Danmarks Tekniske Universitet

Innovation Report Loop 2
62990

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Executive summary

The alubox has a raw and simple look and its primary customers are outdoor people. Alubox demands new features and technologies that can give their product value. In a market full of competition, it is important to increase the product's value. The alubox can contain several kilos, but the user of the box will not be able to move it somewhere without help. That is why we have prepared a bracket on which wheels can be mounted. The bracket is easy to use and wheels can be fitted according to the customer's needs. The bracket is compatible with several sizes of the alubox. The fitting will be able to open up more potential customers and will therefore increase revenue for the company. Our survey with 42 possible customers shows that by making the alubox more mobile, 11.9 percent more customers will choose to buy the box. Overall, alubox is a "small" family business, an increase in the number of customers will not be negative. Our solution is unique and will improve the mobility of the box, increase the customer segment and create value for the company.

Indholdsfortegnelse

1 Background

This report will prepare a solution for the company Alubox. Alubox is a company that focuses primarily on their storage boxes that has a simple and raw look. The Alubox makes it possible to secure your valuables in the box. Although the product is unique, it does not mean that the product cannot be further developed. Alubox operates in a competitive market and competitors have similar products. Therefore, the company demands new features and technologies that can be implemented on the box. We will therefore look at an innovative solution that can be implemented on Alubox's products, which will create new opportunities for the company.

2 Alubox

The problem we are solving is for Alubox, which is a private family business, and it was founded back in 1999. Their expertise lies in producing aluminum boxes, cases, and containers. They have different sizes and types of aluminum boxes, which are sold to customers worldwide. Their customers use the boxes for, among other things, defense, emergency aid, offshore, transport, data carries, etc. The box is designed for safe transport and storage of goods that tend to be sensitive. The boxes are used for safe transport and storage of valuable items, sensitive equipment. Alubox also gives the opportunity to produce specific requests, even if its not a large amount. A specific request could be to create inner fittings and foam for the box. Alubox goals are to provide customers with quality products, excellent service and give on time delivery.

3 Hard Nut

A team meeting was held after a protracted period of testing and research into Alubox, and everyone involved agreed that the product's original design made it challenging to move around. It was crucial to build a new and improved Alubox so that users could utilize it more easily and effectively. As a result, how can we make Alubox more mobile? was our crystal-clear problem formulation.

4 Our proposal

Alubox should first be made more portable so that it may be moved around, as this would make the device more consumer-friendly and fulfill their needs. In line with this, numerous surveys were done, concentrating particularly on the mobility of Alubox, and the best concepts were then reviewed in order to find the ideal answer. Alubox was intended to be designed in a way that made transportation simpler and made it clear how it should be used. The group was seeking for a solution, but it had to satisfy a few requirements: it had to be simple, lightweight, and user-friendly,

and it had to be able to be installed on the existing Alubox design and come with Alubox's patents.

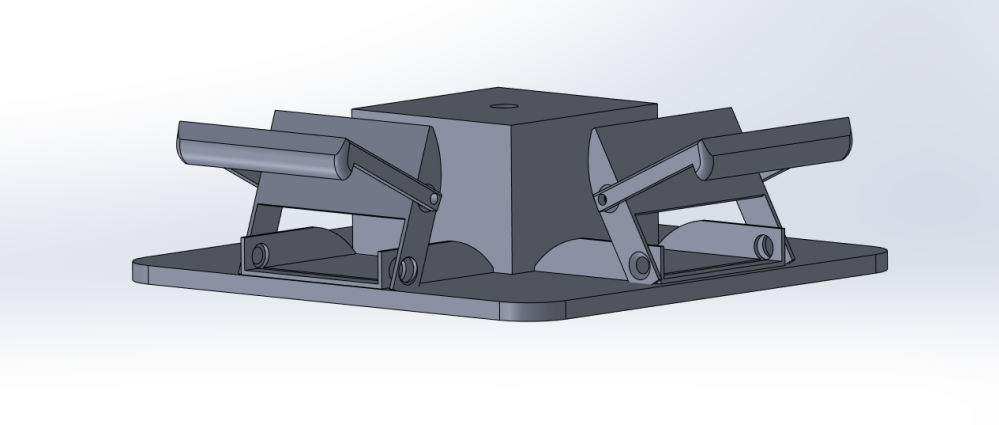

Figure 1: Picture of Solidworks render of product

The idea was to create some brackets that would fit on the Alubox's patented edges and underside. These brackets would then need to be secured to the Alubox using safety clips to prevent them from slipping out. As long as the threading in the wheel box is designed for the specific type of wheel installed, many wheel types can be used to move the Alubox around. This gives the customer the freedom to select the wheels that best suit their needs.

In the long run, our new design will increase revenue for the company while also making the product more useful because it can be used with all varieties of Alubox, is simple to mount and remove, and can have the type of wheel altered to suit consumer demand. Customers will find it easier to transport goods with the new mountable wheels.

It is possible to market Alubox as an environmentally friendly product because the box is made of aluminum, which is reusable, resistant to rust, and high strength. By saving money on new boxes, you also contribute to making a product that is more environmentally friendly overall as its usability increases. This contributes to the development of a distinctive product with the new design that is portable. Alubox is a better solution for clients who need to transfer a lot of items even if it weighs more than traditional boxes because it can be reused and can hold greater weight.

