CHALMERS

High end washroom dispensers
Development of exclusive dispensers for low to medium traffic washrooms.

Master of Science Thesis in the Master Degree Programme
Industrial Design Engineering

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Gothenburg, Sweden, 2012

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Cover:
The figure shows a rendering of the final
concept in a washroom context, page 58.

Abstract

The challenge in the project has been to add a sense of exclusiveness in dispensers for public washrooms. The project has been conducted in collaboration with the company SCA Hygiene Products AB that has expressed the wish to enter a more premium market for their washroom dispensers. The overall goal has been to develop prototypes of exclusive dispensers for low to medium traffic washrooms. The main focus has been on designing hand towel dispensers with a possible additional combination of waste bins.

Since architects often chose or recommend dispensers for public areas, they have been of great importance for this project and have been seen as the critical stake holders. The research phase included study visits in Sweden, France, Poland and Germany along with workshops, interviews with architects and literature studies.

Results from the pre-study worked as a base in the development of concepts. The final concept is a wall mounted aluminium dispenser, containing a hand towel dispenser and a waste bin. The concept was prototyped in collaboration with a product developing company and an evaluation of the concept showed that it fulfils all demands and most of the desires that were stated for the product after the pre-study phase.

Key words: Washroom dispensers, exclusiveness, Tork, architectural view, low to medium traffic, brand identity.

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Appendix

1. Introduction

Following is an introduction to the project conducted in collaboration with SCA Hygiene Products AB (henceforth referred to as SCA)

1.1 Background

In this chapter follows a short description of the project scope and context.

1.1.1 Problem description

The challenge with this project has been to incorporate an exclusive expression in public washroom dispensers and how that could be applied for a company that has not entered the premium market yet. A premium or exclusive market is by SCA identified as high end hotels, restaurants, shopping malls, airports, business centres and equivalent areas.

The architects of above mentioned environments are generally the persons proposing which dispensers to choose in the washrooms. In order to understand why their products are not presented in the exclusive market, SCA has been in contact with architects through interviews and discussions. Through these contacts it has become apparent that few of the existing product families of dispensers are fully attractive for this target group and a new line of dispensers targeting this segment is needed.

1.1.2 SCA

Svenska Cellulosa Aktiebolaget is a worldwide company which covers the four main business areas Personal care, Tissue, Packaging and Forest products. The company employs around 44,000 persons and is present in over 100 countries. SCA is a part of the global company and embraces the business area Tissue which acts as the third largest supplier of tissue products in the world. The Tissue business area includes the Away from home segment (henceforth referred to as AFH) which supplies products, service and maintenance of hygiene solution systems at work places, restaurants, hotels, hospitals etc. Within the AFH segment a larger brand, Tork provides washroom dispensers and equipment including toilet paper, paper hand towels, waste bins, soap, air fresheners and facial tissue within the washroom area. (www.sca.com, 2012)

1.2 Aim and goal

The aim for the project has been to develop Tork hand towel dispensers targeting exclusive or high end washrooms with low to medium traffic. Included in this has been to try to understand what attributes that would make a dispenser attractive to architects designing for exclusive washrooms. The goal with the project has been to produce a full scale prototype of the proposed hand towel dispenser.

1.3 Problem questions

Following are some questions stated for the project aiding in achieving the overall goals. The main question has been seen as the most relevant for the project whereas the side questions are also supporting the achievement of the goal.

Main question

- How can a public washroom dispenser be designed with an exclusive appearance?

Side questions

- What do architects base their decisions on while choosing dispensers for washrooms?

- How can Tork's brand identity be preserved in an exclusive range?

1.4 Limitations

- The cost analysis has been limited to basic approximations

- The targeted main market has been Europe

- Maintenance staff has not served as a critical target group in the project

1.5 Terminology

In Figure 1 is a guide to expressions used in this report and their designated meaning in this project.

Expression	Description
AFH	Away From Home, department of SCA dealing with products in public environments.

Expression	Description
Washroom	Toilets/Restrooms.
ADA	American with Disabilities Act, American governmental institution providing guidelines for accessible design.
Recessed	When a construction is built into a wall.

Figure 1. Terminology guide.

1.6 Current situation

Below follows a brief introduction to the situation the brand Tork is facing today.

1.6.1 Environment

The targeted environment in the project has been public exclusive washrooms with low to medium traffic, which means up to maximum 500 visits per washroom and 8 hours (Larsson, 2012). Public washrooms are open to the public and can be found in for example parks, airports, train stations, restaurants, cinemas, museums shopping malls or arenas (Ordningslagen, 1993). Exclusiveness or "high end" is a subjective measurement which will have to be developed during the project.

1.6.2 Target group

The primary users of the product are visitors at public washrooms. Since the product will be used in public areas such as hotels and restaurants the target group includes a wide range of people in different age and with different cultural backgrounds. Secondary users are the ones that care for cleaning and maintain the dispensers, such as cleaning staff and caretakers.

It is common that it is architects that choose dispensers for public areas. So in this project the architects have been of great importance and have therefore been seen as the critical target group. If an architect does not find a dispenser attractive or interesting he or she will not recommend a client to buy the dispenser and it is therefore important to make the dispensers attractive to architects.

The client of the architect, who often is a manager or owner of a building, is the person who takes the final decision to choose dispensers, and must therefore also be considered. These persons are often limited by economic aspects.

1.6.3 Market positioning

SCA's largest markets, in terms of sales, are Germany, United Kingdom, United States, France, Italy, Sweden, Spain, The Netherlands, Australia and Mexico (www.sca.com, 2012) SCA is number two globally in the AFH segment and has a global market share of 16% with the Tork brand, which is marketed in 80 countries. SCA has a market leading position in Europe with a 20% market share that can be seen in Figure 2, and is number three in North America with a market share of 20%, Figure 3. SCA's market position is particularly strong in the fast-food restaurant sector in North America, where nearly every second napkin is supplied by SCA. SCA has an annual growth of about 1% in North America, 3% in Western Europe and up to 10% in emerging markets such as Russia.

Major SCA competitors in the AFH-segment are among others Kimberly-Clark and Georgia pacific. (www.sca.com, 2012)
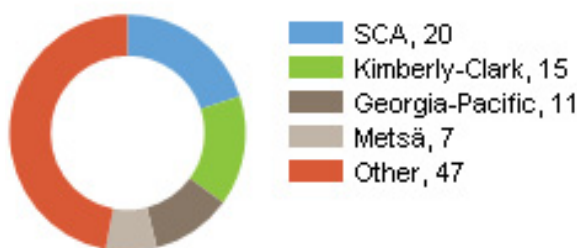
Figure 2. Market shares, AFH tissue, Europe 2011, percent.
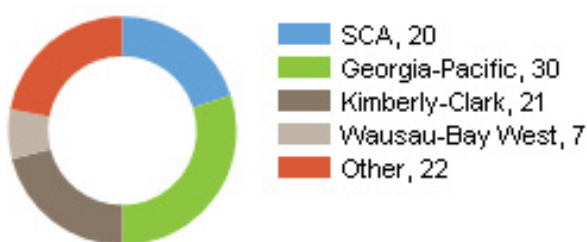
Figure 3. Market shares, AFH tissue, North America 2011, percent.

2.   Methods and work process

In this chapter the whole process, from the planning of the project to the final concept is described together with corresponding methods.

2.1 Planning

To enable the implementation of the project within the stated time frame project plan including a GANTT-chart, a schedule over the available weeks and a design process model have been created. The project plan has facilitated the work and has given the group members and supervisors a common picture of the project's objective and scope. As the project group only consists of two students there have not been any clear roles, both have shared the responsibility in all parts of the project, but some small field of main responsibilities have been divided during the project. The project has been performed during a period of twenty weeks, full time.

The GANTT-chart has worked as an overview of the operations to be carried out within the project's time frame. By doing a GANTT-chart the duration, start and stop of the different tasks were shown and possible bottlenecks were detected.

To illustrate the connections between the different activities in the process, a process model was designed, Figure 4.
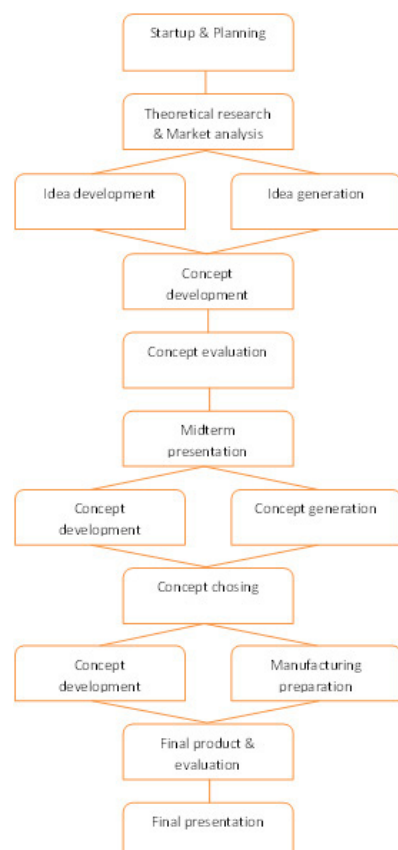
Figure 4. Process model.

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2.1.1 GANTT-chart

A GANTT-chart is a flow chart where different activities are represented, with activities on the y-axis and time on the x-axis. The chart shows when an activity starts and for how long it lasts, it also illustrates how the activities are dependent on each other. (Johanneson et al, 2004)

2.1.2 Process model

In order to get a clear picture of the working process a process model with boxes representing activities can be used. Each box in the model stands for one stage of the process and the model illustrate how the different activities in a project are connected to each other. Some activities take place at the same time and other are iterated several times during the project. Even though some activities take place during the whole process, the stages only indicate when those activities are most dominant. (Kruger et al, 2006)

2.2 Research and data collection

The methods described below have been used to gather the necessary background information for the project. As the project has involved designing a product for exclusive environments, much focus has been on finding out how exclusiveness is perceived and how it could be expressed. The factors that influence whether a product is perceived as exclusive or not have also been investigated during the project. As steps in exploring these factors workshops have been held gaining the results found in chapter 4.7.5. A range of articles on the subject exclusiveness have also been studied with regards to semantics and affective design and the results from these are found in chapter 3.1 and 3.2. In Figure 5 the methods significant for answering the question stated for the project can be found.

To get an insight into trends in today's washrooms a market analysis has been performed, in which various washrooms in Europe, the Stockholm Furniture Fair and a washroom exhibition in Paris have been visited. During the visits pictures were taken of the exhibited materials, shapes and products and some discussions where held with exhibitors regarding trends in washroom design. This has created an understanding of the intended environment where the future product will operate. During the washroom and furniture fair, producers have been consulted and asked questions concerning customer's use and needs in private and public washrooms. This study has been based on unstructured interviews and observations. The results from these studies can be seen in chapter 4.3 and 4.4.

To get an understanding of Tork's market position and to find out how far or how close the new range of dispensers should be the existing brand an internal workshop was held at SCA, where the brand Tork was discussed. The results are found in chapter 4.7.6.

As architects are seen as the critical stake holders for the project, a number of interviews with architects from Sweden, Poland and Norway have been held. These have given knowledge of the basis on which architects make their decisions, trends in the washroom industry, important aspects to consider when designing and much more. These interviews have been supplemented with information gathered from the collections of past interviews that SCA has made with architects from Germany, France and Australia. The results from these interviews can be found in chapter 4.6.

2.2.1 Literature study

A literature study is used to gather background in-

Trend analysis

Literature studies

Washroom mapping

Workshop "Exclusive Tork - Key attributes"	Workshop "Exploring Exclusiveness"	Interviews with architechts
How can Tork's brand identity be preserved in an exclusive range?	How can washroom dispensers be designed with an exclusive appearance?	What do architects base their decisions on while choosing dispensers for washrooms?

Figure 5. Method model.

formation for a project, it can be sourced in many different ways, for example through books, earlier project documentations, scientific journals or databases. (Karlsson, 2005)

2.2.2 Observation

In an observation a typical user scenario is observed and analysed. The observation could be performed in the field during a real user study or in an experimental situation in a laboratory. It is common that the observation has a specific theme or goal, such as evaluating ergonomic performance. (Jorgensen, 1989)

2.2.3 Interview

Interviews can give a picture of for example how users think and feel about a product and not only how they act with a product. It is a way of gathering subjective data. Depending on what type of data that is desired, different interview models could be used, for example structured, semi structured and unstructured interviews. A structured interview is based on questions that are designed in advance and is a good way to get quantitative data. If more qualitative data is desired it is better to use an unstructured interview where the participants are loosely discussing a subject. Semi structured interviews have a few predefined questions with opportunities for open discussions. (Lantz, 2007)

2.2.4 Focus group

A focus group is a type of unstructured group interview with six to twelve people. One person works as a moderator for the meeting and makes sure that all attendants are participating and that all the topics are discussed. It is important to consider the composition of the group with regards to background, interests etc. It is also important to make sure that some persons do not become too dominant and that everyone's opinions are heard. (Obert et al, 2000)

2.2.5 Workshop

A workshop is similar to a focus group but during a workshop the participants have to take part in different activities that are supposed to stimulate a discussion and to generate ideas. Examples of activities could be individual- or group mindmapping, brainstorming, brainwriting and ranking of different products. (Niklasson, 2012)

2.3 Design analysis

The analysis phase started with two HTA, where the main tasks "wash hands" and "refill towels" have been divided into subordinated tasks. The subordinated tasks were then transferred into a matrix for CW and PHEA. This gave a picture of the potential errors that could occur while interacting with the product and the results are found in chapter 2.2 and appendix 1.

To find out the design cues for the brand Tork, a brand identity and a design format analysis have been performed. The results are found in chapter 4.7.3.

2.3.1 HTA

Hierarchical Task Analysis, HTA, is a method that describes the different subtasks that a user has to go through to reach a certain goal; it gives a structured view and an understanding for the task, Figure 6 First an overall task is identified; the overall task is then divided into subordinate tasks. One example is the overall task "drinking water" that could be divided into the subtask "get a clean glass", "put the water tap on", "fill the glass with water", "Put the water tap of" and "Drink from the glass". (Kirwan et al, 1992)
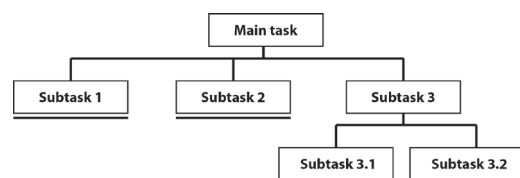
Figure 6. HTA (Kirwan et al, 1992).

2.3.2 CW

Cognitive Walkthrough, CW, is a method for evaluating a product's usability, it is based on the subtasks found in the HTA mentioned above. It works as an active search process for error and problems that may occur during the use of a product. The analysis is based on four questions related to the user's mental goal of the task being performed. The method allows an early assessment of the user interaction with a product without the needs of prototypes. The questions helping to find potential usage errors are:

- "Will the user try to achieve the effect the sub task has?"

- "Will the user notice that the correct action is available?"

- "Will the user understand that the wanted sub task can be achieved by the action?"

- "Does the user get feedback?"

(Lewis et al, 1997)

2.3.3 PHEA

To get an overall picture of how a product is used the CW can be supplemented with a Predictive Human Error Analysis, PHEA. A PHEA is used to identify potential operational errors that could occur during the interaction between the user and the product, why they occur and the implications of these errors. (Sandom et al, 2004)

2.3.4 Design format analysis

In order to create continuity in a company's product range it is important to analyse and have a clear view of which design elements that defines the brand. These design elements have the physical form of different features, such as certain curves, curvature, holes and other form elements. To understand which elements that are common for a product family a design format analysis can be set up. Products from the family are lined up in a row and perpendicular to the row often reoccurring design elements are written, Figure 7. For each product the present design elements are marked. It is possible to grade how distinctively the design element is present within the product; if it is very distinct it is marked with a black dot scoring 2 points, and if it is weakly present it is marked with a white dot scoring 1 point. If the element isn't present at all it is not marked. After scoring the different products it is possible to both see which design elements that are most common in the product family, and also which product that is most typical for the product family. (Warell et al, 2002)
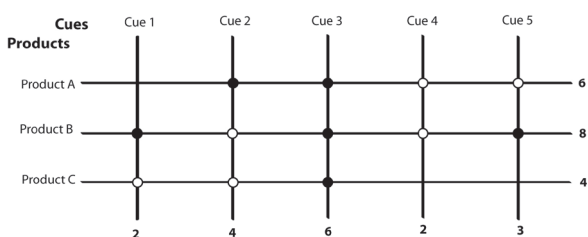
Figure 7. Design format analysis (Warell et al, 2002).

2.3.5 Repertory grid

The repertory grid method visualizes how for ex-

ample brands or products are perceived among users or other stakeholders. A grid is formed by two axes with attributes assigned to them, for example expensive and innovative as in Figure 8. It is possible to place for example different brands or products along these axes, depending on how they are perceived in regards of price range or level of innovation. (Hjort af Ornäs, 2009)
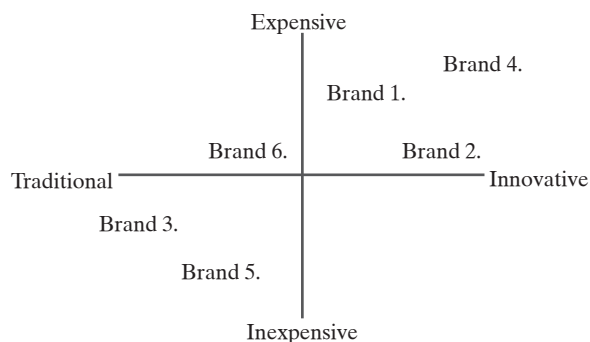
Figure 8. Repertory grid (Hjort af Ornäs, 2009).

2.3.6 Story telling

Storytelling is a marketing and product development tool used to describe the offered product experience to users and buyers. Studies have shown that consumers use products as "props" aiding in expressing their own personal identity or "brand". Since a story can be told and comprehended in many ways it is important that the story the company presents is simple and relies on well-established archetypes. Since consumers need to express their identity with clarity it is important that also a product have a clear expression that can be based on an archetype. (Woodside et al, 2008). Some archetypes used in storytelling and their characteristics are described in the Figure 9 below. (Fog et al, 2005)

Hero/Archetype	Characteristics
The brave hero	Brave, headstrong, firm self belief
The lover	Hot-blooded and sensual
The adventure	Curiosity and daring
The creator	Imagination and creativity
The joker	Humour and joyfulness
The innocent	Honesty, innocence and a big heart
The magician	Full of ideas, surprising
The rebel	Rebellious and uncompromising
The ruler	Ability to lead, authority and class
The everyday hero	Earthbound and straightforward
The caregiver	Caring and giving
The wise hero	Intelligence and expertise

Figure 9. Archetypes (Fog et al, 2005).

2.4 Requirement specification

By using the information gathered from the theoretical survey and the analysis phase a requirement specification has been compiled. The requirement specification includes requirements and desires stated for the product and worked as a help while evaluating the different concepts later in the project.

A requirement specification consists of those demands and desires that can be required for a product. It is a living document that can concern functional, ergonomic, economical and aesthetic aspects. The product has to fulfil the requirements but does not have to meet all the desires. To get an understanding of how important the different desires are they can be weighted on a scale from 1 to 5. This could later be used when screening and evaluating concepts. (Johanneson et al, 2004) The reuirement specification used in this project is found in chapter 4.8.

2.5 Idea and concept generating

To create a common view of the target group, the possible environment and the use of the product, three different scenarios have been developed. In this project the environment has been of great importance and therefore two new methods was created, Target Environment and Target context. These methods have been of great importance in the understanding of the relationships between users, their interaction with the product and the environment in which the product will exist. These contexts is found in chapter 4.7.9.

New Tork key attributes have been developed in order to meet the demands from an exclusive or high end target group. The key attributes have together with the scenario and target environment worked as a base for the moodboard. The pictures in the moodboard have been chosen to meet the expression of the final product. The moodboard and key attributes are found in chapter 4.7.8.

To get a wide range of ideas during the idea generating process brainstorming has been used, both within the project group and during workshops with staff at SCA. To further develop the ideas and to be able to create new concepts Osborn's idea spurs and a morphological matrix have been used. This made it possible to combine different functions into new variants. The ideas and the morphological matrix is presented in chapter 4.9.1.

During the idea generating process inspiration has been gathered through study visits to washroom stores and other furniture shops. Inspiration for technical solutions has also been gathering during these trips.

During the idea generating process, the different ideas and concepts have mainly been sketched by hand, a few foam board models were also produced in the beginning to give an understanding of size and proportion. Later in the process two days have been spent with a design company, where concepts for the interim presentation at SCA were produced. For those concepts, hand sketches have been transferred into Photoshop where they have been further developed, this to make sure that the different concepts were equally presented. The concepts presented at the interim presentation is found in chapter 4.9.2.

After the interim presentation where three concepts were chosen for further development, the model building part started. By making simple full scale models in foam board an understanding of the concepts expression, form and appearance in its context was created and it enabled the group to test the overall functions.

2.5.1 User profile

A user profile describes the target group of the project with for example their interests, occupation and mental and physical abilities. These are things that are relevant for the product developer to know in order to design a product that meets the needs of the target group. (Wikström, 2010)

2.5.2 Scenario

A scenario is a way to visualize and bring life to the usage situation for the product developer and it could be used as an addition to a user profile. A scenario describes the usage of a product and should have a clear start and endpoint. (Wikström, 2010)

2.5.3 "Target environment"

In this project the environment and context in which the product is operating is of great importance and because of this a new method has been developed. The new method is a type of a user profile, but with a fictive characteristic environment instead.

2.5.4 "Target context"

As further steps in designing for a context another new method has been implemented. This method combines the previous mentioned methods User profile, Scenario and Target environment and enables an holistic view which in turn increases the chances for the design to fit the targeted washrooms and users.

2.5.5 Moodboard

A moodboard is a collage of material such as images, texts and colours that describes the expression, feeling and mood that a product should express. The purpose is to facilitate for the idea generation and to document and communicate the expression that the final product should have. (Wikström, 2010)

2.5.6 Brainstorming

Brainstorming is a group method that is used to generate as many proposals and ideas as possible. A cooperative and positive environment is the best climate for brainstorming, meaning that criticism and negative comments are prohibited in order to encourage the flow of ideas. In this method the group members discuss, write and develop all ideas together. (Bohgard, 2008)

2.5.7 Mindmapping

Mindmapping, Figure 10, is a creative brainstorming method for idea generating and a way to visually structure notes and ideas by connecting left and right brain thinking. It is used in a wide context, involving everything from a way to keep notes in school to a way of work with complex development projects. A mindmap starts from a subject or problem which is positioned in the centre. Words, pictures and short phrases are then connected by lines to the central problem or subject. (www.12manage. com, 2012)
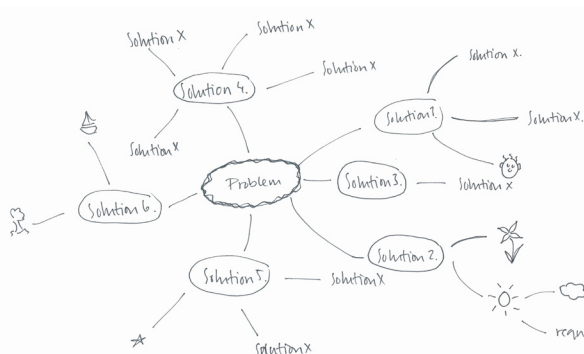
Figure 10. Mindmap

2.5.8 Morphological matrix

A product can often be defined or divided into different functions, for example "divide fruit", "enable one-hand gripping" and "be washable". All these functions can be developed and combined in different ways using a morphological matrix. This way it is possible to develop many combinations with the variation of solutions. One way is to list all possible functions in a column with their corresponding solutions in rows. It is then possible to draw lines moving down from row to row and combining different solutions with each other, Figure 11. (Österlin , 2007)

2.5.9 Sketching

An important and effective way to visualize an idea or design is to sketch it. There are different ways of sketching: it can for example be done with pencil and paper or in a 3D-modeling program. (Österlin, 2003)

2.5.10 Model building

Model building is a way of sketching in three dimensions, it is a physical representation of the intended design or parts of it. It is a good way to get a feeling of proportions and size of the different proposals. Common materials used are clay, foam and foam boards. (Österlin, 2003)

2.5.11 Mock-up

A mock-up is a scale or full scale model of a product that can be used to evaluate and test solutions. The method can be used in usability tests and workshops, where potential users give their opinions. (Österlin, 2003)

2.5.12 CAD

Computer Aided Design, CAD, is a range of computer based programs that can be used to simulate and make models. This makes it possible to inspect a proposal without creating a physical model. (Johannesson, 2004)

	Idea 1	Idea 2	Idea 3	Idea 4	Idea 5
Function A	▪	▬	▮		
Function B	●●	●	⬭	♣	
Function C	✦	▲	✷	✹	
	(A1;B1;C1)		(A2;B2;C3)	(A3;B5;C4)	

Figure 11. Morphological matrix.

2.6 Concept evaluation

To be able to screen ideas and concepts, methods such as Pugh matrix, elimination matrix, panel test and workshops have been used. The different concepts have also been weighted against the requirement specification list. The screening of the concepts are found in chapter 4.10.1, 4.10.2 and 4.10.3.

