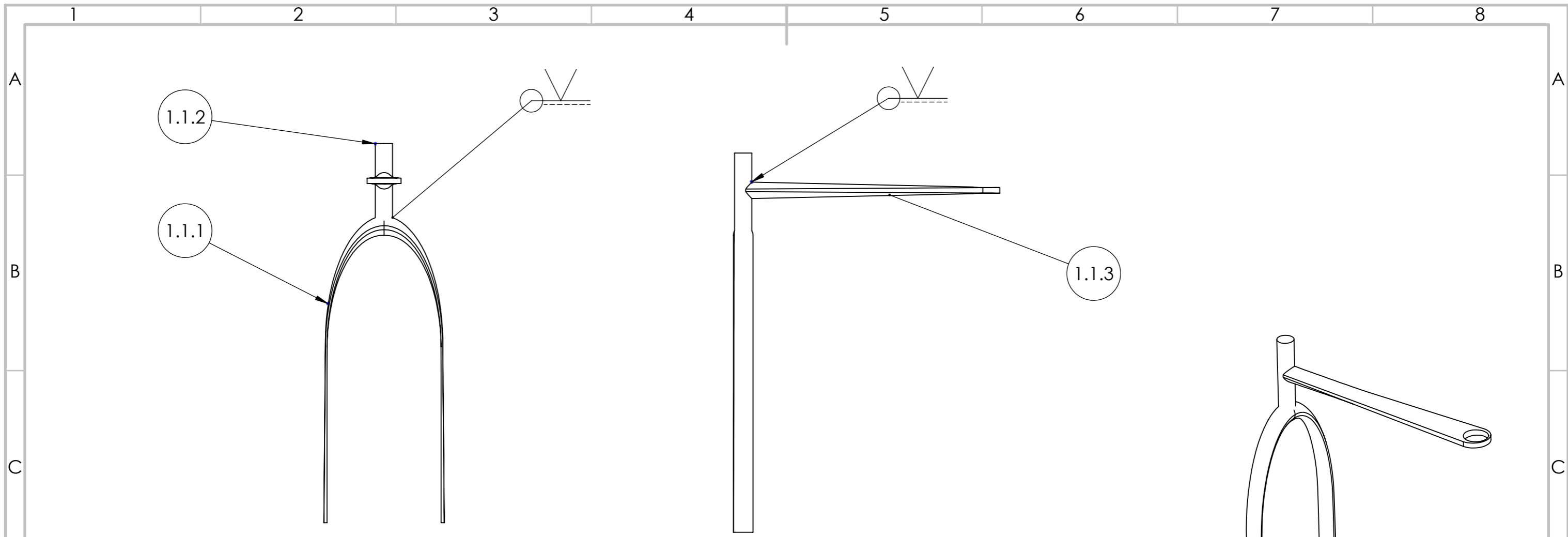
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1.2	FEET BAR	2		
1.1.3	HITCH	1		STEEL E-260
1.1.2	CYLINDER	1		STEEL E-260
1.1.1	BRIDGE	1		STEEL E-260
BRAND	DENOMINATION	QUANTITY	REFERENCE	MATERIAL

UNIVERSITAT POLITÈCNICA DE VALÈNCIA CAMPUS DE ALCOI		TITLE: INICIAL SADDLE SET	
		WORK TITLE: DESIGN OF A PASSENGER SADDLE FOR BIKE	
Reviewed by:	Unity: mm	1er SURNAME: ESTORNELL	DATE:
	SCALE: 1:5	2º SURNAME: PEREZ	11/06/2018
Mark:		Name: Dàmaris	SHEET:
		Titulation: Industrial Design Engineering	



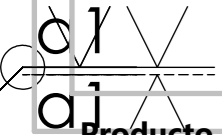
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1.1.2	CYLINDER	1		STEEL E-260
1.1.1	BRIDGE	1		STEEL E-260
BRAND	DENOMINATION	QUANTITY	REFERENCE	MATERIAL

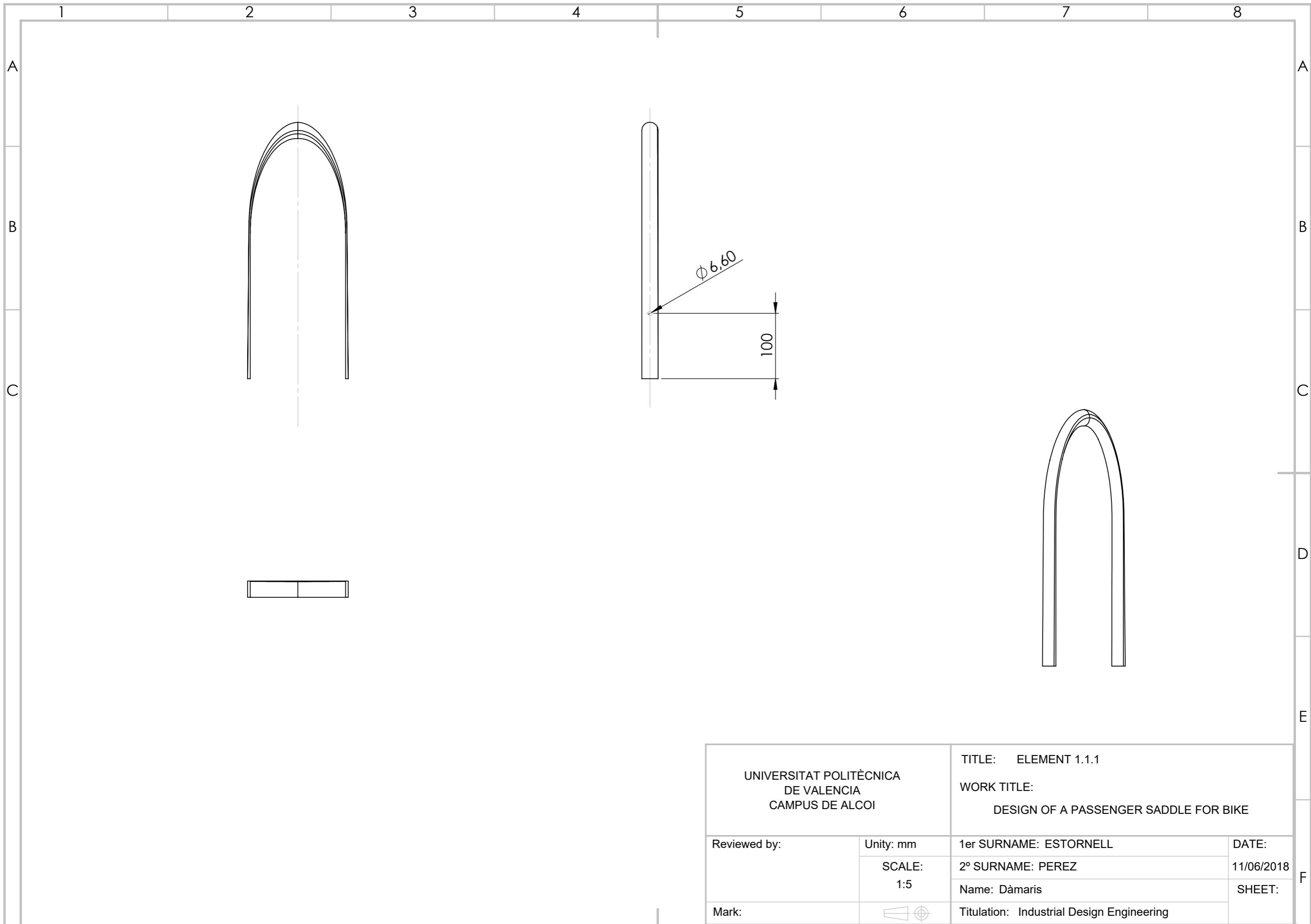
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		Titulation: Industrial Design Engineering	