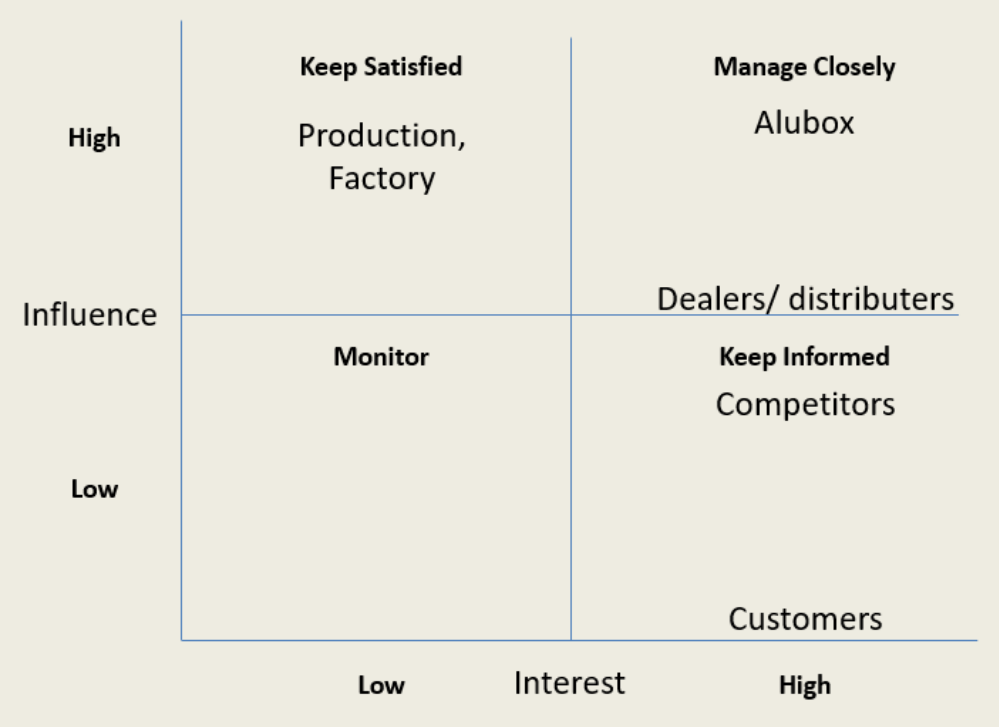

Figure 2: Stakeholder analysis

This figure shows the stakeholders, that have interest or influence on the project. In this case the stakeholders is Alubox, production factory, dealers, competitors, and the customers. Alubox do have both high interest and influence, since they choose to use our solution. The dealers have a lot of interest, but not as much influence as Alubox. The competitors are interested in new products, that Alubox invents and they can have some inflence on it. The customers are also very interested in new products, but they haven't any influence on it. Last but not least has the factory a lot more influence than interest on the product.

5 Questionnaire

In the research phase of the design process, questionnaires were employed to learn more about our target audience. This approach has made it easier to comprehend how people use and feel about the current product. In this project, we decided to base the questionnaire's questions on the ones we had for our research and followed the questionnaire's instructions. As a result, we developed a questionnaire that was distributed online. When the participant was asked if they were familiar with Alubox, 73,8% of respondents responded no.

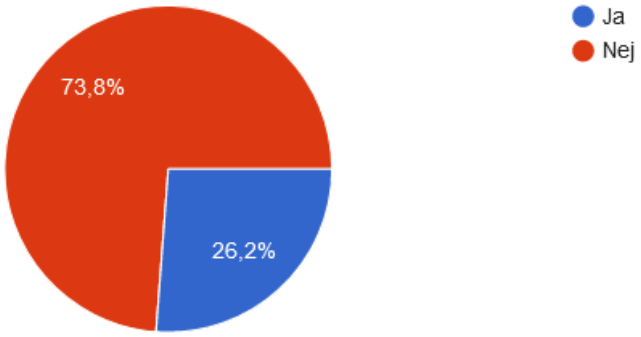

Figure 3: Pictures from Questionnaire data

Several questions related to the original product were posed to survey respondents; the most crucial ones have been highlighted below for the product: Earlier, when asked if they would purchase or utilize Alubox in its current form, 59.5% of survey respondents said no. This has additionally backed up our solution.

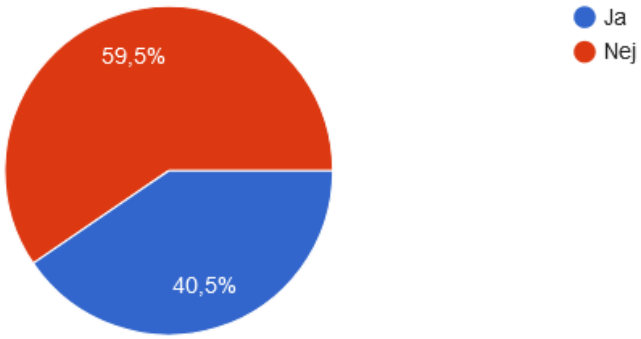

Figure 4: Pictures from Questionnaire data

We questioned the survey respondents if they would purchase and utilize Alubox in its original form. Here, 59.5% of the participants gave a negative response. This reinforces the theory that the original Alubox may require redesigning to make it more user-friendly and enable it to draw in more customers over time. The same individuals were then asked if they would consider purchasing and using Alubox with the newly created design, and it is clear from this that there is a larger tendency among the participants to do so. As shown in the graph below, 52.4% of respondents indicated that they would buy and use the new design.

