



Universidad de Valladolid



**ESCUELA DE INGENIERÍAS
INDUSTRIALES**

UNIVERSIDAD DE VALLADOLID

ESCUELA DE INGENIERIAS INDUSTRIALES

**Grado en Ingeniería de diseño industrial
y desarrollo del producto**

Título del TFG

Be-Amply

Autor:

González Murillo, Lucía

Responsable de Intercambio en la UVa

Eusebio de la Fuente

Universidad de destino

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TFG REALIZADO EN PROGRAMA DE INTERCAMBIO

TÍTULO: Be-Amply
ALUMNO: Lucía González Murillo
FECHA: 29.03-2023
CENTRO: Oslo Metropolitan University
UNIVERSIDAD: Oslo Metropolitan Universit
TUTOR: Oscar-Torjus Utaaker

Resumen y palabras clave (Abstract y Keywords):

Este documento trata de mostrar el proceso de diseño seguido para obtener el producto final elaborado, una maleta alternativa, moderna y con un simbolismo implícito, más que un objeto útil.

Este proceso comienza desde la elección de elementos a fusionar, pasando por la ideación de conceptos e ideas, investigación de los propios objetos escogidos antes de la fusión y finalmente, proceso de elaboración del prototipo final, no sin antes crear distintas maquetas provisionales.

This document tries to show the design process followed to obtain the final elaborate product, an alternative, modern suitcase with an implicit symbolism, rather than a useful object.

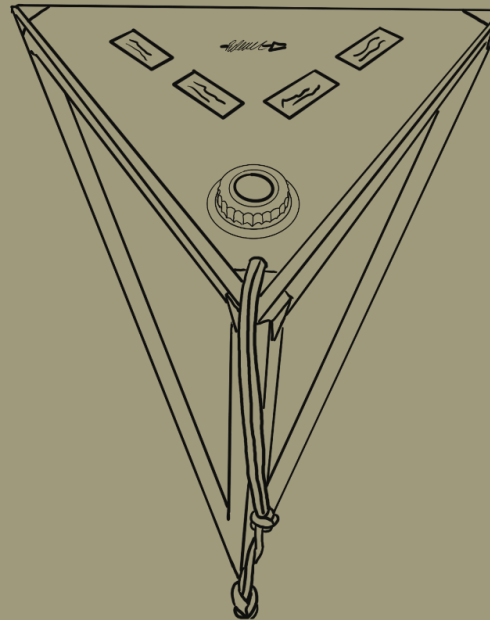
This process begins from the choice of elements to be merged, through the ideation of concepts and ideas, research of the chosen objects themselves before the fusion and finally, the process of developing the final prototype, but not before creating different provisional models.

Keywords: cultural, historical, investigation, design, reverse engineering

Palabras clave: cultural, histórico, investigación, diseño, ingeniería inversa

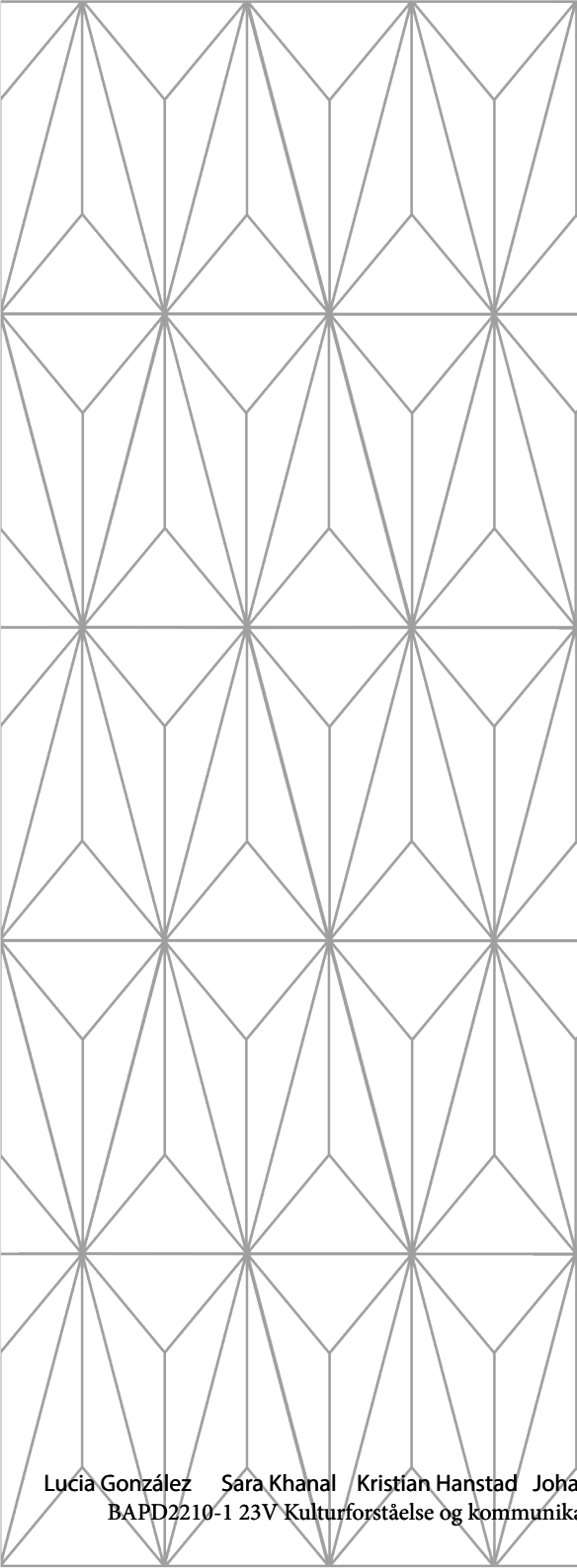
BI-AMPLY

Lucia González Sara lastname Kristian Hanstad Johann Brosvik
BAPD2210-1 23V Kulturforståelse og kommunikasjon



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1. Introduction

This project has the purpose of documenting the design process of the BI-AMPLY suitcase created from two products that were going to be discarded, a radio and a military backpack, both objects from the 50s.

The objective of this project is to develop a product through which its culture and trajectory are shown while giving it a second life.

This document aims to bring together the entire design process from its conception and approach to its final construction.

1.1 Following the things

To begin with, this concept is introduced following the things, since it is the design methodology in which the design team has decided to work.

What is it about?

Following an object's biography
Understanding what things are

It might involve

one object as it moves through different domains
several interconnected object pathways; a type of thing
a thing as it is transformed into materials or other things
materials as they move through different objects and spaces

There's a need to make a decision over what you are following. How you decide on the boundaries of what you are following. The approach entails following objects through different spaces and over time. What is the object's biography?

Following a pair of jeans might lead you to its breakdown into shoddy as it is then reformed into a bank-note. (Woodward, 2020)

Following the things is an approach (rather than a method) that draws upon different methods, such as ethnography, observation, interviews, visual methods and archival histories

There's different directions you can follow the things

it moves from an object to discarded waste to new objects (analytical approach). It combines the practical and theoretical decisions this involves thinking about what things are and where the boundaries of your research and empirical sites fall. (Aspect, 2023)

How are things and how do they relate to each other?

