INTRODUCING PLASTER: EXPLORING ARTISTIC EXPRESSIONS OF NATURAL DYED PLASTER
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Title
Introducing Plaster: Exploring Artistic Expressions of Natural Dyed Plaster

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1.1 REPRESENTATIVE IMAGES OF WORK

The Palette
The Linked
1.2 ABSTRACT

*Introducing Plaster* is a degree work in textile design exploring the fusion of natural dyes and plaster, and how this can be applied as a textile design material. The outcome is presented as an experimental investigation, placed in the context of surface and material design. This study derived from a growing interest in how new materials can be implemented into the field of textile design using established textile techniques and methods. Natural dye, texture and flexibility were explored through the method of hands-on-experimentation. The study moved forward by asking the question: “What happens if?”, and the findings have been analyzed and selected for further development. The final collection consists of five pieces made entirely from plaster, showing another approach to how textile techniques and methods can be developed and adapted to fit materials from another field, for instance: Plaster.

1.3 KEYWORDS

Textile design, Surface design, Plaster, Natural dye, Fusion, Material design.
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2.1 INTRODUCTION TO THE FIELD

Textile design is a broad field that includes the techniques of weaving, knitting, tufting, printing, dyeing and embroidery, amongst others. Textile products are often associated with fabrics, which can be placed in the context of fashion, interior, architecture, automotive and health/wellbeing. Today, the area of textile design is changing. Briggs-Goode & Townsend claim that new technology has a dramatic impact on the textile design field, to the extent that the definition of textile is being reassessed (2011).

The work of textile designer Emma Dahlqvist (2015) shows how the laser cutter can be used to manipulate a rather stiff surface like birch bark to become a flexible textile (Fig. 1). Whilst the work of fashion designer Danit Peleg (2015) shows how the 3D-printer can create flexible textiles from hard materials, using specific joining techniques (Fig. 2). Dahlqvist and Peleg show how material manipulation can be applied upon new and unfamiliar materials, and through those techniques adapt the materials to fit the textile design field.

New technology is also giving us the means to a better understanding of our surroundings and how to take full advantages from them. Artist and designer Johanna Schmeer (2014) have used that knowledge in her work Bioplastic Fantastic, a collection suggesting new types of products for the future (Fig. 3). Designer and researcher Julia Lohmann (2013) have also used new learning to implement seaweed as a textile design material (Fig. 4). Schmeer and Lohmann implements new methods and mind-sets to the textile design field, and the outcome suggest that there are no limits for what textile design can be.
Though, as a contradiction to new technology, some textile designers are reintroducing and modifying old techniques. This can be seen in the work of fashion designer Alice Fine (2015), where natural-dye has been revived and adapted to create new artistic expressions (Fig. 5). Fine is an example of designers who believe that what already exists can be used, re-used or modified. This work shows that an ancient technique can be used in a modern way.

Another way to redefining the textile design field is through fusing materials, methods, aesthetics or fields. The Thread Wrapping Machine by artist Anton Alvarez (2012) is an example of how combining materials can create new expressions (Fig. 6). Textile designer Margrethe Odgaard and chef Jakob Mielcke (2014) have fused the fields of textile design and gourmet in the event Palate-Palette (Fig. 7), whilst textile designer Nina Born (2014) assisted Odgaard in the development of The Knitted Tongues, which are visualizing the four tastes: Sour, sweet, salty and bitter (Fig. 8). Alvarez, Odgaard, Mielcke and Born all put their personal touch on the word fusing. They fuse materials, methods, aesthetics or fields based on the knowledge and skills that each of them has. These works show how personal qualities affect the final results.
2.2 MOTIVE AND IDEA DISCUSSION

As Briggs-Goode and Townsend (2011) claims, the field of textile design needs to develop in order to broaden the area. There are many different ways to do that; Dahlqvist and Peleg uses new technology to implement techniques, while Schmeer and Lohmann uses the new knowledge to implement new materials. In contradiction to that, Alice Fine reintroduces and modifies the old technique natural-dye to explore new expressions. Both Alvarez and Odgaard, Mielcke and Born show how fusing can be used as a method to broaden the design field and also to blur the lines between different fields.

With inspiration from how these references implements new materials, techniques and expressions in textile design, this work uses plaster as a textile design material and explores how the fusion between plaster and natural dyes can create new artistic expressions.