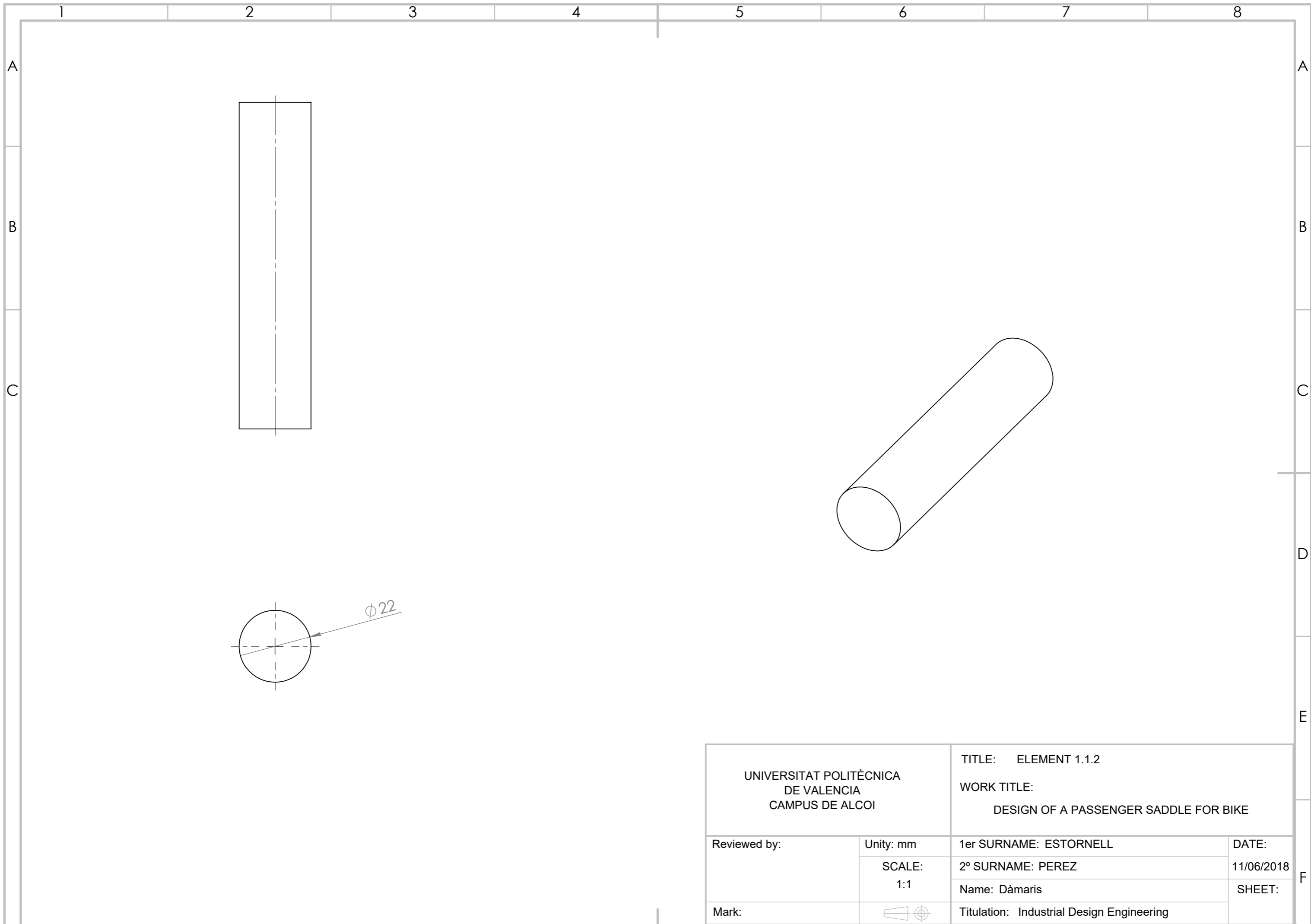
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1.1.2	CYLINDER	1		STEEL E-260
1.1.1	BRIDGE	1		STEEL E-260
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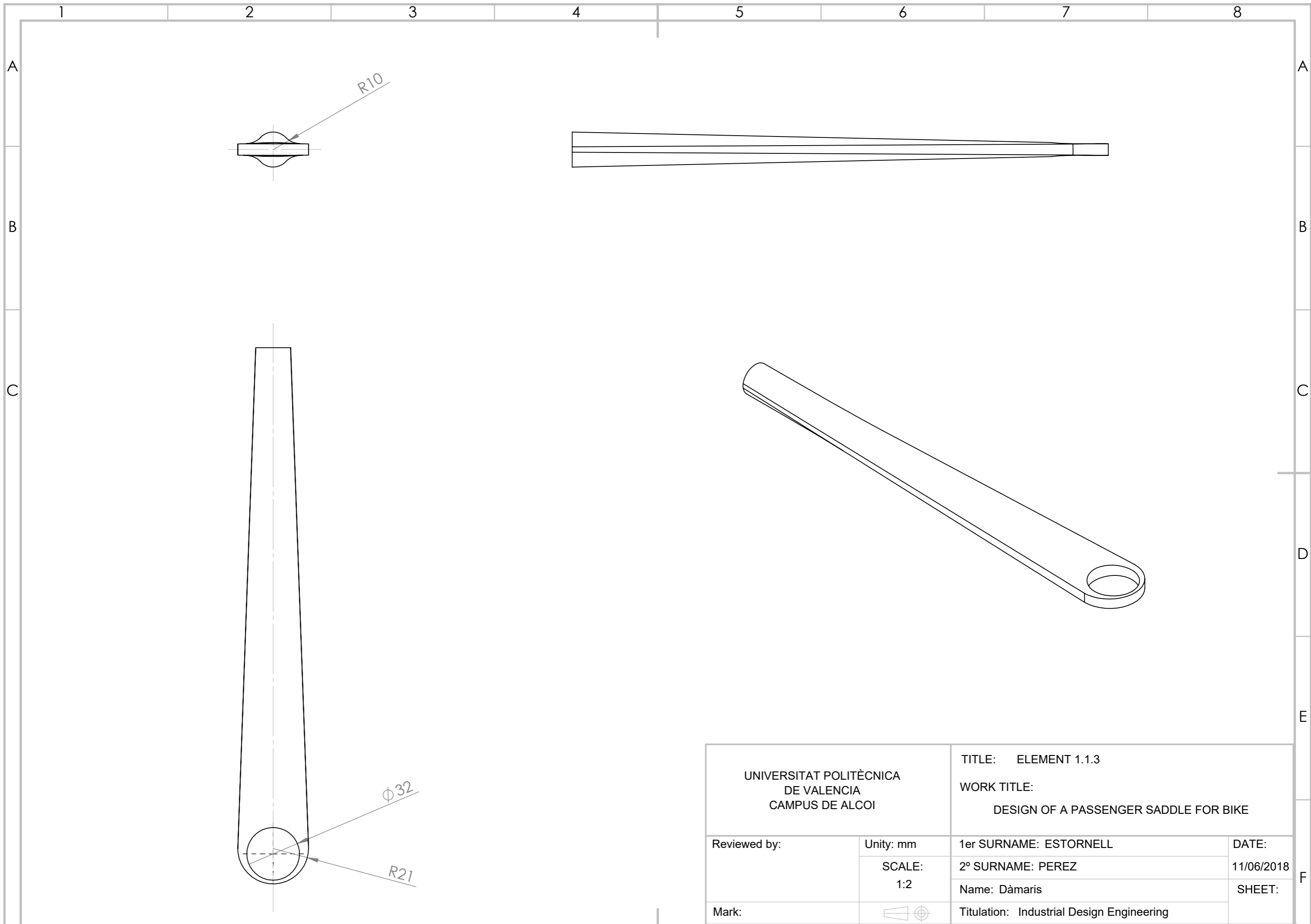