How is the material forms? What are people doing with them?

Important questions

How does the objects use change over time?

What happens when it is not useful anymore?

What is its career so far?

An analytical approach is a process where it's used smaller pieces to solve a problem. Each item gets easier to work with when you separate them, just like a puzzle. This involves taking all the pieces that are relevant to find a solution. In this project we have been taking parts from both the radio and the backpack. The frame of the radio has been cut into smaller pieces, and are still used as the new products support. We also cut the rucksack fabric to make it fit the shape of the framework. (Twink, 2014)

1.2 Two object in one

Once the methodology has been investigated, the team decides to continue with this method by designing an object from two different ones, which are no longer used.

The first object found is a very old radio, the model is Philips BX998A, it was in the electronic waste storage in the basement of the university.

The second item found on the Oslo recycling plant tour is a military tactical backpack.

Once the two objects have been chosen, we proceed to the analysis of each one of them, both its historical context and its shape and different parts that make it up.

Following the things is an approach (rather than a method) that draws upon different methods, such as ethnography, observation, interviews, visual methods and archival histories

There's different directions you can follow the things

it moves from an object to discarded waste to new objects (analytical approach)

It combines the practical and theoretical decisions

this involves thinking about what things are and where the boundaries of your research

and empirical sites fall

How are things and how do they relate to each other?

How is the material forms? What are people doing with them?

Important questions

How does the objects use change over time?

What happens when it is not useful anymore?

What is its career so far?



① This model is one of the most important radios ever built by Philips. It is the first radio that takes into account the design. It was unique in Europe, because it was the only one which had 16 valves equivalent to 22 single valves.

It has some special features that make it exclusive in the production of the time.

Their dimensions are a front of 71 cm in width and 44 cm in height.

It has some pure brass and wooden surfaces to make an impact, it has a classical and conservative design to attract specific social class attention.

② This radio is created just as the war ends and takes advantage of the innovations in radio that had occurred during it.

③ Main features:

Year of production: 1955
 Superetherodyne IF 452/10700 9 AM
 Circuits 11 FM Circuits
 Wavebands: Long Wave (150-345 KHz)
 Medium Wave 1 (517-1620 KHz)
 Medium Wave 2 (517-1620 KHz)
 Short Wave 1 (1,6-5,2 MHz)
 Short Wave 2 (5,1-15 MHz)
 Short Wave 3 (14,7-26,5 MHz)
 FM 1 (87,5-100 MHz)
 FM 2 (87,5-100 MHz)
 Loudspeakers: 1 woofer 1 mid-tweeter

Dimensions (LHP): 710 x 440 x 317 mm / 28 x 17.3 x 12.5 inch
 Net weight: 28,1 kg / 61 lb 15.9 oz
 16 Tubes: 2xEBF80, ECH81, EF80, EC92, EM34, EF89, EF85, EAA91, ECC83, EBC41, 2xPL81, EL84, 2xEZ80

④ Some of the technological advances were:

The first stage of the preamplifier

The bass tone amplifier is of the SRPP (shunt regulated push pull) type

The treble amplifier consists of the second section of the ECC83 double triode and a output pentode.

Another feature of the Philips BX998A is the motorized band selection.

TONE CONTROL WITH LEVEL INDICATION

Inside the cabinet there is a dipole for FM reception and a ferrite rotating aerial for AM reception.

The magic eye has been replaced

⑤ It is very technologically advanced in its time, since it incorporates innovations in the FM radio frequency system.

It is designed for symphonies, operas and baroque music, popular at the time and heard by the upper-middle class.

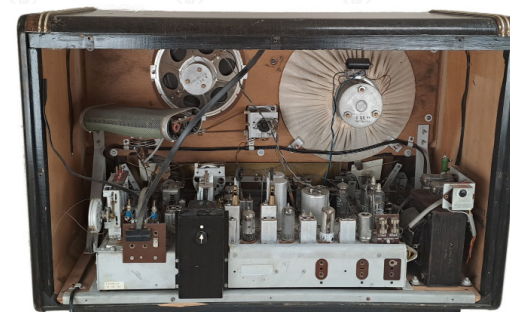
Philips BX998A



①

②

③



⑤

④



① The military's backpack M53 for field use, also referred to and known as the Ludviksekken. It came into production as early as 1953 and has since been used in active service until in the 1990's in the National Guard. The backpack is only available in one size, and can be adapted to the back by adjusting the shoulder straps. Consists of a solid carrying chisel (metal) and the fabric bag which is made of thick cotton canvas fabric. The fabric bag has a loading volume of approx. 50 liters, and closes at the top with a drawstring. Leather shoulder straps. The fabric bag has a lid that is attached to the bag with leather straps. (Depotsjefen's nettbutikk, 2023)

Under the lid there is a slip pocket (storage pocket) with a zip closure. Above the lid, there are leather straps for attaching a sleeping bag/sleeping mat, tent, or anything else that takes up volume/length. The bag has 2 external bellows pockets

(one on each side), each with a volume of approx. 3 liters, with a lid that is fastened with a leather strap. The fabric bag can be easily removed from the carrying chisel, if the carrying chisel is to e.g. use with.

Main features: year of production: 1953, most likely produced by Bergans specifically for the Norwegian Armed Forces. Volume: 56 liters, main compartment: 50 liters, external pockets: 3 liters each. External leather straps for additional carrying capacity such as sleeping bags. Thick cotton canvas that makes it scratch resistant. (Depotsjefen's nettbutikk, 2023)

④ The military are sent away from their place of residence and therefore away from their family to serve their country and military training is mandatory from the age of 19 for men, in the 50s and

for men and women today. For this reason it is important to take into account the travel character of the backpack. In times of war, the soldiers transported everything with them, their most precious resources. Since they had to make a great effort and long walks, they were able to survive with just what was necessary, minimizing the weight they had to carry as much as possible.

Therefore, inside the backpack they only have what is really necessary to survive. The entire design of the backpack shows the character of the army, resistant, versatile and with the right resources to carry out its task.

Military backpack M53



1.2.3 Historical context

Mid Century Modern design

- Geometric forms
- Cold war
- colors: pastel, modern and Scandinavian
- Caterials on things: plastic, wood and metal
- Clean design, inspired from Scandinavia
- Mid century design
- Live better design
- Organics forms of the wood

What was the living conditions like in Norway in the 1950s Post-war period

The state built a social safety net that created security for the residents
The economic growth led to better health and increased life development for many people
A comprehensive and coordinated system would help anyone regardless of income level, equal treatment and protection against illness.

Radio background

In the 1950 era the design aesthetics were based on geometric forms and clean design, inspired from Scandinavia. The colors most commonly used were pastel, modern and Scandinavian. to embrace the mid century design and live better mentality the materials most commonly used are.

In 1945 the Naci state was established in Germany followed by the Holocaust and World War II.
The Federal Republic is founded in Germany and develops intense commercial links with Coal and Steel.



