Design School Kolding - 2019

What's the Matter?

New Pathways for Material-Based Learning and Knowledge Development in Design

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New Pathways for Material-Based Learning and Knowledge Development in Design

The ambition of the Material Pathways part project has been to develop a tool that can enhance learning on materials' roles in design for sustainability. The chapter describes the background for developing the tool in the Sustainable Design Cards, its development process and subsequent test with the MA Design for Planet programme student cohort at Design School Kolding. The project concludes that the Material Pathway tool has potential to engage actors (students or practitioners of design) in learning about materials' role in design for sustainability from a holistic, investigative and reflected perspective. However, we also see, that the potential should be unfolded through accompanying activities that can support the learning process.

An essay about the love we can feel for a design. The text sets out to explore and attempt to pin down the notion of beauty as by drawing parallels between beauty, aesthetics and four designerly viewpoints; Harmony, Trend, Sensation and Experience.

Karen Marie Hasling

Karen Marie Hasling is a teacher and researcher with an educational background as textile and design engineer. She is interested in the intersectional field of learning, materials and design within an overarching frame of sustainability, hereunder environmental concerns, design ethics and awareness creation. Karen Marie is Assistant Professor in Materials and Sustainability within Lab for Sustainability and Design at Design School Kolding.

Ulla Ræbild

Ulla Ræbild is a teacher and researcher with an educational background as fashion designer. Her main interest is how environmental and societal challenges calls for new designer responsibilities and roles, and how this situation affects practice and education. Formally she is PhD, Assistant Professor in Fashion, Method and Sustainability within the Sustainability Lab at DSKD and currently MA programme director for Design for Planet.

Line Rebecca Rumhult

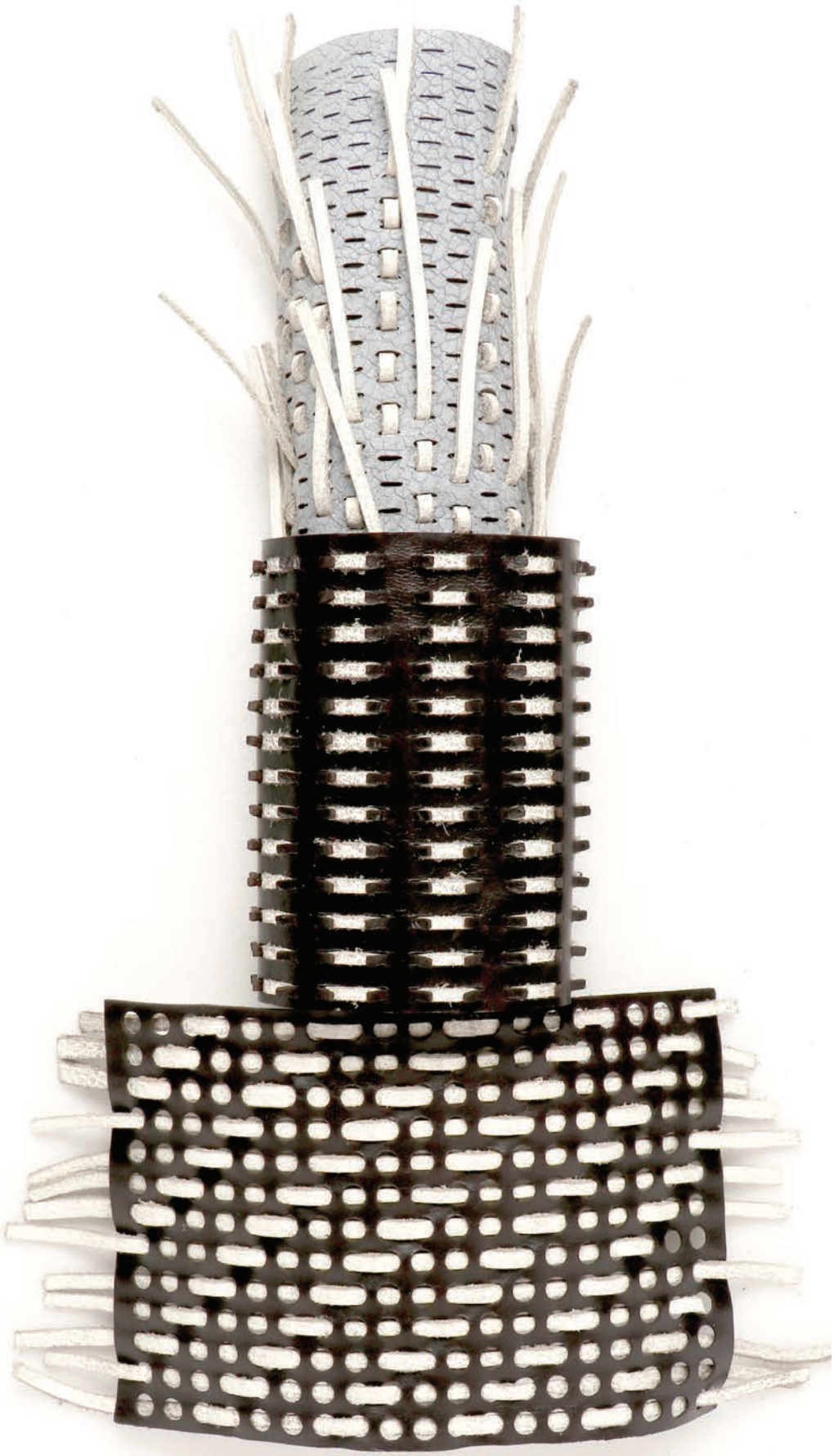
Line Rebecca Rumhult holds an MA in fashion design and has worked as a fashion and accessory designer, for more than a decade. She is teaching assistant professor and workshop manager in the shoes and leather workshop at Designschool Kolding. Her fields of interest are craftsmanship, circular business models, local production and development of educational material.

Maria Kirk Mikkelsen

Maria Kirk Mikkelsen is a designer and educator. Her main interests lie in the intersection between colour, material, aesthetics and design processes. She holds a position as Teaching Associate Professor at DSKD where she combines teaching and artistic research. She has many years of experience as a designer working with colour, material and concept development.

Patrick Bomholt

Patrick Bomholt is an Industrial designer by heart and with a passion for the digital world, who dreams of rendered particles, flowing surfaces and parametric algorithms. Patrick believes that exploring new tools in the digital realm has a benefit for everyone, and he sees it as his duty to spread the word to new and old designers, to embrace the future that is already here.



What's the matter? Nothing? Everything?

Views differ – and regardless, the Planet is what matters. Therefore, contemporary designers are constantly reminded to design for a sustainable future in order to maintain a fertile and healthy Planet that we can pass on to our children. We must design for keeping, not for use-and-throw-away. The matter is also the material with which we design. Our material choices have an enormous impact on the world in terms of resources and pollution. Making the right material choices in a design process therefore becomes a matter of uttermost importance.

This publication presents key insights derived from artistic research projects, which explore how the designer works, and might work, with materials in order to help produce a sustainable future. The projects have applied perspectives of aesthetics, digitalisation and sustainability for exploring, testing and proposing new approaches to material-driven design processes.

The projects represent a landmark in a fruitful and long-term strategic partnership between Design School Kolding and ECCO. With the projects we address a very present design challenge and seek to take on the role as first-movers by showing how design education and companies can work together to create a better future.

We hope you will enjoy the reading.

Pilot Project

In spring 2019, we conducted a pilot study focusing on the output of the fourth running ECCO shoe course. The study had a dual purpose: First, to assess material usage and development in the student projects. Second, to form a baseline from which we could build our investigations in the ECCO artistic research project. The data we used for the material analysis included all ECCO group projects from 2012 to 2018; in total 76 projects that gave us a large volume of data from a relatively long period of time. The projects were logged visually in a data template made for this specific purpose.

The empirical material used to fill in the data sheets consisted of the ECCO shoe project publications published in the same period. These also provided us with student names, images of project processes and final shoe designs, however no concept descriptions.

The mapping and analysis [1] enabled us to make some observations:

If you compare the individual project years, there are obvious shifts in colour and material choices, which seem to align with teacher team shifts.

Material choices become increasingly sophisticated throughout the project years, showing more complex materials and an increase in material diversity in the individual shoe designs.

Only 5 out of 76 projects do not include leather (although additional material and trims are diverse).

Concern with possible sustainability impact seems to be anchored in service and circular design concepts rather than material choices, as the dominant materials are leather and synthetics – unless it is environmentally friendly leather.

The projects evolve from analogue processes in 2012 leading to abstract representations of shoes, to increasingly digital process impact, leading to 2018 realistic prototypes, however speculative in the design.

From the pilot study, the artistic research project separated into the three parts presented in this study. Together they seek to investigate and build new knowledge around materials in design as aesthetic means and strategies, which can accelerate sustainable awareness in design and produce prototyped proposals for the future.

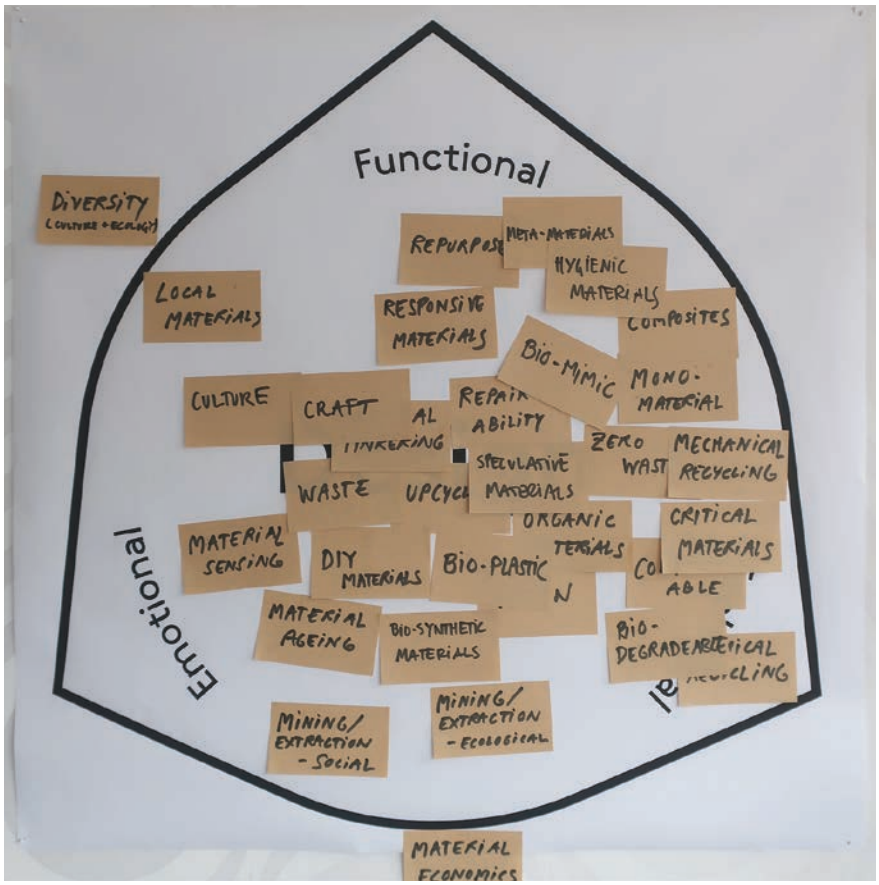

Pictures
Material/concept name
HOW MIGHT WE EXPLORE THE PROPERTIES OF OAK LEAVES THROUGH EXPERIMENTS?
Material narrative
Student(s)
SIGNE BRØCHNER, LOUIS ROSE, MADS BYSKOV, TESPER MUMM SYLVEST
Course / year
2018/2019
MATERIAL NARRATIVES
Material composition
Raw material(s)
OAK LEAVES, ACETONE, GELATIN, GLYCEROL, TANNIN
Process(es)
COLOUR EXTRACTION, MOULDING, CASTING, TANNIN EXTRACTION, SANDING, BURNING, BOILING, GRINDING
SLOW
BIO-INSPIRED
CIRCULAR
BIO-BASED
Animale
Lapideum
Recuperavit
Design

03 Material Pathways

Ulla Ræbild
Karen Marie Hasling

Material Pathways

Supporting a Holistic Perspective on Materials and Sustainability in Design



Process of mapping material positions in the lifetime compass.

