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CONTRACT CHAIR REDESIGN: EULÀLIA

Diploma Work

Engineering in Industrial Design
and Product Development

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Contract chair redesign: Eulàlia

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FACULTY OF MECHANICAL ENGINEERING

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Signed **Ignacio Ballester**,

Registration number: S4004680

I declare,

That the diploma thesis entitled:

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That my Diploma thesis will be result of my individual research work and that I am aware of potential criminal and disciplinary consequences, in case if I would use any unauthorized resources.

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ABSTRACT

The aim of the diploma work is to redesign the Eulalia chair. Mudat Studio is a start-up design studio founded in Valencia in 2020 by Ignacio Ballester, Pablo Verdés and Francisco Javier Martínez. The Valencian company Megamobiliario contacted the studio to design a chair that would fit in with the CREA collection, its new furniture collection designed for Victor Pinto.

For the presentation of the new collection, a POP-UP was organised at the Crafts Centre of the Valencian Community in which Mudat Studio collaborated by bringing its new product: the Eulàlia chair. After the month-long pop-up, it received a lot of feedback from designers, buyers, and users. Therefore, the work to be done is to redesign the chair, improving it, considering these factors.

The aim is to capture part of the creative process and analysis of the feedback received on Eulàlia and then to show the process of redesigning it, justifying the changes.

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1. INTRODUCTION

1.1 Briefing

The object to be developed is a chair for medium-anterior posture, intended for activities related to a table, which will be manufactured and distributed by a furniture company. For its design, the manufacturing process used by the company has been considered in order to guarantee the quality of the product.

1.2 Factors to consider

1.2.1 Conditions of the order

It is a question of designing a chair for the company MegaMobiliario for its new Crea collection.

MegaMobiliario has designed and manufactured a wide range of furniture for home and contract use. Always paying special attention to the care and detail in all the different stages of the manufacturing process. From design, in close collaboration with the designers, to the final stages of production, combining the latest technologies with the care and craftsmanship.

The design of the chair must be related to the way the company works, both in the way it manufactures its products and in their aesthetics. Some of the principles of MegaMobiliario are good design and quality.

One of the aspects to consider for the product design is the machinery used in the company. The factory has a 3-axis milling machine, sawing machinery, edge banding machine, painting, and polishing section. Most of the furniture they manufacture is orthogonal, so our design must adapt to these shapes. As for the final colors of the product, the new collection consists of finishes in natural colors, greens, and browns. Thus, it has been decided to leave the chair in natural finishes to better match the Crea collection. The chair can be finished in other finishes if the manufacturers think it is necessary to make it fit the pop-up.

1.2.3 Protection of the design

"An industrial design adds value to the product, makes it more attractive and eye-catching to customers and can even become the main reason to buy the product. Therefore, the protection of valuable designs is often a fundamental part of any designer's or manufacturer's business strategy.

By protecting an industrial design by registering it with an industrial property (IP) office at a national or national level, the owner obtains exclusive rights to prevent its reproduction or imitation by third parties."

To register the design of the chair in terms of its shape, the following has been done planimetry, explosion and modelling of the product in a file. After sending it with a burofax: a certified document that certifies in a reliable way and with full legal validity a certain event, document, or information in general it has been registered for a period of 1 year. For the redesign of the Eulàlia chair, other documents must be generated with the changes made to protect the new design.

1.2.4 Ergonomics

As previously mentioned, "Eulàlia" is part of the collection Crea collection of Megamobiliario, so its finishes and dimensions are based on this collection. The design process of the Eulàlia chair has been carried out under an ergonomic study. For this purpose, manuals, books, documentaries, and existing chairs on the market were consulted for reference.

The aim was to design a chair for medium-anterior posture, aimed at activities more closely linked to the table. The dining chair is the best example of this type of product. The following book was used to start with the design of the chair. This book was used to know which the dimensions are recommended to develop this type of chair.

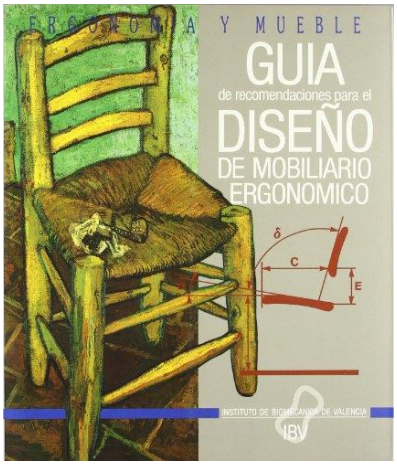


Illustration 1: Ergonomics guide [1]

TABLA 6.2

DIMENSIONES RECOMENDADAS PARA LA SILLA Y MESA MULTIUSO DESTINADAS A LA POSTURA ANTERIOR-MEDIA

(dimensiones en cm)

SILLAS	
A) Altura del asiento	41-43
C) Profundidad del asiento	40-42
D) Anchura del asiento	46-52
α) Inclinación del asiento	3°-5°
E) Altura del apoyo lumbar	15-17
δ) Angulo asiento-respaldo	100°-105°
G) Altura del respaldo	>42
I) Altura del reposabrazos	24
J) Distancia entre reposabrazos	46-52
K) Ancho útil de reposabrazos	>5
L) Longitud útil de reposabrazos	20
κ) Inclinación de reposabrazos	0°
ε) Angulo libre debajo del asiento	<60°
MESAS	
N) Altura de la mesa	69-73
P) Altura mesa-asiento	30-32
S) Altura libre debajo de la mesa	>65
U) Profundidad libre debajo de la mesa	>45

— La silla para postura media-posterior se acerca en su concepción a la silla de descanso, con más inclinación de respaldo. Se trata de sillas para cines, salas de espera, etc.

— La silla para postura media-anterior está destinada a actividades más ligadas a una mesa. La silla de comedor es el ejemplo más típico. Junto con las recomendaciones dimensionales para la silla, se incluyen otras para la mesa correspondiente (Fig. 6.9).

A) ALTURA DEL ASIENTO

Recomendación:

• Postura posterior-media: 39-41 cm

• Postura anterior-media: 41-43 cm

Criterio: A una persona calzada (2 cm de suela) le debe quedar la corva 1 cm por encima del punto más alto del canto delantero del asiento, como mínimo. No es tampoco conveniente que sobre más de 10 cm.

Comentario: El dato antropométrico relacionado es la altura del hueco poplíteo. Si se considera a los hombres del percentil 5 como referencia, más del 50% de las mujeres estarán bien acomodadas, sin gran perjuicio para el percentil 95 de los hombres. Como

Illustration 2: Recommended measurements

The measurements of the chair and the anthropometric dimension with which it was designed are explained below:

Seat height (45 cm): Should be between 41-45 cm. and the related anthropometric dimension is the height of the popliteal bone. The largest dimension allowed has been used as the table of the collection for which it is designed reaches 75 cm.

Seat depth. (40 cm): Between 40 and 42 cm, the related anthropometric datum is the buttock-popliteal length.

Seat width (45 cm): It must be between 45 and 52 cm, the anthropometric dimension that determines this measurement is the width of the hips. The smallest dimension has been selected because as the seat is made of solid oak, increasing the size increases the weight of the product considerably.

Seat tilt (2°. Should be between 3° and 5°): Larger angles are used in recliners. Using this angle favors postures that involve the use of the table.

Seat-back angle (103): Between 100 and 105 for seats with a forward-mid position. The backrest inclination depends on the intended use of the chair, in this case, active postures predominate.

Backrest height (18 cm): This is a thoracic backrest, in which the lumbar vertebrae are exposed to the air between the back legs. The upright position provided by the backrest, lumbar only, combined with the inclination of the seat, provides a correct anterior-middle posture.

During the prototyping and manufacturing process some of the dimensions have changed due to material optimization. The natural veneers that arrive at the company have specific dimensions and so adapting to them reduces the cost of production.

2. CHAIR: EULÀLIA

2.1 History and inspirations

The design of the chair must be related to the company. MegaMobiliario represents the Valencian tradition combined in the industry. Some of the principles of the company are good design and quality.

The first step in the creative process was to take as inspirations things related to Valencia. The city of Valencia and, by extension, the Valencian Community is a land of creativity. Valencian design is not only linked to aesthetics, but also to the functionality that connects with the needs of companies and the end user. Design in the furniture sector, understood as a tool for generating ideas and user-friendly products, made using traditional or innovative production methods, is a source of innovation.

It was decided to design based on Valencian tradition and industry. For this reason, some of the sources of inspiration were the following:

Illustration 3: Moodboard of inspirations: Valencia

In this moodboard there are pictures from “L’Albufera de València”, the Cathedral of Valencia, Town Hall Square, The City of Arts and Sciences, the Mediterranean Sea, craft tradition of the furniture industry and “L’Horta de València”.

The creative process began in Santa Eulàlia street, located in the centre of Valencia, which is why it was decided to choose Eulàlia as the name of the chair. A name with strength and elegance which transmits tradition and youth at the same time.

The project continued with the market study, sketching phase and selection of the final proposal.

