

Redesign of an EM series safe

The research question of this bachelor assignment thesis is:

What is the most effective way of redesigning a safe, making transport and placement conventional for the end user?

The assignment is executed in order to find an answer to a wish from Nauta security. The idea of a safe that could be disassembled and assembled, seemed like a good alternative to the rigid and heavy safes currently produced. However, there was no way of knowing if it could be possible. The safe should be designed according to the European regulations¹ of 1143-1, which is a disclosed document only available for the company itself.

The process started with an analysis of the current product, the problems with this product and how to design such a product. This led to a list of requirements that are used for the design exploration.

The design exploration is build up from a rough idea to a much more detailed concept. Within each step certain choices are made. This limited ideas in the next steps but made sure that these limitations were based on practical desires. The ideas explored in this assignment are translated into 7 different concepts. Some of these concepts are also explained using paper-prototyping. During a meeting with 2 experts in the field of safe design, these concepts were evaluated. The final concept was chosen using a plus and minus system on 5 different aspects. These aspects are as follows: Weight, shape, assembling, costs and strength.

The chosen concept was worked out into 2 detailed concepts using Solidworks. From these SolidWorks model, prototypes were made to test the strength of the connection and see how conventional the assemblage would be. During the making of these prototypes, there was one concept that stuck out in simplicity to make and assemble compared to the other. This concept is worked out on a working scale model of wood, this model is included as figure 1.

The different confidential documents^{1,3,4} and tests were used to perform calculations on the strength of the safe. The conclusion out of these calculations is that the safe is strong enough as a concept. However, further research should be done into some of the weaker parts of the safe. Ideas for these weaker points are mentioned in the thesis, but these ideas could not be tested because the time of the assignment ended. These weak points can be either worked out with smaller tests. Like the way that it was performed during the assignment. But what would be better is making a test sample on a full scale, that will be tested more professional to see how the safe would react. This would give much more reliable test result since it includes all components.

In short, the research question is answered with:

The final concept will be made out of parts that weight less than the ARBO law advises². Also, the design is made strong enough to withstand the forces described in the European norm 1143-1. The concept needs to be worked out further into detail to make a realistic prototype to test the full construction.



Figure 1 Scale model 1:4 of the detailed concept

References:

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