ProcessReport

Alina Melnikova
Ma 4- ID 8
Department of Architecture, Design
and Media Technology
Aalborg University
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Title page

Project title
CombiClean

Theme
Master's Thesis

Project period
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Student name
Alina Melnikova

Supervisor
Finn Schou
Department of Architecture, Design and
Media Technology

Number of reports
5

Number of pages
93

Appendix
7

Content

Summary
In Danish

Dette 10. semesters projekt er lavet i samarbejde med den danske virksomhed, Vikan A/S. Vikan er en af de førende virksomheder inden for produktion og salg af professionelle rengøringsartikler på verdensplan og er blandt andet kendt for deres Mikrofiber koncept.

Min opgave har været at finde andre måder at præparere mikrofiber mopper på, end den måde man bruger i dag; og designe et produkt som kunne bruges til præparering af mindre antal af mopper, end det nuværende produkt kan tilbyde.

Igennem forløbet har opgaven bredt sig ud og resultatet er et fleksibelt produkt, med kombinerede funktioner.

Fokus igennem hele projektet har været på brugernes bevidste og latente ønsker; funktionalitet og brugevenlighed. For at sætte ord på de funktionelle krav er research, interviews, bodystorming og forsøg lavet.

Brugerundersøgelser er udført i to etaper, først en bred undersøgelse af de potentielle brugere, for at forstå målgruppens kultur og generelle krav til produktet; bagefter en mere specifik undersøgelse af de nuværende brugere for at finde svage punkter ved det eksisterende produkt, som kan forbedres.

Eksperimenter har haft en stor betydning for projektet, da det har været vigtigt at finde den mest optimale måde at præparere mopper på. Derfor forskellige forsøg med vand er udført.

Æstetikken er ikke vægtet lige så højt som funktionalitet fra starten, dog er der udarbejdet et forslag til det æstetiske udtryk, som skiller sig ud fra mængden.

Igennem hele forløbet har der været kontakt til virksomheden, hvor de forskellige koncepter og tekniske løsninger har været diskuteret frem og tilbage. Samarbejdet med virksomheden har derfor haft en stor betydning for projektets forløb.

Procesrapport er dokumentationen for procesforløbet, fra planlægningsfasen til evaluering af det endelige produkt. For at gøre det nemmere at forstå, hvorfor det færdige produkt er som det er, bliver forskellige løsningsforslag overvejet og vægtet igennem hele rapporten.
I appendiks til produktrapporten er resultaterne fra brugerundersøgelserne og forskellige tests vist.

Produktrapport er præsentationen af det færdige produkt og dets funktioner.

Introduction

The 10th semester at Architecture and Design is a period where students can show what they have learnt in five years. It is also about finding a problem which is both relevant for the chosen environment, the study guide, and the student's personal interests.

Finding an interesting and appropriate subject is rather difficult and, unfortunately, I had to change the focus point after the first two weeks of the process.

The new theme I work with is improvement of existing cleaning products in cooperation with the Danish company Vikan.

As documentation for the process two reports has been made. To get a full comprehension of the project it is recommended to read both of them. Furthermore, technical drawings and a CD with the reports and the extra information are enclosed.

Some of the numbers in the cost estimation are confidential and are not shown in the report, they are attached as the appendix for the supervisor and the censor.

Acknowledgments

I would like to thank: my supervisor Finn Schou for his support and constructive criticism; Vikan A/S, the contact person Industrial Designer Thomas Lænner, Jørgen Thordahl Lauridsen, Peer Bæch-Laursen and Shane Duff for cooperation; Stadsing in Nørresundby; Clean Care in Aalborg; Employees at Hjørring Biocenter; Development chief of Sunset Boulevard Carina Tranum; Luise A. Fredsted for help with proofreading; ISS Rengøring and all employees of cafés and small shops in Aalborg, who have participated in interviews.

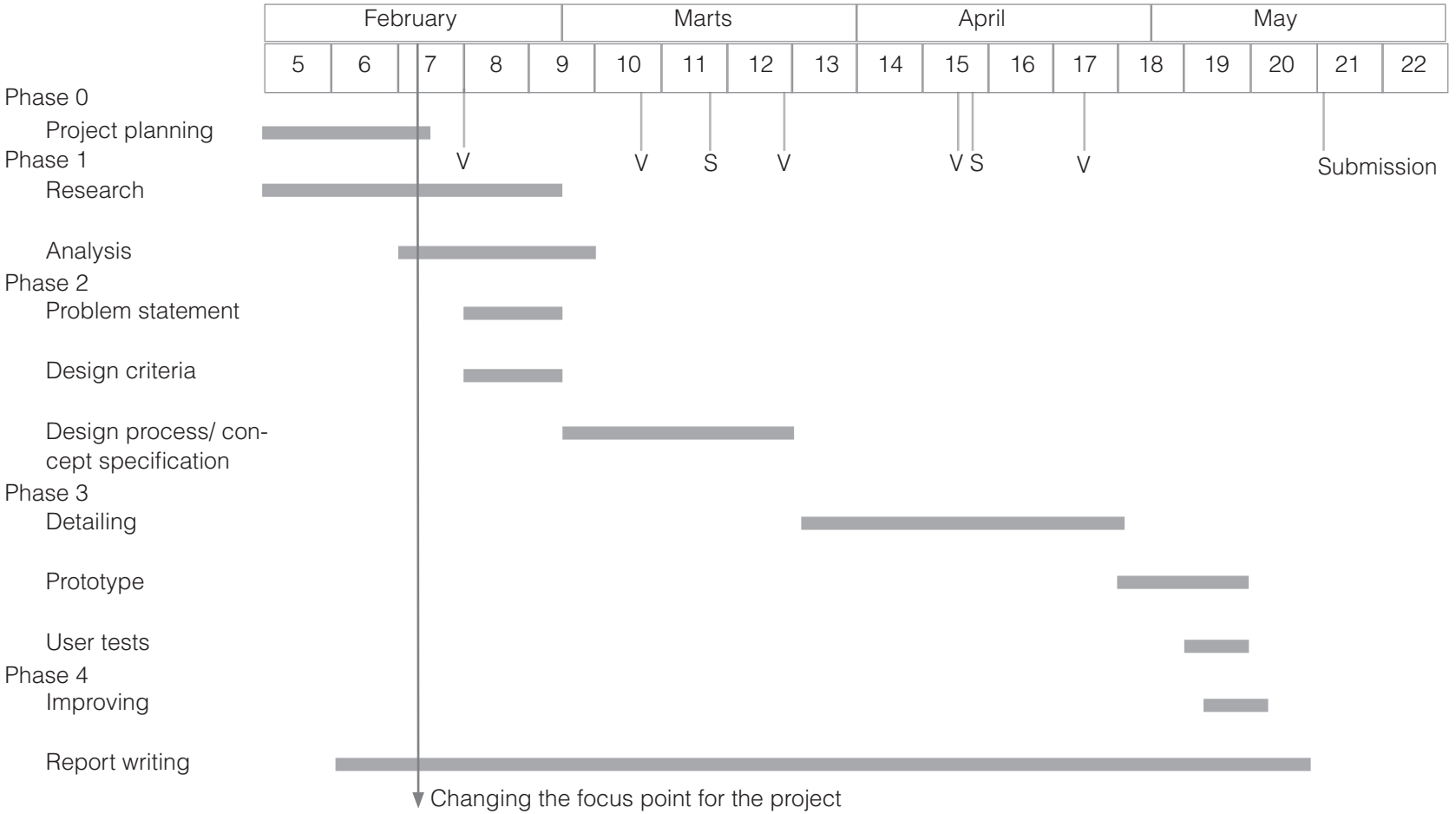
Project planning

The project begins by considering how to anticipate the process. A timetable is made and aspects that will be in focus during the whole process are discussed.

Project planning

The Gant scheme

To get an overview of the process the Gant scheme is used. Important activities, meetings and deadlines are plotted. It is made in the beginning of the project, and it is interesting to see if the planning will be complied with during the whole process.



III. 1: The Gant diagram shows when the important activities are going to take place. V stands for the meeting with Vikan, S - for the status seminar

Methods

The expected process for the project can be divided into the following general phases: Phase 0 (Planning), Phase 1 (Research & Analysis), Phase 2 (Design process/concept specification), Phase 3 (Design detailing), Phase 4 (Reflecting).

During the project several theoretical methods will be used, and a short explanation of how they are used is to be found in the particular paragraphs in the process report.

The common general method, applied for the project, is Kolb's learning model. It is basically about a process consisting of the following steps:

- Concrete experience
- Reflective observation
- Abstract Conceptualisation
- Active Experimentation

When the last stage is completed, you start from the beginning again and keep moving in circles.

	Phase 0: Project framing	Phase 1: Research & Analysis	Phase 2: Design process/ concept	Phase 3:Design detailing	Phase 4:Reflecting
Objectives	To structure the future process as much as possible	To achieve the necessary knowledge about the problem field, target group and the environment	To perform a creative process, from the initial idea to a concept	To find the appropriate materials, production processes, marketing opportunities and to make the general cost estimations	To get an idea of how well the product fits the design criteria
Actions	Making a time plan Finding the appropriate methods	1. Meeting with the company Research Observation Background interviews Marketing analysis Needs analysis User scenarios	Brainstorming Sketching Make ups Function diagrams 'What if?' scenarios Usability tests Regular discussions with the company	Research and analysis of materials Regular discussions with the company Contact to producers 3D sketching Prototype Final presentation for the company	Trying out Evaluation of functions and aesthetics
Outputs	A well structured and well considered project. Avoiding stress factors during the process especially in the end	The phase will result in a defined problem statement and design specifications for the product. A Program has to be completed	A final concept for the product, fitting the specifications, will be chosen in the end of this phase	A final detailed solution will be presented at the end of this stage	Finding out of how well the job is done, reflecting upon the possible improvements

Ill. 2: The diagram is an overview of the process, as it has been planned from the beginning

Learning goals

The main purpose of the master project for students is to 'demonstrate their mastery of key competencies in a self-driven process.' [Study guide, 2012] For me the project starts with considerations of how to structure the time and what I want to gain from this project period. There are a couple of professional learning goals and focus subjects to mention.

User - centered design

I will try to put the users in focus during the whole process. That will involve different methods; such as interviews, usability tests, body storming etc. It will be important to involve the potential users in the project in order to define their needs and wishes and get their responses on the prototypes.

Ergonomics

Ergonomics is a relevant subject, as it is an important part of making a user friendly design. In this project I expect to learn more about the rules of ergonomics within the cleaning branch, and apply those to the final product.

Production methods and cost estimations

As I work with this project in cooperation with Vikan A/S, and as I would like to make the process as realistic as possible, I would like to spend time on considering the appropriate production methods and make a cost estimation with help from the company. The goal is to learn as much as possible from the company and their many years of experience.

Marketing

As a part of the project I would like to come up with a suggestion for the marketing strategy for the new product. The focus will be on how the company can promote the product within the target group, what selling points and advertising materials can be used.

Time planning

The learning objective is also to become better at structuring time for the process. The question of interest is, how much time I spend on different activities.

Other

Other learning objectives are:

- During the whole process I expect an active use of theoretical methods in praxis.
- Training how to solve a problem individually, but to become better at getting help from professionals within different spheres.
- Be more organised, for instance, be better at gathering sources ongoing.

Analysis

On the first meeting the company comes up with at specific task. To widen the problem area an analysis is made. Market and field analysis, user research and a critical analysis of the existing product are made to see the problem from different angles and find other critical points for improvement, than the ones mentioned by the company.

Project Frame

Kick off

The project is made in cooperation with the Danish company Vikan, recommended by my supervisor, Finn Schou. The process starts by research on the internet and analysis of the company before the first physical meeting. The actual meeting is the official start of the project.

The meeting takes place at Vikan's Headquarter in Skive, Denmark. Product Manager Peer Bæch-Laursen, Marketing Manager Shane Duff and Industrial Designer Thomas Lænner introduce the company and explain their point of view on the problem area, there is also a guided tour through the production facilities.

Vikan®
ADVANCING HYGIENIC CLEANING

Ill. 3: Vikan's logo

Ill. 4: Production facilities at VIkan

Ill. 5: Production facilities at VIkan

Design brief

The Design brief is a very short description of the company and their products, it also gives an insight into the main theme of the project.

Name of the company

Vikan A/S
Rævevej 17800 Skive Denmark
Tel.: +45 96 14 26 00 Fax: +45 96 14 26 55

Contact person

Thomas Lænner, Industrial Designer at Vikan A/S

Facts about the company

Vikan was founded in 1898 and today it is one of the leading companies on the market of professional cleaning equipment in the world. The company has its headquarters in Skive, Denmark, and many departments all over the world. It employs about 225 people overall.

Vikan's mission and vision

'Vikan's mission is to develop and provide effective cleaning tools and solutions for customers where hygiene is essential'. [Vikan.com] The company has a number of visions, where they stress the terms such as 'initiative', 'teamwork', 'credibility', 'commitment' and 'responsibility'.

Vikan's profile

Vikan develops products within cleaning equipment and they focus on hygiene, user needs, ergonomics and sustainability. The company works on finding unique solutions, and tries to develop and improve the most of the existing products, all the time.

Ill. 6: Vikan's Headquarters in Skive, entrance

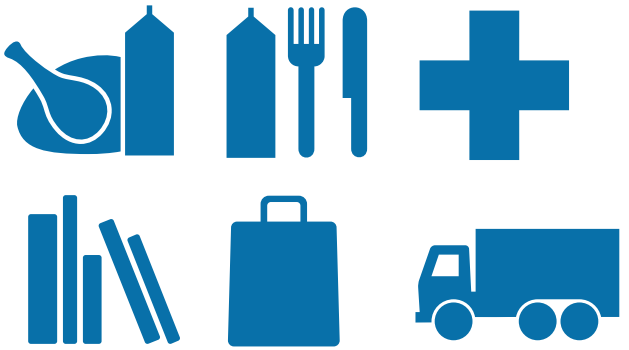
Ill. 7: Vikan's Headquarters in Skive

Ill. 8: Examples on Vikan's products, size-scale is not kept

Product range

Vikan's product range includes many different products from dusters to cleaning trolleys targeting different sectors such as:

- The food and beverage sector
- Kitchen and restaurants
- The health care sector
- Education and municipalities
- Retail and supermarkets
- The transport sector



Ill. 9: The six sectors

Clients

Vikan is a 'business to business' company, and their clients are other businesses within the six sectors mentioned above, for instance Carlsberg, Arla Foods, Sunset etc. They also have a number of distributors, such as Novadan or Clean Care that sell Vikan's products to other smaller companies.

Production

Vikan has production facilities in Denmark where they assemble and pack the products and produce trolleys; Sweden and Estonia, where they produce textiles. Vikan does not have machinery for moulding, therefore they produce their plastic parts at other factories.

Cooperation

Making this cooperation Vikan would like to get a new point of view on their products.

They suggest a problem area:
To improve the existing Prep kit (preparation) system made for mops of 40 cm. That involves finding a solution on how to prepare 1-3 mops at a time, today it is only possible to prepare 10 mops at a time.
The target is the retail businesses, such as quick service restaurants, petrol stations and coffee shops. Functionality and hygiene are of paramount importance and the solution has to be manual - mechanical. Vikan also has a wish for the new product to be based on the

Ill. 10: Vikan's customers

existing products, so the company can re-use their production tools; and that the product is difficult to copy. [Vikan A/S]

Parameters

Preparation of 1-3 mops
Manual-mechanical solution
Hard to copy for the competitors

Ill. 11: Prep kit for 40 cm mops

Preparation kit

Product presentation

The first step in the research and analysis is to find out what a preparation system is and how it is used.

The Prep kit from Vikan is part of a Microfibre concept and is made for preparation of microfibre mops before use. It ensures the right amount of moisture for the mops, so it is easy to clean the floor and quickly get it dry.
With the Prep kit you can prepare mops, transport and store them, in the same box; it is easy to change mops without touching them with your hands. This makes the cleaning process easy, fast and hygienic. When a mop has been used it has to be placed in a bag or another box for hygienic reasons.
In general, the system is a smart solution, 'the customers prepare their mops in mop boxes, so their mops are always ready to be used. The floor is cleaned with clean water, compared to drip mop'. [Nielsen,J.L., 2012]

Ill. 12 The Vikan mop boxes can be placed on the cleaning trolleys

Ill. 13 Changing of the mop. Mop handle is a part of the Microfibre concept. To make it possible to pick up the mop, it has to be placed horizontally with velcro/pocket upwards in the bucket.

Ill. 14 The mop box. The lid helps keep the mops wet, it can be fastened on the side of the box

Ill. 15 There is a grid in the bottom

Ill. 16 The handle allows transport of the mops. The materials Vikan uses for the Prep kit are FDA approved, for food

Microfibre mops. Properties

Why do the mops have to be prepared? In order to fully understand the importance of the preparation process, it is necessary to learn about the properties of the material the mops are made of.

The mops are made of microfibre. The properties of the material make the products a hygienic and effective solution. By using microfibre correctly you achieve reduction of bacteria and dirt by 99,9%, which is much better compared to the ordinary, cotton mops, that reduce the bacteria and dirt by 30 %. [Vikan.com]

Microfibre material is a mix of polyester and polyamide. Due to the capillary structure, microfibre mops gather dirt from the floor and store it in the mop until it will be washed, where all the dirt will be released in hot water. [Intelligroup.co.za]

There are both dry and damp microfibre mops among Vikan's products. The focus of this project is on the damp mops, as they have to be prepared before use which means they have to get an appropriate amount of water. The amount of water depends on the type of microfibre. It is also important that all water is evenly distributed throughout the mop. Normally, it takes a couple of minutes for a mop to obtain water, Vikan recommends to wait 5 min. to be sure that all mops are wet. The right amount of water ensures a good cleaning and a hygienic result. Both because it removes visible dirt particles and bacteria, and because it is not necessary to use chemicals. The floor dries fast after the use of a well prepared mope, that takes about one minute. Fast drying secures a hygienic cleaning by preventing bacteria from reproducing. At the same time it provides more safety for the employees, as they will not slide on the wet floor. One mop spans about 20 m^2 depending on the type of mop and the dirt. (Appendix A) For preparation of many mops it is necessary to place them with the side to the water flow. [Vikan A/S]

Vikan has two types of microfibre mops, with velcro or a pocket on one side. That makes it easy to pick up the mop from the bucket using a mop holder. There is also a release function integrated in the cleaning trolley for pocket mops, but not for velcro.

All in all, microfibre is a material that is suitable for cleaning. To make it work properly you have to prepare the mops with an appropriate amount of water.

Ill. 17 The microfibre mops and the preparation jug with many measures for the amount of water needed for the different types of mops.

Parameters

Correct preparation means:
The right amount of water dependent on the type of mop
The water has to be distributed evenly throughout the mop
It takes a couple of minutes (5 min.) for a mop to obtain water
FDA approved materials
The mop has to be placed with velcro/pocket upwards to be picked up from the bucket

Preparation - process

To find out how the system works, Vikan is asked to show the process of preparation. Furthermore, a couple of experiments are made to find out how easy it actually is to read and use the product.

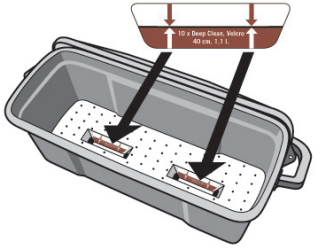
The preparation of mops can be done in a few steps. (Ill.18) Vikan describes it in a manual, it is usually laminated and given to the customers besides the physical product.

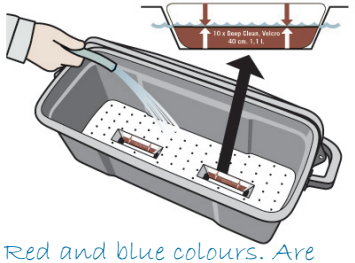
I have had a perception that some of the steps in the process and some details of the product can be improved. To check this assumption a body storming is made. A few fellow students from the university are asked to perform a preparation of mops. (Appendix B)

They try to complete the task twice. First time 'What if the manual was lost?', worst case scenario is acted. Test persons imagine, that the manual is lost, as it often happens in real life, if you get a piece of paper next to a product. They have to find out how to do the task. The results show that it is rather difficult for a person without knowledge about the subject to complete the task correctly.

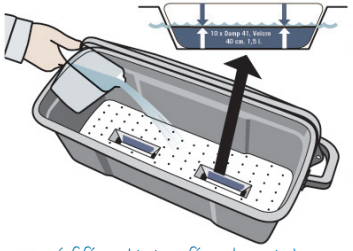
The next try-out is with the manual. The results are much better, but there is still a couple of details that are not transparent for the test persons. The test-preparation time is around 9 min. (including 5 min. waiting for mops).

General comments from the test persons as follows, they need more symbols, informing

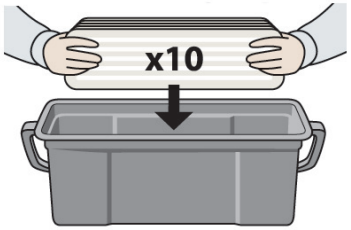




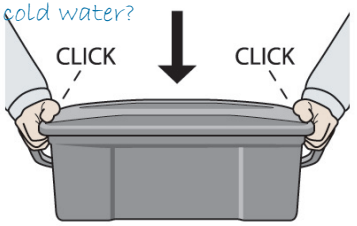
Red and blue colours. Are they signs for hot and cold water?