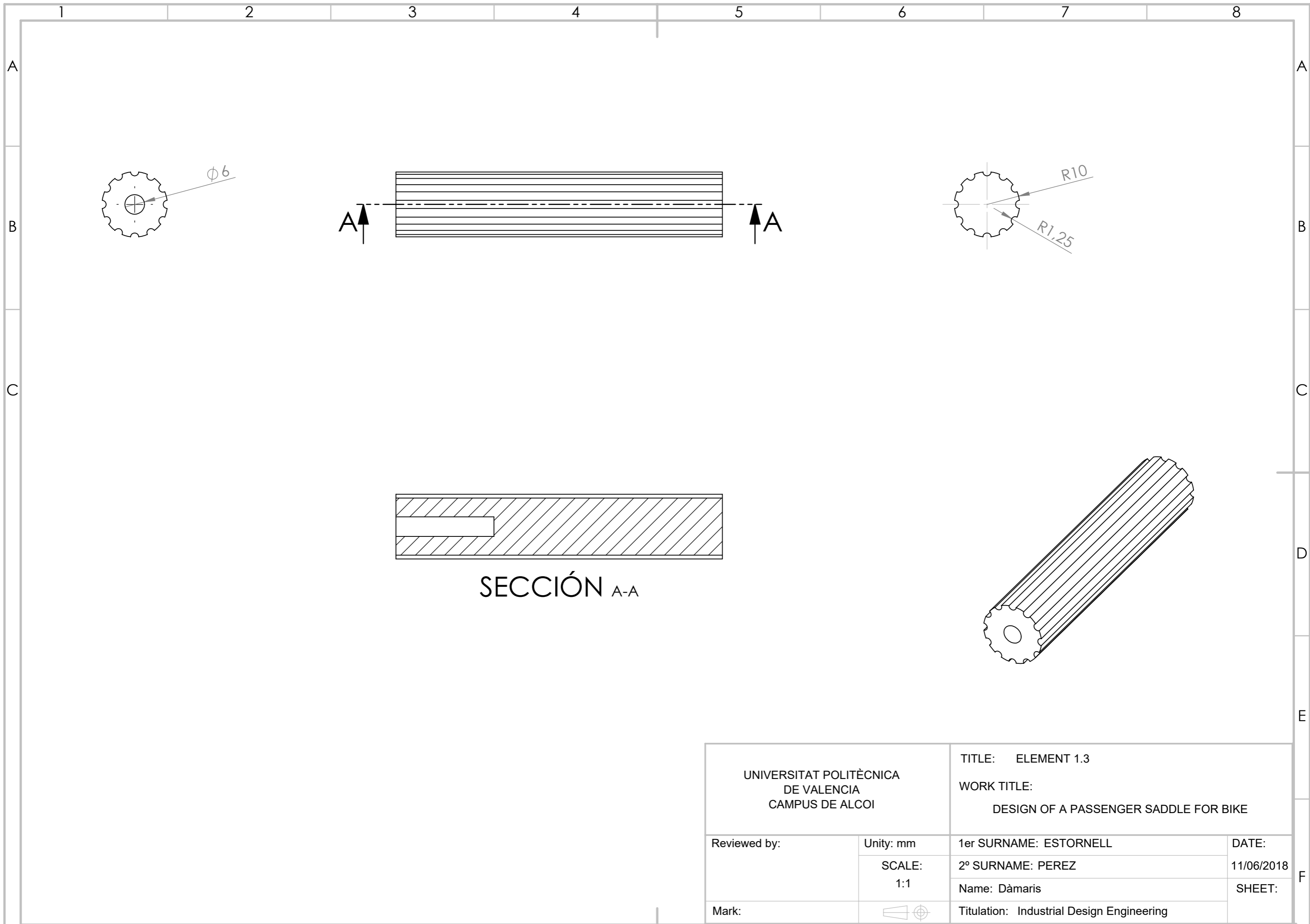
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