GIVING TEXTILES FORM

EXPLORING SELF-SUPPORTING POSSIBILITIES

Bachelor of fine arts in Textile Design
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1.1 ABSTRACT

*Giving textiles form* is a project in textile design exploring how textiles can create self-supporting three-dimensional forms with after finishing techniques. The project focuses on the textile to be self-supporting, by working against and challenging the properties of a textile fabric. The motive for this project is to widen the definition of what a textile can do. The methods of origami and traditional Japanese wood joinery are used to find a functioning and durable construction, as well as manipulating the textiles with colour and after finishing techniques. The result of this work is three coloured textile forms that are three-dimensional and self-supporting, the use of colour strengthens the depth and adds a spatial dimension. This work contributes to broaden the field of textile design by expanding the use of textile.

Keywords: textile design, textiles, self-support, form, construction and colour.
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2.1 INTRODUCTION TO THE FIELD

Textiles have specific characteristics such as being driveable, soft and formable in comparison to other types of materials, for instance wood, clay, Lego or cardboard. These materials have other kinds of features, such as stability, carrying, rigidity and so on.

Akana Moriyama (2017) is a textile designer and architect. Her strength and passion is to work with inside and outside space. Her design projects are often three-dimensional textiles objects that are sewed together in different colours, which creates spatiality within the textile pieces. Moriyama has an interesting way of working with textiles and colour. Her work is characterised by a massive three-dimensional dominance created by the volume and colour that give depth to the textiles. She also places the textiles in environments that assist the piece to change. One example is “Cubic Prism” (figure 1) that is hung outside to be changed by the weather. The object is in different colour through the rain, sun, and wind the textile transform to lighter shades and more fragile.

The Swedish ceramic artist Eva Hild (2016) makes hand-build sculptures in large scale. She creates the sculptures through several thin layers of clay, from a construction were voids, gaps and cavity are planned in a way that volume, strength and fragility are created (figure 2). Hild describes her method as working with the opposite; interior and exterior, impression and expression, strength and fragility.

Origami (Juslenius 2015, Lang 1996) is an ancient technique from the 9th century. The term means fold and paper, and it is about folding paper to three-dimensional forms. The logic of origami is systematically folding after lines and points. For instance, a square has four lines and four points. Through folding the square new lines and new points are created. The new lines and points can be folded against each other to create a three-dimensional form.
Japanese wood joinery (2016) is a technique that has been around for over a hundred years. The technique was used before screws were invented. Japanese craftsmen use the technique to joint two wood pieces together. It is a mathematical and flawless technique, i.e. if something is counted incorrect or cut wrong it will be impossible to fit the pieces together. The construction shows a uniquely Japanese wood aesthetic.

The aesthetic expression of Japanese wood joinery technique can be seen today; the architect Shigeru Ban (2017) uses this method in his work. Shigeru Ban is known for his innovative design work made in paper, particularly recycled cardboard tubes. Through the use of the method and recycled cardboard tubes, Ban combines the old joinery technique with modern aesthetic. Structure is a key for Shigeru Ban to make a material strong (figure 4).

Robert Van Embricqqs (2016) is an architect and furniture designer. He has a fascination of aesthetically pleasing and movement in forms. His work is inspired by form, structure and movement. One important aspect for Van Embricqqs design process is an effort to combine function with aesthetics.

Van Embricqqs joins the wood piece with hinge that makes the design flexible object (figure 5). The wood object is made from a flat wood square that is two-dimensional, but by a twist it would rise into a three-dimensional object, e.g. a chair (figure 5). The construction for Van Embricqqs furniture can make a hard material become movable. Every wood pieces in the object has its own task to succeed into three-dimensionality. Van Embricqqs works are mathematic. In addition, compared to the Japanese joint technique every little misstep will make the wood pieces not fit together.
2.2 MOTIVE AND IDEA DISCUSSION

In the examples mentioned above, textiles, ceramics and woods are investigated in a three-dimensional context, using layering and spatiality as means. Moriyama’s three-dimensional textile objects are held up by threads, ropes or curtain devices to express the construction, form, layers and colour. Through adding colour to the layers, the construction, the forms and the depth are expressed clearer. Hild, on the other hand, uses the properties of the clay material as such. This material is more self-supporting than textiles. By using the ceramic material in large scale and not employing any metal skeleton, Hild creates a structure for the form through applying thin layers of clay successively. Van Embricqs work with wood construction that create self-supporting forms transforming from two-dimensional surface and by a movement it becomes three-dimensional. Like Hild, Van Embricqs is using material that is already self-supporting. The architect Shigeru Ban believes that the material does not need to be strong to be used to build a strong structure. Ban argues that the structure had nothing to do with the cause of material.