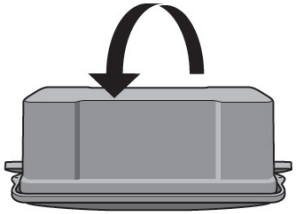
Difficult to find out how much water you need



You can only prepare 10 mops at a time. It is not clear that they have to be placed upright.

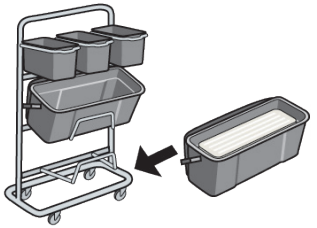


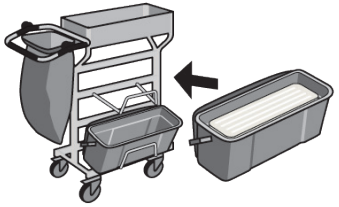
No indication on the lid saying you have to press. How to know if it is locked?



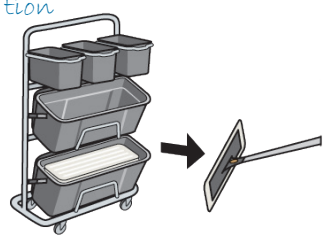
If you have to rotate the box, a feature that helps rotation is needed

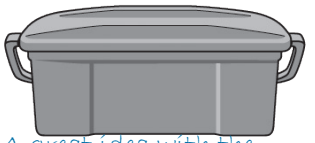
The lid has a rounded shape, which can misleadingly indicate a tilt function





The box can be placed on the cleaning trolley - useful function





A great idea with the handle, but it has to be optimised so it is more comfortable to use

Ill. 18 Instruction, explaining the preparation of mops and comments from the body storming

how to use the product. Details such as lid, handle and grid in the bottom are mentioned as parts that can be confusing.

Parameters:
Transparency of functions, so it is easy to read them without a manual
Make it easy to find out how much water is needed and where to put it

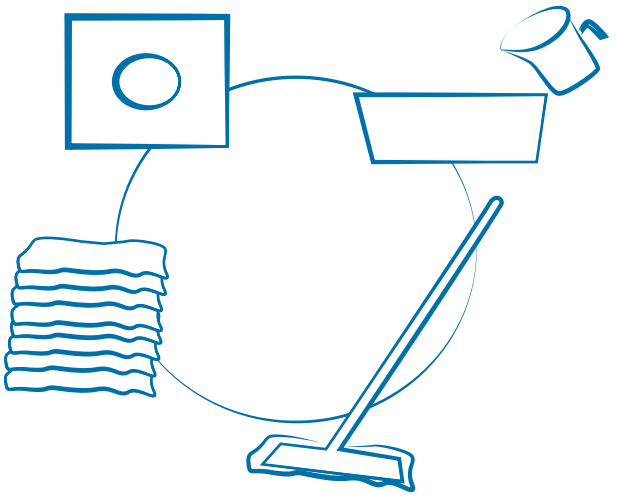
User scenario, cycle

It is necessary to zoom out to see the product in a broader perspective, not only as a part of the preparation process but of the whole cleaning procedure.

Cleaning the floor includes following activities:

- Washing the mops
- Preparation of mops
- Carrying the mops to the area that has to be cleaned
- Cleaning the floor
- Gathering the mops and carrying them out to the washing machine
- Washing the mops

The process is repeated, again and again. It is clear that the preparation of mops is only one activity within a cleaning process, and the other activities are just as important as the preparation. This means that the coming product has to take all of these into account and combine different functions, to make it easy for the user and give him a good experience.



Ill. 19 Activities included in the cleaning process

Parameters:
Easy preparation
Easy transportation
A feature for used mops
A feature for a mop handle

Target group
Retail businesses

On the first meeting Vikan has mentioned that the target group for this project is retail businesses, such as small restaurants, coffee shops and petrol stations. After a quick research and considerations it is decided to focus on restaurants and cafés in Denmark, as at these places there are specific regulations within hygiene. (Appendix C) And their owners are most probably willing to invest money in a new hygienic solution from Vikan.
To learn more about the chosen group a research and observations are made.

Nowadays it is common that employees at such places, mostly young people, have different tasks, they sell products, prepare and serve meal and also do cleaning. In this case cleaning is not their primary task but it has to be done anyway. The employees are often not trained in correct cleaning procedure, at best they get a brief explanation on how to do it on their first day at work.

Usually, there are many customers at cafés and restaurants at a time, and the employees have to focus on good service. It means that if they have to do cleaning of some areas during the day, it has to be fast and discrete.

On busy days the employees are constantly in a hurry and they may risk throwing the cleaning tools or push them with their feet. [Tranum,C., 2012] That requires that the new product has to have a certain degree of durability and solid construction.

There is a large competition between the retail businesses, and every small detail can make a difference. Besides the good service the place has to appear clean and cosy, so their customers feel comfortable.

The fact that restaurants have to meet the demands from the Ministry of Food, Agriculture and Fisheries, to get 'happy Smileys' on their portfolio, can be a good selling point for the future product, and

Ill. 20 Baresso coffee

Ill. 21 Subway

Ill. 22 Burger King

also requires a hygienic solution. Surveys show that consumers are conscious of ‘Smileys’ and conditions at the places they visit. For instance in the year 2008 there were 59% of consumers who told that they have deselected a restaurant with a ‘sour Smiley’. Another survey shows that eight out of ten owners have discussed with their employees how to secure their place ‘happy Smileys’. [Findsmiley.dk]

Vikan’s products, as they are today, are targeted professional cleaning companies. Designing a product for nonprofessionals (people who have not been trained in cleaning) lead to consideration of the function and transparency of the function as one of main criteria. It means that the new product has to be easy and intuitive to use.
The target environment demands a hygienic solution of durable construction.

Parameters:
Intuitive use
Durability and solid construction
Hygienic solution = good selling points

Field analysis

User research: Aalborg city

The end - users, who are in focus, are owners of retail businesses, employees and customers. Employees use the cleaning equipment repeatedly, therefore they can be considered as the primary users.

To get an idea of who these people are and what their needs are, several observations and interviews has been made at retail businesses in Aalborg. [Appendix D] The intention has also been to find places using Vikan's products and get feedback from the users.

The fact is that none of the investigated places has Vikan mops; some use old fashioned twist mops or drip mops. Using those, you dip a mop in a bucket with water many times during the cleaning procedure. The majority of asked persons find it easy enough to clean the way they are used to do it. But when they are asked if prepared mops could ease their workflow, many answer positively. It shows that even though they do not use the Vikan microfibre system at investigated places, they can be a potential market for implementation of Vikan's products.

Some of the asked persons mention, that it is not 'funny' to clean, especially because it is not their primary task. That is something they have to do as part of their duty. It can be interesting to create a new product as a cleaning 'tooltoy' that could make their everyday routine a little bit more enjoyable. This will result in more satisfied users.

In general, during the research it is experienced that if the new product should replace the existing products on the market and match the needs of the target group it has to be functional. By functional it is meant, easy to use, no wastage of time, with simple and intuitive interface.

Parameters:

Functionality
No wastage of time
Intuitive interface
'Tooltoy'
Many cafés in Denmark are potential customers

III. 23 An employee at Baresso Caffe

III. 25 An employee at Café Fair

User research. Hjørring Biocenter

With help from the company, a place where they use Vikan's preparation products, Hjørring Biocenter, is found and contacted. It is not a business within the target environment, but they apply Vikan's preparation system, and the employees are young people which matches the targeted end users. That makes it to a perfect place for conducting research. The aim has been to find out if the users have any issues with the existing products. A situated interview with employees, young boys and a girl at the age of around 17 years, has been made. The questions are asked while they perform cleaning. (Appendix E)

They buy Vikan's products from Skovbo-ren in Hjørring. Unfortunately, the company is not good enough at explaining how to use the products correctly. For example, the employees are told to place the mops horizontally before preparation. That results in uneven distribution of water, some of the mops are more wet than others. Another example is, the employees do not know that they have to wash the mops before the first use in order to achieve a good result. Microfibre mops remain dry first time they use them, even after preparation. They cannot draw any water because of the production chemicals in the material. [Vikan A/S] The lack of information can evoke dissatisfaction with the products and give a bad reputation to the producing company, Vikan. That is another reason for why it is important to make a design that is easy to read, so it is impossible to misunderstand the user scenario.
Like at the other studied places the employ-

Ill. 26 Research at Hjørring Biocenter

ees use the mops every day; they clean floor in the evening, and during the day only if it is necessary.

The preparation takes place at a special area and takes about 3-4 min. The mops lie in the mop box in 30 min. before they get used.

Right before cleaning the employees move the mop boxes and mop holders to the work space, without a trolley. They use the handle for transportation, but today it often falls off. The employees demand more stabile solution.

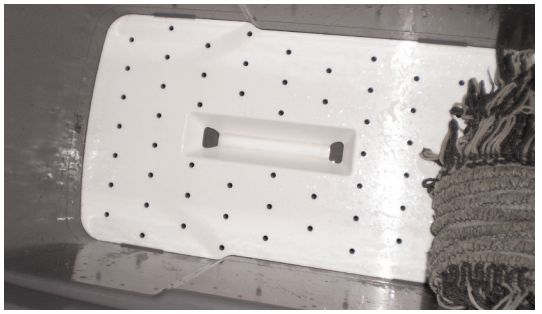
Another critical point with the product is that water runs out every time you rotate the bucket.

The interviewed persons also mention that the grid in the bottom of the bucket begins to smell after a couple of uses and cleaning is needed.

I observe, that the used mops are gathered in a pile on the floor, which does not look professional or hygienic. A solution on this problem is also wanted.

It has been very useful to contact the end users as they interact with the product every day, they have a clear opinion on what works well and what they want to have improved. In order to make a user centered design it is necessary to weigh their statements and use them as a base for the design demands.

Ill. 26 The handles fall away



Ill. 27 The moisture in the bottom of the bucket makes it smell, you often have to clean it

Ill. 28 Water runs out every time you rotate the bucket

Ill. 29 The used mops are gathered in a pile on the floor

Parameters

An appropriate handle for transportation
Prevent water from flowing out
Transparent functions
Incorporated feature for used mops
Remove the grit from the bottom

Aesthetic appearance

Visibility and recognition

Functionality is only one side of a product; appearance is another side which also is important for how the user perceives a product. To understand Vikan's approach to aesthetics and their characteristics it is useful to look at the expression of the products.

It is obvious that Vikan's focus in their products primarily is on functionality, and the expression of the products is often a result of considerations including function and production price only. The products are conservative and have an anonymous look. There is no coherence between the different products, if you see a mop handle and bucket you do not realise they come from the same company, as there are no general characteristics describing Vikan's look.

The company's logo is not placed on all products. The fact that they use different logos on different products makes it even harder for the customers to find out what Vikan stands for.

Vikan sells the main share of their products through their distributors. When end users get Vikan's products without logo, from for instance Clean Care, they only know that the products come from Clean Care. The name Vikan is 'in the shade'.

All this results in Vikan being quite invisible for many customers, the products do not differ themselves on the market, they are grey and look like many other cleaning equipment.

It has been difficult to find out what the company thinks about the future design strategy, but on one of the meetings they mention that they consider to change their guide lines for aesthetics. The new products have to be dynamic, organic and streamlined. The surfaces have to be smooth, but still have edges emphasising the details.

The new strategy with more focus on the appearance and common guide lines, seem to be a good solution for Vikan's anonymity and can make them stand out on the market.

Ill. 30 Anonymous design of the mop box

Ill. 31 The mop handle for the pocket mops

Parameters:
Different look
Dynamic
Organic
Streamline
Smooth surface with edges
Similar logo on all products

Market analysis

Competitors

To define other companies on the market who sell microfibre mops and mop boxes/buckets for preparation, different sources have been used. A research on the internet, contact to professional cleaning services, distributors selling cleaning items and meetings with Vikan has given the following information.

One of the well-known competitors in Denmark is Vileda. This company produces both professional equipment and cleaning tools for private use. That gives them greater recognition among the public. According to Clean Care, a supplier of cleaning equipment for the professional cleaning industry, Vikan and Vileda are their best selling products in Denmark. [Nielsen,J.L., 2012] Their range of products for floor cleaning is rather similar and Vileda's preparation kit consists of a bucket, lid and a grid, like Vikan's.
Vileda is good at marketing themselves, they use different media, such as commercials on TV, which gives them visibility and helps achieve a good position on the market.

According to Stadsing, another supplier of professional cleaning equipment, their best-seller is the Dan Mop. They have found another way for the preparation of mops. The system consists of a dosing bucket, on top of a trolley, with a pipe to a bucket in the bottom of the trolley. This system is made for individual mop-preparation, you put the mop into the bucket in the bottom and open for water from the bucket in the top. But it is not possible to perform that without a trolley.

There are also other complex automatic solutions made for preparation of one mop at a time, that are more high tech than Vikan's products.

The new solution for preparation can be used to keep and improve Vikan's position on the market. The rivals have either similar products or other products that do not solve the problem of preparation of flexible amounts of mops at a time. Solving this problem can result in an outstanding product, it has to be functional and easy to recognise to compete with other companies. A new marketing strategy has to be made in order to brand Vikan.

Ill. 32 The Vileda system

Ill. 33 The Dan Mop system

Parameters:
Outstanding product
Recognisable features

Hygienic design

Hygiene is one of Vikan's main competencies. Their microfibre system is thought of as a hygienic solution which requires a preparation system that has a hygienic design.

A product with a hygienic design does not have places where dirt can store, such as small holes, deep grooves and sharp edges. [Vikan A/S] So the existing handle has to be reconsidered, as it consists of many ribs and grooves.

It is also important that the product is made of material that does not draw and absorb dust and is easy to clean.

Many people associate hygienic cleaning with cleaning agents, which is why the product has to be resistant to chemicals acids and bases. Furthermore the product has to withstand high temperature of water, as hygienic cleaning often is associated with hot water.

To take hygiene into consideration Vikan has made colour coding on their products, but not on the bucket. Colour-coding helps to separate areas to prevent cross contamination and is therefore a useful feature.

With other words, to create a hygienic design you have to consider both the shape of the product and choice of materials and surfaces.

Ill. 34 The handle of the mop box is not hygienic

Parameters:

A product of hygienic design:
Avoid holes or grooves
Material and surface, that does not draw dust and is easy to clean
Materials resistant to chemicals, acids and bases
Resistance to high temperatures
Colour-coding

Ergonomics

Vikan promotes themselves as a company that focuses on ergonomics. That makes ergonomics a factor that is important to consider in the new design, even though the product is only used a couple of times a day for a short period.
Ergonomics is a science discipline, studying human body conditions and interaction with a piece of equipment. [Ergonomics.org]

Good ergonomics improves productivity, health and comfort at a workplace, well designed tools therefore result in satisfied users.

There are no particular rules for cleaning tools, other than it is important to design a product that feels comfortable and natural in use and does not cause strain on different parts of the employees' bodies.

Special attention has to be paid to the handle. It should be easy to grip and hold and it should be made without sharp corners and edges. A soft material is preferred on the hand grips. [Actrav.itcilo.org]
A correctly designed handle has to be adapted to a hand anatomy by its length and diameter.

At the same the product has to look comfortable and give the consumers a want to use the product.

These issues have to be considered as demands for the future product in order to achieve a comfortable and welcoming result.

Parameters:
A comfortable look
Soft material on hand grips

SWOT - analysis

To sum up some of the observations and conclusions from the analysis a SWOT diagram is made. It demonstrates the company's strengths and weaknesses on the internal level and opportunities and threats on the external level.

The SWOT - analysis is mentioned as help to understand the company's position on the market. The intention is to use SWOT as a base for the design strategy as well as the marketing strategy.

The first draft has been sent to Vikan, to get their opinion on my understanding of their situation on the market, and a couple of new issues are added to the diagram.

INTERNAL

Strengths

- Many years of experience and a good reputation among customers
- The company produces a broad range of professional cleaning products within six sectors
- Focus on hygiene and functionality
- Documentation

Weaknesses

- In some products they compromise with ergonomics and hygiene (Such as the handle at the prep kit boxes)
- Some products have not been improved for a long time
- A solution for smaller places, where they use 1 to 2 mops at a time, is needed
- Aesthetic aspect is not highly prioritised

EXTERNAL

Opportunities

- Well known large companies as clients
- They have departments all over the world
- Increasing focus on 'smileys' from consumers, customers of retail business → retail businesses try to achieve good results and get 'happy smiley's' → cleaning plays an important role [Findsmiley.dk]

Threats

- There are also other powerful companies on the market of professional cleaning equipment
- They do not have Vikan cleaning products in many of the retail businesses yet (target group for the new product) in Denmark
- The employees (in retail businesses) do not always understand the importance of cleaning 'correctly' and the importance of hygiene

Ill. 35 The SWOT analysis

Conclusion

Throughout the research phase I have become familiar with the importance of cleaning and the preparation process. The issues about the existing product are found and the target group's needs are interpreted.

During the phase important parameters are identified and they will be used in setting of the design demands later on, at the strategy phase.

Strategy

Based on the conclusions from the analysis a strategy, problem statement, demands for the product and aesthetic wishes are formulated.

Target group

During the analysis phase the original task from the company is rethought. A question is if the businesses would invest in the product if they only use one mop a day. I assume that not all will do that. Therefore, to widen the task and application of the product it is decided to work on a flexible solution from 1 to 10 mops. It will be a good solution for those who use a different amount of mops per day, dependent on the task.

Even though small retail businesses and food services are still in focus, such a product can fit into other places where they constantly use more mops. To widen the user scenario more the product can be made so it fits the existing cleaning trolleys.

Problem statement

'How to develop a new flexible solution for the preparation of microfibre mops, so its functions become more transparent for the users, and the user scenario becomes logical and smooth; this will give the user a good experience, make cleaning faster and more effective than today.'

Limitations

It is made a conscious decision to delimit the project from some aspects.

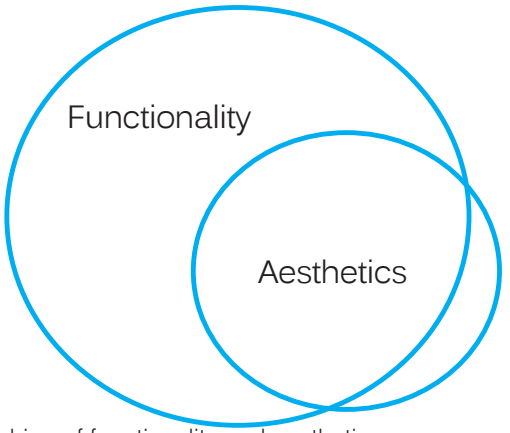
- The project will only focus on the preparation of mops for cleaning of the whole floor area, situations where customers at cafés spill something and employees have to clean the small area immediately is not considered. In this kind of situation, the employees have to act fast and they do not have time to prepare mops and wait for 5 min., so I assume they will take a cloth or a mop, pour water directly on it and clean the dirty area.

- The project is based on the idea, that preparation happens on a plane area, a table or floor. Cases where the bucket is placed on a slope are not considered.

Focus

Before starting the design process it is important to decide how functionality and aesthetics are weighed.

Functionality is a main issue to consider in this project. The process is structured in a way where the general functional principles have to be solved before aesthetics can be considered, so that form follows function. The parameters considering function are therefore demands, parameters considering aesthetics are wishes.



Ill. 36 Weighing of functionality and aesthetics

Demands

1. Priority

Functionality:

- Preparation of 1-10 mops (flexibility)
- Mops get the right amount of water (water is distributed evenly among the mops, and the mops have to be placed with the side to the water flow under preparation)
- Durable and solid construction
  - Can endure a load of about 5 kg (the weight of 10 wet mops and the bucket today)
  - Can endure the challenges in the targeted environments, if the employees do not use it carefully
- Easy to transport
- Simple use
- Place for used mops
- Manual-mechanical solution
- Hygienic solution:
  - Avoid deep grooves or holes in the shape
  - Materials and surfaces that are easy to clean
- Ergonomics:
  - Avoid overloads of different parts of the human body
  - Gripping surfaces are adapted to the hand anatomy
  - Looks and feels comfortable

2. Priority

Functionality:

- Preparation and waiting time is faster than today (< 9min.)
- All parts are incorporated in design, no loose parts
- Size fits the existing cleaning trolleys

Extra functions:

- ‘Tooltoy’
- Integrated device for holding the mop handle
- Integrated device for releasing the pocket mops

3. Priority

Functionality:

- Colour-coding on the bucket
- Integrated device for releasing the velcro mops
- Hard to copy

Demands to the choice of materials

- FDA - approved
- Easy to clean
- Smooth surface that does not draw dust
- Good strength properties
- High impact
- Resistant to chemicals
- Resistant to acids and bases
- Can tolerate high temperatures without changing its properties

Aesthetic wishes

Intuitive

- Transparent functions for the user
- Easy to find out how much water is needed
- Easy to find out where to pour water and soap

New design

- Streamline
- Smooth, but with edges
- Organic

Concept development

The process of conceptualising can be divided into a few stages. First stage includes considerations of functionality and results in very abstract concepts. Second stage is based on two chosen concepts and is about specifying the ideas. The stage ends by a meeting with Vikan, where one concept is confirmed. The last two stages include the development of the final concept.