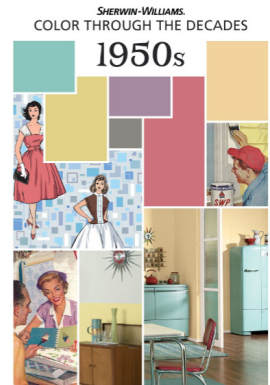
Stuen, E (2021)



Record player. n.d.(1950)



television "Algol" (1964)



Coetlo, M (2021)



Syndee (1950)

1.2.3 Historical context

Backpack background

To investigate more about the life that the backpack has had, it delves into its military context.

After World War II the military got more resources because they saw the potential need for a greater military defense against foreign countries.

One of the upgrades where the backpack.

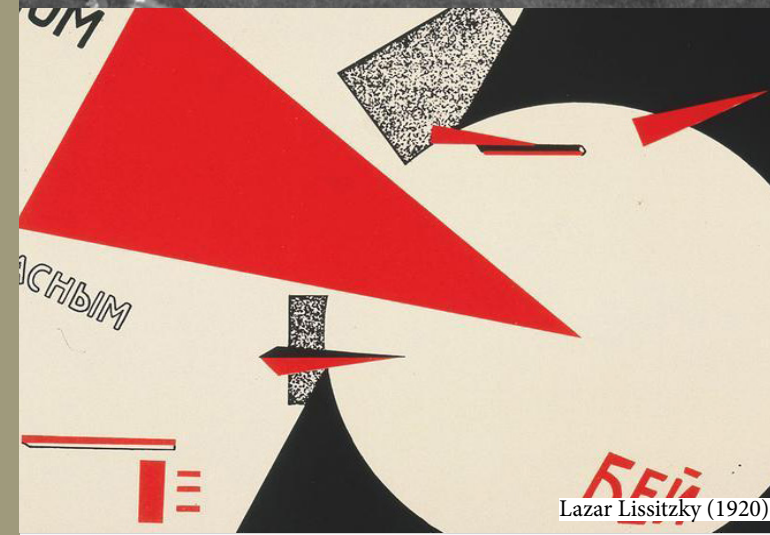
The users of this backpack are soldiers who are part of the army.

The functions of the army are very varied but they use this type of tactical backpacks in missions that require spending the night outdoors.

The soldiers must carry all the military equipment for hours, which this backpack is designed for. It has to be very resistant so it will be able to support all the weight it must contain, in addition to guaranteeing the greatest durability in any type of situation.



Borresen, J (2023)



Lazar Lissitzky (1920)

1.3 Design brief

Background:

In this course, we are going to explore how we can become more aware of cultural dimensions when working as designers. It examines how such awareness can help to influence, and form the basis for design processes and their outcomes. This project begins with choosing our main focus, which is following the things. This is a concept known for studying the history of an object. It also focuses on understanding its operation to finally create a new one from others already used, also known as upcycling.

In search of inspiration and to take a starting point, two objects are sought, one of them inside the university itself, an old radio and another in the visit to the recycling center, a military backpack. In the next steps, both objects, their shape, their history and their use will be studied to achieve the objective of this project, to give life to a new design. For this, different group techniques studied in the course will be used.

Thesis statement:

“How to transform two objects into one and still keep the cultural heritage and material understanding?”



1.3 Design brief

REQUIREMENT SPECIFICATIONS:

Functional requirements:

It must be usable as a showpiece.

Aesthetic requirements:

It must show historical and cultural background.

It has to be aesthetically attractive

Requirements for development work:

Through this project, we will develop our knowledge regarding a general level of cultural understanding. It includes design as a cultural expression, and looking at the role of our projects in relation to broader cultural contexts and societal perspectives.

Requirements for results:

The design work must produce a physically functioning prototype and scale models to illustrate different methods of use. It also needs a 3D visualization that can be tested against users to determine to what extent the product has kept the cultural heritage

Model and visualization requirements:

The model shall be the basis for a user survey via the use of visual and tactile tools.



2. Design process

This section shows the design process that has been followed until reaching the final result.

2.1 First investigations

After the previous search for information on the cultural and historical context of both objects, they are disassembled to analyze their pieces.

The radio

Aluminium parts

These parts are designed to act as cable holders and other components inside the radio.

As you can see, it has holes and no other material.

Aluminum parts with wheels

These are pieces that have an aluminum part and a plastic part.

The plastic part consists of cylindrical bearings that allow the movement of the parts themselves, restricting it in a certain way.

The metal part has the function of supporting bearings and other components inside the radio

Aluminum parts with little bulb

These are pieces that have an aluminum part and a some little bulb.

The metal part is meant to contain and put the bulbs in place.

The bulbs are created by a glass part and some metal inside that makes up the mechanism of it. The function of the bulb is to send light signals to the user. It is the channel by which the radio communicates with the user, indicating if the radio is on or off or if it is on one frequency or another.

Large aluminum matrix

The function of this large piece is to contain all the electronic material and small components of the radio, resistors, cables, etc. For its study and use all these components have been removed.

Pentode

Pentode is the thermionic valve formed by five electrodes. Very similar functionally to the triode, it has three grids instead of just one. It was invented by the Dutch Gilles Holst and Bernardus Dominicus Hubertus Tellegen, of the Philips company in 1926.

Pentodo - Wikipedia, la enciclopedia libre

It has a glass cover while inside it has grilles that allow you to expand the radio signal. It is observed how in the upper part of the pentodes there is a grayish surface produced probably by its overheating.

At the bottom are the electrodes connected to the arrays and the wires that conduct radio signals to other parts of the machine.

Bellboy

The buttons are the tool with which the user can interact with the radio. It allows you to change the station, turn on the radio, ect. These are contained in an aluminum matrix that arranges and positions and contains them.

The buttons are made of plastic while the matrix is made of aluminum. It contains the operation system of the button, including the springs, which is made of steel.

2.1 First investigations



Grid

The grille is made of steel and is the cover of the radio antenna

Two heavy metal walking sticks

Heavy metal rods are used in the antenna. They have two copper coils wound as it is very good conductor of electricity, this makes radio signals transmit faster.

Large matrix with two rails

This matrix with two rails is made of aluminum and its main purpose is to contain different elements, cables, pentodes, ect as well as different bearings that allow the movement of other parts inside the radio.

Antena controller button

As you can see, this cylindrical element consists of an inner part of iron and an outer part more ornate and painted in brass gold.

It is an important piece since it is seen on the outside and is part of the aesthetics of the radio

Condenser

They are widely used in radio receivers, TV, etc., to equalize the impedance in the antenna tuners and set the resonance frequency to tune the radio.

It serves to store electrical energy by supporting an electric field to amplify the signals. It has brass parts on the inside and aluminum on the outside.

Informative glass

This piece of glass contains a brown coating, a thin sheet of plastic that allows an aesthetic finish and a pleasant machine-user communication. You can see how it treats the frequencies, the musical scales and hides the lights, so that when they are turned on a certain part of the glass is illuminated.