The works from Moriyama, Hild and Van Embricqs present certain approaches to more or less self-supporting constructions, and discuss materials, form and three-dimensionality. However, these projects do not consider the possibilities of how textiles can carry a shape without any external support such as a hanger or a body, or using materials with inherent characteristics to from textiles. In this project, the intention is to use textile fabric, the art of origami and the after finishing techniques as means to explore the capability of textiles as being self-supporting. There is developing potential in manipulating textiles into forms that can be self-supporting, and finding qualities that could enhance the textile material possibilities.

The questions are: how can self-supporting be developed in a textile that does not have self-supporting features? What kind of construction do the textiles need to become self-supporting? Does the use of after finishing techniques widen the opportunity or is it just about the construction?
2.3 AIM

The aim of the project is to explore how textiles can create self-supporting three-dimensional forms by means of after finishing techniques, using origami as folding method.
3.1 DESIGN METHOD & DESIGN OF EXPERIMENTS

The process and methods is divided in five main stages: pre-study, form development, colour development, scale development and production.

THEORETICAL PRE-STUDY IN COURSE DESIGN METHODS RESEARCH

In this theoretical pre-study, the aim was to be able to formulate the idea, the issue, the question and the motive for the degree project. The idea is to work with the textile fabric, manipulate it, build with it, create a self-support textile and work with it as it was another material.

The motive is to challenge and broaden the use of textile. The question is; “how can self-supporting be developed in a textile that does not have self-supporting features?”

Figures 7-11 show sketches of the idea in different materials. The first form is built up with plastic beads (figure 7, 8, 9) in layers which has been made systematically. Using different colour shades (figure 8) in the layers create another dimension in the form. This is a method to create depth by layers and colour shades.

Creating form from a flat surface as the textile fabric often is. Figure 10 show paper that has a flat surface. The paper has been folded and by movement the paper creates a form.

Figure 11 shows a textile fabric in the same folding construction as in figure 10. The textile is not stiff as paper to be support. This folding need the textile to become stiffer.

In this sketch the fabric has been taped to become more stiff. The tape indicate that the textile need some after finishing techniques to support the form. After finishing techniques can manipulate the fabric to different properties, in this case the tape expresses that the textile need to become stiffer.
PRE-STUDY IN SPECIALIZATION COURSE

The aim of the pre-study was to explore different textile materials self-supporting capability by manipulating the fabrics with dyeing and after finishing techniques. The method is to sketch directly in the fabric.

This method implies how different the fabric affects with after finishing technique. After finishing techniques give the textile new possibility and / or give the textile a new function. There are different techniques and possibilities in the certain type that can be replicated through rack machine, air rack machine or rotation rack machine. The coating is a thickened chemical that can be coated several times to change the properties of material (Rehnby 2005).

Figure 12 shows various fabrics that been coated with CB21. They have been coated; from one layer to five layers and five layers’ front and back of the textile. This has been replicated on the fabric through rack technique but by hand instead of industrial machine. The rack technique is based on the fact that it can get a thicker layer out of the coating. Result of more coating is that the fabric become stiffer but it gets rubberier and a yellow shade.

Lamination is an after finishing techniques that fix by a heat presser (Rehnby 2005). Flock, folio, and transparent plastfilm can change the properties of the textiles surface and character. To use a plastfilm that is transparent gives a result of stiffer.

Colour is something that is needed for this project to give the forms one more dimension. Figure 13, 14 shows the dyed fabrics in different colours. The small fabrics has been dyed in a rotation machine, large pieces are coloured in a jet-machine.

The form that has been developed in previous cours (figure 10,11) was continued with in this sketching part to investigate the relationship between colour, form and textile. Figure 14 present a transparent synthetic weave that has potential to get darker or lighter colours through folding. This can create another dimension of depth. The textile has been treated with lamination technique where one side of the textile has a transparent plastic. This plastic creates a stiffer textile that has potentials to support.
3.2 DEVELOPMENT & DESIGN RATIONALE

SELECTION FROM PRE-STUDY

The pre-study offered some choices for this project regarding material, technique, colour rule and after finishing technique. The chosen material is a synthetic textile that is transparent (figure 15). That gives the opportunity to see through the textile and create another dimensional. The monochromatic colour rule gives an effect on the transparent fabric. Through putting the fabric in layers, it creates darker colour and the ability to give depth increases.