In general the concept development is mostly characterised by the development of functions and not the aesthetical expression.

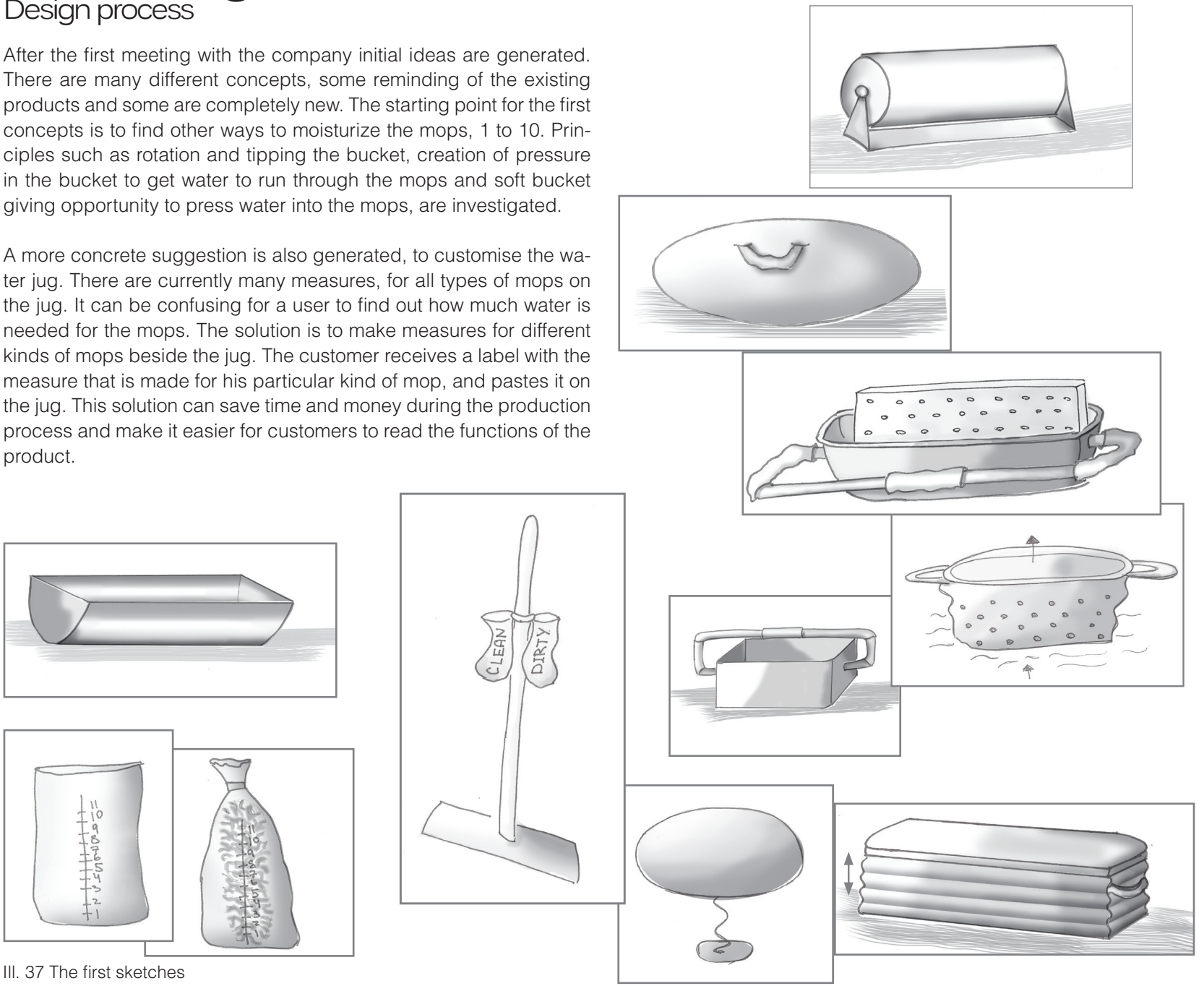
During the whole process there is contact with the company by mail, phone, Skype and physical meetings.

First stage

Design process

After the first meeting with the company initial ideas are generated. There are many different concepts, some reminding of the existing products and some are completely new. The starting point for the first concepts is to find other ways to moisturize the mops, 1 to 10. Principles such as rotation and tipping the bucket, creation of pressure in the bucket to get water to run through the mops and soft bucket giving opportunity to press water into the mops, are investigated.

A more concrete suggestion is also generated, to customise the water jug. There are currently many measures, for all types of mops on the jug. It can be confusing for a user to find out how much water is needed for the mops. The solution is to make measures for different kinds of mops beside the jug. The customer receives a label with the measure that is made for his particular kind of mop, and pastes it on the jug. This solution can save time and money during the production process and make it easier for customers to read the functions of the product.

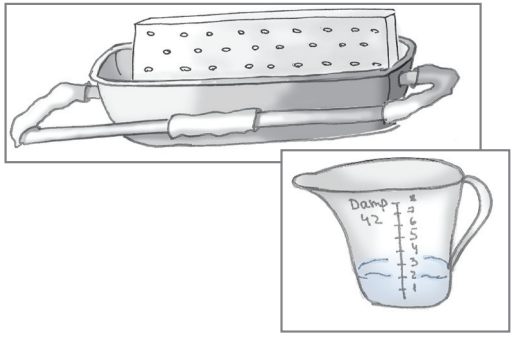


Ill. 37 The first sketches

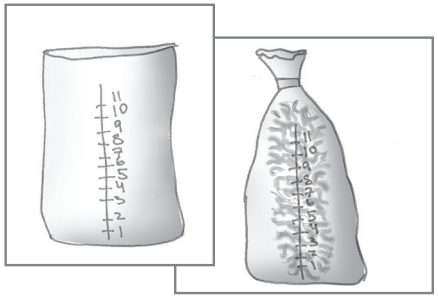
Meeting

Three concepts, 'roast bag', 'grid on the side' and 'pump' seem to be the most interesting and appropriate according to the criteria. They are chosen to be presented to the company. Vikan's favourites are the first two concepts. It is not certain that the third concept is realisable, and it is rather difficult to test it without 1 to 1 models. The decision is, therefore. to continue with the two previously mentioned concepts.

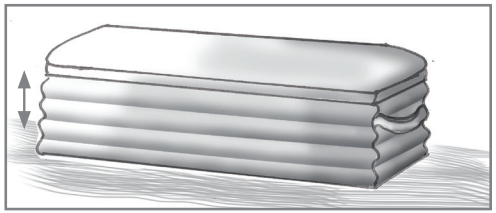
Furthermore, Vikan finds the idea about a customised jug relevant, and wants to implement it. That expands the task for the project, as it is now also relevant to come up with an idea for interface, measures on the jug for the different types of mops.



Concept 1 - 'Grid on the side'. Reminds of the existing solution, the grid is placed on the side and you need to tilt the bucket 90 ° to transport water to the mops

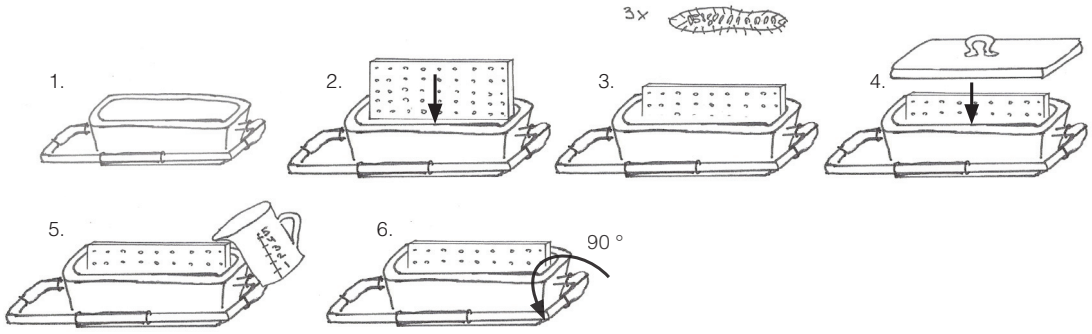


Concept 2 - 'Roast bag'. Mops are placed in the bag and the whole bag is turned a couple of times to transport water throughout the mops

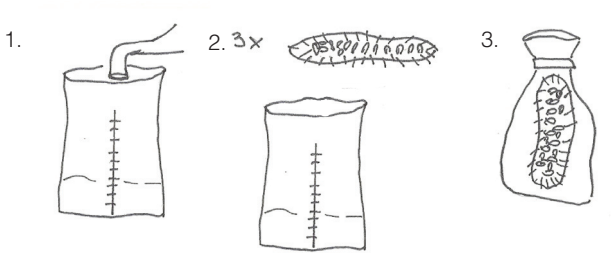


Concept 3 - 'Pump'. The lid fits the bucket tightly, when you push and pull the lid, it makes a pressure in the bucket and the water moves from mop to mop

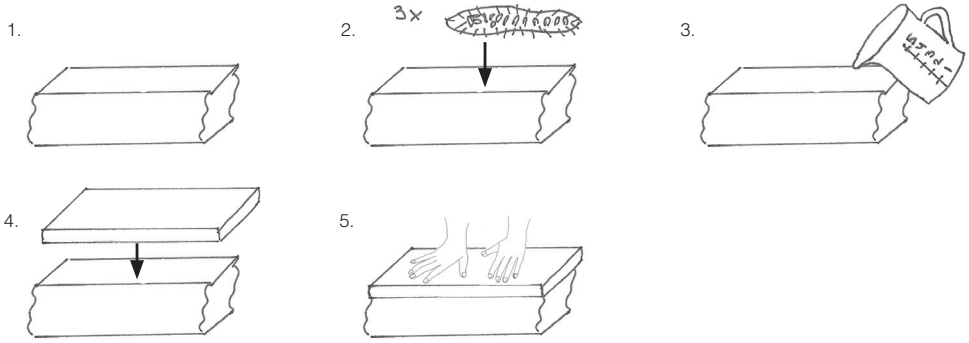
III. 38 Description of the three concepts



- Improved existing solution
- Customised jug
- Ergonomic and more hygienic handle
- Flexible lid placed on the bucket, no water runs on the floor
- The mops are placed horizontally and can be picked up with a mop handle
- Plastic material



- New, different solution
- Individual measure label (for a particular kind of mop) placed on the bag
- Even distribution of moisture
- Plastic material



- New, different solution
- Pump function
- Customised jug
- Mops are placed horizontally and can be picked up with a mop handle
- Rubber material

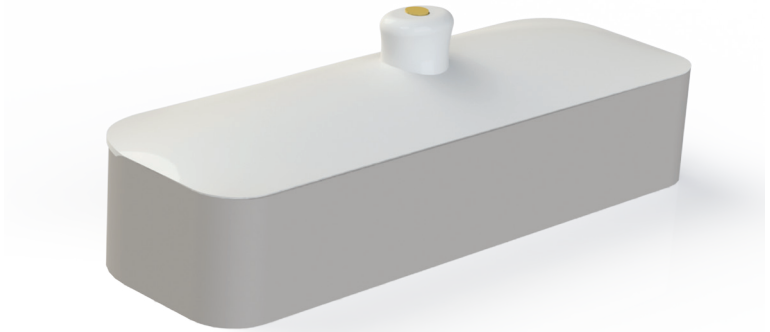
Second stage
Design process

Concept 1 - ‘Grid on the side’ to ‘Grid on top’

The idea with a grid on the side of the box leads to many complications and challenges, another alternative is to make a grid system in the top (Appendix F).

It seems to be very logical to let water run from top to the bottom. At the same time you do not need to rotate the bucket with mops, and the problem with water running out of the bucket is also solved.

The concept is developed to a bucket with a grid system integrated in the lid.



Ill. 39 ‘Grid on top’ - principle allows you to prepare one mop at a time

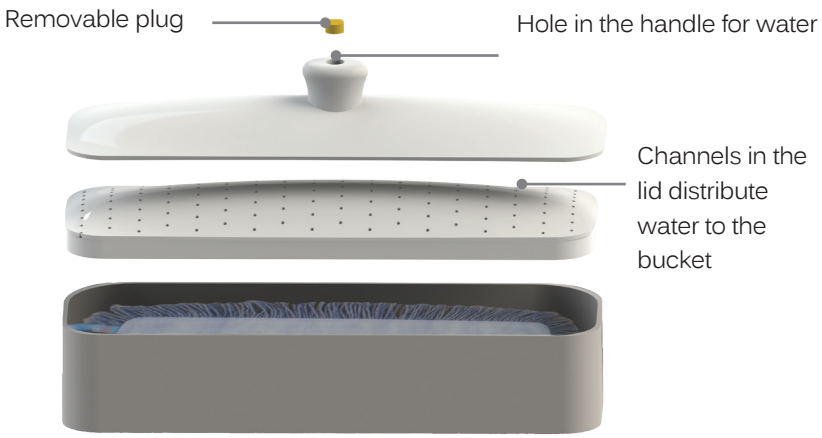
Concept 2 - ‘Roast bag’

The idea with the roast bag is developed to a concept including a rubber container with an integrated lid and a lock system.

Ill. 41 ‘Roast bag’ - all mops are prepared at the same time

Meeting

After phone and physical meetings with Vikan it has become clear that the company sees most potential in the first concept. Seeing it from another point of view, the concept seems to include many interesting details for further development. At the same time, it is doubtful if managing a rubber bag is comfortable. Based on these speculations it is decided to continue work with the ‘Grid on top‘ concept.



Ill. 40 ‘Grid on top’ - principle explanation

Steps:
1. Place mops in the bucket (with velcro or pocket upward)
2. Place the lid on top of the bucket
3. Pour water for one mop in a hole in the handle (on the lid)
4. Take the lid off
5. Your mop is ready

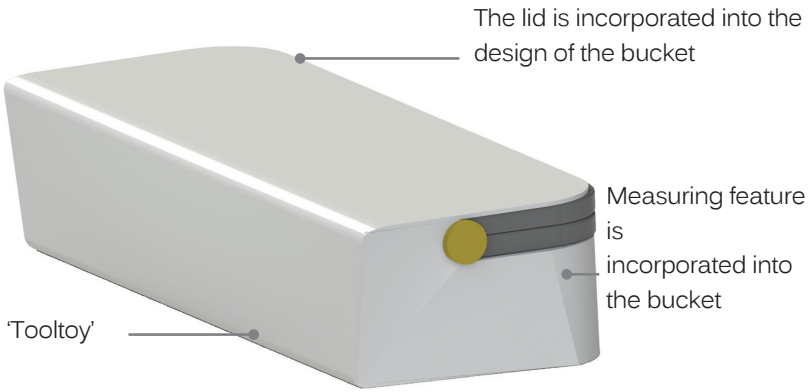
You have to repeat the steps every time you need a new mop

‘+‘

Velcro upwards
Water is evenly distributed
Easy
Vikan likes the idea

‘-‘

If the mops are placed horizontally it is only possible to prepare one mop at a time
Reminds of the existing solution



Ill. 42 ‘Roast bag’ - closed

Steps:
1. Pour the needed amount of water in the bucket
2. Place mops in the bucket (with velcro or pocket upward)
3. Close the bucket
4. Shake the bucket
5. Open it
6. Your mops are ready

‘+‘

Innovative
Interesting
Can withstand being thrown without breaking
All mops are prepared at the same time

‘-‘

An experiment shows, that it is hard to hold and shake a rubber container at the weight of 5 kg

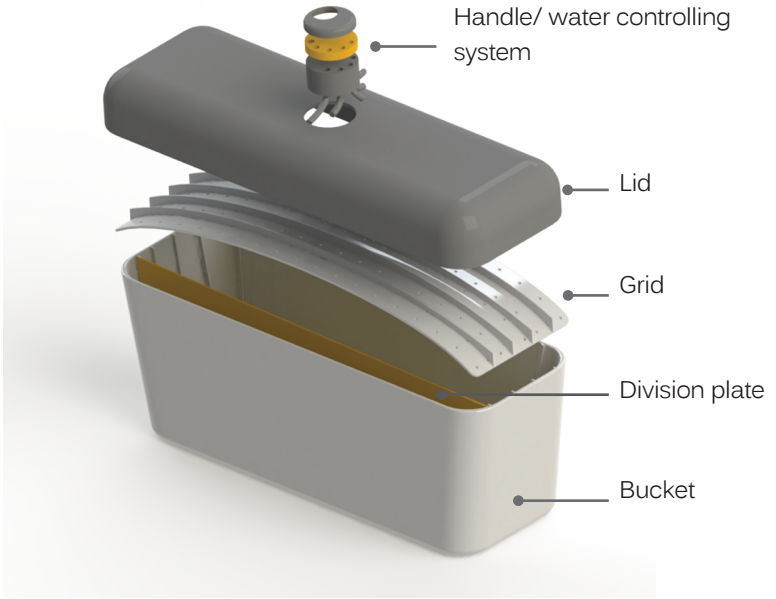
Third stage
Design process

In the chosen concept it is only possible to prepare one mop at a time.
If you need 10 mops, the preparation is a long process where you have to repeat all the steps 10 times. Therefore it is desirable to find a way to prepare all mops at the same time.

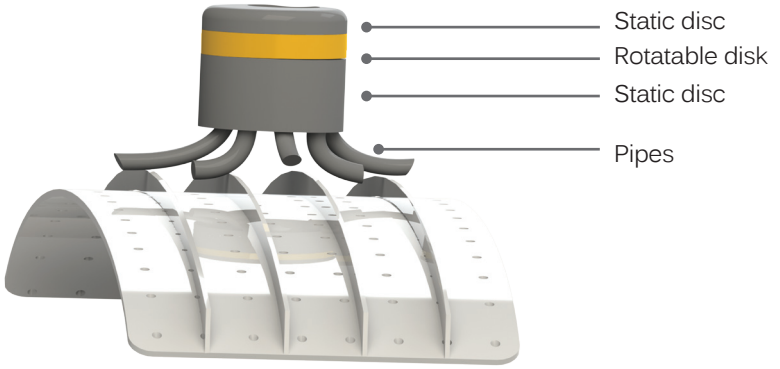
In order to make it possible to prepare all mops at the same time, and evenly distribute water when it runs from top through out the mops it is necessary to place mops vertically. [Vikan A/S] The statement is made by Vikan, to check if that works and all mops get the same amount of water, experiments are made (Appendix G). The tests show that the vertically placed mops get an even amount of water and the principle is wanted to be implemented in the concept.

For the preparation of a flexible amount of mops, a solution on how to control the water transportation among the mops is needed. After the sketching process and modelling an idea for a possible solution is found.

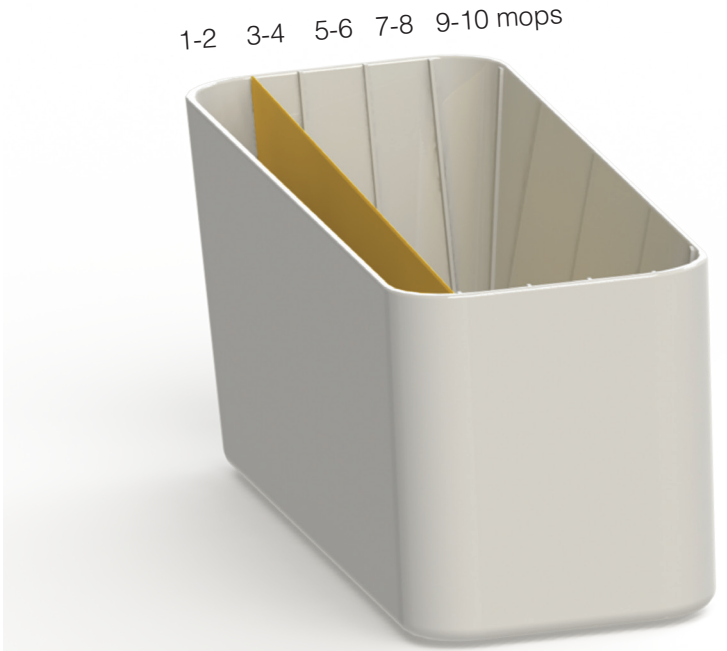
The preparation system consists of a bucket divided into 5 even areas, and a lid with an integrated grid in it. The grid is divided into 5 areas of the same size, as in the bucket. In the lid there is a mechanism that makes it possible to control in which areas the water is going to run. The water controlling system consists of three parts, a static disc on top, a rotatable disc in the middle and a static disc in the bottom. That works in the way showed in Ill.48.



