

# Design and development of packaging for artistic markers

THE HAGUE UNIVERSITY OF APPLIED SCIENCES  
FACULTY TECHNOLOGY, INNOVATION & SOCIETY

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April 17, 2020

# REPORT PACKAGING DESIGN & INNOVATION

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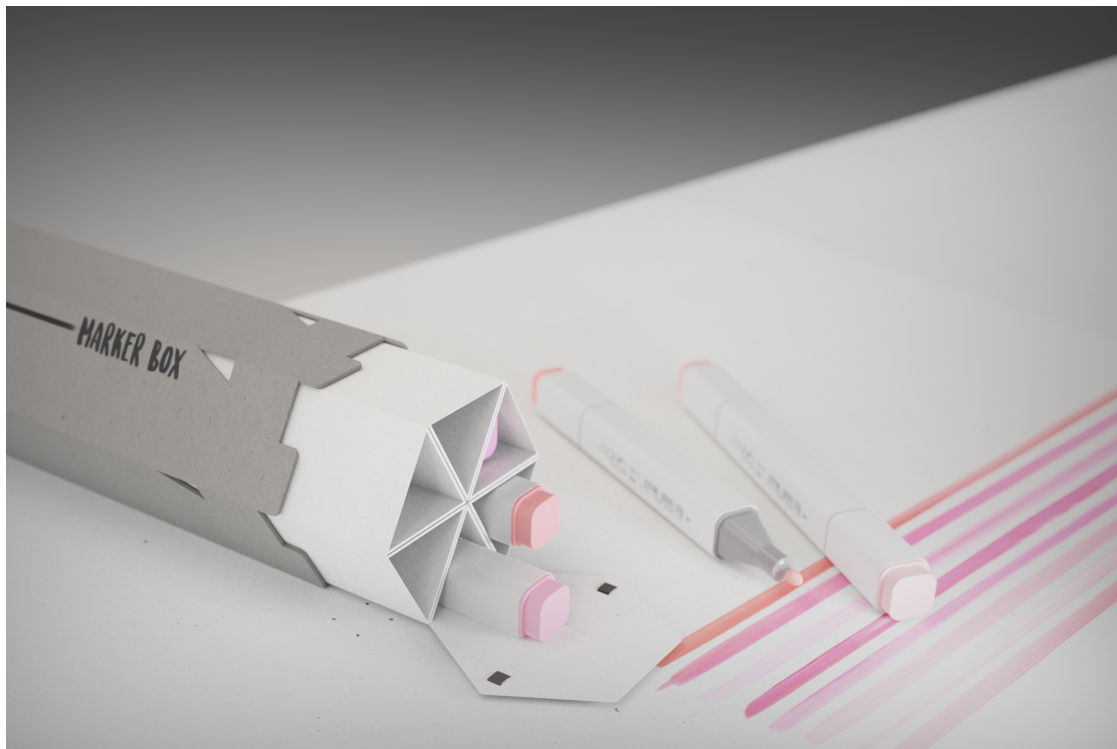


Figure 1: The final design



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# 1 Introduction

We are in a group of four people, with three student designers and one mechatronic engineer student. Together a packaging will be made for The Pro Carton Young Designers Award. Pro Carton is the European Association of carton and carton board manufacturers. The main purpose of the company is to promote the use of carton and cartonboard.

The report reflects the process that the team went through to design a package for The Pro Carton Young Designers competition. The main focus of the project is sustainable packaging made out of cartonboard.

The competition is a way to promote opportunities and innovative solutions in the carton industry. In the competition of 2020 there are four categories in which a team can enter. The four categories of packaging are: Eat & drink, All other/non-food, think outside the box and last Save the planet.

For the categorie eat & drink the focus will lie on a carton board design as a sustainable food and beverages packaging material. In the second category, all other, the focus is on using the most sustainable packaging material for non-food. The third category is, Think outside the box. In this category the participants can design a package out of carton board that is outside of the packaging market. The last category is save the planet. Here ideas can be submitted to reduce or replace plastic. In this way less plastic will be dumped in the ocean and can the package help save the world.

We would like to thank Mr de Koning and Mr Colenbrander for the advice and guidance given throughout the project. Enjoy reading it.

## 2 Analyse

Inspiration is gained before a choice is made about the category in which the product will be designed.

### 2.1 Trends

To get an idea of what products are good on the market, there is looked at the current trends. A few trends are:

Responsible behaviour with environment. People buy things that can be recycling and things that are friendly or have a responsible produce progress.

Single life. People who live alone and they have to buy and cook only for one person. Even more they live in small apartments so they need small furniture, or things that can be easy hidden when they are not using it.

Travel. People use the free time that they have to travel, so they prefer not to spend money decorating their houses and use it to travel abroad.

Prefer buying beautiful products. People use to prefer spending more money to buy beautiful product with good design even if they are more expensive.

Design Experience. Nowadays is more important the way you send a product than the product itself. Improve the user shopping experience is one of the best ways to create a place in the market.

Revalue traditional process and ways to get products. People are more conscious about the way the products are done and the food origin. Nowadays eco-food and products with sustainable produce process are appearing at the market a getting an important space.

### 2.2 Target group

Visual material was collected to get an idea of the target groups in which the product could fall. Inspiration can be gained by looking at what the different target groups are interested in. In the figures below, moodboards have been created to gain inspiration from a number of groups



(a) Childrenen



(b) Sustainability

Figure 2: Moodboards of target groups



(a) Medicines



(b) Supermarket

Figure 3: Moodboards of target groups

## 2.3 Product moodboard

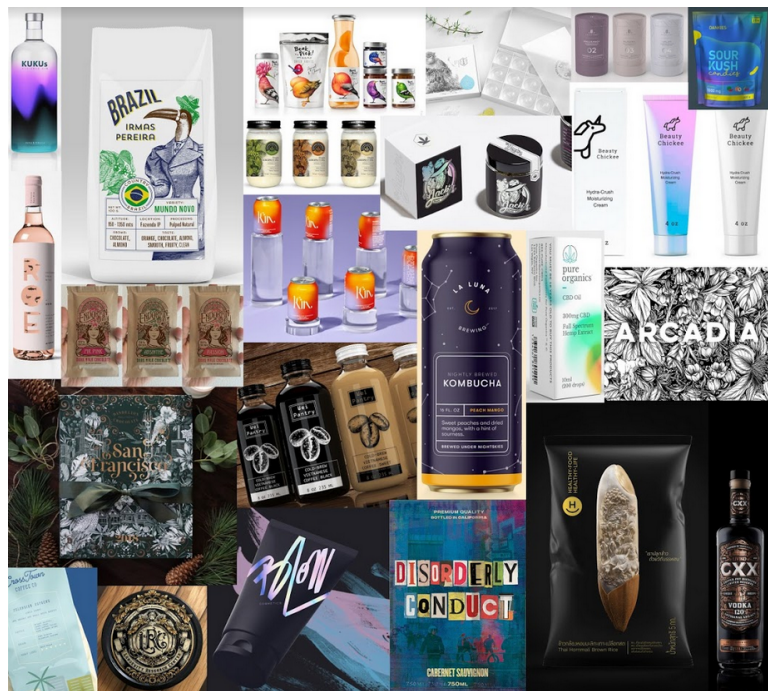


Figure 4: Mood board of inspiring products

Figure 4 shows packaging that can be used to be inspired. What is striking is the mood board is that almost all packaging has stern graphics. This is a feature of packaging that makes it stand out and make it special. Other characteristics of the packaging in de mood board is that they are; minimalistic, "old school" "new school" and/or that they are colorful

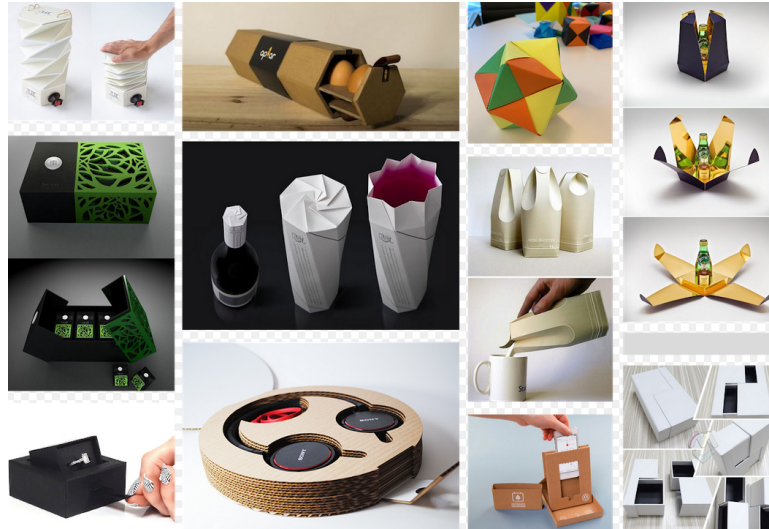


Figure 5: Mood board of inspiring products

More packaging is shown in figure 5. In this mood board packaging is shown with a special futures. The closing mechanism, foldability or the way is unfolds can be an inspiration. This can be taken in to consideration of the teams design



## 2.4 Problem statement

The challenge of designing a package is to combine creativity, knowledge of production, design, ergonomics and marketing. Other focuses of this project are to gain knowledge about the complexity and possibilities of packaging, working on relevant skills necessary for this assignment, doing research, presentations, designs, generating ideas, different alternatives and assess the suitability of solutions.

A few challenges/problems and questions that needs to be solves during the design of the packaging are:

What are the biggest problems with packaging as of today?

Where are these problems coming from? Who is to blame?

Can we find a solution for any of these problems?

Will it improve the current situation?

What are the possibilities with the material we use for the packaging?

What can not be done?

What kind packaging is trending these days? What do people like to buy?

How are products with the packaging shipped? and how much does this influence the design of the packaging?

## 3 Category

Pro Carton Young Designers Award is one of Europe's leading annual young talent competitions for packaging design. It plays a pioneering role in promoting sustainability as it focuses exclusively on carton board design.

Entries can be submitted across the following categories: [2] [3]

- Creative Carton board Packaging: Eat & Drink: The focus lies on carton board as the most sustainable food and beverages packaging material and its recyclability. Give us a taste of great design!
- Creative Carton board Packaging: All other: focuses on using the most sustainable packaging material for non-food packaging. Everything needs packaging, have a look around yourself and get inspired!
- Creative Carton board Ideas: Think outside the box! Here's a chance for you to put forward your carton board ideas outside of the packaging market.
- Save the Planet: Every minute a truck load of plastics is dumped in the ocean. Show us your ideas as to how carton board can reduce or replace plastic and help us save the planet!

The team has decided to go for the second category, "Creative Carton board Packaging: All other". This category appealed to the team the most. The topics "Save the Planet" and "Creative Carton board Ideas" will be included in the design. But the team doesn't just want to focus on those topics.

Plan B is to think about one of the other categories. As soon as we fail to go for our first choices, we will look at the other three. A reason for not going for the first choice is if the team does not have good ideas for this category.