Illustration 4: Moodboard of inspirations: market research

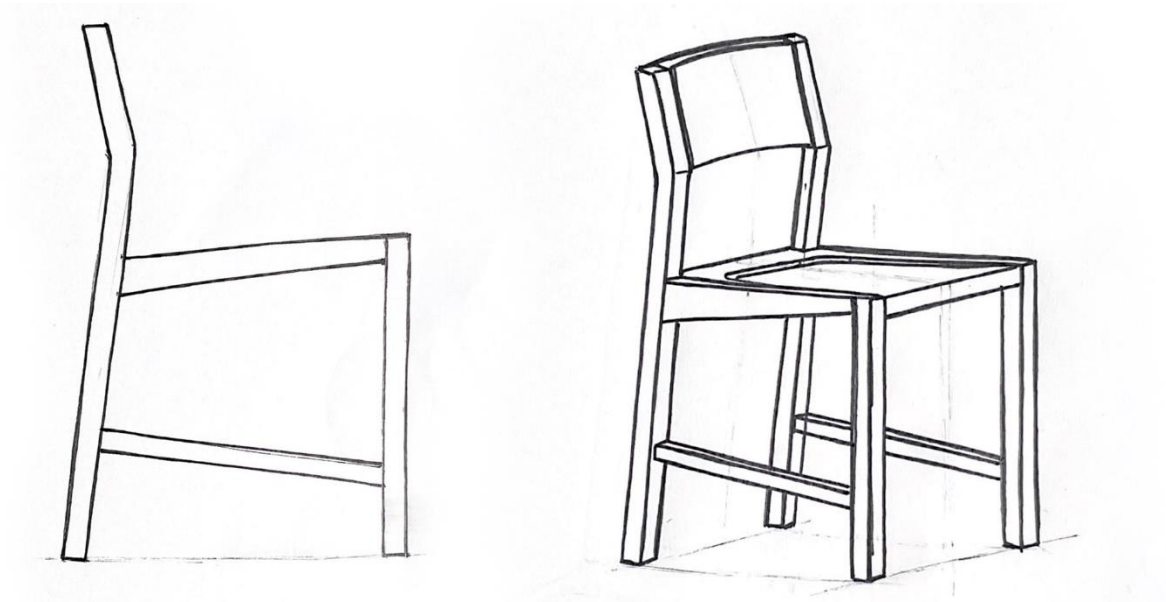


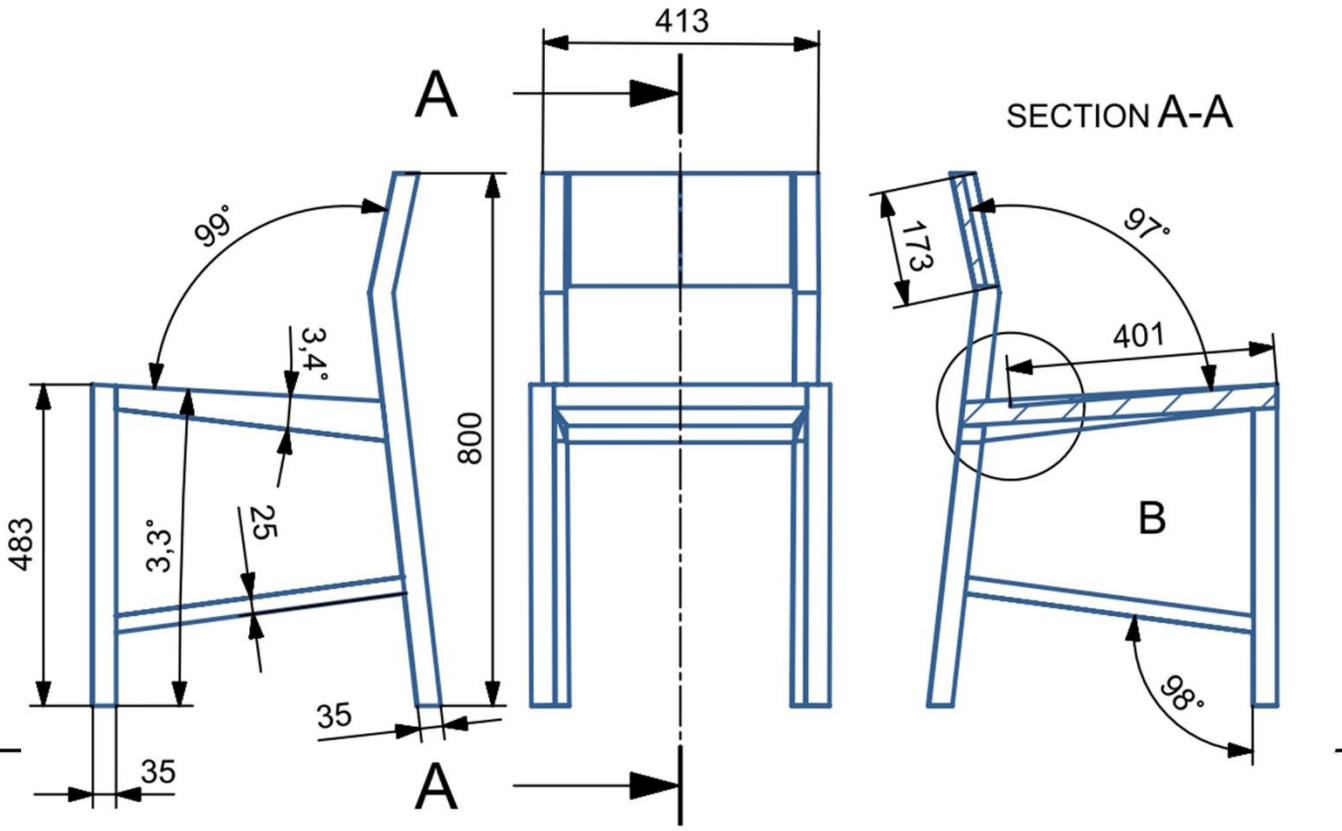
Illustration 5: Final sketches

After finalising the final proposal and its presentation, another meeting was organised with MegaMobiliario to find out exactly whether these pieces could be used for the composition of the chair. After a study of the chair, a series of changes were made to its assembly and structural reinforcements.

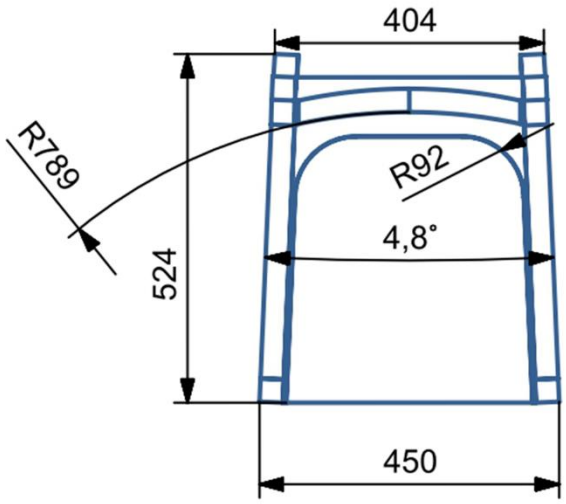
2.2 3D modelling and planimetry

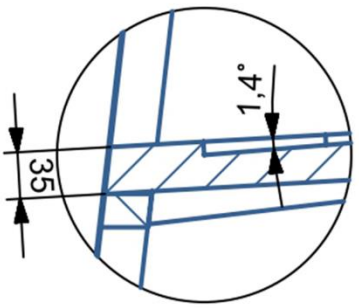
This is the final modelling of the Eulàlia chair before applying materials. It will be manufactured as it has been modelled after the last meeting.

Illustration 6: Shaded view of the Eulàlia chair



SECTION A-A





DETAIL B
SCALE 1:5

Scale: 1:10 Measures in mm.	Name: Ignacio Ballester Olmo	Title: Planimetry of Eulàlia chair
	Date: 15/06/202	Number of plane: 1

2.3 Rendering

The final finish of the chair is solid oak wood. This is the first result of the rendering of the chair seen in perspective view:

Illustration 7: Rendered view wood finish of the Eulàlia chair

Illustration 8: Rendered view final finish of the Eulàlia chair

2.4 Manufacturing process

The chair consists of the following parts. In the following, the different parts and their assembly will be explained. Exploded view:

1. Right front leg
2. Seat
3. Left front leg
4. Right back leg
5. Left back leg
6. Back
7. Right side
8. Left side
9. Back addition
10. Right structural bar
11. Left structural bar

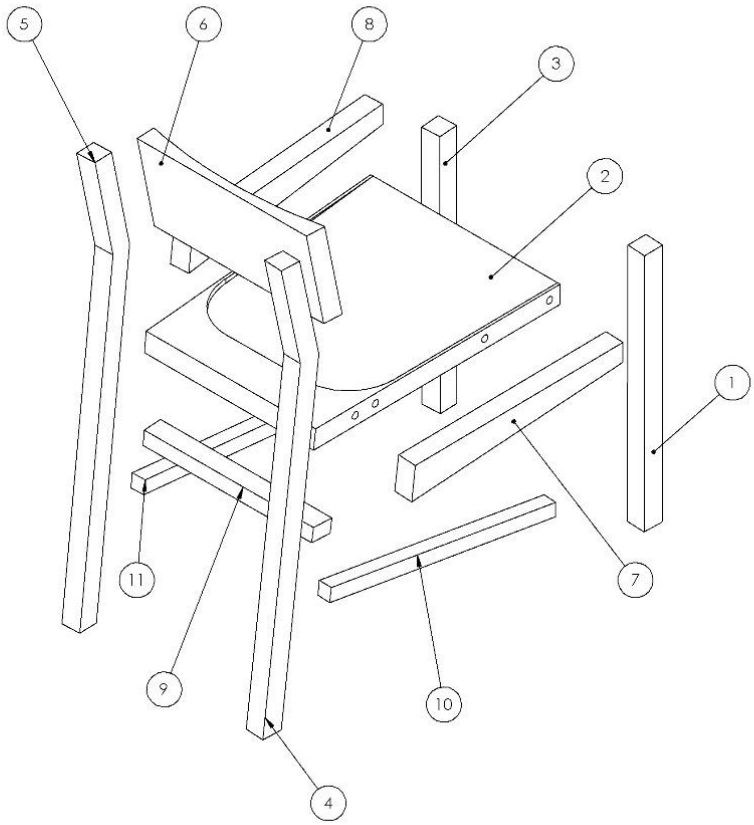


Illustration 9: Exploded view of the Eulàlia chair

The next step is to attach the profiles to the main seat (2) and backrest (6). The seat has 4 holes of 12 mm. diameter in which a bit of glue is inserted so that when the sides are assembledby pressure they are correctly fixed. The same happens with the backrest which has two 12 mm. diameter holes in the two lateral faces.

Once everything is assembled by hand pressure is applied by applying a clamp and with the help of wooden blocks, it is left under pressure the whole night, thus ensuring that the gluing does its function correctly.

Finally, the back addition (9) is assembled by gluing to comply with the aesthetics of the design.

After this assembly process, the chair is ready to go on to the next finishing process. The last step in the production process is lacquering and finishing. This is the result:

Illustration 10: Eulàlia chair after been assembled

As we can see, MegaMobiliario decided to lacquer the chairs to better fit in with the Pop-up aesthetics.

Illustration 11: Final finish of the Eulàlia chair

2.5 Mega Mobiliario's Pop-up

Between November and October 2021, MegaMobiliario organized a Pop-up: #CodeCREA in which its new collection was exhibited so that customers, users and designers could get to know the product first hand. One of the collaborators was Mudat Studio which exhibited its new chair: Eulàlia. As already mentioned, it was very helpful to know what were the mistakes or aspects that could be improved in the first furniture design made by the young studio.

Illustration 12: Eulàlia chair in Megamobiliario's Pop-up

2.6 Feedback after Pop-up

Due to delays in production schedules, the final product could not be manufactured, so the first prototypes were presented without testing with potential users. Testing and trials were to be performed during the pop up. There were three distinct issues that needed to be addressed after the pop-up in order to find a solution.

Reduce the weight:

The main material is solid oak. Because of this Eulàlia weighs 8,5 kg.The weight of the chair generated at the same time a good feeling because the users and customers knew that it was made of solid wood which increases the value of the product. Despite this, the final weight of the chair is too high as it must be reduced.

Structure and structural bars:

It was decided to add the structural or lateral bars to make the chair more compact and resistant when subjected to stress. It follows the symmetrical diagonal of the seat base, thus improving the aesthetics and giving it a distinctive point. The problem is that these bars generate more visual bulk and make it heavier to the eye. The aim is to eliminate them and design a hidden system to reinforce the structure of the chair once the weight has been reduced and the side bars removed.

Ergonomics

The front legs are too long, which makes the seat tilt more steeply. For people of medium-low height, this creates the possibility of sitting with an inclination that is not correct, thus preventing the feet from resting on the floor surface. An ergonomic study will be carried out to check if there are any measures to be changed to improve the ergonomics of the chair.

2.7 Summary

After analyzing the possible changes and classifying them in three different ways, a detailed description of the original parts of the Eulàlia chair will be made. Then the design methodology will be applied, after the initial feedback received, with the redesign of the Eulàlia chair.

3. REDESIGNING EULALIA

The aim of the redesign of Eulalia is not to vary much its shape and aesthetics since its design is perfectly adapted to the manufacturer and Mudat Studio. Therefore, the changes that will be seen below will be ergonomic, structural, weight and, to a lesser extent, aesthetic.

3.1 Detailed description of the design

To start the redesign, it is very important to know how exactly the different parts are, their characteristics and their manufacturing process.

The parts of the Eulàlia chair are industrially manufactured, while the assembly and final details are handcrafted. The chair consists of the following designed and commercially available parts:

3.1.2. Commercial parts

1. Wood dowel pins

Illustration 13: Wood dowel pins

- Dimensions: Length 30 mm. and diameter 12 mm.
- Units: 12.
- Material: Beech wood.
- Process: Industrial piece manufactured in large batches by sawing.

The wooden dowel pin is a cylinder that is used to join two pieces of wood, being the most used joint in carpentry.

2. Protective pad of adhesive felt.

Illustration 14: Protective pad of adhesive felt.

- Dimensions: Cylinder 30 mm. in diameter and 3.5 mm. thick.
- Units: 4.
- Material: Felt.

The pads on the underside of the legs serve to protect both the product from impact and the floor.

The total weight of the commercial pieces used is 0.1 kg.

3.1.3. Designed parts

In this section, the different parts of the chair will be analysed in order to subsequently redesign those that are necessary and compare them with the originals in terms of both shape and weight.