Ill. 43 ‘ Grid on top´ - exploded

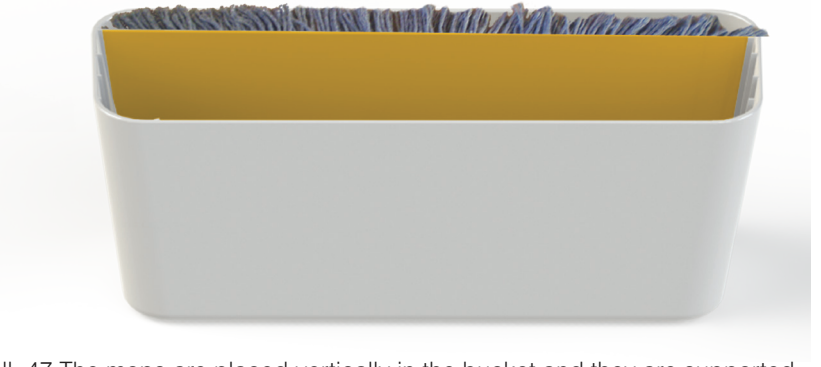


Ill. 44 The water controlling system. The grid has a curved shape, as it is an assumption that it can improve the even distribution of water



Ill. 45 The bucket is divided into 5 equal areas. One area is made for 1-2 mops

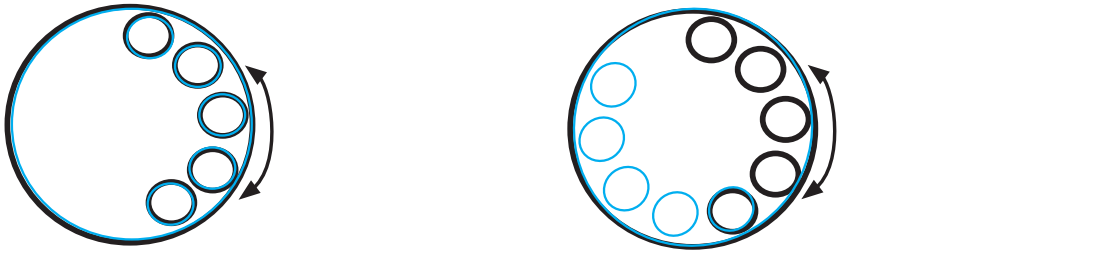
Ill. 46 The bucket from principle ‘Grid on top’



Ill. 47 The mops are placed vertically in the bucket and they are supported by a division plate

1. If all the holes/channels fit together, water will run through all the pipes. The number of prepared mops will be 9-10

2. If one hole/channel fits together, water will run through one pipe. The number of prepared mops will be 1-2



Ill. 48 Water controlling principle

Rotatable disk in the middle of the handle
Static disk in the bottom of the handle (with the pipes)

Meeting

The concept is discussed with the company, and they mention a couple of issues to consider, such as the size of the holes in the rotating mechanism is important. A doubt is expressed whether or not one opening/pipe for each area on the grid is enough to make water run evenly through the grid.

Ill. 59 Discussions with Vikan

Fourth stage
Design process

At this stage, some of the issues Vikan has drawn attention to are tested and an improvement is made.
Experiments are conducted to check if more openings are needed and if the curved shape of the grid can help an even distribution of water. (Appendix G)

The results show that a curved shape is not necessary, and there is a need for more pipes if the grid is constructed in a way described earlier. Also, the holes in the rotation mechanism have to be larger, to get water to run faster through the holes. Taking the results from the experiments and the comments from the company into account, the water controlling principle (Ill. 48) is replaced by a cup in the lid and a sliding mechanism. You can open holes, one by one, by sliding a plate.

At this stage, it is also discussed how to make an ergonomic handle, and the decision is to place soft material on the handle, like they do on for example tooth brushes.

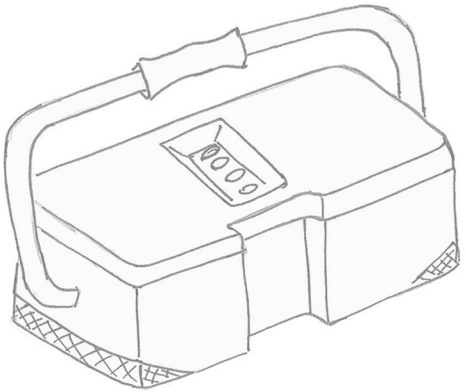
The mop handle holder is desired to be attached on the side of the bucket. Attaching it to a short side will make the construction more stable, otherwise there is a risk for the mop handle and the bucket to tip.

To adjust the bucket to the cleaning trolleys, a groove is made on the front side.

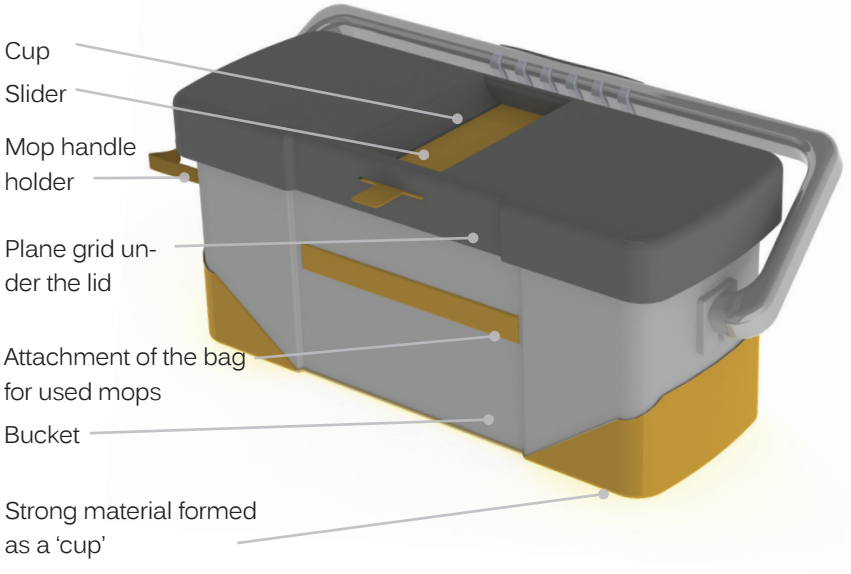
A durable material with low friction factor is placed at the bottom of the bucket, so the product can withstand being pushed and slid on the floor.

Feature for used mops

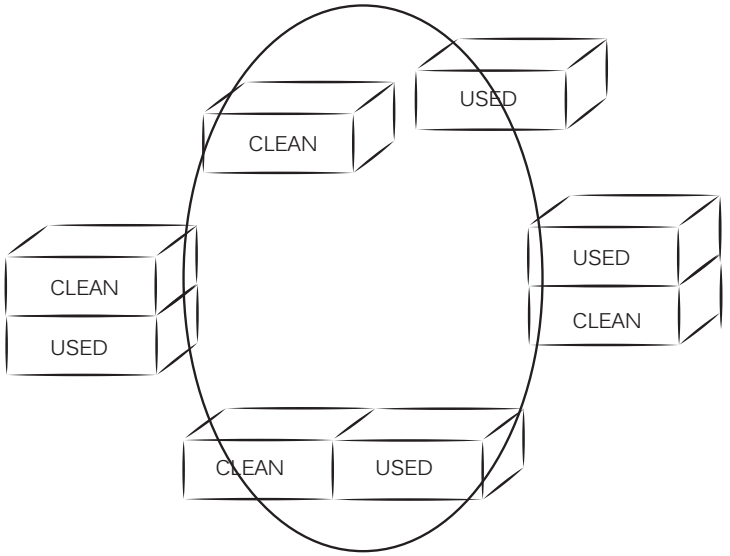
The research shows that it is important to integrate storage for used mops into the design. Different solutions are considered and the one that meets the design specifications is chosen.



Ill. 50 Sketch on the concept



Ill. 51 The final concept



Ill. 52 Different proposals for the container for used mops
a. The mop bucket for clean mops and the container for used mops are put together and divided by a wall.
b. The mop bucket for clean mops is on top of the container for used mops
c. The mop bucket for clean mops and the container for used mops each independently.
d. The container for used mops is on top of mop bucket for clean mops
The most suitable in terms of size and functionality is to have a container for used mops independent from the bucket, so it does not disturb the preparation process. It should be possible to attach it to the bucket, when it is needed.

The idea is that a pocket for used mops is a product by itself, but it has to be possible to put it together with the bucket and easily detach again.

Meeting + Status

The concept is presented to the company and fellow students together with the supervisors. Reflecting, upon the criticism from these two meetings, it is decided to detail on the different parts of the concept and focus on aesthetics.

Conclusion

The concept development has been a long process, with many considerations of functionality with other design parameters in the back of my mind. The phase ends by a determination of a general functional principle. The ‘skeleton’ for the product is in place, and the next step is to go into details with different parts of the design. Aesthetics has not been discussed so far, but in the detailing phase it has to be considered.

The general idea is, that the preparation of the mops can be controlled. The bucket is divided into 5 equal areas, and so is the lid. Water runs from the top (through the holes in the lid), through a grid, installed in the lid, and along the bucket.

Extra features such as mop handle holder, storage bag for used mops are also added.

With help from this system the user can adjust the product to his needs and prepare different amount of mops, depending on the task.

Detailing

With the general concept in place it is time to detail on the product. The focus in this phase is on the aesthetics; the technical detailing of the main elements, lid, handle, bucket and extra functions. The different materials and production methods are discussed and the most appropriate are chosen for the product.

The marketing strategy is also defined.

Aesthetics

It has been difficult to find out what the company's vision about design is. The first idea has been to make a product that could fit into the existing product family (the Microfibre concept), a design that both can be related to the existing products, but also be different so it tells the users that it is a new generation of cleaning equipment that does not necessarily have to compromise between functions and aesthetical qualities.

During the process, it becomes clear that they actually have made design criteria for the new products. Which gives a quite different perspective and free space for the design process.

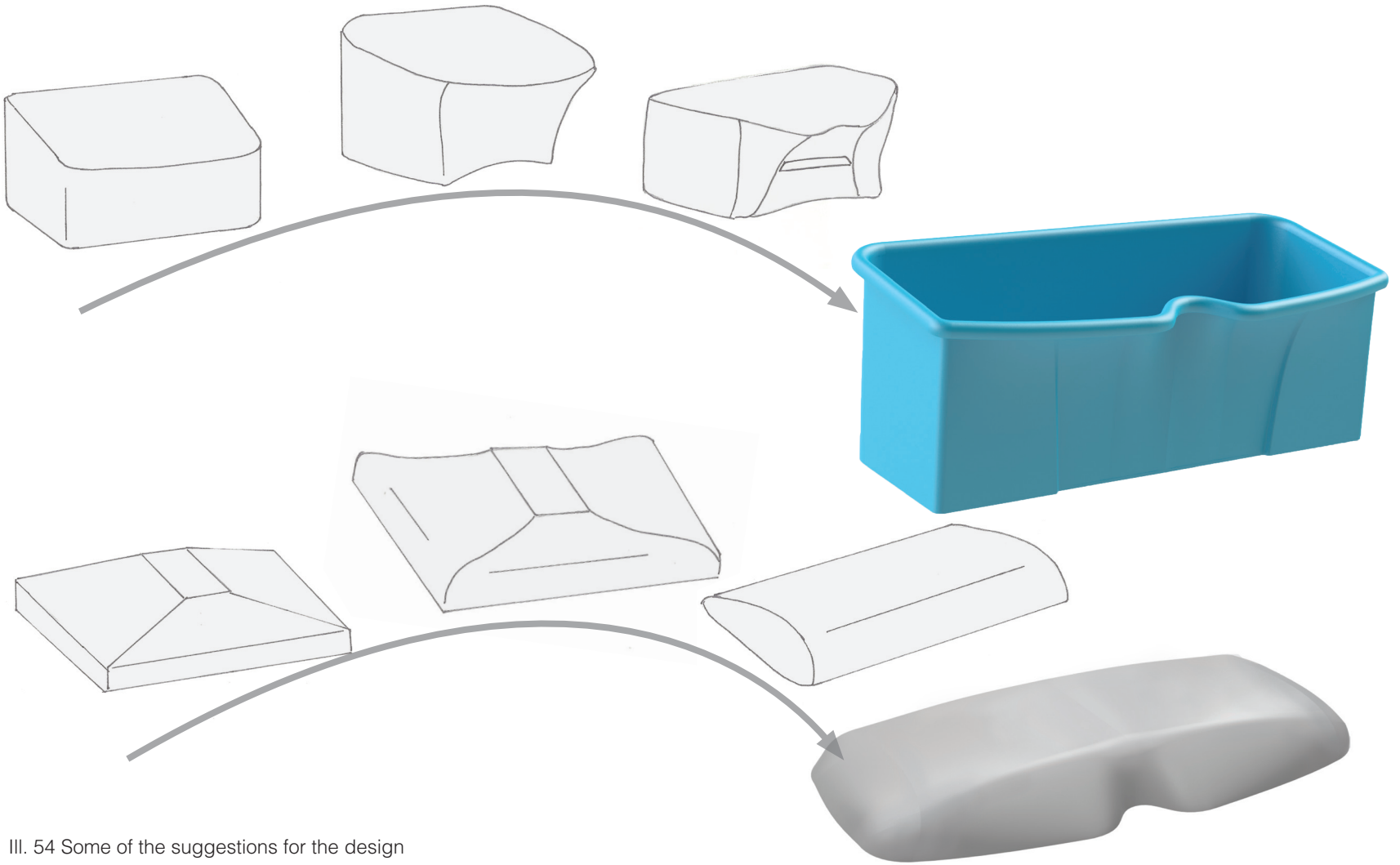
Rethinking the design of the product again and again, and considering the outputs from the analysis, it becomes plain that Vikan needs something different to distinguish themselves from the other companies on the market of professional cleaning equipment. The function of the new product is different and the same has to be valid for the expression of the product. The preparation bucket has to meet the general design criteria for new products from Vikan and it does no have to remind of the existing bucket at all.

The design process primarily includes sketching on two main parts of the product, namely the bucket and the lid. When the shapes on these two are decided, the other parts are designed, still with functionality in mind. The design suggestion now changes from the ordinary, boring look in the concept phase, to a more playful and streamline inspired look.

The chosen design is quite different from the existing products on the market. The inspiration comes from cars, where streamlined design is reflected the best, and their surfaces including curves and sharper edges at the same time. The combination of these two contrasts is fascinating and is something everyone can recognise and interpret in different ways.

Ill. 53 Inspiration, cars have a streamlined look

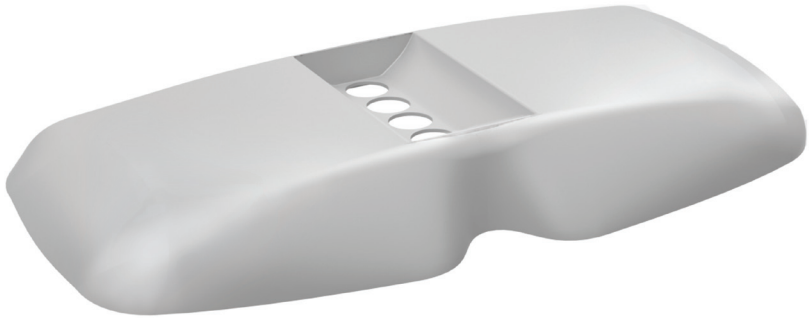
The idea is that the new product is a starting point for a new strategy for Vikan. As a next step, the other products within the Microfibre concept have to be rethought and redesigned in order to achieve a coherence within all products.



III. 54 Some of the suggestions for the design

Lid

The main function of the product, the controlling of the water, is placed in the lid. It is of major importance to think through the design of the lid. To make the concept more precise many experiments are made to find out how water flows in different situations, grids of various shapes and holes of different sizes are tested to find a most effective way to distribute the water. (Appendix G)



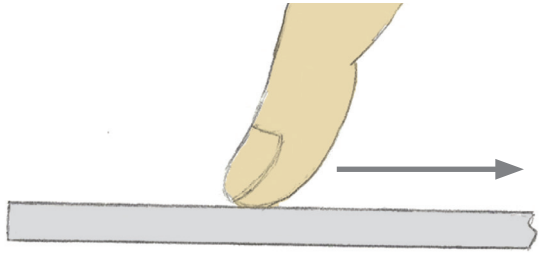
Ill. 55 The lid with 5 holes

Cup

The cup for pouring water is part of the water controlling system. There are five holes in the cup and it should be possible to open them, in order to fit the number of the holes to the number of mops for preparation.

There has to be a feature which helps open and close the holes. It can be formed as a removable plate, that is easy to slide back and forth. The first idea is that the user have to adjust the plate before preparation and then close the holes when the pouring of water is completed. It is suspected that the user will not close the holes after use. The open holes will draw dust and there is also a risk of dropping larger items into the holes. To avoid that and make it easier for the user, the plate can be added a simple mechanical function. For example a principle used in children toys,such as cars and boats, which makes them drive in one direction after you pull them in the opposite direction, can be applied. In the same way, the slider will return to the start position and close all the holes after you pull the plate and release it afterwards. The mechanism consists of a number of gears and a spring. There are a couple of concerns: whether there is a place for the mechanism in a thin slider, whether it can retain its functionality in a humid environment and whether the function is reasonable compared to production expenses.

After a discussion with Vikan, it is resolved to keep it simple and manual and the idea is dropped.



Ill. 56 The mechanical slider. Slide it in one direction

Ill. 57 The mechanical slider. When you slip it moves in the opposite direction

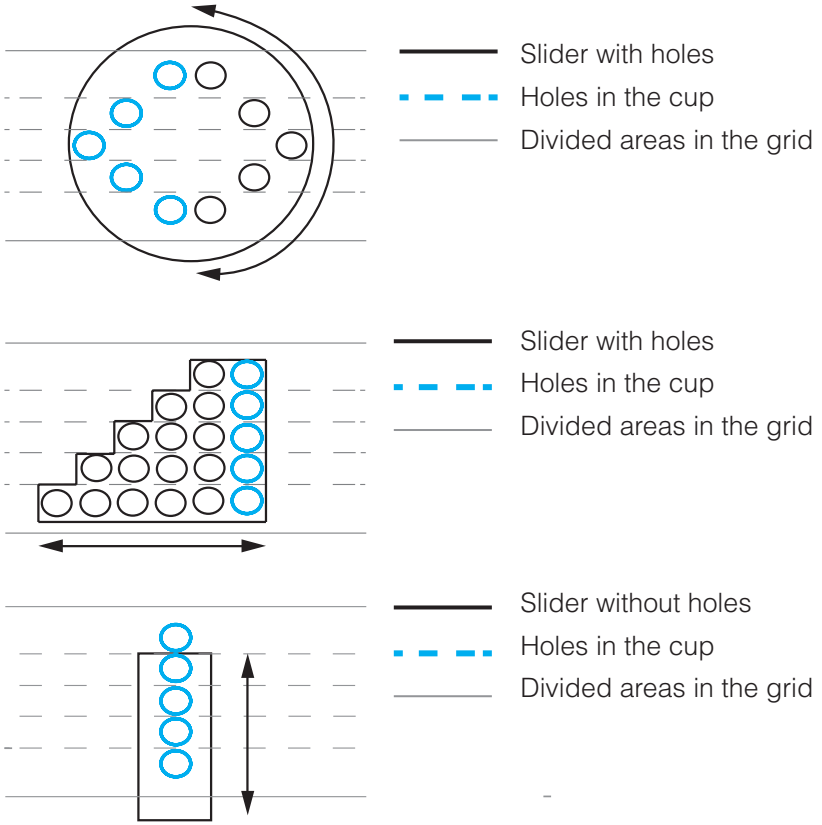
In the general concept, the slider plate goes through the lid when the holes in the cup are open. It is the wish to find a way to integrate it better in the design. Different shapes are tried out.

A round shape, at first, seems to be a solution to the problem. You turn a round disk placed on the top of the lid. When the holes fit together, you have an opening for the water (the same principle as in the concept at the third stage of the concept development). But to make the holes in the disk fit with the areas in the bucket, the disk has to have a large diameter and the lid has to be enlarged, something which is not preferable.

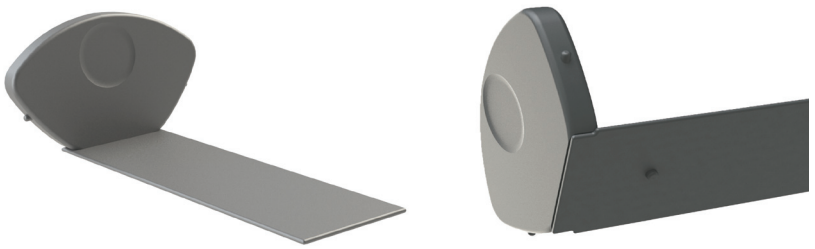
A staircase shaped slider is also a potential solution. Using this kind of slider you have to pull it along the bucket. The slider has to be placed under the cup.

A slider of a soft material is a last suggestion. You can slide it back and forth and it will be hidden under the lid. It appears to be most integrated in the design, therefore it is chosen for further development.

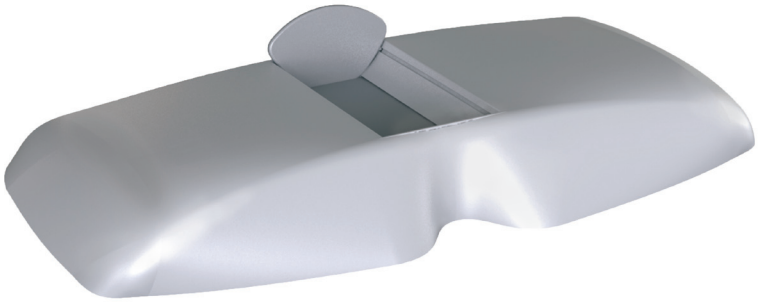
A little handle for sliding is preferable, so that the user can avoid getting wet fingers. A decision is to design a handle that can be operated by both the right and left handed, and therefore it has to be placed in the middle.
There are made channels in the cup for the slider, one for the plate and one for the handle on each side. The channels make it easier to control the movement of the slider.