2.6.1 Pugh matrix

A Pugh matrix, Figure 12, is used to screen and compare different concepts and to see how well they meet the requirements stated in the requirement specification. The different concepts are compared with a reference concept, which could be one of the concepts or an already existing product. The requirements can be weighted according to how important they are to be able to reach the goal. If a concept satisfy a requirement better than the reference it gets a plus, if equal a zero and if less satisfying a minus. By calculating the sum it is possible to rank the different concepts. (Johannesson, 2004)

2.6.2 Elimination matrix

As another step in the evaluation process the concepts can be put in an elimination matrix, Figure 13 In this matrix the concepts are evaluated on the different criteria "Solve main problem", "Fulfil demands", "Realisable", "Within cost interval", "Safe/Ergonomic", "Suits brand identity" and "Enough information". When a concept fulfil a criteria it is assigned a (+), when it doesn't it is assigned a (-) and if more investigations are needed it is assigned a (?). After summarizing the results for the differ-

ent concepts it is possible to eliminate certain concepts if they do not seem to have enough potential. (Johannesson, 2004)

2.6.3 Life cycle analysis

A life cycle analysis, LCA, estimates the total affect of a product on the environment from the early production phases to recycling. Each step in the life cycle of a product is evaluated seperately which means that possible problem areas with high environmental impact can be detected. This aids in the early development stages where possible drawbacks with concepts can be forecasted beforehand and is also a good method for evaluation. (Eriksson, 2009)

2.7 Final concept

Through the concept evaluation a final concept was chosen. This concept had to be further developed and aesthetical and functional details had to be specified, this was done partly through a panel test at SCA. Several variants of the final concept were built in foam board for this panel test. When the final expression was defined, collaboration with a product development company started. Together with them the construction, CAD models and prototypes were produced. The development of the concept are found in chapter 4.10.4, 4.10,6, 4.10.7 and 4.10.8 and the final concept is described in chapter 5. 1.

Criterias/ Concept	1	2	3	4	5	No. of -	No. of 0	No. of +	Total
Reference:									
Concept 1	-	0	+	0	0	1	3	1	0
Concept 2	-	+	+	0	0	1	2	2	1
Concept 3	+	+	0	+	0	0	2	3	3

Figure 12. Pugh matrix (Johannesson, 2004).

Elimination matrix	Solve main problem	Fulfils demands	Realisable	Within cost interval	Safe/Ergonomical	Suits brand identity	Enough information	Comments	Decision
Concept 1	+	-	+	?	+	+	+		-
Concept 2	+	-	+	?	+	?	?		-
Concept 3	+	+	+	?	+	?	+		+
Concept 4	+	-	+	?	+	+	+		-

Figure 13. Elimination matrix (Johannesson, 2004).

3. Pre-study

In this chapter results from the early literature study and data collection is gathered.

3.1 Semantics

A product in an exclusive or high end segment must be experienced as equally exclusive to match its targeted environment. Semantics is a view that aids in understanding how a product conveys its message to users. (Wikström, 2010)

There are four semantic functions, to describe, to express, to exhort and to identify. The describing function generally describes what purpose the product has, for example "dispensing hand towels" or "disposing waste". The purpose is usually expressed by a familiar form or even archetype, such as a cylinder or cube with a large opening on top for waste bins. The expressing function is more about what qualities the product possesses, for example a stable, elegant or friendly basin. The exhorting function triggers a specific action within the user. A handle for example signals that the user should hold or grab the product at that area. The last function, to identify, is how the user can put the product in the whole context with origin, purpose, relations to brand or other products, placing and category. (Monö, 2004)

3.2 Affective design

Following are different views and theories aside from semantics that describe the psychology behind user product experiences.

One proposed view on how users experience products is that there are visceral, behavioural and reflective levels. The visceral level is the most basic and regards appearance and automatic responses to it. On the behavioural level the function and effectiveness of usage are dominating and within the reflective level the user analyses the product and can put meaning to it which can reflect on self-image and personal style (Norman, 2004). This can relate to exclusive design in several ways. On a visceral level the product can have a pure shape instinctively appreciated by the user and regarded as positive. The behavioural level can offer a pleasurable or exclusive way of using the product. On the reflective level the product can have an appearance that is not solely attractive, but trendy or "intellectually attractive". The reflective level has the ability to "override" the other levels and is the level that imposes the strongest emotional response and relationship with the product (Norman, 2004).

The three levels described above can be loosely compared to a study on luxury perceptions where it is suggested that luxury is characterized by the three components functionalism, experiential symbolism and symbolic interaction (Vickers et al, 2003). Functionalism would fulfil the basic needs of the consumers or pose a solution for their problems, experiential symbolism indicates that the product should be a pleasure to the senses to see and use whereas symbolic interaction enables the consumers to reflect on their own self-image and social development (Lee et al 2011).

Both the above mentioned theories relate to Maslows Hiarchy of Needs, Figure 14. According to this theory the needs of a human is developed in certain levels, and a higher level needs cannot arise until the needs of the lower levels have been satisfied. The levels are, ranging from low levels to higher ones, physiological needs, needs for safety, social needs such as love, need for self-esteem and need for self-actualization. The physiological level contains basic needs for food, sleep etc. The next level regards needs for safety and shelter and when this level is fulfilled needs for social relationships and love arises. These three levels are called the lower levels. The higher levels contain the level with needs for self-esteem and the needs for self-actualization. (Maslow, 1954)
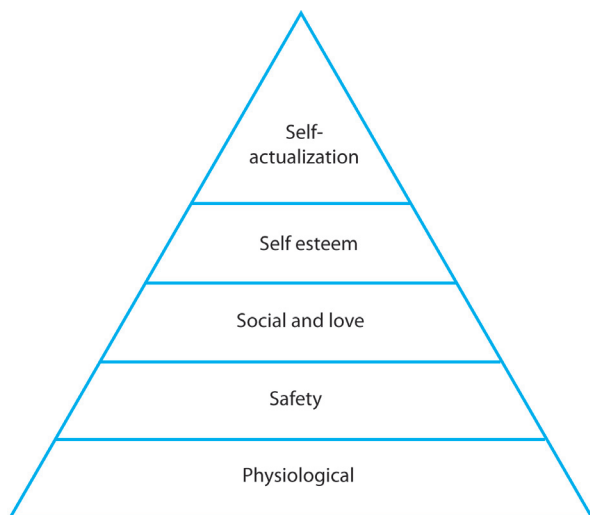
Figure 14. Maslows Hiarchy of Needs.

There is no way of designing universal exclusive products since it is an abstract and subjective emotion (Sangwoo et al 2009). A more general grasp is affective design which explores the user's psychological responses to design. To do so the users affective needs have to be investigated (Demirbilek et al, 2003). Studies have shown that differ-

ences may occur in the designers and users view of exclusiveness. Methods for handling this could be focus groups where attributes related to exclusiveness in the product specific context are investigated (Sangwoo et al, 2009). Further it is of importance to find out what motivates customer to buy exclusive products.

Research on experienced exclusiveness in product interactions is rare but some studies have been made regarding luxury products. A study showed that four motivational forces drive consumers to buy luxury products; materialism, hedonism, uniqueness and perfectionism. Materialism origins from a need of financial wealth and social status which consumers feel are reinforced in them by consuming luxury products. People like to feel different than others and this desire to be unique can motivate luxury consumption. Findings have shown that consumers fill their need to be unique be displaying unusual objects. Hedonism derives from a longing for emotional pleasure. This motivating force is sometimes so strong that it is valued higher than functionalism of products. Strive for perfectionism can arise within consumers who put high standards on themselves. Luxury products is then associated with high quality and performance. (Vigneron et al, 2004)

According to above mentioned theories the project group have found that it is important to understand the driving forces for the target groups and how they base their decisions.

3.3 Washroom usage

It is possible to analyse washroom usage and capacity requirements on hand towel dispensers through different models. One model is to count how many visitors that enters a washroom per time unit, or cubicle per time unit. A difference in visits per washroom or cubicle is important to consider in those cases when customer visit the washroom just to wash their hands and not using the toilets. (Falk, 2012)

3.3.1 Frequency of usage

If there is a large frequency of visitors in short periods in a washroom perhaps more dispensers are put up, and the pressure of capacity on each dispenser is lowered. It is hard to retrieve specific data on washroom usage since the size and usage of washrooms differs a lot depending on what type of building it is located in. It could also vary depend-

ing on culture or even from male to female washrooms, since the usage of urinals results in a shorter time per cubicle which would result in less queuing to the urinals, but perhaps more queue to the sink or hand towel dispenser. In Sweden it is common to have the sink, hand towel dispenser and waste bin in the cubicle, where in other parts of Europe it is more common to have the sink and dispensers outside the cubicles. (Falk, 2012) Since the European market is target in this project it has been assumed that sink and dispensers are located outside the cubicle.

Different types of buildings will have different intervals in frequency of the washroom usage. An arena for example will have few visitors during a relatively long period and then extreme peaks during short periods, for example during breaks. The same thing goes for a café or lunch restaurant, while in a dinner restaurant it can be assumed that all visitors will use the washroom once, but more spread out during evening hours. It is hard to design for an uneven distribution of visitor intervals. In a mall it is not likely that all visitors will use the washroom, and here the spread during the day could be quite wide, but with peaks during lunch and after work hours.

The washrooms frequency of usage will affect the size and amount of cubicles in the washroom. It is common that the amount of sinks will be less or at most the same as the cubicles. For example, one cubicle would probably have one sink outside. But a washroom with ten cubicles would probably not have ten sinks, instead perhaps maybe around five. The amount of sinks will in turn affect how many hand towel dispensers needed, though is important to consider that available space would affect this as well. Again, it can be assumed that the amount of hand towel dispensers needed will be maximum the amount of sinks, but probably less. The fewer sinks there are, the more likely it is that that the relationship sink-dispenser will be 1:1. For example, it is more likely that a washroom with three sinks would have three dispensers then a washroom with ten sinks would have ten dispensers. (Falk, 2012)

3.3.2 Cleaning and maintenance

During previous interviews that SCA have conducted in Europe it has become evident that the capacity of the current waste bin system doesn't seem to pose a large problem. The bin is either emptied or the content compressed when it is time

for cleaning anyway. The driving force for staff to visit the washroom is primarily for general cleaning checks and secondly to refill toilet paper. The frequency of doing this seems to overlap the need of emptying the waste bin or refilling hand towels, which is usually done coincidentally. (Falk, 2012)

For a high end washroom it can be assumed that it is more important that it should not be a line of people waiting for either hand towels, cubicles or sinks at any time, meaning that it is more likely that several dispensers are put up. A single dispenser with high capacity would not help if people are queuing up, as only one person can use the dispenser at a time. It is also more likely that it is important to keep a frequent maintenance schedule with many checks on the dispenser and waste bin conditions, meaning that high capacity of a single dispenser would not be a key driver in purchasing dispensers for high end washrooms. (Falk, 2012)

3.4 Cultural differences

In order to understand differences in exclusiveness experienced during study visits in Europe Hofstede's five dimensions describing cultural values have been studied. The first dimension is power distance which describes how easily formal and hierarchical power systems are accepted. The second dimension is the rate of individualism that is allowed in contrast to collectivism. The third dimension is masculinity vs. femininity where a masculine society values competition, self-confidence and materialism whereas a feminine society values relations and life quality. Uncertainty avoidance is the fourth dimension and can relate to how social life is structured and if there are "rules" embedded regarding for example food or religion. The last dimension is time orientation, which describes how the culture values future compared to past or present time. (Hofstede, 2001).

Regarding consumption or experiences of luxury articles, assumptions in this project have been made that the dimension of individualism and masculinity can be of importance. A high rate of individualism could mean that restaurants, hotels etc. are more likely to express a certain image such as exclusive. A high rate of masculinity would relate to a need of materialism hence also exclusive products.

The calculated index for Hofstedes five cultural dimensions in nations worldwide have previously been calculated by an organization. Looking at

Europe it is evident that generally the masculinity index is low in northern Europe (Nordic countries and Netherlands), whereas it is medium in southwest of Europe (Portugal, Spain, France, Belgium) and medium to high in Eastern Europe (Germany, Italy, Switzerland, Poland, Austria, Hungary). Individuality on the other hand is medium to high in northwest and south of Europe (Nordic countries, Great Britain, Ireland, Italy, France, Benelux, Germany, Switzerland), medium in Eastern Europe (Poland, Czech Republic, Austria, Hungary) and low in southwest of Europe (Spain and Portugal). (www.clearlycultural.com, 2012) Figure 15 and 16 shows the rate of individualism and masculinity in Europe.

1-20 21-40 41-60 61-80 81-100 101-120
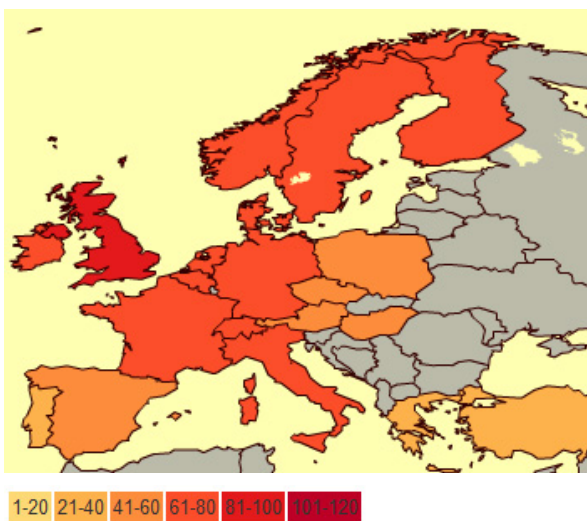
Figure 15. Rate of individualism in Europe.

1-20 21-40 41-60 61-80 81-100 101-120
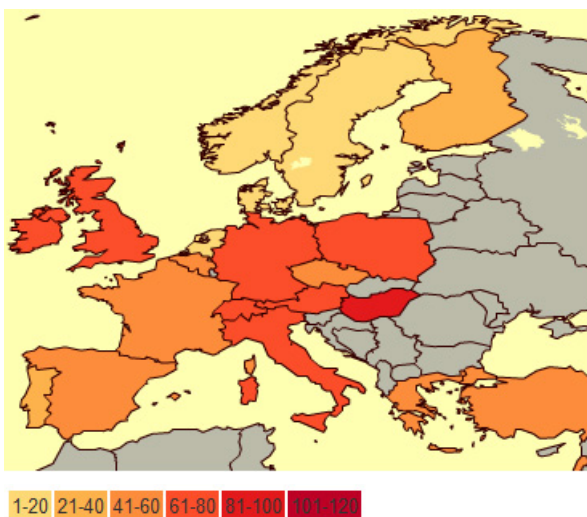
Figure 16. Rate of masculinity in Europe.

3.5 Environment

SCA is expressing a strong wish to work sustainable and caters for that their production will leave as small ecological footprint as possible. A strong focus of this lies in their forest product were they try to plant more trees than they use. Previous thesis work have explored which aspects that is most important for sustainability among dispenser systems and the result shows that in relation to the paper usage the manufacturing of dispensers is almost negligible (Ohliv, 2008). Even so, it is important to consider the environmental aspects of the dispenser production.

An SLCA has been made on the Tork Aluminium line as a reference for this project, Figure 17 (naturalstep.org 2012) As mentioned above it is apparent that paper hand towel usage is one of the major negative factors in the whole system. Paper demands large quantities of forest as raw materials and energy in the felling and production processes. The felling and paper production plants takes up large areas and can cause pollution in the nature. The other major problem is the oil needed for plastic components. Large off shore platforms and production- and refinement plants is needed for this. Again, these plants and platform cause pollution and waste that in worst case can cause disorder in the eco-system. One last problem is the production of aluminium. Aluminium demands large quantities of energy if it primary produced, though if it is made of recycled aluminium it only requires approximately 5% of that energy. Despite these three aspects the production of the Tork Aluminium line has more positive sides then negative.

	Design and development	Raw material and manufacturing	Production	Distribution and packaging	Usage	End of life
Material from crust	Computer (metals, oils, silicon)	Plastics (ABS, BOM, FA) Aluminum Water	Metal for tools Energy Computer (metals, oils, silicon)	Plastic Transportation (Gasoline, diesel)	Water	Recycling plastics Recycling metals
Man-made materials	Plastic additions	Plastic additions Anodizing fluid		Glue Colour for printing	Detergents	
Degradation of nature	Paper	Production plants Oil platforms Pollution	Production plants Waste Pollution	Cardboard Paper	Paper usage	Recycling cardboard Paper waste
Meeting people's needs	Working conditions	Working conditions	Working conditions	Working conditions	Working conditions	Working conditions

Good	Quite good	OK	Quite bad	Bad	Don't know
All positive	Mainly positive	Some positive	Mainly negative	All negative	Insufficient information

Figure 17. SLCA of Tork Aluminium line.

4.   Interim result

In this chapter interim results from the early research phase to the final concepts are found.

4.1 Target group

The target group for the dispenser line can be divided into three segments, architects or interior designers that propose dispensers for their clients when building or rebuilding washrooms, the person responsible for buying the dispensers and the end user who will use the dispenser.

4.1.1 Architects and interior designers

In the process of constructing a new building it is architects or interior designers that are responsible for suggesting washroom interior, including dispensers. The line between architects and designers is fuzzy since they often work close together so both interior designers or architects can be responsible for the actual proposal of dispensers (Atlassi and Tolic, 2012). Interviews with architects from Sweden and Poland together with material from earlier interviews by SCA with architects from Australia, Germany and France have been summarized. The material was consistent and showed that the interior of the washrooms is somewhat neglected. Often it does not reflect the architect's intention with the design of the building as a whole. The wholeness or holistic view of architect's means that in many cases

the dispensers are supposed to blend into its environment and sometimes they should stand out.

4.1.2 Buyers

The person responsible for purchasing washroom products is often driven by economic barriers. The washroom dispensers are not generally regarded as high priority and are easily victims to cost optimization. (Atlassi, 2012)

4.1.3 Users

There is no exact information available of the users of the product so following reasoning has been conducted for the project.

The users are those who will visit the building, it can be hotel guests, shoppers, business men and women at conferences, visitors at airports or museums etc. The profile of the end user will therefore depend on the image the building have and the clientele it strive to attract. These users probably expect a high quality standard corresponding to the building image. In this group maintenance staff is also included.

4.2 Usage situation

To find out the potential problems and the capacity needed for the dispensers an usage study was performed. This study includes an analysis of the actual interaction with a dispenser and theories about washroom usage in general.

4.2.1 Usage interaction

To find out what the usage situation looks like on the existing dispensers, different methods have been used. First two HTA were created, one for "Clean hands" and one for "Refill hand towels", Figure 18.

The CW and PHEA gave a picture of the potential operational errors that could occur during the interaction between the user and the product, why they occur and what the imply of these. This enabled an early assessment of the product. The methods show that there are not that many serious problems that can occur and most of them only appear for a first time user. The biggest problems seem to be to extract paper hand towels in those cases when this function could be a bit hidden, such as behind glass mirrors. If the waste bin is placed low and behind a board with a hole it could also be problematic to find. New users often face problems with sensor based solutions. Completed CW and PHEA can be found in Appendix 1.

4.2.2 Washroom usage

Considering the models mentioned in chapter 3.3 combined with capacity data from SCA collected from washrooms in Europe the following reasoning could be drawn. Data indicate that low traffic washrooms would have up to 150 visitors per washroom and eight hour period, and medium traffic would have up to 500 visitors per washroom and eight hour period (Larsson, 2012). If it is assumed that each washroom have five cubicles on average and a five cubicle washroom would have three sinks and two paper hand towel dispensers, each dispenser would have to serve maximum 250 persons per eight hours if the usage of the dispensers are evenly distributed on the two dispensers. If each visitors use on average 2.4 hand towels, (Larsson, 2012), 0-600 hand towels would be used during an eight hour period. Today, all SCA hand towel dispenser lines can be filled with approximately 2 ½ bundles of paper hand towels of premium quality. One bundle of Tork Premium Extra Soft paper hand towels contains 100 towels, so the dispenser would have a capacity of 250 paper towels. It is likely that cleaning staff would maintain the washroom and refill the dispensers at least two times during the eight hour period, meaning that there should not be any problems with the capacity of the dispensers today.
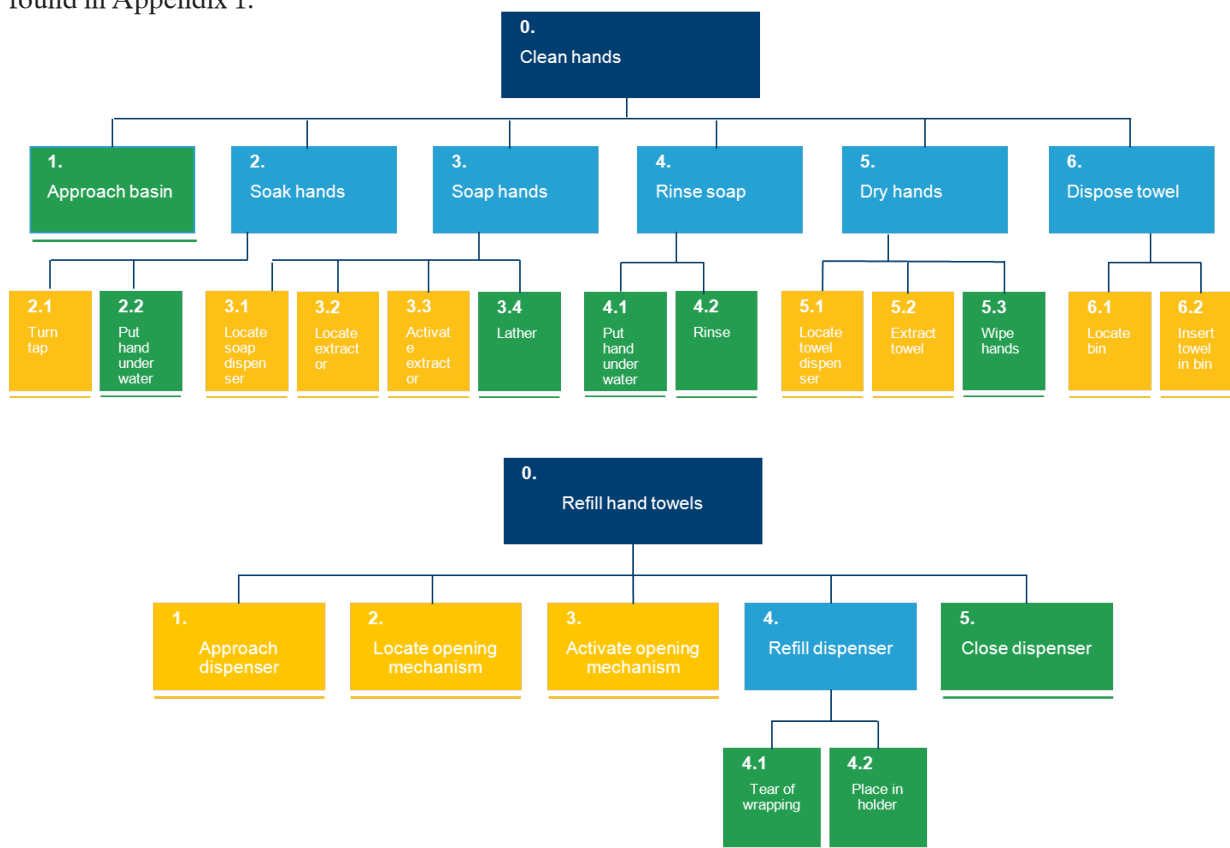
Figure 18. Hierarchical Task Analysis, HTA.

One important aspect to consider is also how the proportion between the waste bin and hand towel dispenser relates. The best scenario would be if the capacities match, so the waste bin is full when the dispenser is emptied. In order to see what this relationship looks like today a test was done at a SCA office. A hand towel dispenser from Tork Elevation was filled with two and a half bundles of Tork Premium Soft hand towels and the cleaning staff was told to not refill the dispenser or empty the waste bin. When half a bundle was left the waste bin was full. The content was then pressed together making the bin only half full and a new bundle of hand towels was added in the dispenser. When another bundle had been used the bin was full again. Again it was possible to press down the content, this time to two thirds. Even though there was space left in the bin it could be assumed that the cleaning staff would change waste bin bags by this time. This would mean that approximate three bundles of premium paper hand towels will fit in Elevation waste bin, which has a capacity of fifty litres, assuming that either a cleaning staff member or user would press the content at least one time. If no one presses down the content a fifty litre waste bin could contain two bundles of hand towels. A bundle of Tork Premium Soft hand towel paper has the dimensions 130x85x212 millimiter, which gives

an volume of around 2,34 litres. In the worst case scenario no one will press down the content of the waste bin, and this would mean that two bundles of total 4,68 litres will fill a fifty litre waste bin. One bundle will need twentyfive litre when used and the proportions would be around 1:10, meaning that one bundle of unused paper hand towels need ten times its own volume of waste bin. In a more likely scenario three bundles will fit into a fifty litre waste bin, meaning that one bundle will need 16,67 litres of waste bin. In this case the proportions will be around 1:7. If the waste bin has a volume of forty litre it would mean that around 2,4 bundles of paper hand towels would fit if it is assumed that the content is pressed down once.