1. Front legs

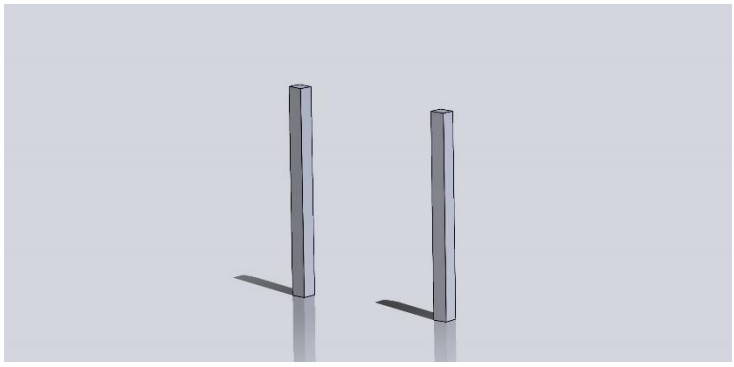


Illustration 15: Front legs

- Dimensions: W 35, D 483, H 35, mm.
- Units: 2.
- Weight/unit: 0,38 kg.; Total weight: 0,76 kg.
- Material: European natural oak.
- Shape: Quadrangular prism.
- Manufacturing process: Machined cut.

The front legs are attached to the seat piece and side joints by means of drilled holes and wood dowel pins. It has the same thickness as the side joints which gives the appearance of a single piece when joined together.

2. Back legs

Illustration 16: Back legs

- Dimensions: W 35, D 800, H 35, mm.
- Units: 2.
- Weight/unit: 0,70 kg.; Total weight: 1,40 kg.
- Material: European natural oak.
- Shape: Prism with square base that provides strength to the chair.
- Manufacturing process: Mechanized cutting of wood sheets.

The two back legs start from the floor and reach the highest part of the chair. Between them is the backrest, which is glued to the back legs.

3. Seat

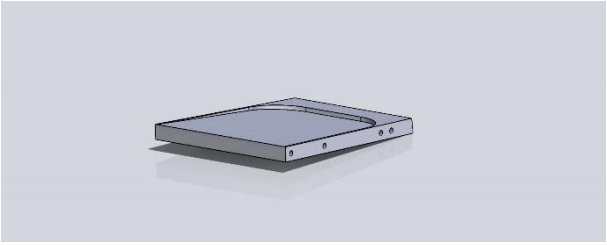


Illustration 17: Seat

- Dimensions: W 380, D 471, H 35, mm.
- Units: 1.
- Weight: 3,74 kg.
- Material: European natural oak.
- Shape: Solid trapezoid with 1 cm fretwork (made with 3-axis machinery).
- Manufacturing process: Mechanized laminate cutting. The underlayment is made by milling and the side holes by drilling.

The seat has an underlayment to improve comfort. On the sides of the seat have been drilled to introduce the wood dowel pins and thus join the rest of the parts. These holes for tufting serve to strengthen the joints of the chair and provide structural rigidity to the product.

4. Backrest

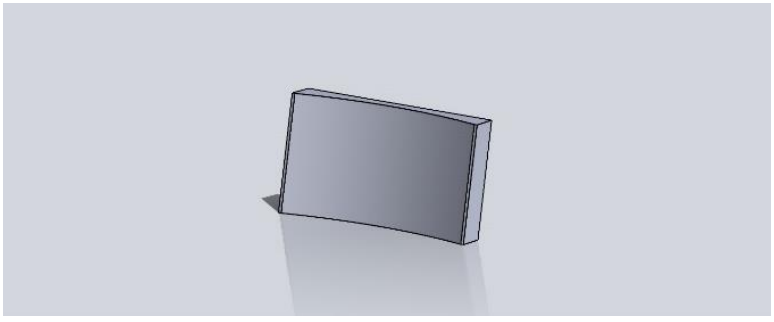


Illustration 18: Backrest

- Dimensions: W 344, D 35, H 170, mm.
- Units: 1.
- Weight: 0,96 kg.
- Material: European natural oak.

- Shape: rectangular prism with the front surface curved
- Manufacturing process: Cutting of solid oak block and bending by vertical milling machine.

The backrest in the Eulàlia chair only covers the thoracic area and, due to its dimensions, the lumbar region is exposed to the air. As previous I mentioned, it has been glued to the back legs. Finally, the backrest has an ergonomic curve made by milling, this difference offers the necessary comfort in a chair of medium-anterior posture.

5. Side joints

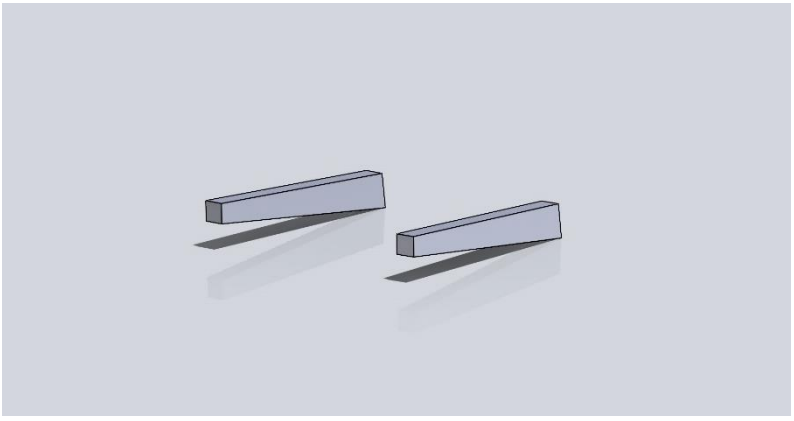


Illustration 19: Side joints

- Dimensions: W 35, D 407, H 60, mm.
- Units: 2.
- Weight/unit: 0,47 kg.; Total weight: 0,94 kg.
- Material: European natural oak.
- Manufacturing process: machined cut and drilled side holes.

These side pieces join the back legs, the seat, and the front legs. In the same way that they join to the seat, they join to the legs, through perforations and wood dowel pins. These structural parts give the seat sufficient strength to support the weight of the user.

6. Back addition

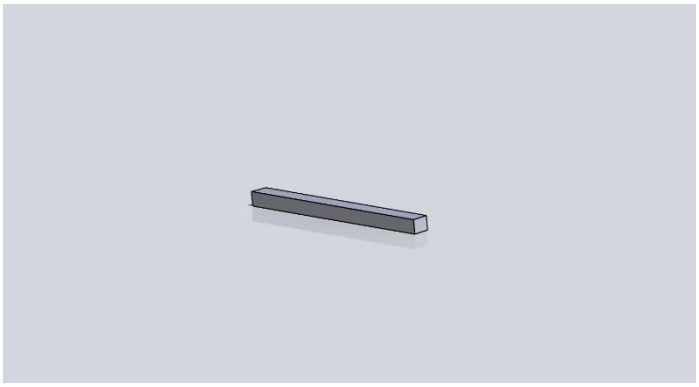


Illustration 20: Back addition

- Dimensions: W 25, D 343, H 35, mm.
- Units: 1.
- Weight: 0,22 kg.
- Material: European natural oak.
- Shape: rectangular prism.
- Process: Machined cut.

This component is located at the back of the chair, under the seat. The function of this component is purely aesthetic. In the side view of the seat, this should be perceived in a decreasing way. This effect is achieved thanks to the rear trim. In addition, as the lower part of the seat is not completely solid, this reduces the weight of the whole product.

7. Structural bars

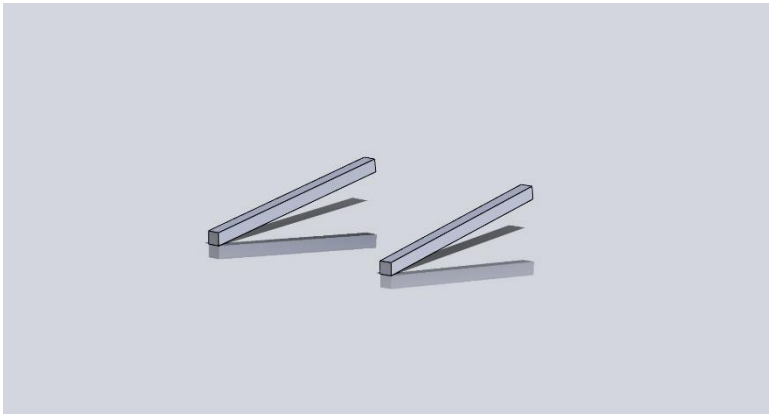


Illustration 21: Structural bars

- Dimensions: W 25, D 436, H 25, mm.
- Units: 2.
- Wight/unit: 0,19 kg.; Total weight: 0,38 kg.
- Material: European natural oak.
- Shape: Quadrangular prism.
- Process: Mechanized cut.

The side locks serve as reinforcement between the front and back legs and front legs. This component is indispensable in our design, because without it the chair would not lack the strength to support the weight of the users. These braces distribute the weight throughout the structure of the chair and are fixed to the legs by means of tufts and gluing.

The total weigh of the parts designed is 8,4 kg. We must add 0,1 kg. of the commercial parts. **The weight of the Eulàlia chair is 8.5 kg.**

3.2 Methodology in design

A design methodology must be used in all projects or product development. The methodology, in addition to the definition of the process to be followed with its phases, stages, milestones, decision and setback points, etc., includes documentation and support tools suitable for a wide range of situations, casuistry, since each project is totally singular and specific and cannot be generalised. [2]

The methodology to be used is the **Lean Start-up methodology**. As mentioned above, the feedback that was obtained was based on the prototypes made by the company.

The **Lean Startup** methodology allows the validity of the product to be tested throughout the entire process. Based on a prototype, the needs of the customers are known, and this means that, as it is not a finished product, the investment is lower, as is the failure rate. This methodology is applied through three steps: build, measure and learn.

1. Build

In this initial phase, the idea has to be translated into a material product. The result is a minimum viable product (MVP) or prototype with basic functions that can be used to study the reaction of customers. This way, with the data collected, the article can be refined, and it is possible to know which public will be interested.

In this case, the young Valencian studio, after researching the market and drawing inspiration from Valencia and its cultural tradition, transformed their idea into a material product: the Eulàlia chair. The prototype of the chair was presented at the MegaMobiliario Pop-up to find out the reaction of the interested public. The company's investment was not high as only a run of 4 prototypes was made.

2. Measuring

To know if the project is working, you need good measurement tools. The second is to collect information about the product and consumer reactions. At this stage there are the "pirate metrics" from which the product response is collected. Applied to this case, the "pirate metrics" are:

- Acquisition: gaining a new customer. The MegaMobiliario pop-up was to be attended by regular customers and retailers. After the announcement of the participation of the Eulàlia chair, a new target group entered the scene. Young people interested in Valencian and national design came to see the new chair previously shown on social networks. Automatically another customer was generated.

- Activation: the new customer registers and uses the product. As mentioned above, new customers, together with regular customers, come to the pop-up to use the product.

- Reference: the customer shares the product with friends. After going through the pop-up, customers and users comment on the product with friends and professionals. This is where the points for improvement are collected.

3. Learning

In this last step, the company learns from the results collected during the whole process. From here the cycle starts again to elaborate the final product. It is built by knowing what potential customers need and the opinions of people directly or indirectly related to the project.

Knowing what the customer wants reduces the probability of failure. At this point, once all the comments have been gathered, the process of redesigning the Eulàlia chair begins to obtain the best possible result and, after that, to launch it on the market as a finished product. [3]

This is the outline of how this circular methodology works.

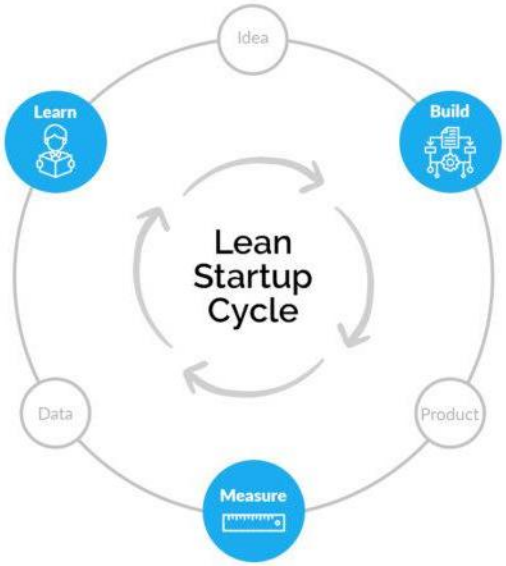


Illustration 22: Lean Start-Up Cycle [4]

3.3 Analysis and development of the changes

Using the lean start-up methodology, specifically in the third step, we have learnt which characteristics of the Eulalia chair need to be modified to improve it.