Figure 16 shows an after finishing material that is lamination for textile which is a transparent plastic film.

The coloured examples (figure 13, 14) are analyzed by a digital colour composition tool that is developed by fashion designer and lecturer Erika Blomgren. The tool is a digital tool for exploring and learning about colour compositions for fashion design collections. The idea behind this tool is to let students explore and study the basic rules for colour compositions and to develop a sense and vocabulary for discussing, making arguments for and articulating colour choices in e.g. fashion design (2016). Figure 17 shows one example from a yellow fabric.
THE LOGIC OF ORIGAMI

The form development started by finding out the logic of origami, which is about points and lines. These points are meant to meet each other in order to create new lines and points. The pages 11-12 show image series on systematically executed foldings, using both square and triangle.
FROM SMALL TO LARGE FORM

Figure 33 and 35 shows two forms which are picked from the form investigation series. Figure 34, 36 and 38 shows sketches of the forms that are folded. The sketch has two types of lines; straight and dashed. This means that the lines will be folded in opposite direction from each other.

The form in figure 34 is based on a square and it has potential to stand up by having eight carrying points from the folding. To scale up this construction the form will collapse. The shape needs more foldings to get stronger.

Figure 35 is folded from a triangular surface. This form has many folds on a small surface. This makes the shape stronger.

Figure 37 are a combination of figure 33 and 35. By combining the square form and the triangle form the construction achieved the desirable strength to be self supportive, but both figure 37 and figure 33 itself are not strong enough in larger scale to be self supportive.

Figure 39 and 40 (bellow) shows the form (figure 37) in a large scale. The fabric's surface before folding was 160 x 160 cm. When increasing the scale the tip of the form became weak and wavy, which can be seen in figure 39 and 40. To avoid this the form needed even more strength. This was achieved by folding the form even more times. The conclusion is that a larger form needs more foldings to uphold its strength than the smaller form.
Figure 39. Large scale folding combination of figure 33 and 35 from above.

Figure 40. Large scale folding combination of figure 33 and 35.
DEVELOP THE FORM IN PAPER

Figure 41 - 44 show images of the development from figure 37. This construction are folded in a larger scale (Figure 45 - 51). Figure 51 present the folding construction that was strongest. The contraction added more volume to the form and the tip became straight and not wavy as seen in figure 40.
COLOUR DEVELOPMENT

Adding colour to the piece provides depth and enhances the three-dimensionality. The first piece has two forms, one large and one small, that a decision was taken to test one colour hue in different chromaticity; the small shape was chosen to be dark while the large was light.

Transfer-print is the colour technique that is being used. This technique has a printed paper on top of the fabric that will be fixed through heat and press (figure 54).

The blue colour were selected from the samples. It was found that the shades of the blue colour created must contrast, the darkest became almost black and the brightest became almost translucent.

The decision to use transfer as a colour application method created undesired pleats in larger scale, which influenced the colour outcome. It was decided to search for another colour application method. Instead of transfer printing, a spray paint was tested which gave a satisfying result.
TEST PRODUCTION

Figures 55 - 62 illustrates the working process for creating the form; application of colour, construction and execution.
Figure 61 and 62 shows how the lamifix are fixed on the fabric and with heat press.

Figure 63 show the result of the forms. The small form (figure 63) is 40 cm and the larger form (figure 64) is 80 cm. The dark small shape disappeared inside the lighter larger form. Even though the shapes were displayed together on a lightbox, no depth were created. The result proved that the colour rule monochromatic did not work.
COLOUR DEVELOPMENT WITH NCS COLOUR SYSTEM

Started systematically to select the light shade from each colour belonging the same chromaticness and blackness and then choose a new colour shade that increases with more blackness (figure 66). Using transfer print as a sketch method gave the opportunity to produce many colors (figure 67).
Figure 69 shows transferprinted material using the NCS colour system. The transferprinted textile folds into standing shapes in two different sizes to fit inside each other. This increase abilities to create colour blends. Figures 72 - 103 shows different combinations with this method.
Figure 144 show the chosen colours yellow and red. The Red and yellows complementary colours are blue and green (figure 145). Figure 146 show pastel colour which will be used.

Through merging red and yellow together the colour orange is created. This combination create a strong colour that consist of the whole colour spectrume from yello to red.

The pastel colours are lighter in its nuance. Working with pastel colour enabled to see how lighter colours acts in the folding form.