4.3 Washroom mapping

In order to analyse present trends and what exclusive washroom looks like today study visits have been made, both within Sweden and in other parts of Europe. Access to images from previous projects at SCA has also worked as a base for the washroom mapping. The study visits have given a clearer picture of the environment that the future product is supposed to operate in. Study visits have taken part in Stockholm, Gothenburg, Paris, Berlin and Warsaw. A summary of the information gathered from
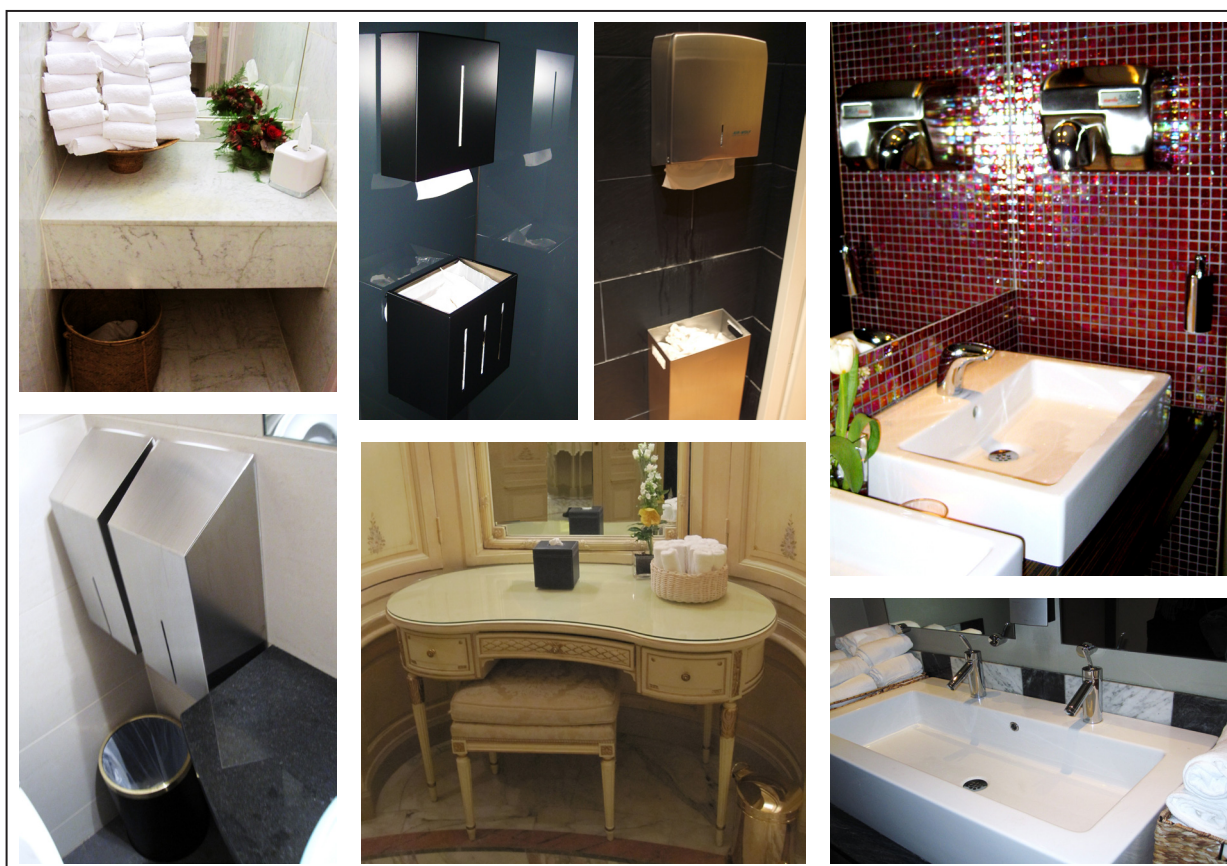
Figure 19. Inspiration from washroom mapping, from top left: Paris, Gothenburg, Berlin, Gothenburg, Stockholm, Paris and Stockholm.

each study visit could be found in the following text and Figure 19 show examples of visited washrooms.

4.3.1 Stockholm

In Stockholm five hotels in the exclusive or luxury category have been visited along with the washroom at a conference centre and several high end restaurant washrooms. The overall style has been strict with simple squared shapes and the colour scheme has been kept to black and white with a few splashes of colour. Commonly occurring materials are stainless steel and plastic and entirely wall mounted or floor standing dispensers.

4.3.2 Gothenburg

In Gothenburg, a new exclusive hotel along with other hotels, chain stores and a variety of restaurants have been visited. The style of the washrooms was similar to the ones visited in Stockholm, with the expectation of Avalon which had many colours in the design. The standard of the washroom varied surprisingly much during the visits, even considering that some buildings had slightly different target groups. One of the restaurants visited in Gothenburg had used storytelling when they had decorated their restaurant and their washroom.

4.3.3 Paris

In Paris the hotels have had a more flamboyant interior design than the hotels in Stockholm and Gothenburg. The washrooms felt more personal and there were often places where the customer could sit down and relax or put on makeup. The style was romantic with rounded shapes, yellow colours and floral patterns. Most of the washrooms had cotton towels instead of paper towels piled on the counter and wall mounted dispensers were rare. A common colour was light yellow and rounded shapes were popular as well as brass coated materials and marble.

4.3.4 Berlin

In Berlin, washrooms at restaurants, art galleries and medium standard hotels were visited. The style was most similar to the style found in Stockholm but less exclusive. Common material was plastic and the dispensers were wall mounted with waste bins on the floor.

4.3.5 Warsaw

Paris and Warsaw were close in style with regards to colours and shapes. Shopping malls, high end hotels and restaurants where visited and at several places recessed dispensers could be found.

4.3.6 Summary

The study visits have shown on big differences in interior design from country to country, which put high demand on a dispenser to blend in. The dispenser should work at stricter and colour less design, as well as in washrooms with more colour and circular shapes.

4.4 Trend analysis

To complement information gathered from study visits and to find out inspiration from trends of today's washrooms, two different fairs have been visited. During the fairs interesting materials and shapes where documented. Examples of pictures taken at the two fairs are found in Figure 20. First out was the Stockholm Furniture Fair 2012 at Älvsjömässan in Stockholm. The Stockholm Furniture Fair focus on Scandinavian design but there are also exhibitors and visitors from other parts of the world, this year the fair had almost 40 000 visitors (www.e-magin.se, 2012). The fair gave a view on new trends and lifestyles options in a variety of contexts. As the Stockholm Furniture Fair has a variety of furniture for both private and public sectors the amount of washroom exhibitors were limited. Vola AB, Höganäs, DuPont, Duravt and Hillab were some of the washroom exhibitors that could be found at the fair. Even though the supply of washroom exhibitors was limited the fair was a good way to find out general trends in interior design when it comes to materials, shapes and colours. Natural materials and especially light coloured wood was very popular at the fair. Another trend was both expected and unexpected material com-binations. Wood in combination with leather, steel, textile or glass could be seen a lot. Along with the materials the colours also had a neutral appearance. Many of the exhibitors used light in different ways in their designs. The trends in washroom design were simple shapes and natural materials and colours.

The second fair visited was the washroom fair at Ideo Bain in Paris. This fair was only for washroom exhibitors and most of them where focusing on private use but there were also some exhibitors that aimed for the public segment. Similar to the Stockholm Furniture Fair natural materials and colours could be found here as well, though not in the same extent. In contrast it was more common with dark wood than the light wood found in Stockholm. A common material was Corian in white or black, with other variations available. A supplier of recessed dispensers for a more exclusive market was found and their products where made out of stainless steel and had rectangular shapes. They had a whole product family for public washrooms such as hand towel dispensers, waste bins, soap dispensers, hooks, toilet brushes etc.
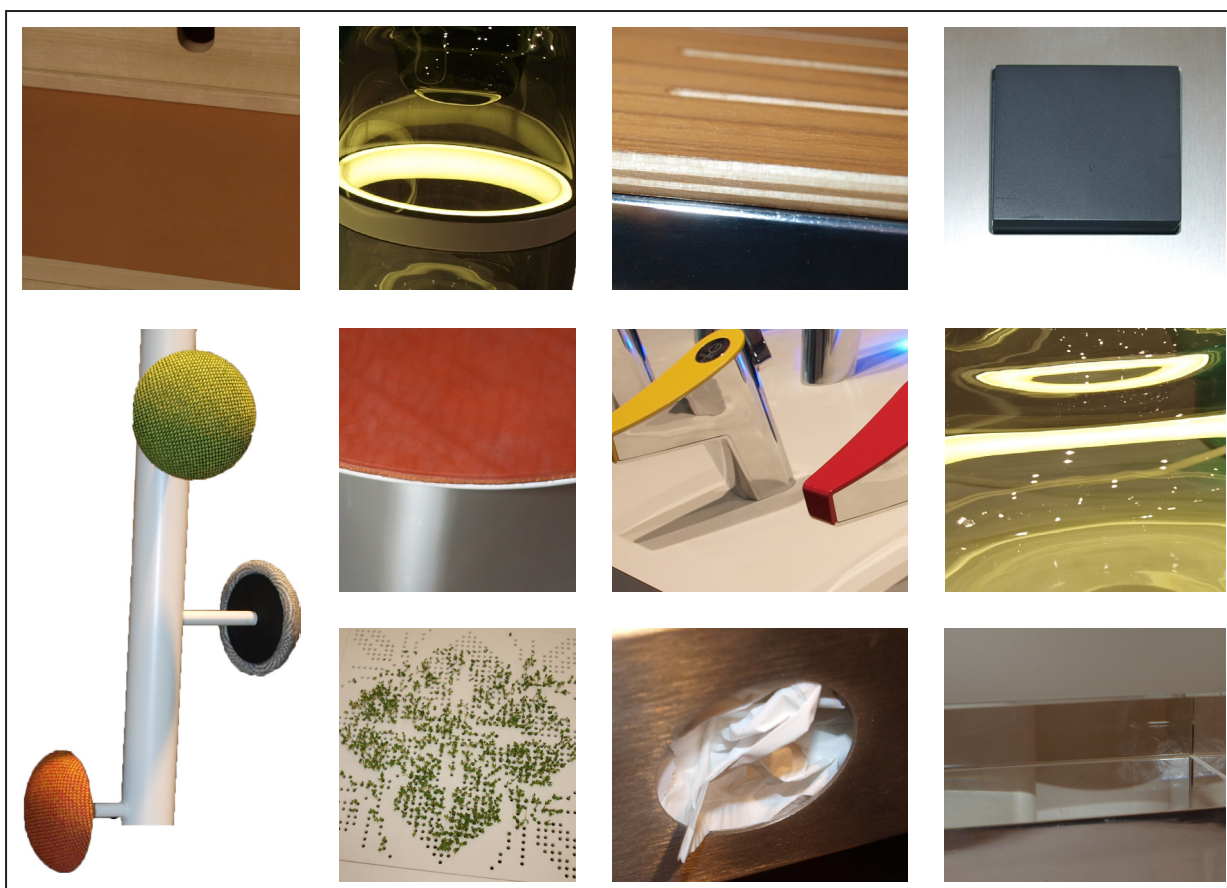

Figure 20. Inspiration from furniture fairs.

4.5 Cultural differences

Study visits, interviews and articles have shown on cultural differences in interior design trends and the perception of exclusiveness. A washroom that is seen as trendy in one country could be totally wrong in another. Visits to Paris and Stockholm have for example shown that high end washrooms in Paris often have marble and brass material, yellow and mild colours and rounded forms while the exclusive washrooms in Stockholm are stricter, with white, black and contrast colours, straight lines and stainless steel or aluminium.

4.6 The architectural view

During the research part of the project meetings and interviews have been held with architects both in Sweden and other parts of Europe. Information has also been gathered through earlier compilations of interviews with architects from France, Germany and Australia conducted by SCA. This was done in order to get a good picture of today's trends in the field of interior design, how architects view exclusiveness and on what they base their decisions. The results have aided in the later design work and made important questions clear about this critical stakeholders. For the interviews an interview form has been used, Appendix 2. The interviews were semi-structured with some main questions as guides but with opportunities for follow up questions and elaborations. Below is a compilation of the questions and answers during interviews and information found in earlier interviews, for more details see Appendix 3.

- What do architects base their decisions on while designing for public washrooms?

Often the architect tries to reflect the exterior of the building in the interior design in order to create unity. This means that one must consider the image and expression of the whole building while designing for the interior. In most washrooms the dispensers should blend in with the environment whereas they should act as accents to the interior in other. One of the architects said that in the end it is all about making the customer happy, meaning that sometimes architects need to put aside their own preferences for the sake of making the client satisfied. It is important to design for future trends since building projects can take several years and the design should be attractive even years after finished construction. It seems like trends start in public interior design, moving to private homes later.

Cost and the ability of customization also seem as important parts in the decision process. Architects find personal contacts with product suppliers important in their work. They also find it easier to corporate with companies that have architects as their main target group

- Which channels for inspiration do architects use?

Fairs, internet, sales representatives, databases such as Architonic, magazines, colleague, own list of companies and catalogues was mentioned as media for inspiration.

- What is trendy in public washrooms today?

Trends usually start in the public sector and then transfers to the private sector. Natural material and mild colours are becoming more popular and one of the architects thought that the trend was moving away from the bright and strong colours. Some architects mentioned trends in sensors and in recessed dispensers. Free standing dispensers, large mirrors with integrated light, the waste bin as a hole in the surface, shiny or chrome materials was also increasing. Natural materials such as stainless steel, glass, aluminium and wood have a timeless touch that always is considered trendy or right.

- What is exclusive according to architects?

Simple shapes with effort on details and materials, Corian, porcelain, plastic in the right way, natural materials, mild colours, stainless steel, classic, well worked design and products with quality. Some of the architects mentioned that "to let me feel as someone special" was important when it came to exclusive products. The view on exclusiveness seems to differ depending on cultural background. For example architects from Poland and Frence where more positive to gold and marble than architects from Sweden.

- Are recessed or surface mounted dispensers pre ferred?

When integrated dispensers are proposed the suggestion is often turned down in Sweden due to high costs. There is a common view that integrated dispensers give a clean, exclusive and subtle impression and are relatively easy to blend in. It was mentioned that recessed dispensers are more useful and less imposing on the "final look", but that surfaces mounted dispensers could be better in some wash-

rooms.

- Are sensors or manual dispensers preferred?

Sensor dispensers, with electronic sensors activating automatic feeding of paper, are easy to keep clean but it can be difficult to make them intuitive. In public, sensors are used more since they are hygienic, whereas manual dispensers often are preferred in more private areas. Most of the architects thought that sensor dispensers were better due to hygienic reasons.

- Additional information and recommendations.

Some architects recommended combinations of materials in unusual ways and using old materials in a new context as ways to create an intriguing but still timeless design. They recommended to work with materials and not with flashy shapes and that the product should be a part of a context, also that the context should be in focus rather than the product. They suggested using natural materials and taking users with impaired vision into consideration. Some architects said that there are differences in the definition of exclusiveness in different countries while some disagreed.

4.7 Design analysis

As a foundation for the later design work a design analysis of the brand Tork was conducted. The different parts of the analysis are shown in this chapter.

4.7.1 Product lines

Tork has five key product lines in Europe at the moment. The line "Elevation" targets public washrooms. The "Tork Aluminium" line target mostly washroom but also have products in the restaurant sector, where also "Xpressnap" is a key product line. For industrial and heavy duty environments the "Performance" line has been developed. The four product lines can be seen in Figure 21. The product lines that have been used as references in this project are "Box 2000", "Elevation" and " Tork Aluminium".

Figure 21. Tork's key product lines.

4.7.2 Brand identity

Tork has during recent years exchanged their brand values to a more conceptual approach on how to get a close relationship with their customers. The older versions of the words were "Attentive", "Close to customer", "Open", "Sharing", "Caring", "Warm" and "Generous". (www.sca.com, 2012)

Within the Tork brand structure three product levels are embedded. There are three systems that targets different groups and are named "Universal", "Advanced" and "Premium". "Universal" is a level that covers basic needs and is said to have a standard performance. The "Advanced" level offers effective systems with higher functionality and quality. The "Premium" level is marketed as the highest quality system which is the best one available and offers style and best cost-in-use. (www.sca.com, 2012) The three levels is mostly apparent on the quality of the paper hand towels but it is also possible to differentiate target groups for the dispenser lines. "Box 2000" target more basic needs whereas "Elevation" claims to be "lifting everyday washrooms". The "Tork Aluminium" line aims to target image environment with higher profile. With regards to this the "Elevation" and "Tork Aluminium" lines are found to be the lines with most significance for this project.

4.7.3 Design format analysis

During a design format analysis of the Tork brand the design history of the dispenser lines ranging back from the early Tork dispensers to the Tork Aluminium line was analysed. The analysis showed that the early dispensers, Box 2000 and Elevation have a well worked design DNA that exhibits consistency. Several explicit cues are re-occurring and the implicit cues match the Tork brand identity. The Aluminium line however doesn't have any implicit cues that coincide with the rest of the products, whereas a few of the explicit cues are consistent. The inconsistency has its natural causes; it is a premium product line that is supposed to be distinguished from the rest of the range.

The development of the explicit cues can be seen in Figure 22 to 26. Important curves or form elements were drawn on pictures of the existing products and then transferred to another paper.

The elements that have been found to re-occur in several dispenser families have been investigated in order to find out which elements that are mostly
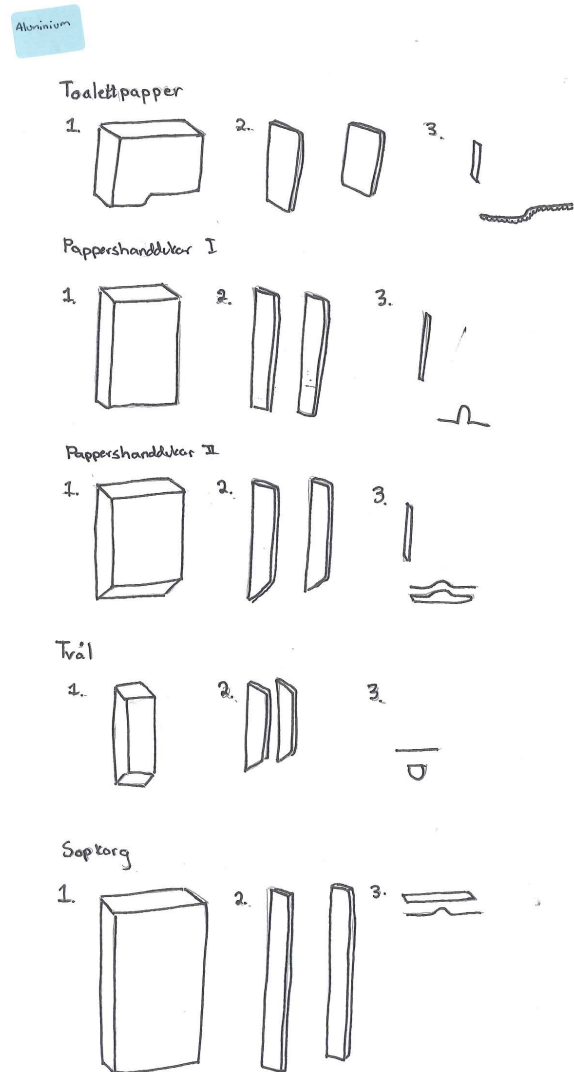
Figure 22. Explicit cues for the Aluminium line.
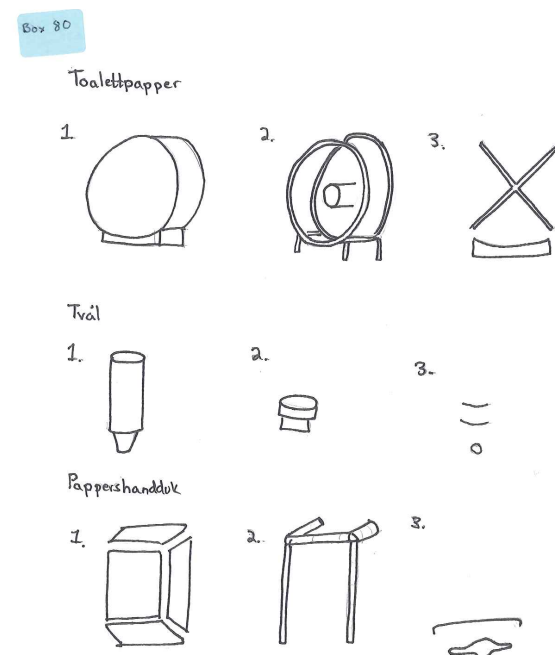
Figure 23. Explicit cues for the Box 80 line.
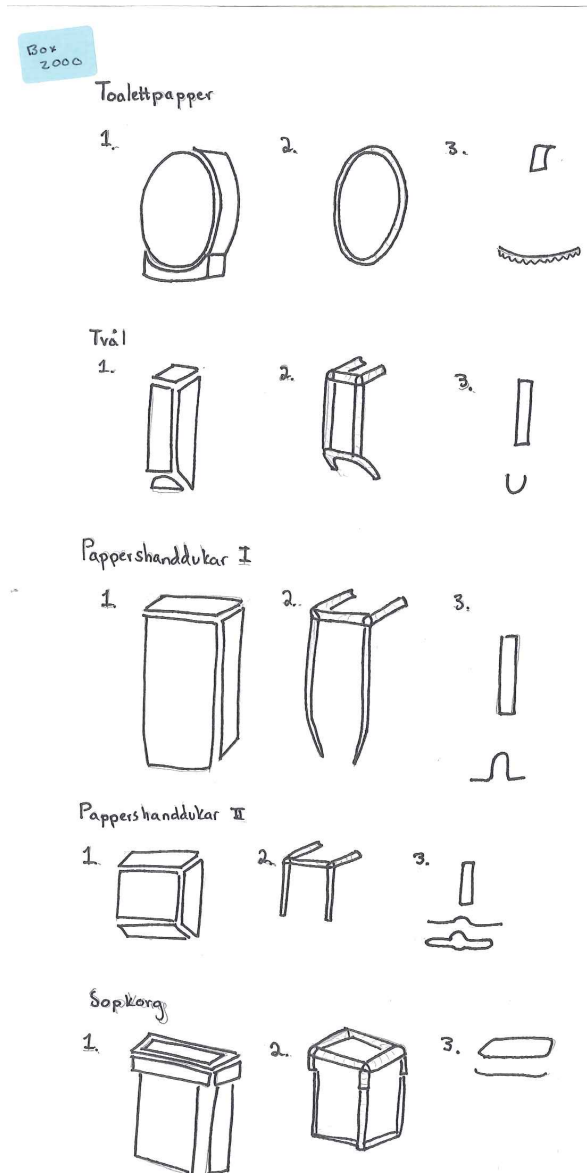
Figure 24. Explicit cues for the Box 2000 line.

Figure 26. Explicit cues for the Elevation line.

Figure 25. Explicit cues for the Box 90 line.

associated with Tork and which dispenser range that expresses these elements to a high extent. In some cases data was missing from the early product families and these have not been included in the analysis in these cases. There were also insufficient material of the waste bins in some of the lines and in these cases the waste bins have been excluded from the study.

The product families have been investigated with regard to the type of dispenser as well as the family as a whole. In Figure 27 the result for the hand towel dispensers is visible. Here it is evident that deep cut out, rectangular shapes, big radius and vertical axis are prominent. The Box 2000 family is exhibiting the most of the design elements closely followed by Elevation and Box 90.

For the soap dispensers it is the vertical axis, contrasting materials, clean forms and semi-circular push button that are the most used design cues. Box 2000 and Elevation are found to be the lines with

most typical Tork soap dispensers, Figure 28. As for toilet paper again Elevation and Box 2000 expresses most of the cues. Transparency, circular shapes, basic volume combinations and smooth teeth are the most common design cues, Figure 29.

The total occurrence of design cues put together can be found in Appendix 5. A summary of the five most prominent design cues is found in Figure 30.