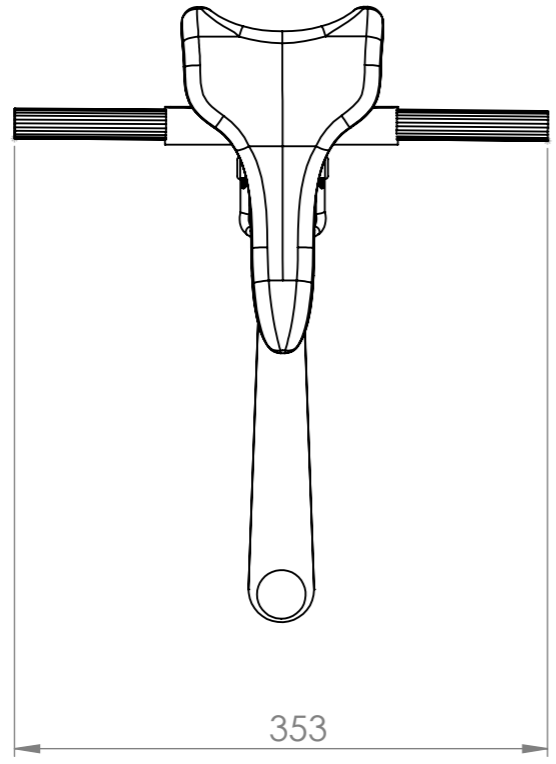
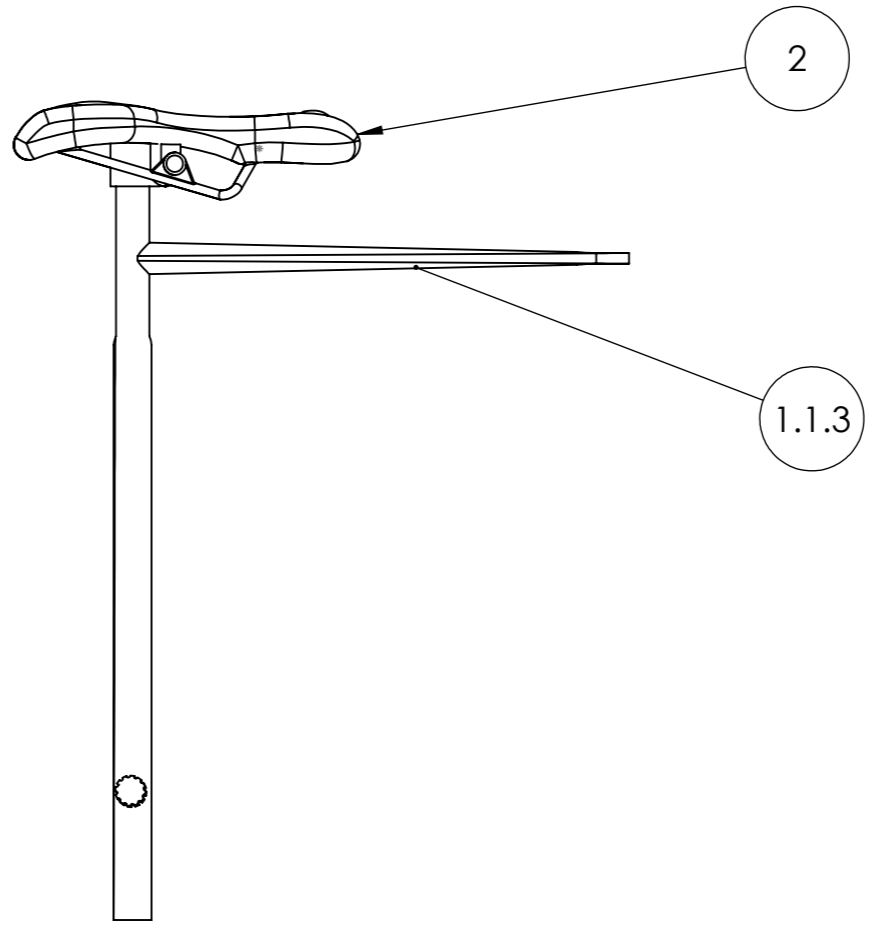
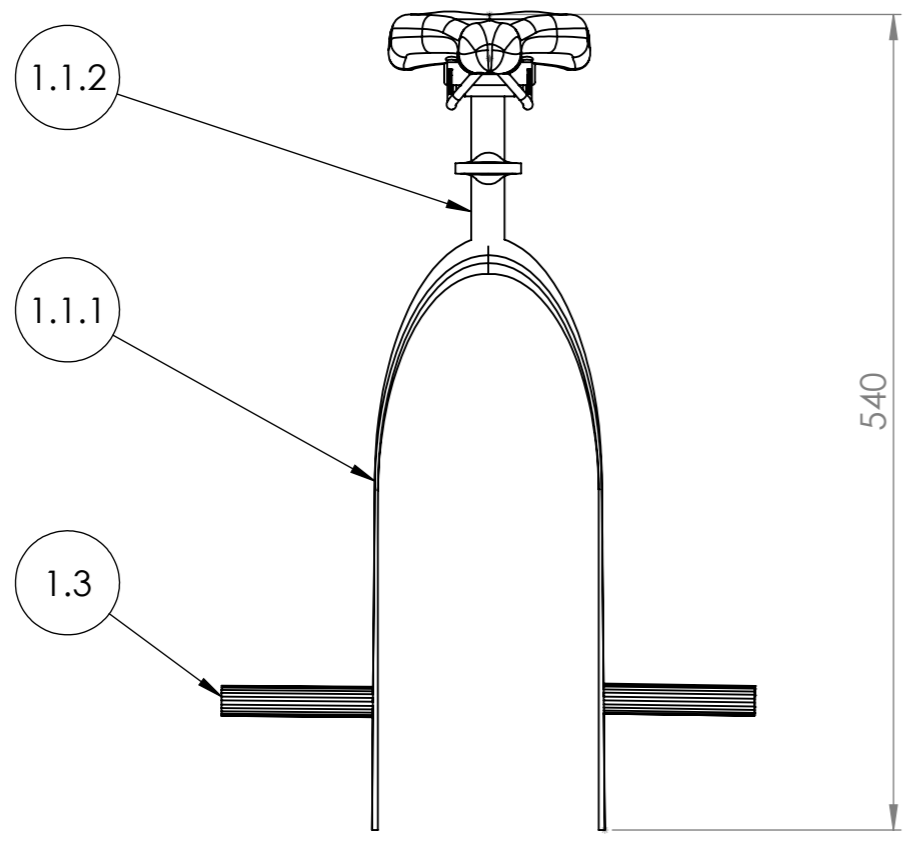