Audio transformer

Audio transformers are designed for use in audio amplifier applications for amplifier and speaker coupling and impedance adjustment.

It should be noted that it is a very heavy element and has signs of overheating, oxidation and deterioration.

Speakers

It has a conical shape and its outer part is made of aluminum. Inside it there is an electromagnet to convert signals into sound. Attached to this is a film of black paper.

Frequency controller buttons

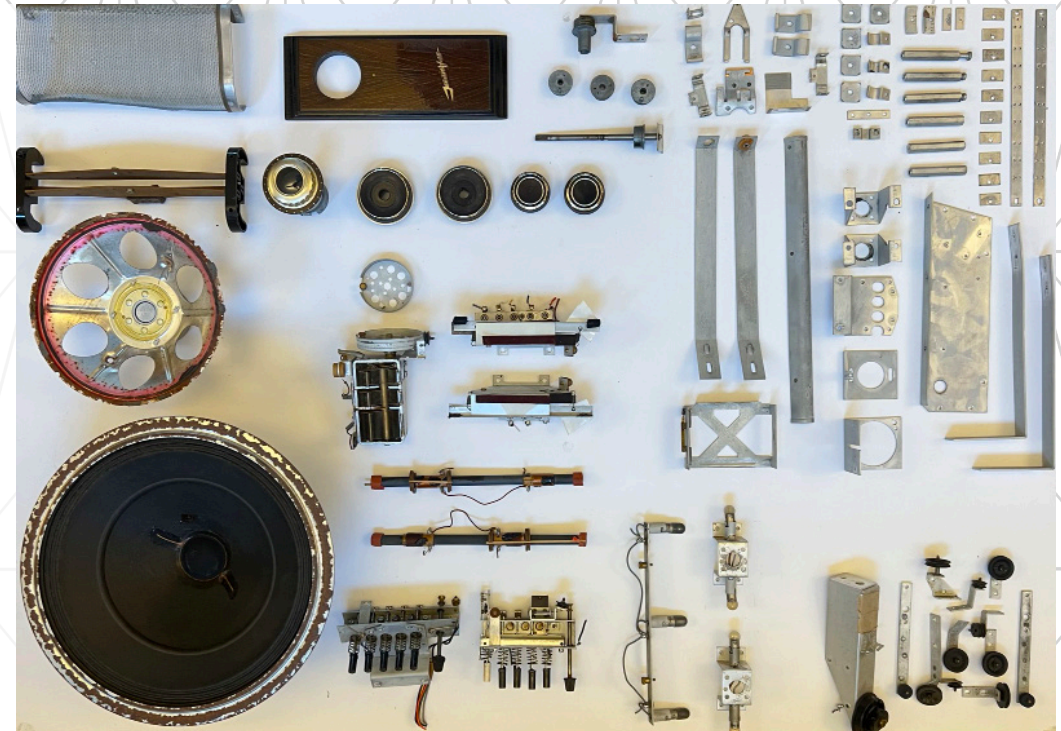
These buttons are made of plastic and are seen on the outside of the radio, they serve to search for the radio frequency signal and adjust the volume of the radio itself.

Golden textile part

This golden fabric is very characteristic of the time and the most impressive piece in the aesthetics of the radio. It is the first thing you see when looking at the radio and what makes it a luxury piece aimed at the upper classes. It is attached to a wooden board, of low quality, with glue.

Speaker textile part

It is a piece of cloth that covers the speaker. Its main function is to protect it from external dirt that can damage it and improve the acoustics of the radio itself.



2.1 First investigations

The backpack

The entire backpack is made up of different pieces of fabric and other materials joined together by stitching.

To separate all the pieces, all the seams are unstitched.

Among the different parts of the backpack stand out:

Rear metal part: it is made up of welded steel bars, it is the most resistant and heaviest part of the backpack and allows it to remain standing.

Attached to it are the backpack handles.

At the bottom there is a piece of braided dark green fabric, in very good condition, it serves to protect the lower back and is very resistant

Backpack handles: they are made of synthetic leather and have a laminated surface. They stand out for a worn finish.

Green canvas: it makes up the body of the backpack, it is green, typical of the army, it is thick and very resistant, it makes up several pockets in addition to the basic container of the backpack.



2.1 First investigations



Canvas: thinner material and more similar to a conventional fabric, it is used to make pockets and is the one that is attached to a zipper.

Reinforcements: they are placed on the parts of the backpack where the most effort is generated, they prevent it from breaking. They are made of synthetic leather and fur in a very light green that contrasts with the dark green of the canvas.

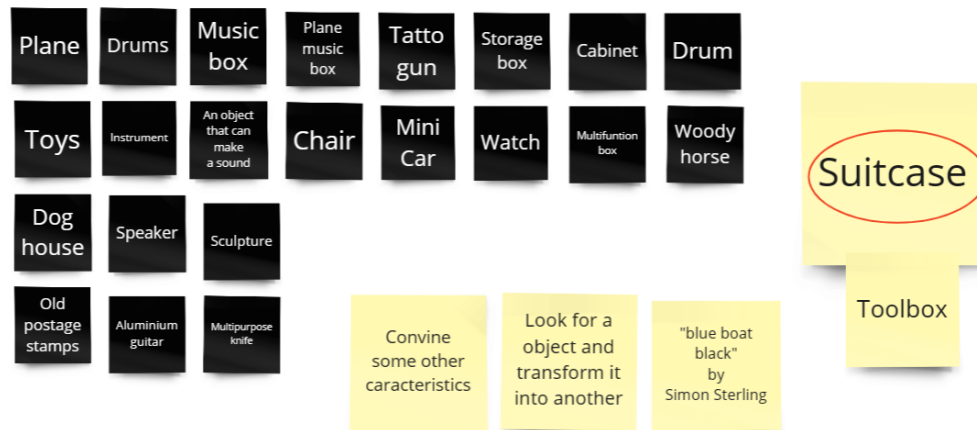
Buckles: they allow the length of the handles to be adjusted, they are very resistant, made of steel.

Rings: joins straps together, made of steel

Straps: they serve to compress the contents of the suitcase and hold external elements to it such as esperillas.



2.2 Looking for ideas



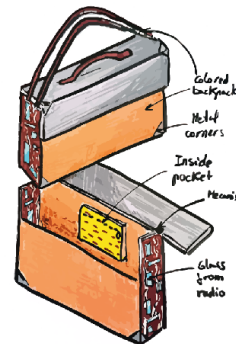
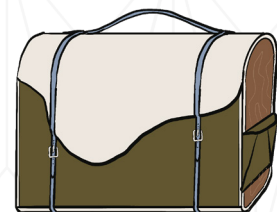
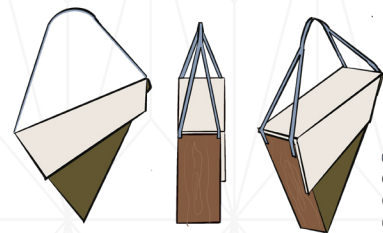
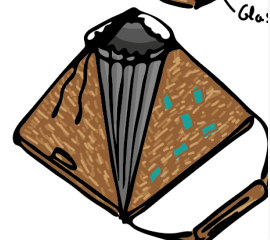
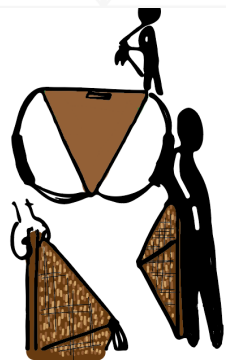
During the idea phase, we visited several things such as boats, planes, bicycles, music boxes and decorative objects that were of interest as a product. During the survey we made an overview of what materials we had, and with this it changed the type of products we can realistically make.