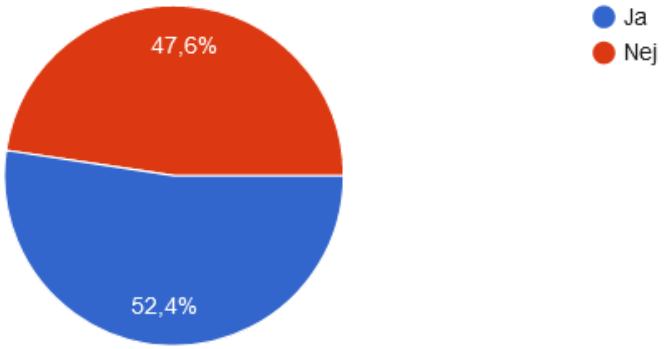

Figure 5: Pictures from Questionnaire data

When participants were surveyed to determine whether they would purchase and utilize the product with the new design, there was an increase of 11.9%, which is evident from the questionnaire. This shows that there is a market for the new design of Alubox

6 The prototype

Through our concept phase we happened upon a few key design choices in our product. Firstly we found that the shape of the clamp was important for how tightly the component was attached to the box. It was therefore designed to fit the corner edge of the AluBox by giving it a rounded shape. Throughout the entire design and prototype phase, a lot of small measurement changes were made. This was done to ensure exact fit of the clamp parts and ensure that all lengths and forces would act as intended.

6.1 Wheel

One note of importance for the design was that no wheel was designed to fit with the clamp. This is due to the fact that a wheel is something that will most likely be bought from outside manufacture and is a generalized component that is easy to find in retail. Therefore we designed the components to fit multiple types of wheel, by allowing clearance between component and box underside and allowing multiple type of thread holes to be cleared into the design.

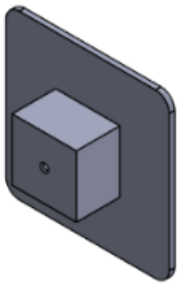

Figure 6: Wheel thread hole illustration

6.2 Clamp user experience

The clamps have been designed to have rounded corners and no sharp edges to avoid harm to the user and make ease of use when using the clamps as some amount of force is necessary to activate the clamps.

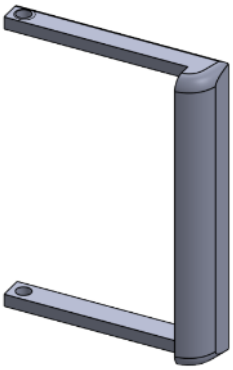

Figure 7: Clamp illustration

6.3 Requirements

We had some requirements that our prototype had to fulfill, these requirements where:

1. The final product should be implementable on most aluboxes and should be an additional addon that could be bought separately.
2. The final product should be attachable and detachable.
3. The wheel should be attached as a push in wheel in the corner bracket.

4. The product should be a stable solution.

5. The final product design should fit the current box design.

6. The product should make alubox boxes transportable.

We concluded that our prototype fulfilled the requirement as such:

1. Our prototype is design after the alu boxes corners which we measured to be standardized. Therefore, our bracket should be attachable on all the aluboxes and sold separately.

2. It is attachable and detachable via the clamps.

3. As described in design choices, we did not make a wheel. However, our wheel box is made with a threadhole which should serve the push in requirement.

4. While small adjustments might be needed to ensure the design. Some stability is ensured in the physical properties of the design.

5. It does, though exact measurements of the AluBox' might prompt improvements

6. Putting wheels on an alubox should make it transportable, as the boxes can contain up to 50kg weight, and this is way too much for safe lifting. And our prototype makes it possible to put wheels on an alubox.

6.4 Cost price estimation

By making the prototype, there has been calculated the estimated cost price. As the cost price is estimated, there has also been used estimated size measurement, the bracket size is 10mm, but by adding 10mm for an estimated size, the cost price is calculated with 20mm. The fully price for the four brackets incl. the wheels are 1045 dkk as illustrated in fig: 8. Our total volume was 10,000 mm, and therefore we chose to double it. We did that to make it more realistic and because we didn't quite know about the relationship.

Cost Price Estimation

4 Wheel bracket	**Price**
Material (EN AW-5754) 200g	164 dkk.[1]
Manufacturing cost	200 dkk.
Factory running cost 15%	54 dkk.
Factory margin 25%	91 dkk.
Factory selling price	**509 dkk.**
Distribution and wholesale margin 30%	152 dkk.
Price Retail excl. vat	**661 dkk.**
Selling price excl. vat 25%	826 dkk.
VAT 25%	206 dkk.
Selling price for customer	1032 dkk.
Round off price to:	**1045 dkk.**

Figure 8: Cost price tabel

6.5 Problems/Improvement

In order to fasten the clamps to the box, a certain physicality is necessary. It is not a lot as the pressure needed to push the clamps down are only a few kilos. However, this can present a problem to disabled, elderly or injured users. While this will in most cases be seen as a negligent problem due to the minor pressure and the fact that AluBox' current customer base is Off-Road drivers that possess some sort of physicality, we still found it important to bring up, as potential further engineering can somehow lessen the load needed for the clamps, while the clamp-on force remain intact.