Ill. 58 The different slider-principles



Ill. 59 The slider with a little handle. In the bottom of the slider there is a little stop feature that makes you know, when the slider is in the right position.



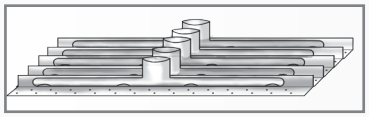
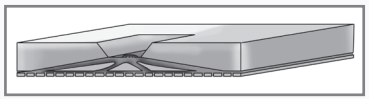
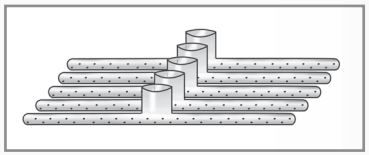
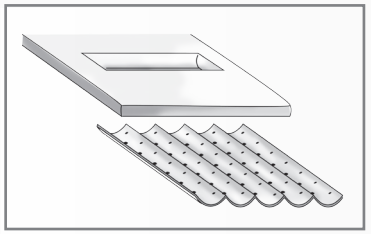
Ill. 60 The channels for the slider in the lid

Grid

The grid is another important part of the concept. It has to be designed so it works in the most efficient way, different ideas inspired by the experiments are therefore considered. (Appendix G)

The idea, mentioned in the concept phase, is to develop the existing Vikan's grid to a plane grid with 5 divided areas. The water can run from the hole in the lid and through the grid. But the experiments show that it is not enough with one hole per area to spread the water evenly along the bucket. The water has to be divided into a number of 'streams' before it reaches the grid, if there is a distance between the hole in the lid and the grid.

In the process of finding a more suitable solution, a number of ideas are evaluated. They are mapped in a diagram and discussed with Vikan in terms of production and cost.

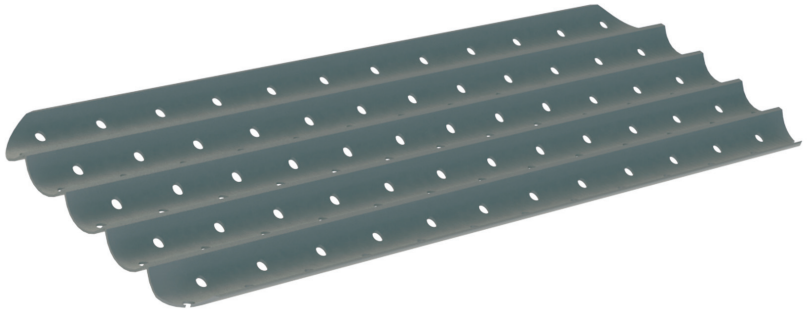
Grid	Advantages	Disadvantages	Comments
Divided grid and pipes with 4 holes 	Water is spread evenly	Complex system, includes many parts	To get water distributed evenly through the mops, all openings in the pipes have to point down
Channels in the lid that distribute water to the grid 	Even distribution of water	Expensive solution Lid has to be made of a solid material	The shape has to be optimised due to material costs and weight
Only pipes 	Simple solution Water is evenly distributed Dividers on the grid are not needed	Complicated and expensive to produce	It has to be made of plastic, rubber is not appropriate
Grid is inspired by pipes, it has curved shape 	Simple Water is evenly distributed Dividers are integrated in the grid	The water distribution feature has to be placed on the lid, in this way the grid can be assembled and work in the similar way as pipes	A ceiling for the grid is needed to achieve the same effect as by using a pipe. Otherwise water will come up and out in unwanted areas. That leads to two opportunities: 1. The cup for pouring the water has to be moved on the lid, so the grid can be placed directly under the lid, and the top of the lid becomes a 'ceiling' for the grid. 2. The cup is placed in the lid as it is thought originally. An extra plate is placed upon the grid in the lid.

III. 61 Different suggestions for the grid

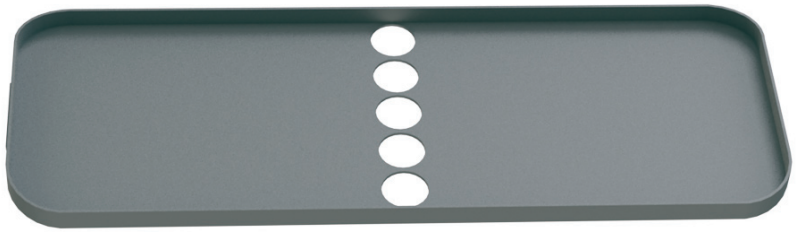
The choice is between a pipe - shaped grid and a curved grid, based on the pipe-idea as they are a simple solution that, according to the experiments, distribute water as wanted. As the curved grid seems to be easier and cheaper to produce [Vikan A/S] it is decided to develop on this idea.

The two options with a cup either under the lid or on the lid are tried out. The cup placed on the lid does not look as a part of the design but more as something that is placed on the lid and can be removed again.

When the cup is placed under the lid the design has a more integrated look. This option is chosen for further development.

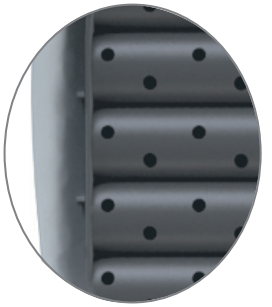


Ill. 62 The grid, bottom. The holes are 6 mm of diameter, as the tests show that water runs much faster through the 6 mm hole compared to the 4 mm hole.



Ill. 63 The grid, top

Ill. 64 The grid is clicked under the lid



Ill. 65 The ribs in the lid keep the grid in place

Bucket

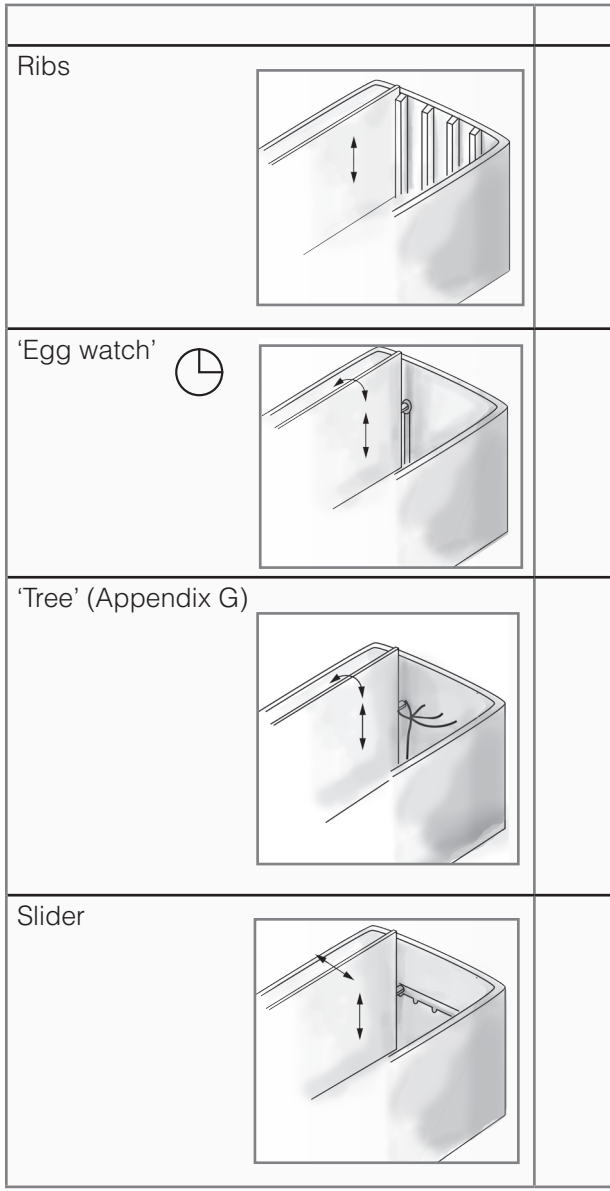
As mentioned earlier, the bucket is divided into 5 equal areas. In this chapter there is a discussion on how the division works best.

Division plate

To support the mops in a vertical position during the preparation, there has to be a division plate in the bucket. It has to be movable in order to be able to allow the preparation of a different amount of mops. It is an important part of the process to design it in a way, so that it is easy to adjust to the different user scenarios. At the same time it has to appear as an integrated part of the entire design, so it will not disappear when it is not in use.

Today, the users have to turn the mops from vertical to horizontal direction after the preparation. Even though it is not a design criteria that it should be possible to turn the mops inside the bucket automatically or without touching them, it is an interesting issue to look at and see if it is realistic to add this new function to the bucket. The first idea is to make the plate rotate in the bucket when rotating the handle of the bucket. This seems to be hard to realise considering all the design parameters.

Some other ideas are mapped, discussed with the company and evaluated with regards to the cost and value.



Ill.66 Different suggestions on the division plate

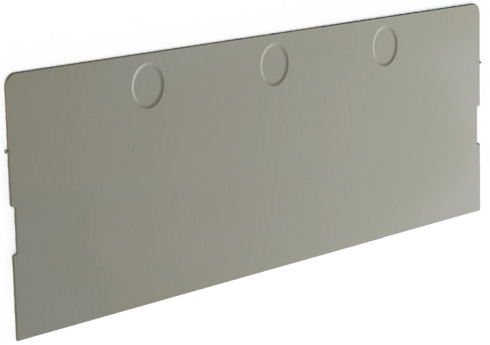
	Description	Advantages	Disadvantages
	Ribs in the short sides of the bucket are made to support the division plate. The bucket is divided by ribs in 5 even areas and a smaller extra area for storage of the plate, when it is not in use.	Easy to produce by injection moulding Simple principle If there are 1- 4 mops they automatically fall to a horizontal position when you remove the plate (according to a test) Place for storage of the plate	Plate is a loose part, can be lost You have to remove the plate and place it at the storage area - two steps If there are more than 4 mops in the bucket, they will not turn automatically.
	An egg watch mechanism is integrated in the plate. After 5 min. of preparation the watch stops and the plate rotates automatically. When you open the bucket your mops are already done.	Mops get turned automatically Easy for the user Intuitive solution	Many parts to assemble, gears and springs, which results in longer assembly time and higher cost Not appropriate with the mechanism because of humidified environment
	There are channels in the short sides of the bucket. These allow to slide the plate manually to the needed position for the preparation. Furthermore the channels help to rotate the plate and the mops afterwards. The plate ends in the bottom of the bucket. When you want to prepare mops again you have to pull the plate up and place it in the needed position again.	Possibility for turning the mops The user does not touch the mops directly Simple, manual function No loose parts, but the plate can be easily removed	There is a doubt if it can function smoothly in reality Hard to turn 10 mops Water can be stored under the plate in the bottom, which is not hygienic
	There are two horizontal channels with 4 grooves each on the short sides of the bucket. The plate can be slid back and forth, when you prepare mops it is placed in an appropriate groove. After the preparation you have to lift it and slide it to the wall.	More simple an smooth function compared to other ideas No loose parts, the plate is always in the bucket	No possibility for turning the mops

An idea with channels in the short sides of the bucket is chosen for the product. It is easy to slide the division plate back and forth, small rounded grooves helps you to find the right position for placing the dividing plate.

There has to be an extra channel making it possible to assemble the plate and the bucket in production and also for maintenance.

To make the division plate more stable, so it does not turn in the bucket during the preparation, it is decided to make ribs in the bottom of the bucket.

Ill. 67 The idea with channels in the wall of the bucket



Ill. 68 The division plate. Small rounded grooves are made in the top to indicate where to hold the plate when sliding it

Handle

The design of the handle is necessary to specify.
A handle is seen as an element that is attached to one of the main parts of the product. If it is attached to the lid it makes the construction more complicated, as the joints between the lid and the bucket has to be strong enough to endure a load of 10 wet mops and the weight of the bucket (about 5 kg at all). For this reason the handle is attached to the bucket.

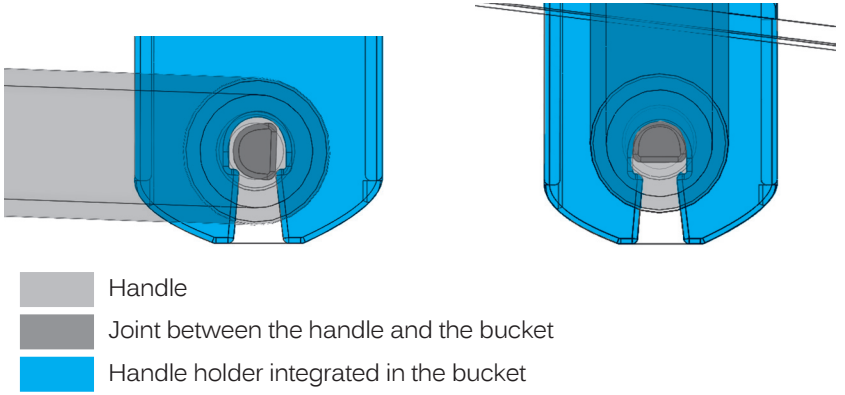
To make the design different and taking into consideration that a mop handle holder is wanted, a 'half' handle is discussed. A handle of this construction does not have good strength properties, as it is only attached to the bucket at one point.
A handle attached to the bucket in two points is therefore preferred.

To make the handle ergonomic it is reasonable to use a soft material on the gripping surfaces.

The handles at the existing mop boxes easily fall away, which is uncomfortable for the users. This issue can be solved by shaping the joint between the handle and the bucket in a special way.

Ill. 68 The handle

Ill. 69 The handle, detail of the join



Ill. 70 When the handle is in the horizontal position you can press it down and take it out. When it is in a vertical position it remains on its place and can't fall away because of the shape of the joint

FEM-analysis

To check how design will react 'in reality', it is made a FEM- analysis of the handle.

Material:

PP 401-CB50 [Ineospolyolefins.com]
Young's Modulus 1.3 x 10^9 N/m^2
Yield strength 2.4 x 10^7 N/m^2

Conditions

Thickness 4 mm
The handle is fixed in the ends, at the joints
A load of 50 N (5 kg) is added to the top area, at the gripping surface.

Factor of safety

When factor of safety is sat to 1, a minimum factor of safety, the whole model is blue. That means that it is not going to collapse.
When the factor is sat to 2, there are a couple of areas that are critical, at joint in both ends of the handle. And therefore a fillet between the handle and the joint is needed.

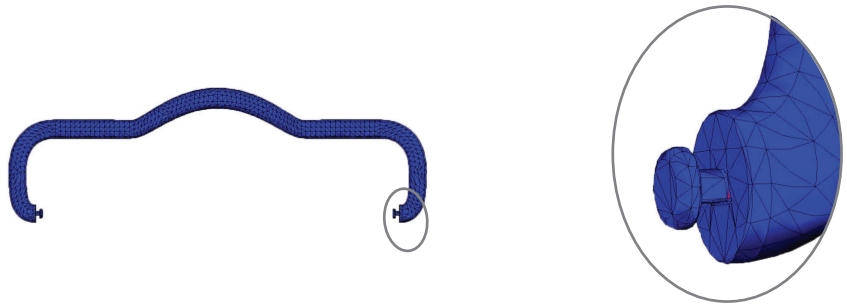
Von Mieses

The stress looks reasonable, about 5 N/m^2, though the stress is larger in the areas at joints.

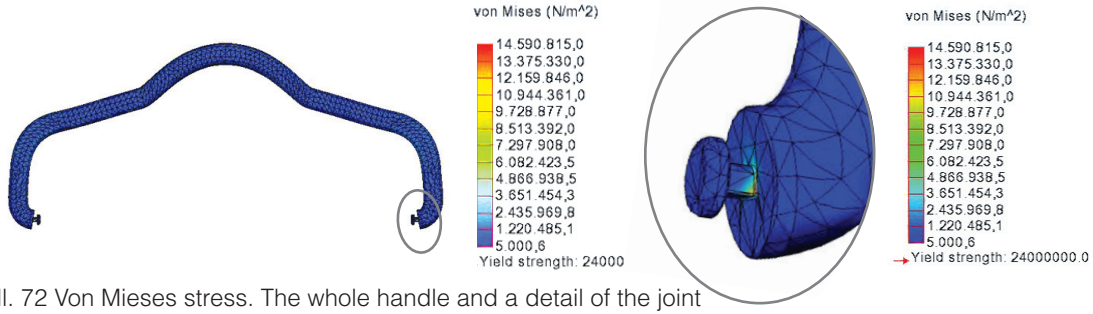
Displacement

Displacement is also acceptable, max. 1.4 mm.

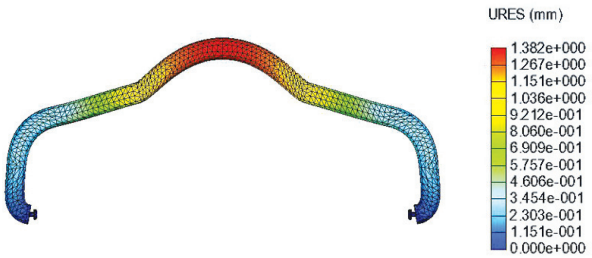
To achieve good results in the two mentioned areas, it is decided to enlarge the radius of the joint.
A smaller thickness is wanted to be checked.



Ill. 71 Factor of safety. The whole handle and a detail of the joint



Ill. 72 Von Mieses stress. The whole handle and a detail of the joint



Ill. 73 Displacement. The whole handle

A radius of the fillets is changed to 1 mm. And the thickness of the handle is changed to 3 mm (as the rest of the product) to check if it can withstand the same load.

Material:

PP 401-CB50 [Ineospolyolefins.com]
Young's Modulus 1.3 x 10^9 N/m^2
Yield strengths 2.4 x 10^7 N/m^2

Conditions:

Thickness 3 mm
A load of 50 N (5 kg) is added in the top area, at the gripping surface.

Factor of safety

Now the factor is sat to 2, and the whole handle is blue, which is positive.

Von Mieses

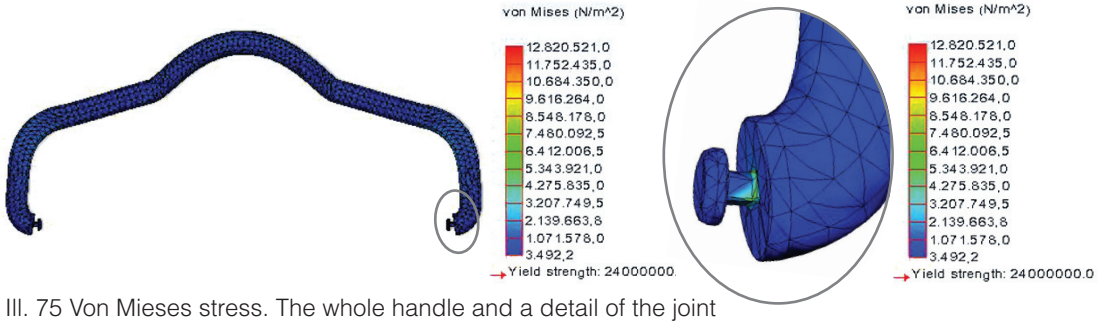
The stress looks reasonable and much better in the areas at the joints.

Displacement

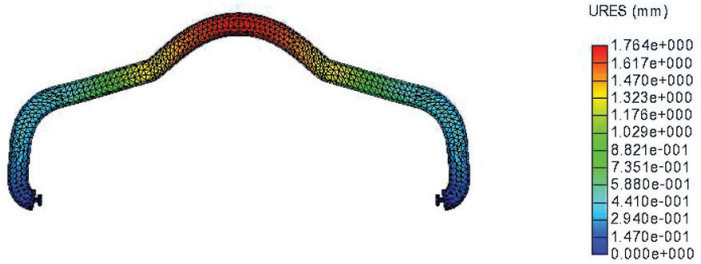
Displacement has become a little larger, as the thickness of the handle is smaller. The displacement is 1.7 cm, which is still acceptable.

The results seem to be acceptable, and the dimensions: thickness of 3 mm and fillet of 1 mm are used for the product.

Ill. 74 Factor of safety. The whole handle



Ill. 75 Von Mieses stress. The whole handle and a detail of the joint



Ill. 76 Displacement. The whole handle

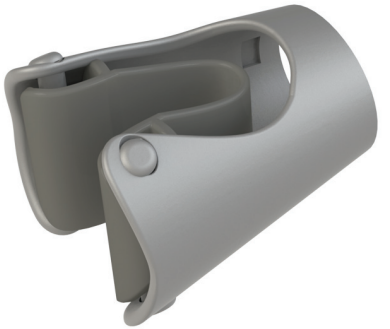
Mop handle holder

To design the mop handle holder it is looked at the existing solution. It fits different sizes of mop holders and is a stable solution that grips the handle and prevents it from falling on the floor.