With the materials in front of us, we started brainstorming ideas for products that would in a good way extend the material. Then the ideas became more in the direction of a suitcase, music box or something in the direction of a display box.

We finally chose a suitcase, considering the materials we got from the backpack and the radio. The reason behind a suitcase is because the music from the radio makes you travel. and the military backpack you only take what is necessary. With this in mind, we will create a suitcase where you can only take the most necessary things with you when you travel.

2.4 First sketches

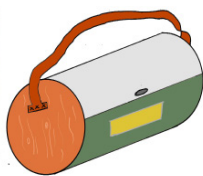
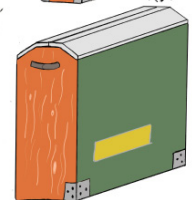
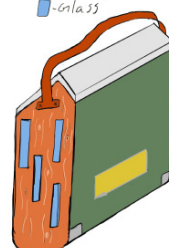
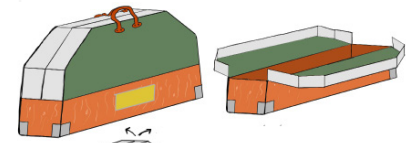
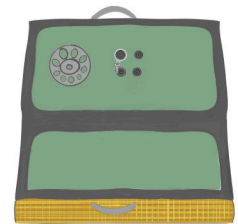
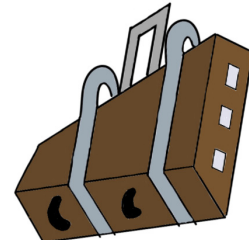
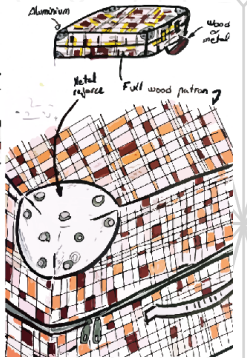
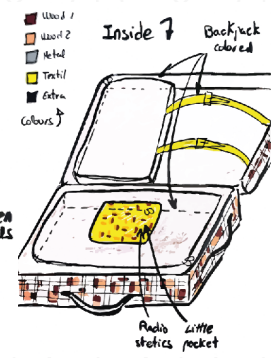
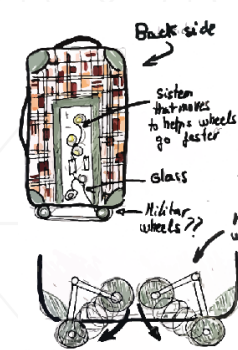
Here we have the first sketches of the suitcase. We have put many different forms and solutions, and discussed along the way what works or not.



- Leather
- Wood
- Cotton canvas
- Aluminium

- Leather
- Wood
- Cotton canvas
- Aluminium

- Leather
- Wood
- Cotton canvas
- Aluminium



- - Aluminium
- - Tree
- - Stoff
- - Glass

2.5 Final design

After some discussion regarding the design of the suitcase, we took a vote to choose a design. We ended up with a pyramid design which is inspired by the triangle, since it is an abstract form of attack or war. As can be seen in the Russian Suprematism of 1919, in the painting Beat the Whites with the Red Wedge by El Lissitzky. Observing this picture, it can be seen how the red triangle is a representation of the attacking army.

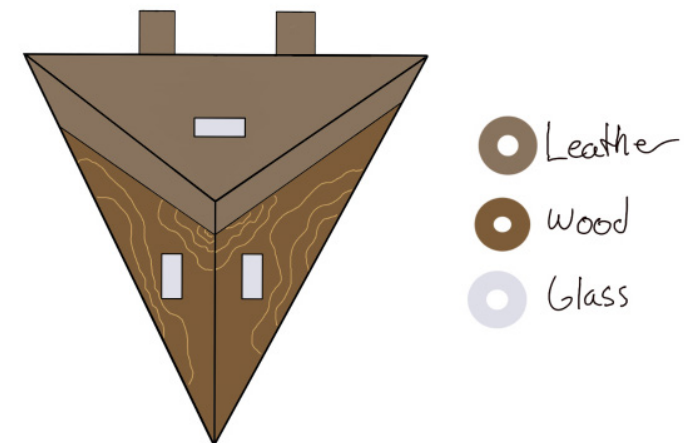
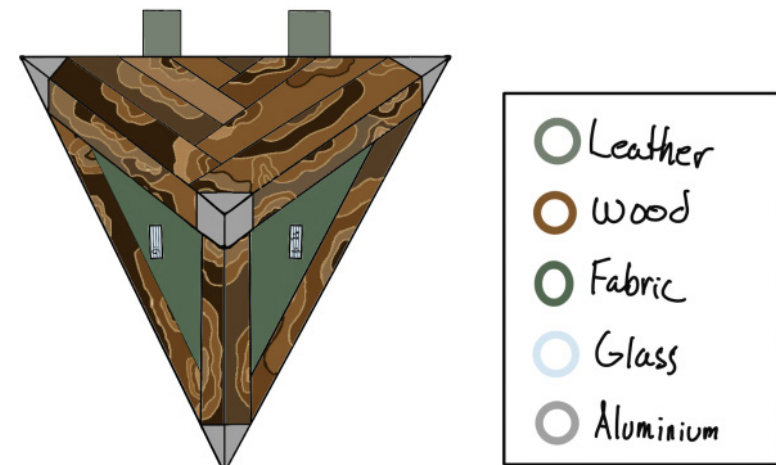
It is currently considered one of the most elegant and versatile geometric forms. Since it allows the creation of a multitude of structures, in a resistant and aesthetic way.

On the other hand, in the design of the 50s, the organic forms of furniture and wood stand out. The 50s are also known as the years of the beginning of consumerism, since they begin to manufacture in mass so that people buy more and more things, instead of repairing them.

Work is currently underway to reduce this, which is why this suitcase has just enough space to include only what is really necessary.

Therefore, in this design it is intended to create an elegant and very tight in size suitcase. to only house what is really necessary, different, that looks modern and futuristic, for high society, totally contrary to the organic forms of the 50s. That maintains a military and army attack character and that inside it houses the impressive aesthetics of the radio.

This design is elegant and very tight in size. To only house what is really necessary. The shape is totally contrary to the organic forms of the 50s. That maintains a military and army attack character and that inside it houses the impressive aesthetics of the radio.