Plaster consists of sand, water and either lime, gypsum or cement. It is commonly used both as a building material, for decorative purposes or for DIY. It has similar properties to concrete but has a shorter drying time, is lighter in weight and weaker. Plaster also has similar properties to clay, but plaster is self-hardening (Kuiper, 2007).

Studio Jeroen Wand (2011) have found inspiration in the properties of plaster and explores these in the Never-Ending Plaster Research (Fig. 9). They say about the plaster that it is a seemingly useless material for products because plaster comes with its own set of rules and regulations. This research is a dialogue between Wand and the plaster, where both have equally influence on the outcome (Wand, 2011).

Fig. 9. Never-Ending Plaster Research
Studio Jeroen Wand, 2011
Because plaster has certain weaknesses, designers tend to use concrete or clay as material instead. Artist Jamie North (2014) have used concrete to show one visual aspect of the fusion of building materials and nature (Fig. 10) and designer Deborah Osburn (2014) have used inspiration from Japanese textile dyeing techniques to make a series of ceramic tiles, each tile is hand dyed with Indigo or Gold Verdigris and therefore unique (Fig. 11).

This work will similar to Never-Ending Plaster Research explore the possibilities of plaster as material for textile design, though it will also include, similar to the work of Jamie North, the combination of plaster and nature. Instead of having both the plaster and the nature obviously showing, the fusion will be rather subtle and enhance each of the fields in one coherent expression. As Deborah Osburn's ceramic tiles, each piece in this work will be unique both due to the chosen dyeing method and due to the material.

The primary motive for this study is to show that plaster can be more than a building material or a DIY-kit for your children's footprints. Within the context of textile design, this work will higher the value of plaster and by looking into what has already been done artistically with plaster and materials similar to plaster, there is great possibility of further developing this area.

2.3 AIM

The aim of this degree work is to apply plaster as a textile design material and explore the artistic expression of plaster when mixed with natural dyes.
3.1 DESIGN METHOD & DESIGN OF EXPERIMENTS

Method

This degree work was carried out following the principles of experimentation, where the research developed through hands-on-experiments (Koskinen 2011).

The plaster was brought out of its original context and used as a material for textile design, based on the designer’s knowledge and skills as a textile designer. The work evolved by asking the question: “What happens if?” and the findings were collected and analyzed in order to present different pieces in the result.

By keeping the experimental approach until the end, some results are presented as a material investigation, some result are presented as designed pieces, and some are in between.

Using the principles of experimentation helped this research in order to explore the unfamiliar material of plaster from a textile designers perspective and to keep an open-mind throughout the process. In practice, it means that plaster was used in the same way textile designers would use textiles and threads. A textile can be printed upon using screen-print and transfer-print amongst others, and fibres can be dyed before they are spun, when they are spun together as a thread or after the threads has been woven or knitted together. These techniques were applied upon plaster, the same way they are applied upon textiles, to see what new expressions could be generated through the fusion of textile techniques and plaster.

Pre-study

The pre-study began with a desire to explore non-textile materials such as clay, epoxy, latex, plaster etc. in relation to textile design. The work evolved within the aim to create tactile surfaces through material combinations and aftertreatment techniques.

The different materials were explored simultaneously and with the same means. This was done in order to be able to do a proper analyze of the findings, and to compare the different materials properties, their strengths and weaknesses.

By analyzing the findings of the pre-study, plaster was found to have the most suited properties. Plaster showed a good ability to absorb color; it was light in weight and easy to handle, the liquid stage before hardening was found to be particularly interesting in comparison to the other materials, and it had a good ability to show details in different sizes.

The result of the pre-study was presented as a large collection of experiments divided into three categories: Texture, flexibility and elasticity. These textile qualities where chosen because they relate to the field and could be expressed through the plaster but from a new point of view.
3.2 DEVELOPMENT & DESIGN RATIONALE

Material

Plaster comes in different hardness and compositions, and therefore also reacts and looks differently. The plaster used for this research is a standard hoppy-plaster from Panduro. This specific plaster was chosen because it is lighter in weight, which means that the outcome could become bigger in size and one would still be able to handle and carry it by hand. It was also chosen due to its white neutral color and because this sort of plaster demands less plaster pr. dl. water. The disadvantages of this plaster, is that it breaks easier than the others.