6.6 What needs further testing?

In order to ensure product effectiveness a final physical prototype must be made, measurements and clamp security must be tested to ensure the clamp fastens properly and also ensures stability of the wheel. While the concept is physically sound, small adjustments might need to be made in order to fit the exact shape of the AluBox.

6.7 Solidworks Prototyping

In order to get an understanding for our concept and also make a feasibility evaluation we decided to make a SolidWorks drawing and 3D render.

By measuring the standardized AluBox, corner degrees and the patented bottom edge, we were able to make a clamp design that would fit the boxes and be able to be secured properly. This design process also allowed for quick reiteration of concepts or design that was impractical, unnecessary or would make the clamp simply non-functional.

Throughout the paper, several different renders of the clamp can be seen, here we will show the work drawings with measurements that have already been fitted to go direct to manufacturing as it has been made with industry standards.

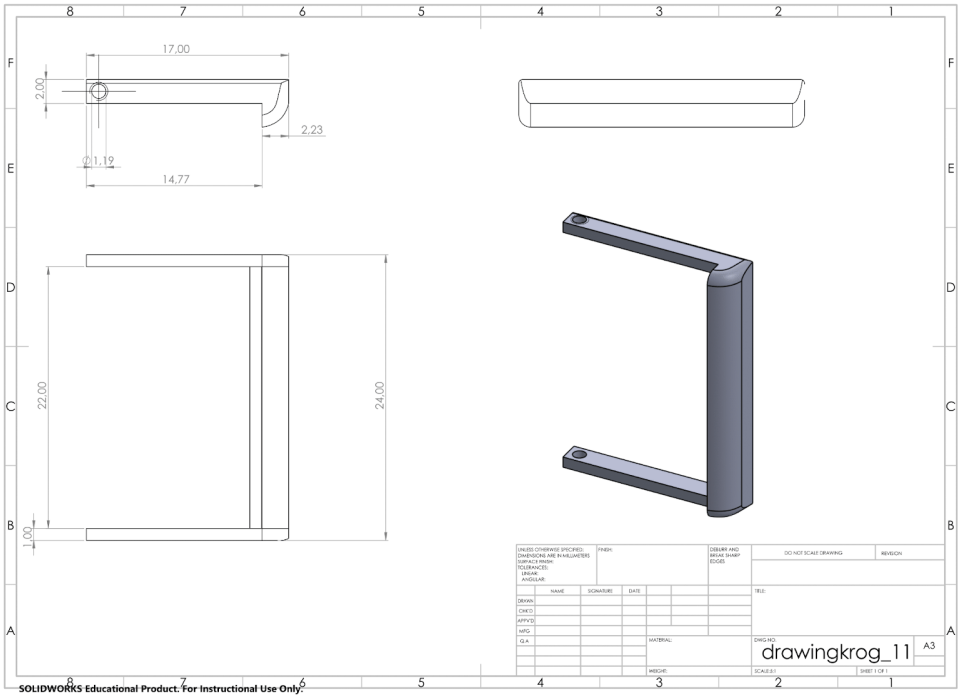

Figure 9: Clamp: Work Drawing from Solidworks

These four parts form the overall product when assembled and have been made with simple geometric structures.
In order to more efficiently produce these parts only the clamp would need to be simplified as its most efficient way of producing would be with a CNC machine, though this can be more expensive than simple plate bending manufacturing.

These improvements are obvious and plenty, but this core design is functional, efficient and full-fills the hard-nut and intended application.