5.2 CONSTRUCTION PLANS

SET PLANS

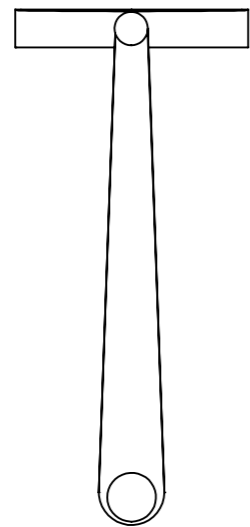
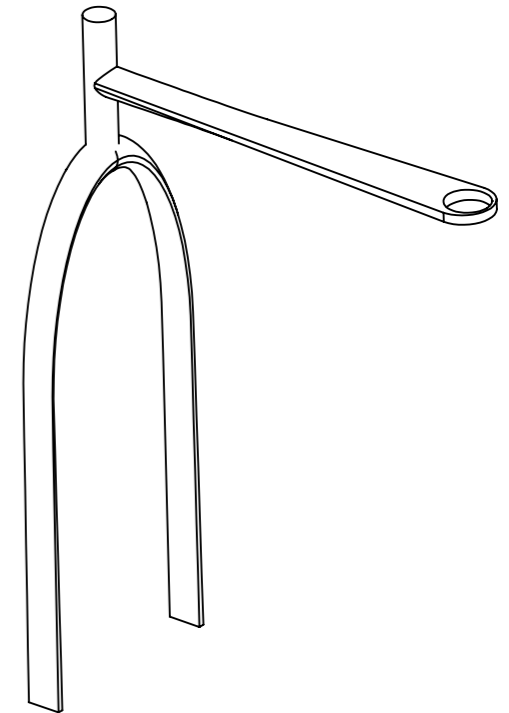
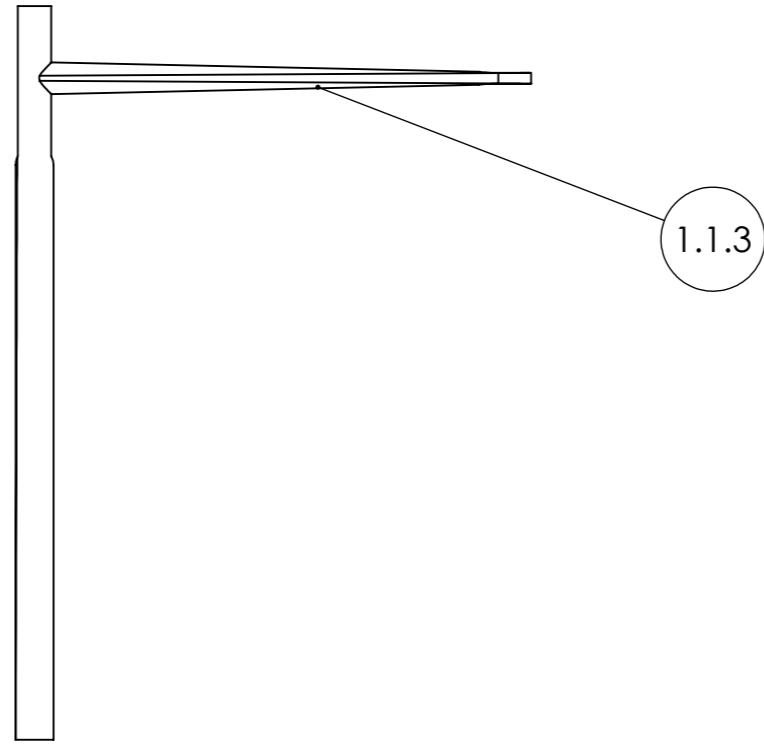
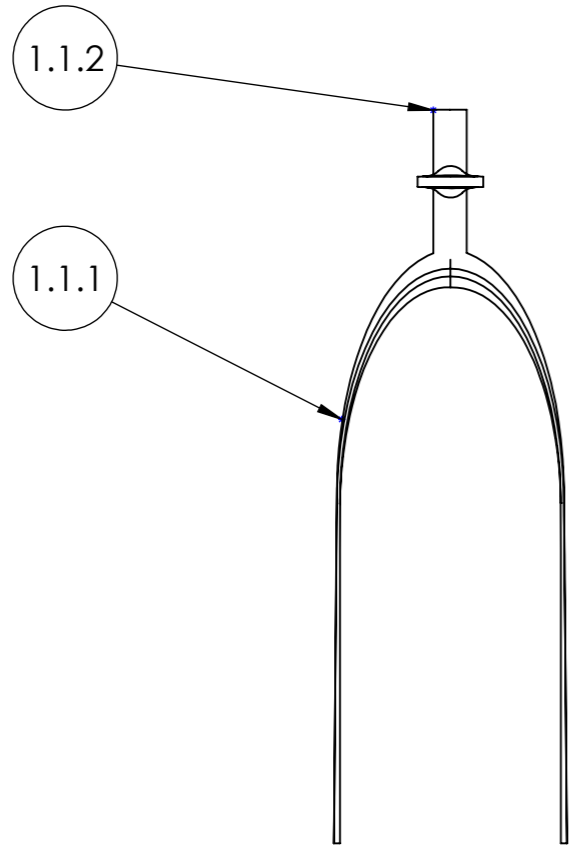
SUBSET PLANS