The implicit cues discovered in the range, excluding the Aluminium line, were found to be "Friendly", "Open" , "Airy" ,"Inviting", "Playful", "Safe" and "Clean". These cues correspond well to Tork's brand expressions. The Aluminium line in turn was found to express attributes such as "Elegant", "Cold", "Hard", "Anonymous" and "Masculine". Explicit cues that were found to be common over the product range were leaning bases, big cut outs, smooth teeth, clean forms, movement in lines, basic forms such as rectangular or circular forms and transparent windows or indicators. For the product
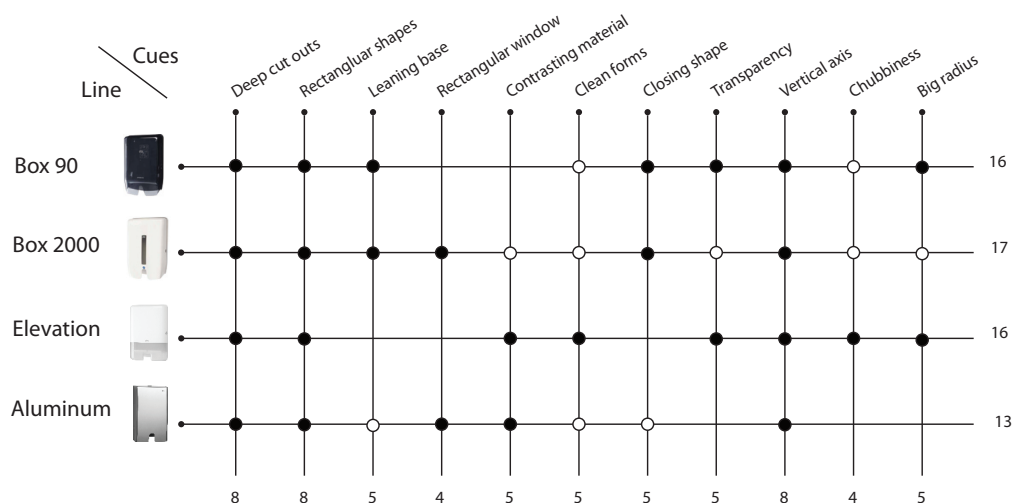
Figure 27. Design format analysis of Torks hand towel dispensers (Warell et al, 2002).
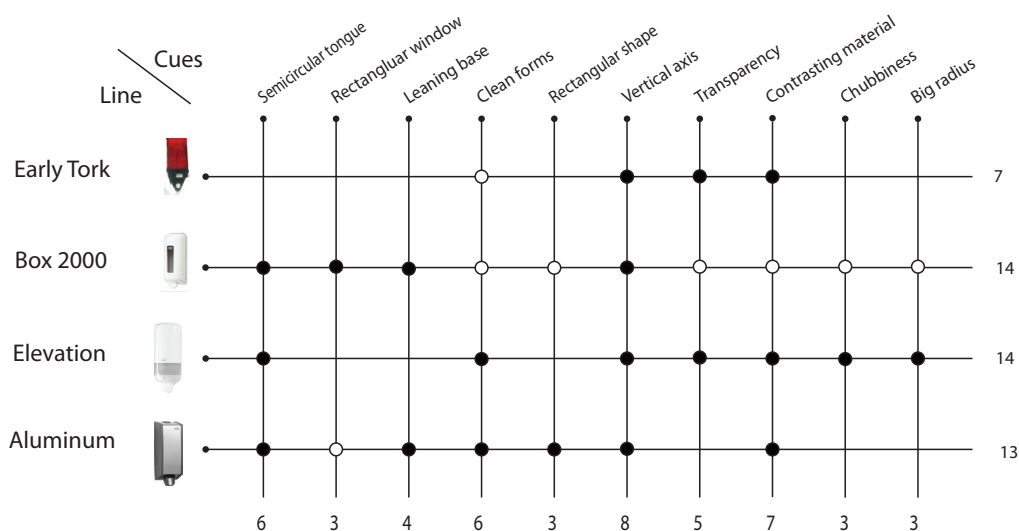
Figure 28. Design format analysis of Torks soap dispensers (Warell et al, 2002).
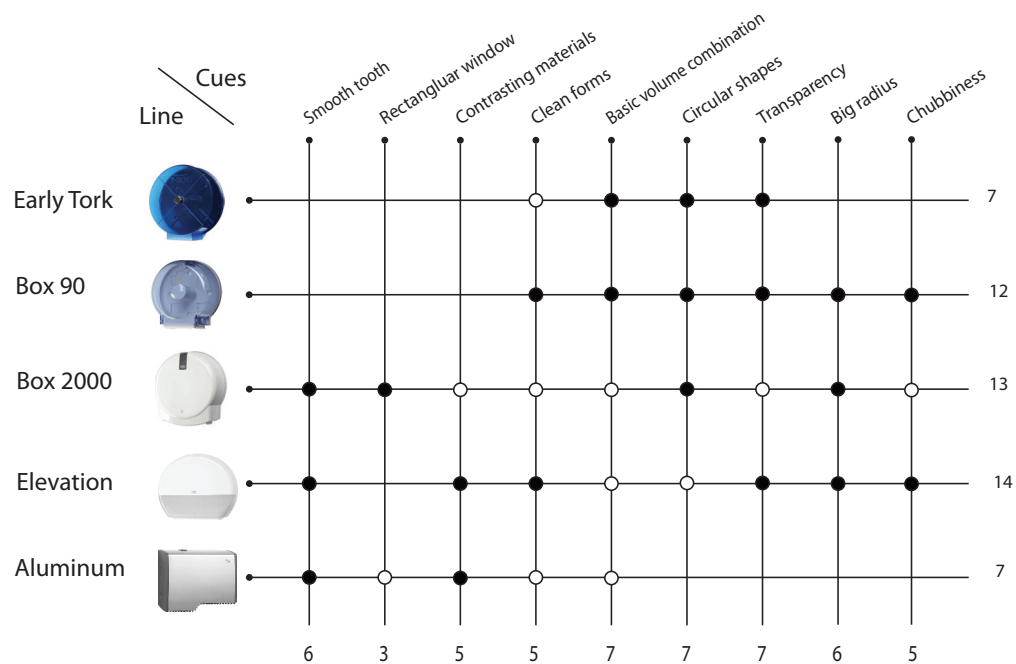
Figure 29. Design format analysis of Torks toilet paper dispensers (Warell et al, 2002).

Explicit cue	Occurrence (out of 26)
Clean form	18
Vertical axis	18
Contrastring material	17
Transparency	17
Big radius	14

Figure 30. A summary of Tork's five most prominent design cues.

families excluding the Aluminium line the attributes big radius and chubbiness were also common. The product type that had the least consistency was the waste bin, whereas the hand towel dispenser had a clear consistency.

4.7.4 Competitors

To get a picture of Tork's market position, different competitors have been investigated. Some of them are part of the European market and some of the American. To give an overview of the position two repertory grids have been created, Figure 31. Summaries and product pictures of the investigated competitors are found in this chapter.

Vola

Vola is a relatively small Scandinavian company famous for its simple and elegant design and is one of the leaders when it comes to contemporary design of dispensers, Figure 32. The company is owned and established by the family Overgaard in Denmark 1873. In the seventies the company started collaborate with the Danish architect and designer Arne Jacobsen; this was the start for Vola's design line that they still have today. One of Vola's strengths is that they have a complete range of product for washrooms; this makes it easier for architects to create a holistic impression of a washroom. They are not distributors of paper and soap, only for dispenser. (www.vola.com 2012)

D line

D line is a Danish design company established by Holscher 1971 in Denmark. They produce washroom dispensers along with ironmongery for high end segments such as hotels, residential homes and public areas. (www.dline.com, 2012) D line is seen as an important competitor for Tork in the high end segment. Their products are minimalistic with simple shapes and lines and produced in stainless steel. D line is similar to Vola in their design and they also have a wide range of products for both public and private washrooms. Figure 33.
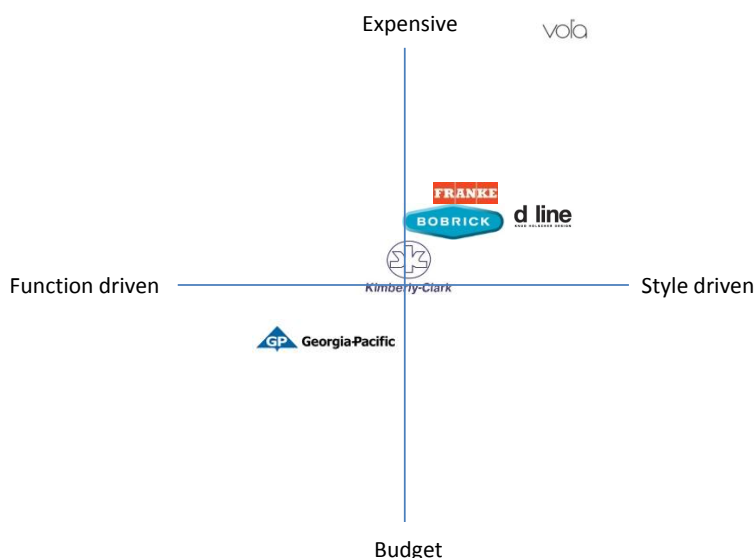
Figure 31. Repertory grid.

Figure 32. Example products, Vola.

Figure 33. Example products, D line

Bobrick

Bobrick is one of the biggest manufacturers of dispensers in North America and was founded in 1906 by George Augustus Bobrick. From the beginning Bobrick was manufactures of different commercial products such as waxes and ammonia and to promote their products they started to produce dispensers. Bobrick was the first company to introduce wall-mounted dispensers, lather dispensers and recessed multipurpose dispensers on the market. (www.bobrick.com, 2012) Their design is strict with straight lines, squared shapes and cold colours. Most of their dispensers are made in stainless steel, Figure 34.

Figure 34. Example products, Bobrick.

Franke

Franke started as a producer of stainless dispensers in Switzerland in 1911. Today Franke exist on all continents and the concern contains in total 60 companies divided in four divisions. In Sweden the companies Franke Futurum and Franke KS Sweden are a part of the division Kitchen Systems. (www.franke.com, 2012) The products from Franke are similar in desin to Bobrick. They produce both wall mounted and recessed dispensers in stainless steel, Figure 35.

Figure 35. Example products, Franke.

Kimberly-Clark

Kimberly-Clark was established 1870 in Wisconsin, they are big producers of tissues and are the company behind many famous tissues brands such as Kleenex, Scott, Kotex, Depend. They are found worldwide and their products are sold in more than 175 countries. (www.kimberly-clark.com, 2012) Their product range includes mostly wall mounted dispensers in plastic materials, Figure 36.

Figure 36. Example products, Kimberly-Clark.

Georgia Pacific

Georgia Pacific is a United States based company, in Europe they are known as Lotus. The company is one of the world's leading manufacturers of tissue, pulp, paper, packaging, building products and related chemicals. They are one of Europe's leading producers of soft paper products. (www.gp.com, 2012) Their dispensers are mostly made in plastic and are not targeting the high premium segment, Figure 37.

Figure 37. Example products, Georgia pacific.

4.7.5 Exploring Exclusiveness

One workshop was held with six employees and master thesis workers from the design apartment at SCA in order to develop the concept of exclusiveness and how Tork could work with an exclusive image. The workshop duration was approximately two hours and the main theme was exclusiveness. During the workshop the participants first had to associate around three words; exclusive, genuine and innovation. The words genuine and innovation were chosen to broaden the view and to see if these words related to exclusiveness. When the word exclusive was discussed all of the participants were unified that exclusive were extreme in some sense and could often fit on both sides of a scale but never be neutral. Example of opposites that were mentioned were worked through or raw, personal or impersonal, low or high usability, high or low maintenanc needs and robust or fragile. The participants also discussed that cultural differences will greatly affect what people find exclusive or not. Association words that come up when the word genuine was discussed were for example simple forms, well known, heartily, true, personalised, tradition, rusti-

cally and honest. The word innovation generated words as; patent, solution, simple, in a new way, hyped, new way of thinking and change habit.

After the association words, the participants were asked to give examples of what they found not exclusive. Examples of words that came up were over explained, poor and noisy sounds, plastic, 3 for 1 deal, over the top and laminate.

As a second exercise the participants were shown pictures of 9 different espresso machines, Figure 38. The reason why espresso machines were chosen was that they belong to a hygienic segment without risking bias, as the use of direct competitors in the washroom segment could cause. The participants were asked to say if they found the product exclusive or not and why. When they had discussed all of the products they had to rank them from the most exclusive to the less exclusive. The winning concept was number 5 and the least exclusive was number 4. Some of the reasons why they chose number 5 was because they really liked the wooden handle

Figure 38. Espresso machines shown at workshop. They were ranked in the order 5, 9, 6, 3, 1, 7, 8, 2, 4 where 5 was seen as the most exclusive and 4 as the least exclusive.

and the soft organic form. Some thought that the uninterrupted curve form on the back looked nice and that it would have been a bit boring without it, while other thought it was least attractive. The whole product was found well balanced and made with quality, which showed for example in the neat split lines. The lowest rated espresso machine, number 4, got only negative aspects such as; too much transformer, looks like a helmet, big, clumsy and terrible. The water container on this machine did not seem to fit with the rest of the product.

After the ranking of products the participants got 9 pictures, Figure 39, of different washrooms that they were supposed to rank in the same way as they had done with the espresso machines. Through lively discussions the participants agreed that F was the most exclusive washroom and H the least. A comment about the best washroom was "the overall appearance of washroom F was cool, but the different parts of the washroom would not have been interesting on its own". The worst washroom got the comment "H was the worst of them all, espe-

cially the dispensers, they did not fit in at all. Visible radiators and waste bins on the floor made it even worse. Although the separated sinks were a small plus". It was only washroom F that the participants found really exclusive. The rest failed due to the use of "multi-tap-sinks". The participants thought that washrooms feel more exclusive when the sinks are separated from each other. They also found it important to separate between exclusive and stylish washrooms. These results seem to support the materials gathered from SCA.

In the end the participants were asked to sketch different ideas and to help them they were given association words and material options.
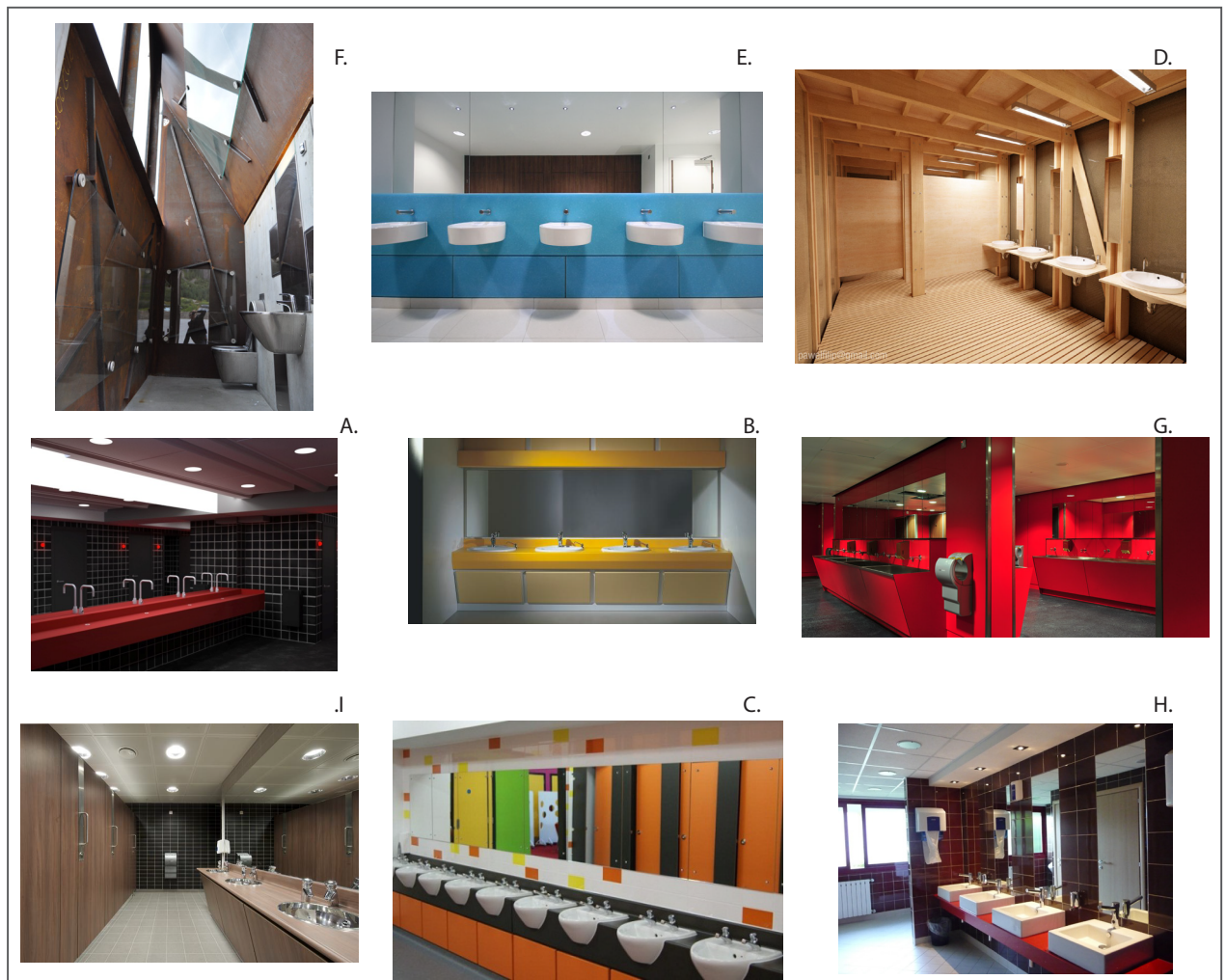
Figure 39. Washrooms shown at workshop. They were ranked in the order F, E, D, A, B, G, I, C, H where F was seen as tje most exclusive and H as the least exclusive.

4.7.6 Exclusive Tork - Key attributes

After the design format analysis it was clear that Tork had a split identity, where the more premium Tork Aluminium line differs from the other product lines. In order to support this conclusion and to create new key attributes a second workshop was held, this time with staff from the marketing department at the AFH segment at SCA. The participants did mindmaps for the words exclusive and Tork, on their own and then presented the outcome in a group discussion, this to minimise the risk of participants colouring each other's thoughts. The workshop ended up with an exercise where the participants had to find out which archetypes, described in chapter 2. that they thought that the exclusive line from the brand Tork should be connected with. The participants were given a paper with twelve archetypes and explanations about them, Figure 9. They were asked to choose three that they thought the exclusive line should be associated with. The ones that were chosen were "The creator", "The powerbroker", "The wise", "The loyal" and "The adventurer". Two of the participants chose "The creator" as number one and two chose "The powerbroker" as number two and all the participants had chosen "The wise" as their third option.

Both this workshop and the previous one supported a decision that an exclusive line must be distinguished somewhat from the other range. It was still unclear which attributes the new exclusive line should express, but after analysing discussions and answers on exercises during the workshops some key words stood out. Previous interviews with Australian architects performed by SCA aside with own interviews with Swedish architects also supported the process of choosing these expressions. The chosen key attributes were "Classic", Genuine", "Simplicity", "Inviting", "Visionary" and "Scandinavian", Figure 40. Classic and visionary aims to achieve a timeless design that also adds a twist that make the dispenser more interesting. Visionary is also inspired by the architects that need to design for future trends that feel new years after the first draft. "Genuine", "Scandinavian" and "Inviting" connects the new line with the Tork brand. These expressions are close to Tork's key attributes like open, warm and caring but still stand on their own.

4.7.7 Observations

To find out how the existing dispensers are maintained an observation was performed with a member of the maintenance staff at SCA. By following and observing the staff and through open discussions a better view of the maintenance process was gathered. Through the discussion it came out that sensor based design is found to be easier to maintain, they require a little more work while refilling but needs to be refilled more seldom. The staffs at SCA does not use indicators to see how much it is left in a dispenser. Instead the staff found it easier and quicker to just open it, as the dispensers are not locked at SCA. The whole interview and analysis of the usability test can be found in Appendix 5.

Visionary	Scandinavian	Classic	Genuine	Simplicity	Inviting

Figure 40. New key attributes.

4.7.8 Moodboard

The mood board used as inspiration for the design process and its key attributes can be found below, Figure 41. Simple, clean shapes relate to Classic, Genuine and Simplicity. Surprising form elements found in the left side of the board relates to Visionary expressions. Naked steel, leather and clear glass indicate genuine materials and the pictures in the top left and to the right have an Inviting feeling. The overall use of simple shapes and natural colours in an innovative way relate to the Scandinavian expression.

Figure 41. Moodboard.

4.7.9 Target context

During the project a larger understanding grew for the architect's view of a holistic process involving people and their environments. It was therefore decided to develop scenarios involving usage situation, user profile and target environments together as a unity. Since the targeted user is a quite broad group three different scenarios were put together. Designing for three different targeted environments was expected to pose problems and therefore the first scenario presented is the main one for the project, whereas the second and third functions as supporting scenarios where it would be favourable that the final concept could work as well. The compositions were based on inspiration from visits to washrooms and high end buildings.

The rushed career woman

Amela is 36 years old and in her mid-career. She is at the strictly decorated lobby washroom at a large company on Manhattan and has 5 minutes before her interview with the prestigious interior firm begins. For Amela perfection and efficiency matters and that includes a refreshing at the washrooms. The first thing she does is rushing into the second most far away cubicle, she reckons that one is the least used one. After finishing she washes her hands at the basin in front of the mirror and dries her hands with a hand towel from the dispenser. A quick scrutiny in the mirror with some additional lipstick and adjusting of the hair and 4 minutes after entering the room she is out and ready for meeting her future employer, Figure 42.

Figure 42. Example washroom.

The cultivated enjoyer of life

Ethan strolls into the washroom at the famous design museum in Moscow and enjoyably lets the eyes pass the interior with its flowing lines and figu-rines. Ethan loves art, and after 30 years of working experience in the art auctioning business he is good at it. After a career filled with stress and tension he has learned to relax and enjoy his free time. After using the toilet he washes his hands at the rock basin and closes his eyes while the water flows over his fingers. After drying his hands he casually strolls out again with his fingers brushing an onyx sculpture on the way, Figure 43.

Figure 43. Example washroom.

The club girls

Angie and Rebecca pull their heads back in laughter after Rebecca's humorous posing in front of the hotel washrooms mirror. Both have just turned 23 and are getting ready for their night at the V.I.P. release party for the band Angie's cousin plays in. The party is going to be held at a top floor club in London's most exclusive neighbourhood and the girls are gleaming of glam, even the mosaic in the washrooms is tiny gold tinted tiles. The girls have been in the washroom for a while and tested different make-up and hairstyles. In the waste bin lies a fair quantity of hand towels used to wash of lipstick and eye-shadow. Angie checks her watch and suddenly exclaims that it is time to go or they will be late. In fast movements the girls collects their belongings in their bags, wash of the remaining make-up from their hands and quickly leave the lobby washroom, bustling of laughter and clattering heels Figure 44.

Figure 44. Example washroom.

4.8 Requirement specification

Before the design work started all demands and desires that could be put on the final product where specified in a requirement specification. The specification was altered several times during the process and the final results can be seen in Figure 45 The demands and desires were divided into three divisions, technical, ergonomic and aesthetic. The most important demands in the technical sections are that the dispenser should feed paper towels and protect these from the environment. It should also enable disposal of the amount of hand towels the dispenser is able to obtain. Several important demands is found in the ergonomic section, for example enable intuitive usage, be easy to clean, be able to refill for one person and both tall and short persons. In the aesthetic section it is of importance that the dispenser appeals to architects, is constructed of genuine materials and have a holistic use of logotypes.

Technical

	Function	Measurement	Demand/Desire
1	Allow dual mounting system	Wall mounted and recessed	Desire
2	Use existing refills	All advanced and premium refills	Demand
3	Cope with foreseeable forces	15 N without deformation	Demand
4	Indicate when refill is needed	When one pack of towels can be inserted	Desire
5	Durable under long period of use	10 years of frequent usage	Demand
6	Endure transporting temperatures	-10C +70C	Demand
7	Have recyclable parts	100%	Desire
8	Be able to be customized	>3 expressions	Desire
9	Protect paper and soap from environment	Bacteria, water and dirt	Demand
10	Allow theft protection	Soap, towels, paper	Demand
11	Have low production cost	<300 Euro	Desire

Ergonomic

	Function	Measurement	Demand/Desire
12	Enable refilling for short and tall cleaners	Height 5 perc. women and 95 perc. men	Demand
13	Enable usage for children and adult users	Height 5 perc. women and children, 95 perc. men	Demand
14	Enable mounting for one person	Single handed	Demand
15	Allow easy cleaning	No dirt pockets	Demand
16	Stand cleaning detergents	All common	Demand
17	Indicate intuitive usage	9/10 Shall understand first time usage	Demand
18	Allow easy refilling from cleaning staff	Should take <15 sec	Demand
19	Allow usage of disabled persons	One armed	Demand

Aesthetic

	Function	Measurement	Demand/Desire
20	Fit target environment	Appeal to 6/10 Architects	Desire
21	Holistic use of logo and printing	Appeal to 6/10 Architects	Demand
22	Use of genuine materials	All outer materials	Demand
23	Appeal as an exclusive product	6/10 Architects	Desire
24	Express Tork exclusive attributes	4/6 Attributes	Desire
25	Not appear to physically stick out	6/10	Desire

Figure 45. Reqiurement specification.

4.9 Concepts

The next step in the development process was to create ideas and concepts. This was performed through several iterations and a wide range of concepts and ideas were produced and combined, Figure 46. A summary of the most interesting proposals can be found in the following chapter.

4.9.1 Ideas

During the idea generation phase brainstorming was used to produce a variety of ideas. Ideas were sketched and shared within the group for further development and inspiration. In this stage ideas were derived from the basic functions of dispensing hand towels, throwing trash and mounting/placement without detailed solutions. Ideas were also derived using form seeking methods where the aesthetic appearance or visual impressions steered the process. The group wanted a wide range of ideas ranging from innovative to more immediately realisable versions in order to be able to take a step further from the traditional dispensers available today. To get an overview of the ideas and see possible combinations they were put in a morphological matrix, Figure 47.

Figure 46. Concept generation.

Figure 47. Morphological matrix.

4.9.2 Concepts

From the ideas thirteen concepts were developed and presented at a mid-term presentation. The concepts were chosen from the most promising combinations from the morphological matrix. The relatively large amount of concepts was desired from SCA. The concepts are briefly presented with pictures below.

Spin it

Spin it is a cylinder shaped integrated system with a bin in the bottom and a hand towel dispenser on top. The two pieces are held together with a pole fastened in the floor and going through both parts, visible from the top. The free standing system enables freedom of placement within the room. Proposed materials are black corian for the cylinders and steel or glass for the pole, Figure 48.
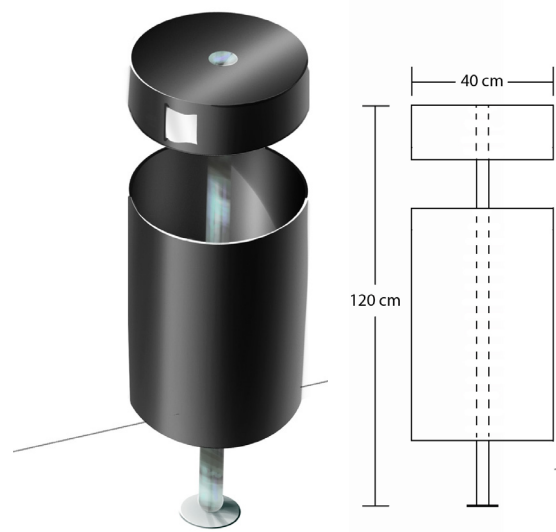
Figure 48. Spin it.