Background

The motivation for this part of the overall project has been to find a way to support a holistic and nuanced understanding of materials in relation to sustainability in the context of design.

In 2017, we published the Sustainable Design Cards (SDC) [2,3] containing 28 approaches to sustainability in design. From the amount of positive feedback internationally and the traffic on the website (www.sustainabledesigncards.dk), we can see that the card tool format suits actors in and around design well.

However, given the generic and broad perspective on materials and sustainability contained in the SDC card Environmentally Friendly Materials, we have identified a need to unfold this area in more detail, beyond sourcing of e.g. organic cotton or recyclable plastic, and point towards a material consideration that relates to e.g. context, property, use, user, time, system, experience and culture. That is, considering materials in diverse ways when we, as designers, seek to make qualified choices in the shadow of global climate change, social inequality, pollution and decrease of bio-diversity.

Last, but for this project, not least, the pilot project described earlier, indicates that in terms of shoes and the ECCO shoe project at Design School Kolding, there is a large, unexploited potential in using the frame to explore materials and shoes innovatively beyond leather. As a few of the projects show, shoes, considered as design products, seem to have the potential to be the ideal 'laboratory' for material investigations and speculations: They are relatively small in scale, they most often consist of diverse materials, they relate to the human body, and they require a fair mix of functional, technical and emotional considerations for the product to succeed. It is our hope that material explorations can be supported by the Material Pathways tool, as it dissects diverse material positions, provides examples to learn from and points to further learning options through literature.

Material Pathway Cards Content

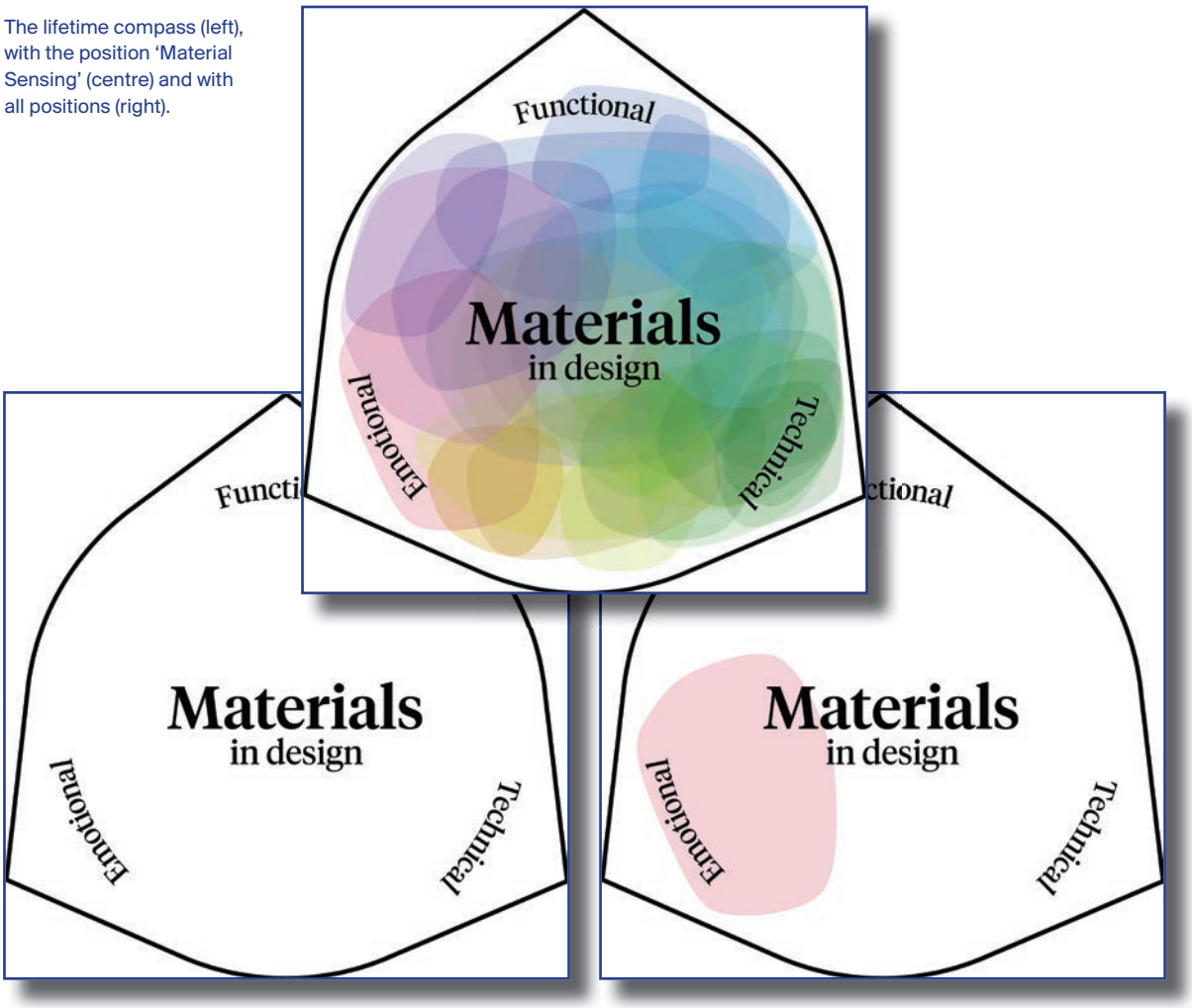
Material Pathways consists of 33 cards. The format is similar to the SDC deck, with adjustments in colour scheme and fonts for individual visual identities. The cards have a graphics side and an information side. The graphics side includes a compass that builds on and unfolds a product's lifetime in relation to a material's properties and characteristics.

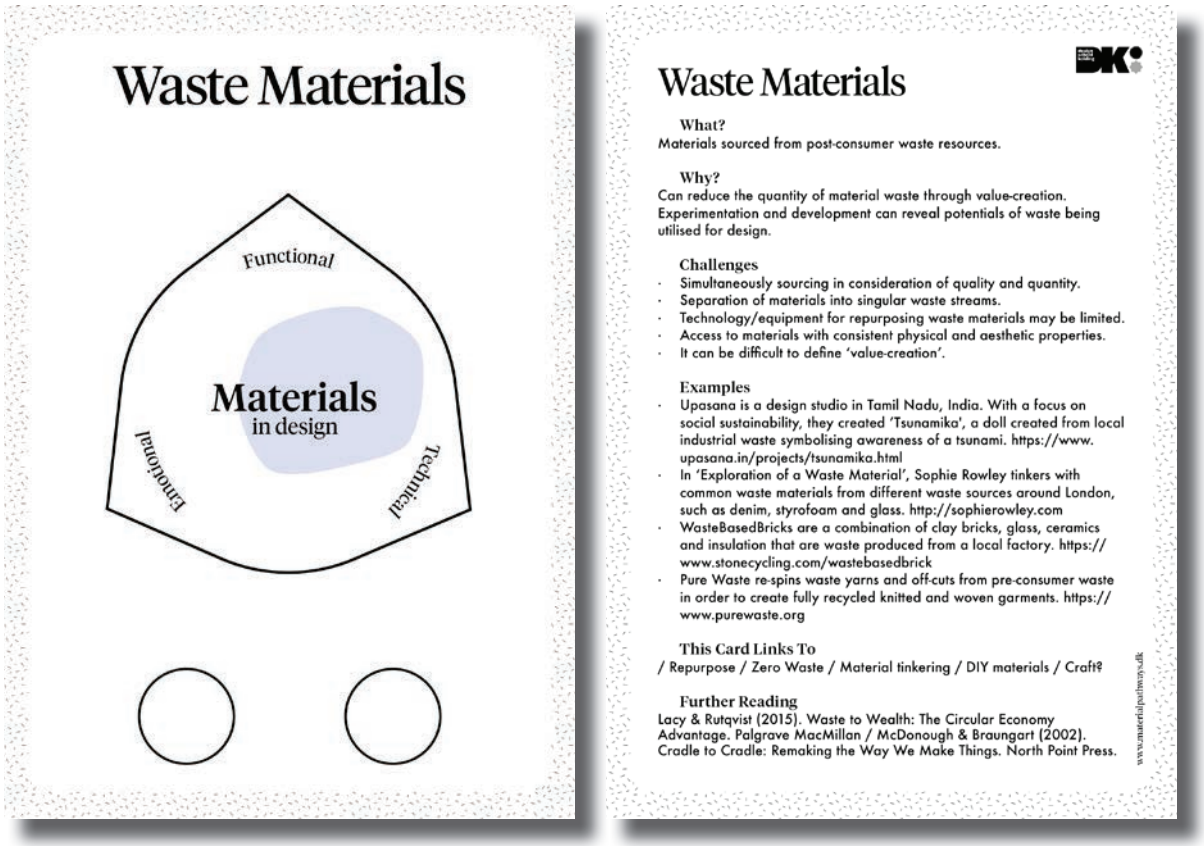
Product lifetime can be described as "the extent of efficient or sufficient use in a product" [4], and in the compass this is illustrated as tension between technical, functional and emotional aspects. However, here we expand the concept from products to specifically considering the material component and how this engages in the value of the product. We see that technical lifetime refers to the length of time a material or product stays in use before it breaks or wears out; functional lifetime refers to the length of time a material or product stays in use before its functionality no longer meets the user's expectations or needs; and emotional lifetime refers to the length of time a material or product stays in use before the user stops having emotional attachments to it.

Users of the deck can use the compass as a way to guide or build awareness concerning choices and approaches to material use within these three ways of understanding lifetimes [5].

Each of the material positions in the Material Pathway deck is situated as a coloured cloud space in the compass that visually indicates the types of lifetime factors at play, i.e. a material card may refer to more than one. The functional aspect is represented as blue, the emotional as red, and the technical as green, which provides the opportunity to give each position's cloud space its own colour mix depending on compass position. In the figure the lifetime compass is shown (left), and as an example, the material position 'Material Sensing' unfolds as a red cloud space (right).

The lifetime compass (left), with the position 'Material Sensing' (centre) and with all positions (right).





The graphics side (left) and the information side (right) for the material position 'Waste Materials'.

Furthermore, on the graphics side, each card has assigned categories displayed as pictograms that correspond with the phases in a product lifecycle. Here we work with the six categories: Raw Materials, Refinement and Production, Transport and Retail, User and Practice, Disposal and Recovery and Design and Concept.

In the Sustainable Design Cards, between one and four categories were assigned to each card. For the Material Pathways cards, we wanted further input on which categories were assigned to which material position cards, and this is one of the activities in the workshop described further below.