This section will analyse and develop the different points of improvement of the Eulàlia chair, comparing the pieces of the first design with those of the redesign to see the points of improvement and the development that has been carried out.

As previously mentioned, reducing the weight was one of the points to improve the initial chair. The weight of Eulàlia is 8.5 kg, a rather high weight for a chair, this is due to the fact that its components are made of solid oak. To reduce the weight, the ergonomics and structure of the chair must be considered, factors that also needed to be improved. It must maintain optimal measurements and be in the range of the recommended measurements for the ergonomics of an anterior-medium posture chair. In addition, despite the reduced weight, the chair must withstand the corresponding compressive and bending stresses. The objective is to keep solid oak as the main material, as it gives the product quality and structural strength.

3.3.1 Analysis of the market

A market analysis of anterior-medium posture chairs made of oak has been carried out in order to know and establish a range of different.

Ruskin Chair [5]

Solid oak dining chair with oak veneer reinforcement.

- Measures: W 54 x H 82 x D 45 cm; Weight: 7 kg.

Illustration 23: Silla Ruskin

Silla Ply II [6]

Scandinavian-inspired, the Ply II chair, made entirely of solid oiled oak, has sober, clean lines for a very natural finish.

- Measures: W 45 x H 81 x D 50 cm.; Weigh: 8.6 kg.

Illustration 24: Silla Ply II

Cross Chair [7]

The Cross Chair frame is made of solid oak: a durable material with a natural weight that lends authority to the design. Made only from FSC-certified wood, eco-labelled wool, and aniline leather.

- Measures: W 50.8 x H 76.7 x D 47.6 cm; Weight: 5 kg.

Illustration 25: Cross Chair

EX 1 [8]

The EX 1 chair is a timeless design, made of solid oak. Varnished for extra protection.

- Measures: W 43 x H 82 x D 56 cm.; Weight: 7 kg.

Illustration 26: EX 1 chair

These 4 chairs have been selected as they have similar characteristics to the Eulalia chair. The average weight of these chairs made of solid oak is 6.9 kg. Once the search and analysis has been completed, it has been concluded that Eulàlia should weigh between 6 kg and 7 kg so, reduce its weight by between 1.5 kg and 2.5 kg as minimum.

3.3.2 Development and analysis of the redesign

In the following, the development that has been followed for all the changes made for the redesign of Eulalia will be explained. The original pieces will be displayed with a wood finish and the redesigned pieces with a greyish finish.

To make it less visually heavy and slenderer, it has been decided to reduce the thickness of the parts that make up the sides of the chair from 35 mm to 30 mm. This is the comparison of the original parts with the redesigned parts both in terms of shape and new weight.

Front legs

The base of the front leg is 35 x 35 mm, in the new front leg it is 30 x 30mm. This is the comparison of the original piece with the current one.

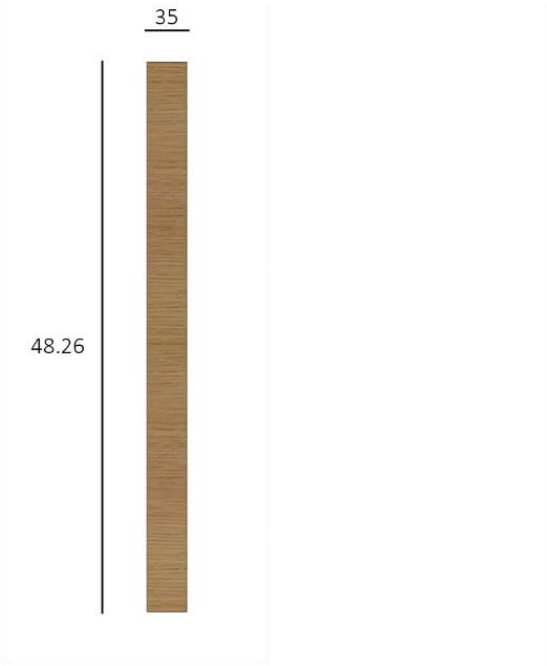


Illustration 27: Comparison 1 - front legs

Side joint

The side joint piece has also undergone modifications, its thickness is now 30mm and its length 426.87 mm. The weight of this part per unit is reduced from 0.47 kg. to 0.37 kg.

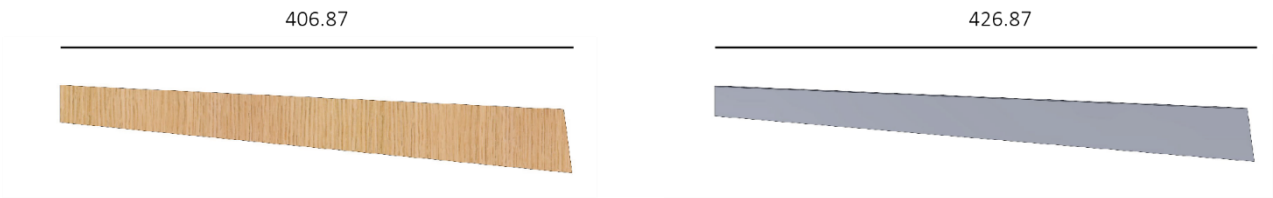


Illustration 28: Side joint comparison

Back legs

As for the back legs, the prism base is reduced from 35 x 35 mm to 30 x 30 mm. The weight of this piece per unit is reduced from 0.7 kg. to 0.5 kg. In addition, along with the backrest, the edge in contact with the user's back has been rounded by 5 mm to make it more comfortable.

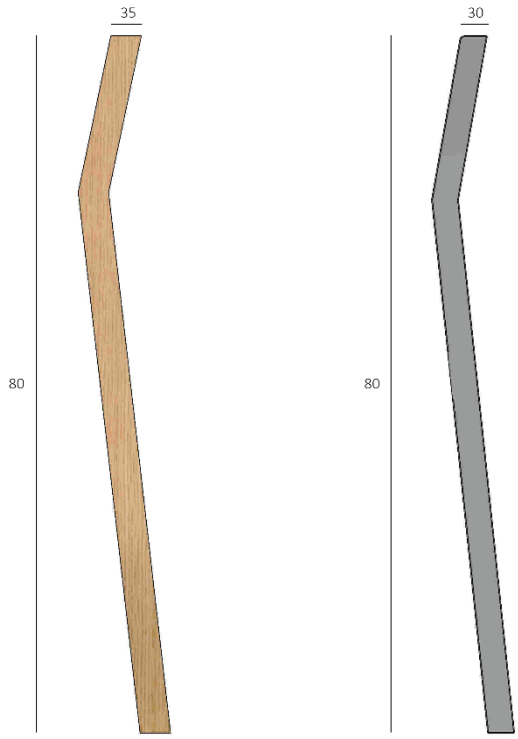


Illustration 29: Comparison back legs

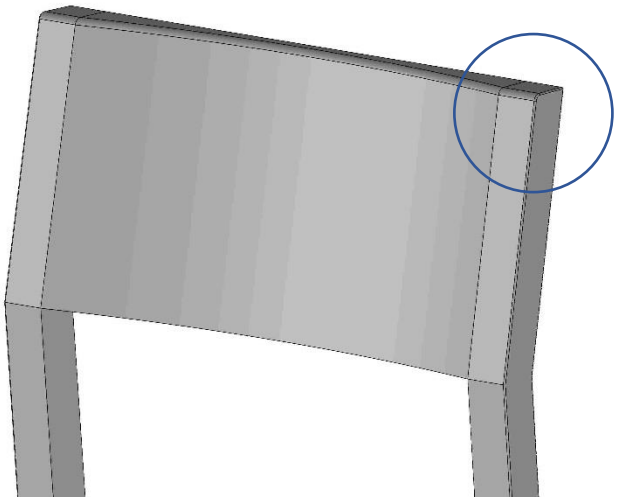


Illustration 30: Rounding of the upper edge

The second change is to shorten the front legs. This change is due to the fact that, ergonomically, the seat was very inclined, which meant that the upper part of the front legs (common edge with the seat) was in contact with the lower leg area (hamstrings), thus bothering the user. According to the "Guide of recommendations for ergonomic furniture design" the angle between the seat and the backrest should be between 100°-105° and the seat height between 41 - 45 cm.

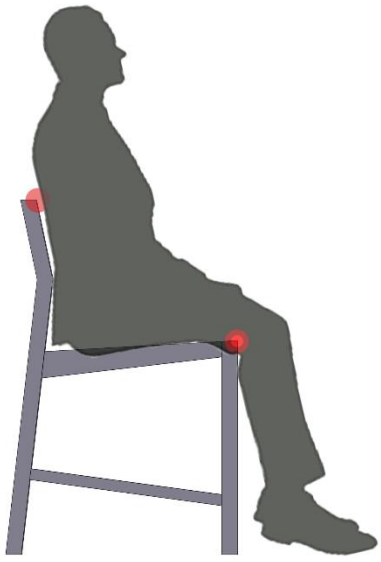


Illustration 31: Hot spots

In the following illustration we can see the difference in height of the initial front leg and the new seat-back angle which solves the main ergonomic problem of the chair.

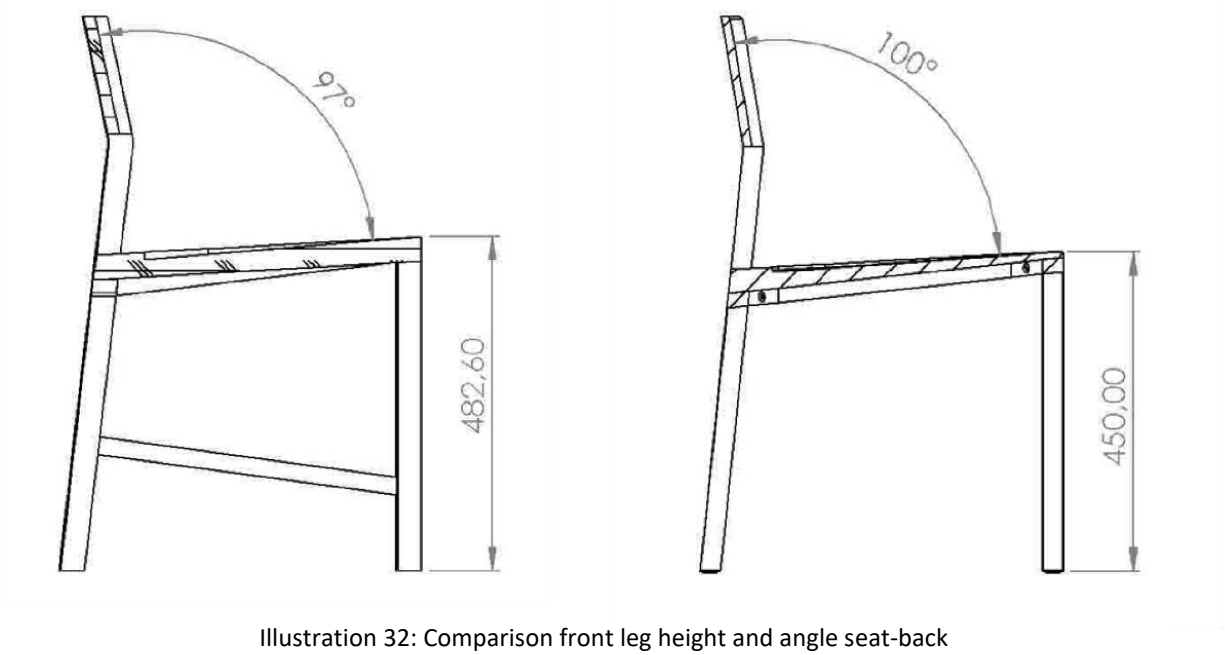


Illustration 32: Comparison front leg height and angle seat-back

The weight of each front leg of the chair is 0.38 kg. The section that is reduced and the 5mm. of profile that is reduced makes the new weight of the front leg 0.29 kg

With the modifications of the front legs, back legs and side joints, weight has been lost 0.18 kg., 0.4kg. and 0.2 kg. respectively.