### 3.1 Place in market

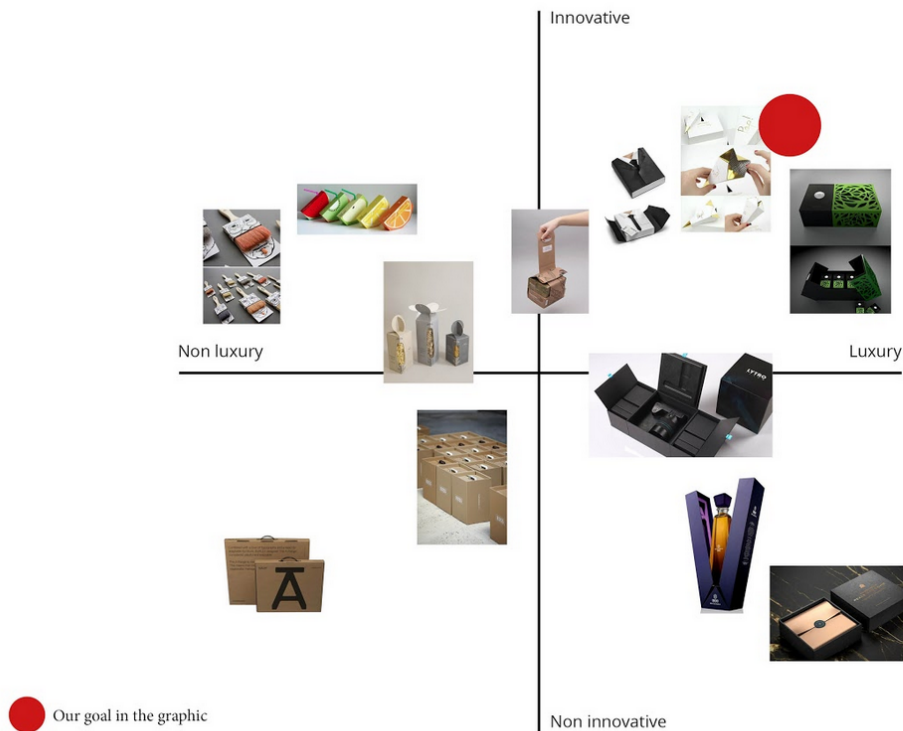


Figure 6: Wanted place in the market

To get more information about already existing packaging's, we did some research. We've placed the packages we found in a diagram to see what is already on the market and how luxury and innovative they are. As you can see there is a lot of difference between packaging's. Some are really basic and have a cheap look. They are not informative and do not take your interest. However, some packaging's have are for example a basic design, but they have an interesting and fun graphic design. Also there are some packaging's that look really "fancy" and expensive. We've chosen to try to make our design both innovative and luxury at a certain level. You can see our "place-in-market"-goal as a red dot in this picture.

## 4 Brainstorming



Figure 7: Brainstorm

For the European Carton Excellence Award there is never one direction. The idea is that the participants come up with innovative new products, made out of carton board.

Brainstorming is a great way to start coming up with ideas for a product. It is a relaxed, informal approach of start designing or solving a problem. Brainstorming encourages people to come up with ideas that may be crazy or not even possible. In this process nothing will be criticised. From the ideas of the brainstorming original, creative solutions and products can be crafted.



## 5 Concepts

After brainstorming, eight ideas were chosen to further explore and elaborate. We looked at how a useful and realistic product of the idea could be made. The eight ideas are presented in the following sections. It also briefly explains why this product could be fun or useful.

### 5.1 Bottles

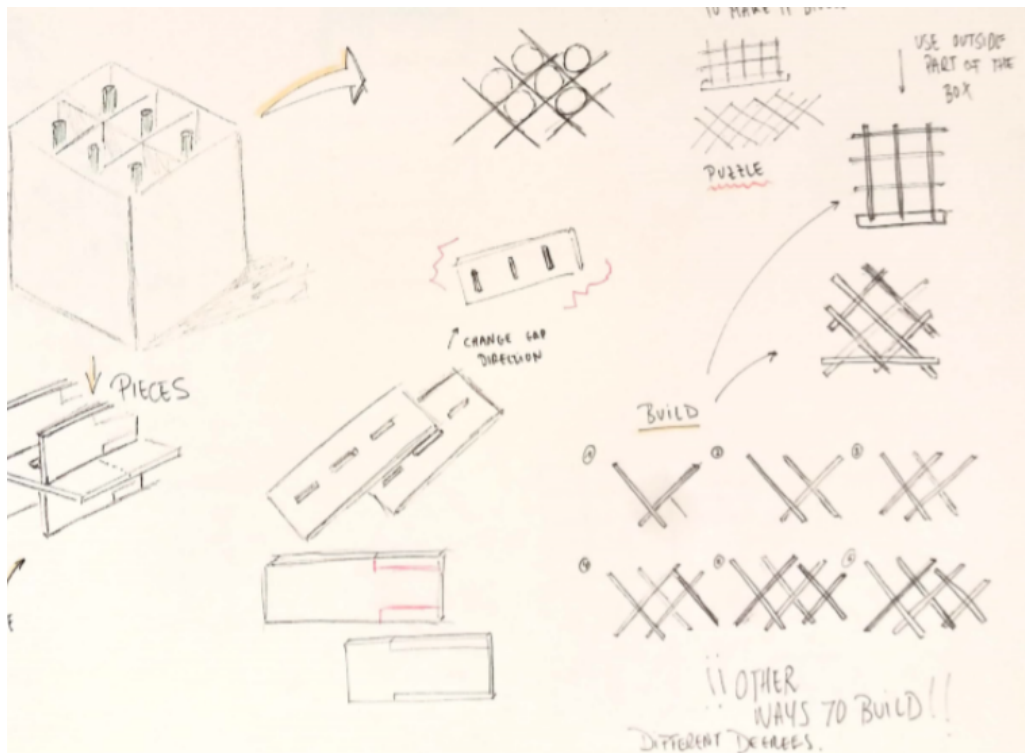


Figure 8: Idea for bottles

The first concept is a design for a package of bottles. In the design the idea is that the box where the bottles are stored can be used for a second purpose.

There are similar products like the ideas the team. Because of this the new design will have to be an improvement on the existing designs. To make it special and a product that really will be used by the buyer is difficult.

Reason for development:

Multiple uses/applications

- A way to carry
- A way to store

Longer lifespan

## 5.2 Resizable shipping/transport box

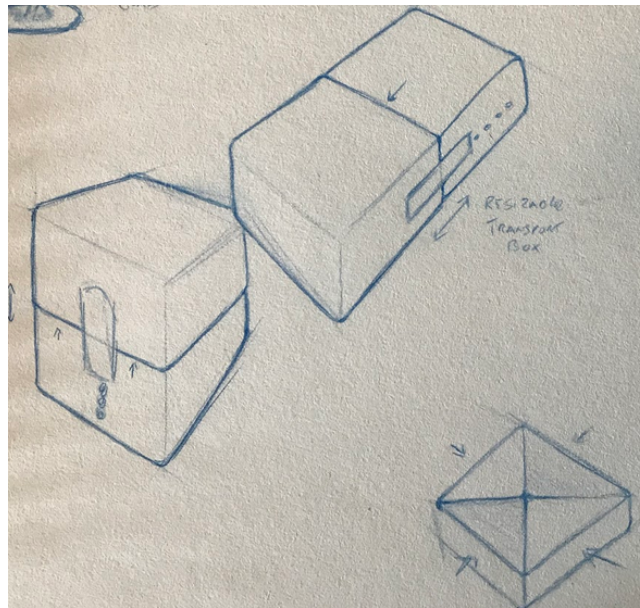


Figure 9: Idea for resizable shipping/transport box

Nowadays, more and more thought is given to environmentally conscious packaging. One of the packaging that is given a lot of attention is the packaging that is used for transport. What can be done to make the packaging more environmentally friendly is to make it resizable. By being able to change the size of the packaging, it takes up as little space as possible during transport. This allows more packages to be transported and it can be said that the resizable packaging reduces emissions.

It would be a good product to develop. A properly functioning resizable transport packaging has not been on the market so far. This is because it is very difficult. The packaging must be able to guarantee that the product purchased is not damaged. This is the main priority of the designer. In order to design a safe and well-functioning transport packaging, careful consideration and testing is required to create a system that works for multiple products.

Reason for development:  
Less storage space needed  
Less CO<sub>2</sub> emission  
Universal use

### 5.3 Cutlery



Figure 10: Idea for cutlery

If you are in the school canteen and you have bought a nice soup or fried rice, you can get disposable cutlery. The disposable cutlery is almost always made of plastic. This product is usually used only once and is then discarded. This is a huge waste of plastic. This is why it would be nice if there is a way to make the disposable cutlery from cardboard. It is quite a trend to use less plastic, for example the paper straws. Because of the trend, people would be open to replacing the disposable plastic cutlery. The down side of the idea is that it will not be recyclable for it is not clean.

Reason for development:

No/less plastic

Trend

## 5.4 Shoebox

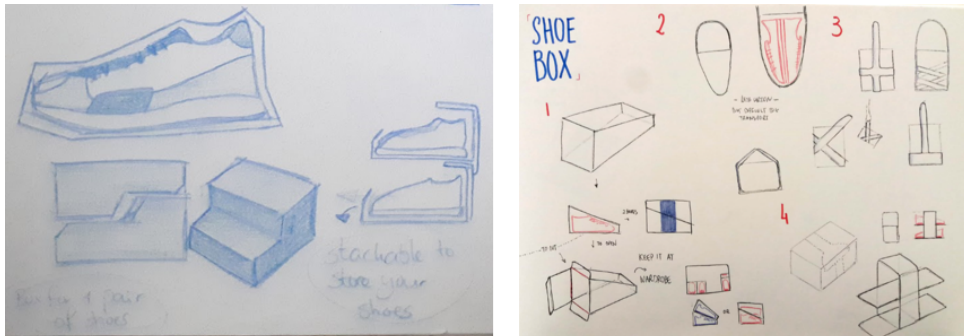


Figure 11: Idea for shoebox

Packaging for shoes is almost always the same. They are rectangular dos with a lid. But this is not necessary. Much can be done to make a practice but also an interesting shoe box. This could be used for a limited edition of shoes.

Reason for development:

Interesting

many possibilities

## 5.5 Pottingsoil

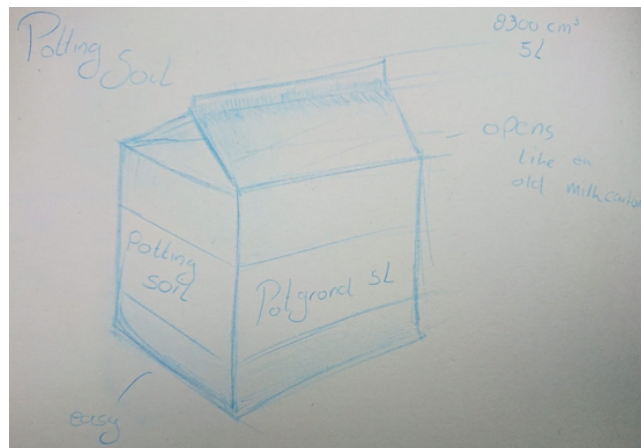


Figure 12: Idea for pottingsoil

Potting soil is sold in large plastic bags. This is often very inconvenient if you want to remove the soil from the packaging. The plastic bag forms which makes the earth not easy to pour out. The idea is to make a packaging from cardboard that can replace this plastic packaging. The packaging that can be designed from cardboard can be made in such a way that it is easy to pour. An example is the shape of a milk carton.