The product lifecycle applied here with the phases: Raw Materials, Refinement and Production, Transport and Retail, User and Practice, Disposal and Recovery, and Design and Concept.

Testing the Deck of Cards

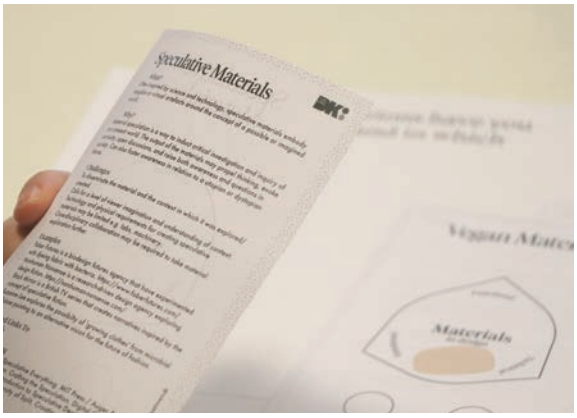
From the very early planning of the project, it was agreed that it would be relevant to test the deck of cards in the Material Narratives course that we teach our MA Planet students in their first year. Design for Planet is one of three cross-disciplinary MA Programmes at Design School Kolding (the others being Design for People and Design for Play) and is a two-year Master of Arts study in design for sustainable development. The programme is international and attracts applicants from Scandinavia, Europe and overseas with diverse disciplinary BA backgrounds, either in design or related disciplines. Many students arrive with experience from professional practice in industry. The study offers a free space for them to explore various challenges, approaches and contexts related to sustainability. They can choose to work in groups or alone, with companies, organizations or citizen groups. The test cohort represents a relevant group from a test perspective, due to the students' diverse cultural and geographical origins, varied design disciplines and span in experience.

The aim of the Material Narratives course is to allow students to explore and unfold their perception and use of materials in a design for sustainability context. At the outset it was not determined how the cards would be tested, but the deadline served as a guideline for the development process and how far we had to be before the start of the course.

In November 2019, the deck cards were tested in an independent workshop in the second out of five weeks of the Materials Narrative course. Before the workshop, students were told that they could use the workshop to reflect on their use of materials, but also see the workshop as a format for their own investigations. In the introduction week for the Master's programme in August, students were introduced to the Sustainable Design Cards and thus, all students were familiar with the format of the new deck.

The workshop was conducted as a 2.5-hour session in the morning before lunch. The 21 students who attended the workshop were divided into groups of two to four students, based on how they chose to sit when they arrived.

After a general introduction to the cards (here also named position cards, as each card accounts for a material position), the session was divided in two activities of approximately 1 hour each. In the first activity, we were interested in acquiring insights on how students could relate the deck of cards to their previous work. In the second activity, we were interested in having students contribute directly to a part of the deck of cards, that is, we wanted further input on which categories were assigned to which material position cards.

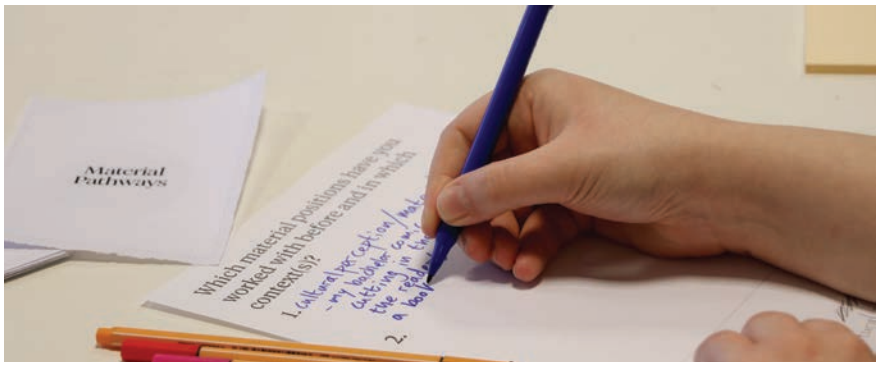


The Work-in-Progress Deck of Cards

In the workshop, the students were presented with a work-in-progress version of the deck of cards, which was advanced enough to give them an understanding of the deck, but which also left details to be pursued further in the workshop itself and when processing feedback from students after the workshop. Thus, all position cards had written content, but some descriptions were better worked out than others, and not all had been placed in the lifetime compass. However, it was intentionally decided to leave out categories on individual cards to allow students to supply feedback without being biased on any prior thoughts we had on this.

The First Activity: Identifying material positions in prior design practice and/or projects.

In the first activity students were asked, individually or in groups, to identify, write down and subsequently discuss positions from the deck they had previously activated as well as the given contexts. Each student was given a template to fill in the positions and contexts (s)he identified. The activity was concluded with a short plenary reflection during which students were asked to share their experiences and immediate thoughts.



From the filled in templates, 124 material positions were identified – an average of 6.5 per student. The below chart figure shows how many times each of the positions were identified.

Chart of material positions per number of times identified.

Position	Answers	Percentage
Upcycled Materials	12	63%
Waste Materials	10	53%
Craft	8	42%
Local Materials	8	42%
Bio-Plastic	7	37%
Mono-Materials	7	37%
Bio-degradability	6	32%
Material Tinkering	6	32%
Repurposed Materials	6	32%
Material Sensing	5	26%
Mechanical Recycling	5	26%
Natural Materials	5	26%
Repairability	5	26%
Composite Materials	4	21%
Compostability	4	21%
DIY Materials	4	21%
Material Ageing	4	21%
Chemical Recycling	3	16%
Biomimicry	2	11%
Critical Materials	2	11%
Degradability	2	11%
Ecological Sourcing	2	11%
Vegan Materials	2	11%
Cultural Perception	1	5%
Material Economies	1	5%
Organic Production	1	5%
Responsive Materials	1	5%
Zero Waste Materials	1	5%
Bio-Synthetic Materials	0	0%
Fully Grown Materials	0	0%
Material Diversity	0	0%
Meta-Materials	0	0%
Speculative Materials	0	0%

The introduction to the activity did not clearly state, whether students were allowed to combine or identify more than one position per context. So, in filling in the template, it is clear that some students deliberately only focused on one position at a time, while other students chose to identify several positions that fit the same project.

For 57 context descriptions, one position was identified and described. Examples of these are:

> **Craft:** "Skills Project, Le Klint, Form & Shape as an industrial designer, it's a great way to explore shape and materials through craft methods."

> **Local Materials:** "I wrote my bachelor's thesis about food waste and therefore looked a lot into local materials and production."

> **Material Economics:** "Working with a project for training local communities in old local crafts and teaching them how to make a living from it."

In other cases, up to five positions were identified. Examples of these are:

> **Bio-Plastic – Bio-degradability – Biomimicry – Composite Materials – DIY Materials** used to describe a project, where the student "developed a material made from sugar beet waste pulp mixed with a homemade bioplastic resulting in an MDF-like material"

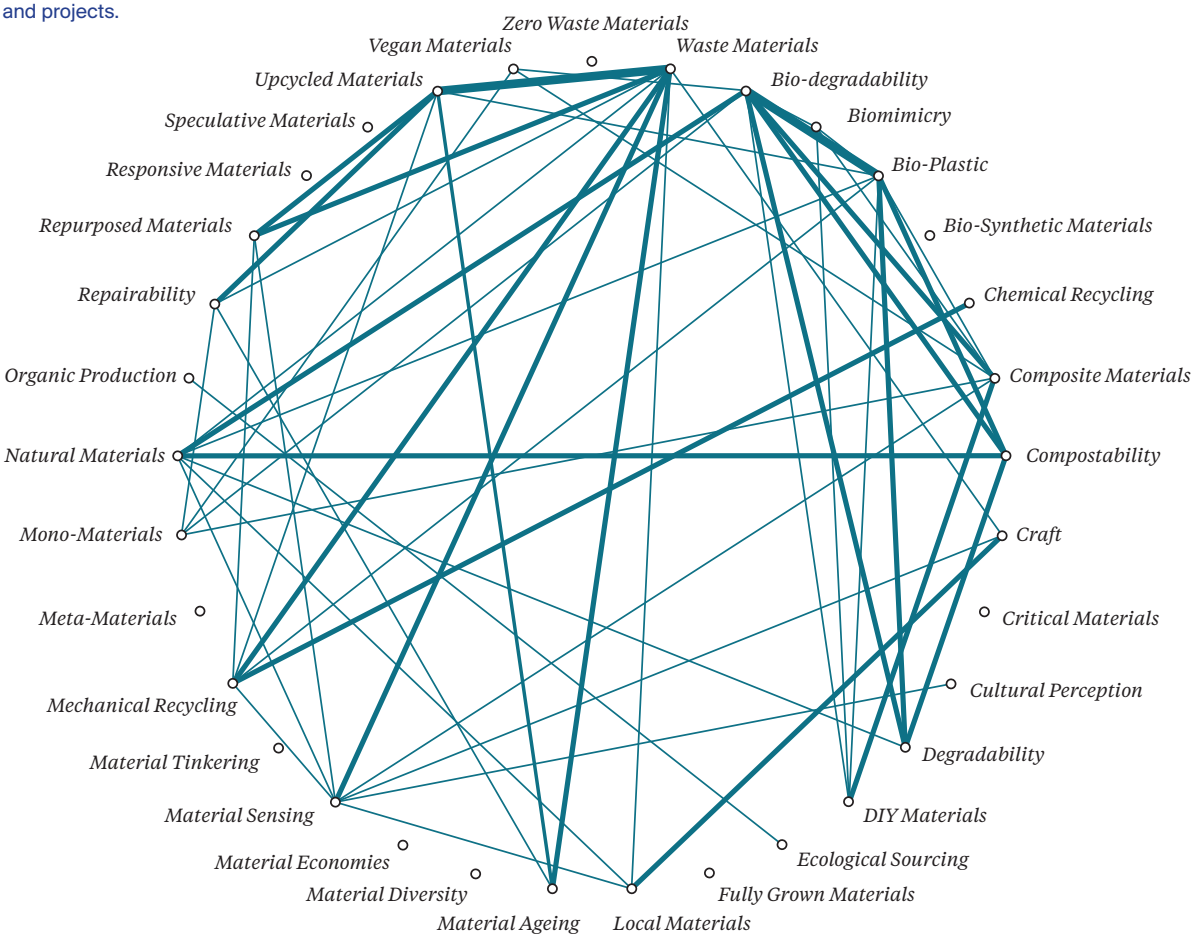
or

> **Upcycled Materials – Waste Materials – Material Ageing – Repairability** used to describe the project 'Traces of Life' where one student in a group worked with thrown-away items and upcycled them in ways that embrace their flaws, e.g. sashiko stitching and made tote bags out of tablecloths, bedsheets, etc. from materials found in second-hand stores.

From the context descriptions using more than one position, it has been possible to illustrate potential affinities between positions. Based on 67 positions, 11 contexts were described with 2 positions, 4 contexts were described with 3 positions, 4 contexts were described with 4 positions and 3 contexts were described with 5 positions. The information we have does not tell whether affinities of positions within a context may differ, i.e. that not all positions relate equally to each other. Nevertheless, here all connections have been given an affinity of 1.

In the below chart, affinities between positions have been visualized. Here the thicker the line, the stronger the affinity. Two affinities between positions were described three times: Upcycled Materials and Waste Materials and Bio-Plastic and Bio-degradability, while 16 were described twice.

Circular affinity chart of the material positions in students' previous work and projects.