In addition, one of the main ergonomic problems with the chair has been corrected.

Backrest

The backrest piece has also undergone some modifications due to the redesign of the chair profiles. The new piece is 5mm. longer and 5mm. thinner than the original one. Its new weight is 0.83 kg.

Structural bars

One of the goals in the redesign of the Eulalia chair is to eliminate the structural bars to reduce the weight and visual bulk of the chair but maintain the structural strength. With such bars there was no need for any reinforcement with the 4 legs at the bottom of the base.

With reduced profile thickness, shorter front legs and without structural bars, this is the Eulalia chair. In the rear part the reinforcements can be placed to maintain the structural strength. At the front there is a problem because of the shape of the seat there is no space to place the reinforcements.

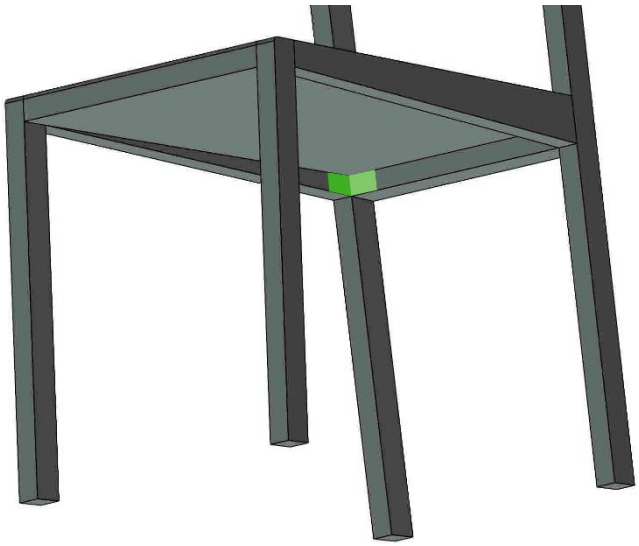


Illustration 33: Back reinforcement area

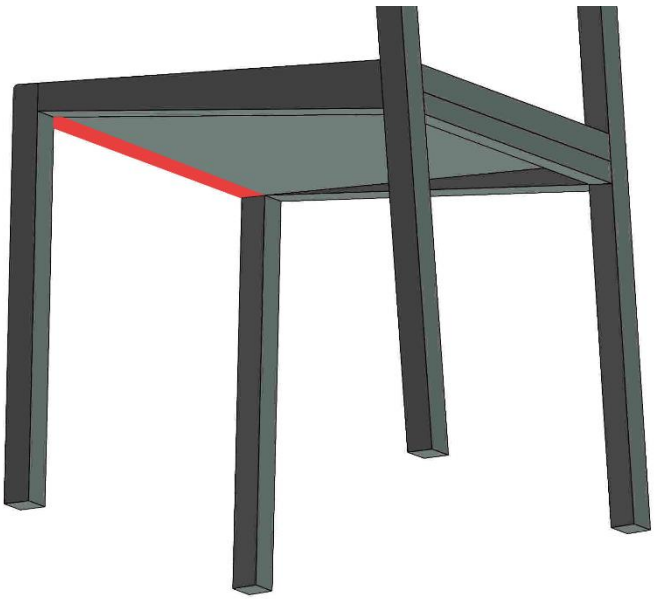


Illustration 34: Front reinforcement area (not possible)

The reinforcement pieces are an essential element in the redesign of the chair since only with the wood dowel pins used in the union of the pieces is not enough to maintain the structural strength. In addition, in the manufacturer's experience, it is necessary because users tend to make movements with the chair forcing these structural points. Generate **buckling stress** in the back legs.

Illustration 36: User generating a buckling stress on the rear legs

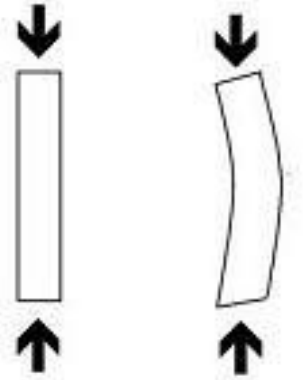


Illustration 35: Buckling stress

After discussions with the manufacturers, it has been decided to use this type of reinforcement as it joins each of the legs to the structure of the chair, making it more compact and resistant to compression and bending stresses.

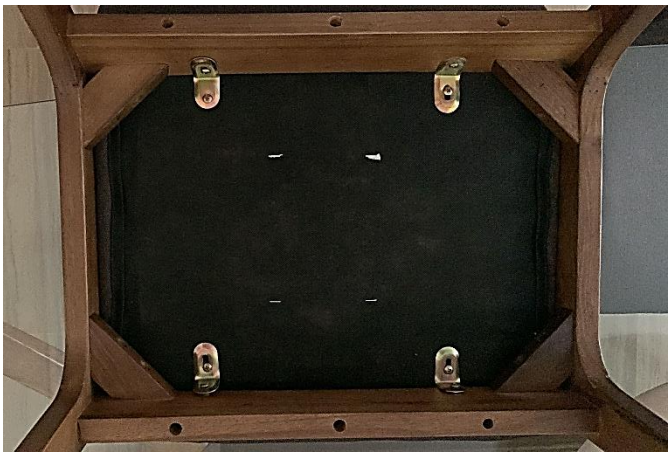


Illustration 37: Reinforcements

After analysing this problem with 3D modelling, it was decided to test two possible improvement solutions, both of which would reduce the weight significantly. The seat part is the heaviest part of the chair, weighing 3.74 kg.

Opción 1:

The first option is to make a hollow out on the underside of the seat using a milling machine. The recess would be of 1.5 cm. Structural reinforcement pieces would be screwed to the side surfaces of each corner, thus solving the problem.

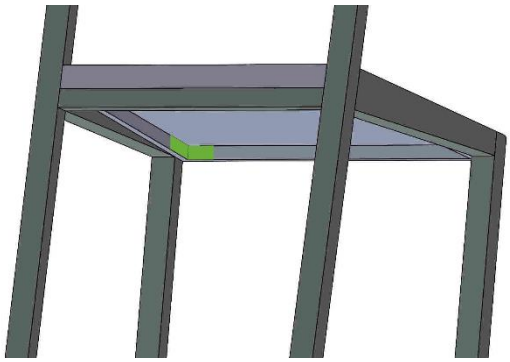


Illustration 38: Option 1 seat redesign

The pros of option 1 are as follows: it would not change the aesthetics of the chair as no parts are removed and the casting is not visible from the views of use.

The weight of the seat decreases significantly, from 3.74 kg. to 1.32 kg.

The major drawback is the costing process. Even if the milling machine is used to make the upper part of the seat, another step would have to be added to the manufacturing process, which increases the number of hours, electrical consumption, and material waste, since a large part of the solid oak piece would be wasted. In addition, buying a block of such dimensions is very expensive, which would make the chair more expensive.

Opción 2:

Space is needed at the front of the seat in connection with the front legs to accommodate the brackets. Therefore, it has been decided to change the overall shape of the seat. The new seat will follow the diagonal of the red line.

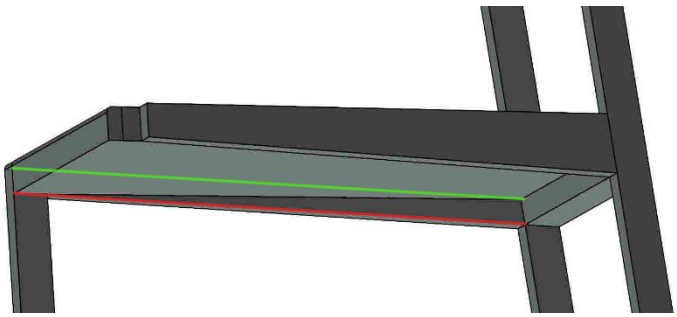


Illustration 39: Option 2 seat redesign

This is the form of the previous entry. After modification, the final seat shape would look like this. The seat would go from weighing 3.74 kg to 2.23 kg.

Illustration 40: Comparison of the seat

So that the aesthetics and the image of the chair does not vary in any of the views, a piece will be placed in the front part as the added rear one, whose function is aesthetic. In this way the diagonal of the seat is maintained and in the front view the line is not lost. The new part is the same as the rear add-on whose weight is 0.165 kg.

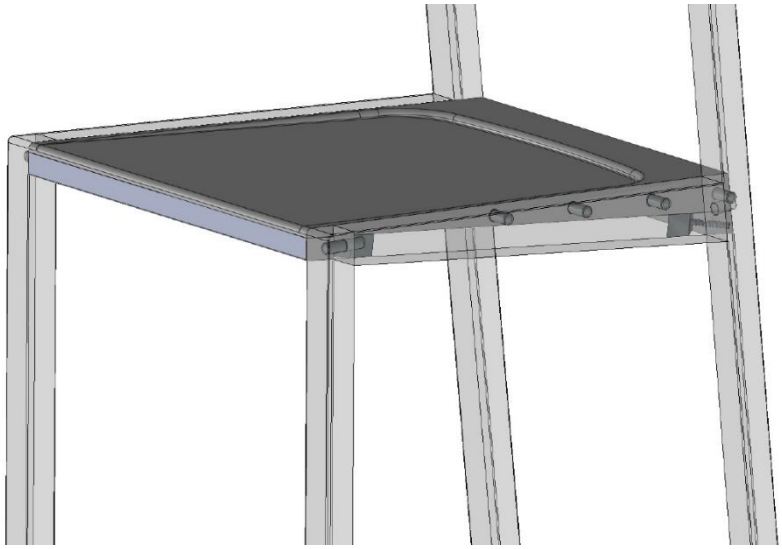


Illustration 41: Addition part - option 2

As for the manufacture of the seat, the process would be the same as the original seat, cutting and milling for the top. As the new additional part is the same as the rear part, there is no need to program the machine for a new cut.

Although option 1 lightens the weight of the chair 1.07 kg. more than option 2, both options already fall within the weight range established at the beginning of the redesign. The waste of wood in option 1 is much higher as the option chosen in Eulalia's redesign is option 2.

Therefore, the lower part of the seat with the reinforcements would have this new image:

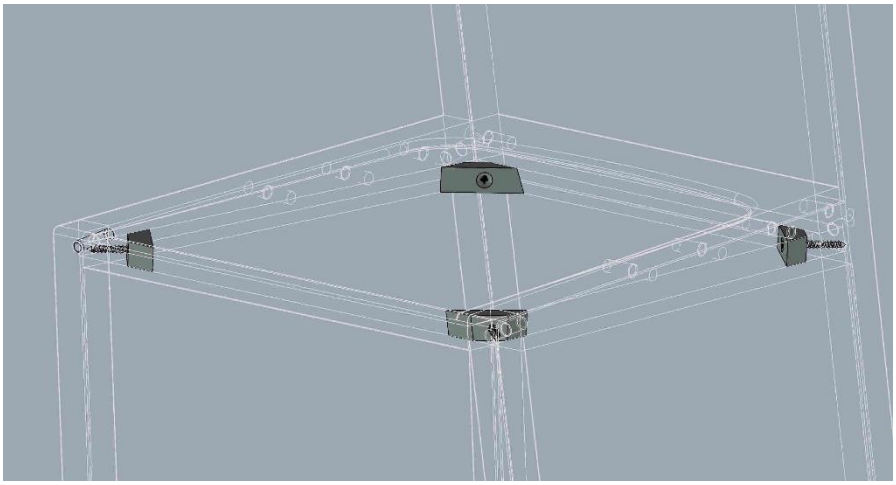


Illustration 42: Reinforcements - perspective view

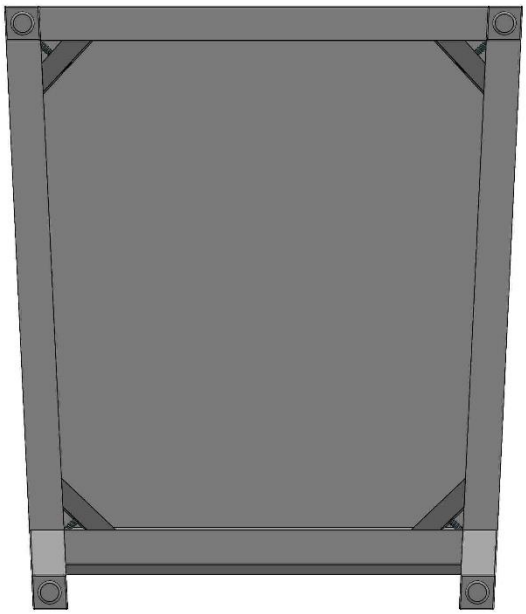


Illustration 43: Reinforcements - bottom view

In both options it is necessary to add the reinforcement pieces. These pieces are made of solid oak because they may come out of residues of other pieces.