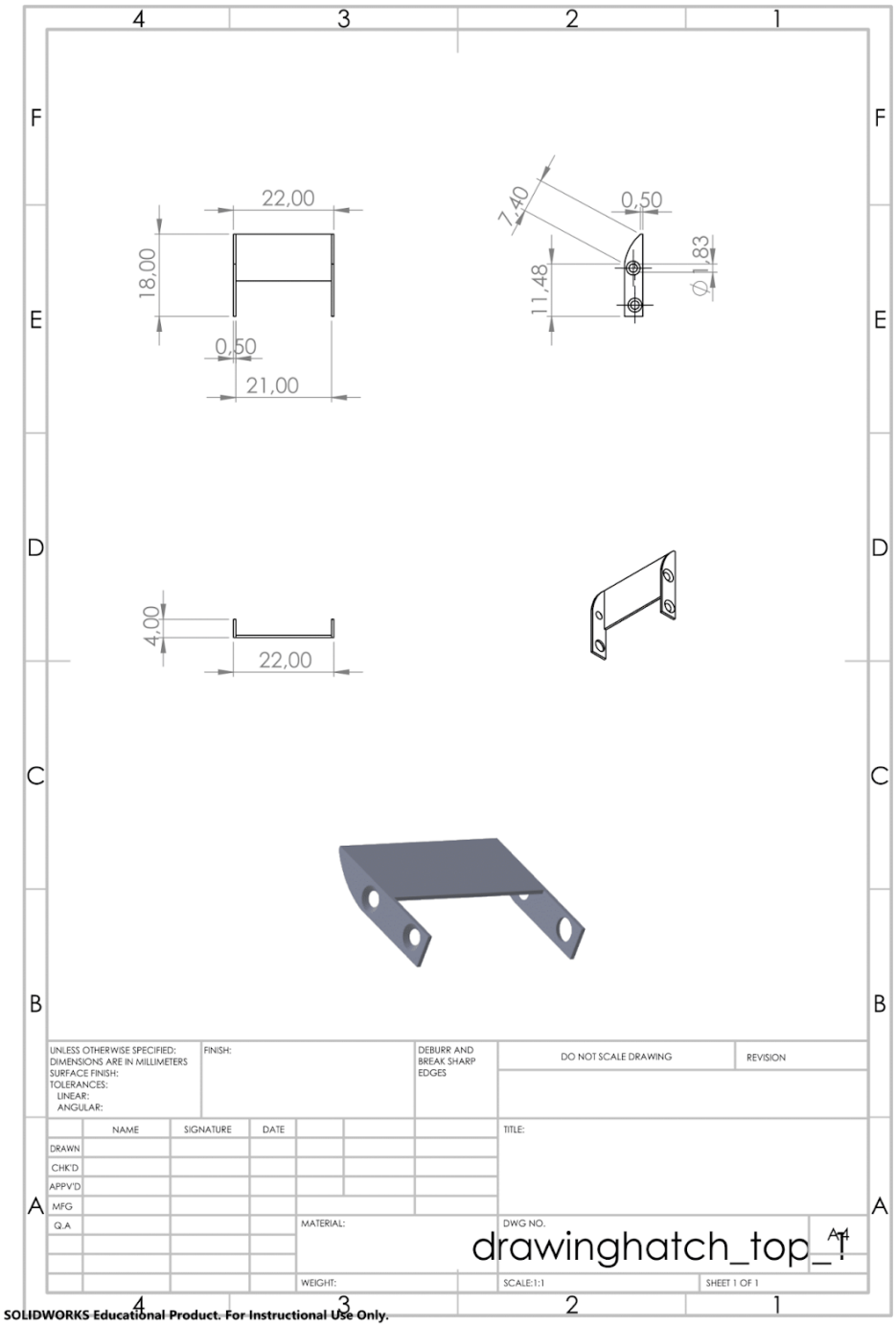

Figure 10: Fastener: Work Drawing from Solidworks

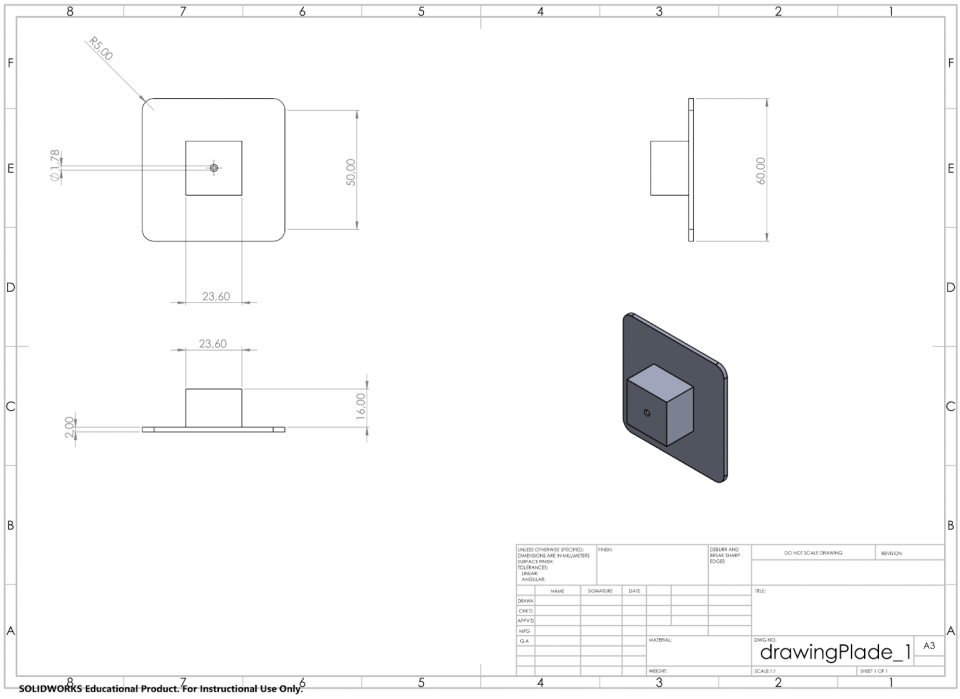

Figure 11: Bottom Plate: Work Drawing from Solidworks

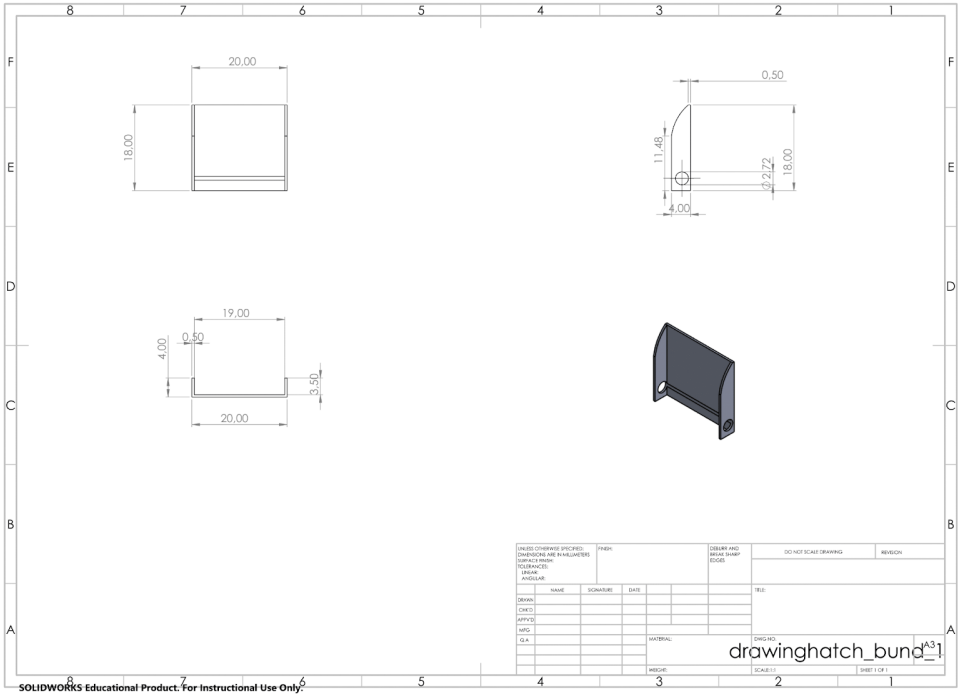

Figure 12: Bottom Attacher: Work Drawing from Solidworks

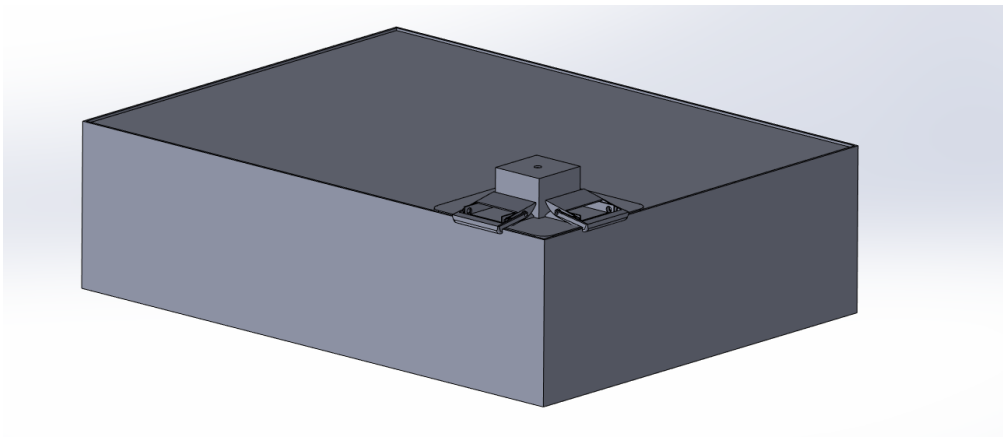

Figure 13: Finaly assembly attached to box

7 Business perspective

Alubox is doing good business, although it still seems like they are in their start-up phase in some aspects. Today quite a few boxes are being sold, and therefore we as a group will make sure to get even more sales. Their monthly sales in Denmark are 40-80 orders. Alubox also has a wide range of collaborations with various distributors, who put their stamp on the boxes and help increase sales. From the company's side, no great emphasis has been placed on the website and user-friendly purchasing. This, too, can cause confusion and less purchase amongst their loyal as well as new customers. The procedure for how it works with purchases is done by emails and bank transfers. Therefore, improved purchasing options can increase sales. The boxes today are sold at a reasonable price with a good profit for the company. They do have accessories for the boxes, for instance RuumX, which creates small spaces inside the box. In this way they are constantly coming up with new products, which leads to more profit.

7.1 Dealers