Looking at both charts gives us an indication of the way materials are addressed, applied and understood in the students' practice at this stage in their education. The first chart shows that there is a concentration around waste, which makes sense, as waste materials are often accessible to students, can be inexpensive to source and can be manipulated within studio or home environments. Furthermore, craft and the local has a strong representation that links to the roots of many design programmes. Nevertheless, we can also detect an impact from material driven design where students experiment with making their own materials such as bioplastic. In the brown and red areas, we find the least represented positions. Some of them possibly because they require particular facilities or technologies. Other positions might need a fair amount of time for research into the matter or simply for the material process itself, for instance Fully Grown Materials. The second chart shows that of the test group, many students unprompted connected material positions when they described their practice and material experiences i.e., they were able to identify and see the connections between separate material positions in what they do and link them into what we see as Material Pathways.

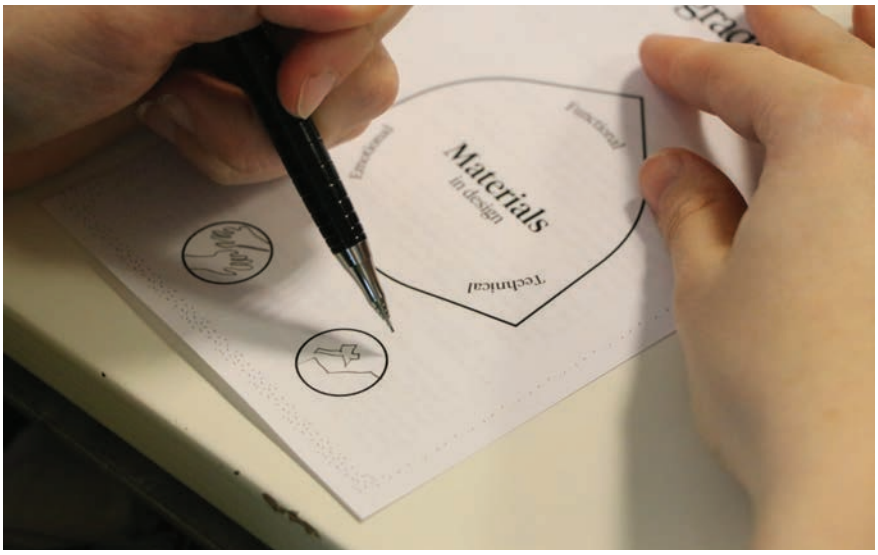
Activity 2: Categorisation of Positions

In the second activity, the groups were asked to discuss and indicate, which of the six phases in the product lifecycle they agreed on that each position related to the figures. It was up to the students to choose how to indicate this, however two circles on each card were left empty for this purpose.

It turned out that even though students had not been given clear instructions on this, in many cases, the two circles seem to have worked as an indication of the number of phases related to a position. There are also one, three and four phases indicated for some positions, but most have two.

Six of the seven groups filled in phases within the given duration of time with the exception of a few position cards. One group had only indicated phases on a few cards.

Since it was generally the same cards, such as Bio-Synthetic Materials, Bio-Plastics, Chemical and Mechanical Recycling and Composite Materials, a reason could be that the students did not know positions and thus how to relate phases to them. There is, however, no direct correlation between the material positions often identified in projects from the first activity of the workshop and how strongly categories have been identified in the second activity.

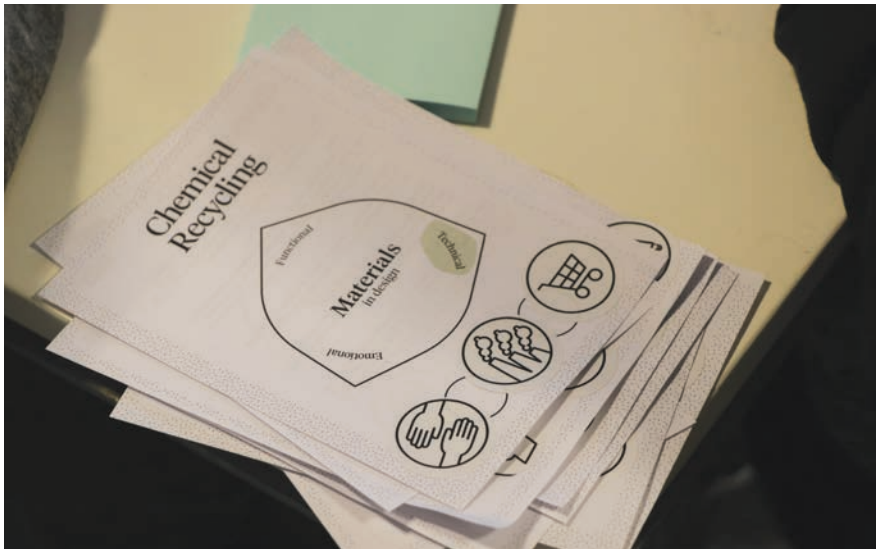


Indicating product life cycle phases on the cards with icons in the Material Pathways workshop.

Two groups were given stickers with the icons of the phases to indicate identified phases, while the remaining groups of students, with the exception of one, without talking to each other, drew the icons on the cards.

Using the stickers with icons was a way to see if or how it would affect the discussion as no time had to be spent on drawing icons by hand. The two groups finished about the same time as the rest of the groups, but they generally applied more phases to each card.

The input on categorisation in the workshop will be further discussed in order to finally determine how the material positions should be categorised in the final printed and digital versions of the deck.



A pile of cards where a student group has used stickers to indicate what they find to be relevant life cycle phases.

The oral feedback we received directly after the exercises is valuable for the further development of the deck. Content-wise some students articulated that particular cards need a more exact wording in terms of sustainability value or outcome in order to avoid companies using them for greenwashing purposes. However, as authors, we have to balance a critical stance with neutrality as, for the most part, materials and material lifecycles come with sustainability pros and cons, which must be contemplated and weighed from case to case. We thus see the cards as material positions in the world, more than a set of guidelines. Other input related to further alignment of scope of position title and the provided examples, as well as within the card titles themselves.

Overall Reflection

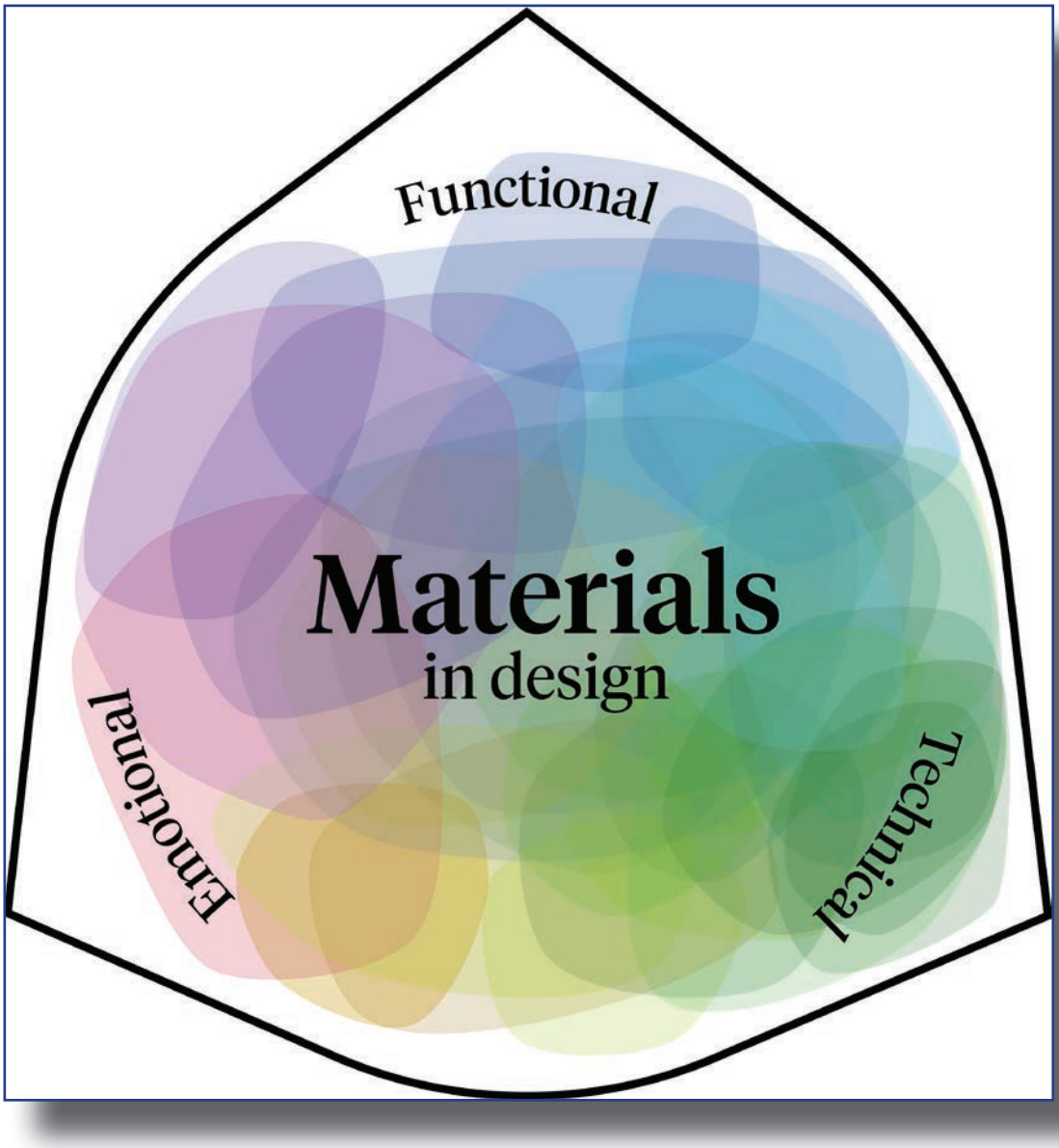
We also saw reflections on the impact of the exercises, e.g. a student from industrial design expressed that overall, “the tool gives a good perspective – many positions are known, but maybe not consciously used previously. Having a discussion about or around a card automatically makes the position more conscious.”

Another student with a background in Fashion Design stated that in her group “we learned a lot about specific material areas that we are not really aware of. There are a lot of them. We don’t always think of them as such, as separate concepts.” Which was followed up by other comments on how the cards can be used as a way to address and clarify limitations.

The discussion related to the second exercise centred on the types and number of phases pre-defined by us. One group in particular argued that in terms of material, transport and retail are both really big fields and maybe they could be disconnected.

Overall, apart from direct input, the workshop provided us with a tentative understanding of the possible relevance of the deck, but also the realization that while a tool can be of relevance, it is as much the accompanying exercises that can steer activation of the tool and foster learning.

The cards will now be re-worked and finalised early 2020 with input from the above described workshop, and with feedback from an open workshop for all Design School Kolding students to be held ultimo 2019. They will be available as open source on www.materialpathways.dk.