CUTTING PLANS



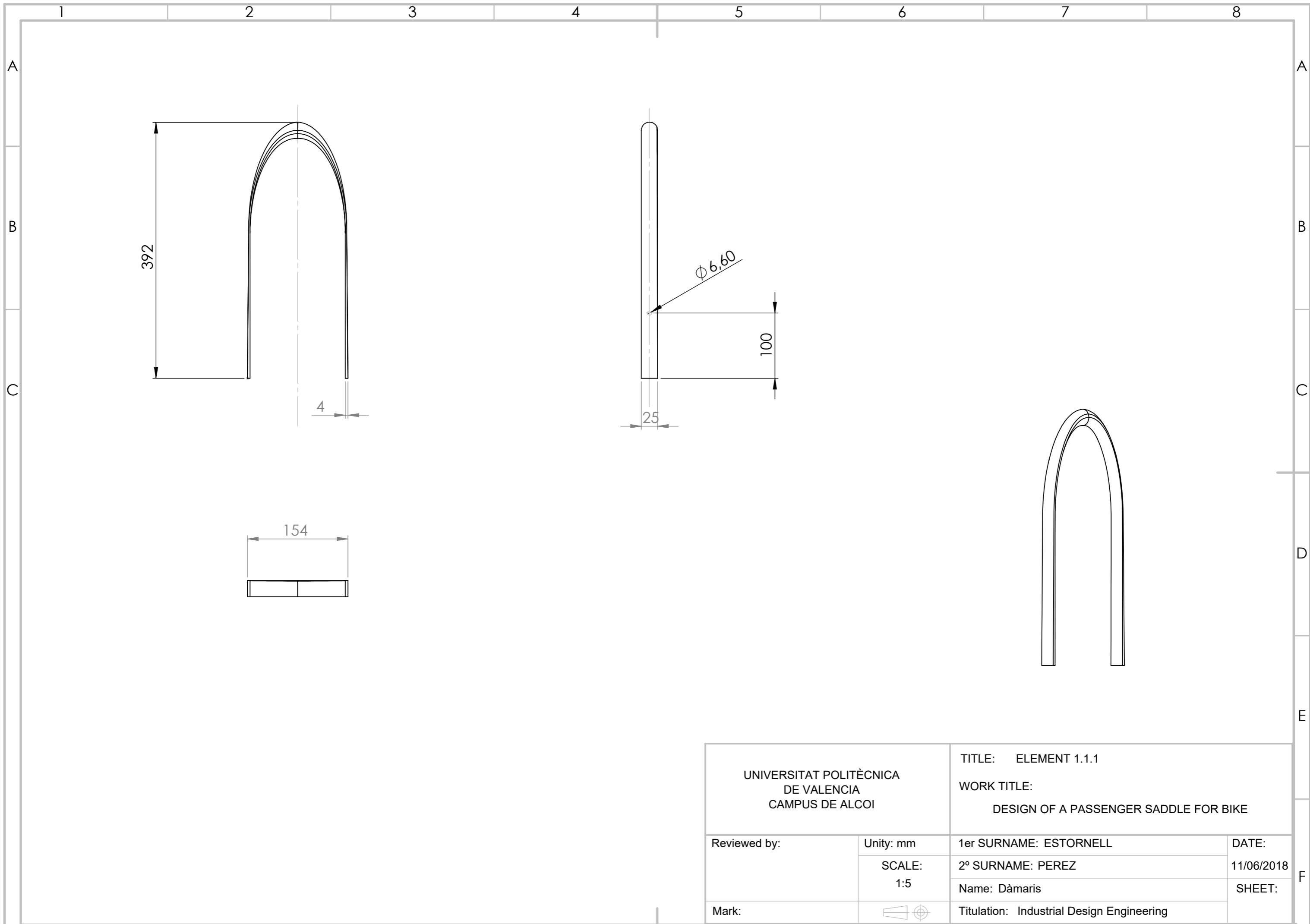
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1.2	FEET BAR	2		
1.1.3	HITCH	1		STEEL E-260
1.1.2	CYLINDER	1		STEEL E-260
1.1.1	BRIDGE	1		STEEL E-260
BRAND	DENOMINATION	QUANTITY	REFERENCE	MATERIAL