Reason for development:

Easier to use

No plastic

## 5.6 Tissue

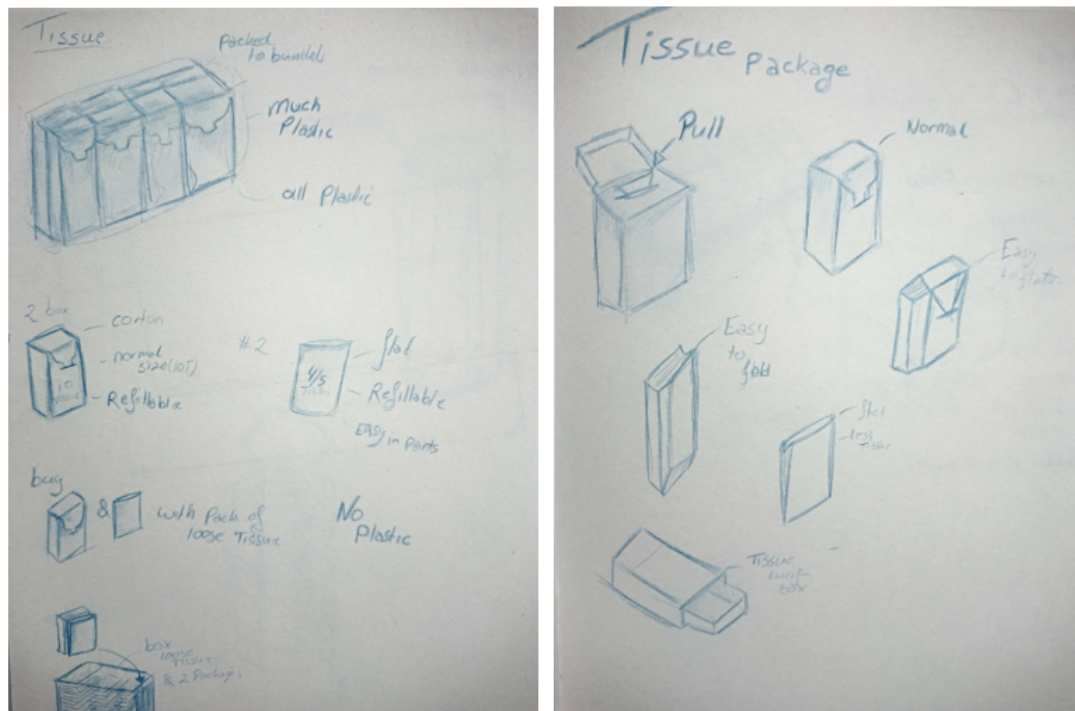


Figure 13: Idea for tissues

Spring has started again and the pollen will make many people sniff again. Handkerchiefs are very useful in this situation. As you have probably noticed, these are always in a plastic packaging. Today each person in Western Europe uses about 200 tissue a year. This is about 20 tissue packages [5]. According to the population counter of the CBS, there are 17,434,600 people in the Netherlands [4]. In the Netherlands alone, approximately 2 billion tissues are consumed per year. Due to the large amounts of this product, it would be good if no plastic were used.

The idea is to make a cardboard packaging that can be used several times. For example, the consumer can buy a package with 100 loose tissues and will receive 3/4 cardboard tissue packages. The packaging can be refilled so that as little material as possible is used for the product.

Reason for development:

No plastic

Not on the market



## 5.7 Markers

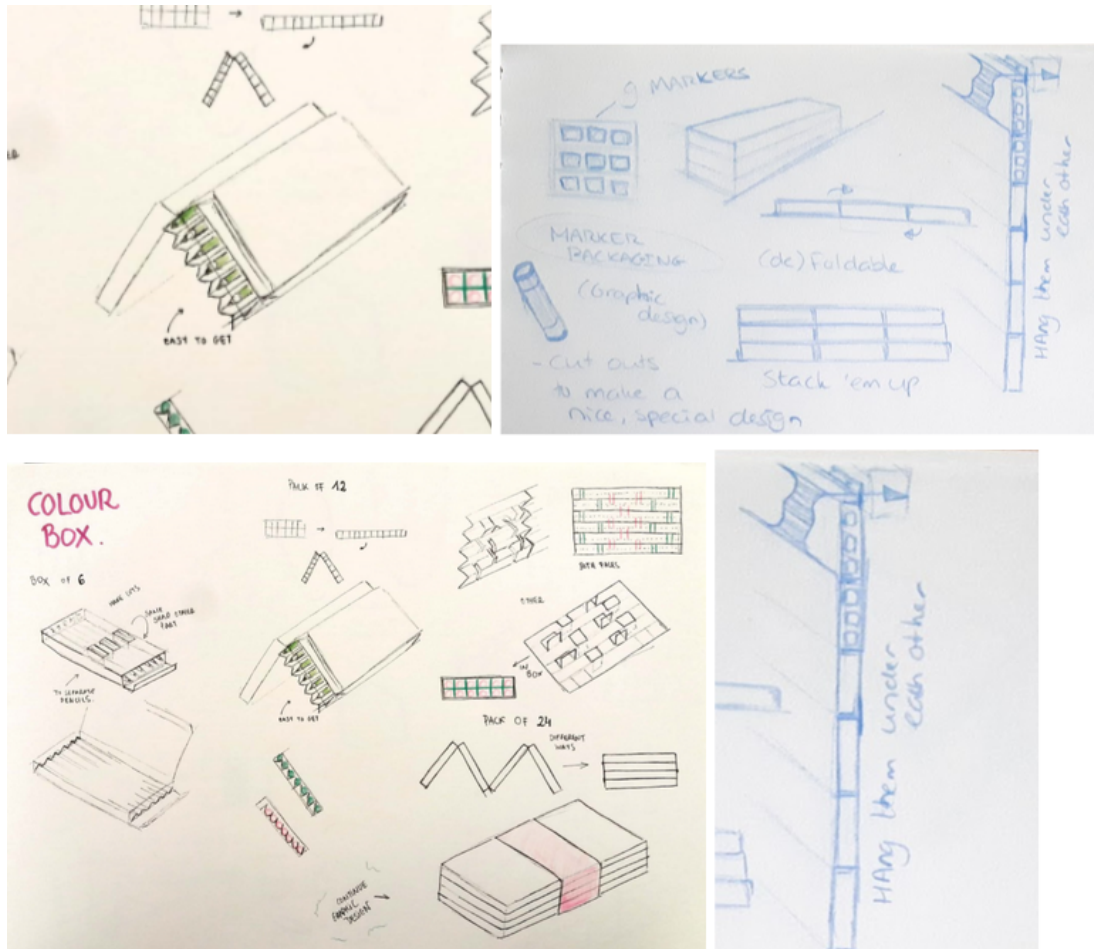


Figure 14: Idea for pencils

The concept is a cardboard packaging for markers. Most packaging of this product is disposable or made of plastic. This idea will change that. The idea is to make a package that sells the markers that the customer can use for storage. It will be a design where the content is clearly visible when opened so that it is pleasant to use. This has value for the user, which makes people want to keep the packaging.

Reason for development:

Package and storage

Buyer can decide which color

No plastic

## 5.8 Jewellery box

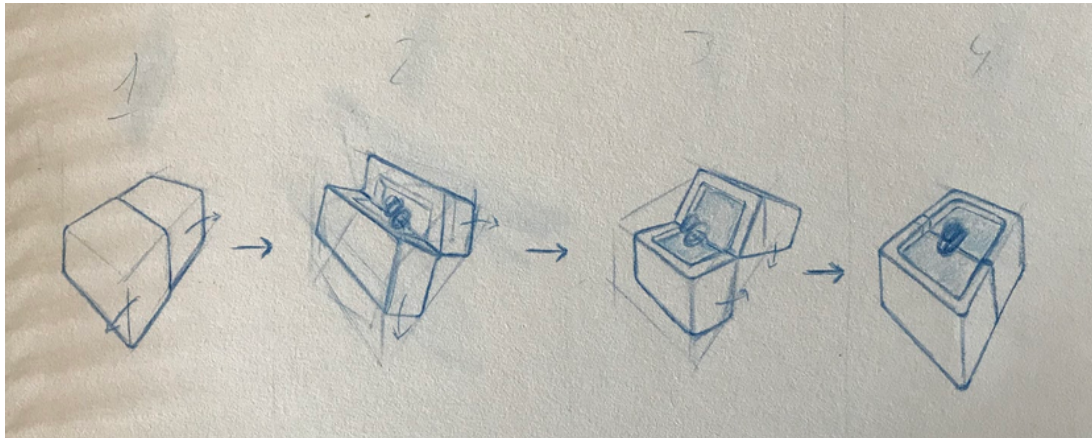


Figure 15: Idea for a jewellery box

Are you going to propose to someone and buy a ring, are you finally going to buy that beautiful watch or do you prefer that necklace. All of these things will likely be put in a nice box if you bought it. Jewellery quickly becomes expensive, so it is appreciated if it is packaged in a beautiful way. This is usually done with a decorated plastic box where you can store the item. Finding a way to make a neat box out of cardboard is a challenge. This material is quickly associated as cheap.

It is a nice challenge to design a packaging for this product that can be used when selling quality jewellery.

Reason for development:

No plastic

Something new

## 6 Picking directions

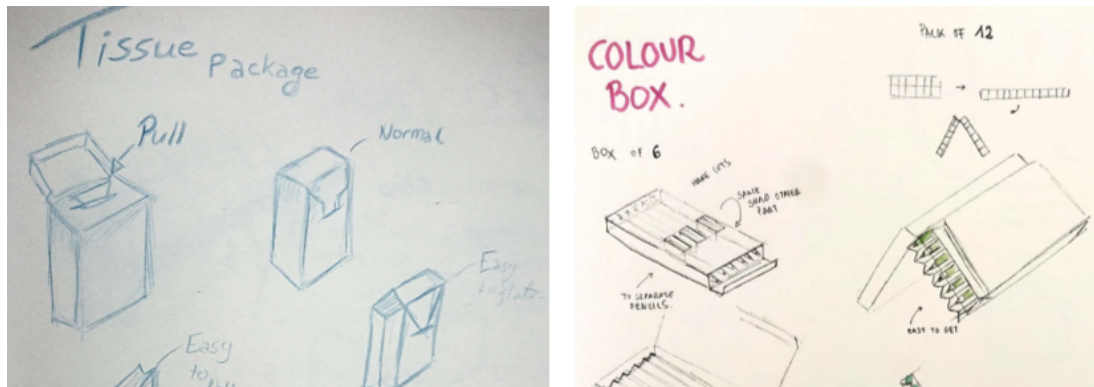


Figure 16: Idea for pencils

After receiving feedback on the eight directions, choices were made to elaborate on two of the ideas. The first concept that will be further worked out is the tissue idea. The other design is the packaging for markers. These have become the two ideas because the team saw the most potential in them.