Shape up

This set could act as wall mounted or recessed dispenser and waste bin. Big openings indicate where to retrieve the hand towels or dispose waste. A feather mechanism feeding the towels in the hand towel dispenser enables placement horizontally or vertically on the wall. The proposed material is brushed aluminum with visible wooden plugs, Figure 49.
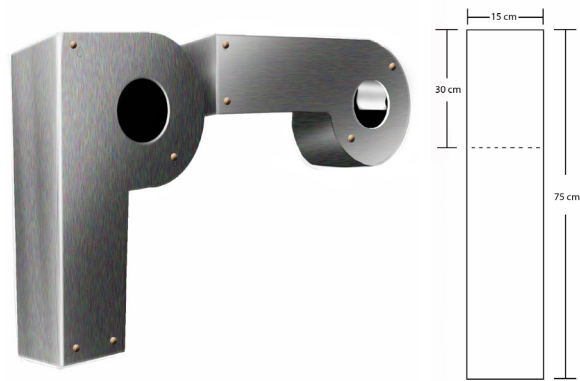
Figure 49. Shape up.

Stripes

Stripes is a vertical recessed or wall mounted concept with front panels made of steel bars placed at an angle with each other. The stripes/bars have irregular heights and are forming and uneven opening in front of the hand towel dispenser and waste bin. The system contains a combined towel dispenser and waste bin. One of the stripes is in clear glass, working as a level indicator, but it could be replaced with wood if found more suitable, Figure 50.
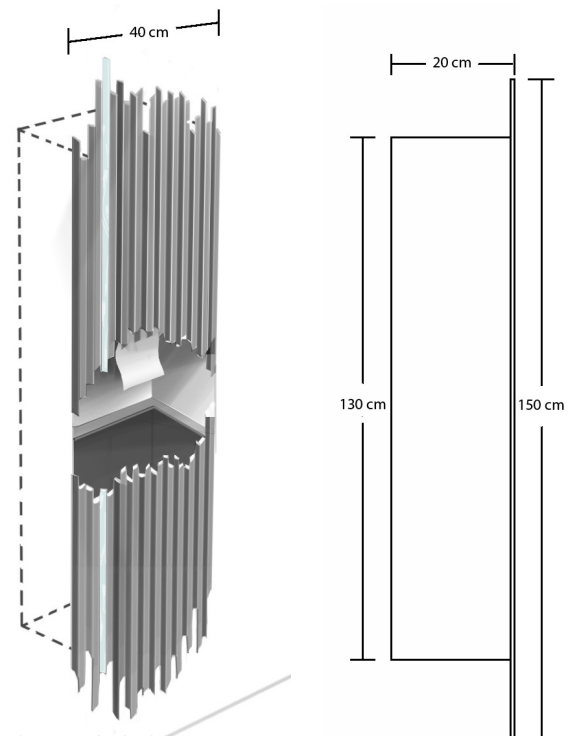
Figure 50. Stripes.

Divided

This set is also wall mounted or recessed with rounded openings for the waste disposal and hand towel on the front panels. Front and side panels are proposed to be in stainless steel and in the meeting between front and side panels a frame of clear glass is placed. The clear glass can work as an level indicator for the hand towel dispenser, whereas it has a solid background for the waste bin unit, hiding the waste bag, Figure 51.
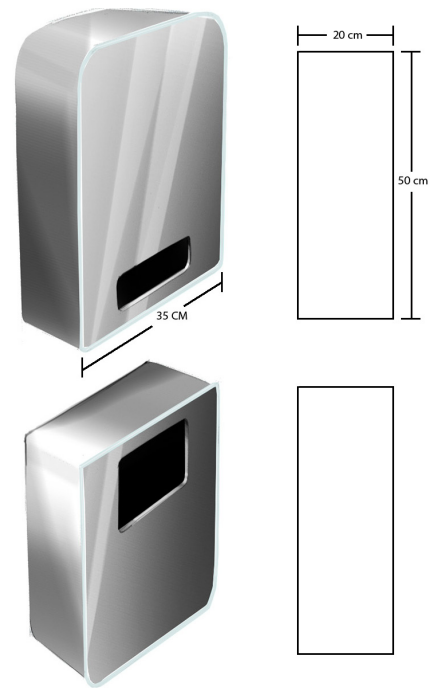
Figure 51. Divided.

Horizon

This concept includes a combined set of double hand towel dispensers and waste bins. The concept is able to be wall mounted or recessed and is oriented on a horizontal axis rather than the more traditional vertical axis many recessed dispensers have. Cut outs in front of the hand towel dispensers indicate where the hand towels can be found, Figure 52.
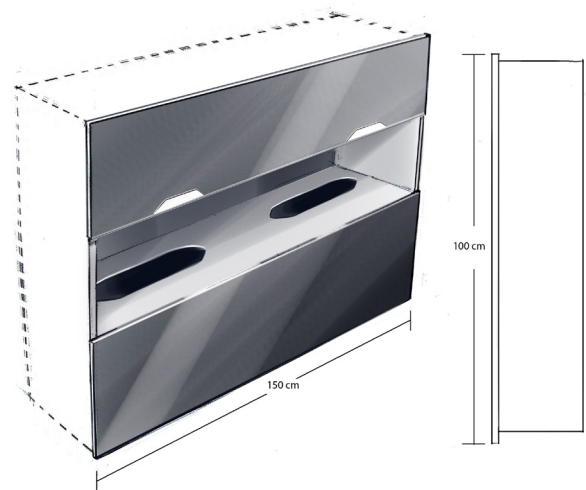
Figure 52. Horizon.

Bench

This concept is a free standing system shaped as a high bench, with top fed hand towel dispensers in the "legs" and waste bins in the middle and partly in the legs. The proposed material is black anodized aluminium with sections cuts around the waste bin holes in natural aluminium colour. The hand towels are fed out on a chamfer, also in natural aluminium colour, Figure 53.
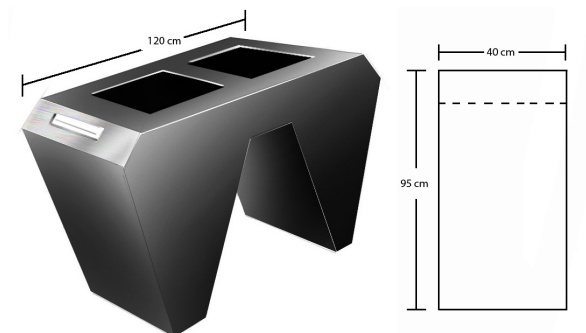
Figure 53. Bench.

Wall modules

The Wall modules concept is constructed by a bent anodized black aluminium sheet hanging from a steel rail from the top and bottom. Round holes are stamped out enabling access to the waste bin and hand towel dispenser placed behind the panel. The sections cuts at the sides and around the holes are in natural aluminium colour, Figure 54.
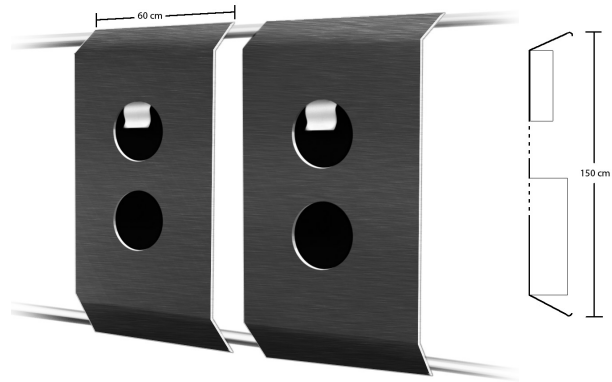
Figure 54. Wall modules.

New elevation

This concept evolves from the existing design of the Tork Elevation line, but in a stricter version. A set of a wall mounted hand towel dispenser and waste bin is designed in a more "classic" dispenser style. The hand towel dispenser has a level indicator in shape of a clear glass stripe in the lower parts of the front. The same stripe appears in the waste bin design, but here with surface behind, not enabling the waste bag to be seen. The hand towel dispenser has a discreet cut out to indicate where to extract the hand towels. The front and sides are in stainless steel, Figure 55.
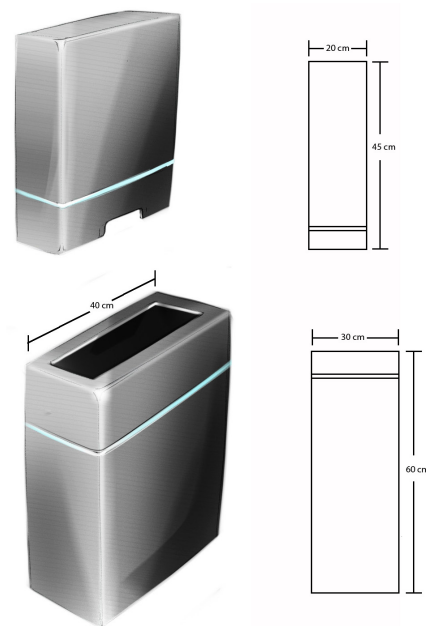
Figure 55. New elevation.

Parted mirrors

Two separate mirror panels front this hand towel dispenser and waste bin set. Round corners and light behind frosted glass give a soft impression. The light is placed in the upper part of the hand towel unit in order to function as a lit bathroom mirror. The mirrors are a bit wider and taller than the waste bin and hand towel dispensing unit behind them in order to give a light impression and blend in with the walls. The system is wall mounted, Figure 56.
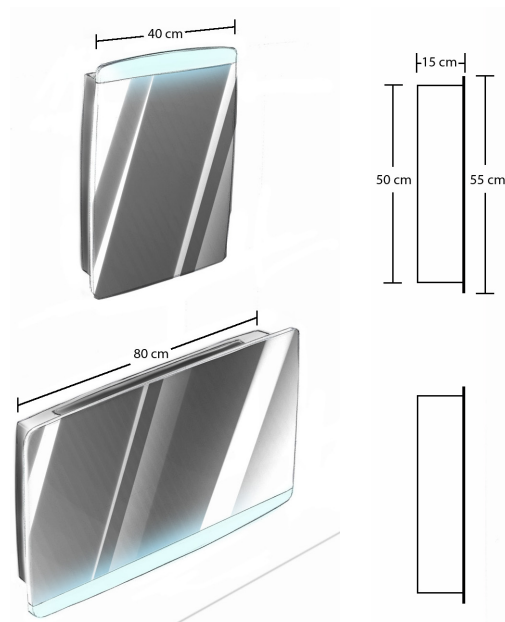
Figure 56. Parted mirrors.

Station

Station is a concept that goes from floor to ceiling with two separated units containing double hand towel dispensers and waste bins. The front panels are in black piano varnish with brushed aluminium where the hand towels are extracted and the waste bin openings. The sides are chamfered to give an integrated impression, Figure 57.
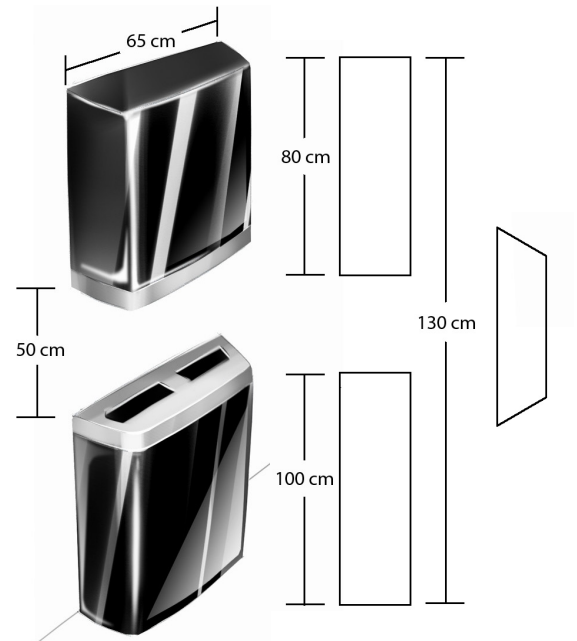
Figure 57. Station.

Table top

Table top can be mounted either on a counter/shelf in the washroom or on the wall. It's a slim hand towel dispenser with strictly rounded edges and chamfers. The proposed material is black corian. The mounting mechanism is flexible and can be accommodated to different thicknesses on shelves etc, Figure 58.
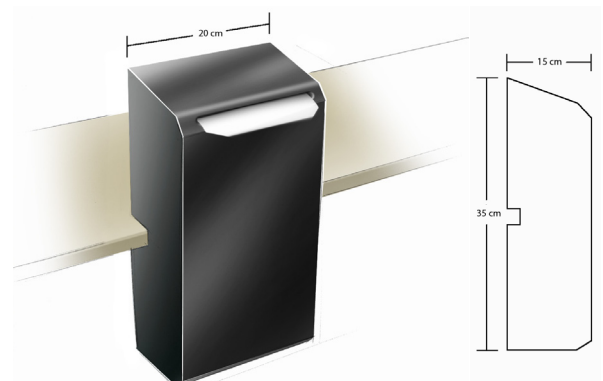
Figure 58. Table top.

Rooftop

Another concept reaching from floor to ceiling is Roof top which comes in a set of two hand towel dispensers and one large waste bin. The squarely shaped hand towel dispensers are attached to the ceiling and reaching down while the waste bin is free standing, although both units can be wall mounted. The major parts of the units are in stainless steel but in the top and bottom wood is inserted in the steel, giving an impression of steel wrapping around a solid wooden rectangle, Figure 59.
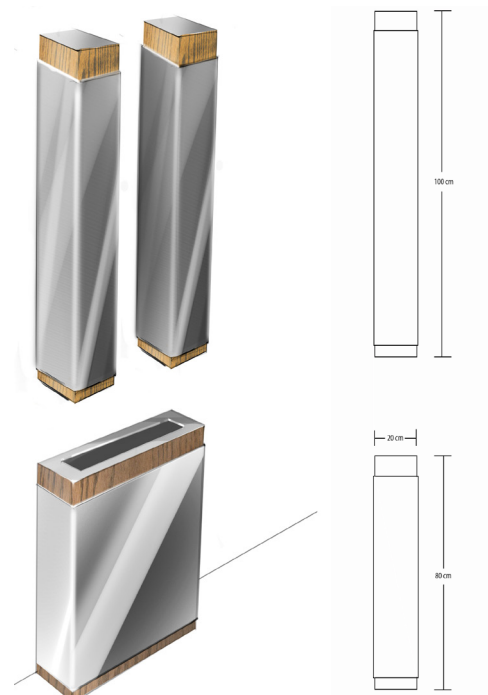
Figure 59. Rooftop.

4.10 Screening and development

When the thirteen concepts had been visualized and presented they were evaluated in the different stages described in this section.

4.10.1 Workshop

Two workshops were held where the concepts were presented and evaluated. The first workshop was held at SCA with seven members from design and marketing departments. The second workshop was held at Chalmers where eight students from Architecture, seven students from Technical Design and four students from Technical Architecture evaluated the concepts. This way it was possible to detect differences in different stakeholders view, SCA staff against architects or designers, marketing against designers etc. In both workshops the participants were given scoreboards (Appendix 6) where they could rate each concept on their function and aesthetics separately on a scale of 1-5, where 5 was the top grade. A field for open comments was also available. Each concept was printed and put on the wall with a brief explanation and material suggestions attached. A brief presentation was held before the rating started and at SCA a discussion was held afterwards. As an external reference from the "buyers" side of the stakeholders of the product the manager of the design hotel Avalon in Gothenburg also evaluated the concepts.

In the workshop at SCA Wall modules, Roof top and Parted mirrors scored high in aesthetic appearance. At Chalmers the students agreed that Roof top and Wall modules had the most attractive appearance, along with Mirror Cabinet. If the aesthetic scores are summarized at both workshops Wall modules, Rooftop and Parted mirrors become the top three concepts. If the numbers are analysed further in the different target groups it's possible to see that the architect students held Wall modules as their favourite, whereas Roof top was by far the most popular with the design student, scoring whole 4.8 points. The technical architect students seemed to prefer Horizon.

For the functional aspects New elevation was the most popular at SCA, closely followed by Roof top and Parted mirrors. New elevation was top rated at the Chalmers workshop as well, this time followed by Horizon and Divided. The total scores of the functional aspects resulted in New elevation as a favourite, followed by Bench, Horizon and Divided. If the total mean of the functional and aesthetical

score is calculated the three top rated concepts become Roof top, Wall modules and New elevation. A summary of the workshops result can be found in Appendix 6. In Figure 60 some comments about the top three concepts can be seen.

Wall modules	+	Wow-factor, very innovative. Good looking! Unique mounting, new thinking. Good version of recessed and capacity, easy to manufacture.
	-	Not very useful with round openings. Opening for towel looks wrong. Don't like aluminium.
Roof top	+	Excellent, flexible, modular and new thinking! Nice mix of materials and good size and shape. Good capacity and that it is possible to attach to celling and wall. Nice spa feeling and nice with wood details.
	-	Narrow hand touch. The size works against the aesthetics if placed by wall.
Parted mirrors	+	Excellent concept, creative use of light and elegant. Looks almost recessed and high capacity could really work in a high end environment. Simple and discrete.
	-	Does not appeal to me, the bin remind me of a radiator. Don't like the proportions and the mirror on the bin. Needs symbols.

Figure 60. Comments about the top three concepts.

The external manager worked as a reference and to a large extent confirmed the results received in the workshops, also gave top scores to roof top, wall modules and new elevation. The scoring can be found in Appendix 7.

4.10.2 Pugh

In order to see how well the concepts performed against the stated requirements they were put in a Pugh matrix (Appendix 8). Each concept was evaluated against all demands and desires. In this case it was possible to see which concepts that didn't satisfy one or several of the demands. Since the concepts were on an early stage it was decided that even if some of the concept failed in the matrix they still had the chance to make it to the next stage if it was decided that changes could be made enabling the concept to fulfil all demands.

4.10.3 Elimination

In the next stage other aspects than just the demands and desires aided in evaluating the concepts. Before this stage more information and thoughts were gathered for each concept and the results from the workshops aided in the decisions. In this stage four concepts were preliminary chosen to be worth investigating further. These concepts were Roof top, Divided, Parted mirrors and Wall modules. After further discussions within the group and with supervisors from SCA it was decided that Divided would not make it further. This was decided since the concept did not have the same level of innovation as the other concepts and the decision was supported by the results from the previous workshops. The matrix can be found in Appendix 9 and the three surviving concepts was Roof top, Parted mirrors and Wall modules.

4.10.4 Development

The chosen concepts Roof top, Parted mirrors and Wall modules were produced as mock-ups in full scale in order to evaluate them further, Figure 61. This gave a feeling of the size and how it would feel to use the different concepts. After further evaluation and discussion the decision to further develop the wall module was taken. The roof top failed foremost due to that proportion was optimized only when ceiling attached and not wall hung in which case the concept gave a clumsy expression. The end choice stood between parted mirrors and wall modules, where parted mirrors failed mainly since it was considered less suitable to the exclusive target environment.
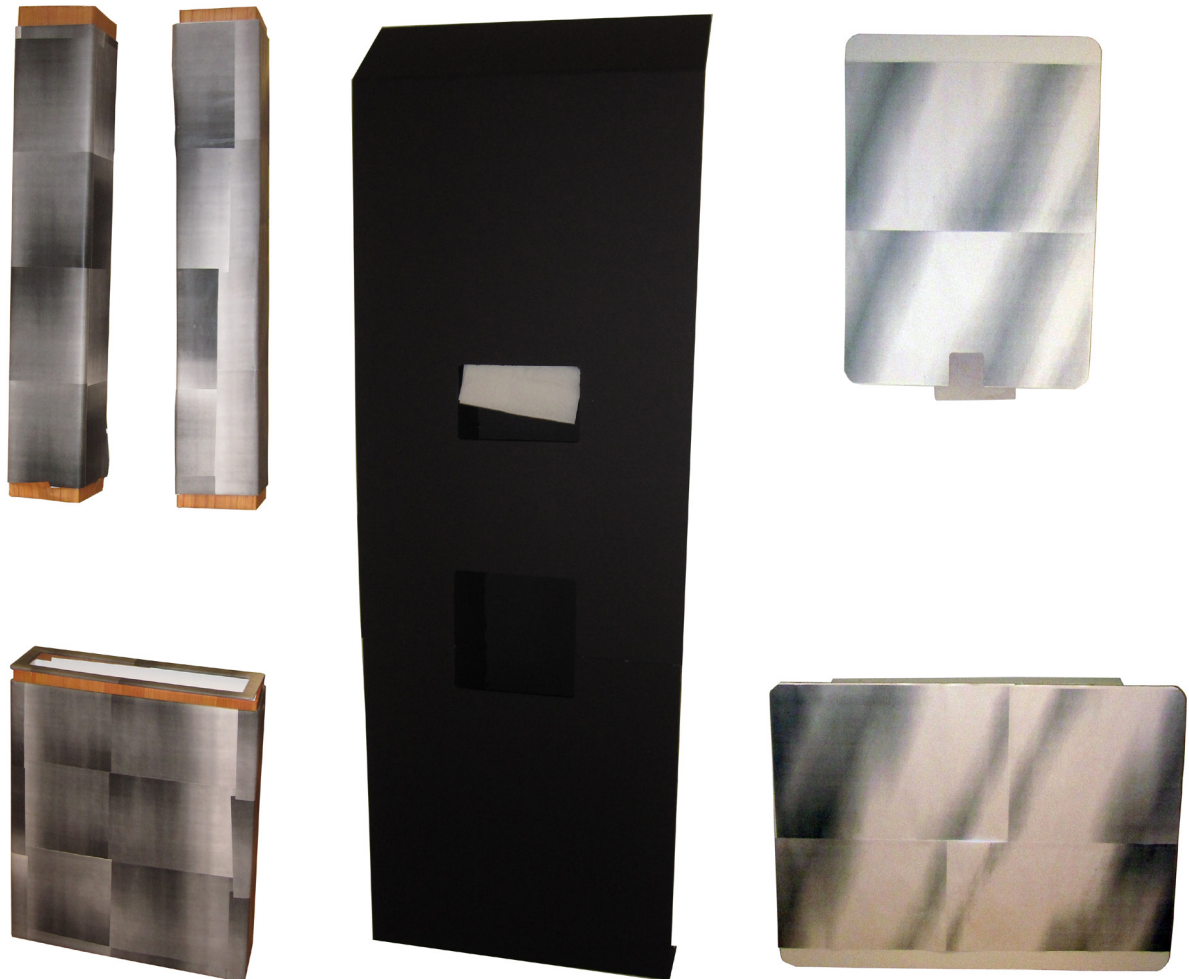
Figure 61. Mock-ups, from the left: Rooftop, Wall modules and Parted mirrors.

4.10.5 Proposed materials

The proposed materials for the three developed concepts are shortly described in this chapter.

Aluminium

Aluminium, in its elementary form, is relatively soft and malleable both in warm and cold condition and therefore it is common to use different types of aluminium alloys. By alloying aluminium strength equal to structural steel can be achieved. Due to its low weight in combination with its high strength aluminium alloys are useful in a wide range of fields. In contact with water and air aluminium develops a very thin and hard layer of oxygen. This layer protects the aluminium from further chemical attacks such as corrosion. Aluminium can be welded, soldered and glued and is often used in applications such as transports (planes, cars, trains, busses, etc.), facades, roofs, windows, interior design, packaging design, chemical industry and kitchen utilities. (www.ne.se, 2012)

To make aluminium more resistant, the surface can be anodized which gives an increased corrosion protection and a hard durable surface. The anodized surface layer can be dyed in different colours allowing the core of the material to retain its natural trait and colour. The surface layer is usually between 0,001-0,1 mm thick, depending on purpose for the product. (www.ne.se, 2012)

An increasing share of the aluminium production is made out of recycled and re-melted metal. Remelting of aluminium requires only about 5% of the energy required for new production which is made of bauxite. Scrap aluminium is therefore a very valuable raw material. Through improved waste sorting and improved metallurgical technology, the recycled aluminium is now almost equated in quality with primary aluminium. (NE.se 2012)

Stainless steel

Stainless steel is a type of iron alloy with a high corrosion resistance against water and solvents. Common alloy elements are chrome, molybdenum, nickel and nitrogen. Corrosion resistance occur when a very thin layer of oxygen appear on the surface which protects the steel. Stainless steel is often chosen due to its high corrosion resistance but also due to high strength, toughness and ductility. Stainless steel is used in a numerous applications involving structures in domestic, transport, civil engineering, architectural and other areas. (www.ne.se, 2012)

Wood

Wood may not be the first thing in mind when choosing materials for humid environments such as washrooms, but today it is common to find wood both in private and public washrooms. Depending on type of wood and treatment technique, wood could be more or less suitable to use. A common type of wood used in washrooms is teak, which is also a common material for boats. To secure a long life time it is important that the wood is treated, used and maintained properly. To increase the resistance to moisture, wood could be pressure treated, oiled or painted, but there are also some wood that can be used in humid environments without being treated, larch is one example of that. (www.viivilla.se, 2012)

In this project a suitable material could be wood veneer, which is thin sheets or flakes, usually out of hardwood. Veneers can advantageously be glued as coating on furniture. Veneer for decorative coating is often less than 1 mm thick. (www.ne.se, 2012) Warm wood details, combined with cold stainless steel can be used to create a more vibrant washroom. (www.badrumstrender.se, 2012)

Glass

Glass is a common material in today's washrooms. It is easy to keep clean and fit into most environments. To create mirrors it is common to use two sheets of glass with a mirror foil in between. As the material can stand water, detergents and common chemicals used in private homes and public areas it is a good material for washrooms. It is possible to dye glass in different colours and also possible to make it opaque. Glass as a material could be used as simple level indicators on dispensers. Glass products can be manufactured in different ways, two common methods are to blow or press the glass into different forms, or to centrifuge it. The centrifuge method is used for producing glass bowls and heavier bulk cargos that will later be polished.(www.ne.se, 2012) Glass has a relatively high density and stands spread forces much better than point forces. (www.wisy.se, 2012)

4.10.6 Panel test

To be able to decide the details on the final concept, Wall modules, a panel test was held. The details that were tested were two different widths of the dispenser and the size and form of 7 combinations of hand towel and waste bin holes. The panel test was divided into two parts, one where the participants had to evaluate the hole combinations in a functional aspect and one where they should evaluate the width and the hole combinations from an aesthetic perspective. For the first part seven models of the concepts were created, one for each hole combination, Figure 62, and for the second part two models were built with different widths and then simulated holes of carton was attached to the models, Figure 63. During the panel test 27 staff members from SCA were attending. The participants were randomly chosen in order to reach a broad group.