The aesthetics will not be lost, and the chair will be made entirely of solid oak. Each piece weighs 0.012kg. As there are four reinforcing pieces, the final weight of the Eulalia chair is 5.74 kg (designed pieces). To this weight must be added the weight of the wood dowel pins, the crews and the protective pad of adhesive felt.

All parts will be assembled using wood dowel pins and gluing. After assembly, all sharp edges will be sanded to finish the manufacturing and assembly process before lacquering.

This is the result:

Illustration 44: Final modelling of the Eulàlia chair redesign

3.4 Summary

The changes produced during the redesign of the Eulàlia chair significantly improve it in all the aspects that needed to be modified. The objectives achieved will be explained below:

- Reduce the weight:

The material of the chair is still solid oak. By reducing the thickness, eliminating the structural bars, and redesigning the seat, the weight has been significantly reduced. The main objective was to reduce the weight by 2 - 2.5kg. The new Eulalia chair weighs, after all modifications, 5.74 kg. The weight has been reduced by 2.76 kg. To the final weight of the parts, it will be necessary to add about 0.1 kg for the wood dowel pins, the screws and protective pad of adhesive felt. In the detailed explanation of Eulalia's redesign, you will see exactly.

- Structure and structural bars:

One of the main features of the chair was the diagonally placed structural bars, but after feedback from the pop-up it was decided to dispense with them if the structural strength of the chair remained unchanged. The problem was that these bars generated more visual bulk, made it heavier to the eye and increased the overall weight of the chair. The goal was to design a reinforcement system at the base of the chair that would not change the aesthetics of the chair and would follow a clean and honest design as the previous one. As seen above, it can be said that the second main objective of the chair redesign has been achieved.

- Ergonomics

The front legs were 3 cm. above the recommended seat height as this was one of the main ergonomic changes to be made. The seat inclination has decreased due to the first change and therefore the seat-back angle is now at the recommended 100°-105°. With the redesign of the front legs, seat, backrest, and rear legs rounding the edges in contact with the user, the ergonomic redesign of Eulàlia is completed.

The next step would be to make a batch of prototypes to test them again with users and, once everything is correct, start manufacturing them for the market launch.

4. FINAL PROPOSAL

The material chosen for the renderings is reddish oak. In the following renders you can see how the Eulàlia chair would look like after being lacquered and after having made the final handcrafted finishes.

Illustration 45: Eulàlia's final finishes

Illustration 46: Bottom view Eulàlia

Illustration 47: Eulàlia's presentation

5. DETAILED DESCRIPTION

Once the Eulalia chair has been completely redesigned, this is the final design. In this section you will see the exploded view of the chair with all its components. It will be applied the final finishes, a detailed description with all the parts and components and the costs of the whole process of production, assembly, and distribution.

5.1 Exploded view

1. Front leg (2)
2. Back leg (2)
3. Backrest
4. Side joint (2)
5. Front addition
5.1 Back addition
6. Structural reinforcements
7. Seat
8. Wood dowel pins (18)
9. Screw (4)
10. Protective pad of adhesive felt (4)

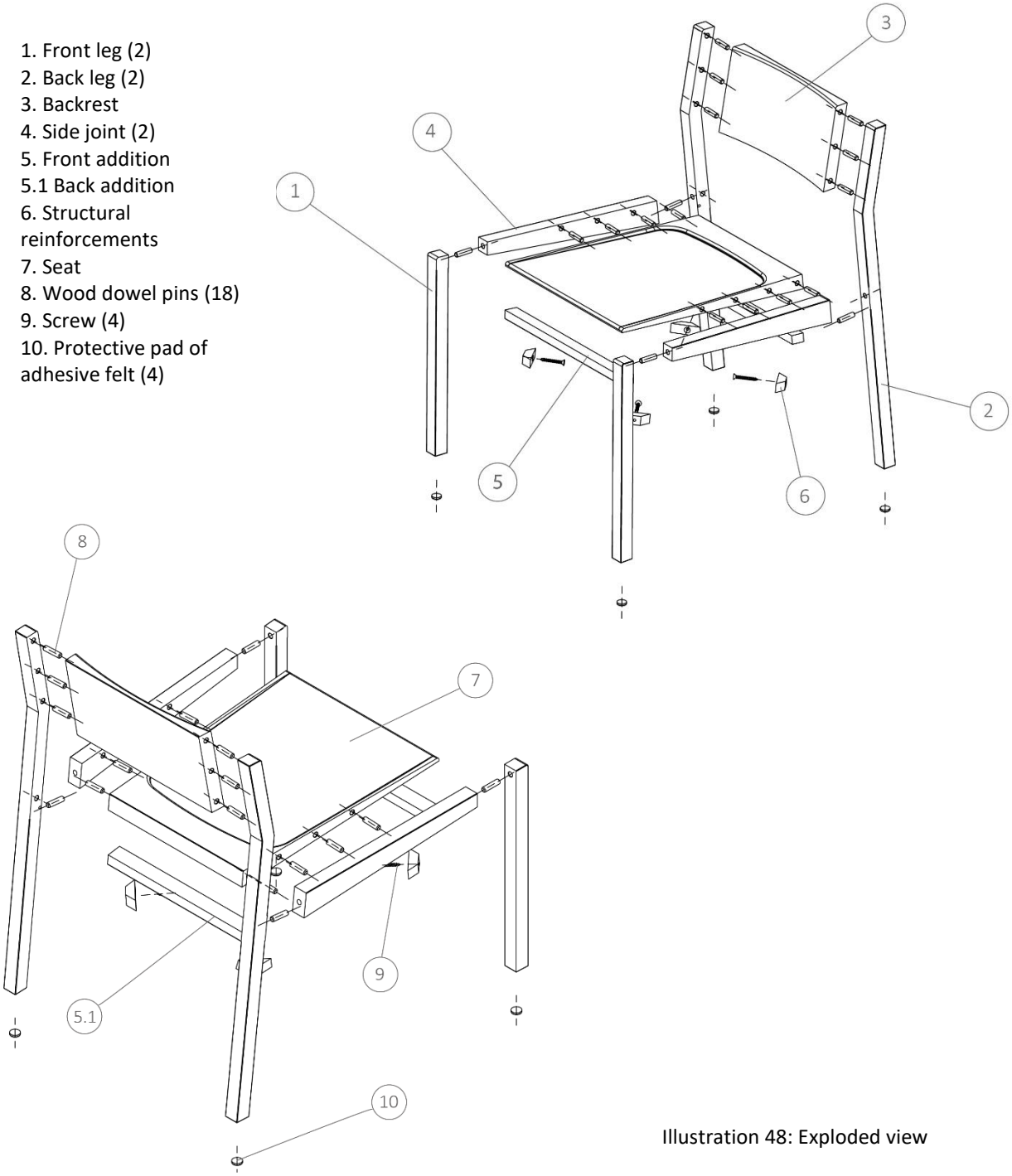
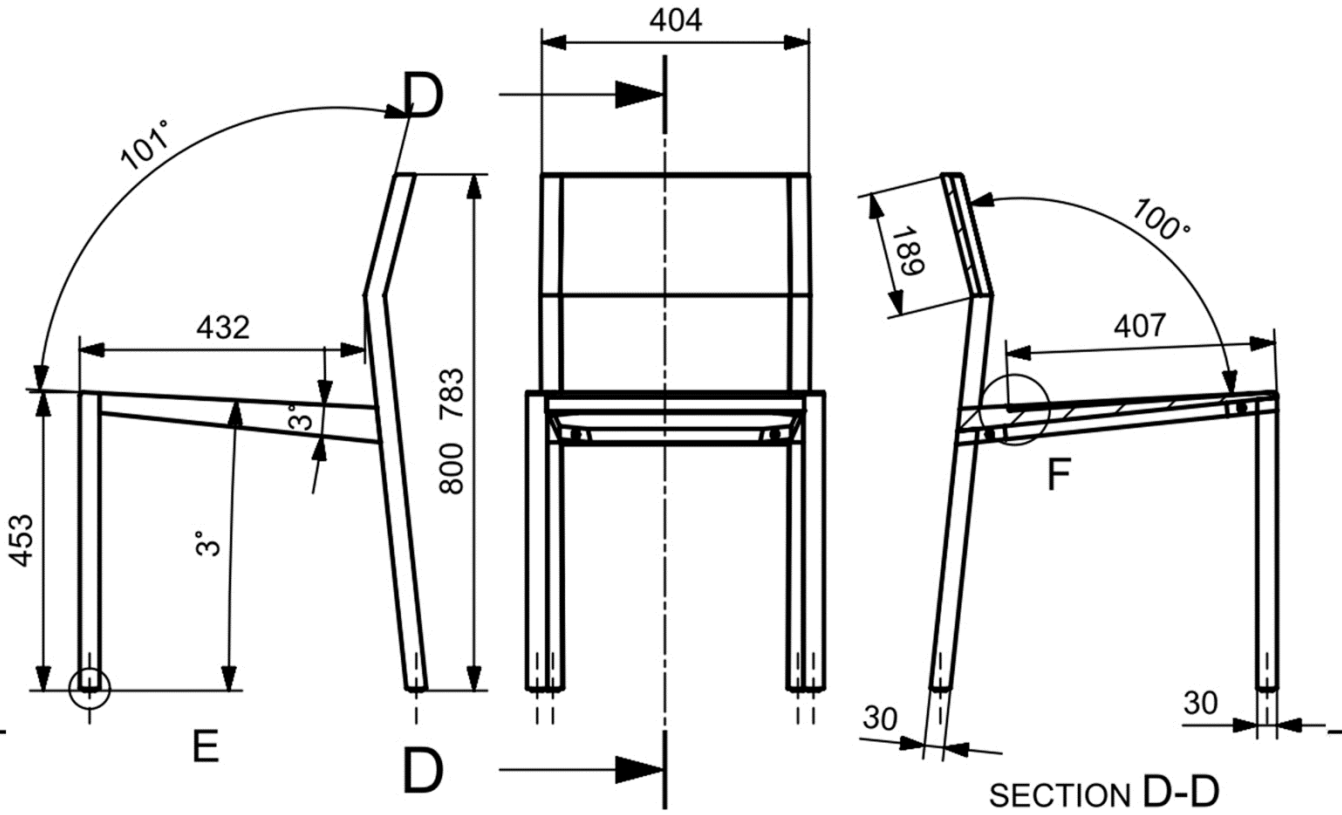
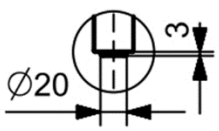
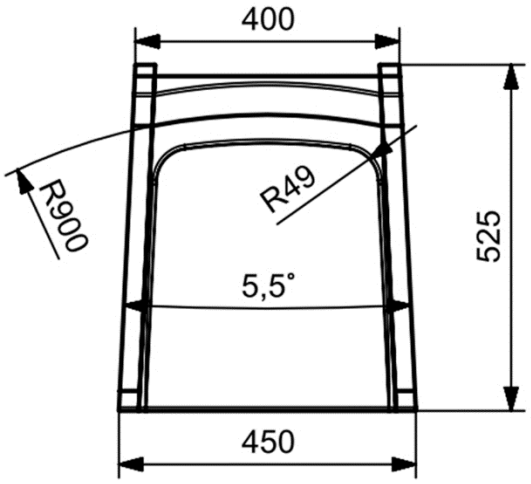


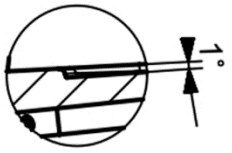
Illustration 48: Exploded view





DETAIL E
SCALE 1:5





DETAIL F
SCALE 1:5

Scale: 1:10 Measures in mm.	Name: Ignacio Ballester Olmo	Title: Planimetry of Eulàlia chair redesign
	Date: 15/06/202	Number of plane: 1

5.3 New Eulàlia chair pieces

After the redesign, the Eulàlia chair consists of the following designed and commercial pieces:

5.3.1 Commercial parts

1. Wood dowel pins

Illustration 49: Wood dowel pins

- Dimensions: Length 40 mm. and diameter 10 mm.
- Units: 18.
- Weight/unit: 0,001 kg.; Total weight: 0,018 kg.
- Material: Beech wood.
- Process: Industrial piece manufactured in large batches by sawing.