The important point for the tissue concept was to reduce plastic. This is actually a problem and through a cardboard design we would contribute to the reduction of plastic waste.

The marker concept was chosen because it is a unique product. The way it would be used is not yet available in cardboard in stores.



## 6.1 Chosen ideas

### 6.1.1 Tissue box: Concept 1

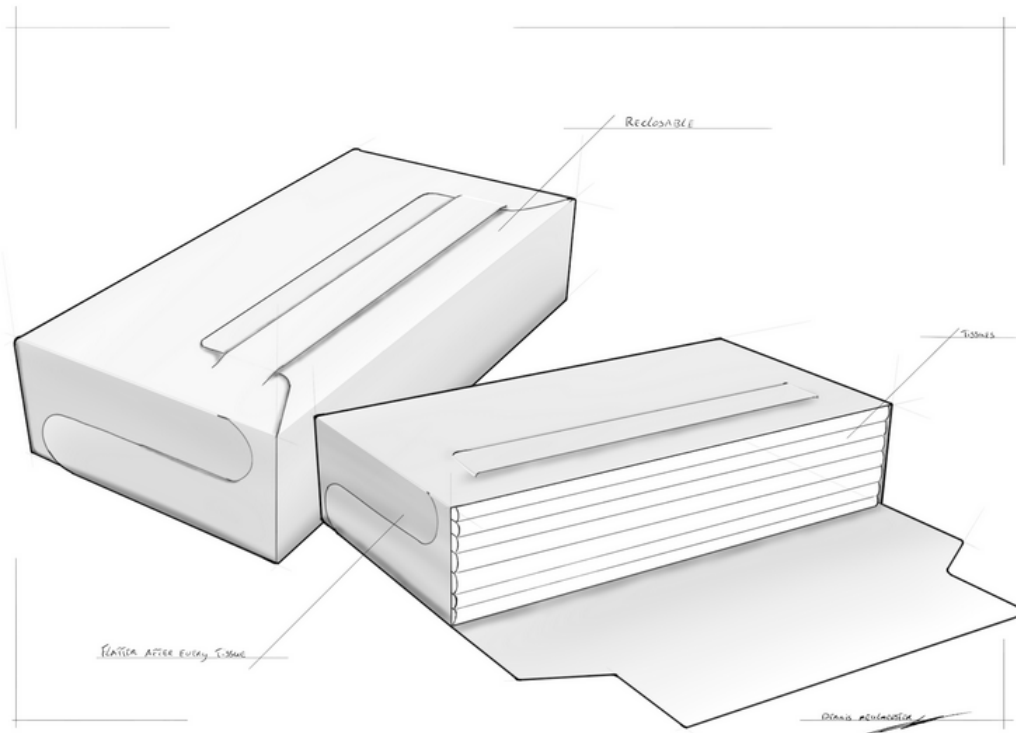


Figure 17

The idea behind this tissue box is to replace the plastic packaging currently used to package tissues. The reason it is packaged in plastic is because it's the most compact in size and cheaper than most other packaging.

If we wanted to go for a cardboard packaging we have find a way to make it cheaper or make it more attractive so people are willing to spend a little more for more value.

The idea we had was to add some sort of graphics which will give the packaging a more expensive and a cool look, which will hopefully justify the higher price.

The box contains 10 tissues and has a lid which closes at the top, this way the lid won't break that fast. The box also fits in your pocket and will shrink in size when there's less tissues in there.

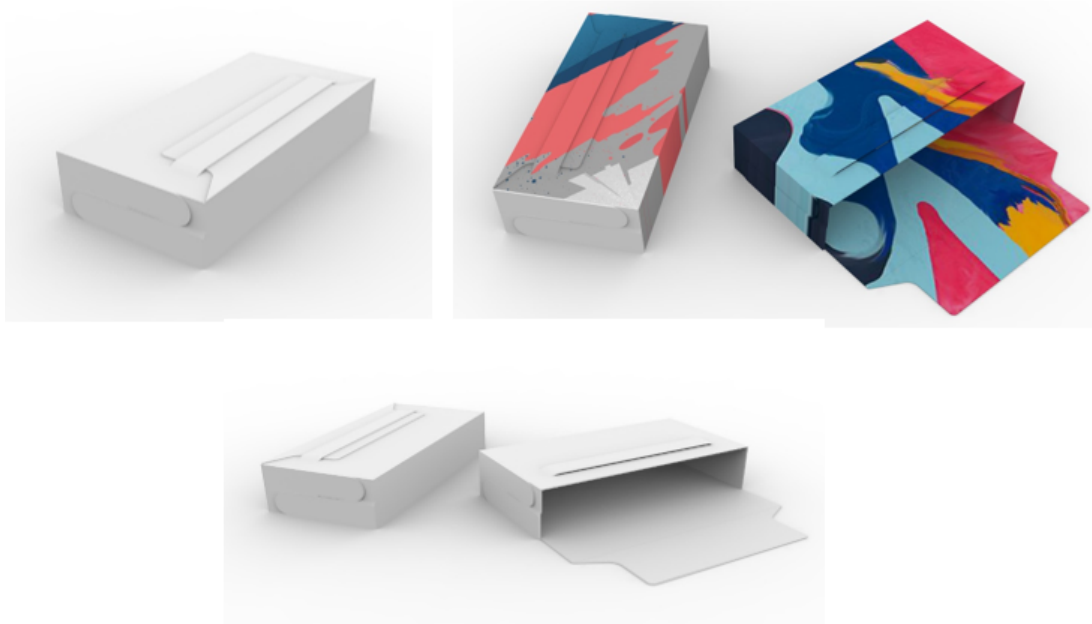


Figure 18

On this page you can see some of the renders we made to better communicate the idea behind the tissue box. You can also see how it would look if we add a graphic design to the packaging.

These renders together with the other renders of the other concepts helped us making decision or picking directions continuing into the other phases.

### 6.1.2 Tissue box: Concept 2

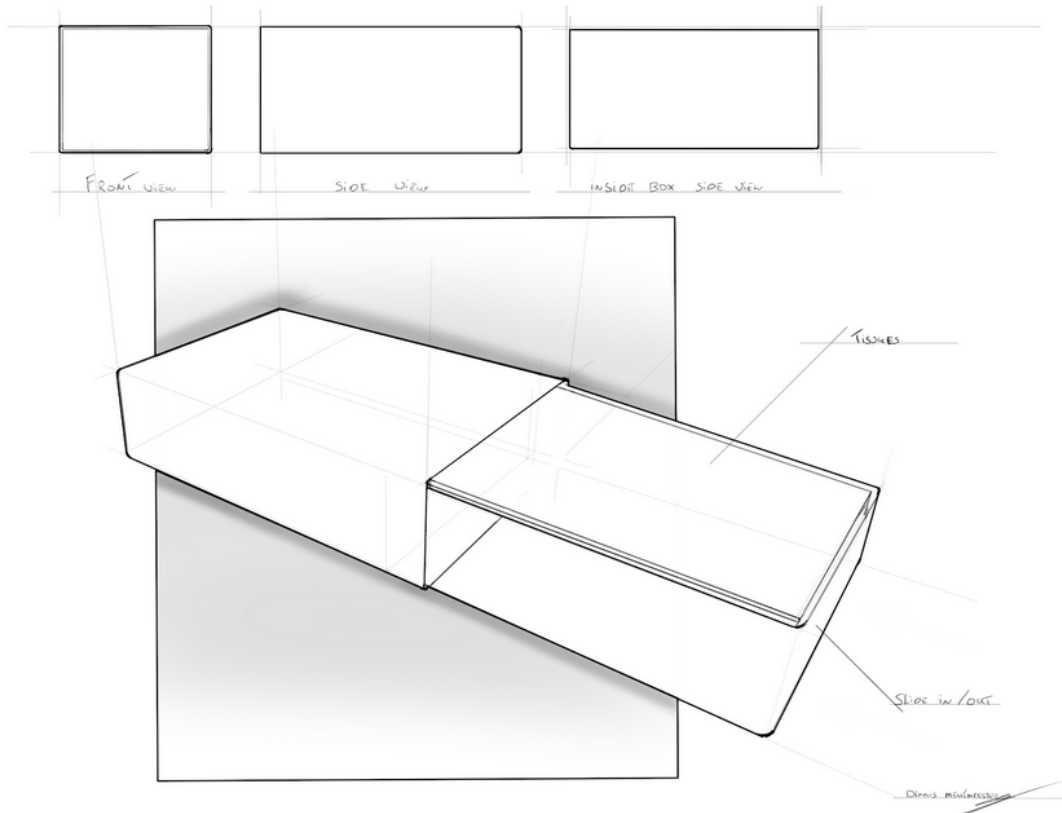


Figure 19

On this page you can see another concept. This is another box containing tissue papers. its shaped like a box of matches and has the same drawer system. It's made ,just like the other tissue box concept, for multiple refills.

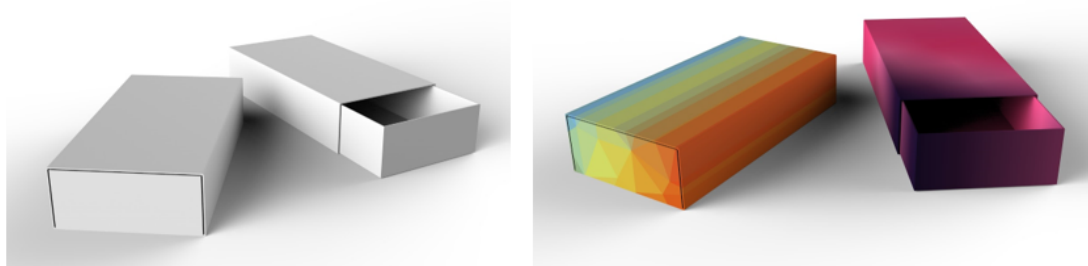


Figure 20

Here are some renderings to further communicate the tissue box. In one of the pictures u can see an example of a graphic applied to the outer side of the box.