The participants were given one scoreboard (Appendix 10) for each part of the test where they could rate each concept. They had to tick if they found a concept very nice, quite nice, not so nice or not nice at all and there was also a field for open comments available on the scoreboards. A brief presentation of the project and how the panel test was supposed to be performed were held before the rating started.

The result showed that the holes where the hand towel and the waste bin were combined, the two top right models in Figure 62, were most appreciated as the user found it easier to both take the paper and to use the waste bin. The problem with the combined holes was that some of the participants found it unhygienic that it was open between the hand towel dispenser and the waste bin. There were two variants of the combined hole, one with square corners and one with more rounded corners. They were rated almost equal and were therefore both taken for further adjustments.

When it came to aesthetical aspects the combined holes got high ratings again. Most of the participants preferred the slimmer variant of the dispenser, the one to the right in Figure 63, but some said that some of the hole combinations fitted better on the wider dispenser. As the slimmer front panel was preferred more often and since this concept demanded less space without losing too much capacity, this was chosen.
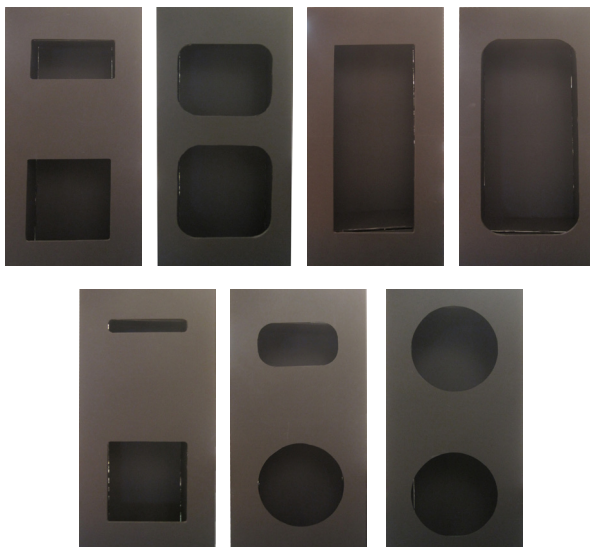
Figure 62. Models of hole combinations.
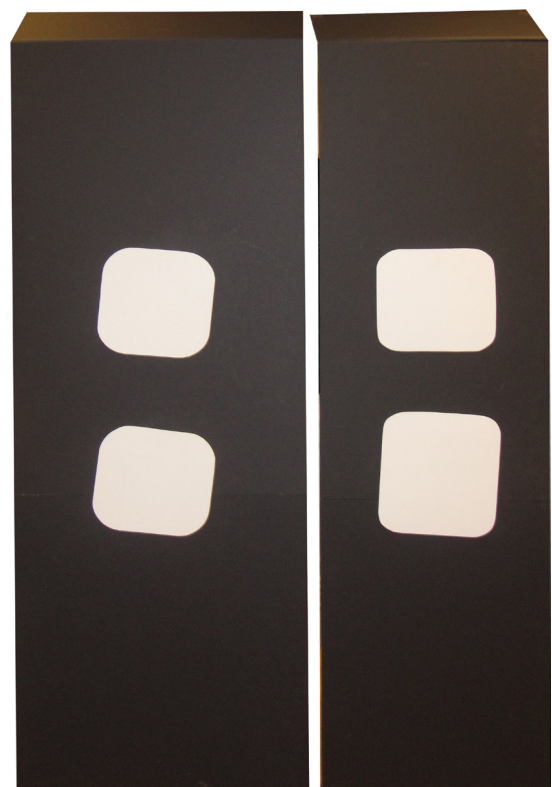
Figure 63. Models with different widths.

4.10.7 Adjustments

After the panel test, the form and size of the front sheet and the holes had to be stated. The panel test showed that the holes where the hand towel and the waste bin were combined, the two top right models in Figure 62, were most appreciated. To minimize the unhygienic feeling that some of the participants felt with the combined holes, a small frame around the waste bin was added, this to give a feeling that the bin is more closed.

As the two holes got almost equally rated further adjustments had to be done to be able to state the final shape of the hole. Some sketches of the concept were built in a CAD-program where the different shapes of the corners where tried and finally a shape in between the rounded and the squared was chosen. This shape met the overall expression of the concept as it harmonised with the front panel best.

To give the expression of a hanging front panel a horizontal bend both on the top and the bottom of the front sheet were added, this also made it easier to attach an opening mechanism to the front sheet.

From the beginning the rails had a cylindrical cross section, but to match the expression of the overall concept in a better way and make it easier to at-tach the front sheet and the dispenser on the rail a square section cut with rounded corners was chosen. To make it easier to clean the box between the hand towel dispenser and the waste bin the box have got rounded inner corners.

More detailed result of the final concept and de-scribing figures of the different parts are found in the final result chapter.

4.10.8 Technical solutions

The product must be able to open in an easy way so that the hand towel could be refilled and the waste bin changed. Four different concepts have been discussed, one with a sliding door mechanism, one working in the same way as a car trunk, one with a normal door opening mechanism and one where the door was supposed to first be clicked out and then turned as a normal door, the different concepts are found in Figure 64. The winning concept was the "door opening" concept. This was found as the easiest both when it comes to production and usage. To specify details of the opening mechanism the company Creator was consulted. A meeting with them in Borlänge was held and after that the final solution was decided. More details about the final concept are found in chapter 5.
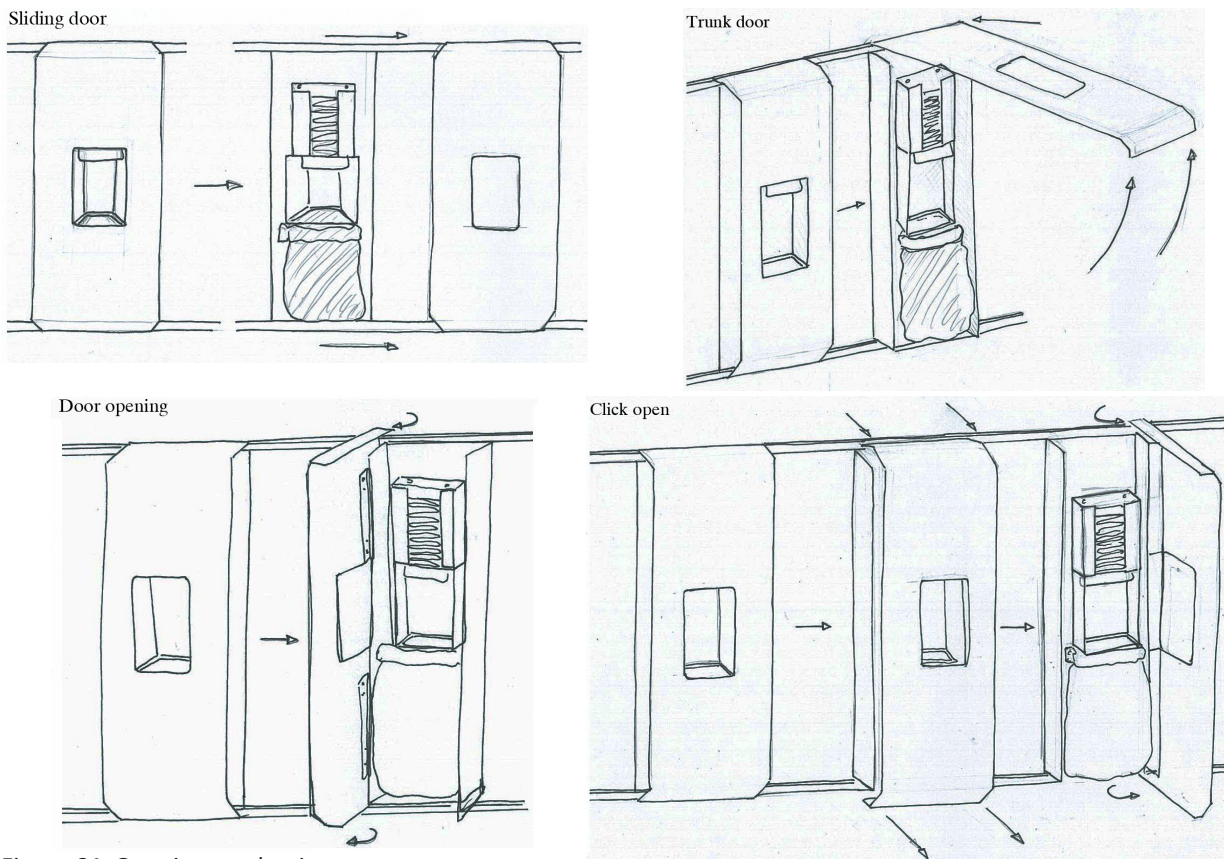
Figure 64. Opening mechanisms.

5. Final result

In this chapter the details of the final concept are presented.

5.1 Details

The final concept is constructed by a large box containing a hand towel dispenser and a waste bin unit attached to two rails fastened in the walls of a washroom. Covering the box is a bent sheet of aluminium working as a front panel that can be opened as a door in order to reach the hand towel and waste bin units. To hide the sides of the box aluminium side panels are attached. An overview of the concept can be seen in Figure 65.

Figure 65. Overview final concept.

5.1.1 Front panel

The front panel consists of a bent sheet of brushed, black anodized aluminium with a thickness of 3 mm. In the middle of the panel there is a rectangular hole with rounded corners, enabling access to hand towels and waste bin located behind the panel, Figure 66. The larger area of the front panel is vertical, with 45 degrees bents in the top and bottom. Following the bents is yet another bend of 45 degrees, giving the panel a horizontal direction, Figure 67. The large vertical area gives an impression of a wall unit, aiding the impression of a recessed dispenser. It also gives a calm and almost discreet expression and the strictness make it easier to make the dispenser blend into different types of washrooms. The simplicity of the sheet also makes it easy to produce in different materials and colours in order to fit different customers. The section cuts at the edges of the sheet and the hole are chamfered and polished in order to soften the edges, preventing risks for damage on hands from sharp edges, Figure 68. A second function of polishing the edges is that the natural aluminium colour appears. This gives an aesthetic twist and connects to the natural expression through the material. The polished edges around the hole also aid in giving attention and indicating that there is functions in the hole.

The finish on the front panel is brushed and then anodized in a black or natural colour. The brushed finish gives the surface a structure that is easily recognized and can give the impression of using genuine materials. Anodizing the surface in black is enabling a more strict and neutral expression making the dispenser easy to fit different washrooms. The choice of a natural colour as well gives a more similar expression to the existing combined dispenser and will work well in many washrooms. The possibility to dye the front panel also makes it possible to customize in a relatively easy way.

The dimensions of the hole and the curvatures has been carefully chosen both in order to make the user comfortable extracting hand towels and throwing waste, and to harmonize with shape of the whole front, Figure 69. The curvatures are big enough to make the user comfortable having the hand close to the hole without feeling that it is sharp or could cause damage. Controversially, according to the panel tests, a hole with large curvatures felt larger than the same hole with sharper corners even though the latter objectively is larger. At the same time it is important that the corners

don't have too big curvatures, disrupting the harmony with the shape of the front panel or giving the construction a lower capacity. The placement of the hole within the range of ADAS, (www.access-board.gov/ada-aba/ada-standards-doj.cfm, 2012), guides on which heights the hand towel dispenser and waste bin should be located at. The height of the hole allows a large enough distance between the hand towels and the waste bin to give a hygienic impression, at the same time enabling a sufficient capacity.

The bents at the top and the bottom are kept with smaller curvatures just big enough to avoid an expression of sharp edges. The distance between the first and the second bent is five cm both horizontal and vertical, enabling a 45 degree slope. This gives a rather small area between the bents, giving an impression of a large vertical sheet just slipping over the edges of the rails.

5.1.2 Rails

The rails have a rectangular section cut with smaller curvatures in the corners, in the same style as the hole in the front panel, Figure 70. The straight sides enable good possibilities for attachment of the dispenser and waste bin unit, while the curvatures and rectangular shape connects to the hole shape in the front panel. The rails attach into the wall by smaller rail segments placed perpendicular to them and mounted on steel sheets with screw holes which gives the rails good support when mounted on the wall, Figure 71. The steel sheets have the same relative dimensions as the hole in the front panel.

5.1.3 Inner construction

The hand towel dispenser, Figure 72 and the waste bin are attached on a large steel box behind the front panel. The box lacks front but got sides, bottom, top and backside, Figure 73. On the top and bottom parts the box is attached to the rails by metal strips that are bent and screwed on the rails as shown in Figure 74.

The hand towel dispenser is placed with the mouth around one cm above the upper edge of the hole and close to the front panel. This make the paper hand towel face the user who doesn't have to stick in the hand very far into the hole.
Approximate 3 cm below the lower edge of the hole a waste bag frame is attached with a hinge in the left side of the large box. The hinge make the frame easy to rotate out in order to change plastic
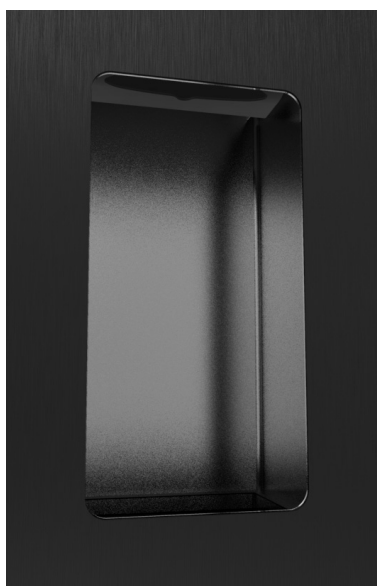
Figure 66. Hole for reaching hand towel and waste bin.

Figure 72. Hand towel dispenser.
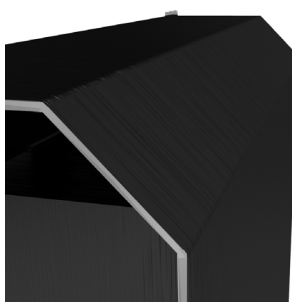
Figure 67. Top bents.
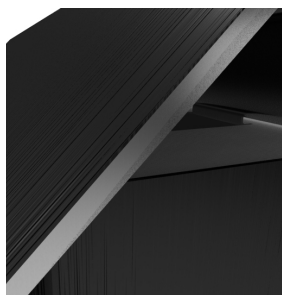
Figure 68. Section cuts.

Figure 69. Front panel on rails.

Figure 73. Larger steel box.
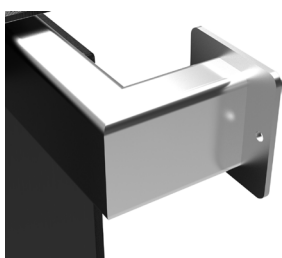
Figure 70. Rail.
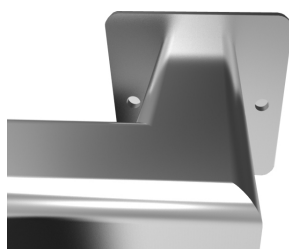
Figure 71. Steel sheet for mounting.
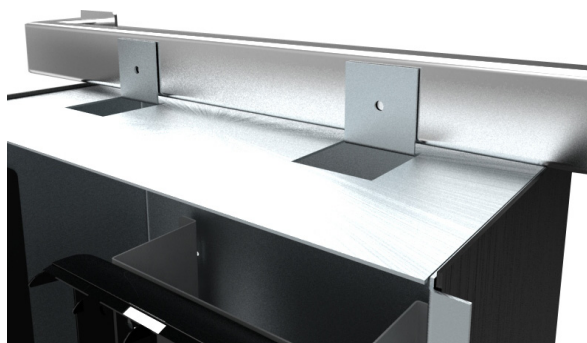
Figure 74. Fastening of steel box on rail.
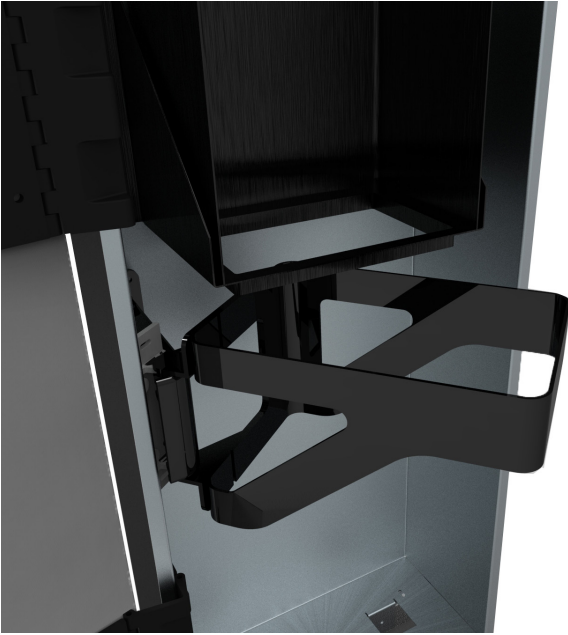
Figure 75. Waste bag frame.
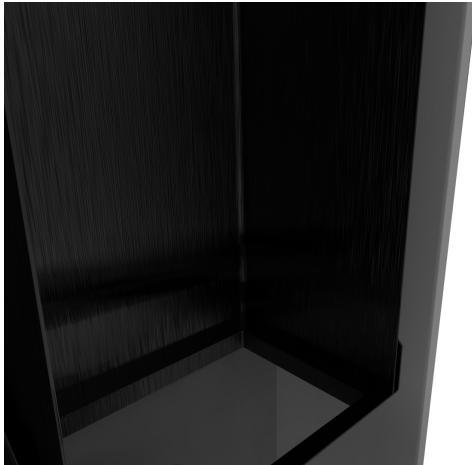
Figure 76. Frame over waste bin.

Figure 77. Hinges.

Figure 78. Tork standard lock.

bags, Figure 75. Above the waste bag frame another frame of aluminium is attached to a smaller box connecting the waste bin area and the hand towel dispensing area. The aluminium frame is rectangular with curvatures to harmonize with the rest of the dispenser. It also has a two cm flange coming down from the hole of the frame, Figure 76. The flange and the frame are preventing sight straight down in the waste bin, it also indicates where to throw the waste and works as a barrier between the waste and new hand towels in the top. The smaller box between the waste bin area and the hand towel dispenser protects and prevent insight into the larger box. It has rounded corners to support cleaning and prevent bacteria to gather in any sharp corners.

5.1.4 Opening mechanism and mounting

The front panel is attached to the larger box with three hinges. The hinges have a large contact area in order to provide stability to the front, Figure 77. The hinges are fastened to the front panel by hooks welded on, making it possible to detach and replace the front panel if needed. The front panel is opened by a simple click function on the right side. A lock of Tork standard is provided, Figure 78. A pipe connects to the other side where another hooking device is places. The lower rail should be placed at a height of 10 cm from the floor, following standards for cleaning. This also results in that the height of the hand towel dispensing ends up at 122 cm, which is in the limit of ADAs recommendations for disability adapted washrooms. (www.access-board.gov/ada-aba/ada-standards-doj.cfm, 2012)

Figure 79. Prototypes of a black and black combined with silver dispenser.

Figure 80. Prototypes of a silver and gold dispenser.

5.2 Prototype

In the end of the project a lot of time has been used to produce four prototypes of the dispensers. The prototypes were developed in collaboration with Creator in Borlänge and Specialteknik in Gothenburg. Cad-models and drawings were made for the prototype production. It was decided to produce four variants so that different colour combinations could be tested. One prototype was made in whole black aluminium, one with gold front and golden sides and interior, one with black front and natural sides and interior whereas the last one was produced on complete natural aluminium colour, these can be seen in Figure 79 and 80. A simple type of hinges was developed for the sake of the prototype and these hinges posed problems while locking the front panel in place. For the prototypes this has been solved by using magnets on the left side.

5.3 Aesthetics

The esthetical expression of the product is strict and subtle. Long, straight lines are mixed with medium radius in the hole and rails, giving a minimalistic and simple expression. The radius at the corners of the hole also soften the strict expression. The large, empty areas on the front panel evokes interest and the smooth brushed finish with the polished sides intrigue and invite the user to look closer. The bents at the upper and lower parts adds interest and together with the rails intoduce new and exciting elements. The concept altogether represent classic forms but with a twist from the seperate elements.

5.4 Cost

The industrialized production costs for the dispenser have been roughly estimated with the aid of one of SCA's producers of the Tork Aluminium line. The posts are mainly divided into the three different materials used and assembly costs. Two versions of the product were estimated. The first version is based on the construction used in the prototypes and the second version is based on future development where the inner steel box is excluded. The costs have been summarized in Figure 82.

Parts	Cost $\in$	
	Version 1	**Version 2**
Aluminium parts	170	170
Steel parts	80	10
Plastic parts & Assembly	30	30
Total	**280**	**210**

Figure 82. Costs

5.5 Evaluation

Below is an evaluation of the final concept. Since the prototype arrived late in the project the evaluation is made upon CAD-models, results from the panel tests and on theoretical basis.

5.5.1 Requirement fulfilment

The final concept is in this chapter evaluated against the demands and desires stated for the dispenser. Since the prototype arrived too late to be evaluated for this report the evaluation has been based on the group members own judgment. The final concept fulfils all demands and many of the desires. The two desires that are not fulfilled are "Allow dual mounting system" and "Indicate when refill is needed". The product handles "Allow dual mounting system" in a slightly different way. The mounting system is still wall attached, but the dispenser can be recessed. Also, if attached to a wall the system somewhat resembles recessed systems especially if many dispensers are installed in a row. The level indication can be solved by the use of infrared indicators signalling to a software system. This way the maintenance staff can see if refill is needed on a computer or other network devices. An electronic system would cost a bit more but could still be reasonable since the system is in the high end range. The evaluation against the requirement list is found in Appendix 11.

5.5.2 Life Cycle Analysis

A simple life cycle analysis has been performed on the final concept. The tool that was available to use was not so detailed whereas the results should only aid as a guideline. The whole LCA can be found in Appendix 12 but in general it is apparent that it is material that consumes water and produces most carbon dioxide. If the concept was developed further it would be possible to save material and costs on the environment.

Even though the concept uses a lot of material it can be considered that a relative big investment, which a larger metal dispenser would mean, also works as an incitement to keep the product longer, expanding the life cycle. The plane front panel could also be modified easily or exchanged, if the expression grows old or worn.

In comparison with the Tork Aluminium line a SLCA (naturalstep.org 2012) for the Wall modules concept is presented below, Figure 82 The general difference is that less plastic is used and instead stainless steel is used. The three problems areas remain the same as for the Tork Aluminium line; that is paper usage, oil platforms and production plants and the energy required to produce the metals.

	Design and development	Raw material and manufacturing	Production	Distribution and packaging	Usage	End of life
Material from crust	Computer (metals, oils, silicon)	Plastic (ABS) Aluminum Steel Water	Metal for tools Energy Computer (metals, oils, silicon)	Plastic Transportation (Gasoline, diesel)	Water	Recycling plastics Recycling metals
Man-made materials	Plastic additions	Plastic additions Anodizing fluid		Glue Colour for printing	Detergents	
Degradation of nature	Paper	Production plants Oil platforms Pollution	Production plants Waste Pollution	Cardboard Paper	Paper usage	Recycling cardboard Paper waste
Meeting people's needs	Working conditions	Working conditions	Working conditions	Working conditions	Working conditions	Working conditions

Good	Quite good	OK	Quite bad	Bad	Don't know
All positive	Mainly positive	Some positive	Mainly negative	All negative	Insufficient information

Figure 82. SLCA for the Wall modules concept.

5.5.3 Target context

The final concept has been evaluated in its target context to see how well it works in its potential environment stated in chapter 4.7.9. The rendered concept in their context can be seen in Figure 83 to 85.

Figure 83. Final concept in target context.

Figure 84. Final concept in target context.

Figure 85. Final concept in target context.

6.   Discussion

In this chapter the thesis project is discussed in its different parts.