The plaster gave certain challenges in relation to waste and how to handle it. Plaster cannot be washed in sink, which made it difficult to reuse the containers that the plaster was mixed in. This was solved by using soft containers instead of hard, so that the dried leftover plaster easily could be pressed and pushed out of the form. Different tests were made to reuse the leftover plaster, but once the plaster had dried it could not be reused with water. It was also tested to use the leftover plaster together with new plaster, but it only made the plaster weaker.

Scale

The first experiments were made in a size that fitted the hand, due to an intention of exploring the interaction between the audience and the plaster pieces. Later, it was decided to go up in scale, but still keep a size where the pieces would be easy to handle and not too fragile to break. Also, the pieces containing more plaster parts had to be strong enough to hold each other but still thin enough to look pleasing.
Texture

The degree work started with an exploration of how to apply textile-textures and other textures to plaster by pouring or molding (Fig. 12 and 13). The plaster showed good ability to express both bigger non-textile textures from bubble wrap and small textile textures from fabric (Fig. 14). It was also tested to add other materials to the plaster, as a way of creating texture, but in these samples the plaster had no direct purpose other than being the host (Fig. 15) The laser cutter was also used to make the plaster textured, and it was possible to both laser-cut directly into dried plaster and to pour liquid plaster onto laser-cut paper (Fig. 16). But through the exploration of natural dye, the kitchen chemicals vinegar, bicarbonate and alun that are used with that, new textures occurred from within the plaster (Fig. 17). These sponge-like textures were found to be more intriguing to look at because they were not directly imitating other well-known textures, and because they occurred from a chemical reaction instead of a forced imprint.
Flexibility

Principles from weaving, knitting and tufting techniques were applied upon plaster, in order to investigate flexibility. From weaving it was the aspect of horizontal and vertical lines, from knitting it was the idea of shapes or loops interlocking themselves and from tufting it was the aspect of having a foreground going through a background. For this exploration, fabrics, threads and other materials were tested in combination with plaster. But with the intention to try to make plaster flexible, these added materials were put aside, since they became the flexible part of the pieces and not the plaster.

The principles from weaving almost succeed in the first try outs and needed only small adjustments at the end. The horizontal line was a pile made in plaster, and the vertical line was connecting link (Fig. 18, 19 and 20). The round pile and the round hole in the link is what is creating the flexible part. If the pile where to be squared and the hole as well, the piece would not be flexible. The distance between the holes in the link also plays a part in the flexible aspect. The closer the holes are the less flexible and so on. With that knowledge, three different links were tested, and the half circle was found to be more appealing to look at in all potions compared to the square and the triangle (Fig. 20, 21 and 22).
The exploration of knitting was found to be impossible without using other added materials; the liquid plaster could not be casted around other plaster parts making them interlock, and therefore it was tested to interlock two open plaster parts and close them with liquid plaster, but apparently dried plaster detests liquid plaster. Instead, a thread was used to knit the plaster pieces together (Fig. 24). But this test was ruled out, due to the aim to only use plaster.

The tufting experiments turned out to be quite difficult and clumsy. The first try outs consisted of plaster as the foreground piece and fabric as the background, but the plaster was too thin and fragile (Fig. 25). The second try outs consisted of larger plaster pieces in the foreground and an intention to use plaster as the background, but visually it looked clumsy and the flexible effect was insignificant.

Not wanting to accept that there should be only one flexible piece in the collection, inspiration was taken from pleats to do sketches for another sample. The first sketches were made in paper (Fig. 26). Beginning to be quite familiar with plaster it was clear that this sample had to be slightly thicker than previous tests, in order to hold the weight of each other. This piece now shows the modular aspect of flexibility can be connected in several different ways for different purposes and shows the modular aspect of flexibility (Fig. 27, 28 and 29).
Elasticity

After the pre-study, elasticity was decided as a textile quality, together with texture and flexibility, to be expressed through plaster. As plaster does not have the actual ability to become elastic, it was decided that the samples would have to give an impression of elasticity instead. For instance, the examples where liquid plaster was poured into a balloon and squeezed together with a band, gave an impression of something elastic happening (Fig. 30). Different scales where tested to see how the expression could change (Fig. 31). But, as the work evolved, these samples were found to be more towards sculptural pieces made by an artist and not showing enough textile potential, and therefore the word elasticity was left out.