For instance, there is Equipt, which is an exclusive U.S. distributor. Their customers are all around the world and they are mainly using it for defense, industrial, emergency services, transportation, and recreational use.[1] The other dealers who also help selling Alubox together with their other products are the following, Nakatanenga, Trekk 4x4, APB Trading, Desert Foxx etc. These companies are placed in Netherland, England, Germany, Australia, Greece, and Belgium. It gives far more customers than if the company was only located in Denmark. It helps to create a larger network across different countries.

7.2 Production

They produce the boxes at home in Denmark, instead of moving production to China. The main reason for this is that they want to avoid getting poor quality boxes. Production in Denmark takes place in closed factories, where they assemble the parts for the box, while they get some of the parts produced from Poland. They also try to cooperate only with those dealers who do not have low quality boxes. To avoid mixing them with other boxes and thus ensure customer satisfaction. In other words, their focus lies in being qualitative rather than quantitative. Happy and satisfied customers also result in customer loyalty.

7.3 Business Model Canvas

The model is basically used in the development process. It can be used to see what value has been added to the product and for whom it is aimed. It's a good tool to evaluate business ideas in an early stage. These nine elements can be divided in four sections.

1. Section 1, Offering: Value proposition.
2. Section 2, Activities: Key activities, key resources and key partners.
3. Section 3, Customers: Customer segments, channels and customer relationship.
4. Section 4, Finances: Cost structure and revenue streams.