Functional
Materials
in design
Emotional
Technical

Material Pathways as a way to Enhance Learning on Materials' Roles in Design for Sustainability

Overall, we can tentatively conclude that the Material Pathway tool has potential to engage actors (students or practitioners of design) in learning about materials' role in design for sustainability. However, we also see that the potential should be unfolded through accompanying activities to support the learning process. We have gained some first experiences in this that we can build on; naturally through the workshop where the deck was tested by MA students in predefined exercises, but also from the involvement of students in the development of the tool itself. We decided early on to involve two Design for Planet students in the development work, partly because they could fill the role of research assistants, partly because it is important for students to experience what knowledge development in design is about. However, what we had not planned for was the kind of deep learning on materials and reflection on their own practice that this process carried for the students. And, on the other hand, what it positively brought to the project to be able to have the synergy between the students' and our own perspectives and wonderings. The two students' testimonies are included in this piece of writing as they in effect represent what we seek to achieve with Material Pathways: to foster a holistic, investigative and reflected approach to materials' role in design for sustainability through engagement with the deck.

“Working on this project alongside my studies at the Design School has been incredibly fruitful. As a textiles student with a background in menswear, my approach to projects have employed both tangible processes like material tinkering combined with taking a wider perspective, such as proposing material strategies towards a more circular economy within the fashion/textile industry. In this respect, the Material Pathways project sits very close to my practice.

Along the way I have been able to transfer and integrate the knowledge I have gained from researching for the cards to influence and strengthen my personal projects, and vice versa. It proved to be hugely valuable to use my own and my peers’ personal experiences of working with some of these strategies as it added a layer of relatability and raw understanding. It also served as a good opportunity to take a step back to reflect on some of the challenges that I have faced when working with certain elements illustrated in the cards such as craft, material tinkering, and repairability. Sustaining conversations with my peers and tutors aided a broader perspective opposing my inclination to relate the topics to the field of fashion and textiles. It was at times refreshing to look beyond design projects, and instead to research examples of traditional techniques used by global communities which organically engage with material strategies, such as ‘boro’, a visible mending technique used in Japan to extend fabric longevity.

Many of the cards such as Waste Materials and Repurposed Materials had such strong links in their examples and intentions that it was at times difficult to distinguish their differences. Re-thinking how to make the information more specific helped, but when taking a step back it seemed very relevant that they were so intertwined. From experience in working with the sister deck ‘Sustainable Design Cards’, my peers and I often have a focus topic, but other layers of the project point at two or more additional cards that hold together the concept.

As a maker and thinker hoping to continuously develop consciousness of how we might adopt approaches in our projects that heal as opposed to harm, I hope Material Pathways will serve as a toolkit for unravelling uncertainties, developing understanding and creating approachability to the themes explored.”

Reflection from student assistant Ashna Patal

“The Material Pathways project has been an exciting learning experience that has also helped me as a designer to gain a better understanding and an overview of materials. This means above all broadening my views on the variety of how materials can be approached in design, and how in different ways they may guide the design process. I feel like the knowledge that I have now on materials is something I have been previously lacking as a fashion designer. Through the project I have realised how much more there is to know about materials and sustainability; materials are in fact for instance very political, philosophical and emotional. They also communicate our cultural values and can disrupt current systems in many ways.

Materials often somehow seem to be taken for granted and that might be due to lack of ability to see materials holistically. I think that this kind of educational tool is needed for gaining a better understanding of what kind of roles materials play in this world. I hope that this deck of cards would help people who work with materials not only be more critical and mindful with material selection and production but also inspired by all the sustainability potentials materials embed.

My responsibility areas in the project covered approaches from technical to more political or culture-related ones. Working with some cards was more straightforward whereas some other areas required deeper contemplation of what the approach actually even means, and how it should be framed in order to make it comprehensible.

I have been working with my card areas parallel to each other. Many of the approaches are related in some way, so often when I was exploring one category, I came across something interesting relating to another. I think this way of working has also helped me to see the different approaches more holistically and how intertwined they actually are. I hope that the tool is as user-friendly as possible and helps people who use them to embrace materials and sustainability more deeply than before in their current and future projects.”

Reflection from student assistant Iiris Herthua

04 My Quest for Beauty

Maria Kirk Mikkelsen

My Quest for Beauty

I Love that Shoe!

I am blown away. Do you know that feeling? To be emotionally moved by a product? That a specific product seduces you, and you are not exactly sure why? As if you sense this particular product more intensely than other similar products. Have you ever asked yourself what it is about this precise product that gets under your skin and affects you so deeply that you might even have to own it at any price? Maybe the only answer you can find is this: the shoe is just so beautiful. But what is it that makes this exact shoe so beautiful? And is it only you who thinks so? You are almost certainly not the only person who experienced the beauty of this shoe. But on the other hand, probably not everyone in the world would think that this particular shoe is immeasurably desirable. So, what is beautiful and what is ugly, and why do we not all experience the same?

If these questions make you want to keep reading, you are probably a designer and you are probably waiting in suspense for me to give you the answers. After all, if you could hold the key to what touches people so profoundly, it would be a relatively simple task to create products that are exclusively wonderful that your company could sell, and you would become a great success. But I am not going to give you any answers. Instead, I give you more questions. Because I want you out of that comfortable chair and I want you to engage in a discussion with me. In the following I will write in a bold essayistic style to explore and attempt to pin down the notion of beauty.

So, what does it mean that something is beautiful? How much of the experience of beauty is subjective and how much is objective? If the experience is completely subjective, does that mean we should not deal with it and let it remain subjective? No, I want to shout. No, because we have to talk about the seductive elements of design. It may well be that the aesthetic expression of design products is something we (just) sense as a non-verbal language. But that does not mean we should not talk about it. It may be difficult, because it requires us to transform something non-verbal into words. Being able to perceive a product and transform this perception into a sense

of passion, love, sadness, drama and so on is, to the best of my knowledge, one of the designer's greatest abilities. And it is this ability we use when we design meaningful products. This is a basic, tacit knowledge that we must articulate in words in order for it to grow. Like other abilities, this ability must be nurtured and challenged so that it can develop and become strong. Imagine, for a moment, the consequences of not cultivating and growing this ability in the designer. Can you picture a future where the designer can only design shoes captured as a concept on post-it notes?

The Beautiful Material Strategy

A shoe can be divided it into different designed elements. First of all, the shoe has a function. On top of this, it also has an expression. Function and expression. As part of the shoe's expression, the designer has worked with both form and material. Let us dive into the domain of materials for a second. What significance do material choices have for the notion of beauty that I touched on in the previous paragraph? I can repeat my questions here: what makes a material composition beautiful, delicious, exquisite? How do we perceive and interpret materials when they are composed in a final product? And can we just assume that what I as a designer perceive and interpret is also what my future user will perceive and interpret? Does he understand the narrative as I understand it?

In the above I used the word 'expression' about the way the product appears with its form, colour and material. In a casual conversation, I might carelessly have talked about it as the product's aesthetic expression. But the word 'aesthetic' tends to confuse people because it has had so many different connotations over the years. However, to dive deeper into the study of when we perceive a material strategy as beautiful, I venture out to talk about aesthetics with the enthusiasm and audacity of a design practitioner. I will introduce to you four practical and designer-like ways of looking at aesthetics, all of which are present when we relate to a design. It is albeit aesthetic in a somewhat rewritten version than how it has been formulated historically. I call these four aesthetic approaches Harmony, Trend, Sensation and Experience.

Harmony

One of the earliest conceptions of beauty is as a common ideal of beauty we all strive for. In Antiquity, beauty was imbedded in the object. It was therefore objective and detached from the observer. When Aristotle defines beauty, it is precisely on the idea that beauty is a divine ideal that man can approach with harmonies in rhythms and proportions. Aristotle introduces us to beauty as something opposite from ugliness and states in his text Poetics that "to be beautiful... every whole made up of parts, must... present a certain order in its arrangement of parts" [6]. Thus, the belief is that people share a common, objective beauty ideal that can be achieved by arranging elements in a certain way. Can we agree on a common beauty ideal today? Hardly. But although I claim to be a postmodernist and as such have broken with the ideals of modernism and the dogmatic approach to design that it represents, I nevertheless repeatedly seek answers and inspiration from great thinkers' notions of harmony. I call them harmonies here, because they were formulated in that belief. This applies to form and composition both, where The Golden Section and Fibbonaci are still used as mathematical laws of proportion to create, understand and talk about form [7]. The same can be seen in the field of colour with Goethe's instructions of ideal distributions of colour quantities as well as Johannes Itten's [8] and Josef Alber's [9] work with how the colours harmonically influence each other. I love the idea of harmonies formulated as laws. It gives me a language for discussing what I see. Whether I interpret these historical laws of harmony as ideal or true, I will return to in a moment.

Trend

I would like to turn our attention to trends and taste preferences that dominate at different times. Trends can be described as an expression of a common assessment of something as being preferable to something else. If we stay on the subject of shoes, we can take the classic Dr. Martens boot. At a presentation at ECCO earlier this year, one-third of the designers and students present were wearing Dr. Martens boots. It must be said to be an expression of a fairly significant trend among designers. I am not part of that trend; I wore Dr. Martens boots in the 1990s. That was enough for me. So, I am positioned outside the community of this shared preference. Nevertheless, here I will sneak in a remark about aesthetics again and use trends as another bid for understanding beauty. Immanuel Kant describes aesthetics as good taste; as the ability to intuitively distinguish between the beautiful and the ugly [10]. In the context of the Dr. Martens boots, not all of us, but exactly one-third of the designers present that day, share a common beauty ideal or has the good taste. Today, we can hardly say that all mankind has a common under-

standing of 'the beautiful' but it occurs in groups of people. In smaller groups, trends emerge as collective beauty ideals. Kant's good taste becomes a collective taste. For the designer who put on his Dr. Martens boots that morning in Tønder, it was precisely the ability to distinguish between the beautiful and the ugly within his group that was guiding him to make that decision. He knew the good taste of the group.

Maybe your group has some of the aforementioned harmonies as their ideal. After all, I promised to return to them. If you perceive regularity and order as beautiful, is that then not proof that the harmonies mentioned above are actual laws? Or perhaps just a taste? A trend in your group? Maybe you experience it completely the other way around; that some chaos and disharmony is needed to create life and thus beauty?

Sensation

The third element I would like to introduce in connection with aesthetics is Sensation. The original Greek word 'aisthesis' means exactly that: sensation. Understanding aesthetics as sensation is akin to phenomenology, which is about sensing and describing phenomena. With this understanding, we can consider any designed expression as an aesthetic expression, regardless of whether we think of it as beautiful or ugly. We see the colour of the leather. With our fingertips we feel the leather's smooth surface with small cracks after many bends. We hear how the leather squeaks as the shoe moves. We can smell the leather and the many layers of leather grease. And if we dare take it in our mouth, we can also taste the juice from both leather and grease. We sense the material; thus, it gives us an aesthetic experience. Merleau-Ponty says about phenomenology that the purpose is not to capture absolute truths but to learn to see the world again [11]. He also argues that senses must be renewed not to create blindness. In other words; if we have the same sensory impressions all the time, we become used to them and blind to what they offer us. But with a little awareness, we can have an aesthetic experience of even the most mundane things, if we are physically present and involved in the world. The contemporary design theorist Patrick Jordan proposes, in parallel to this, a new way of approaching design. Instead of a functionality approach or a usability approach, he introduces a pleasure approach to design [12]. The first layer of this approach he calls Physio-pleasure, which relates to the body and pleasures derived from sensory organs. So, he articulates that the design must include the sensory qualities to give you pleasure. This is something a concept on a post-it note cannot do!