2.5 Final design

However, after all the searching and research, we asked ourselves the question:

Do we tend to take more with us than we can fit in this suitcase?

The design of the suitcase is a modern and future-oriented design. It is very narrow inside to only house what is really necessary. The reason for the small space is that you should not have room for everything you normally take with you. With this in mind we have created this statement against consume-

rism. To make people question what they have and what they really need.

From the 2 objects that were produced in the 50s, to a suitcase that breaks the traditional soft and organic design language. Using hard straight lines and sharp edges, this design is a modern twist on what once where.

With this reflection, the design not only chooses the following the things methodology but also wants to reflect a critique of a typical behavior of society, materialism and consumerism, so this design also uses critical design.



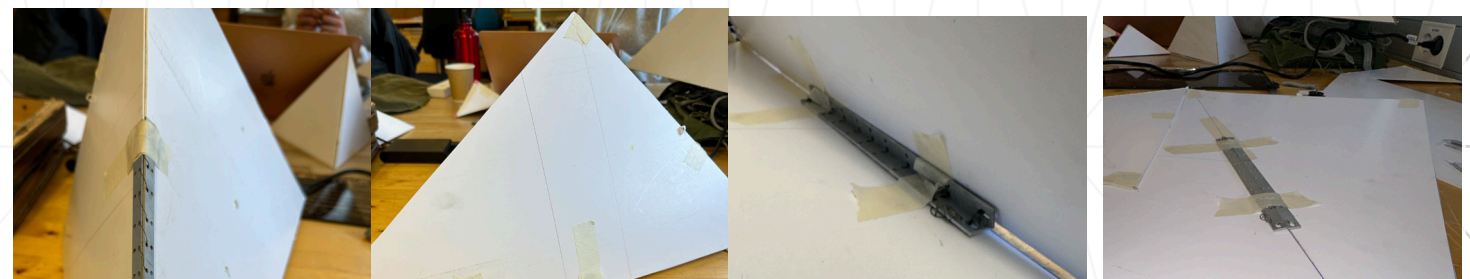
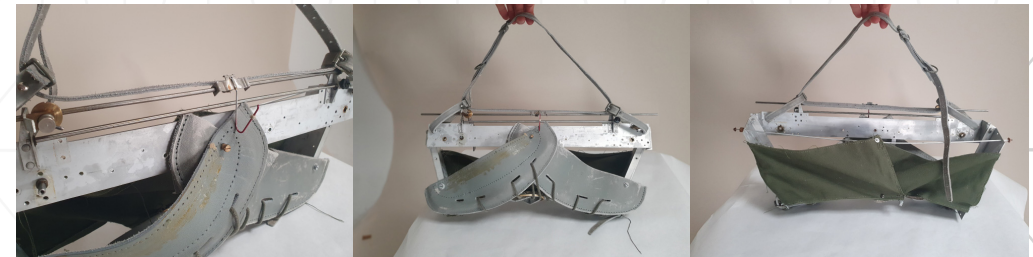
3.Design development

This section shows the process of construction and preparation of the model of the suitcase, the object of this project.

3.1 First mockups

To begin the manufacturing process, start with the sketch of the pyramidal suitcase. With this, different models are created to test shapes, sizes, exterior designs and opening and closing mechanisms.

These models are shown below.



3.2 Construction process

During the construction everyone worked on each part of the suitcase from the frame to the corner pieces.

We chose to use the fine wood from the radio as a framework. By not painting over it you can still see the nice original color that was on the radio. The fabric between the framework is from the military backpack and goes well with the color of the wood.

We have used some components from the radio to give a slightly clearer hint of what it once was.

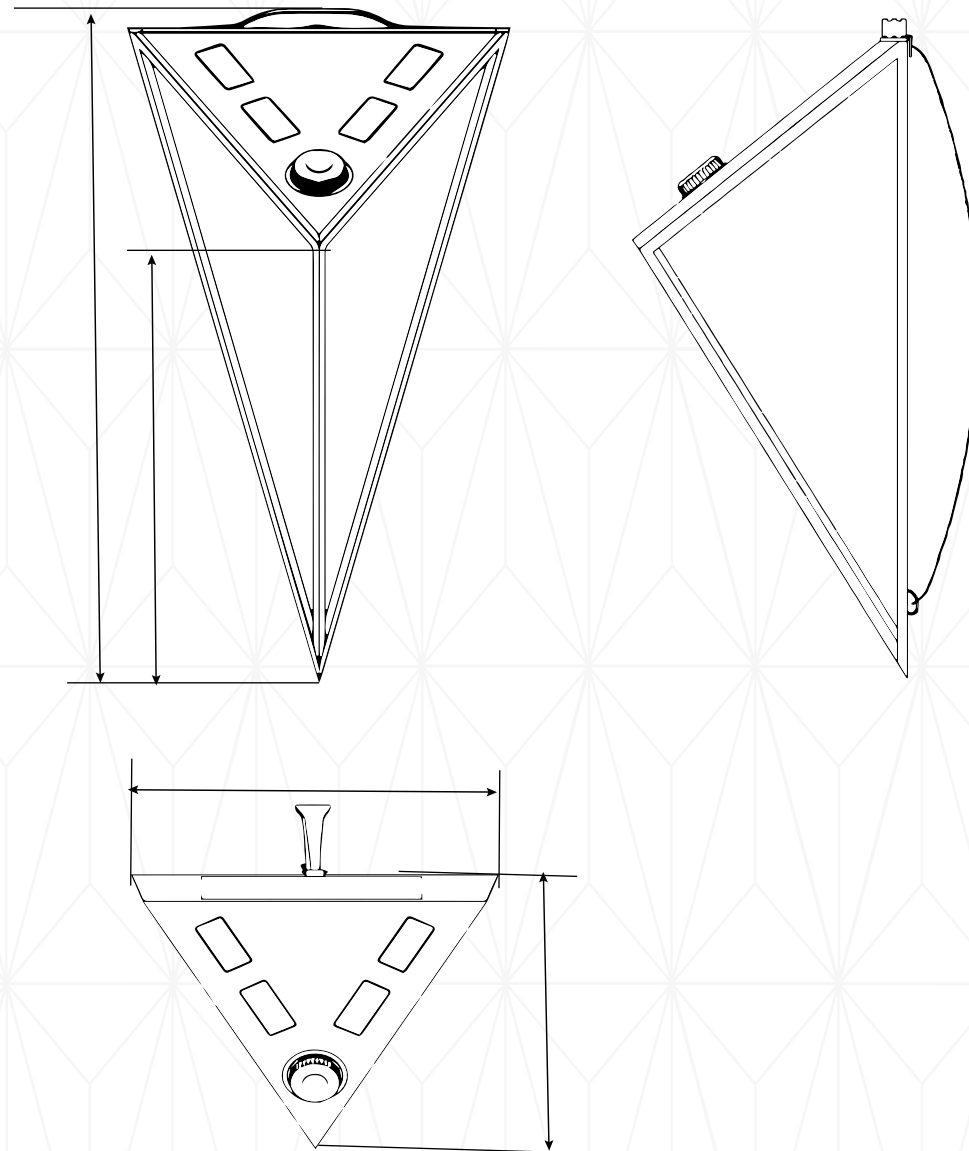
You can see the glass plate, some buttons from the panel, golden fabric from the speakers and not least a small logo with the old name on the radio.