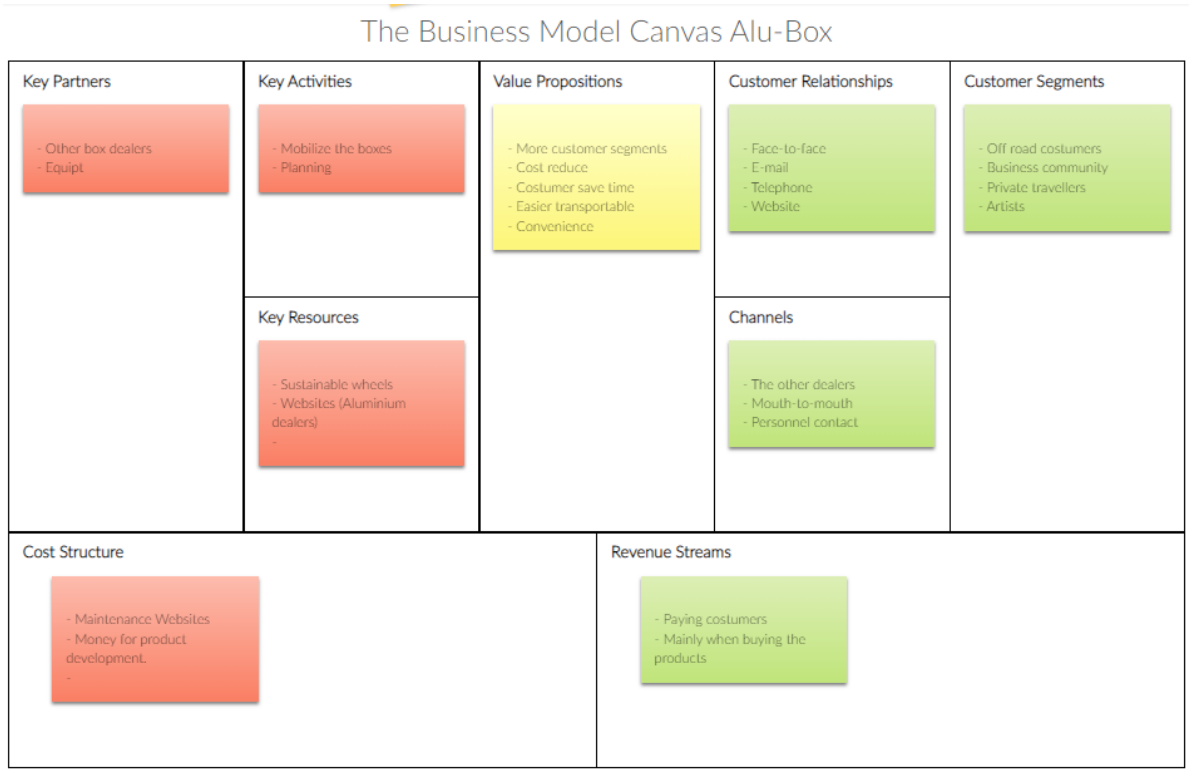

Figure 14: Buisness Model Canvas

7.4 Value Proposition Canvas

There has been created a value proposition canvas, Alubox to customers. The model is created, by looking at which kind of value the solution gives the customer segment. The solution makes it more transportable, it's made with the option of using different kinds of wheels. The customers now doesn't have to mix brands, to fulfill their transport needs. Every option for is now available at Alubox.

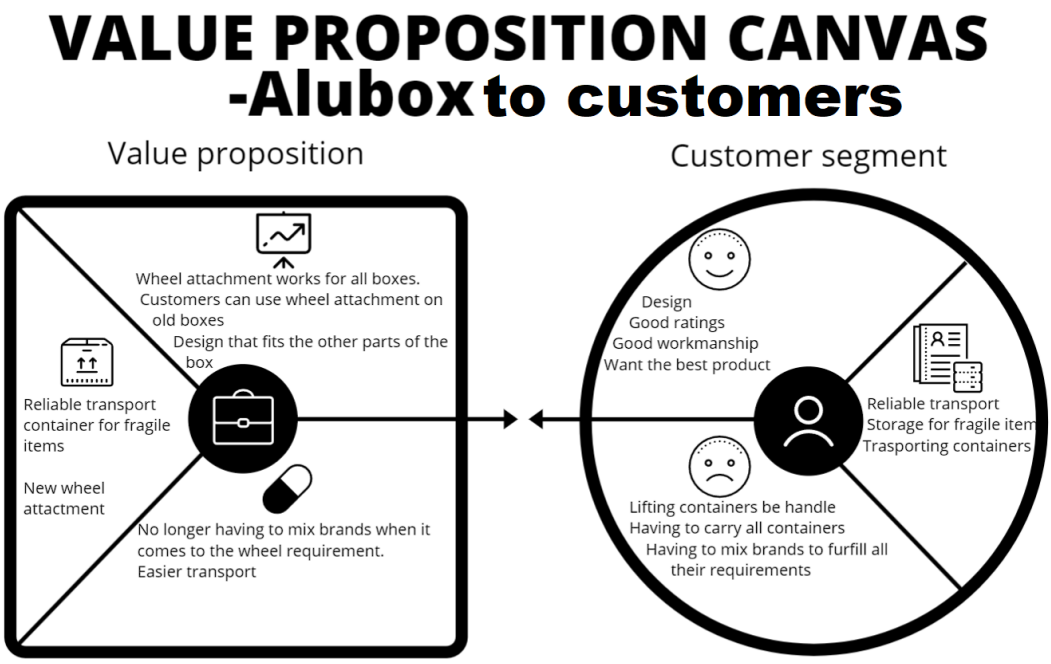

Figure 15: Value Proposition Canvas, Alubox to Customer

There has been created a value proposition canvas, Team AAA to Alubox. The model is created by looking at which kind of value it gives, first of all, its a easy implementation solution, furthermore its attachable to every Alubox, therefore also usable for customers that already have bought a Alubox.