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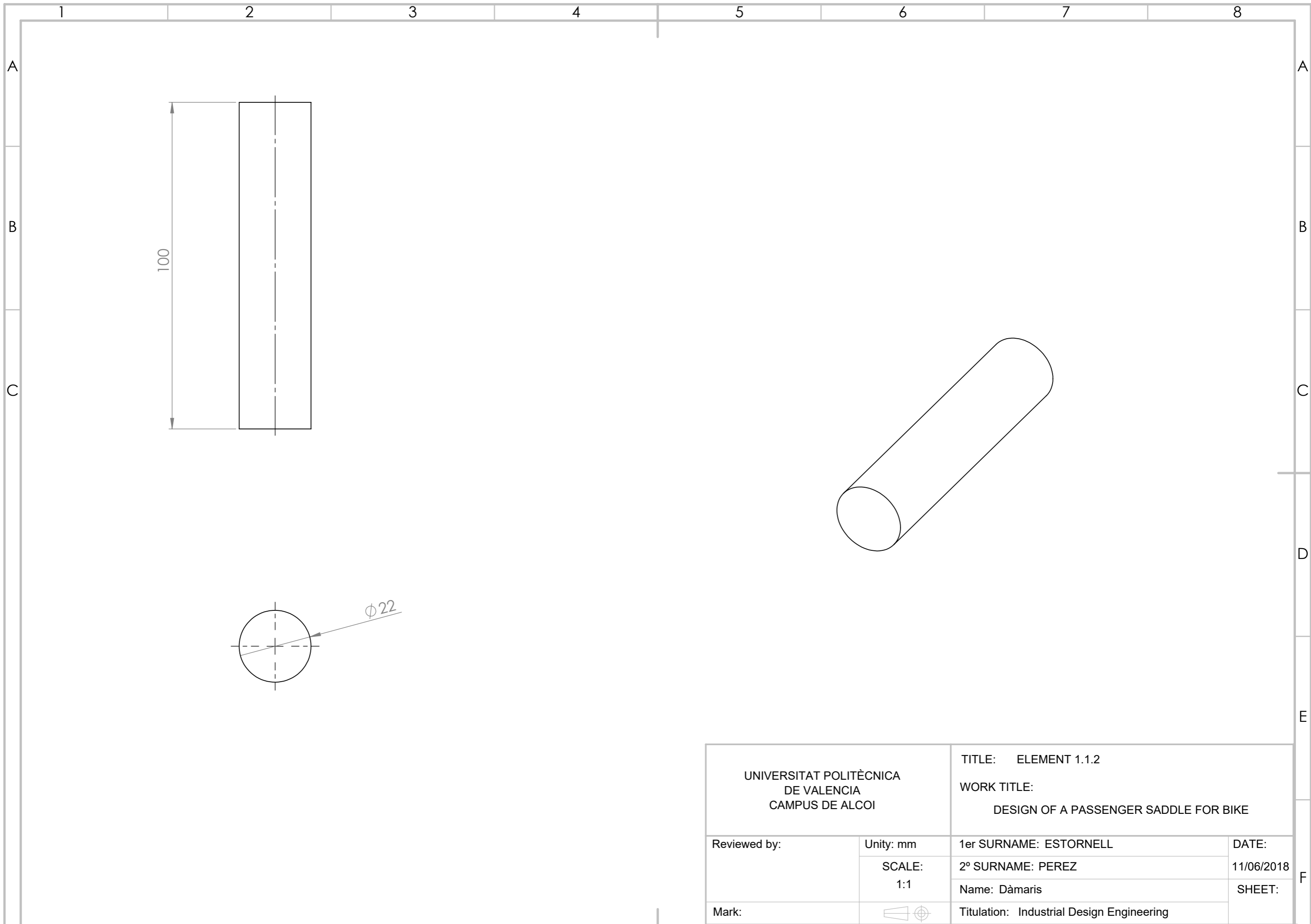