The wooden dowel pin is a cylinder that is used to join two pieces of wood, being the most used joint in carpentry.

2. Protective pad of adhesive felt

Illustration 50: Protective pad of adhesive felt

- Dimensions: Cylinder 30 mm. in diameter and 3.5 mm. thick.
- Units: 4.
- Weight/unit: 0,001 kg.; Total weight: 0,004 kg.
- Material: Felt.

The pads on the underside of the legs serve to protect both the product from impact and the floor.

3. Screw

Illustration 51: Screw

- Dimensions: 4 x 50 mm.
- Units: 4.
- Weight/unit: 0,003 kg.; Total weight: 0,012 kg.
- Material: Zinc.

These screws are to be used to join the 4 legs to the chair frame together with the wooden bracket. Together they form the structural reinforcement pieces.

The weight of the 18 wood dowel pins, the 4 protective pad of adhesive felt, and the 4 screws is approximately 0.035 kg. = 35 gr.

5.3.1 Designed pieces

These are the redesigned pieces. I will explain the new features of each one and the manufacturing process.

1. Front legs

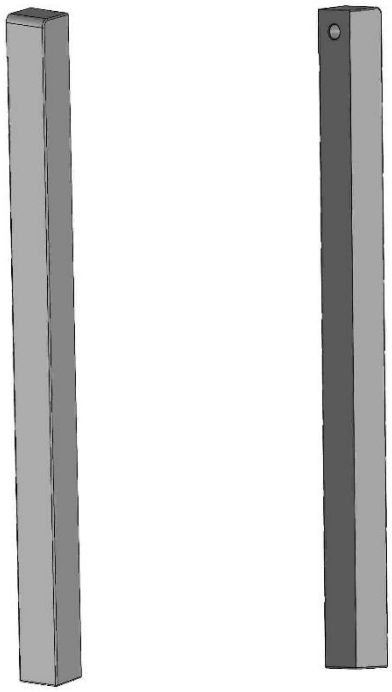


Illustration 52: Front legs - front and back perspective view

- Dimensions: W 30, D 483, H 30, mm.
- Units: 2.
- Weight/unit: 0,29 kg.; Total weight: 0,58 kg.
- Material: European natural oak.
- Shape: Quadrangular prism.
- Manufacturing process: Machined cut, milling for rounding and drilling for the hole.

The front legs are attached to the seat piece and side joints by means of holes and wood dowels bins. It has the same thickness as the side joints which gives the appearance of a single piece when joined tog.

2. Back legs

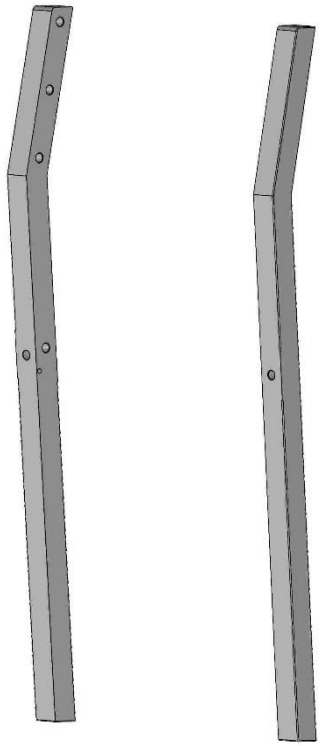


Illustration 53: Back legs - perspective view

- Dimensions: W 30, D 800, H 30, mm.
- Units: 2.
- Weight/unit: 0,5 kg.; Total weight: 1 kg.
- Material: European natural oak.
- Shape: Prism with square base that provides strength to the chair.
- Manufacturing process: Mechanized cutting of wood sheets, milling for rounding and drilling for the hole.

The two back legs start from the floor and reach the highest part of the chair. Between them is the backrest, which is joined with wood dowels bins and glue to the back legs.

3. Seat

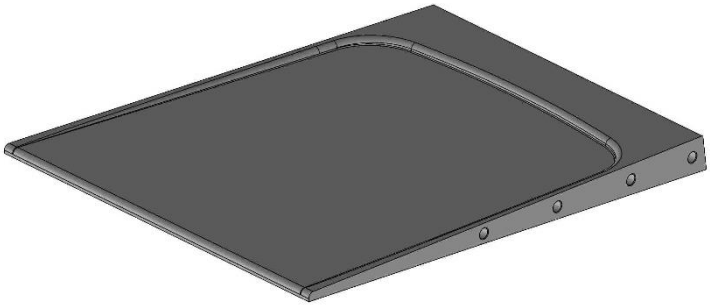


Illustration 54: Seat - perspective view

- Dimensions: W 390, D 480, H 35, mm.
- Units: 1.
- Weight: 2.23 kg.
- Material: European natural oak.
- Shape: Solid trapezoid with 1 cm fretwork (made with 3-axis machinery).
- Manufacturing process: Mechanized laminate cutting. The underlayment is made by milling and the side holes by drilling. Milling for rounding the edge.

The seat has an underlayment to improve comfort. On the sides of the seat have been drilled to introduce the wood dowel pins and thus join the rest of the parts. These holes serve to strengthen the joints of the chair and provide structural rigidity to the product.

4. Backrest

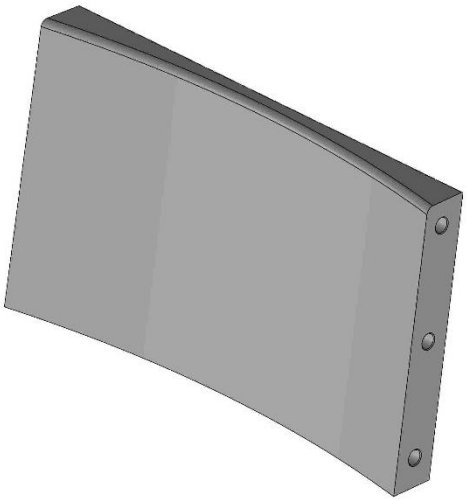
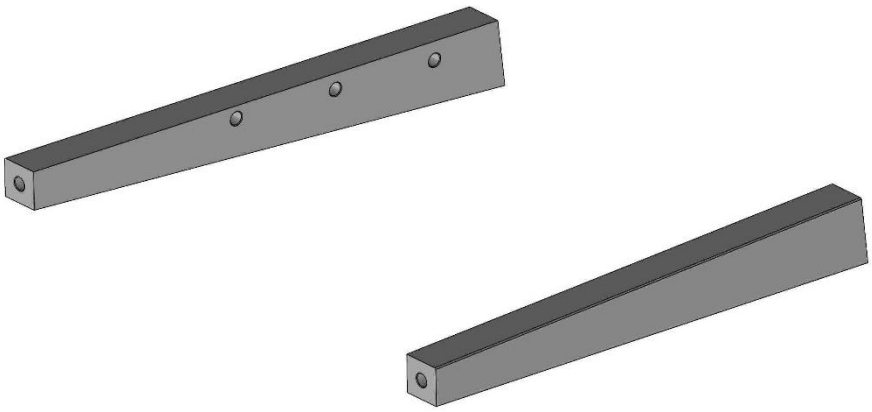


Illustration 55: Backrest - perspective view

- Dimensions: W 348, D 30, H 170, mm.
- Units: 1.
- Weight: 0,83 kg.
- Material: European natural oak.
- Shape: rectangular prism with the front surface curved
- Manufacturing process: Cutting of solid oak block and bending by vertical milling machine. Drilling for the side holes. Milling for rounding the edge.

The backrest in the Eulàlia chair only covers the thoracic area and, due to its dimensions, the lumbar region is exposed to the air. Finally, the backrest has an ergonomic curve made by milling, this difference offers the necessary comfort in a chair of medium-anterior posture. This new part makes the chair more comfortable thanks to the rounding of the edges in contact with the user.

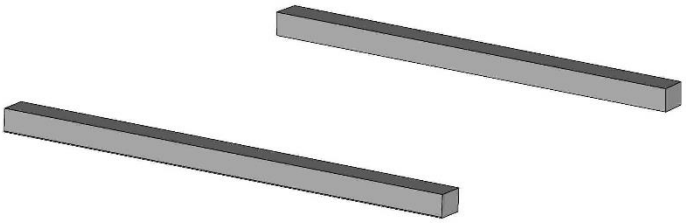
5. Side joints



- Dimensions: W 30, D 426, H 60, mm.
- Units: 2.
- Weight/unit: 0,37 kg.; Total weight: 0,74 kg.
- Material: European natural oak.
- Manufacturing process: machined cut and drilled side holes.

These side pieces join the back legs, the seat, and the front legs. In the same way that they join to the seat, they join to the legs, through perforations and using wood towel pins. These structural parts give the seat sufficient strength to support the weight of the user.

6. Additional pieces



- Dimensions: W 390, D 30, 20 mm.
- Units: 2.
- Weight: 0,165 kg.; Total weight: 0,33 kg.
- Material: European natural oak.
- Shape: rectangular prism.
- Process: Machined cut.

This component is located at the back and in the front of the chair, under the seat. The function of this component is purely aesthetic. In the side view of the seat, this should be perceived in a decreasing way.

7. Structural reinforcements

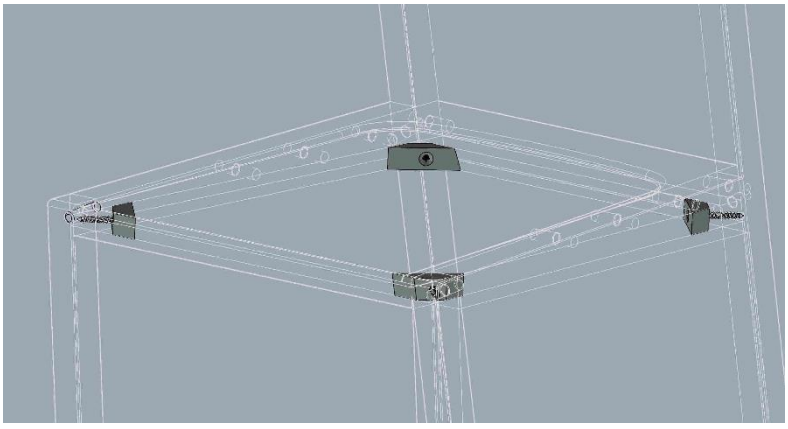


Illustration 56: Structural reinforcements

- Dimensions: W 65, D 17, H 20, mm.
- Units: 4.
- Wight/unit: 0,012 kg.; Total weight: 0,048 kg.
- Material: Solid oak.
- Shape: Solid trapezoid.
- Process: Mechanized cut. Drilling for the hole.

The structural reinforcement pieces will be bolted to the legs, putting pressure on the structural base of the chair. Thanks to this system, the weight of the chair has been significantly reduced. They will perform the same function as the structural bars that were between the front and rear legs in the original chair.

The total weight of the purchased parts is 0.035 kg and that of the designed parts is 5.74 kg. **The total weight of the redesigned Eulàlia chair is 5.775 kg, or 5.8 kg.**

5.3 Cost

The updated costs of the different parts and manufacturing processes have been calculated to know their new price.