Figure 147 shows the NCS colour circle. The colours that are selected are encircled and the arrows explain the colour that is created by combining the coloured shapes.
THE PROCESS OF ATLAS VERSION 1

The process steps are illustrated in a video at vimeo*. The video shows the working steps for the form; copy the lamifix pieces from the template, cutting out lamifix, apply the lamifix by heat, pleating by heat press and folding by hand.

Figure 148 shows the folding construction sketch that is 140X110 cm.

Atlas version 1 is red and yellow (figure 150). The larger form is red and the smaller form is yellow.

Figure 149 shows the form in a small scale paper sketch.

Password to film - atlas.
THE PROCESS OF ATLAS VERSION 2

The process of Atlas Version 2 goes through the same steps as Atlas Version 1.

The construction sketch is in size 220X110 cm (Figure 151).

Figure 152 shows the form in a small scale paper sketch.

Atlas 2 are based on two forms one of them is folded the same as Atlas 1 but figure 153 show the other form that is folded opposite. This folding create a stable ground.
THE PROCESS OF ATLAS VERSION 3

Atlas version 3 goes through the same production and folding steps as Atlas Version 1 and 2. Figure 155 shows the folding construction in the size 330X110 cm before folding. Working with 330 cm became physically impossible to colour, laminate and fold. The forms needed to be made separately and joined by hand stitches.

Figure 116 shows the three paper forms in small scale in different positions.
4.1. RESULT

Figure 158. Atlas version 1, 2 and 3.
Atlas version 1, 2 and 3, consist of three textiles that are three-dimensional and self-supporting. The combination of the folding construction, textile fabric and after finishing technique enable the forms (shapes) to be self-supporting. Using lamination as after finishing techniques, the properties of the fabric became possible to manipulate. Manipulating the fabric gives the opportunity to fold a sharp construction that are stable and self-supporting. By the use of a transparent textile, it is possible for the viewer to observe the folding techniques and that the construction is not supported by anything else than the textile itself.

The name Atlas comes from a Greek titanium who was punished to carry the whole earth. This implies that Atlas was as strong titanium and this should reflect in this three textile objects that can carry themselves.
THE RESULT OF ATLAS VERSION 1

*Atlas version 1* is divided into two forms, the same folding construction but different sizes. The red form is largest of the two (figure 161, 162), the yellow form is supposed to be inside the red form (figure 159, 160). The colours together, blended with the light from the lightbox, creates colour shiftings in the object, created by both forms. Colour changes from yellow to orange and red (figure 163, 164). This creates a depth of both the colours and the three-dimensional form.
THE RESULT OF ATLAS VERSION 2

*Atlas version 2* is a shuttered form. The top is the same folding as in version 1 but in the colour of blue. The bottom (figure 128 - 130) is created in an opposite way than the top (figure 125 -127. The opposite folded form in green colour gives a stable platform to the object. The blue and green are the complementary colours from the red and yellow. The light from below gives a green-blue colour, the difference in this colour gives a lighter shift than in Atlas version 1.
THE RESULT OF ATLAS VERSION 3

Atlas version 3 is a playful development of folding construction and placement of object. This piece expresses how the forms functions from below, from above and from the sides.

The colours are light green-blue, vanilla yellow and strawberry red. All the colours heritages from Atlas version 1 and 2.

The colour expression changes depending on the angle of the viewer. Some angles facilitates the transparency, other angles create stronger colours because of the double folding.
4.1 PRESENTATION

*Atlas version 1, 2 and 3* are displayed on a light box to show two things; the light from below enables to blend colours and to show the viewer that the object is solely in textile. The light box has a dimming function that communicates the relationship between the light, colour and self-supporting textiles to the viewer. The objects are lit from the ceiling to highlight the top of the form, which otherwise would have been dark.

The light box is placed on podium with the same height 50 cm so the viewer can see the textile object from above. The podium form are customised after the textile objects size. Atlas 1 has a podium 80 X 80 cm, Atlas 2 has a podium 60 X 70 cm, Atlas 3 has a podium 60 X 180 cm.
4.2 CONCLUSION

The exploration of what a textile can do is an essential question in this study. After finishing techniques, colouring and folding construction are techniques that has been investigated to achieve self-supporting objects.

The after finishing technique were important to manipulate the textile properties and to find new. The Lamifix needs heat press with 190 degrees for the textile properties become stiffer and straighter. This part created a problem because the fabric shrinks at too high temperatures (Figure 174) and the plastic film does not attach with low temperatures. This required that the fabric needed to be shrunk with 220 degree heat press before attaching the Lamific. Using lamifix worked well with smaller pieces since it is easier to control, because the fabric does not shrink as much as larger pieces.