6.1 Process

Several parts of the data collection were based on qualitative information rather than quantitative. This is especially true with the observation of the cleaning staff where only one person took part in a in-depth interviews. The information gathered from this research has been analysed as guidelines and not fact. If maintenance was more important in this project more cleaning staff would have been interviewed. In this project it was decided that focus and time should be put on other aspects.

Some of the interviews with architects that we have taken part of in the project were gathered materials from large surveys collected by SCA. Since we did not attend these interviews ourselves but merely got to read about them this may have inflected our interpretations of the result.

The methods used for this project have been relevant and all have given significant inputs in the development of the product. The method target context that has been developed for this project has proven to be especially important for the final result and the evaluation, this due to that it connects the product with its proposed environment.

6.2 Questions

The questions stated for the project have been altered during the process due to a wider understanding of the problem. In the beginning there was an additional question regarding recessed dispensers, but the projected group decided that this issue had a too prominent infliction on the process. The other questions had been very important in guiding the group to the final design.

6.3 Result

The different parts of the project have had varying importance for the final result. Contacts with architects along with study visits and trend analysis have had the largest impact on the final concept, giving understanding and input on what aspects that is important for washroom interior design.

6.3.1 Theory

Regarding cultural differences and Hofstedes model some assumptions have been made in this project, such as how masculinity or individualism

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relates to consumption of exclusive products. These assumptions have aided in the understanding and reasoning of the differences experienced in different cultures during the project. The results from these reasoning have acted as guidelines and not as absolute facts.

6.3.2 Concepts

The thirteen concepts produced for the mid-term presentation are a quite high number for a usual design process (Rosenberg, 2012). In this case it was caused partly from a wish from SCA to see a wide range, and also due to the complexity of designing a product expressing "exclusiveness". Since that attribute is subjective it can be hard to find a "spot on" concept that has a general support if only a few concepts are presented.

6.3.3 Prototype

While producing the prototype some compromises in the design needed to be made in order to meet the time frame for the project. This involves the finish of the rails which in the original design would have a chromium finish. The appearance of the plates connecting the rails to the wall has been redesigned after the prototype production started. Instead of a lock function that locks both sides of the front panel magnets have been put on the left side panel whereas a regular lock have been put on the right side panel.

The construction with the bent front panel, the rails and the side panels posed difficulties with the opening angle and hinges. For the prototype a solution with the side panels attached to a steel box is chosen. It will however be more costly than if the side panels were attached to the front panel and onto the rails. The dispenser and bin frame could then be attached to the front panel as well and a large steel box would be unnecessary. This would need a thorough investigation of possible hinge constructions that could allow the construction to rotate more than 90 degrees, and at the same time have a high stability. This investigation didn't fit within the time frame of this project but would make a large difference to the end result.

6.3.4 Evaluation

Since the prototype arrived at a late stage of the project it was not enough time to do a usability test or any changes before the end of the project. The evaluating has therefore been based on sketches

and CAD-models which will give limited validity.

6.3.5 Ergonomics

In this project, ADAS recommendations for accessible design have been used. These recommendations are based on an American population which might differ from the European contexts. Even so, the ADAS guidelines are used among manufacturers in Europe and are therefore considered to be sufficient.

6.4 Project as a whole

The project as a whole has kept up well with deadlines and we feel that the result is good and relevant. A large amount of time was put on the early stages of investigating the subject and generating ideas and concepts. This time was well needed in order to gain a full understanding of the complexity and subjective sides of industrially produced exclusive design. More time in the construction phase in the end of the project had given a more refined prototype with solutions of lock mechanism and construction of hooks on the hinges to place the front panel on, enabling an easy exchange of the front.

7.   Vision

Recommendations for further development of the concept can be found in the following chapter.

It is highly recommended that SCA continues to investigate how to approach a high end or image segment. It is evident that there is a need for these kinds of products in the segment.   In this investigation an analysis of how the brand Tork should relate to an exclusive segment should be included.

If the product developed in this project would be developed further the most important aspect to consider is a solution of hinges that would allow a light, stable and secure design without using a large amount of material. A evaluation with stake holders testing the existing prototypes is recommended in order to see if the result remain the same since the concept evaluation.

From the gathered material from architects it has become evident that a holistic view on washroom interior is necessary. It is therefore recommended that a line of dispensers are further developed and even could include or match existing hooks, toilet brushes, shelves and other parts of washroom interior. There also seems to be a large need for customized products that could fit various washrooms so a simple and cost effective way of doing this would gain a strong competitive edge. This could be done either with a front that is easily replaced in different material or colours or with printing or film that is attached to a front panel.

8. Conclusion

Some concluding remarks can be found in this chapter.

8.1 Questions

In the beginning of the project one main question along with three side questions were asked for the project. These questions have been investigated during the project and a brief summary of the results follow below.

Main question

- How can a public washroom dispenser be designed with an exclusive appearance?

Through several interviews and workshops performed during the project the theme exclusiveness has been investigated. Even though the investigations have been qualitative the result is consistent that an exclusive washroom dispenser would possess properties such as classic, timeless and simplicity and should be easy to blend in with the environment. Materials should be "authentic" and can include combinations of metals, glass and wood.

Side question

- What do architects base their decisions on while choosing dispensers for washrooms?

The architects met and investigated in this project always consider the building in first hand when designing washrooms. The washroom should reflect the thoughts about the rest of the building. It is therefore the purpose and image of the building that much control what expression the dispenser should have and many architects mention that a dispenser that is easily customized would be a perfect solution.

- How can Torks brand identity be preserved in an exclusive range?

This is a question that still needs more investigation. The identity Tork possesses today is not directly targeting the high end segment, and indications show that an exclusive range could benefit from having other brand values, though similar to the Tork current brand values.

8.2 Final results

The goal to develop a prototype of a hand towel dispenser is completely fulfilled. The prototype also

involved the waste bin as the system is combined. As steps in this a fair overview of architects and interior designers work has been developed, enabling implementation in a product. The product is judged to respond well to the demands and requirements stated and can be adapted to different environments quite easily.

9. References

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Appendix

1. CW and PHEA

2. Interview form

3. Interview results

4. Design cues

5. Observation results

6. Score board - Workshop

7. Workshop evaluation results

8. Evaluation results external manager

9. PUGH matrix

10. Elimination matrix

11. Score board - Panel test

12. Panel test results

13. Evaluation against requirements

14. LCA

Appendix 1

CW & PHEA – Wash hands

A. Will the user try to achieve the effect that the subtask has?
Does the user understand that this subtask is needed to reach the user's goal?

B. Will the user notice that the correct action is available?
E.g. is the button visible?

C. Will the user understand that the wanted subtask can be achieved by the action?
E.g. the right button is visible but the user does not understand the text and will therefore not click on it.

D. Does the user get feedback?
Will the user know that they have done the right thing after performing the action?

Tasks	A.	B.	C.	D.
1	Yes. After toilet visits the user will have a need to wash hands	Yes. Basin is very visible.	Yes, basins are strongly associated with washing hands.	Yes, visible approached.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				
Error	**Cause**	**Effect**	**Detection**	**Recovery**
Not find basin	Hidden/design not fitting archetype	Slowing down washing process.	Immediate.	Ask for help, search more.
Task	**A.**	**B.**	**C.**	**D.**
2.1	Yes. The user will have a need to soak the hands.	Most of the times. Sometimes sensors or complicated taps make it hard to understand how to use it.	Most of the times. Sensors or complicated taps can make it difficult.	Yes. Water will start flowing, but sometimes with slack.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				
Error	**Cause**	**Effect**	**Detection**	**Recovery**
Not understanding function	Hidden/design not fitting archetype	Slowing down washing process.	Immediate.	Ask for help, continue search.
Turn wrong way	Not to standard.	Slowing down washing process.	Immediate.	Ask for help, continue search.
Task	**A.**	**B.**	**C.**	**D.**

2.2	Yes.	Yes.	Yes.	Yes.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not enough sensor time.	Constructed wrong.	Hard to soak hands.	Immediate.	Try again.
Task	**A.**	**B.**	**C.**	**D.**
3.1	Yes, will want to add soap.	Mostly. Sometimes the dispensers are "hidden" behind or under mirrors/similar.	Yes.	Yes, visual feedback.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not find dispenser	Hidden/design not fitting archetype	Slowing down refilling process.	Immediate.	Ask for help/search more.
Task	**A.**	**B.**	**C.**	**D.**
3.2	Yes, want to understand how to extract soap.	Mostly, sensor based extractor might be hard to understand.	Yes.	Yes.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not find extractor.	Hidden/design not fitting archetype	Slowing down refilling process.	Immediate.	Ask for help/search more.
Task	**A.**	**B.**	**C.**	**D.**
3.3	Yes, want to extract soap.	Mostly, sensor based extractor might be hard to understand.	Mostly, buttons or sensors are associated with the action.	Yes, but sometimes with slack.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not understand construction	Hidden/design not fitting archetype	Slowing down refilling process.	Immediate.	Ask for help/try again.
Believe sensor based while it's not.	Design implicates sensor.	No soap extracted.	Immediate.	Ask for help/try again.

Task	A.	B.	C.	D.
3.4	Yes, common known.	Yes.	Yes.	Yes.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				

Error	Cause	Effect	Detection	Recovery
Not lathering.	-	-	-	-

Task	A.	B.	C.	D.
4.1	Yes.	Yes.	Yes.	Yes.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				

Error	Cause	Effect	Detection	Recovery
Not putting hand under water.	Believe soap should dry in.	Not removing bacteria.	None.	Wash hands.

Task	A.	B.	C.	D.
4.2	Yes.	Yes.	Yes.	Yes.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				

Error	Cause	Effect	Detection	Recovery
Not putting hand under water.	Believe soap should dry in.	Not removing bacteria.	None.	Wash hands.

Task	A.	B.	C.	D.
5.1	Mostly, sometimes looking for hand dryer or not want to dry hands at all.	Mostly. Sometimes the dispensers are "hidden" behind or under mirrors/similar.	Yes.	Yes. Visual feedback.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				

Error	Cause	Effect	Detection	Recovery
Not find dispenser	Hidden/design not fitting archetype	Slowing down washing process.	Immediate.	Ask for help/search more.

Task	A.	B.	C.	D.
5.2	Yes, want to dry hands.	Mostly, sensor based extractor might be hard to understand.	Mostly, holes or sensors are associated with the action.	Yes, but sometimes with slack.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				

Error	Cause	Effect	Detection	Recovery
Not extracting correct	Hidden/no implication from design.	Slowing down washing process.	Immediate.	Ask for help.
Task	**A.**	**B.**	**C.**	**D.**
5.3	Yes.	Yes.	Yes.	Yes.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not find dispenser	Hidden/design not fitting archetype	Slowing down refilling process.	Immediate.	Ask for help.
Task	**A.**	**B.**	**C.**	**D.**
6.1	Yes mostly. Some persons might not care to throw away in bin.	Yes, it is common that bins exist it washrooms.	Yes.	Yes, visual feedback.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not find dispenser	Hidden/design not fitting archetype	Slowing down refilling process.	Immediate.	Ask for help.
Task	**A.**	**B.**	**C.**	**D.**
6.2	Yes mostly. Some persons might not care to throw away in bin.	Yes mostly. Sometimes the function is a bit hidden.	Yes. Sometimes the function is a bit hidden.	Yes.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery

CW & PHEA – Refill hand towels

A. Will the user try to achieve the effect that the subtask has?
Does the user understand that this subtask is needed to reach the user's goal?

B. Will the user notice that the correct action is available?
E.g. is the button visible?

C. Will the user understand that the wanted subtask can be achieved by the action?
E.g. the right button is visible but the user does not understand the text and will therefore not click on it.

D. Does the user get feedback?
Will the user know that they have done the right thing after performing the action?

Task	A.	B.	C.	D.
1. Approach dispenser	Yes.	Yes, cleaner will now that dispensers exist.	Most of the times, and particularly after one use.	Yes, visible approached.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				
Error	**Cause**	**Effect**	**Detection**	**Recovery**
Not find dispenser	Hidden/design not fitting archetype	Slowing down refilling process.	Immediate.	Ask for help/ continue look for it.
Task	**A.**	**B.**	**C.**	**D.**
2. Locate opening mechanism	Yes.	Yes.	Most of the times, and particularly after one use.	Yes. Visual feedback.
Which action can the user do wrong at the right time? Which action can the user do right at the wrong time? What happens if the user not completes or excludes an action? What happens if the user performs the actions in the wrong order?				
Error	**Cause**	**Effect**	**Detection**	**Recovery**
Not find opening mechanism.	Hidden/complicated.	Unable to open dispenser/slow down refilling process.	Immediate.	Ask for help/ continue look for it.
Task	**A.**	**B.**	**C.**	**D.**
3. Activate opening mechanism	Yes.	Most of the times, and particularly after one use.	Most of the times, and particularly after one use.	Yes. Visual feedback.
Which action can the user do wrong at the right time?				

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not understanding how to use opening mechanism.	Too complex.	Not able to open dispenser/slow down process.	Immediate.	Ask for help.
Open with force without using mechanism.	Do not understand the opening mechanism, or too time/energy consuming to use mechanism.	Can break dispenser/not able to open.	Immediate.	Use mechanism.
Not having key.	Lost/forgotten.	Cannot open dispenser.	When realizing key is gone.	Find another key.
Applying force at wrong place (buttons/pressure points)	Not understanding construction.	Cannot open dispenser.	When dispenser is not opening.	Ask for help, try again.
Task	**A.**	**B.**	**C.**	**D.**
4.1 Tear of wrapping	Yes.	Yes.	Yes.	Yes, visual feedback.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Drop papers on floor.	Hard to balance while tearing off.	Slow down process.	Immediate.	Pick up towels/get more.
Not remove wrapping.	Not understanding function.	Not possible to extract towels.	When user tries to use product.	Remove wrapping.
Task	**A.**	**B.**	**C.**	**D.**
4.2 Place in holder	Yes.	Yes.	Yes.	Yes.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Place vertical.	Not understanding feeding mechanism.	Not possible to extract towels.	When user extract towel.	Replace towels.
Place wrong paper type.	Mistake or not knowing	Not fitting/hard to extract.	Immediate/when user extract towel.	Change towels.
Stack on side.	Not understanding feeding mechanism.	Not possible to extract towels.	When user extract towel.	Replace towels.
Try to refill without opening	Lack of indication	Slow down process/ destroy	Hard to detect	Ask for help/ open and refill in

Try to refill without opening	Lack of indication	Slow down process/ destroy towels/ hard to fill full	Hard to detect	Ask for help/ open and refill in in the right way.
Task	**A.**	**B.**	**C.**	**D.**
5 Close dispenser	Yes.	Yes.	Yes.	Yes.

Which action can the user do wrong at the right time?
Which action can the user do right at the wrong time?
What happens if the user not completes or excludes an action?
What happens if the user performs the actions in the wrong order?

Error	Cause	Effect	Detection	Recovery
Not closing properly	Not understanding mechanism.	Dispenser standing open/ towels fall out/ encourage theft	Immediate/later when user arrives/ towels on floor	Close properly.

Appendix 2

Interview – XXX

Meeting Details: Location:
Date:
Start Time:
End Time:

Meeting Attendees:

Contact details: Address:
Email:
Web:

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1. *Background*

1.1 "Company"

1.2 "Person interviewed"

2. *Field of work*
   - *Jobbar ni med offentliga miljöer och I så fall av vilken typ? (hotell, museum, köpcentrum etc.)*
   - *Har ni inrett toaletter i offentliga rum?*
   - *Vi jobbar med produkter mot toaletter i exklusiva miljöer, har ni haft kontakt med sådana miljöer?*

3. *The decision making process*
   - *Har ni avtal med specifika interiörfirmor när ni inreder?*
   - *Vad gör en interiörfirma attraktiv för er? (pris, flexibilitet, närhet etc.)*
   - *Vilka faktorer spelar in när ni inreder?*
   - *Specialbeställer ni ofta platsanpassade produkter?*
   - *Hur ofta följer kunden er designrekommendation?*

4. *Trends*
   - *Finns det några speciella trender inom färg, form, material för exklusiva miljöer idag?*

5. *Recessed versus surface mounting*
   - *Är det populärt med inbyggda produkter/dispensrar?*
   - *Hur ofta förekommer det att man väljer inbyggda dispensrar vid renovering?*

- *Hur ställer sig ni och era kunder till golvställda produkter? (t.ex. sopkorgar på golvet vs upphängda)*

6. *Sensors versus manual*
   - *Är det populärt med sensorstyrning?*

7. *What is "Exclusive" for you?*
   - *Vad är exklusivitet för dig? (form, material, kontext etc)*

8. *Additional information and recommendations*
   - *Vad vet ni om TORK idag?*
   - *Tycker ni att något saknas i TORKs serie?*

Summary

1. *Background:*

2. *Field of work:*

3. *The decision making process:*

4. *Trends:*

5. *Recessed versus surface mounting:*

6. *Sensors versus manual:*

7. *What is "Exclusive" for you?:*

8. *Additional information and recommendations:*

Appendix 3

Interview – Wingårdh Arkitektkontor AB

Meeting Details:	Location:	Nonna, Kungsgatan 12
	Date:	16 February 2012
	Start Time:	12:00
	End Time:	13:00

Meeting Attendees: Leila Atlassi, interior designer at Wingårdh Arkitektkontor AB
Karolina Adolfsson
Josefin Sohl
Karin Ljungberg

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1. Background

1.1 Wingårdh Akitektkontor AB

Wingårdh Arkitektkontor AB is an architect office established by Gert Wingårdh in 1988 and is located in Malmö, Gothenburg and Stockholm. They mainly work with larger companies such as Ericsson, Volvo, AstraZeneca and SEB but are also involved in smaller commitments. Among them, the villas are particular outstanding, for example Villa Astrid and VillAnn in Hovås, Amundön, Kvarnhuset in Västra Karup and Villa Nilsson close to Varberg.

1.2 Leila Atlassi

Leila has a bachelor degree in Technical Design from Chalmers and a master degree in interior design from HDK (Högskoaln för design och konsthantverk). During her master thesis project she was introduced to Wingårdh Arkitektkontor AB where she has been working the last 5 years.

2. Field of work

During Leila's time at Wingårdh she has been working with a wide range of public scenes such as offices for larger companies, museums, concert halls and shopping malls. Since the line between the architects and interior designer at Wingårdh's is not distinct, she works close with architects. She also has worked with interior design of public washrooms in some of the projects.

3. The decision making process

As architects and interior designers only recommend products for their customers and do not buy any product themselves, they do not benefit from having agreements with suppliers. On the other side a well worked relationships with suppliers tend to lead to some type of professional bonds.

Personal contacts and earlier experiences are of great importance when it comes to make decisions about different products. The first impression of the supplier is also very important. Architects find it easier to corporate with companies that have architects as their main target group, communication problems have occurred with companies that have the end user as target group.

Architects use different channels to get inspiration and to find contacts and products. These channels span from furniture fairs and internet browsing to sales representatives from different suppliers.

A forum that is used when looking for products is Architonic, which is a data base where different companies show their products. It can easily be used as a search motor to find specific products. Leila also has her own list of companies that she has been working with earlier and has a good experience working with.

If architects do not find exactly what they are looking for they contact the supplier to see if the product is possible to customise (change in colour, form, size, etc.) for its specific surroundings. They do not design any products themselves.

Interior designers often work with the building's exterior design as an inspiration and try to reflect the exterior in the interior.

When choosing interior products it is important that the designer consider maintenance, it should be easy to clean the surfaces and to refill for example dispensers. A problem that often occurs is that the architects often wishes for clean shapes and lines and doesn't appreciate for example level indicators on soap or paper dispensers that take a dominant place. On the other hand these indicators make maintenance much easier.

4. Trends

As a counter reaction to the white and black colour that was very popular for five to ten years ago, coated materials in different colours have been popular in the recent years. A trend usually starts in certain areas in the public sector and then after a while transfers to the private sector.

The dispensers do not always have to blend in; sometimes they work as an accent, something that gives an extra touch to the interior.

At the moment it is popular to have natural material and dull colours, the trend is in some way moving away from the bright and strong colours that have been trendy for a while.

Stainless steel is a material that works over time and seems to becoming more popular at the moment.

People wants to feel comfortable with the design so design that is long lasting should aim to be classic, but with a twist that sparks interest.

5. Recessed versus surface mounting

Leila has proposed integrated dispensers, but they have always been turned down due to high costs. Wall thickness and wall material also have to be taken in consideration. Even if recessed products isn't used so much today, clients want to avoid floor standing devices.

She thinks that an integrated dispenser could give a clean, exclusive and subtle impression.

6. Sensors versus manual

Sensors are cool!

They are easy to keep clean and make it possible to blend in the dispenser in a better way. The problem could be to make them intuitive, so that the first time user is able to use it. Often stickers or symbols are used to indicate how the product should be used and those could disturb the overall impression. Sensors also have a tendency to be "blingy" so it is important to keep them discreet and well blended within the contexts.

7. What is "Exclusive" for you?

Leila finds products with simple shapes, but where effort has been put on details and right materials exclusive. Examples of materials that she think is exclusive are Corian, porcelain, plastic in the right way, real materials, dull colours and stainless steel. Classic and well worked design and products with quality.

8. Additional information and recommendations

Make sure that your product distinguishes from the rest on the market. Combine materials in unusual ways, challenge and amaze. Use old material in a new way. New is fun!

It should be new and fresh, but at the same contain something classic. Work with materials and not with flashy shapes, simple shapes are often best as products should be part of a context, in this case a washroom.

Do not use affected materials such as laminate and material that pretends to be something else. A material could be right if used in the right way and in the right context even though it is not trendy at the moment. You should be careful with dismissing a material just because it is used in a certain way or associated with certain attributes today.

When designing, take in consideration that users with low vision should be able to use the product.

Have a context focus instead of a product focus.

Contact Björn at TD and make sure that you talk with a wide range of people to ensure that you get the information you need.

Summary

1. *Background:* Located in Malmö, Gothenburg and Stockholm. They mainly work with larger companies such as Ericsson, Volvo, AstraZeneca and SEB.

2. *Field of work*: Offices, museums, concert halls, shopping malls and public washrooms

3. *The decision making process:* Only recommend products, so do not benefit from having agreements with suppliers. Important with personal contacts and earlier experiences and easier to corporate with companies that have architects as their main target group. Channels used; fairs, internet, sales representatives, Architonic and her own list of companies. Asks for customisation, but do not design any products themselves. Tries to reflect the exterior in the interior.

4. *Trends:* Usually starts in the public sector and then transfers to the private sector. Does not always have to blend in. Natural material and dull colours, moves away from the bright and strong colours. Stainless steel works over time.

5. *Recessed versus surface mounting:* Proposed integrated dispensers, but always turned down due to high costs. Could give a clean, exclusive and subtle impression.

6. *Sensors versus manual:* Sensor is cool! Easy to keep clean and blend in. Problem could be to make them intuitive.

7. *What is "Exclusive" for you?:* Simple shapes with effort on details and materials. Corian*, porcelain, plastic in the right way, real materials, dull colours, stainless steel, classic, well worked design and products with quality.

8. *Additional information and recommendations:* Distinguish from the rest on the market. Combine materials in unusual ways and old material in a new way. Work whit materials and not with flashy shapes, the product should be a part of a context, context focus instead of product focus. Do not use affected materials and take users with low vision in consideration.

Interview – Zenit Arkitekter

Meeting Details: Location: Birger Jarlsgatan 114 in Stockholm
                            Date: 10 February 2012
                            Start Time: 15:00
                            End Time: 15:30

Meeting Attendees: Mira Tolic, architect at Zenit Arkitekter
                            Josefin Sohl
                            Karin Ljungberg

Contact details: www.zenitarkitekter.se

1. Background

Zenit Arkitekter AB is a Stockholm based architecture company that has existed over 30 years. They have customers both in the private and public sector and have in total 8 employees. They share office and collaborate with the interior designer company Nils Holger Inredning & Design.

2. Field of work

Zenit architect has been focusing on schools and sport halls during the recent years. They have not been working with luxury designs.

3. The decision making process

The architects always propose all interior including dispensers to their clients. Sometimes the clients have already decided what they want, and the architects generally follow this line even if it doesn't feel like it fit the other design 100% in order to keep the client happy. The architects often have deals with providing firms of interior designs but are open to new products and scan the market frequently.

4. Trends

Sensor based dispensers and recessed products are popular, no products on the floor.

5. Recessed versus surface mounting

Built in, or recessed, devices are popular during rebuilding or restoration.

6. Sensors versus manual

Mira liked dispensers with sensors, easier to clean.

Summary

1. *Background:* Located in Stockholm. They mainly work with schools and sport halls.

2. *Field of work*: Schools and sport halls.

3. *The decision making process:* Keep the client happy!

4. *Trends:* Sensors and recessed dispensers.

5. *Recessed versus surface mounting:* Recessed, more and more common.

6. *Sensors versus manual:* Sensor is good, easy to keep clean and blend in.

Interview – Anna Derach

Meeting Details:	Location: Through a mail conversation
	Date: 19 March 2012
	Start Time: 16.55
	End Time: 16.55
Meeting Attendees:	Anna Derach
	Karin Ljungberg
	Josefin Sohl
Contact details:	Address: ul. Inżynierska 3 /4, 03 - 410 Warszawa
	Email: ania@nizio.com.pl
	Web: http://www.nizio.com.pl/uk

1. *Background*

1.1 "Company"

The Nizio Design International (NDI) design studio was found by Mirosław Nizio
in 2002 and is based in Warsaw's Praga district. They are specialising in designing museum
compounds and thematic exhibitions.