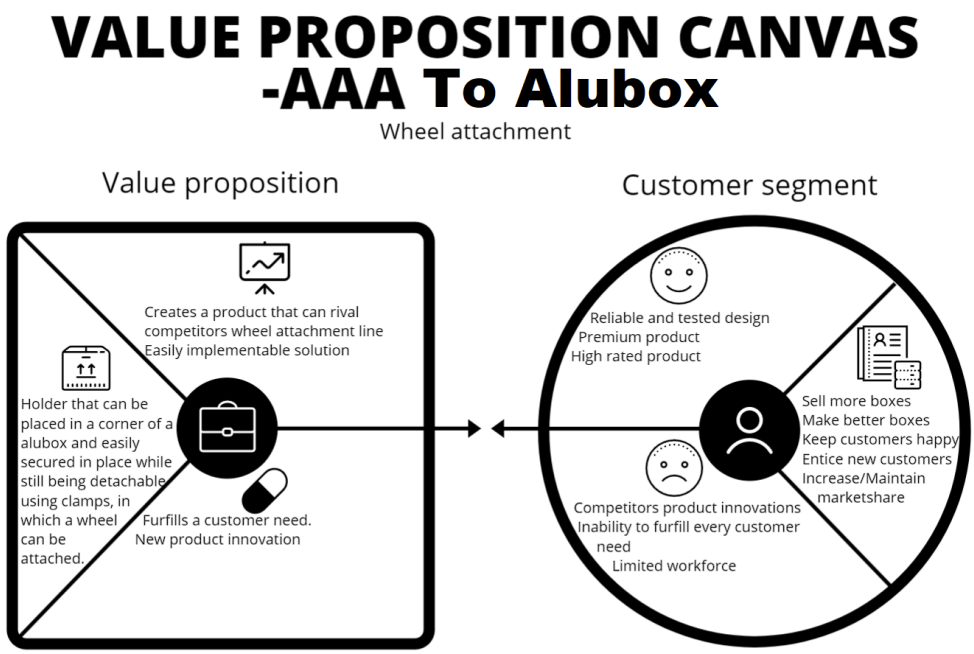

Figure 16: Value Proposition Canvas, AAA to Alubox

7.5 Solution

With the solution we came up with, it can create value for customers. Our solution for transportable boxes using wheels can be used on all existing boxes. A new box with wheels is not created, but instead brackets that can be clamped on all boxes. In that way we can satisfy current and new customers. Our solution also does not come with specific sets of wheels. This means that the company itself can choose wheels for different terrains. In this way, we can satisfy a larger target group and potential customers.

8 Further perspectives

Before we got to the final solution, there was many options and proposals. But this was the best solution, so our Proposal was only a temporary illustration in Solid-Works, and therefore we didn't got to test it in real life with a physical prototype. So the next step could be to start producing a physical product that could be tested for the stability and if it is easy to apply and if necessary could get even more improved. The solution theoretical should fit and be usable, but it gives another perspective with a real physical product, and could maybe show some obstacles.

The proposal is a good option for getting the Alubox more transportable, but it could also be a

smarter solution in peoples homes, were they know are able to transport the alubox in different corners a cross their home or room. It is easy to have a alubox as storage place for maybe heavy things or things that can get hidden away inside of the alubox. So the proposal could get into maybe interior designers, that maybe would like the idea of a transportable storage box in their design process. There isn't a specific customer segment.

The solution helps different customer segments, isn't developed for a specific customer segment, as many customer could get the benefit of this solution. The solution is a accessorise, so it can be used on already purchased items, so customer that already have aluboxes, can just buy the accessorise, and use our solution.

9 Conclusion

This project has overall been a successful assignment for both the group and for Alubox. We have with the innovation project work on how to make Alubox more mobile so the company and its customer can use the new solution with ease. We have therefor worked hard on how to make that possible so we can help with our engineering background. In tree weeks have accomplished to make a good and solid prototype for Alubox. We are happy and proud of the outcome that we have made in this group and hopefully will this solution make a great impact for Alubox.

10 Work distribution

Sections in bold subsections not

Section	Written by
Executive summary	Furkan
Bagground	Furkan
Alubox	Ihtsham and Abdul
Hard nut	Mohamed
Our proposal	Mohamed and Ihtsham
Questionnaire	Mohamed
The Prototype	
Wheel	Laurits, Abdul and Troels
Clamp user experience	Laurits, Abdul and Troels
Requirements	Laurits, Abdul and Troels
Problems and improvement	Laurits, Abdul and Troels
Cost price estimation	Abdul and Ihtsham
Solidworks prototyping	Laurits
Business and economic perspective	Ihtsham
Further perspective	Abdul
Conclusion	Abdul and Mohamed

References

[1] Equipt. Alubox.com, about. https://www.equipt1.com/collections/alu-box. (accessed: 15-08-2022).