Color

Different ways of coloring the plaster where tested. During the pre-study, pigment print was tested and showed to be very intense in color and also watercolor was tested, but this became very dull in color (Fig. 32 and 33). The transfer printer and folio and flock printing was used to add both color and pattern to the plaster, but the outcome of this method depended on the flatness of the plaster, which was quite difficult to achieve (Fig. 34). Natural dye was also tested and was found to be more interesting than pigment color, because of its unpredictable outcome which could be used as a design parameter and a nice contrast to the strict forms and shapes in the plaster pieces (Fig. 35). All though the end-color is unpredictable, the color palette is still coherent because of the similar tints and shades of natural dye.
**Color that changes**

In this work, time has been an important factor due to the fact that plaster takes at least 48 hours to dry, and when combined with the water from natural dye, it takes even longer. This means that the color has as many hours to settle as the plaster takes to dry. The hue changes a lot during that time; in some samples the color start to change after a day and in other samples the color start to change after three days. Also, some colors change for the entire period, and some only change over a day or two. This causes it to be very difficult to count on the exact color outcome (Fig. 36 and 37).

The natural dye in itself is also very difficult to control, for instance, the color change from pink to red whether one uses the beetroot peel or the actual beetroot, and all shades in between can be obtained depending on the ratio of these (Fig. 38).

Depending on whether the color is added in the liquid stage or the hardened plaster is left soaking in dye, different color-outcomes can occur. When the hardened plaster is left soaking overnight, the natural dye leaves a mark that can be washed away or kept for different expressions (Fig. 39). If it is chosen not to wash away the surplus color, it can leave a stain when touching the samples, but because the dye is natural, it is not toxic for the hands.

Another aspect that plays a big part in how the color eventually turns out, is whether the samples is left laying down or standing up. The color travels upwards towards the air, which often leaves another color in the bottom or on the backside. Most of the samples in this study have been left for drying laying down in order to obtain a different front and back side (Fig. 40 and 41).
4.1 RESULT

The result is a collection of five individual pieces, each showing different aspects of how the fusion of plaster and natural dye creates new artistic expressions. Some pieces are presented more as a material investigation and some are presented more as designed pieces. Together the pieces give a suggestion to how the textile design field could look in the future in terms of material, expressions and context.
The Palette (Fig. 42 and 43) consists of 90 natural-dyed plaster squares. Beetroot, coffee, green tea, black beans, turmeric, red cabbage, carrot blast, yellow onion peel, red onion peel and powdered brazilwood have been used to dye the plaster. Vinegar, bicarbonate and alun have been used as ingredients to change the PH-value and thereby also the color and texture. The natural-dye has been added in the liquid stage of the plaster in some squares, and in others the hardened plaster squares have been soaked in natural-dye overnight. This piece shows the variety when plaster and natural-dyes are combined.
The Domes (Fig. 44 and 45) is a series of half spheres showing the different textures that occurs when mixing vinegar into liquid plaster. Some of the half spheres have also been partly dyed using red cabbage, black beans and coffee. This piece is presented as a material investigation, showing how texture can occur from plaster itself, when the PH-value is changed.
*The Linked* (Fig. 46 and 47) consists of piles connected by several links. The inspiration for this piece comes from the horizontal and vertical lines in the weaving, and it is flexible in one direction. The links are dyed with red and yellow onion and can be perceived from different angles to give an impression of stripes or circles. *The linked* shows how connecting points can give flexible qualities to the plaster.
*The Folded* (Fig. 48 and 49) consist of several identical parts, which can be connected in different ways for different purposes. This piece was inspired from pleats, and has, to a certain extent, the same movement. The piece is dyed with powdered brazil wood and vinegar. *The folded* shows the modular aspect of flexibility.
The Pillars (Fig. 50 and 51) is build up from broken pillars, placed closely together in a circle. The pillars are dyed with beetroot, coffee and alun. Using almost the same recipe every time, this piece shows the strength in natural-dye and its unpredictable outcomes.
4.2 PRESENTATION

All pieces within *Introducing Plaster* are placed in the middle of the room in order to be perceived from all angles (Fig. 52). *The Palette* is placed on the floor in the middle of the exhibition and are presented as the core piece where the additional result derives from. *The Linked* is placed hanging from the ceiling and leaning on to a podium to show the flexible aspect. *The Folded, The Pillars and The Domes* are placed on podiums made in specific height and width to enhance the qualities of each piece. At the examination, the pieces where lit with general lighting, but optimum would be to have additional lighting and play with the shadows of each piece in order to enhance the structures and forms.