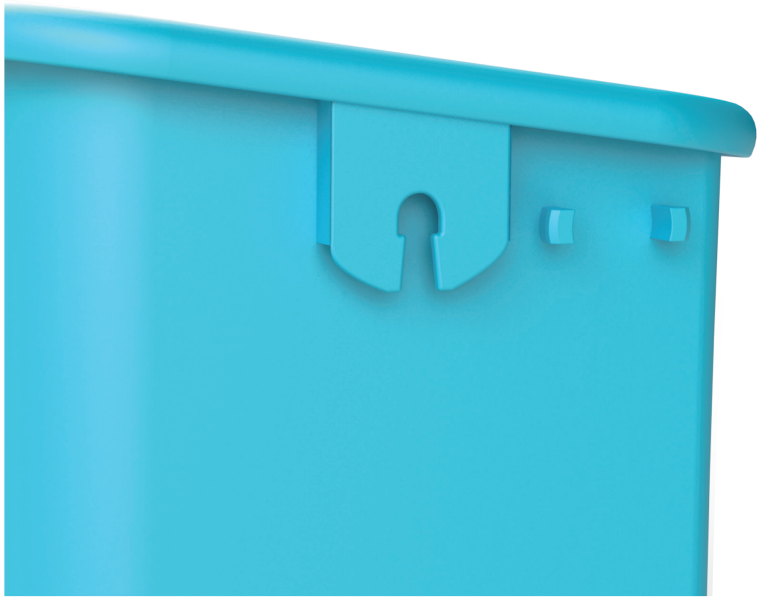
The design of the new mop handle holder is also S-curved, though it is shaped differently compared to the existing one.

In order to add the product more ergonomic value, it is decided to make a feature that allows to move the bucket on the floor only by help of the mop handle, when it is attached to the bucket. The durable material in the bottom, described in the concept development, is therefore still relevant.

Ill. 77 The existing mop handle holder



Ill. 78 The new mop handle holder has a more organic look



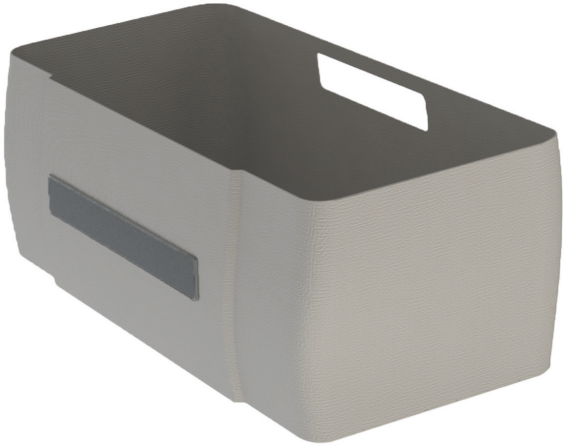
Ill. 79 The mop handle holder is attached to the bucket by a snap fit.

Storage of used mops

According to the final concept, the bag for the used mops has to be attached to the bucket.
That can be achieved by using a textile bag with an integrated velcro system (the same principle as at the mops today). It consists of a hook attached to the bucket and a velcro attached to the textile bag.

If you need the room for used mops, you can easily fasten it to the bucket.
When the cleaning is done, the mops can be brought to the washing machine and the bag can be washed together with the mops. This makes it to a hygienic solution.

For the user to be able to avoid touching the used mops when placing them in the bag, a mop releaser is integrated in the shape of the bucket.



Ill. 80 The bag for the used mops

Ill. 81 The bag is attached to the bucket by a velcro system. The edge of the bucket is curved because of the mop releasing function

Technical considerations

During the process, different materials and production methods are discussed. The requirements, mentioned, in the ‘Strategy’ chapter are crucial for these technical considerations.

Materials

Today, Vikan uses PP plastic for their mop boxes. A research shows that there are a couple of other materials that have quite similar properties as PP, for instance PE-HD material. An overall comparison shows, that some of PE-HD materials have a better yield strength and elasticity, but the density is higher than that of the PP materials. The price difference is not large, but PP material is still cheaper than PE-HD [Isoplast.dk] The final decision therefore is to use PP material for the bucket, handle, lid and division plate.

	Density (kg/m^3)	Yield strength (MPa)	Youngs modulus (MPa)	FDA	Temperature (° C)	Acid	Base	Prise (DKK/kg)
PP copolymer	940-965	20-30	800-1300	+	- 40 - +95	+	+	52
PE-HD	895-905	30-40	600-1400	+	- 30 - + 95	+	+	55

Ill. 82 PP and PE-HD properties

For the gripping surfaces it is wanted to use a soft plastic material that both gives the design a comfortable look and actually is comfortable in use. An appropriate material is TPE.

In the bottom of the bucket, on the outer surface, there is a need for a material that can slide easily on the floor. A suitable choice can be PA 6 - plastic, also called nylon. The material is FDA approved, it is durable and is good to slide. Though the prise is more expensive than for PP plastic, 89 DKK/kg. [Isoplast.dk]

Production

Today, Vikan does not benefit from the sale of the preparation boxes as much as from other products. The expected number for a first production is therefore under 50,000 pieces. [Vikan A/S] Implementation of the new concept together with a new marketing strategy will hopefully increase the production number of the buckets. Therefore, it is relevant to discuss production methods with production numbers under 50,000 and over 50,000.

The most appropriate method for the bucket and the lid production is injection moulding. The method results in good finishes, with roughness of 0,2-1,6 µmm [CES,2005], and you do not have to treat the surfaces afterwards. It also allows for complex forms. Though you have to consider shape, thicknesses and draft angles, to make it possible to remove the part from the tool.

For the handle it is decided to use blow moulding, in order to achieve a hollowed construction. There are three types of blow moulding: injection blow moulding, extrusion blow moulding and stretch blow moulding. Extrusion moulding is the most used production method of these three. It is often applied for plastic toys and irregular shapes, and it is cheaper than the other methods.[CES,2005] Extrusion moulding is a suitable production method for the handle. Blow moulding requires a hole in the part for gas pressure. The hole can be placed at the surface for gripping, so it can be covered by the soft material afterwords.

The question is now how to put the soft gripping surfaces onto the handle. There are two ways of doing that, by 2 component blow moulding or manual assembling after the handle is moulded.

To assemble the different parts of the products in a manual way is rather expensive, about 5 DKK for 1 min. [Vikan A/S] Therefore it is often preferable to make the most of the design as one part if it is possible, especially if the production number is over 50,000 pieces. If the shape is complex, like two materials on the handle, the tooling cost can be high and it is cheaper to assemble the parts in the manual way, in case of a production number under 50,000 pieces.

So in the beginning, the handle will be moulded by extrusion blow moulding, afterwords the soft pieces will be clicked on the handle.

As the production number will increase, the manual process can be replaced by an automatic one. At the moment, Vikan does not have any machinery for moulding at their place, so it is not a problem to change a production method, that will not involve more expenses from buying new machines.

The same principle can work for the bucket and the nylon material on the bottom part.

Reconsidering the design

After the production methods are determined, some parts of the design have to be rethought and optimised.

Channels in the bucket

As the bucket is produced by injection moulding the channels in the bucket have to be rethought, so as to make the production cheaper.

If the channels are moulded in the bucket, you have to have an extra drag in the side which increases the cost. It is much cheaper to cut channels in the PP- plastic plates and place them in the bucket afterwards.

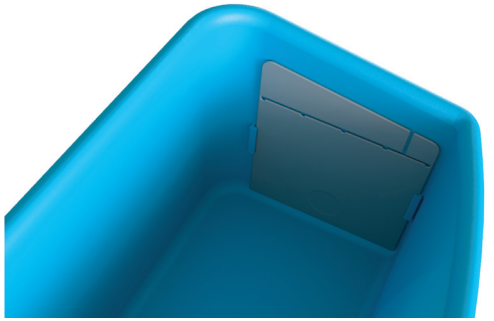
The plates can be slid into the bucket in the grooves made for this particular purpose.

The bottom of the bucket

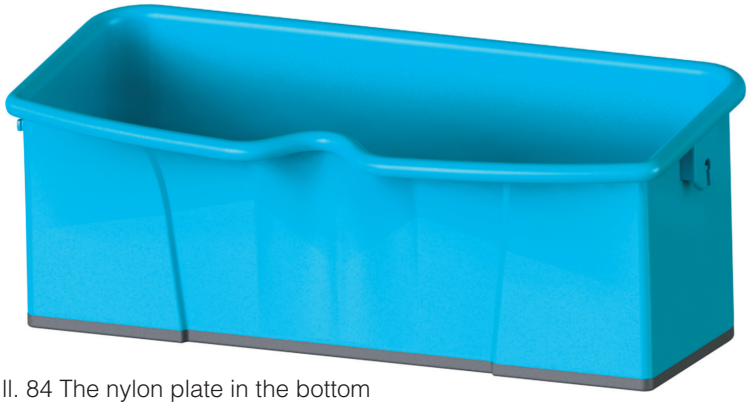
The nylon in the bottom of the bucket has been thought as 'cup'-shaped. This means that it has to be moulded either alone or together with the rest of the bucket. To decrease the production costs, a nylon standard plate can be used. The plate is cut to fit the bottom shape of the bucket and is glued to the bottom of the bucket.

Strengthen ribs

To strengthen the curved shape in the top of the bucket, ribs are used. They are placed in continuation with the handle holder on the two short sides of the bucket.



Ill. 83 The extra plate. Like in the division plate, small rounded grooves are made to help the sliding process, when the plate has to be removed



Ill. 84 The nylon plate in the bottom

Ill. 85 The strengthen rib

Colours and surfaces

Surface

A surface treatment is also an important issue to consider in the design process.

It is a wish to achieve a smooth surface, that is easy to clean and does not draw dust, therefore a surface MT -1006 is chosen.

The surface is acid treated which, compared to spare erosion, gives the product a smooth surface. [Vikan A/S]

Colours

There is a colour coding system at Vikan's products, and the same system is wanted to be used for the preparation system. So the colour on the bucket varies.

Other parts of the product are kept in grey nuances. The main elements: the handle, the lid and the bag for the used mops, have light grey colour. The parts that are added: the grid, mop handle holder, velcro, plates in the bucket, the nylon plate and the division plate are darker.
The reason for the choice of the grey colour is that it is necessary to combine a colourful bucket with neutral colours on the other parts, in order to give the product a professional look.

Ill. 86 The bucket is produced in different colours: red, orange, green, light blue, dark blue and violet. All the other elements always have dark grey or light grey colour. The colours are inspired by Vikan's colour codes sample from 2011

Graphical indications

To ease the interaction between the user and the product, signs on the product are needed. Symbols showing where to pour water, how to place the mops in the bucket and how to use the water controlling system are wanted to make the system work properly.

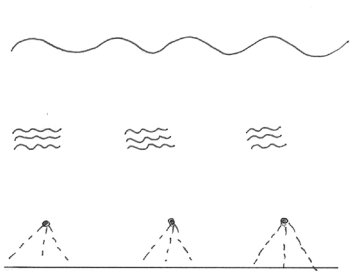
The most suitable place to pour water in the cup is the curved wall. A couple of quick suggestions on how to show this feature are made. The first suggestion seems most understandable, as a long wave can be associated with water. Though it does not fit into the entire design of the product. The product has an organic shape and therefore it is more appropriate with more straight lines to balance the curvy appearance. A dashed line is chosen instead of the curved line.

In order for the concept to be able to work, it is important that the mops are placed in the correct areas in the bucket, and the right number of holes in the lid are opened. Different graphics are tried out, and the one that looks most simple and understandable is chosen. A simple line symbolises a mop and the number in the 'mop' is the amount of the prepared mops.

The symbols are spread along the lid and look incoherently, therefore a frame is added. It goes from one edge of the cup to another and shows that the symbols (the 'mops' and the numbers) refer to the function of the cup.

In the bucket, the divided areas are marked by a number of the prepared mops.
There is the wish to place an individual label for one kind of mop on

III. 90 The symbols in the bucket



III. 87 First sketches on the symbols

III. 88 Trying the different graphics on the lid

III. 89 The chosen graphic

the jug. As the user will put it on the jug, it has to be very simple. The graphic is based on the graphic on the lid. It is characterised by simple lines and numbers, that are easy to read.

III. 91 The label for the jug. The lines on the top and in the bottom indicate how to put it on the jug, they have to be aligned with the edges of the jug.

III. 92 The label on the jug. The graphic is very simple, numbers and measure lines are made large to ease the process of measurement.

Marketing

The intention of the company is to achieve a recognisability among the customers and be different from the competitors. That demands clear lines for the design of all products and you have to start somewhere. The new product is a start for optimising the Microfibre concept. That means that the next step is to redesign the mop handle, the preparation jug and the cleaning trolleys.

In the same way the company sells 'Start sets' today, it has to be possible for the customers to buy the new products as a set. That will probably improve the turnover.

The marketing strategy touches two types of customers, namely the existing customers and new customers. In both situations chains of restaurants and cafés are involved. It is not profitable to target small, single places.

Existing customers:

The first idea has been to suggest Vikan to offer selling the new microfibre sets for smaller price if the customers return the old buckets. Replacing the old, grey, anonymous buckets without a logo, with a product of a more characteristic design with a visible logo, will make Vikan's name more known.

The old plastic buckets can be made to granules and used again for the injection moulding of the new product. Even though Vikan can get a good output of this, a better branding and strengthen their green politics (which is mentioned on their website), it also demands a good logistic planning of how to gather the old buckets as well as large investments.

A more realistic way to do it is to send the new product as a demo model to the existing customers for free. In order to show that Vikan feels 'responsibility' and 'commitment' (mentioned as Vikan's value mission), Vikan can send a poster with a list of the recycling centres where the customers can return the old plastic buckets.

New customers

To attract new customers Vikan has to be more active, by sending flyers and salespersons to the potential customers. They already do that, but they have to focus more on the Danish market. Chains such as Burger King, Baresso Caffe, Starbucks Coffee and Nadias sandwich bar are seen as potential customers.

To make the Vikan brand more well-known, it can also be helpful to advertise it in the media.

Logo

Today, Vikan does not print the logo on all their products, as well as they use different logos on different products. For branding it is necessary with the same logo on all products.

The logo can be printed on the product by tampon printing.
This method allows to print the logo in colours after the production. To prevent the logo from fading it is preferable to treat the surface by corona typing. [Vikan A/S]

The name of the product is CombiClean, which refers to the many functions that are combined in one product. It is easy to remember, which can be a part of the branding philosophy. The name is also printed on the surface of the product.

Different fonts are tried out to find the most appropriate font for the product, and CombiClean is chosen. It has both curved lines as the product and more straight lines as the Vikan's logo.

CombiClean
CombiClean
CombiClean
CombiClean
CombiClean
CombiClean

Ill. 93 Different fonts that are considered

Ill. 94 CombiClean product with Vikan's logo

Ill. 95 Zoom in, the logo and the name

Presentation

The result of the design process is a product with improved functions, compared to the existing solution, and completely new functions added.

It allows for the preparation of a different amount of mops, 1 -10, at a time. The water controlling system ensures that all the mops get the right amount of water, for an effective, fast and hygienic cleaning.

In the preparation process you do not have to turn the bucket around, as the water flows from top to bottom, and no water is spilt on the floor or the users' clothes.

The handle is designed in a certain way, so it is only possible to take it out when it is in a horizontal position and you have to press, so it will not, suddenly, fall away and thereby annoy the users.

The soft material on the handle is comfortable for your hands.

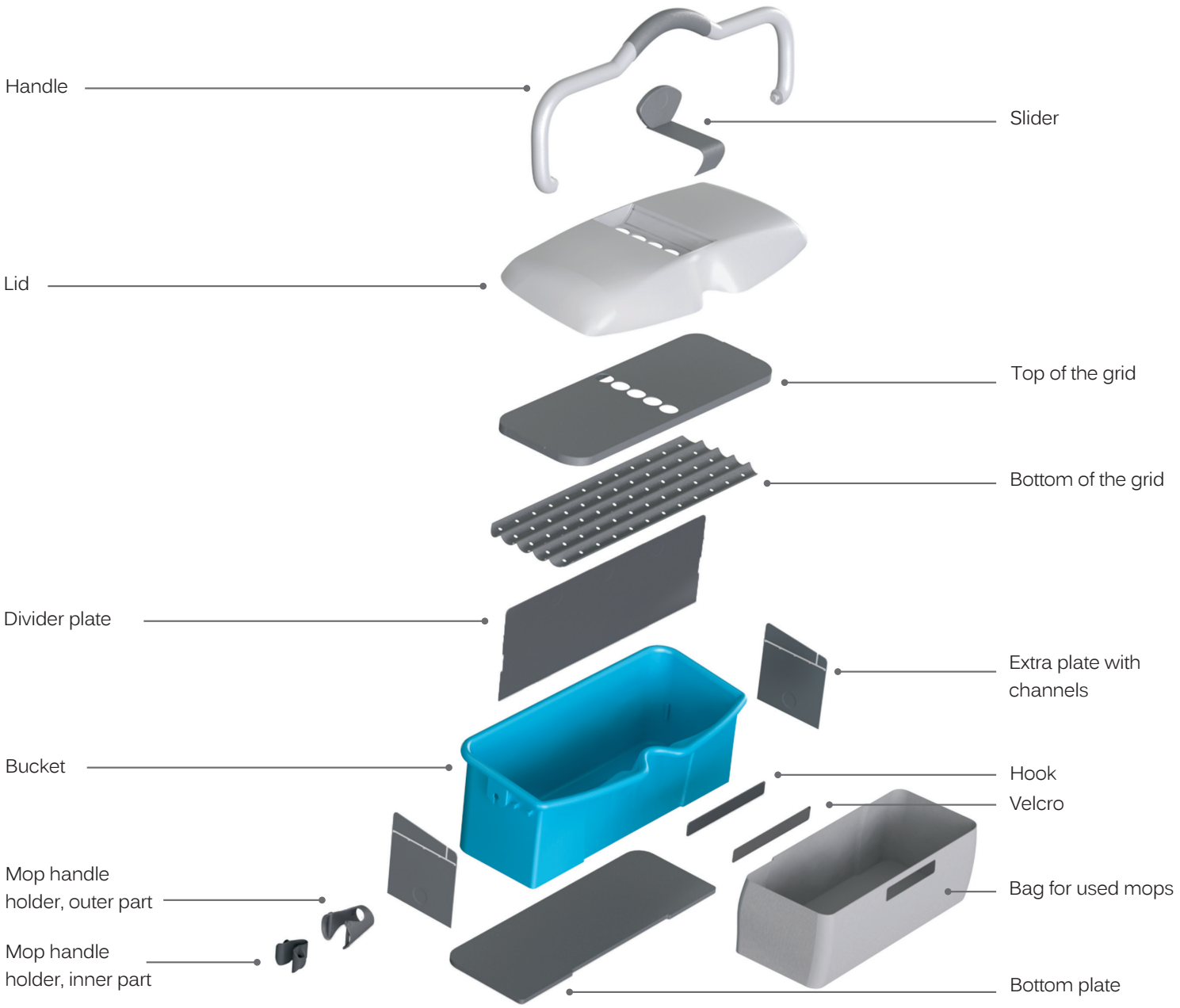
The grid is designed in a such way so water runs quickly through it and into the bucket.

The new features ease the process of cleaning, thereby making it a better experience.

The aesthetics is inspired by streamline and differ the product from the other buckets on the market.

The shape and symbols make the product's functions transparent for the user.

Ill. 96 CombiClean. Presentation



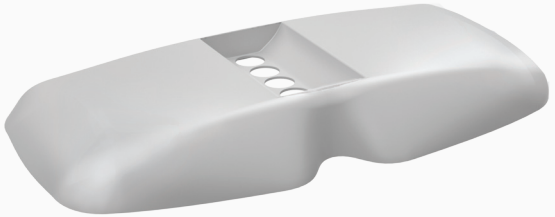
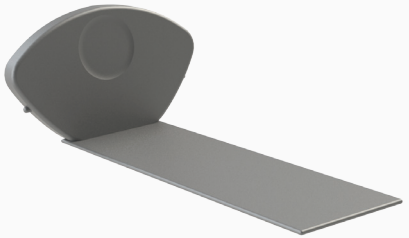
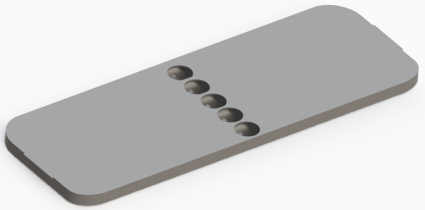
Ill. 97 The architecture of the product

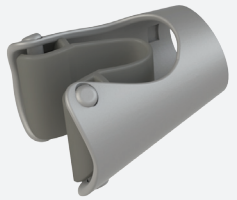
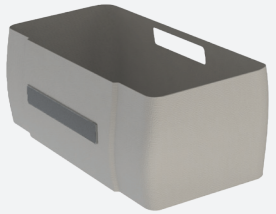
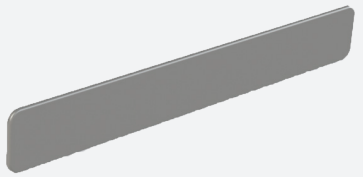
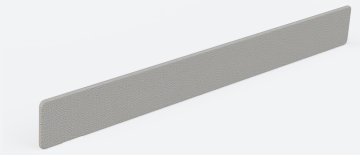
Cost estimation

With help from the company the approximate production price is found. The factors of importance for the calculation are, of course, materials, production methods, thicknesses of the parts and number of the pieces in the production.
The calculation is made for production number of 2,500 pieces.