### 6.1.3 Pencil box: Concept 1

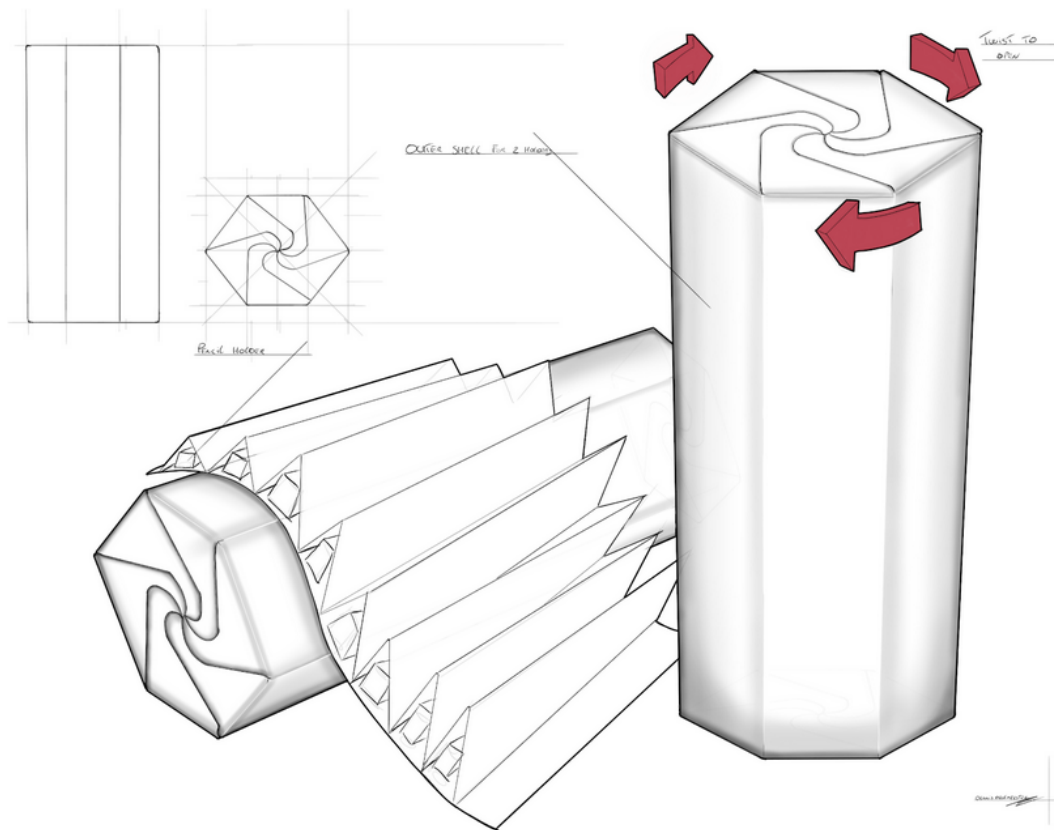


Figure 21

The next concept is a marker box. The idea behind this concept is that it is multifunctional and reusable. The box is made to hold 6 markers\* and will store your pencils nicely for later use.

If you wanna get your markers you simply open the top part which will twist open by turning the lid. You extract your marker out of the box or you can choose to take the whole roll out which you can roll out on the table for even more comfortable access to your markers.

The box is made to transport your pencils safely but will also provide you with an easy to use tool on the table.

\*not 8, like in the picture

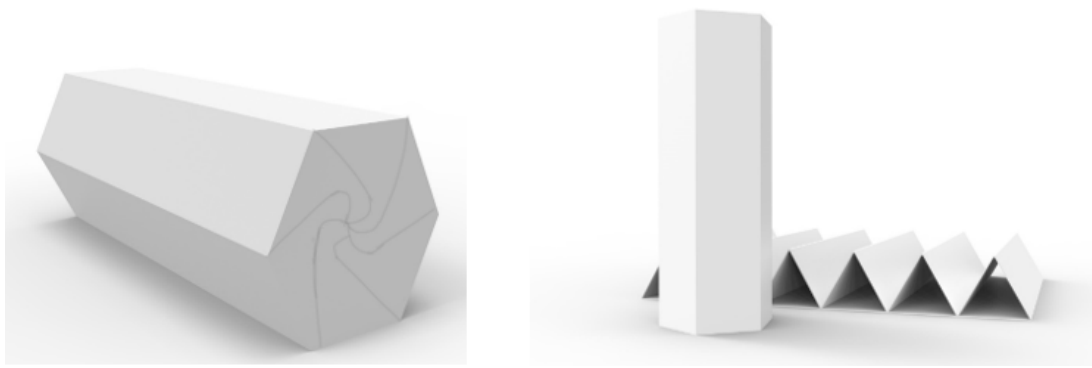


Figure 22

On the renderings on this page you can see both the parts of the concept. It's the inner part with the markers and the outer shell. We made these renderings to further clarify the look and feeling with this concept.

#### 6.1.4 Pencil box: Concept 2

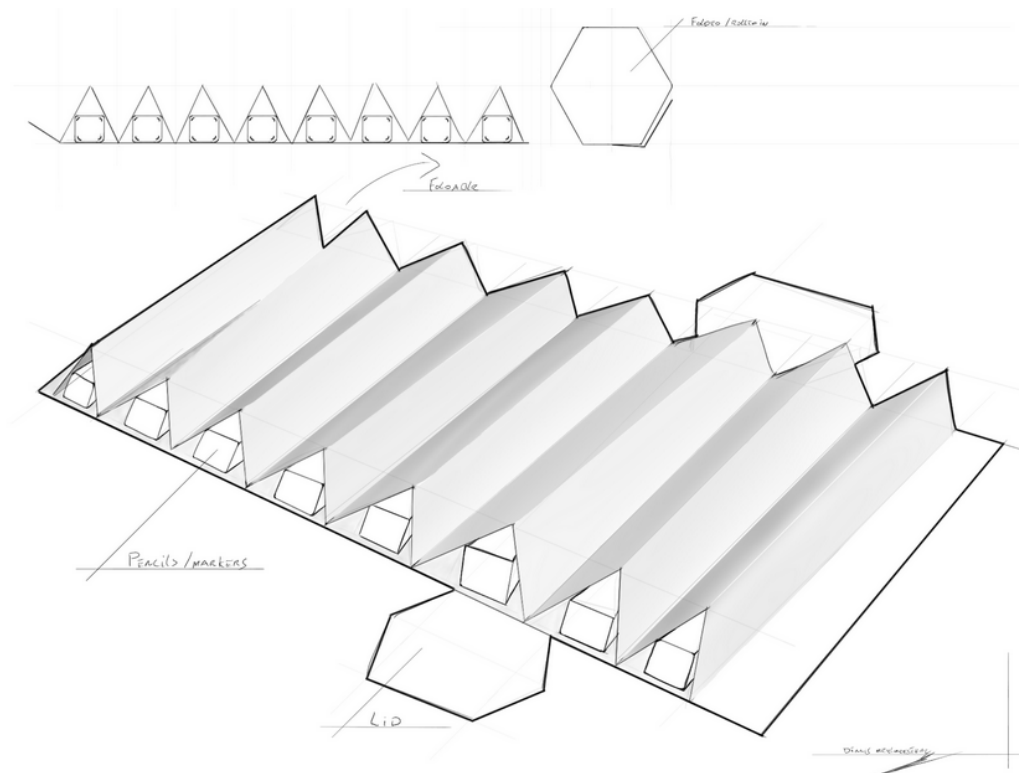


Figure 23

The final concept is basically the inner part of the last concept but then with its own closing system. So what you are left over with is a roll with markers you can roll up and put away in your bag or on the table. The functional aspects are the same as the last concept.

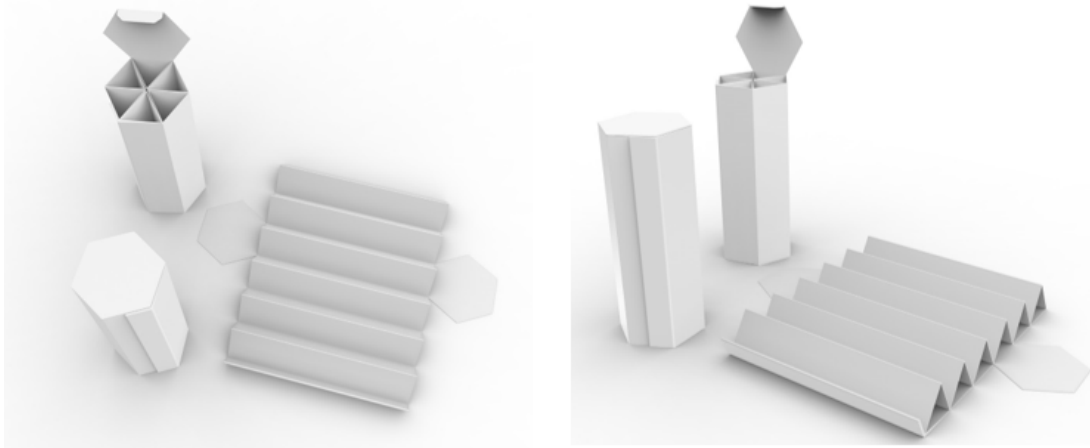


Figure 24

These are the renderings we made for the last concept here you can see the closing system further explored. It also gave us a better picture and feeling of the shape and the look of this concept.

## 6.2 Material and production techniques

To produce tissues box high weight paper will be used. It is easy to produce, fold, print and paste. Also it is totally recycled. It lets give different uses. There are a lot of kind of paper depending their weight, finishes or raw materials. In these cases Paper with weight between 200 to 250 gr/m<sup>3</sup> will be utilized.

For marker products compact cardboard will be used. It is resistant, easy to work with and responsible with the environment. Nevertheless, every product will have different thickness, depending the needs they required. Other factor to keep on mind is the weight of the cardboard, for this reason the material used will have a thickness between 0,6 to 0,9 according to the weight it will have.

For all products, cutting die production technique will be used. It is a easy system, that works with high speed and accuracy. It can use different materials with different thicknesses and plates can be changes in a little period of time making more productive the pieces production. Also the machine can fold and print the different products getting the final product in only one step.

## 6.3 Cost estimation Of the four concepts

A study was done to know the cost estimation of the proposal concepts. It could be used to decide which idea develop using the final cost as an argument of the choice.

The cost estimation is divided into two parts. The first one is to know the cost of the material needed for every piece. In this case, some pieces are extracted from the same main body, for this the product of the sheet of paper or cardboard is divided between the pieces will be created.

The second one is destined to know the labor cost, how much cost the operator labour divided in every piece he or she can generate during one work hour.

Using this two aspects the production cost of every product can be known and then use the data to decide if a project can be developed with economic benefits.