Experience

When evaluating if we think something is beautiful or not, we have several options for doing so. Based on the above we can use the laws of harmonies. Or we can base the judgement on our own sensual pleasure; the soft towel in the spa or the smooth leather on the new headphones that just feel like a tender touch of the ears. Or we can use the beauty ideal of our group. The fourth and very important element is our individual, lived experience. Here I will return to the story about the Dr. Martens boots. When I can say with certainty today that I will never wear Dr. Martens boots again, it is precisely because of my lived experience. You could say I have worn them up, I am done with them, they belonged to a time when I played in a rock band with young boys and hid beers under my clothes. So, when I see the boots today, I call on my past experiences and interpret the boots based on that. Contrary to Antiquity's definition of beauty as something objective found in the object, beauty here is understood as something subjective created in the person who perceives the object. Philosopher and psychologist Gregory states about perception that it is a hypothesis we make based on our past experiences [13]. This way we already have a fixed interpretation of the world, almost before we experience it. The thing about our individual experience is a very annoying thing when designing. We cannot control it. We basically do not know what others have experienced in their past and how that will play a role when they perceive our designs. This is where it becomes highly subjective and difficult to talk about. And therefore, immensely exciting.

Seduce them

As I go on my quest for beauty, I am aware of these four elements or designerly interpretations of aesthetics: Harmony, Trend, Sensation and Experience. In terms of harmonies, I perceive aesthetics as a kind of indication of what is harmonious and thus also disharmonious in compositions and colour compositions. In relation to trend, I look for a common beauty, which can be seen in groups in contemporary times. The sensation is an increased awareness of all the sensory impressions I get. And in the end, I use my lived experience to ask questions about positive or negative reactions I get based on a design. Often, I find something here that cannot be explained by the other three parameters.

I wrote in my introduction that I want you, the designer, out of your comfortable chair and ready to engage in a discussion. On second thought, it is not a discussion I call for, but rather a dialogue and an increased awareness of the fact that we as designers are still working on creating beauty. Not beauty understood as Aristotle's dogmatic truths, but beauty understood as a complexity that seduces us but does not always easily decode. Whether we design a shoe,

a car or a wayfinding system, we must translate design concepts into physical manifestations. The basic narrative of the design must be interpreted into abstractions and placed in the expression of the shoe, the car, the wayfinding system; in the aesthetic expression with its elements of harmony, trend, sensation and experience.

In a time with an abundance of immaterial and intellectual concept designers, meeting designers, system designers and so on, I call on the old-fashioned designer's basic skills. I am talking to you who knows how to design, who can conjure narratives in materials and form. You master a craft and a very special ability to make the right choices. You do not reach these choices with your mind but through your actions. Your hands can feel when the sewing in the leather fits tightly, or which surfaces to combine in order to create the perfect tension. You can create the narrative in design, and with your choices of colours and materials, you can pass this narrative on to your user. A poet uses words to seduce his reader and open up new worlds; you seduce and open up new worlds by the use of refined material compositions. I do not have a recipe for how we create beauty. But I know that it is crucial to good design, that it is present. And crucial that we articulate it.

05 Sustain & Recraft

Line Rebecca Rumhult

Sustain & Recraft

It's Personal

Incorporate, from Late Latin "Incorporare",
formed by the in-(into/towards) and derivation of corpus 'body'.

Leather possesses an incorporated strength as a natural and bred material, which has grown into its own beauty. Time, unexpected occurrences and life itself are expressed in its organic shape, varying thickness and uneven edges. One's eyes and hands are never bored from exploring the surface of fine lines, formations and unintentional patterns.

As a professional working with leather, I am attracted to the history of the skins. I know that only because there was life, this material possesses its beauty. Maybe for that same reason I have often felt grateful, even in awe, working with the skins. Their softness, flexibility and strength are unparalleled to any material ever used for accessories. I respect the material. This close emotional relationship can only be achieved by working and crafting the leather and becoming its friend. Opposed to many other materials, the leather in itself, without coloring, surface treatments or decorations and without even being a finalized design object, has a high emotional value. When vegetable tanned, the leather prolongs its life span and proves itself as a changeable and living material by reacting to the handling, developing patina and showing the passing of time. I can think of no other accessory material throughout history with the same powerful presence. The leathers themselves bear witness to their own superiority. It is thought humans began wearing animal skin clothing as early as 170000 BC, and the oldest existing closed-toe leather shoe consists of a tanned cowhide formed around the foot and tied with leather laces. The shoe dates back to 3700-3500 BC.

Then why do we as shoe makers and designers need to concern ourselves with new materials? Because with new materials come new possibilities and new business opportunities.

We no Longer Choose from What is - We Design 'What if'

These years, we are seeing a vast number of new materials for accessories being developed.

As shoe makers we are preoccupied with how they behave and perform. What are their known and unknown reaction patterns when we treat them like we would normally treat leather in the process of making shoes? Do we need to craft them differently? Do they offer us new possibilities and new directions in our design process? Are they realistic and scalable materials ready to be used in the production of footwear, or do they need to be developed further?

Methodology

Bovine leather (cow, buffalo, ox and calf) makes up 64% of all leather produced from the world's total number of tanneries and are therefore the most widely used leather type. About 90% of the world's leathers are chrome tanned. Chrome tanned bovine leathers are also the most used material in the ECCO x DSKD courses, thus making it the most obvious material to compare to the other materials.

Developing the crafting techniques aptitude comparison ruler was an attempt to easily visualize the comparison of the chrome tanned leather with the other materials by establishing 9 crafting techniques parameters:

Split

Skive

Glue (water based/contact glue/self-seal latex milk)

Fold

Stitch

Steam/Heat

Sand

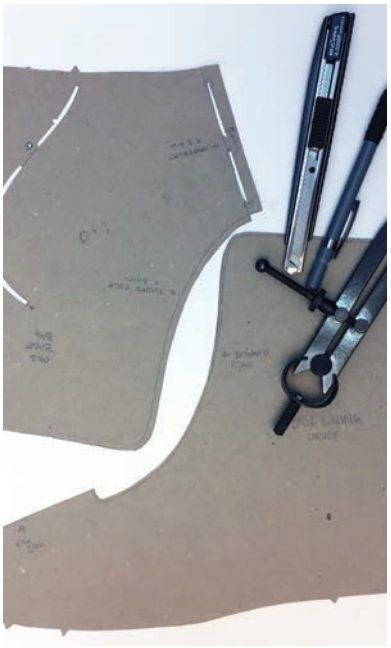
Laser cut

Last

Extras : Colouring and growing

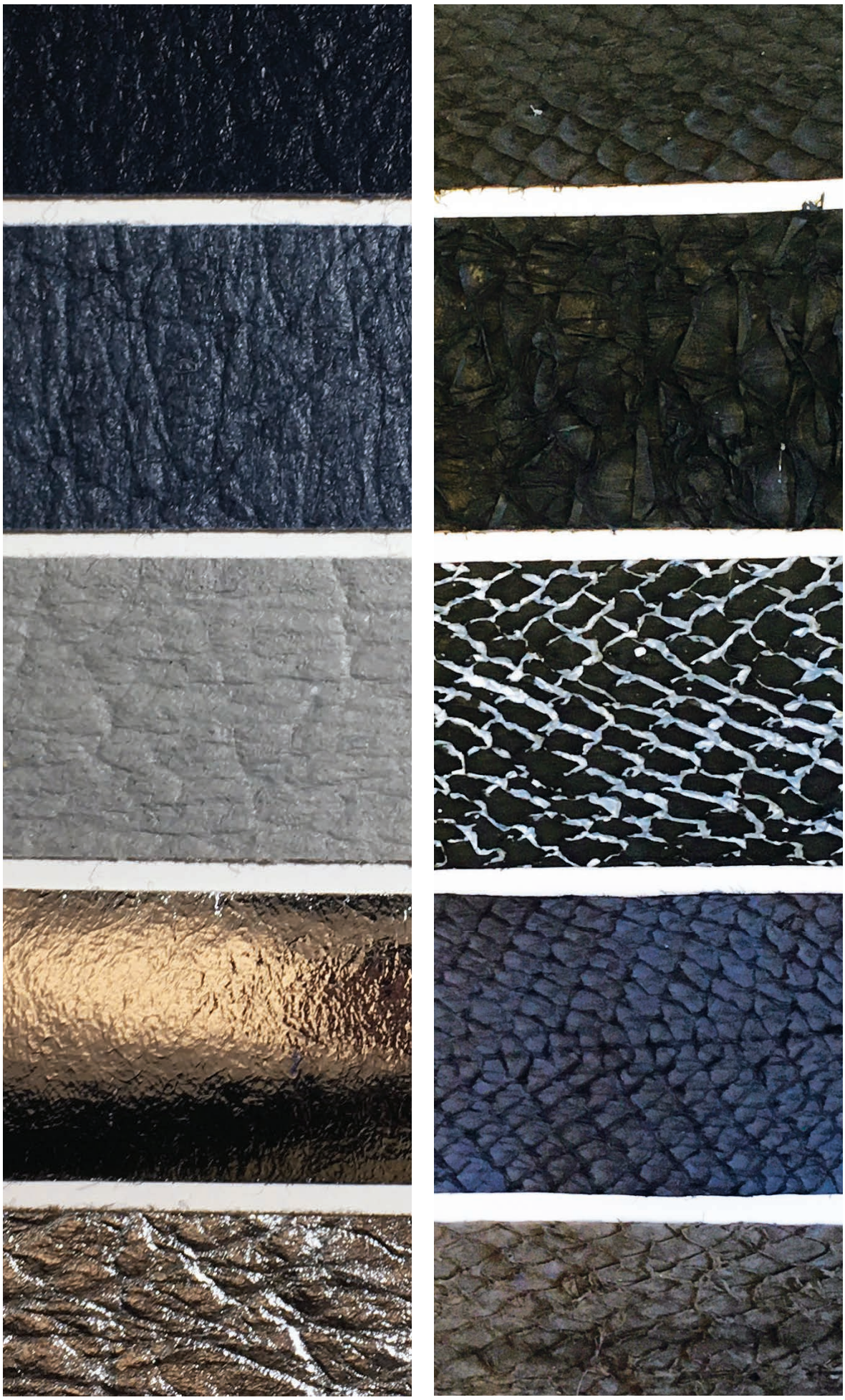
These techniques are, besides being used in the footwear industry, the techniques used in the shoe making process by the students in the ECCO x DSKD courses. For the predetermined design object, a boot was chosen, selected from student work in the 2019 ECCO course. Several criteria form the foundation for choosing this specific design. Firstly, the design chosen must contain a not too limited range of materials, to be able to explore and investigate a broad span of materials. Secondly, the design must have a variation in colours and surfaces in the attempt to replicate the original. And finally, the design should not be too expressive to outshout the focus on the materials.

Equally important to the individual crafting processes performed using the crafting ruler is measuring the functionality of the materials in relation to the placement on boot. Based on the results of the crafting ruler, each material is assessed by functionality and given a suitable placement on the boot. Finally, a reflection on the scalability in relation to the industry is given, based on the observations throughout the experiment.