The time for the manual assembling of the different parts is considered and the approximate price is estimated, on the basis of the information, that 1 min. manual assembling costs 5 DKK .[Vikan A/S]

Part	Material	Production method	Production price (DKK)
Bucket 	PP-plastic	Injection moulding	(See the attached appendix, Confidential. Cost estimation)
Extra plate with channels (x2) 	PP-plastic	Standard plastic plate with cut channels.	(See the attached appendix, Confidential. Cost estimation)
Divider plate 	PP- plastic	Injection moulding	(See the attached appendix, Confidential. Cost estimation)

Part	Material	Production method	Production price (DKK)
Bottom plate 	PA6 (nylon)	Standard nylon plate that is cut to fit the bottom of the bucket. The plate is glued to the bucket	(See the attached appendix, Confidential. Cost estimation)
Lid 	PP-plastic	Injection moulding	(See the attached appendix, Confidential. Cost estimation)
Slider 	PP-Plastic (Sliding handle) Rubber (Plate)	< 50,000 pieces Injection moulding Manual assembling (the handle is glued to the rubber plate) > 50,000 2 component injection moulding	(See the attached appendix, Confidential. Cost estimation)
Grid 	PP-plastic	Injection moulding 2 parts are moulded and afterwards they are assembled by press fit	(See the attached appendix, Confidential. Cost estimation)

Part	Material	Production method	
Handle 	PP-plastic (Handle) Soft plastic (Gripping face)	< 50,000 pieces Extrusion blow moulding Manual assembling of the soft parts and the plastic handle > 50,000 2 component extrusion blow moulding	(See the attached appendix, Confidential. Cost estimation)
Mop handle holder 	Rubber	Injection moulding 2 parts are moulded and assembled	(See the attached appendix, Confidential. Cost estimation)
Storage of dirty mops 	Textile	Sewing	(See the attached appendix, Confidential. Cost estimation)
Hook 	Plastic	Injection moulding The hook is glued to the bucket	(See the attached appendix, Confidential. Cost estimation)
Velcro 	Velcro	The velcro part is sewed to the textile bag	(See the attached appendix, Confidential. Cost estimation)

In the end all the parts have to be assembled to one product, the assembling time is set to 1 min., that results in the cost 7.5 DKK.

All in all the, production price of the whole product is estimated to about 161.61 DKK.

Ill. 98 Overview over the elements and the production methods

Value for money

CombiClean is a completely new product, and in order to market it you need strong selling points to convince the company and retail business owners to invest money in the new cleaning equipment.

During the whole process the focus has been on the end users' needs to design a user friendly product. Considering the interests of Vikan and the retail businesses you have to think about the profits. For example, it is not necessarily enough to say that the product is ergonomic, to sell it to the retail businesses. If this function increases the cleaning time, the idea will not sell. Therefore, it is important to tell both parts where and how they can earn money on the new product.

Vikan

ADVANCING HYGIENIC CLEANING

Vikan	Retail businesses
• New different design, that is recognisable • Logo on all the products = More transparent brand • Improved functions compared to the existing solution • Adding completely new relevant functions (according to the user research) = Better selling points = Satisfied customers • The product is targeted a new group of users, which widens Vikan's market More customers = larger profit	• Not only a preparation bucket, but a whole cleaning station with a cleaning bucket, storage of the used mops and a mop handle holder, in ONE product. • Fast and easy preparation = Time saved on cleaning and satisfied employees • Correct preparation of the mops = Hygienic result = 'Happy smileys' = More customers • Adjustable preparation = You can prepare 1- 10 mops at a time using one product (you do not have to invest in more products) • Appealing aesthetics = It is not necessary to hide the cleaning equipment from the customers

III. 99 The value for money

Evalua-tion

The product is now evaluated, and a discussion of the functions, aesthetics and the whole process is made.

Evaluation

In the beginning of the design process the demands and wishes for the product are made. To conclude if the product meets those an evaluation is made. The evaluation of the product is a result of the rethinking of all the functions as well as details. The initial idea has been to get feedback from the potential users. But no prototype is made yet, so the users have to reflect on the renderings. It has been difficult for them to come up with any specific comments. The evaluation is therefore subjective and is made from my own point of view and conversations with the contact person at Vikan, my supervisor and the fellow students.

All the thoughts are plotted in a diagram, where the product is rated in terms of how well it fulfils the demands and wishes.

Functionality

Demand/ wish	How well does the product perform?	Eventual comments
1. Priority		
Preparation of 1-10 mops (flexibility)	5	The water controlling system allows for the preparation of a different amount of mops
The mops get the right amount of water (water is distributed evenly among the mops, and the mops have to be placed vertically)	5	Tested in experiments
Durable and solid construction (can endure a load of about 5 kg; can endure the challenges in the targeted environments, if the employes do not use it carefully)	4	The bucket has the same thickness as the existing product and is made of the same material, PP, so it is assumed that it can withstand the same load. The FEM- analysis of the handle shows that it can easily withstand the load of 5 kg. Though there is not made a FEM over all details
Easy to transport	4	The handle helps transport and mop handle holder is made for small transportations

Simple use	4?	This parameter is difficult to evaluate without knowing users opinion. I would say the new product is more intuitive compared to the existent product.
Place for used mops	5	There is a bag for used mops
Manual-mechanical solution	5	There are no mechanisms
Hygienic solution	2	The surfaces are smooth, but there are a lot of small holes and channels
Ergonomics	4	There is a soft material on the handle, it is also possible to move the bucket on the floor by the help of the mop handle, so you do not have to bend to grip the handle.
2. Priority		
Preparation is faster than today (< 9min.)	3?	It is hard to say if it is fulfilled without trying a prototype. The size of the holes and grid are made in a way, so water runs faster through them than through the existing grid.
All parts are incorporated in the design, no loose parts	4	The lid is a loos part, but all other components can be assembled with the bucket
The size fits the existing cleaning trolleys	5	A groove is made in the front side of the bucket, so it can be placed on a trolley
Extra functions		
'Tooltoy'	4	It looks more attractive than the existing bucket and it evokes different associations

Integrated device for holding a mop handle	4	There is a mop handle holder, but it is not 100% integrated in the design, seen from the aesthetical point of view
Integrated device for releasing the pocket mops	5	The shape of the bucket makes it possible to release the pocket mops
3. Priority		
Colour - coding on the bucket	5	The bucket is produced in different colours
Integrated device for releasing the velcro mops	1	There is not made a suggestion for solving this problem
Hard to copy	1	The shape of the new product is more complicated compared to the existing product. But it is made by injection moulding and you do not have to use some special tools. So, all in all, it is not difficult to copy the product
Wishes		
Transparent functions for the user	?	I have to conduct user tests before I I can evaluate these factors
Easy to find out how much water is needed	?	
Easy to find out where to pour water and soap	?	

Ill. 100: The diagram shows the rating of the product from 1 till 5. 1 is worst performance, 5 is best performance

Aesthetics

The inspiration comes from streamlined curves in cars. The final shape is completely different from the existing. It has an organic look. But if I had more time for the project, I would like to work more on the development of the appearance of the product.

Reflection

The project period is over and it is time to reflect upon the whole process and the achieved results.

Process

The process had been different this time. As I was working in a single person group I had to take a part in all activities. That was very useful as I had to do the tasks I did not have responsibility for in former group work. Working alone was also a little frustrating at some points, as I did not have a person to discuss with, and all processes took longer time.

User centered design

The intention from the beginning was to use the target group and their comments as much as possible during the process. A research and interviews were made in the beginning to find the issues with the existing product. I had not discussed the different concepts and the functions with the end users during the process, as I felt it would be too abstract to explain different ideas to them at that stage.

In the end potential users were asked about their opinion on the new product, but it did not give a good output. The asked people had difficulties with evaluation of the product from the pictures. They needed something more tangible, such as a prototype.

It had been my plan to evaluate the product earlier in the process and improve it afterwards. Unfortunately, there was no time for that. The improvement would be the next step in the process, if there was more time left.

Even though I did not discuss the product and its features with the target group earlier in the process, the parameters for the design, I worked with during the whole process, came from the research of the users' needs. And they were essential for the product.
All in all, the product was an attempt to accommodate all the needs from the users .

Ergonomics

To learn more about ergonomics was one of my learning objectives. I found some general rules for making the cleaning process ergonomic. But that was primarily addressed to people doing professional cleaning all day long. The subject 'ergonomics' was not quite relevant for the chosen target group, as they only interacted with the product for less than 30 min. a day. Anyway I had many considerations on how to make it comfortable (that is what ergonomics is about) to use the product and how to make the product look comfortable.

Production methods

Due to the cooperation with the company I learned some new facts about the production and plastic material, as we had many discussions on that subject. Furthermore, I was invited to a plastic manufacturer to see the machinery and tools for injection moulding and 2 component moulding. That gave another understanding of the theoretical facts. I tried to take the requirements from the production methods into account in the design.

The company helped me with the cost estimation and gave an explanation on what factors were important for the estimation of the production cost.

Marketing

During the project I was introduced to Vikan's marketing strategy. Together with the results from the research it gave me an idea on how to improve the existing marketing politics. I came up with a general suggestion on how to promote the new product for both the existing customers and potential users. A suggestion for a folder that could be sent to the customers was also made. So I would like to consider this learning goal as fulfilled.

Time planning

This time I tried to make an overview of different activities per day and note how long time I spent on them. It was interesting to see what tasks were most time-consuming, and that would probably help me in

the planning of the future projects. The activities that took long time were mail corresponding and meetings, and also 3D modelling was very time consuming for me.

Cooperation with Vikan

It had been educational to work in cooperation with Vikan A/S. Discussions with the contact person, industrial designer, elucidated the problems from other angles, that was indispensable for the project, considering that I worked on my own.

The company provided me with useful information and had been helpful with technical considerations.

However opinions on the problem field were different within the company and that was a little confusing.

From the first meeting they hold on to the idea that I had to make a design where I reused as many elements as possible from the existing design because of the tooling cost. My decision was though to make a completely new design and make it to a part of the new design strategy.

General

I have made many experiments which was very good as they supported the concept. It could be very useful if I made more models and prototypes to check on the different functions, but I did not feel there was time for that, so that had a low priority during the project.

I spent much time on the conceptualisation, much more than expected, that left a short time for the detailing. It could be useful to spend more time on evaluation of all the functions, and integrate the mop handle holder better in the design and make more thought through interface. It could be interesting to make a product as realistic as possible and almost ready for production, but that would require much more technical considerations, knowledge and time.

Product

A general concept of the preparation of the flexible amount of mops was new and seemed practical. The new product had more functions than the existing and was more adapted to the target group.

However, there were a couple of issues that could be discussed. The simplicity of the product was one of them, adding the product the new features made it more complicated. The number of the preparation steps was not decreased, but the process of the preparation was more intuitive. Both the shape of CombiClean and the signs were made to ease the user's interaction with the product.

As mentioned earlier, the design of the mop handle holder could be developed further to achieve more integrated look.

Furthermore, it could be a good idea to check if the velcro could hold 10 wet used mops, if you lift the bucket together with the bag. Otherwise another solution for attachment of the bucket and the bag for the used mops was needed.

The extra plate with channels in the side of the bucket had an unstable shape. A solution to that could be closing the channel by 'a wall' on one side, so the channel does not go through the plate.

The CombiClean concept had a feature for releasing of the pocket mops integrated in the shape of the bucket. But it did not solve the problem with releasing the velcro mops. It could be an extra interesting feature to add to the product.

The aesthetics appearance was based on the product's functions and was first considered in the detailing phase. I should probably start thinking of the aesthetic qualities of the product earlier, in order to achieve a holistic result.

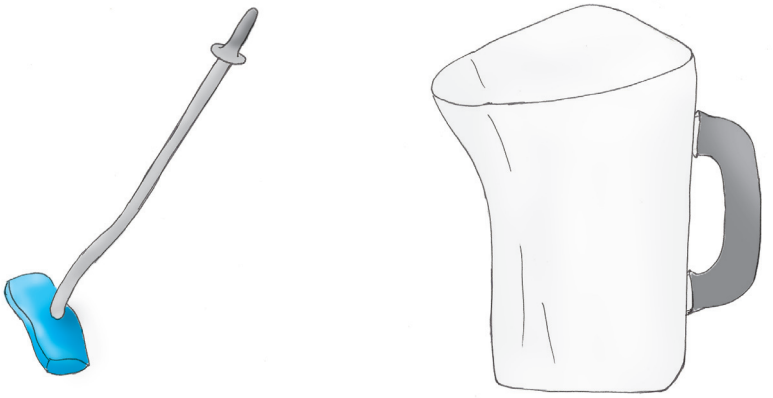
The project resulted in a suggestion on how Vikan could keep its

leading position on the market of the cleaning equipment and expend its target group. The requirement from the company saying that they want to reuse as many elements from the existing product as possible was not met. As I felt that would delimit the creative process. The final product consists of completely new elements. If the company decided to produce the whole product they could not use any of the existing tools and that would demand extra cost for them. Therefore, if the company decided to work further with the concept, they would probably use the idea of the preparation from the top and adjust it to the existing bucket. [Vikan A/S]

The frame for the project had been widen during the process from a task to find a way to prepare 1-2 mops to reconsidering the existent way of the mop preparation and evaluating other important functions to incorporate in the product.

The idea was that CimbiClean was a new start for Vikan, where they would not compromise with aesthetics or ergonomics. Other products from the Microfibre concept, the mop handle, the preparation jug, the mops and the cleaning trolley would be the followers. Unfortunately, I did not have time for making detailed suggestions for how these products could function and look like. I have thought about possible ideas and made some sketches.

Another relevant thought for discussion was how to make the mops fit Vikan's mop handles, and to give the customer more advantages if he used Vikan mops with Vikan's mop handle instead of the other mops. That would probably result in more customers buying Vikan mops. But this discussion could be a project for itself.



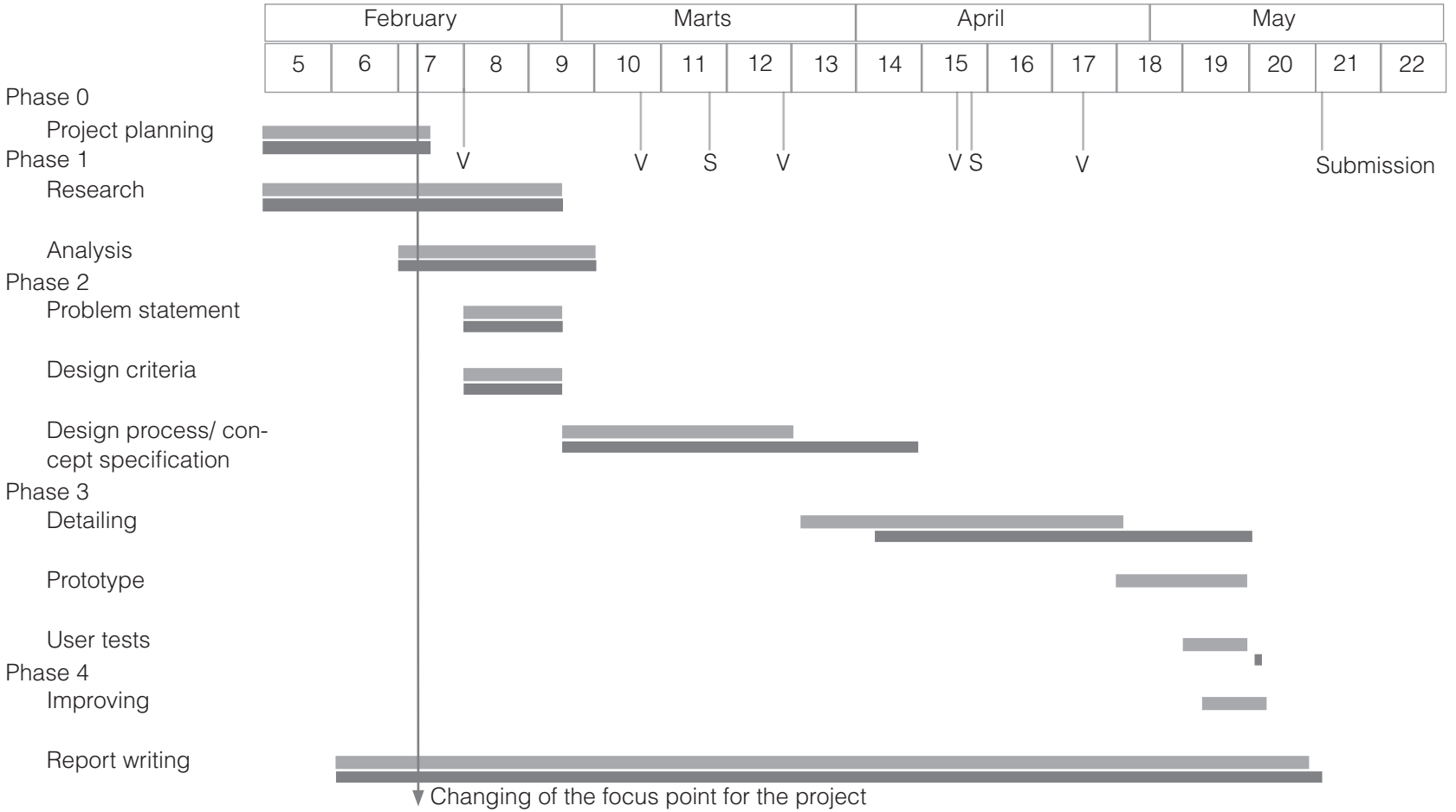
Ill. 101: Rough sketches on the other products from the Microfibre concept. Their shapes relate to CombiClean. The mop holder (in the bottom) is inspired by the lid, and the handle relates to the handle of CombiClean.
The jug is inspired by the curvy lines of the bucket. There is a soft material on the handle for better ergonomics.

Conclusion

For a short summation on the project the conclusion is made. As the reflection, it both touches on the process and the product.

Process

In the start of the project I had made a time plan. In the beginning all the deadlines were complied but during the concept phase and the detailing the processes were displaced, and some of the activities



Ill. 102 The new Gant diagram shows how the planned activities and deadlines were displaced during the process. Making a prototype and the user tests with the following improvement of the product were moved to the period after the submission.

were removed. The actual time table looked in the following way. So even though the planing was made in the beginning the stress factor was not completely avoid in the end.

Product

The result of the design process was a functional product with improved functions compared to the existing solution, and also some new functions.

The main focus during the process had been on the functionality of the product and especially on the even distribution of water. Many experiments were conducted to test different ideas and find the most efficient way to prepare the mops.

The users' statements were highly prioritised during the whole design process in order to design a user friendly product.

The evaluation showed that the product met almost all of the demands, though there were a couple of the criteria of the secondary priority, that were not fulfilled.

The aesthetics of the product followed function, but the overall form was inspired by dynamic lines from cars. It resulted in CombiClean, with organic curves both in the lid and in the bucket, which would differ it from the other solutions on the market.

In my opinion, the process with the various activities resulted in a product that satisfied the problem statement and the most important demands. Though it could be very useful to ask about the users' opinion, to get more precise feedback and improve the product according to that.

Formali-
ties

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List of illustrations

Ill. 3:[Vikan A/S]
Ill. 8: [Vikan.com]
Ill. 9: [Vikan A/S]
Ill. 10: Vikan's customers:
Carlsberg: http://www.yourlogoresources.com/carlsberg-logo/ 24-02-2012
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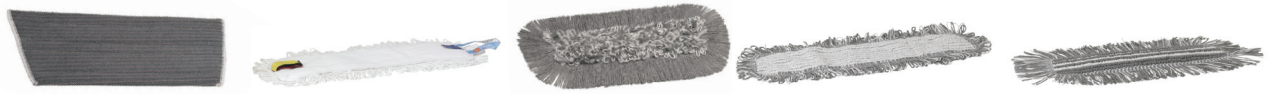
http://www.nextconceptcars.com/concept-cars/bugatti-type-12-2-streamliner-design/
Other illustrations are own made. All the illustrations are edited in photoshop

Appendix

Appendix A

Microfibre mops. Data



Type of mope/velcro	Damp 41	Damp 42	Damp 43	Damp 47	Damp 48
Weight +/- 5 g (g)	85	84	108	73	115
Water for preparation (g)	144	147	216	128	201
Weight after preparation (g)	229	231	324	201	316
Size (mm)	130 x 450	150 x 500	180 x 500	160 x 500	150 x 550
Floor area (m^2)	20 - 40	20 - 30	15 - 30	20 - 40	20 - 30

Type of mope/pocket	Damp 41	Damp 42	Damp 43	Damp 47	Damp 48
Weight +/- 5 g (g)	105	109	127	85	125
Water for preparation (g)	184	191	254	149	219
Weight after preparation (g)	289	300	381	234	344
Size (mm)	145 x 465	170 x 500	195 x 470	160 x 500	150 x 500
Floor area (m^2)	20 - 40	20 - 30	15 - 30	20 - 40	20 - 30

[Vikan.com]

Appendix B

Body storming

Appendix C

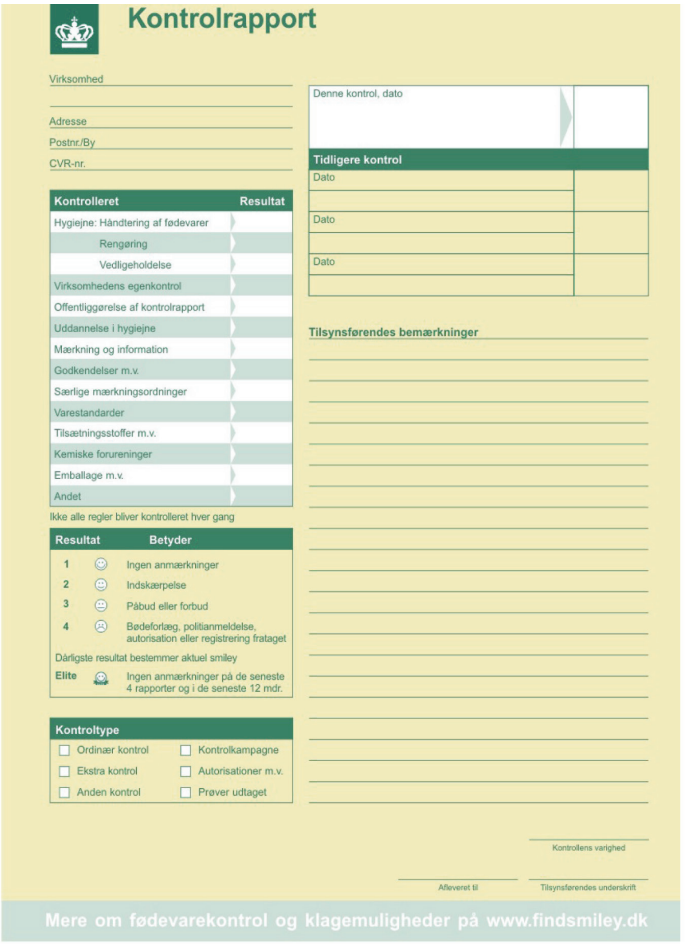
Hygiene

Hygiene is one of Vikan's main competencies. 'Hygiene' is a broad term with many hundreds years' history. Understanding of it is different from person to person and from country to country. In general, 'hygiene' is about 'health' and 'cleanliness'. But what is cleanliness?