Concept 1

|  |                 |
|--|-----------------|
| <b>Tissue Concept 1</b>  |                 |
| <b>Material cost</b>   |                 |
| - Quantity: 1 piece<br>- Material: Paper weight between 200gr/m <sup>3</sup> 500 x 700 mm<br>- Price: 0,95€<br>- Pieces per plate: 12<br>- Final material cost= 0,95€/ 12= 0,0791€ |                 |
| Subtotal 1   | -,0791€         |
| <b>Labor cost</b>  |                 |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,1 s= 0,000028 h<br>Final labor cost: 0,000028 h x 20 €/h= 0,00056€                         |                 |
| Subtotal 2   | -,00056€        |
| <b>FABRICATION COST</b>  | <b>0,07966€</b> |

Concept 2

|  |           |
|--|-----------|
| <b>Tissue Concept 2</b>  |           |
| <b>Material cost Part 1</b>  |           |
| - Quantity: 1 piece<br>- Material: Paper weight between 200gr/m3 500 x 700 mm<br>- Price: 0,95€<br>- Pieces per plate: 12<br>- Final material cost= 0,95€/ 12= 0,0791€<br>Subtotal 1 | -0,0791€  |
| <b>Material cost Part 2</b>  |           |
| - Quantity: 1 piece<br>- Material: Paper weight between 200gr/m3 500 x 700 mm<br>- Price: 0,95€<br>- Pieces per plate: 12<br>- Final material cost= 0,95€/ 12= 0,0791€<br>Subtotal 2 | -0,0791€  |
| <b>Total material cost</b>   | 0,1582    |
| <b>Labor cost Part 1</b>   |           |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,1 s= 0,000028 h<br>Final labor cost: 0,000028 h x 20 €/h= 0,00056€<br>Subtotal 2             | -0,00056€ |
| <b>Labor cost Part 2</b>   |           |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,1 s= 0,000028 h<br>Final labor cost: 0,000028 h x 20 €/h= 0,00056€<br>Subtotal 2             | -0,00056€ |
| <b>Total Labor cost</b>  | 0,00112€  |
| <b>Total fabrication cost</b>  | 0,1593€   |



Concept 3

|  |          |
|--|----------|
| <b>Marker box Concept 1</b>  |          |
| <b>Material cost outside part</b>  |          |
| - Quantity: 1 piece<br>- Material: High density cardboard 1000 x 1400 mm<br>- Price: 4,4€<br>- Pieces per plate: 10<br>- Final material cost= 4,4€/ 10= 0,44€<br>Subtotal 1  | - ,44€   |
| <b>Material cost inside part</b>   |          |
| - Quantity: 1 piece<br>- Material: High density cardboard 1000 x 1400 mm<br>- Price: 4,4€<br>- Pieces per plate: 16<br>- Final material cost= 4,4€/ 16= 0,275€<br>Subtotal 2 | - ,275€  |
| <b>Total material cost</b>   | 0,715€   |
| <b>Labor cost outside part</b>   |          |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,2 s= 0,00006 h<br>Final labor cost: 0,00006 h x 20 €/h= 0,0012€<br>Subtotal 3        | - ,0012€ |
| <b>Labor cost inside part]</b>   |          |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,1 s= 0,00003 h<br>Final labor cost: 0,00003 h x 20 €/h= 0,0006€<br>Subtotal 4        | - ,0006€ |
| <b>Total Labor cost</b>  | 0,0018€  |
| <b>FABRICATION COST</b>  | 0,7168€  |

Concept 4

|   |              |
|---|--------------|
| <b>Marker box Concept 2</b>   |              |
| <b>Material cost</b>  |              |
| - Quantity: 1 piece<br>- Material: High density cardboard 1000 x 1400 mm<br>- Price: 4,4€<br>- Pieces per plate: 6<br>- Final material cost= 4,4€/ 6= 0,73€<br>Subtotal 1 | -,73€        |
| <b>Labor cost</b>   |              |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,3 s= 0,000084 h<br>Final labor cost: 0,00003 h x 20 €/h= 0,0017€<br>Subtotal 2    | -,0017€      |
| <b>FABRICATION COST</b>   | <b>0,90€</b> |

## 6.4 Requirements

Above is the list of requirements, we used this to make decisions about ideas we have or we use it to find out which direction to go for. We came back to this list many times during the product to make sure we are making a good product.

|   | <b>Requirement/wish</b> | <b>Category</b>             | <b>Description</b>   |
|---|-------------------------|-----------------------------|--|
| 1 | Requirement             | Manufacturing               | The packaging needs to be made out of cardboard.                                   |
| 2 | Requirement             | Manufacturing/<br>Nature    | Solution must be an improvement looking at the current packaging already existing. |
| 3 | Requirement             | Marketing                   | Solution must be the same price or cheaper than the current packaging.             |
| 4 | Requirement             | People                      | Package is made for multiple uses, to avoid unnecessary trash.                     |
| 5 | Wish                    | Manufacturing               | Packaging must be 100% recyclable.   |
| 6 | Wish                    | Manufacturing               | Packaging solution needs to reduce used material on old packaging.                 |
| 7 | Wish                    | Manufacturing/<br>Marketing | Packaging needs to be cheaper to make than currently used package.                 |
| 8 | Wish                    | Marketing                   | Package solution has a ‘wow’ factor.   |

## 7 Materialization

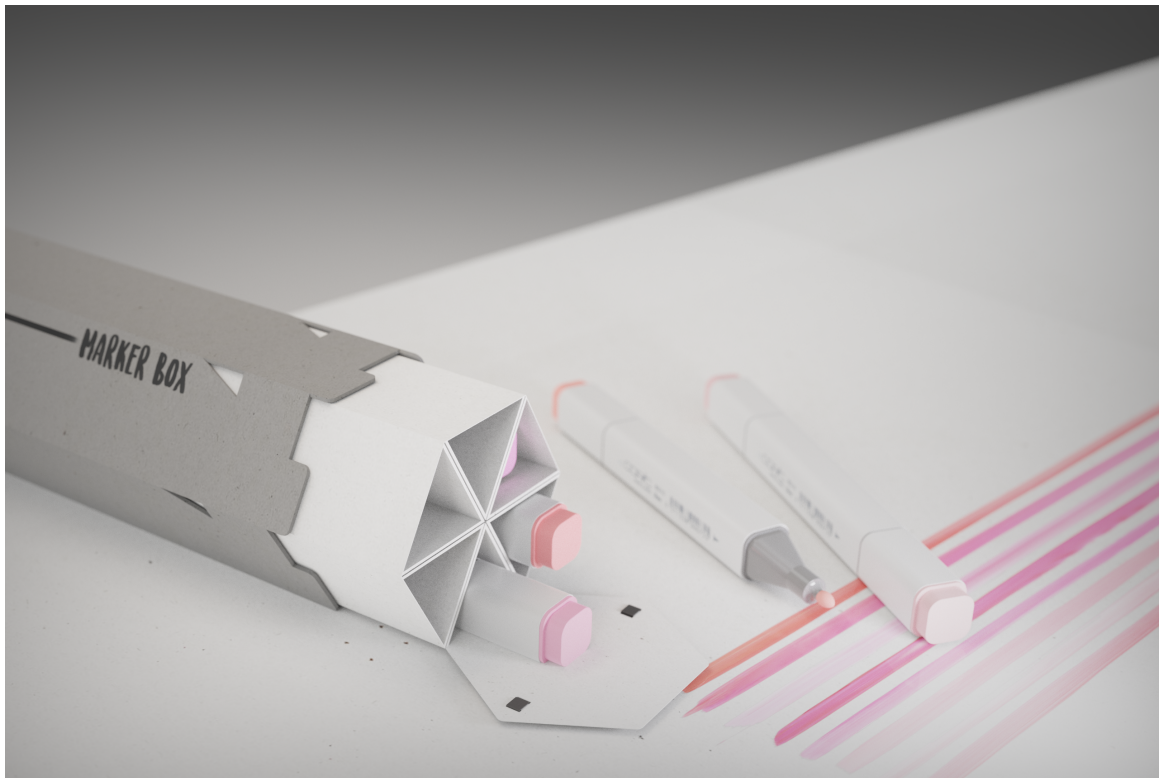


Figure 25: The final design for the markerbox

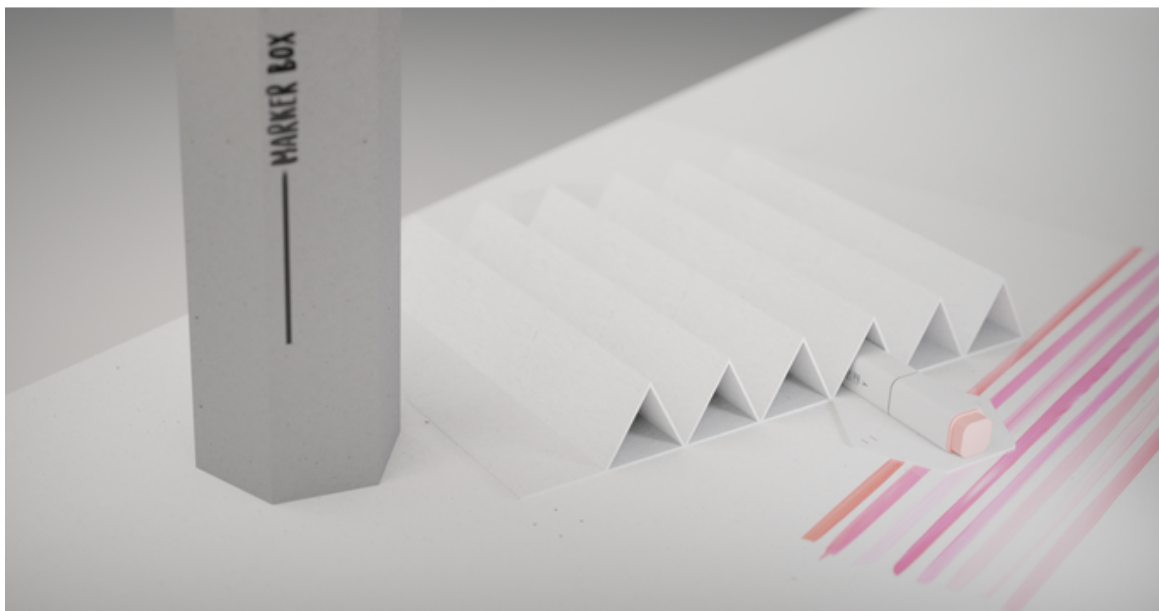


Figure 26: The final design for the markerbox

On this page you can see the end result of this project. The marker box has been further developed so it can be produced and sold. On the renderings u can see the functionality of the idea and the markers

which are placed in the marker holder.

During the making of these renderings the team tried different colors or graphics on the packaging. This was to get a better feeling how it would look like with some graphics on the outside. For the final render we decided to go for a gray box so the focus could be kept on the idea it self. The graphics will still be part of the product when in production.

There is looked at certain optimisations the team could apply to the product. For example the closing system has been improved since the concept phase. Even though the product is finished there's always room for improvements. Here a list of some optimization points:

- The closing system at the moment could be a little complicated, this is the reason we made an user manual. This system could further optimise by making it easier to use and less fragile.
- At the moment 6 markers will fit it the marker holder. If we wanna make it that u can hold double this amount, we could make the outer twice as long and put 2 marker holders in there.
- At some places we can still reduce the material use, to make the packaging even more environmental friendly.
- The outer design of the shell will most likely have a graphic design. We can further improve on this by getting a graphic designer on board that could make a design that fits our product.