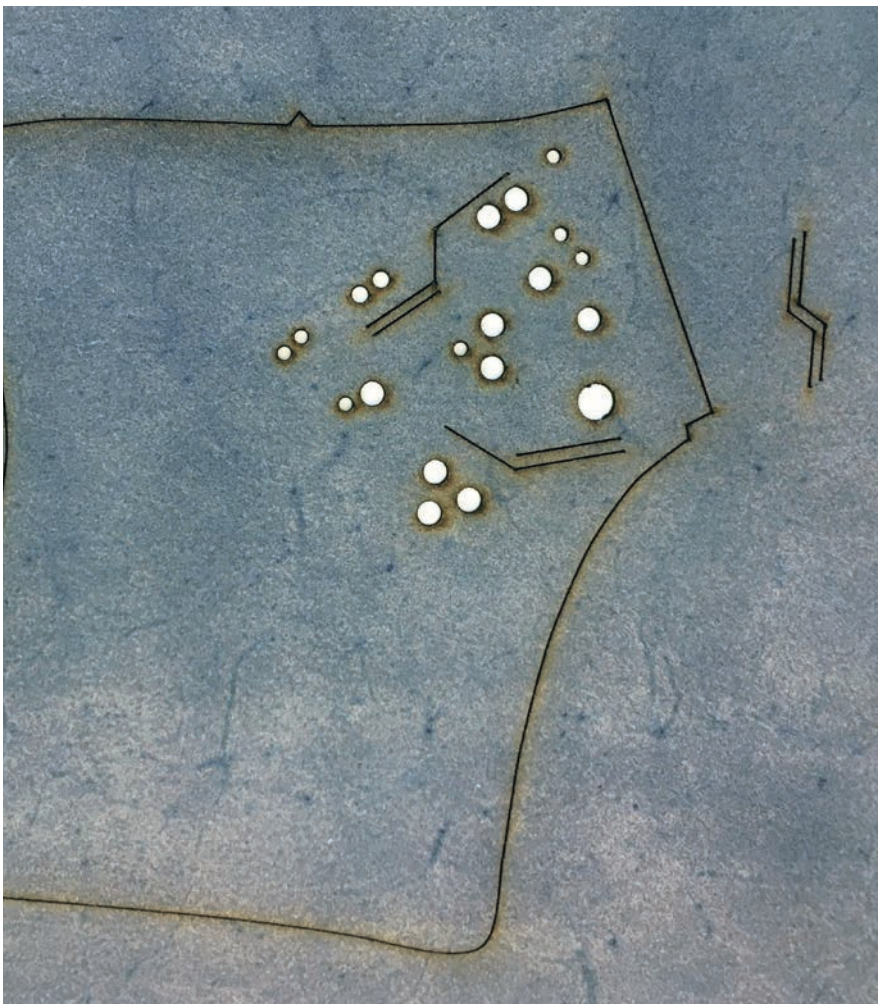
“Comparing materials can be complicated, and assessing the material alone cannot do it”

Student versus Professionals

In ECCO x DSKD courses, part of developing the collection takes part at Design School Kolding (DSKD) and part takes place at the ECCO prototyping facility in Bredebro. The experiments have sought to imitate this set up by allowing the materials to be crafted within the DSKD leather workshop by students and in the ECCO prototyping facility by professionals. This was also to measure the differences in performance within each material as well as the level of difficulty in obtaining a satisfying crafting result. The results of the student work can all be directly read in the crafting ruler, whereas the comparison between the lesser skilled crafter and the professional is touched upon as general reflections and observations for each material. It is worth mentioning that the level of machinery within respectively DSKD and ECCO is of course not directly comparable as the level of machinery is far more advanced at the ECCO prototyping facility.

The Higg Sustainability Index (MSI)

Comparing and measuring materials can be a challenge. The Higg Materials Sustainability Index (MSI), though not exhaustively, provides a good tool for removing the emotional and undocumented from the equation and replacing it with the factual. Even so, as the index has many different data sources with different assumptions, caution needs to be taken when measuring. The Higg Materials Sustainability Index (MSI) provides access to a large amount of relevant information about the impacts of material production used in the apparel and footwear industry. Leveraging the information in different ways can create a clear understanding of what is causing different types of material impacts and the different production processes that can be used to reduce those impacts.



Building a Material and Method Knowledge Base

The project experiments, observations and discoveries form the basis of the material knowledge base in the format of a series of study materials, one for each material investigated. The idea is to provide the students with a tangible tool in order to sharpen their understanding of each material's potentials and pitfalls and how to reflect on materials for accessories in general. The series of study materials will also function to increase knowledge of the properties of each individual material and help identify how to measure their level of sustainability as a material or throughout the supply chain. They also raise awareness of what is expected of a material when used in footwear and accessories and are intended to be used in workshop related teaching.

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Reflections & Conclusions

As shoe makers we are spoiled with an almost limitless availability of materials. The traditional leather types present us with all the options of colours, embossments, surface treatments, and they have a proven record in terms of functionality.

With the sustainable materials this level of development and all the processing techniques are far less prevalent. Their basic essence is to be sustainable and they are being developed for this purpose. At the core of their sustainable qualities lie still an unresolved limitation for supplying us with endless design choices.

Sustainability has no unambiguously upshot. Comparing materials can be complicated, and assessing the material alone cannot do it. While fish leathers seemingly have material potential,


Plaster mould of outer sole


Grow material inoculated with mycelium


Mycelium swatches with added milk paint powder


Testing latex and mycelium grown into each other


Layer by layer building latex outer sole


Finished latex outer sole still in plaster mould


Final thick layer of latex before adding the mycelium


Adding grow material to latex layer in mould


Turning white after 5 days of growing in mould


Finished latex/mycelium outer sole


Finished latex/mycelium outer sole


Finished shoe with mycelium/latex outer sole

However, this does not mean the materials are better as we also need to determine how we assess materials in the future.

In several of my material crafting experiments I touch upon the performance of the material and the fact that I would like to dive deeper into the questions of durability and longevity and, derived therefrom, quality.

But how do we know if longevity and durability will remain factors of quality in the future?

New materials also disrupt our ways of producing. The further away from the properties of the known materials we get, the further away the ordinary production methods must assume to be.

Rather than pressuring the material to resemble something it is not, we should let it be in its own right. We are then forced not only to design a material but to design a system to support the new material.

With the conifer leather I see great possibilities to make a mono material shoe. With a locally sourced and manufactured material being fully compostable or re-castable, all of a sudden longevity and durability are not factors equaling quality.

In the case of the apple leather, rather than using it as a traditional leather material, I would reinforce it and mould it directly into shape. Rubber boots or one-piece bags would be suitable products for this processing method.

Designing a material is not enough; we need to design an entire system around the material. Only then do we present a strong, new alternative to the existing materials that allows the new materials to compete on their own terms.

CORK WITH TENCEL BACKING

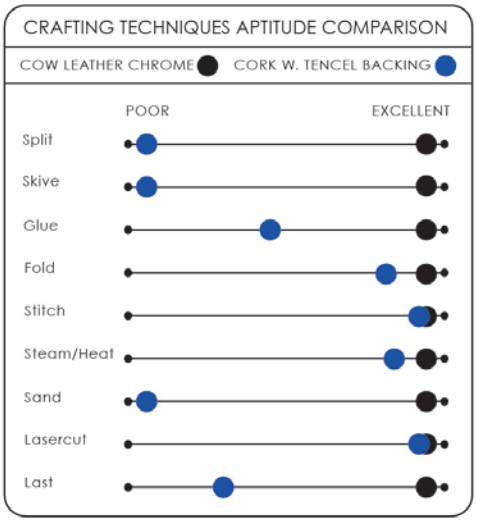

BIODEGRADABLE


VEGAN


ORGANIC MATTER

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

CORK
Cork is a quite versatile material, with a long tradition in shoemaking for being used as a filler between the inner and outer sole. Specific for this version is the backing of tencel fabric, which, to some extent, gives it the necessary strength, to be used in accessories. The backing also ensures that the cork obtains some of the desired functions as a combination of fabric and leather.
As it is quite thin, it is unfit to be split and skived, however this is not required, due to the fabric properties.
Glueing, folding and stitching are all easily done and the material responds easily to pleats and other folding techniques. Pay attention to the different cork types available, the surfaces vary and some tend to create more open surface structures, when crafted.
As with splitting and skiving, sanding is not recommended as it removes either the cork surface or the tencel backing, leaving the material without strength.
The cork has little flexibility, making it a challenge for the lesser skilled in terms of flat lasting. As it does not react to heating and steaming in terms of moulding the areas around toe and heel, it requires some level of technical skill to last tight and even. However, the thinness, to some extent, makes up for the lack of flexibility.



DESIGN AND SCALABILITY REFLECTIONS

As this material is currently only available in an uncoloured version (unless you buy a huge amount), one of the "how to" for this material is dyeing the surface with dispersive dye (see page 2). The material reacts nicely to the dispersive dye, and the colouring opens up to a vast number of possibilities in the continued design process.
The company behind the material has performed ISO testing focusing on abrasion resistance and Martindale wear, with good results. In the context of this project it would be desirable to be able to test the material in accordance with the applicable ISO standards within footwear, in order to obtain the best possible basis for data. As this is not possible, the experiments have focused on the crafting techniques.
Cork is a very interesting material with great possibilities. Even with the tencel backing, it does not score higher than 31 in the HIGG MSI, giving it one of the lowest scores of the materials tested. The backing is made of OEKO-TEXcertified 100% tencel fabric, with glue and finishing being water-based.

LASER CUTTING - HOW TO

LEATHER TYPE	THICKNESS	POWER	SPEED	CUT FROM BACKSIDE
CORK W. TENCEL BACK	0,6 MM	100	50	YES

- Change the speed according to the thickness of the material (the leather workshop has a thickness gauge tester).
- Always have enough material to run many tests, as settings can vary a lot.
- Remember your pattern will be reversed if you cut from the backside.
- Some materials develop residue around the cut parts, so test cut from both front and back, to see the difference.
- If residue is visible on front after cutting, it can often be removed with a moist cloth.
- It is recommended to cut coated materials from the backside.
- Power default is set to 100 (max), regulate the speed of the laser instead. The slower, the more it cuts through.
- If you are cutting through the material, it is best to run at low speed or cut the pattern twice.
- If you only need to engrave, it is recommended to still cut with max power (100) but at faster speed.

SPECIFIC FOR THIS MATERIAL - COLOURING - HOW TO USE DISPERSIVE DYE

TOOLS:
• Pot/Container • Water • Paper • Dispersive Dye Bafixan Blau 2 RL 851672 or other (buy in the textiles and fashion shop)
• Paint Brush • Cork • Heat Press • Heat Press Paper (This is next to the heat press)

METHOD:
1. To create the recipe you will use the Bafixan and Water, use a pot/container to store your dye:
940g water + 60g Bafixan Blau 2 RL 851672
You can use the scales in the dye lab on the Textile floor. (The lighter the colour desired, the more water you can add).

2. With your dye, paint a coat of paper using a paint brush. (The paper can be normal printing paper).

3. Wait for this to be completely dry (If it is not dry, this will damage the heat press).

4. Turn on the heat press, located on the Textiles floor. (There are 2 buttons; one on the wall and one on the machine) The temperature should be 210 °C. and time for the press should be 30 seconds.

5. When the heat press is at the correct temperature, place the heat proof paper on the press (This is next to the machine). Place one sheet of heat proof paper on the press and your cork. Then add the painted/coloured paper with the heat proof paper on top. (Always have the fabric on the bottom as the heat will come from the top).

6. The heat proof paper should always be used when using the heat press to protect the machine and your work.

7. Lower the press and wait.

8. When the press is finished, it will beep and you are able to lift up. Be careful as it is hot and wait for your paper and cork to cool before moving.