Vikan has found a way to measure ti which extend a surfaces is clean, where they test how many bacteria there are. If you do not have that kind of device, you usually determine, if a place is clean or not, considering visual factors. If there is no dust and dirt, the place seems to be clean.

An interesting fact is that many people believe that the floor is clean, if they see it has been moped and it is very wet. [Vikan A/S] In reality, if the floor remains wet for a long time, bacteria will reproduce very fast. And even though the place looks clean and neat, it is not hygienic clean.

For places such cafés and restaurants it is important that they both look clean and are hygienic. In Denmark there is a focus on this area. Ministry of Food, Agriculture and Fisheries has made a set of rules for food establishments, and controls them by regular inspections and inspections without warning. Different issues are evaluated including hygiene and the results are shown in a report. Rating covers from 'sour smiley' to 'happy smiley'. The results of the inspections are visible for everyone; therefore it is of great significance for the companies to have 'happy Smileys'.
[Foedevarestyrelsen.dk]



Kontrolrapport

Virksomhed

Adresse

Postnr./By

CVR-nr.

Denne kontrol, dato

Tidligere kontrol

Dato

Dato

Dato

Kontrolleret	Resultat
Hygiejne: Håndtering af fødevarer	
Rengøring	
Vedligeholdelse	
Virksomhedens egenkontrol	
Offentliggørelse af kontrolrapport	
Uddannelse i hygiejne	
Mærkning og information	
Godkendelser m.v.	
Særlige mærkningsordninger	
Varestandarder	
Tilsætningsstoffer m.v.	
Kemiske forureninger	
Emballage m.v.	
Andet	

Ikke alle regler bliver kontrolleret hver gang

Resultat	Betyder
1	Ingen anmærkninger
2	Indskærpelse
3	Påbud eller forbud
4	Bødeforlæg, politianmeldelse, autorisation eller registrering frataget

Dårligste resultat bestemmer aktuel smiley

Elite Ingen anmærkninger på de seneste 4 rapporter og i de seneste 12 mdr.

Kontroltype

- ☐ Ordinær kontrol
- ☐ Ekstra kontrol
- ☐ Anden kontrol
- ☐ Kontrolkampagne
- ☐ Autorisationer m.v.
- ☐ Prøver udtaget

Tilsynsførendes bemærkninger

Kontrollens varighed

Afleveret til

Tilsynsførendes underskrift

Mere om fødevarekontrol og klagemuligheder på www.findsmiley.dk

Appendix D

Field analysis. Interviews

In the beginning a broad field analysis is made at small retail businesses in Aalborg. The aim is to find out what the general cleaning habits are and find places with Vikan products.

Name of the place	What cleaning equipment do you use when cleaning?	How do you use the mops?	How often do you clean? When?	How many mops do you use at a time?/ How often do you change the water?	How long time does it take for you to prepare, clean?	Is it something that could be improved in the process?
Baresso coffee	Does not know the name My observation: not Vikan	Mop and bucket with water. Flush the mop in the bucket, when it is needed. No trolley	Once a day in the morning or evening, unless the customers have spilt etc.	1 mop at a time, Use the same water or change it ones or twice if it is necessary	No preparation	Floor is very wet after cleaning, risk of slipping
Fredsens chokolade	Microfibre mops, but do not know the name of the producing company. My observation: not Vikan	Every day in the evening (when they are closed for customers)	Once a day	1 mop	Approximately 15 min.	
Summerbird	Employee does not know the name of equipment My observation: it is a Vileda set	Twist mop. Flush the mop in the bucket and twist it	Once a day	1 mop	5 min.	It functions well

Kaffe Fair	The employees do not know the name. My observation: it is Vileda	Mop and drip bucket with water. Flush the mop in water and press it against the drip edge. No trolley	3 times a day	4-5 mops a day		It can be stressing to clean, as you also have to serve food. It takes long time
Sunset(Kennedy Arkaden)	Employee does not know who the producer is. My observation: the name of mops is Eco Rasant Xpress	Mop and bucket with a dripping grid. A little trolley for two buckets	Morning and evening every day (before, after opening)	1 mop		Difficult to make the floor 100% it clean, because there is much fat
Sunset (Boulevarden)	Employee does not know who the producer is. My observation: the name of mops is Eco Rasant Xpress	Mop and bucket with a dripping grid. A little trolley for two buckets	Once a day, in the morning	1 mop	10 min.	Use of the bucket and trolley is uncomfortable
Shell petrol station	Does not know the name	Flash mop in water in the bucket and press surplus water out of the mop by a feature on the trolley	Once a day	1 hour for all cleaning	1 mop, same water	It is boring to clean
Burger King	Does not know the name		Twice a day, morning, evening	2 mops	20-25 min.	Difficult to make the floor clean
Kebab house	Old fashion cotton mops (‘long hair’)		Once a day, evening			No problems with cleaning

Candy shop	Does not know the name	Mops and bucket with water. No trolley	Once a day, in the evening	1 mop	15-20 min.	Functions well, but it could be better if it was easier to moister the mop. The new solution has to be easy to use and functional. Aesthetics makes a difference
Photocare	Does not know the name My observation: they use Vermop, microfibre mops	6 mops are prepared in one bucket with water (too much water). Then they clean floor with wet mops	3-4 times per week	6 mops		'It is boring to clean'

The interviews show that none of the researched places use Vikan. The employees do not know who produce their cleaning equipment. The majority of the asked persons do not use trolley and they demand functionality and efficiency.

Appendix E

Field analysis. Hjørring Biocenter

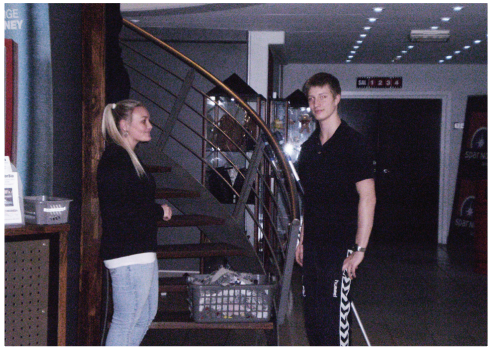
Research in Hjørring Biocenter gives a good overview on what issues the users of Vikan preparation products are strangling with.

Interview

- There are many mistakes during distribution of the products, salespersons are not good enough to explain how different products function and the users can't benefit the features of the product 100%. The employees miss information.
- The employees clean once a day, always late in the evening
- 'Lid cannot be fastened, it is leaky' and water runs out. In the preparation process water runs out of the bucket, when they turn it. The users get water on their cloths, both when they turn the bucket first time, and turn it back to start position).
- Used mops are stored in a washing basket.
- Water stores in grooves in the bottom of the bucket and it smells, you have to clean the bucket often
- Handle falls away, when they transport the bucket.
- It takes 3-4 min. to prepare mops, they lie in the bucket for 30 min. afterwards, while the employees do the other duties.
- In summer time they usually use 20 mops, but in winter time it is not enough

Observations

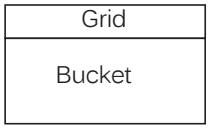
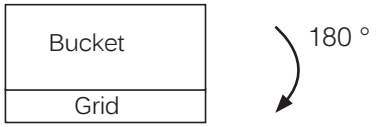
- The employees place mops in a wrong way before preparation, horizontally (wrong information from sales persons)
- The employees carry used mops in their hands, and afterwards they through them on the floor. When they are done with cleaning they gather all the mops in a basket.



Appendix F

Grid position

There are different ways of placing the grid in relation to the bucket. Based on fact that mops have to be placed with a side to the water flow, and that mops have to be placed horizontally with velcro/pocket upwards to make it possible to get them with a mop handle, following considerations are made:

Solution	How does it function?	So what?
	Mops are placed vertically Water runs down to the bucket automatically	You have to turn the mops before use
	Mops are placed vertically You need to rotate the bucket to get water run through the mops	You have to turn the mops before use
	Mops can be placet horizontally with velcro upwards You have to tip the bucket to get water run through the mops	Mops are ready to be used

Appendix G

Experiments

Experiment 1. Division of water

Assumption:

If water runs from top of T-pipe and runs out from two pipes. The amount of water will be divided into two equal parts.

Result:

The experiment shows that water will always be divided into two equal parts.

Items:

Two pipes of 10mm /14 mm
T-pipe
Two transparent cups
Water tap

Process:

1. Rubber pipes are fixed to a T-pipe
2. The construction of pipes is held under the water tap
3. Two transparent cups are placed in such way, so water can flow from the pipes into the cups
4. The water tap is opened and water runs through the pipe-system






Experiment 2. Division of water

Expected output:
To find out how water flows through the pipes, and if it is distributed evenly through all the five pipes.

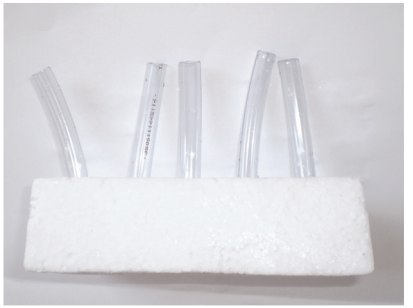
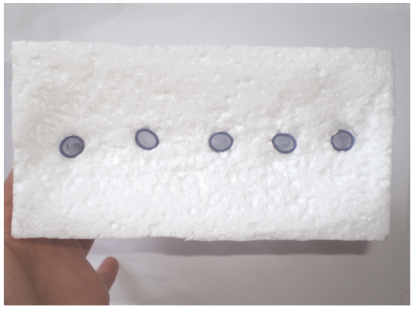
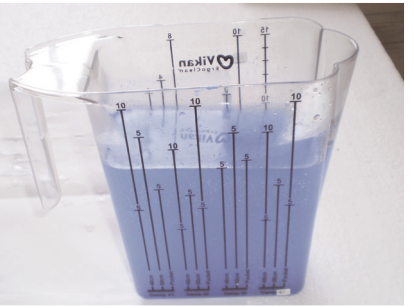
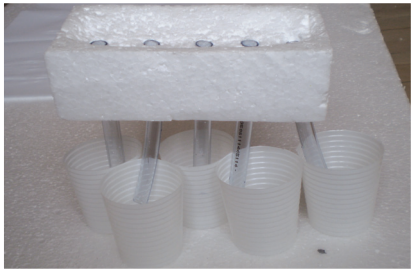
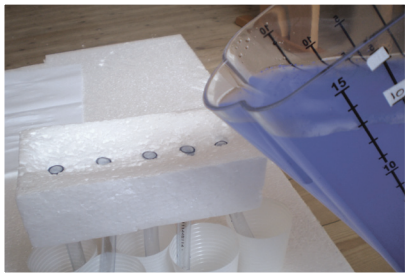
Items:
Two pipes of 8mm -10mm
Foam model with five holes and a deep groove
Five cups
Coloured water (makes it easier to see the result)
Jug

Process:
1. Pipes are placed in the holes in the foam model
2. Cups are placed under the pipes
3. Water is poured in the groove, while the jug is slowly moved along the groove

Result:
This experiment is carried out many times, the most of the times there are almost equal amount of water in the cups. But the results varied.

Another observation is that it is necessary to widen the groove to make it more comfortable to pour water in it, from the jug. Otherwise there is a risk of spilling.

To pour water through this kind of construction you do not need more time, than through a plane plate.


Experiment 3. Hole diameter

Expected output:

It is scientifically proven that water runs faster through larger holes. But what is the time difference?

Items:

A preparation lid with holes of three sizes, 4mm, 5mm, 6mm

Process:

1. The lid is divided into 3 areas, with holes of 4mm, 5mm, 6mm
2. The same amount of water is poured in each area, one at a time
3. I observe how water runs through the holes while the time is noticed.
4. The experiment is repeated 5 times for each area

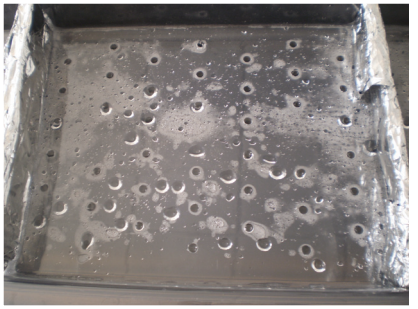
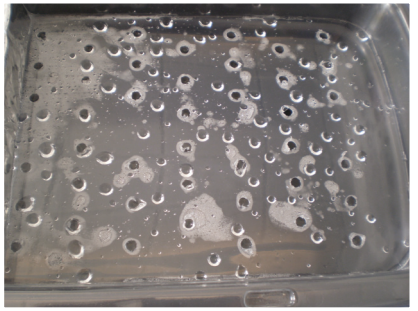
Result:

The result can be seen in the diagram below. It is clear that holes with diameter of 6mm distribute water much faster than the others.

At the same time water does not gather in puddles, but runs straight through the holes.

Hole diameter / Experiment	4 mm	5 mm	6 mm
1.	100 sec.	90 sec.	60 sec.
2.	50 sec.	40 sec.	70 sec.
3.	70 sec.	50 sec.	40 sec.
4.	90 sec.	40 sec.	30 sec.
5.	45 sec.	50 sec.	29 sec.
The average result	71 45,8 sec.	54 45,8 sec.	45,8 sec.



Experiment 4. Grid shape

Expected output:
The intention is to check if a curved shape is better to distribute water than a plane shape.

Items:
A plane acrylic plate with holes d=4 mm
A curved acrylic plate with holes d=4mm

Process:
1. A curved plate with holes is put into a sink
2. Two plates are placed on top of the acrylic plate (limiting an area)
3. Open for water
4. Water runs through the holes

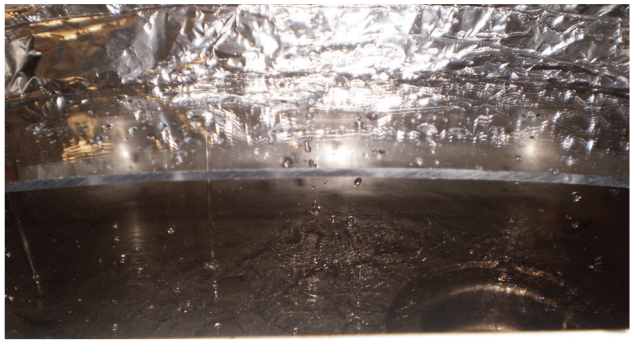
The same process is repeated for a plane plate

Result:
The experiment shows that the anticipation is not correct. Water is not distributed even at the curved plate, it does not run through all holes in the plate.

The results although are better with the experiment with plane plate, as water flows broadly through all the holes. Plane shape is therefore more appropriate for the product, than curved shape.

The experiment shows that one opening for water is not enough to transport water along the whole bucket, if it is a distance between the opening and grid.





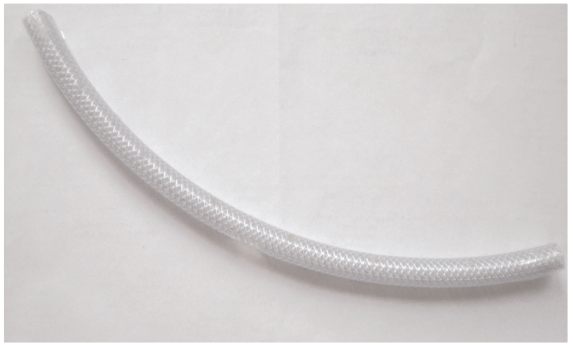
Experiment 5 Grid pipe-shape

Expected output:
To find out how water runs through the small holes in a pipe

Items:
A pipe, closed in the ends, with small holes
Water tap

Process:
1. Pour water through the pipe
2. Observe results

Result:
Water is transported through all the holes. It looks like it is an even amount of water that runs through all the holes.



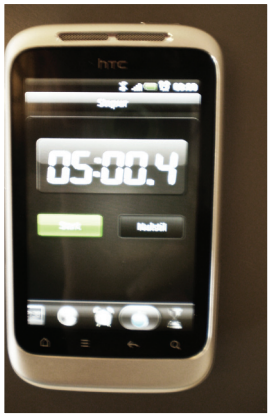
Experiment 5. Preparation of mops - vertically

Expected output:
Today Vikan recommends to prepare the microfibre mops while they are placed vertically. It seems logical to place them vertically to distribute water throughout the mops. Vikan has not made experiments to check if it works properly, so I decide to check that.

Items:
1 Preparation box
1 Preparation jug
2 mops
1 Plate
Water

Process:
1. Place 2 mops in the bucket
2. Screen the mops with a plate
3. Pour water at the mops
4. Wait for 5 min.
5. Place one of the mops at a tissue
6. Wash floor with another mop
7. Evaluate the results

Result:
The experiment shows, that water is evenly distributed throughout the mops, and the method is appropriate the for the concept.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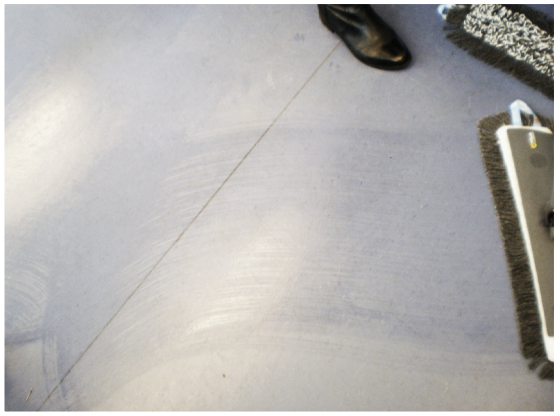
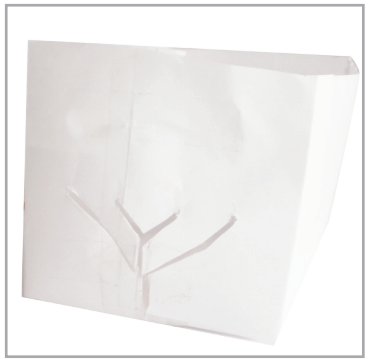
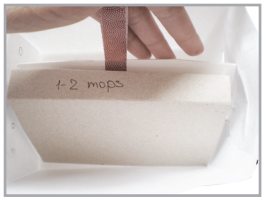


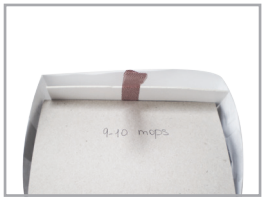
Experiment 6. Rotation of mops



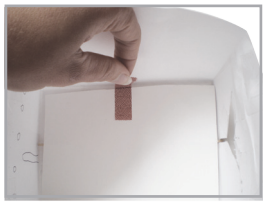
1-2 mops



9-10 mops



Lifting of the plate



Expected output:

To find out how the dividing plate moves in the bucket when it rotates the mops.

Items:

A box of paper (imitation of a mop bucket) with channels in the wall
A cardboard plate (imitation of a dividing plate)
Imitation of mops

Process:

1. The plate is placed in the box
2.1-2 mops are placed in the box
3. The plate is rotated, its movement is routed by the channels → the mops follow the plate
4. The same steps are made for 9 -10 mops

Result:

The experiment shows that the channel system works for the rotation of the plate/mops, but an extra channel is needed for 9-10 mops (as it is on the model at the moment, it is only possible to prepare 1- 8 mops.)

As the plate ends on the bottom a feature helping the lifting of the plate is needed.

Synopsis

In the process report the process from the project planning to the detailing of the final product is shown. Important considerations and decisions are described and in the end the final product is presented and evaluated.