## 7.1 Mock-up

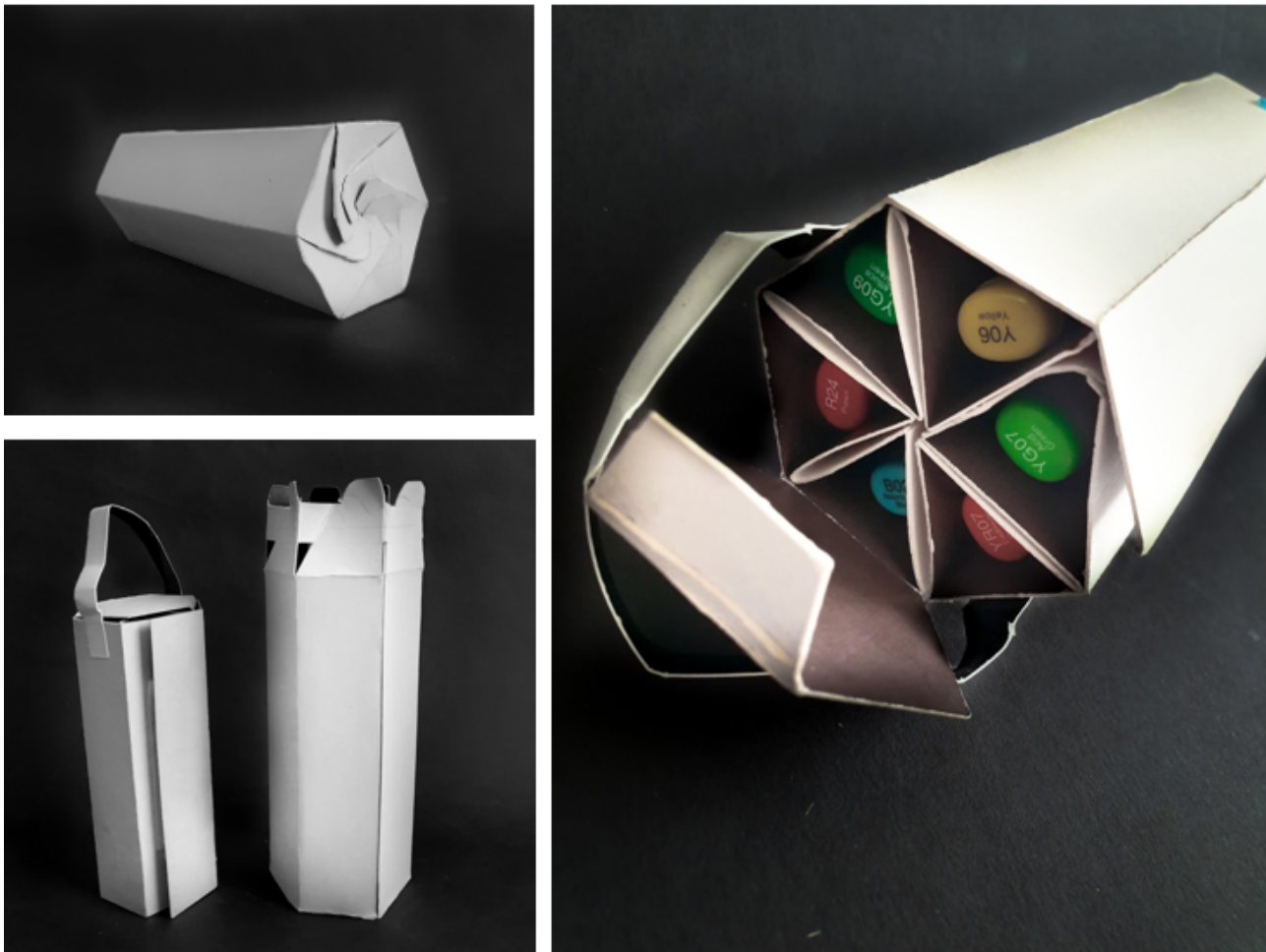


Figure 27: The mock-up of the markerbox

To see if the concept would really work the team made a lot of mock-ups with different closing systems to see what would work and what would not work.

After making these mock-ups a better understanding what is important and what isn't while using the packaging began to form. So after this, a lot of adjustments were made to the concept before designing it for manufacturing.

While trying to figure out what was the best design for the marker box concept we have taken a look at the existing Matze box. This box is hexagonal and has a nice closing system. We tried to add this closing system to our marker box idea. There was a lot of measuring needed to get the closure working. But in the end, also using the Matze box as a reference, we figured out how to design the outer shell to make it work. Because of the use of the triangles, the marker holder (inside part) could be rolled up and fit into the outer shell with storage for six markers.

## 7.2 Technical aspects

An idea needs to have technical aspects to become into an products. The material that is better to produce, if it is resistant enough or too much expensive. also is fundamental to know different production systems and choose the one is optimal for marker box shape. Moreover use this information to know the cost and which improvements will make it new and special.

### 7.2.1 Material

Compact cardboard has been used to produce the product. This material is between 0,7 to 0,9 mm thin. This material has several properties that the marker box needs. It is rigid and can protect the marker from hits and possible falls. Also it is responsible with the environment, it can be totally recycled; it is customizable so it be printed using offset or flexographic printing techniques. Moreover it is easy to fold creating cut lines.

Other applications of compact cardboard are bindings, palletizing, separators of various items or table games like puzzles.



Figure 28: Compact Cardboard

### 7.2.2 Production

Die cutting machine will be used to produce the pieces. This machine can cut several plates in little period of time, approximately 165 strokes per minute. . It works in precise way with cut-to-print registration accuracy of +/- 0.1mm or better. Also it can print, cut and fold the plate material getting the final product almost finish when it goes out of the machine. The plates are quick to change, so it can produce more pieces in less time. The products can be done with different materials, not only cardboard, like metal, plastic...

### 7.2.3 Cost

The marker box is made with two different pieces for this there are two prices to calculate. The price is divided into two parts, the first one is material cost where one piece price is searched and the second part where labor cost for each piece is analysed. The material cost uses the general price of the main body ( High density cardboard) and the amount of piece that can be extracted from it. Cost labor studies the time the operator needs to produce a piece and the cost per hour her or his work has.

|  |                |
|--|----------------|
| <b>Etui</b>  |                |
| <b>Material cost</b>   |                |
| - Quantity: 1 piece<br>- Material: High density cardboard 1000 x 1400 mm<br>- Price: 4,4€<br>- Pieces per plate: 16<br>- Final material cost= 4,4€/ 16= 0,275€ |                |
| Subtotal 1   | -,275€         |
| <b>Labor cost</b>  |                |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,1 s= 0,00003 h<br>Final labor cost: 0,00003 h x 20 €/h= 0,0006€        |                |
| Subtotal 2   | -,0006€        |
| <b>FABRICATION COST</b>  | <b>0,2756€</b> |

|   |             |
|---|-------------|
| <b>Outer shell</b>  |             |
| <b>Material cost</b>  |             |
| - Quantity: 1 piece<br>- Material: High density cardboard 1000 x 1400 mm<br>- Price: 4,4€<br>- Pieces per plate: 6<br>- Final material cost= 4,4€/ 6= 0,73€ |             |
| Subtotal 1  | -,73€       |
| <b>Labor cost</b>   |             |
| - Cardboard third rate operator<br>- Cost per hour: 20€/ hora<br>Time to do the piece:0,3 s= 0,000084 h<br>Final labor cost: 0,000084 h x 20 €/h= 0,0017€   |             |
| Subtotal 2  | -,0017€     |
| <b>FABRICATION COST</b>   | <b>0,9€</b> |

|                    |                |
|--------------------|----------------|
| <b>Final Price</b> |                |
| Etui               | 0,2756€        |
| Outer shell        | 0,90€          |
| <b>Total</b>       | <b>1,1756€</b> |



### 7.2.4 Cut-out

The cut out show the maximum measures of the pieces and the shape they have. These data are fundamental in product production because they have direct link with final cost and material waste. Changing the surface distribution or some measures company could save investment.

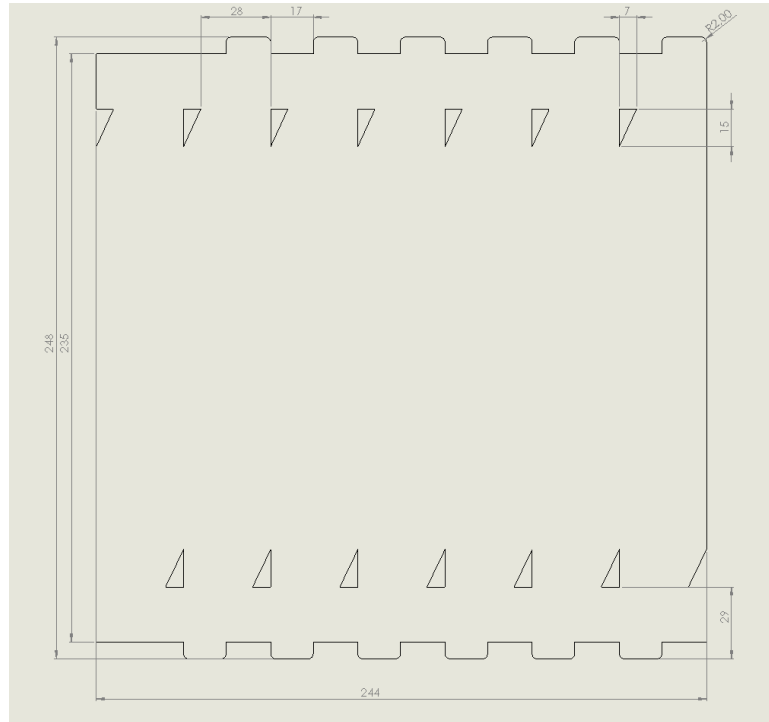


Figure 29: The cut-out of the outershell

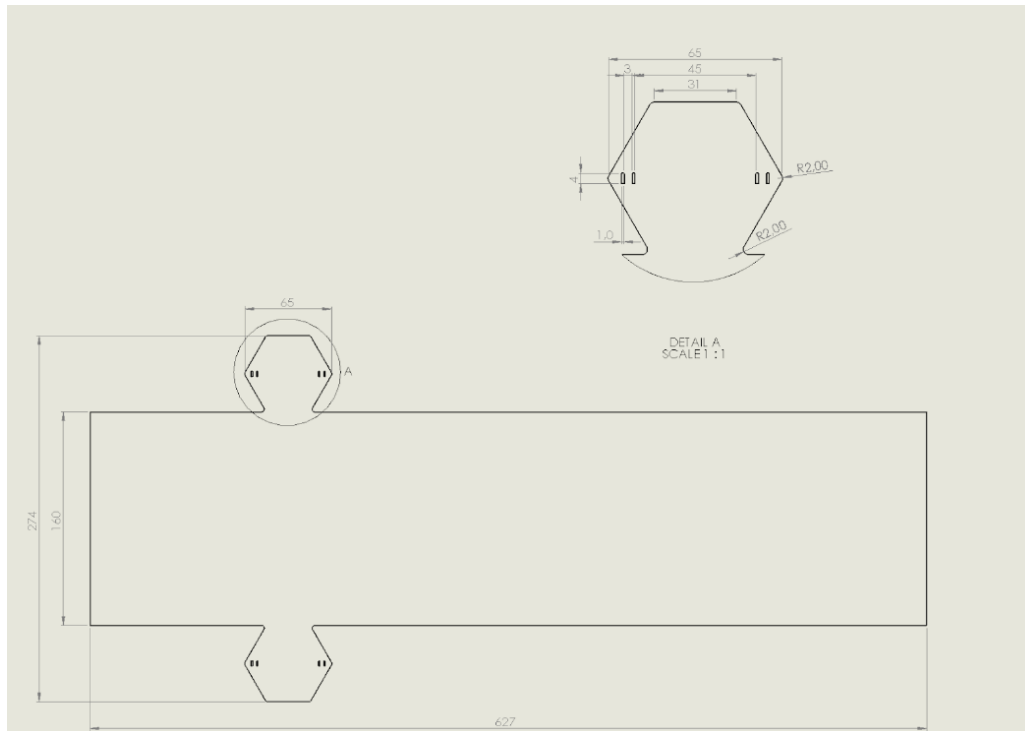


Figure 30: The cut-out of the etui

Moreover the cut outs are distributed into the plates. They are collocated with the aim of getting the most pieces possible, keeping the quality and creating the less material waste as possible. Cardboard plats let change the distribution easily because they are easy to produce in customers measures needs. Some aspects are fundamental to consider before start to produce and one of the fields to work more are the cut out.