Figure 174 After treatment moment
The colours in the textile object were important to create a depth. The fabric was transparent and this created opportunities to make the colour stronger or lighter by overlapping. Initially, Atlas version 2 was made with dark blue and dark green colours (Figure 175, 176). Through the folding the form became even darker, more dense and opaque. This result proved that dark colours to the shape did not create any depth. The conclusion is that the form needs to be both transparent and opaque. It became possible to use bright and clear colours.
The shape development was important in order to find out how the folding construction will function to carry itself. Atlas forms were folded with two folding constructions, figure 157 and 178 illustrate these two paper forms in small scale. Figure 177 are folded into a shape that create more volume. Figure 138 shows the form that is from the same construction as figure 177 but folded opposite. The result of this folding is more compact and stable. The object can stand up, down and on the side without losing its shape. This means that the folding construction matters for the shapes to be self-supporting.

The final conclusion of the method consists of three parts, after finishing techniques, colour technique and folding construction. Using laminix as a after treatment made it possible to achieve sharp edges, making the construction stronger and giving it a character of being self supportive. Spray colour gave the fabric both an even and strong colour and made the fabric stiffer that helped it become even stronger. The folding construction was based on the idea of finding the logic of origami. This method made it possible to understand how a plain weave material needs to be folded in order to bear itself. All these three parts constitutes the essence of the self supporting form.
4.3 DISCUSSION

The aim of the project has been to explore how textiles can create self-supporting three-dimensional objects by means of after finishing techniques, using origami as folding method.

The project has developed a knowledge that a textile fabric needs a construction to be self-supporting. This has opened up opportunities to widen the use of textiles. If this exploration should continue, it would be interesting to explore if the textile fabric can carry something more than it self. The question is; what is needed to be successful with such a task? One aspect to succeed this investigation would be to construct a woven fabric. Experiments with different textile yarns in combination with different bindings will create a variation of woven qualities. The aim would be to create a textile that is self-supporting by only the combination of the weaved fabric and the construction.

In this work the fabric has been coloured with spray colours. To work with spray colours has been a challenge because it is hard to get an even surface. But changing the spray nozzles to get different direction, straighter or more diffuse beam, makes it possible to control and achieve an even surface. Colour spray has only a certain range of colours. To invent more colours, experiments with layers and light has been conducted, as seen in all the Atlas versions. Further work with colours in weaving would be to explore coloured yarn. Using coloured yarn in a weaving machine will achieve different expressions, like colour shades, structure and surfaces.

Shigeru Ban’s quote about the fact that it is not about the material, it is about the construction, make sense. The textile material does not have carrying properties, however, by the use of a folding construction the opportunity to carry it self is possible. Robert Van Embricqs wood furniture function with constructions, the existing material changes the actual properties. The wood furnitures enables flexibility by its construction and has properties more like textile fabric, while Atlas 1, 2 and 3 are in textile fabric and can carry a form as if it had wood properties. Eva Hild’s large-scale clay sculptures are developed after a construction where the clay is applied with thin layers so the clay-sculpture can carry itself in a larger scale. She has a method to enable the construction to function in a large scale. In comparison to this work, the folding techniques, based on the logic of origami, has been developed to more advanced constructions so the textile can carry itself in larger scale. That is the method enabling the textile construction to function in a large scale. In Akana Moriyama’s three-dimansional textile objects exists a depth created by the use of colour, a theme that is explored by this work as well. The difference is that Moriyama’s works achieve three-dimensional shapes by a hanging construction while this work achieve it by itself.

Finally, this work present another aspect for widen the use of textile. Exploring the ability to build with the textile material raises an idea to make interior products or furniture products. The product has the potential to be a sustainable solution. Making a product only in textile material will make it easy to dispose after use. Or to work in a material that will “die” by itself. Such materials are developing today by Erik Lindvall, creative director at Guringo Design studio and Jonas Larsson, senior lecturer at The Swedish School of Textiles, in the project called Streamateria (2017). They have discussed how consumers are shopping for clothes today; customers buy and throw away as if the clothes were a one-time product. The discussion was their starting point for considering making a material that dies by itself after use. The Streamateria project created an interest in how customers buy interior products. Can this material also be applied to interior production that decomposes into the ground after use?
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BOOK

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