![Fig. 52. Presentation at examination](image-url)
4.3 CONCLUSION

This degree work has applied plaster as material for textile design and explored the artistic expression of the fusion between natural dyes and plaster. The result is not a not definitive answer but shows a variety of how this can look like. It shows a flexible aspect from the textile field, whereas plaster is rarely associated with flexibility. It also shows the textile dyeing method natural dye and how this can be applied in many different ways to show different expressions and textures within the fusion of plaster and natural dye. This work was limited to only exploring the fusion of plaster and natural dye as a material for textile design and could be broadened by adding other factors.

The method of hands-on-experiments has helped this work forward and opened up the exploration of plaster. The starting point of not knowing anything about plaster has also taking this study in a direction towards textile design, since those are the techniques, methods and state of mind that I, the practitioner, has. Had this work been done with the same prerequisites, but from a practitioner within furniture design, the outcome would have been different.

*Introducing plaster* presents how textile design is not only about threads, bindings and fabrics, but also about color, texture, surface and material. The work speaks to our senses; it can be understood by smelling, touching, hearing or looking. It contains elements that surprises and elements that are more comprehensible, this variety makes one curious and shows a wide range of how plaster can act and adapt.

The study is presented as a textile design research and is to be placed in the context of surface and material design. As mentioned earlier, the work does not suggest a definitive answer and is therefore still open for further exploration and could potentially become a whole new study. At this point in the process the work is broadening the understanding of textile design by showing how materials, surfaces, color and texture can be explored through materials not normally seen within the field. It also shows how thoughts, principles and methods from textile design can be adapted and applied upon plaster and the findings could be brought back into the textile field. For instance, by looking at the investigation of flexibility, this suggests an alternative definition of what weaving, knitting, tufting and pleating is. This approach could be brought back into an exploration of traditional textiles in order to see the techniques from another point of view.
4.4 DISCUSSION

Considering the sustainable aspect of designing, there is evidence that plaster can be recycled and reused on an industrial level (Geraldo et al., 2017). The properties of the plaster changes slightly, but not significant enough to be useless. Since this plaster is dyed with natural dyes, it would also be possible to recycle these, though the mixture of the colors would be a factor to consider. Most likely the color will fade, since the recycled plaster would have to be mixed with water again.

At the moment this degree work is presented as an investigation, but it could potentially be developed further towards a more tangible context. This could be done by switching out the plaster in favor for another material, for instance concrete or clay which is stronger and more tolerable. Then this outcome could move into the context of interior design. The plaster could also be switch with bioplastic, and then the work would explore a sustainable substitute for plastic products. Depending on which context it is to be placed in, the scale would also have a great impact on the outcome, is it to fit in the hand? The room? Outdoors?

In relation to the work of Deborah Osburn, who produces unique ceramic tiles for interior, this work could be used to create unique patterns for decoration. The diversity within the colors and textures, which is represented in *The Pillars*, creates an intriguing surface pattern. The shapes and the connection of the these could, inspired from *The Folded*, be like a puzzle instead of squares placed next to each other.

As this work shows the fusion of both materials and fields explored by a textile designer, it opens up the question of what skills each designer needs to have. Could this work have been further developed if it had been a collaboration between two designers from different fields, as seen in the work *Palate-Palette*, or if the designer had knowledge from different fields? From one aspect, yes, from another aspect, no. Exploring the unknown can bring new and unseen properties of a material, but it can also slow down the process.

There are two main investigations from this work that was ruled out, which could be interesting to put back and further develop, these are the laser cutter and the textile material. The laser cutter was ruled out in favor for the textures that occurred from vinegar and bicarbonate, but at this point it could be valuable to start exploring patterns rather than textures in order to add elements of decoration. The same goes for the textile material. They were ruled out in that part of the process, where the plaster needed more focus because the textile took over both the function and the expression. Now that a deeper knowledge of plaster is gained it could strengthen the work to bring a textile material back into the work, an explore how a textile could add new qualities to the plaster rather than the other way around.

This work contributes to the textile design field through presenting how a textile mind-set can be applied upon new and unfamiliar materials, to adapt the materials to fit the future of textile design. This method of working, can be used in other contexts, where a certain knowledge is used to explore areas that the knowledge does not already contain.
5 REFERENCES