- **Seat**

Table 1: Seat- material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price (€/m^2)**	**Subtotal**
Oak wood (35mm thick)	1	0,187	133	23,80 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal**
Wood dowel pins	8	Beech wood	0,005	0,04 €
Bottom lacquer	0,2	Polyureyhane paint	10	2,00 €
Colour lacquer	0,2	Polyureyhane paint	10	2,00 €
			TOTAL	28,94 €

Table 2: Seat - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery (€/h)**	**Time (h)**	**Machinery**	**Subtotal**
Milling	20	0,085	CNC	1,70 €
Polishing	20	0,05	Sander	1,00 €
Bottom colours	25	0,05	Painting station	1,25 €
Colour lacquer	25	0,085	Paintng station	2,13 €
Outsorced products				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal**
Cut	15	0,03	Saw	0,81 €
Thicknessing and squaring	15	0,05	Thicknesser	1,35 €
Drilling	15	0,05	Drill	1,35 €
Edging	15	0,05	CNC	1,00 €
			TOTAL	10,59 €
MANUFACTURING COST				39,52 €
Quantity of pieces		1	**TOTAL COST**	39,52 €

- **Backrest**

Table 3: Backrest - material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price (€/m^2)**	**Subtotal**
Oak wood (35mm thick)	1	0,187	133	23,80 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal**
Wood dowel pins	8	Beech wood	0,005	0,04 €
Bottom lacquer	0,2	Polyureyhane paint	10	2,00 €
Colour lacquer	0,2	Polyureyhane paint	10	2,00 €
			TOTAL	28,94 €

Table 4: Backrest - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery (€/h)**	**Time (h)**	**Machinery**	**Subtotal**
Milling	20	0,085	CNC	1,70 €
Polishing	20	0,05	Sander	1,00 €
Bottom colours	25	0,05	Painting station	1,25 €
Colour lacquer	25	0,085	Paintng station	2,13 €
Outsorced products				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal**
Cut	15	0,03	Saw	0,81 €
Thicknessing and squaring	15	0,05	Thicknesser	1,35 €
Drilling	15	0,05	Drill	1,35 €
Edging	15	0,05	CNC	1,00 €
			TOTAL	10,59 €
MANUFACTURING COST				39,52 €
Quantity of pieces		1	**TOTAL COST**	39,52 €

- **Front legs**

Table 5: Front legs - material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price (€/m^2)**	**Subtotal (€)**
Oak wood (30mm. thick)	1	0,017	114	1,93 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal (€)**
Protective pad	1	Pad	0,12	0,12 €
Bottom lacquer	0,04	Polyureyhane paint	10	0,40 €
Colour lacquer	0,04	Polyureyhane paint	10	0,40 €
			TOTAL	2,85 €

Table 6: Front legs - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Polishing	20	0,033	Sander	0,66 €
Bottom colours	25	0,05	Painting station	1,25 €
Colour lacquer	25	0,05	painting station	1,25 €
Outsorced products				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Cut	15	0,033	Raw	0,89 €
Thicknessing and squaring	15	0,04	Thicknesser	1,08 €
Drilling	15	0,02	Drill	0,54 €
Edging	15	0,02	CNC	0,30 €
			TOTAL	5,13 €
MANUFACTURING COST				7,98 €
Quantity of pieces		2	**TOTAL COST**	15,96 €

- **Back legs**

Table 7: Back legs - material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price (€/m^2)**	**Subtotal (€)**
Oak wood (30mm. thick)	1	0,028	114	3,19 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal (€)**
Protective pad	1	Pad	0,12	0,12 €
Bottom lacquer	0,08	Polyureyhane paint	10	0,80 €
Colour lacquer	0,08	Polyureyhane paint	10	0,80 €
			TOTAL	4,91 €

Table 8: Back legs - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Polishing	20	0,083	Sander	1,66 €
Bottom colours	25	0,03	Painting station	0,75 €
Colour lacquer	25	0,03	Painting station	0,75 €
Outsorced products				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Cut	15	0,03	Raw	0,81 €
Thicknessing and squaring	15	0,03	Thicknesser	0,81 €
Drilling	15	0,05	Drill	1,35 €
Edging	15	0,02	CNC	0,30 €
			TOTAL	6,13 €
MANUFACTURING COST				11,04 €
Quantity of pieces		2	**TOTAL COST**	22,08 €

- **Side joints**

Table 9: Side joints - material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price(€/ud)**	**Subtotal (€)**
Oak wood (30 mm. thick)	1	0,024	114	2,78 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal (€)**
Bottom lacquer	0,05	Polyureyhane paint	10	0,50 €
Colour lacquer	0,05	Polyureyhane paint	10	0,50 €
Wood dowel pins	2	Beech wood	0,005	0,01 €
			TOTAL	3,79 €

Table 10: Side joints - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery**	**Time (h)**	**Machinery**	**Subtotal (€)**
Polishing	20	0,03	Sander	0,60 €
Bottom colour	25	0,03	Paiting station	0,75 €
Lacquer colour	25	0,04	Painting station	1,00 €
Outsorced products				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Cut	15	0,016	Saw	0,43 €
Thicknessing and squaring	15	0,03	Thicknesser	0,81 €
Drilling	15	0,01	Drill	0,27 €
			TOTAL	3,86 €
MANUFACTURING COST				7,66 €
Quantity of pieces		2	**TOTAL COST**	15,31 €

- **Additional pieces**

Table 11: Additional pieces - material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price (€/m^2)**	**Subtotal (€)**
Oak wood (30 mm. thick)	1	0,008	114	0,91 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal (€)**
Bottom lacquer	0,03	Polyureyhane paint	10	0,30 €
Colour lacquer	0,03	Polyureyhane paint	10	0,30 €
			TOTAL	1,51 €

Table 12: Addition pieces - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Polishing	20	0,035	Sander	0,70 €
Bottom colour	25	0,01	Painting station	0,25 €
Lacquer colour	25	0,01	Painting station	0,25 €
Outsorced products				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Cut	15	0,03	Raw	0,81 €
			TOTAL	2,01 €
MANUFACTURING COST				3,52 €
Quantity of pieces		2	**TOTAL COST**	7,04 €

- **Structural reinforcements**

Table 13: Structural reinforcements - material costs

Material costs				
Raw material				
Description	**Quantity**	**Dimensions (m^2)**	**Price (€/m^2)**	**Subtotal (€)**
Oak wood (20 mm. thick)	1	0,002	76	0,15 €
Outsorced products				
Description	**Quantity (l, kg...)**	**Material**	**Price (€/ud)**	**Subtotal (€)**
Bottom lacquer	0,01	Polyureyhane paint	10	0,10 €
Colour laquer	0,01	Polyureyhane paint	10	0,10 €
Screw	1	Zinc	0,005	0,01 €
			TOTAL	0,35 €

Table 14: Structural reinforcements - labour cost

Labour cost				
Direct labour				
Job	**Operator rate and machinery (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Polishing	20	0,025	Sander	0,50 €
Bottom colour	25	0,01	Painting station	0,25 €
Lacquer colour	25	0,01	Painting station	0,25 €
Operaciones subcontratadas				
Description	**Operator rate (€/h)**	**Time (h)**	**Machinery**	**Subtotal (€)**
Cut	15	0,015	Raw	0,41 €
Drilling	15	0,01	Drill	0,14 €
			TOTAL	1,54 €
MANUFACTURING COST				1,89 €
Quantity of pieces		4	**TOTAL COST**	7,57 €

After calculating the costs of each part, the sum of all of them has been made. To this we must add the finishing, assembly and packaging for the transport of the chair.

Table 15: Final cost of the chair

Pieces	Cost		Finishes	Cost
Front leg (x2)	15,96 €		Lacquer	10,20 €
Back leg (x2)	22,08 €		Gluing and assembly	22,08 €
Seat	39,52 €		Transparent plastic bag	1,00 €
Backrest	16,43 €		Transport box	6,00 €
Side jointsl (x2)	15,31 €		**Final cost finishes**	39,28 €
Additional pieces (x2)	7,04 €			
Structural reinforcements (x4)	7,57 €			
Total cost pieces	123,91 €		**FINAL COST OF THE CHAIR**	**163,19 €**

6. CONCLUSIONS

After the cost calculation, the manufacturers decide whether or not to accept the redesign project of the Eulàlia chair. Mudat Studio's goal is to bring it to market under the MegaMobiliario brand as manufacturers, bringing a youthful touch to its new collection and providing a collaboration with an emerging studio.

Both the manufacturers and the studio are from Valencia. In 2022 Valencia is the World Design Capital and, as every year, they celebrate the Habitat Fair in mid-September. For start-ups there is a hall called Nude, a possible option is to present the redesign of eulalia in a stand of Mudat Studio to find new manufacturers or new projects.

As a student I had never done a redesign until the redesign of the Eulàlia chair. It has been an opportunity to learn about the different product methodologies and teach how to apply them. Analysing a product piece by piece after having had a feed-back from professionals helps to improve it significantly and achieve excellent results in the redesign. In this case, the redesign of Eulàlia has met the initial objectives set.

7. ANNEX

1. Mya Collection. *megamobiliario.es*

Illustration 57: Mya Collection

MYA is a program of living room furniture and sideboards with a simple and slightly Nordic style. Its design is an exercise in formal simplicity. A gesture the axis of the design: a front that folds 90 degrees and forms the handle. handle. And depending on how the handle is positioned, the wood follows its orientation.

Wood and metal feet and a contemporary color palette are also added, walnut veneer and structured oak veneer give the furniture a very natural look. natural look to the furniture.

2. Wood dowel pins

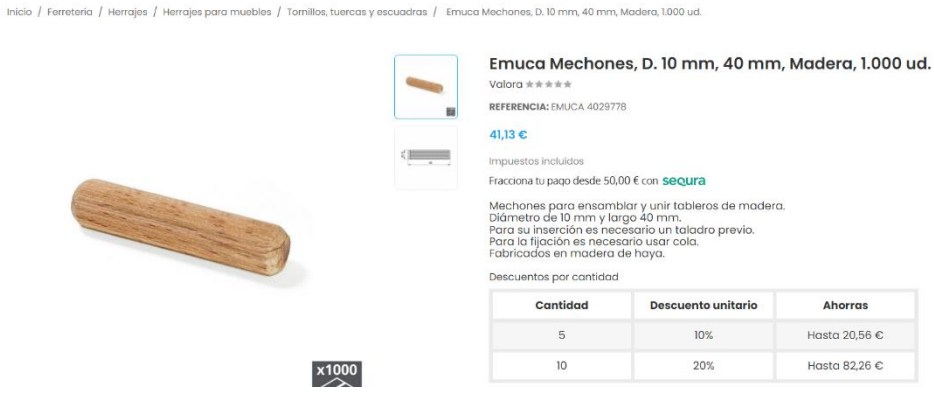


Illustration 58: Wood dowel pins - where to by

https://www.latiendadeelectricidad.com/es/67129-lote-de-1000-mechones-emuca-de-madera-d-10-x-40-mm-para-uniones-a-presion-8432393011561.html

3. Protective pad of adhesive felt

Illustration 59: Protective pad of adhesive felt - where to buy

https://www.amazon.es/Emuca-2038016-fieltros-autoadhesivos-redondos/dp/B01MZDRA17/ref=sr_1_18?__mk_es_ES=%C3%85M%C3%85%25

4. Screw

Illustration 60: Screw - where to buy

https://www.amazon.es/Fischer-Tornillos-FPF-II-Unidades/dp/B084T5NRK3?ref_=ast_sto_dp&th=1

8. BIBLIOGRAPHY

[1] “Guía de recomendaciones para el diseño de mobiliario ergonómico”

[2] https://www.tekniker.es/es/metodologia-desarrollo-de-producto

[3] https://www.edix.com/es/instituto/lean-startup/

[4] https://businessmodelanalyst.com/what-is-lean-startup/

[5]https://www.habitat-design.com/es/p/ruskin-silla-para-comedor-de-roble-natural#product-specificationsy

[6] https://www.habitat-design.com/es/p/ply-ii-silla-roble

[7] https://taktcph.com/products/cross-chair/

[8] https://ethnicraft.com/ch/en/p/10150657/oak-ex-1-dining-chair-contract-grade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