1.2 "Person interviewed"

Architect at Nizio Design International (NDI) design studio.

2. *Field of work*

She is working on schematic design and design development for the executive phase of
projects. She has been designing the public toilets in museums and also prepared a project
for the toilets, shower rooms and changing rooms for the governmental project of sport
fields "Orlik 2012" in Poland.

3. *The decision making process*

She bases her decisions on design, costs and resistance and to get inspired she uses different
websites, catalogues that she is getting from the agents. If she do not find what she is
looking for and if it is not too expensive she asks companies for XX or design the product
herself.

4. *Trends*

Every year there are some products that are trendy. Once, that is a white color, the other time black, but the concrete material is all the time trendy, e.g. black steel is very popular in her office.

5. *Recessed versus surface mounting*

It depends on the place and the character of the interior. The recessed dispensers are very modern and look aesthetic of course, but sometimes, they cannot be noticed by the users or they simply do not match.

6. *Sensors versus manual*

She prefers sensors, due to hygienic reasons.

7. *What is "Exclusive" for you?*

She finds sensors mechanisms, marble or gold materials exclusive.

8. *Additional information and recommendations*

The definition of exclusive style in Poland and in other countries must mean something else. Every country has its own understanding of that term, because of various culture and esthetic sense. She thinks that the market in Poland is still not as good developed as in the west countries. There is also an issue of the costs of products and budgets of investors.

Summary

1. *Background:* Interior designer for e.g. washrooms at museums

2. *Field of work*: Recent projects; toilets, shower rooms and changing rooms for the sport fields "Orlik 2012" in Poland.

3. *The decision making process:* Design, costs, resistance. Uses catalogues and websites.

4. *Trends:* Honest materials are always trendy.

5. *Recessed versus surface mounting:* Depends on the place and the character of the interior.

6. *Sensors versus manual:* Sensors, due to hygienic reasons

7. *What is "Exclusive" for you?:* Sensors mechanisms, marble or gold materials

8. *Additional information and recommendations:* There is a difference in the definition of exclusive style in Poland compared to other countries.

Interview – Łukasz Boniewski

Meeting Details:	Location: Through a mail conversation Date: 20 March 2012 Start Time: 09.40 End Time: 09.40
Meeting Attendees:	Łukasz Boniewski Karin Ljungberg Josefin Sohl
Contact details:	Address: ul. Inżynierska 3 /4, 03 - 410 Warszawa Email: lukasz@nizio.com.pl Web: http://www.nizio.com.pl/uk

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1. *Background*

1.1 "Company"

The Nizio Design International (NDI) design studio was found by Mirosław Nizio in 2002 and is based in Warsaw's Praga district. They are specialising in designing museum compounds and thematic exhibitions.

1.2 "Person interviewed"

Architect at Nizio Design International (NDI) design studio.

2. *Field of work*

His field of work is to projecting architecture as well as interior design for public and private sectors. He has participated in some projects concerning washrooms for public spaces.

3. *The decision making process*

He bases his decisions on opinions of other architects, more experienced than him. He uses internet sources like forums and articles, magazines, books and realizations of other architects. It is very difficult to get something customised in Poland.

4. *Trends*

As many trends in projecting washrooms as the amount of architects and clients.

5. Recessed versus surface mounting

It depends on project. Recessed mounted dispensers may be more useful and les imposing on " final look" of the washroom, but sometimes surfaces mounted dispensers look really nice in washrooms.

6. Sensors versus manual

In public, sensors are more hygienic, but in private apartments he prefer manual, especially well designed.

7. What is "Exclusive" for you?

For me it means "to let me feel as someone special".

8. Additional information and recommendations

The difference in preference in exclusive styles in Poland versus western parts of Europe such as France or Great Britain: Today it is very similar and big differences are very difficult to notice. But in Poland we have to work a little harder to make our public washrooms more functional and especially cleaner.

Summary

1. *Background:* Interior designer and architect for both the private and public sector.

2. *Field of work*: Private and public, some projects concerning washrooms for public spaces.

3. *The decision making process:* On opinions of other architects, more experienced than him.

4. *Trends:* As many trends in projecting washrooms as the amount of architects and clients.

5. *Recessed versus surface mounting:* It depends on project. Recessed more useful and les imposing on "final look", but sometimes surfaces mounted dispensers look really nice in washrooms.

6. *Sensors versus manual:* In public, sensors are more hygienic, in private he prefer manual.

7. *What is "Exclusive" for you?:* " to let me feel as someone special"

8. *Additional information and recommendations:* No big differences between the design in Poland today and the design in the western part of Europe.

Interview – Lars Helling

Meeting Details:	Location:	Email
	Date:	2012-03-22
	Start Time:	-
	End Time:	-

Meeting Attendees: **Lars Helling, Josefin Sohl, Karin Ljungberg**

Contact details:	Address:	
	Email:	lars.helling@larshelling.no
	Web:	www.larshelling.no

1. Background

Lars Helling Arkitekter Oslo. Lars Helling has among other been the architect consultant when Gothia Towers has been renovated. He is also responsible for parts of the new building of Gothia Towers, such as the interior of the restaurant and washrooms. He finds inspiration from trips, magazines and experiences from a long carrier.

2. Field of work

Has experience from public washroom and exclusive environments.

3. The decision making process
   -

4. Trends

Shiny hands-on surfaces, stucco lustro instead of tiles, chrome, large mirrors with integrated lightning. Terries and free standing dispensers. Opening in surfaces for bins, Fresh air and calm, electronic music.

5. Recessed versus surface mounting
A problem with the recessed solutions is that the solution and placement often comes to late to the building entrepreneur. It is also a permanent solution. Also exclusive is connected to personal service and is associated with design for private spaces, which have technically simple solutions.

6. *Sensors versus manual*

My experience is that all technical solutions breaks, and what is broken is not replaced immediately. There is nothing as unexclusive as a sensor that is not working.

7. *What is "Exclusive" for you?*

Exclusive is really when the large masses are excluded and something that is only understandable and reachble for the "elite". But in our commercialized world we are clever enough to make it available for more people, when we present simple products in a refined way.

8. *Additional information and recommendations*
-

Summary

1. *Background:* Architecture

2. *Field of work*: Hotels

3. *The decision making process:* -

4. *Trends:* Free standing dispensers, large mirrors with integrated light, bin as a hole in the surface, shiny or chrome materials.

5. *Recessed versus surface mounting:* Surface.

6. *Sensors versus manual:* Manual.

7. *What is "Exclusive" for you?:* Displayed or packaged in a refined way

8. *Additional information and recommendations:* -

Appendix 4

Cues / Line

Cues (columns): Deep cut outs · Rectangluar shapes · Leaning base · Rectangular window · Contrasting material · Clean forms · Closing shape · Transparency · Vertical axis · Chubbiness · Big radius · Semicircular tongue · Smooth tooth · Basic volume combination · Circular shapes

Line		Total
Box 90		16
Box 2000		17
Elevation		16
Aluminum		13
Early Tork		7
Box 2000		14
Elevation		15
Aluminum		13
Early Tork		7
Box 90		12
Box 2000		13
Elevation		14
Aluminum		7

Column totals: 8 · 11 · 9 · 10 · 17 · 18 · 5 · 17 · 18 · 12 · 14 · 6 · 6 · 6 · 9

Appendix 5

User experience

Name: Abdul

Background: Cleaner. Has cleaned at other places before but now only at SCA. Mainly on floor 4 but also on floor 5 and parts of floor 2.

H1 electric paper towel
Feeds out paper first, then open, generally without using key. Pull out roll and put in cart. Take new roll and put in, then stick it into the roll, feed out with button and stick it through the hole. Change every tenth day.

Comments: Don't use diod indicators or indicators at all, always open up to see. Sometimes the blue plastic part is broken so saves old ones.

H2 hand towel
Open up and analyze content. Take the paper from shelf, tear of wrapping with one hand while holding the paper in the other and put the wrapping in the sink. Make sure the right side is down. Put it on top of the other papers, sometimes push down to fit. Always hold one hand against other towels preventing them to fall out. Must change every day.

Comments: Shorter colleagues has had incident when paper fall out on to floor. Sometimes deputy cleaners put in towels with the wrong side down.

Elevation bin
Bend down and open by pushing button, head close to sink. Pull up bag with two hands. Place new bag by placing in middle and pull on the frame. Make sure watermark is on place, otherwise it might be impossible to close.

Comments: Door breaks sometimes.

H1 manual paper towel
Open up dispenser, take out paper. Feed out with pushing button. Put in new paper, stick in rolls while feeding, put through hole while feeding.

Comments: Hard to feed and stick through rolls at the same time.

T6 Toilet paper auto shift
Open up dispenser, empty rolls fall out automatically. Take new paper from shelf, remove wrapping and pull out red plastic parts. Pull some paper loose and make sure it's turned at the right way. Close lid.

Comments: Sometimes refills with wrong side. Finds Jumbo roll easier to refill.

Sanitary bin
Finds extra cover in the way and makes it hard to change bags. Sometimes removes this.

General comments
Find sensor based design easier, it is a bit more work while refilling but only needs to refill towel every tenth day instead of every day. Thinks that washroom is a place where you have times to think and consider.

Appendix 6

Concept	Function 1-5 Points	Aesthetics 1-5 Points	Comments
Mirror cabinet			
Table top			
Bench			
Spin it			
Shape up			
New Elevation			
Horizon			
Wall modules			
Roof top			
Parted mirrors			
Divided			
Stripes			
Station			

Appendix 7

Concept	Function					Aesthetics					Comments
	SCA	A	AT	TD	Tot	SCA	A	AT	TD	Tot	
Mirror Cabinet	3,3	2,9	3	3	3	3,3	3	3.7	3.5	3.3	+ Good looking, high capacity and nice materials. Good with towel and bin on the side. Home-feeling and easy to clean. + Light indicators - good! Interesting. Easy to understand and maintain. - Difficult to fit in to most washrooms. Design doesn't appeal - bulky and boring. Hard to find dispensers. Too big.
Table Top	2,3	2,7	3,5	3,8	3	3	2,9	2,3	2,5	2,8	+ Nice, like the new way to attach the dispenser. Interesting material and "close-feeling". Innovative. Easy to use. - Low capacity, unstable and hard to fit in all washrooms. Unhygienic with top fed towel. Not high end, boring and doesn't add value. Looks like a mail box, aggressive. Does the fastening hold in the long run?
Bench	3,3	3.1	3.7	4.3	3.9	3,7	2.3	2	2.3	2.6	+ Like that it is different. Clear use of brushed aluminium and good function. Easy to use. Interesting form. - Bulky and difficult to fit into many washrooms - due to size. Unhygienic to have towel close to bin. Not SCA. Looks too industrial. Space ship, doesn't blend in in most environments. Too big!
Spin it	2,6	2.9	3	3.5	2.2	3,6	3.1	2.7	3	3	+ Stands out! Retro-modern, fun and very interesting according to position. Nice materials and convenient. Easy to use. - Doesn't make sense and difficult to sell. Not SCA. Unpractical and is too close to the outdoor bins.
Shape up	2,5	2.1	1.3	2.8	2.3	3,1	2.9	1.3	2	2.8	+ Nice with different shapes, materials and wood plugs, fun and interesting. Simple and hygienic. How to use the bags? - Doesn't make sense, doesn't like the form. Difficult to sell and bad use of space, expensive with details. Too impractical and weird bin. Unmotivated form and a bit messy.
New Elevation	4,3	3.9	4	4.3	4.1	3,6	2.4	2.7	3.2	3	+ Very nice and good looking, love the combination of glass and stainless steel. Bonus that they are separated. Built on existing design - good. Hygienic, elegant and simple. Nice with stripe. - A bit too "safe" and bulky. A bit boring and the bin could feel a bit big. Could be unhygienic due to split line.
Horizon	3,4	3.9	4	4	3.8	3,4	2.7	3.7	3	3.1	+ High capacity solution and blend in well. Strict and simple design. Nice that it is able to recessed! My favourite. - Impractical to install, boring, not high end, mass production. Difficult to fit in but excellent when it does. Opening too far away. Bulky and a bit to sterile.
Wall modules	3,6	3.6	3	3.5	3.5	4,1	3.9	3.3	3.5	3.8	+ Wow-factor - very innovative. Good looking! Unique mounting, new thinking. Good version of recessed and capacity, easy to manufacture. Modern and charming - Not very useful with round openings. Opening for towel looks wrong. Don't like aluminium. Square holes would look better.
Roof top	4,1	3.4	3	3.8	3.7	4,3	3.6	2	4.8	3.9	+ Excellent, flexible, modular and new thinking! Nice mix of materials and good size and shape. Good capacity and that it is possible to attach to ceiling and wall. Nice spa feeling and nice with wood details. - Narrow hand touch, expensive = exclusive. The size works against the aesthetics if placed by wall.
Parted mirrors	3,9	3.9	4	3.7	3.3	4	3.1	2.7	4	3.6	+ Excellent concept, creative use of light and elegant. Looks almost recessed and high capacity could really work in a high end environment. Simple and discrete. - Does not appeal to me, the bin remains me of a radiator. Don't like the proportions and the mirror on the bin. Needs symbols.
Divided	3,6	3.9	4	3.8	3.8	3,1	3.3	2.7	3.2	3.1	+ Good looking, clean and simple, good mix of materials. Bonus that the two units are separated. Friendly and easy to use. Good hole dimensions. - Looks very basic and not that innovative. Don't like to front fed dispenser. The glass doesn't stand out.
Stripes	2,9	3.3	4	3.8	3.4	3,5	3.3	3.3	2.2	3.1	+ Very innovative, striking and high wow-factor. Good for museums or high image public buildings. Easy to use. - Not SCA, unhygienic, looks dangerous, expensive? Safe? Too niched.
Station	3,5	3.4	3.3	4.2	3.7	3,5	3	2.7	3.5	3.3	+ Good material and capacity, simple and classic design. Pretty, flexible and nice finish. Easy to use. - Very big, too traditional and could be hard to produce. Unpractical with two openings on the bin. Too much shine.

Appendix 8

Concept	Function (1-5 point 5 is high)	Aesthetics (1-5 point 5 is high)	Comments
Mirror cabinet	4	5	
Table top	5	5	
Bench	4	4	
Spin it	5	5	
Shape up	3	4	
New Elevation	5	3	
Horizon	5	4	
Wall modules	5	5	
Roof top	3	5	Trä och vatten?
Parted mirrors	4	5	
Divided	5	3	
Stripes	5	4	
Station	5	3	

Weighted PUGH matrix

How well each concept fulfill demands and desires, (0)=not at all (1)=to some extent (2)=well. Red indicates inability to fulfill demand.

Criterias/Concept	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Total
Mirror cabinet	0	2	2	1	2	2	1	0	2	2	0	1	1	1	1	2	0	2	1	1	1	1	1	1	0	28
Spin it	0	0	1	1	2	2	1	1	2	2	2	2	2	1	1	2	1	2	2	1	1	1	1	1	1	31
Shape up	2	2	2	2	2	2	2	1	2	2	1	1	2	2	1	1	1	2	1	0	1	2	0	2	2	35
New Elevation	0	2	2	2	1	2	2	1	2	2	1	1	1	2	2	2	2	2	1	0	1	2	2	2	0	35
Roof top	2	2	2	1	1	2	2	1	2	2	1	1	1	1	1	1	2	2	1	1	1	2	2	2	1	37
Divided	2	2	2	2	2	2	2	1	2	2	0	1	1	2	1	2	1	2	1	1	1	2	1	1	2	39
Wall modules	0	2	2	1	2	2	2	2	2	2	2	1	1	2	1	2	1	1	1	2	1	2	2	2	1	39
Stripes	1	2	2	2	2	2	2	2	2	2	0	1	1	2	0	2	1	0	1	1	1	2	1	1	2	36
Parted mirrors	0	2	2	1	2	2	1	1	2	2	0	1	1	2	1	2	1	1	1	1	1	1	1	2	1	32
Horizon	2	2	2	1	2	2	2	1	2	2	1	1	1	1	1	1	2	1	1	0	1	2	1	1	2	34
Bench	0	2	2	1	2	2	2	1	1	2	1	2	2	2	2	2	2	2	2	0	1	2	0	1	1	36
Table top	2	2	1	1	2	1	2	1	1	1	0	2	2	2	2	2	2	1	2	1	1	1	0	1	1	34
Station	0	2	2	1	2	0	2	1	2	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1	1	33

Appendix 10

Solution	Solve main problem	Fulfils demands	Realisable	Within cost interval	Safe/Ergonomical	Suits brand identity	Enough information	Comments	Decision
Elimination matrix									
Mirror cabinet	+	-	+	?	+	+	+		-
Spin it	+	-	+	?	+	?	-	Paper feeder construction	-
Shape up	+	+	+	?	+	?	+	Extreme	-
New Elevation	+	-	+	?	+	+	+		-
Roof top	+	+	+	?	+	+	-	Mounting function?	**+**
Divided	+	+	+	?	+	+	+		**+**
Wall modules	+	+	+	?	+	+	+		**+**
Stripes	+	-	+	?	-	-	+	Extreme?	-
Parted mirrors	+	+	+	?	+	+	+		**+**
Horizon	+	+	+	?	+	?	+	Wall mounted? Common?	-
Bench	+	+	+	?	+	?	+	Extreme?	-
Table top	+	+	+	?	+	?	-	Mounting function	-
Station	+	-	+	?	+	?	+		-

Appendix 11

How would you rate the esthetical appearance of the following versions?

Version A

☐ Very nice

☐ Quite nice

☐ Not so nice

☐ Not nice at all

Version B

☐ Very nice

☐ Quite nice

☐ Not so nice

☐ Not nice at all

Comments _____

_____

_____

_____

Dispenser Panel

How would you rate the usage of the product?

Version 1
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Version 2
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Version 3
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Version 4
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Version 5
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Version 6
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Version 7
- ☐ Very good
- ☐ Quite good
- ☐ Not so good
- ☐ Not good at all

Comments

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

Appendix 12

Vers-ion	Functional Very good 3 points	Quite good 2 points	Not so good 1 points	Not good at all 0 points	P	A/B	Esthetical Very good 3 points	Quite good 2 points	Not so good 1 points	Not good at all 0 points	P	Comments
1	3	9	14	1	41	A	3	14	6	4	33	Något små hål. För litet hål för handdukar.
						B	5	20	2	0	57	Slår i knogarna. Bästa slängfuntion.
2	3	12	12	0	45	A	2	14	9	2	43	På A känns hålen lite för små. Dåliga proportioner för A. kanske lite sämre med rundning.
						B	11	15	1	0	64	Något små hål, men ser trevligt ut med rundningen. Generellt bättre med runda hål.
3	13	10	2	2	61	A	6	9	10	2	46	Mindre plottrigt än de föregående.
						B	11	5	10	1	53	Fräschare än instängda hål.
4	17	8	1	1	68	A	7	12	8	0	53	Bättre än 3, pga runda hörn. Snyggare med runda kanter! Hörnen kunde ha haft en mindre radie.
						B	14	8	5	0	63	Snyggast! Kan skvätta äckel.
5	11	4	8	4	49	A	3	6	12	6	33	Pappershålet ser väldigt litet ut, det lilla hålet känns väl litet mot dispensern.
						B	7	9	7	4	46	Skitsnyggt, men dispensern måste vara tip-top. Snyggt! För smalt håll Dåliga proportioner i A. Bra att papper sticker ut!
6	10	16	1	0	63	A	4	11	9	3	43	Trafikljus, tycker bättre om rektangulära hål.
						B	10	8	5	3	51	Gillar runda former ☺ Vill ha lättare att ta papper. Klumpigt med ruda hål!
7	1	13	12	1	41	A	1	14	10	2	41	Ser konstig ut, South Park-känsla, bättre än två runda hål, rätt snygg men bättre med samma form på hålen. Tänker på lekprogram på TV eller skolgympan. Bäst, superbra!
						B	7	13	6	1	53	

4B kom på 1a plats på funktion och 2a på estetik!

A is best	B is best	They are equal	Comments
5	17	5	A för bred över lag, B känns lite elegantare. Jag tycker att den smala var snyggare, A klumpig. Bredden spelar ingen roll. B är för smal!

Överlag B bättre än A!

Appendix 13

Technical

Function		Demand/Desire	Fulfilment Yes/No
1	Allow dual mounting system	Desire	No
2	Use existing refills	Demand	Yes
3	Cope with foreseeable forces	Demand	Yes
4	Indicate when refill is needed	Desire	No
5	Durable under long period of use	Demand	Yes
6	Endure transporting temperatures	Demand	Yes
7	Have recyclable parts	Desire	Yes
8	Be able to be customized	Desire	Yes
9	Protect paper and soap from environment	Demand	Yes
10	Allow theft protection	Demand	Yes
11	Have low production cost	Desire	Yes

Ergonomic

Function		Demand/Desire	Fulfilment Yes/No
12	Enable refilling for short and tall cleaners	Demand	Yes
13	Enable usage for children and adult users	Demand	Yes
14	Enable mounting for one person	Demand	Yes
15	Allow easy cleaning	Demand	Yes
16	Stand cleaning detergents	Demand	Yes
17	Indicate intuitive usage	Demand	Yes
18	Allow easy refilling from cleaning staff	Demand	Yes
19	Allow usage of disabled persons	Demand	Yes

Aesthetic

Function		Demand/Desire	Fulfilment Yes/No
20	Fit target environment	Desire	Yes
21	Holistic use of logo and printing	Demand	Yes
22	Use of genuine materials	Demand	Yes
23	Appeal as an exclusive product	Desire	Yes
24	Express Tork exclusive attributes	Desire	Yes
25	Not appear to physically stick out	Desire	Yes

Appendix 14

			aluminium product manufacturing, average metal working	3 kg	
	Screws	chromium steel 18/8, at plant		0.0035 kg	disposal, steel, 0% water, to municipal incineration
			section bar rolling, steel	0.0035 kg	
	Other parts	aluminium, primary, at plant		2 kg	disposal, aluminium, 0% water, to sanitary landfill
			aluminium product manufacturing, average metal working	2 kg	
Rails					
	Rail	steel, low-alloyed, at plant		5 kg	disposal, steel, 0% water, to municipal incineration
			surface treatment, cold impact extrusion, steel	5 kg	
	Screws	chromium steel 18/8, at plant		0.0035 kg	disposal, inert waste, 5% water, to inert material landfill
			section bar rolling, steel	0.0035 kg	
Dispenser & waste bin					
	Dispenser	acrylonitrile-butadiene-styrene copolymer, ABS, at plant		0.8 kg	disposal, plastics, mixture, 15.3% water, to municipal incineration
			blow moulding	0.8 kg	
	Waste bin frame	acrylonitrile-butadiene-styrene copolymer, ABS, at plant		0.2 kg	disposal, plastics, mixture, 15.3% water, to municipal incineration
			blow moulding	0.2 kg	
Interior					
	Steel box	steel, low-alloyed, at plant		12 kg	disposal, steel, 0% water, to municipal incineration
			hot rolling, steel	12 kg	
			steel product manufacturing, average metal working	12 kg	
	Screws	chromium steel 18/8, at plant		0.01 kg	disposal, steel, 0% water, to municipal incineration
			section bar rolling, steel	0 kg	

			aluminium product manufacturing, average metal working	3 kg	
	Screws	chromium steel 18/8, at plant		0.0035 kg	disposal, steel, 0% water, to municipal incineration
			section bar rolling, steel	0.0035 kg	
	Other parts	aluminium, primary, at plant		2 kg	disposal, aluminium, 0% water, to sanitary landfill
			aluminium product manufacturing, average metal working	2 kg	
Rails					
	Rail	steel, low-alloyed, at plant		5 kg	disposal, steel, 0% water, to municipal incineration
			surface treatment, cold impact extrusion, steel	5 kg	
	Screws	chromium steel 18/8, at plant		0.0035 kg	disposal, inert waste, 5% water, to inert material landfill
			section bar rolling, steel	0.0035 kg	
Dispenser & waste bin					
	Dispenser	acrylonitrile-butadiene-styrene copolymer, ABS, at plant		0.8 kg	disposal, plastics, mixture, 15.3% water, to municipal incineration
			blow moulding	0.8 kg	
	Waste bin frame	acrylonitrile-butadiene-styrene copolymer, ABS, at plant		0.2 kg	disposal, plastics, mixture, 15.3% water, to municipal incineration
			blow moulding	0.2 kg	
Interior					
	Steel box	steel, low-alloyed, at plant		12 kg	disposal, steel, 0% water, to municipal incineration
			hot rolling, steel	12 kg	
			steel product manufacturing, average metal working	12 kg	
	Screws	chromium steel 18/8, at plant		0.01 kg	disposal, steel, 0% water, to municipal incineration
			section bar rolling, steel	0 kg	
	Lock plastic	acrylonitrile-butadiene-styrene copolymer, ABS, at plant		0.004 kg	

			blow moulding	0.004 kg	
	Lock metal	chromium steel 18/8, at plant		0.014 kg	
			milling, steel, small parts	0.014 kg	

End of Life Overview

Description	Process	Amount

Distribution Overview

Description	Transport Mode	Distance
Germany-Lilla Edet	transport, lorry >32t, EURO3	800 km
Lilla Edet-Göteborg	transport, lorry >16t, fleet average	56 km

Consumables Overview

Description	Consumable	Amount Consumed