Marker box plate measures 1100 mm x 1200. Six inside pieces or sixteen outside pieces can be extracted in every cut.

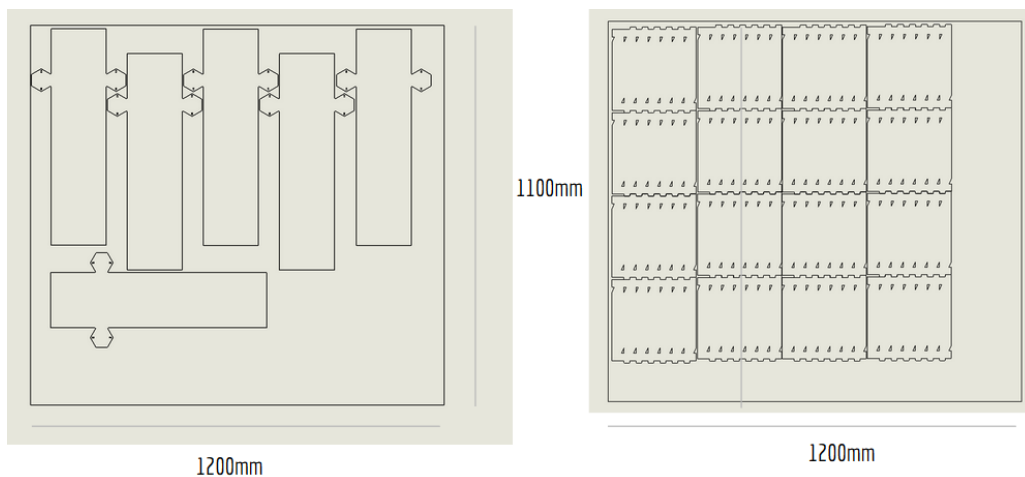


Figure 31: The cut-out of the marker box

### 7.2.5 User manual

The package contains a compact short user manual. This has been added to be on the safe side so that the user does not have to struggle with the packaging. The manual explains in three steps how to open the package and in three how to close it. Here are pictures added for clarification.

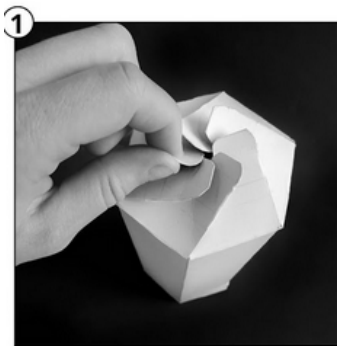
## USER MANUAL



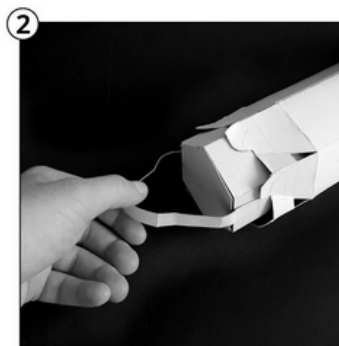
SAFETY WARNINGS:  
Keep away from water.

### Opening the pencil box

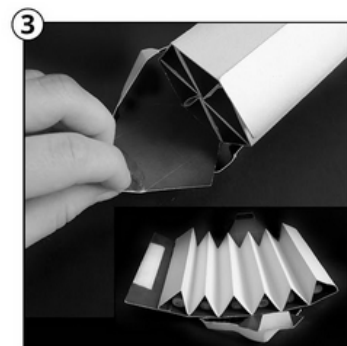
In this manual will be explained how to use the pencil box.



1 Pull one of the six small lids up to open the shell.



2 Pull the etui (inside part) out of the shell by pulling out the strap of the etui.



3 To get the pencils/markers out of the box, open the inside etui. This can be done by opening the top or bottom lid or by rolling out the etui by opening the side lid (the long side).

Figure 32: Manual for opening the markerbox

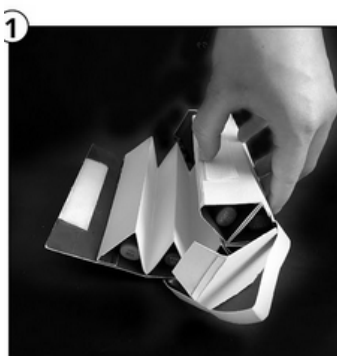
## USER MANUAL



SAFETY WARNINGS:  
Keep away from water.

### Closing the pencil box

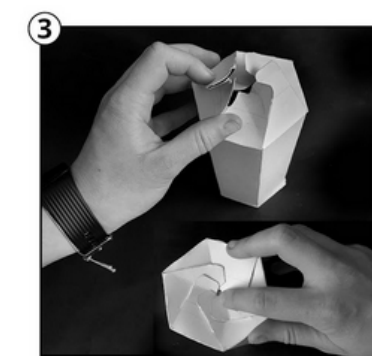
In this manual will be explained how to use the pencil box.



1 Roll the etui back up and close the 3 lids (top, bottom, side).



2 Put the etui in the shell.



3 Close the package by pulling the opening part down.

Figure 33: Manual for closing the markerbox

## 7.2.6 Graphics

Different graphics have been designed for the marker box. Adding graphics to the product gives it more value. This can be done by adding color, shapes and figures. The product will stand out more which will increase the value of the product.

All graphics designs are made gender neutral. Hence, every design will be interesting for both men and women.

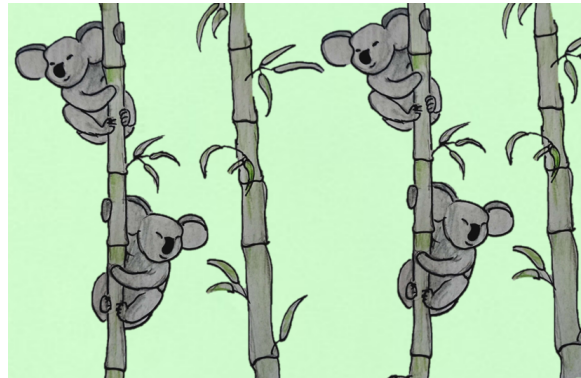


Figure 34: Graphic of koalas

The first design is of a koala bear. It is a sweet, fluffy animal of which a design can be made with a cute factor.

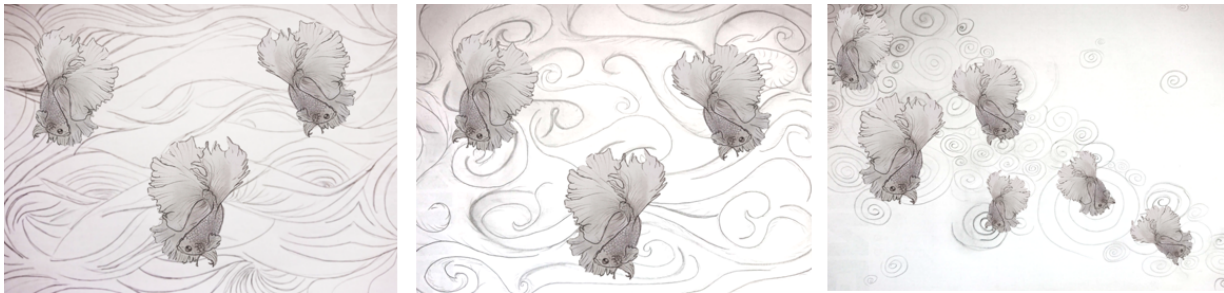


Figure 35: Graphics of a siamese fighting fish

In figure 35 three sorts of graphics can be seen. All of these graphics are the siamese fighting fish. Different backgrounds have been made to be able to see the design of the fish in different ways. The siamese fighting fish is a very colorful animal. This quality of the fish can be used for the product.

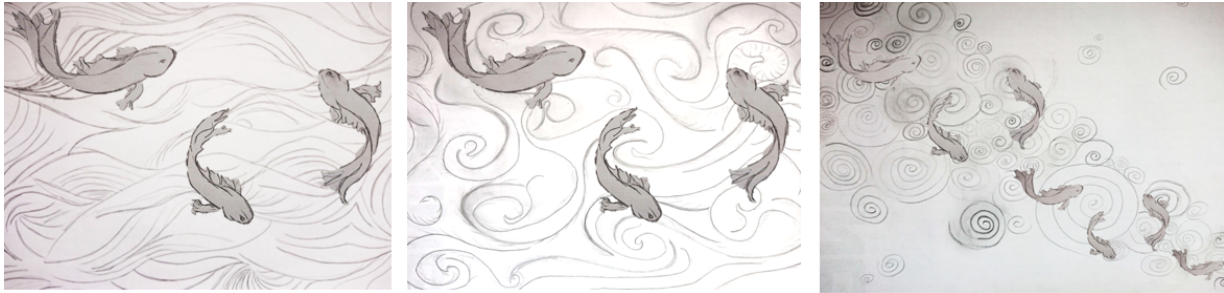


Figure 36: Graphics of koi fish

In figure 36 the same backgrounds of the graphics in figure 35 are used for a different fish. Here can a koi fish be seen. It is a more simple fish which will attract less attention. koi fish are more often used for graphic designs. Also in this design color can be added.



Figure 37: Graphics of geometric and abstract shapes

For the last serie of graphics geometric and abstract shapes are used.

## 8 Conclusion

Two of eight ideas have been further elaborated. These were the tissue packaging and the marker box. After much consideration, it was decided to developed the marker box.

The result is a worked out prototype of this idea. It is fully made out of cardboard. In this package six markers can be stored. To make the product stand out more, graphics can be added. The package is handy for the buyers because they can fill the box themselves.

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