1.1.3	HITCH	1		STEEL E-260
1.1.2	CYLINDER	1		STEEL E-260
1.1.1	BRIDGE	1		STEEL E-260
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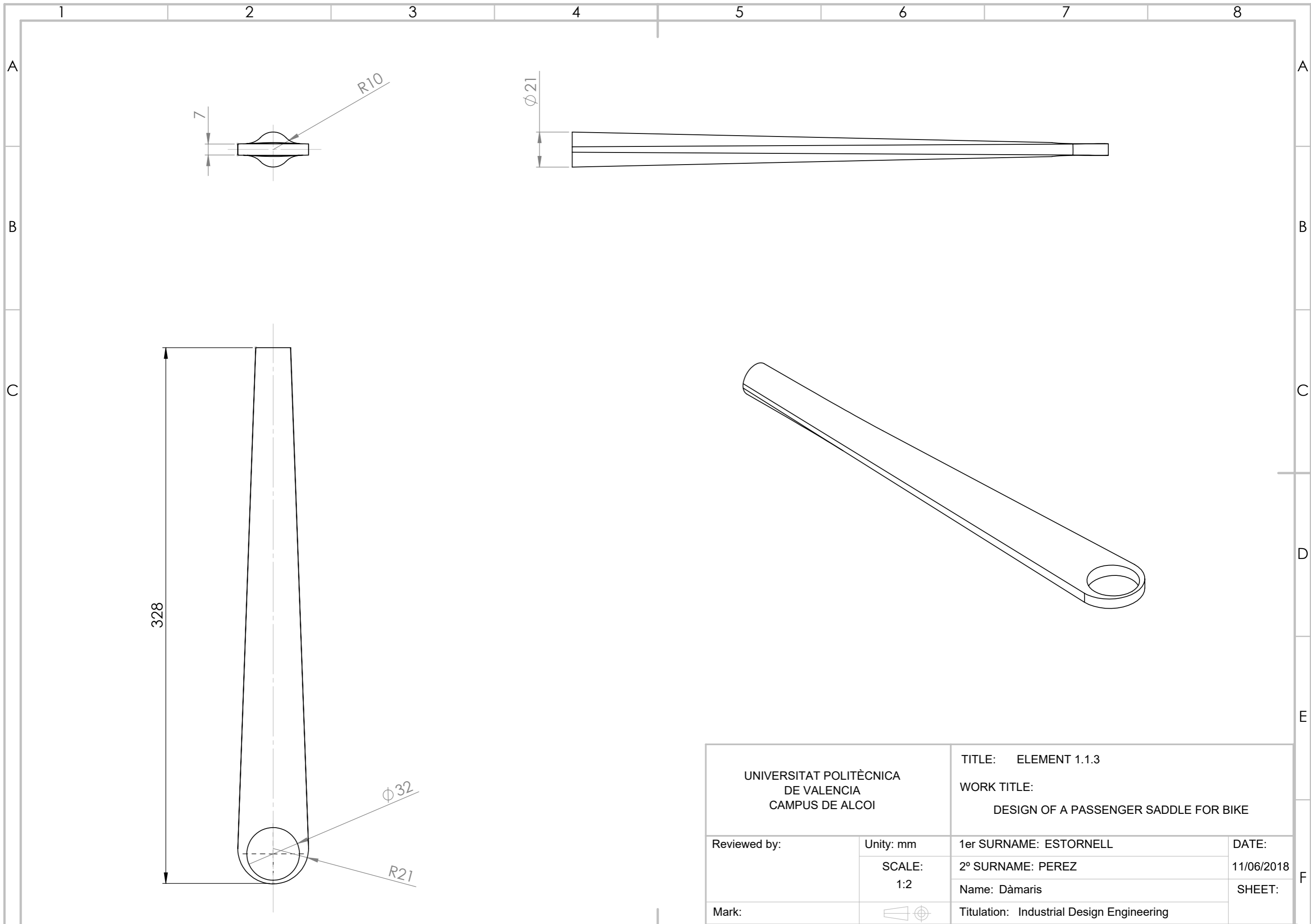
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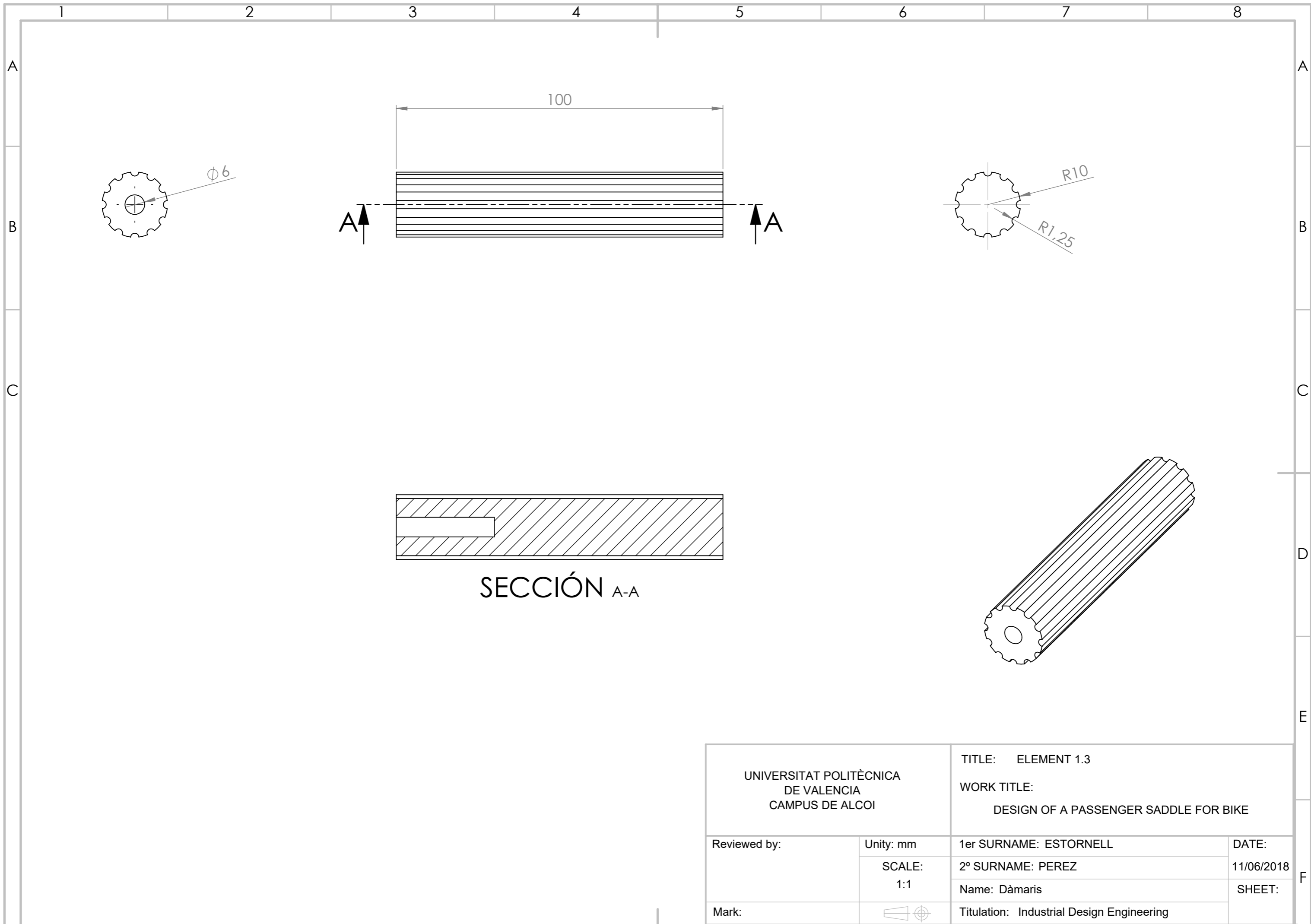
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Mark:		Name: Dàmaris	SHEET:
		Titulation: Industrial Design Engineering	

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<https://www.sciencedirect.com/topics/materials-science/carbon-fiber-properties>
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Elastopolymer gel (2)

- Bikes world. El sillín: morfología, partes y tipos.
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- J C Lötters, W Olthuis, P H Veltink and P Bergveld. The mechanical properties of the rubber elastic polymer polydimethylsiloxane for sensor applications.
<http://iopscience.iop.org/article/10.1088/0960-1317/7/3/017/pdf>

PHOTOS

Image 1 – Saddle

https://www.decathlon.es/sillin-bicicleta-urbana-100--id_8389349.html

Image 2 – Saddle support structure

<http://www.flowbikestore.com/cuadros/cuadro-bicicleta-pista-aerodinamico-negro&language=es>

Image 3 – Bar between setas

<https://articulo.mercadolibre.com.mx/MLM-614459914-stoneman-sports-qsp-610-adaptador-de-barra-de-bicicleta- JM>

Image 5 – Density table

<http://invenes.oepm.es/InvenesWeb/detalle?referencia=PCT/EP2007/006659>

Image 24 – Saddle 1

https://www.ebay.com/itm/Montura-para-Ciclismo-Bicicleta-de-Carretera-Bicicleta-Ninos-Cuero-Cojin-Asiento-Trasero-posterior/152524248023?_ul=CO&nma=true&si=04NNTN2e%252B9khVMG42AKMA6Mck4w%253D&orig_cvip=true&rt=nc&trksid=p2047675.l2557

Image 25 – Saddle 2

<https://www.eltiodelmazo.com/2016/06/13/sit-two-dos-personas-en-una-sola-bici/>

Image 26 – Saddle 3

<http://diariodeuncampista.com/2016/04/portabultos-para-bici-tipos-y-caracteristicas-principales/>

Image 27 – Saddle 4

<http://www.babaik.es/blog/portabultos-para-bicicleta-tipos-y-caracteristicas/>

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Image 45 – Electrode base

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