3.3 Technical drawings and measures

One of the requirements for the backpack is to be useful for travel, therefore the general measurements of the suitcase are based on the standard measurement used in airplanes to allow the suitcase to be brought into the cabin.

Below are some technical drawings and general measurements.





4. Final images of the real model

4 Final images of the real model



4 Final images of the real model



4 Final images of the real model



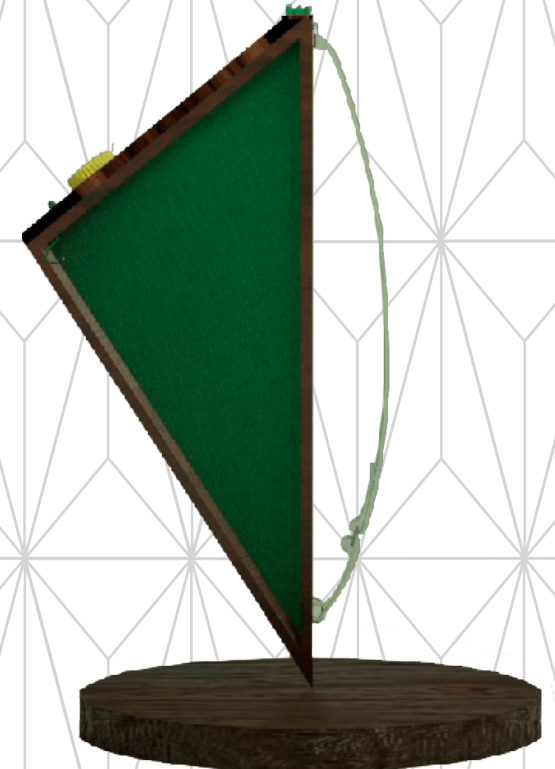
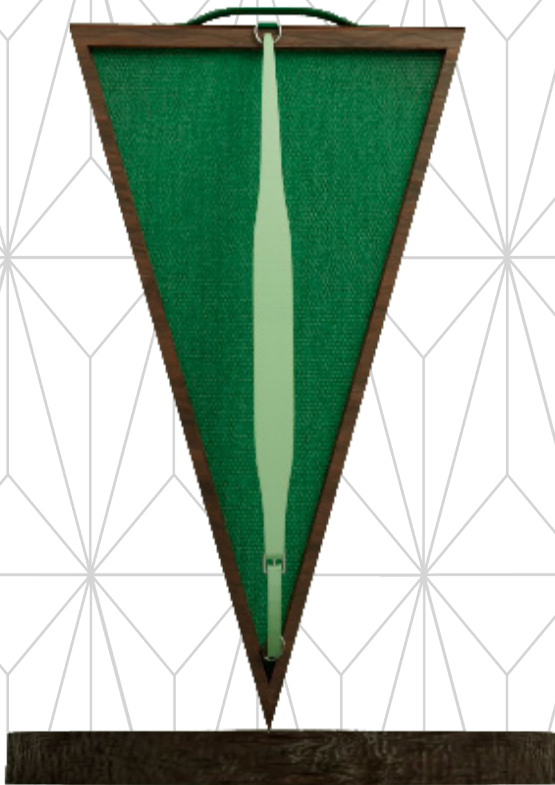
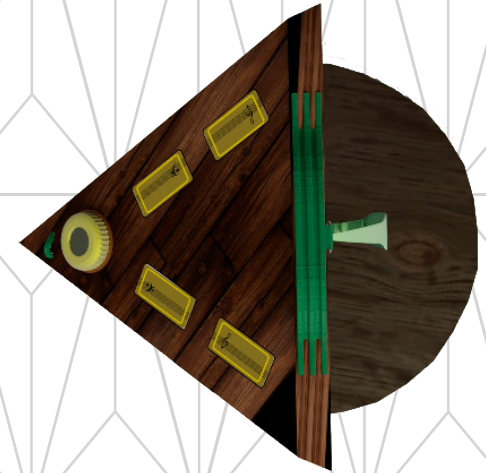
4 Final images of the real model



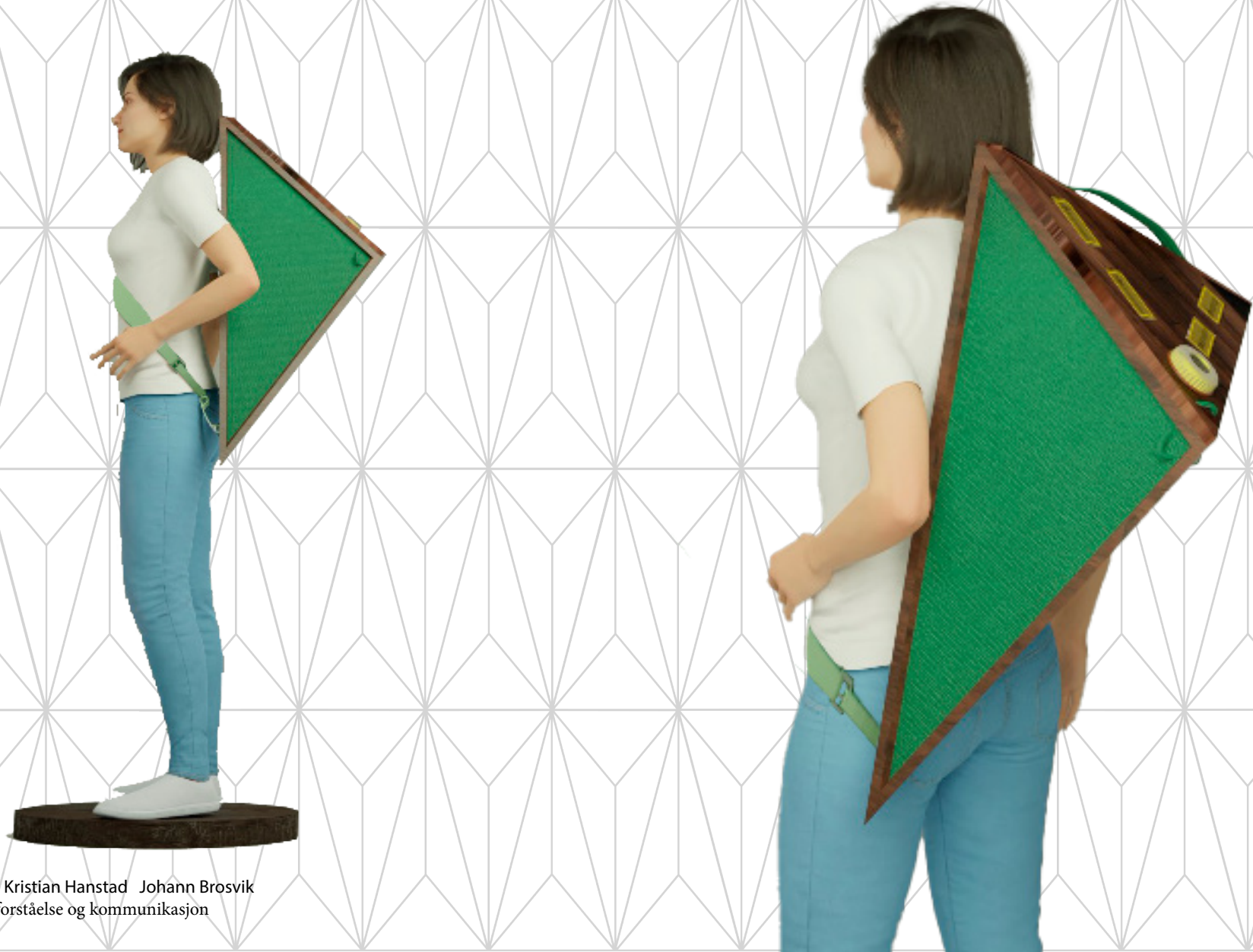
5.Render



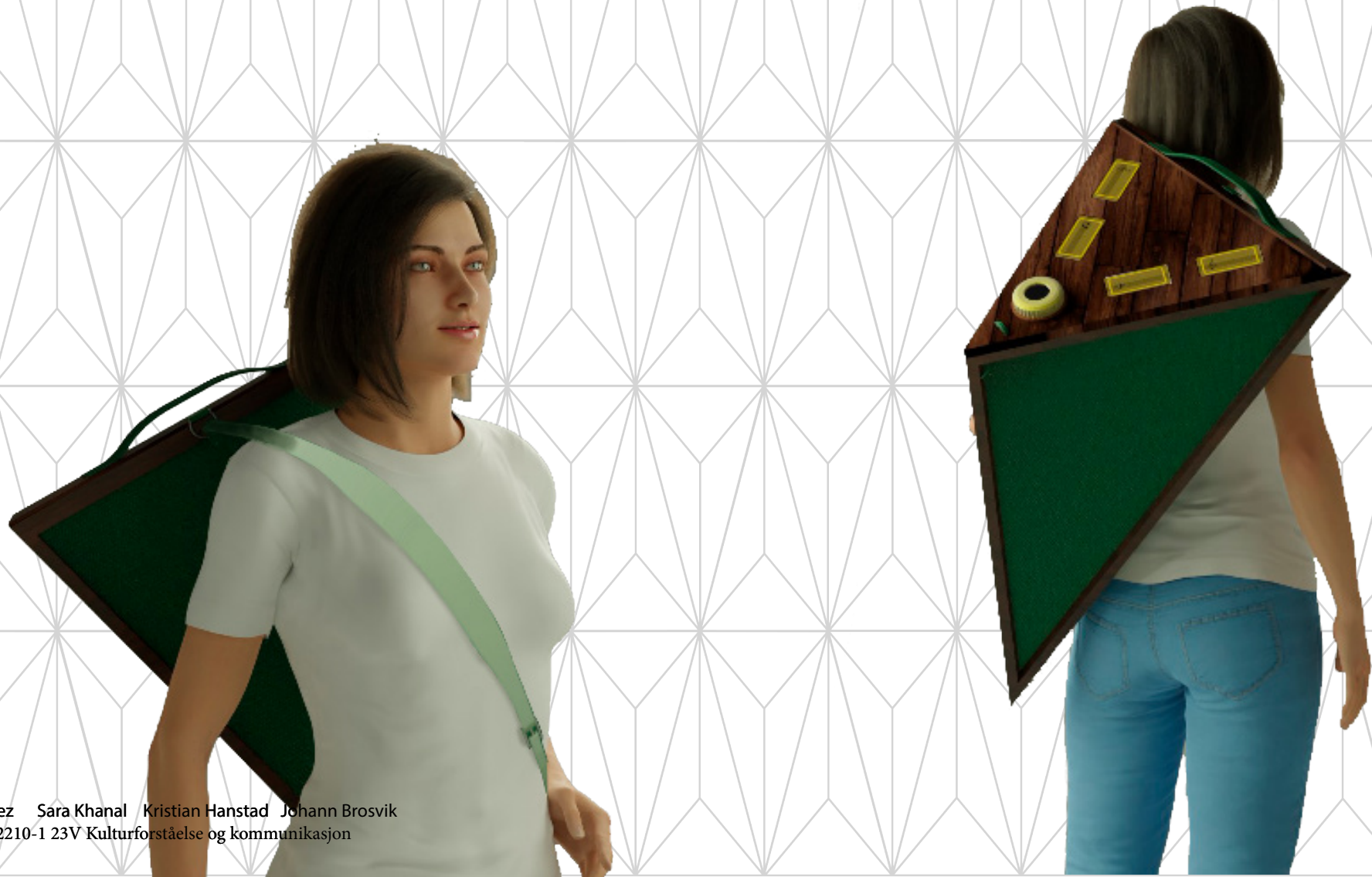
5 Renders



5 Renders



5 Renders





6. Resources

Resources

Aspect (2023)

<https://aspect.ac.uk/resources/research-methods-follow-the-thing/>

Depotsjefen`s nettbutikk (2023) Ryggsekk M53, med bomullsekk

<https://www.depotsjefen.no/products/ryggsekk-m53-med-bomullsekk>

Sophie Woodward. 96-116pag. Date: 28 feb 2023. Published in 2020

Twink (2014)

https://www.thwink.org/sustain/articles/000_AnalyticalApproach/index.htm

Pictures

Børresen, J (2023, 28.mars). Norsk forsvarshistorie

https://snl.no/Norsk_forsvarshistorie

Coetlo, M (2021)

<https://no.pinterest.com/maugecita12/old-fashion-in-love/>

Lazar Lissitzky (1920) propaganda plakat

<https://www.travelpostersonline.com/vintage-russian-poster---beat-the-whites-with-the-red-wedge-1920-12897-p.asp>

Record player. n.d.(1950) www.pinterest.com.

<https://www.pinterest.com/pin/braun-design-at-paul-smith-albemarle-street-by-das-programm--399272323186075422/>

Stuen, E (2021, 17. august) Fra kjønnsforskjell til likestilling.

<https://kjonnsforskning.no/nb/2021/08/fra-kjonnsforskjell-til-likestilling>

Synde (1950) Retro 1950-talls Shapes-bakgrunn

https://www.google.com/search?q=1950+shapes&xsrf=APwXEdEp7DKZ9lovHmzHJ-sJE-9-jt6mQ:1680074713167&source=lnms&tb-m=isch&sa=X&ved=2ahUKEwiktOWDzoD-AhXMqVEDHX31C9gQ_AUoAXoECAEQAw&biw=1163&bih=587&dpr=1.65#imgcr=RB-z3O0_T-s8HOM

Television "Algol" (1964) Richard Sapper

<https://www.idesign.wiki/en/italian-50s-industrial-design/>