9. When you are finished with the heat press, please turn it off.


Dyed painted paper before heat pressing

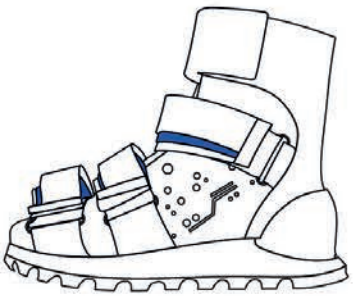

Swatches of dyed cork, to establish the correct colour


Tencel back, natural col. cork and blue col. cork


Laser cut cork

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

As the cork is thin and slightly inflexible, combined with the fact that it was given a surface colour treatment, it made most sense to use the material in a decoration function.
The patterns can be placed in any direction, as the only factor to take into consideration is, for some cork types, the repetitive pattern.
It could be interesting to further experiment with the material to determine if eligible durability for some of the more vulnerable parts of the boot could be reached.



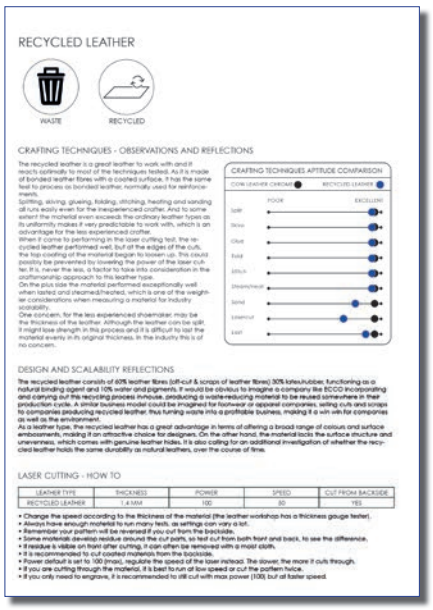
ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI*)

CORK W. TENCEL BACKING — 31
CHROME TANNED COW LEATHER — 161

*In the comparison it is attempted to measure as correctly as possible, but as the index have many different data sources with different assumptions, caution needs to be taken.

SOURCES - SIMILAR MATERIALS - LEARN MORE

https://www.onocollaborations.com/ono-creations • https://msi.higg.org/sac-materials • ECCO KUV/Publication • Dispersive dye colour archive • https://www.barktex-shop.com/en/



RECYCLED LEATHER

WASTE RECYCLED

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

The recycled leather is a great leather to work with and it reacts optimally to most of the techniques tested. As it is made of bonded leather fibres with a coated surface, it has the same feel to process as bonded leather, normally used for reinforcements.
Splitting, skiving, glueing, folding, stitching, heating and sanding all runs easily even for the inexperienced crafter. And to some extent the material even exceeds the ordinary leather types as its uniformity makes it very predictable to work with, which is an advantage for the less experienced crafter.
When it come to performing in the laser cutting test, the recycled leather performed well, but all the edges of the cuts, the top coating of the material began to loosen up. This could possibly be prevented by lowering the power of the laser cutter. It is, never the less, a factor to take into consideration in the craftmanship approach to this leather type.
On the plus side the material performed exceptionally well when lasted and steamed/heated, which is one of the weighter considerations when measuring a material for industry scalability.
One concern, for the less experienced shoemaker, may be the thickness of the leather. Although the leather can be split, it might lose strength in this process and it is difficult to last the material evenly in its original thickness. In the industry this is of no concern.

CRAFTING TECHNIQUES APTITUDE COMPARISON

COW LEATHER CHROME RECYCLED LEATHER

POOR EXCELLENT

Split
Skive
Glue
Fold
Stitch
Steam/Heat
Sand
Lasercut
Last

DESIGN AND SCALABILITY REFLECTIONS

The recycled leather consits of 60% leather fibres (off-cut & scraps of leather fibres) 30% latex/rubber, functioning as a natural binding agent and 10% water and pigments. It would be obvious to imagine a company like ECCO incorporating and carrying out this recycling process inhouse, producing a waste-reducing material to be reused somewhere in their production cycle. A similar business model could be imagined for footwear or apparel companies, selling cuts and scraps to companies producing recycled leather, thus turning waste into a profitable business, making it a win-win for companies as well as the environment.
As a leather type, the recycled leather has a great advantage in terms of altering a broad range of colours and surface embossments, making it an attractive choice for designers. On the other hand, the material lacks the surface structure and unevenness, which comes with genuine leather hides. It is also calling for an additional investigation of whether the recycled leather holds the same durability as natural leathers, over the course of time.

LASER CUTTING - HOW TO

LEATHER TYPE	THICKNESS	POWER	SPEED	CUT FROM BACKSIDE
RECYCLED LEATHER	1.4 MM	100	30	YES

- Change the speed according to the thickness of the material (the leather workshop has a thickness gauge tester).
- Always have enough material to run many tests, as settings can vary a lot.
- Remember your pattern will be reversed if you cut from the backside.
- Some materials develop residue around the cut parts, so test cut from both front and back, to see the difference.
- If residue is visible on front after cutting, it can often be removed with a moist cloth.
- It is recommended to cut coated materials from the backside.
- Power default is set to 100 (max), regulate the speed of the laser instead. The slower, the more it cuts through.
- If you are cutting through the material, it is best to run at low speed or cut the pattern twice.
- If you only need to engrave, it is recommended to still cut with max power (100) but at faster speed.

Recycled leather is available in many colours and surfaces

Back and front of leather has different colours

Recycled leather is uniform and extremely easy to skive

Close up straps and counter of finished boot

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

The recycled leather has no limitations when it comes to choosing pattern placement on boot.
In this experiment the recycled leather was used on both counter, toe and strap parts.
As it is quite thick in its original form, it was split, laid double and sewn for the strap parts and shaped and moulded for the counter and toe parts. Both toe and counter parts were reinforced with toe puff and counter material (thermoplastic stiffener) and these processes were without complications.
For this placement the material fulfils all required technical specifications to replace the original material.

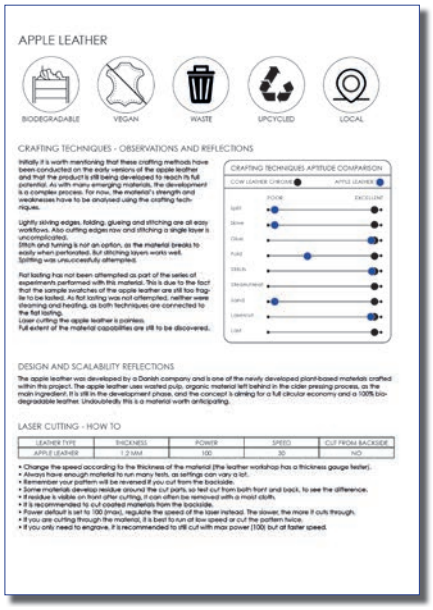
As previously described, laser cutting might cause problems as colour and patterning are a surface treatment that does not penetrate like a dyeing process would. In the experiment the laser cut made the surface treatment lift from the leather, which lead to the decision not to use the recycled leather for the laser cut parts of boot.

ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI)

Recycled Leather can unfortunately not be measured in the Higg MSI. Hopefully the company behind the development will soon submit their production data into the index, for more direct comparison.

SOURCES - SIMILAR MATERIALS - LEARN MORE

http://www.recycleather.com • ECCO IGV/Publication



APPLE LEATHER

BIODEGRADABLE VEGAN WASTE UPCYCLED LOCAL

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

Initially it is worth mentioning that these crafting methods have been conducted on the early versions of the apple leather and that the product is still being developed to reach its full potential. As with many emerging materials, the development is a complex process. For now, the material's strength and weaknesses have to be analysed using the crafting techniques.

Lightly skiving edges, folding, glueing and stitching are all easy workflows. Also cutting edges raw and stitching a single layer is uncomplicated.
Stitch and turning is not an option, as the material breaks to easily when perforated. But stitching layers work well.
Spitting was unsuccessfully attempted.

Flat lasting has not been attempted as part of the series of experiments performed with this material. This is due to the fact that the sample swatches of the apple leather are still too fragile to be lasted. As flat lasting was not attempted, neither were steaming and heating, as both techniques are connected to the flat lasting.
Laser cutting the apple leather is painless.
Full extent of the material capabilities are still to be discovered.

CRAFTING TECHNIQUES APTITUDE COMPARISON

COW LEATHER CHROME APPLE LEATHER

POOR EXCELLENT

Split
Skive
Glue
Fold
Stitch
Steam/Heat
Sand
Lasercut
Last

DESIGN AND SCALABILITY REFLECTIONS

The apple leather was developed by a Danish company and is one of the newly developed plant-based materials crafted within this project. The apple leather uses wasted pulp, organic material left behind in the cider pressing process, as the main ingredient. It is still in the development phase, and the concept is aiming for a full circular economy and a 100% biodegradable leather. Undoubtedly this is a material worth anticipating.

LASER CUTTING - HOW TO

LEATHER TYPE	THICKNESS	POWER	SPEED	CUT FROM BACKSIDE
APPLE LEATHER	1.2 MM	100	30	NO

- Change the speed according to the thickness of the material (the leather workshop has a thickness gauge tester).
- Always have enough material to run many tests, as settings can vary a lot.
- Remember your pattern will be reversed if you cut from the backside.
- Some materials develop residue around the cut parts, so test cut from both front and back, to see the difference.
- If residue is visible on front after cutting, it can often be removed with a moist cloth.
- It is recommended to cut coated materials from the backside.
- Power default is set to 100 (max), regulate the speed of the laser instead. The slower, the more it cuts through.
- If you are cutting through the material, it is best to run at low speed or cut the pattern twice.
- If you only need to engrave, it is recommended to still cut with max power (100) but at faster speed.

Decoration pattern parts for apple leather

Apple leather skived, glued, folded and sewn

Laser cut apple leather

Apple leather used for decoration

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

The apple leather, in its current form, is in some aspects fragile and lacks strength. It made most sense to use the material in a decorative function. At the same time the appearance of the material had similarities to the transparent decoration used in the original design.

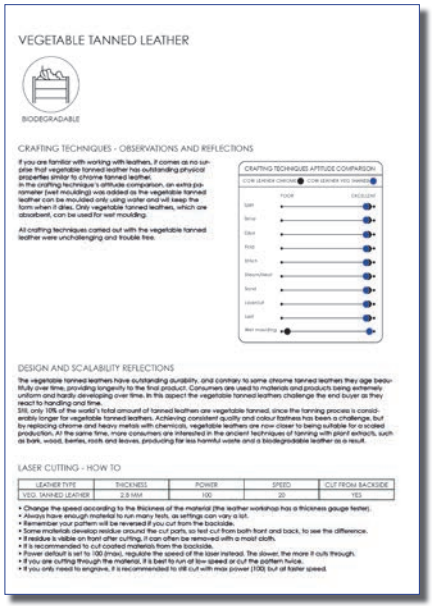
The patterns can be placed in any direction on the material.
It could be interesting to further experiment with the material to determine if eligible durability for some of the more vulnerable parts of the boot could be reached.

ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI)

Apple leather can unfortunately not be measured in the Higg MSI. Hopefully the company behind the development will soon submit their production data into the index for more direct comparison with other materials used in footwear and apparel.

SOURCES - SIMILAR MATERIALS - LEARN MORE

https://theapplegirl.org • https://msi.higg.org/sac-materials • ECCO IGV/Publication • https://www.vegeacompany.com



VEGETABLE TANNED LEATHER

BIODEGRADABLE

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

If you are familiar with working with leathers, it comes as no surprise that vegetable tanned leather has outstanding physical properties similar to chrome tanned leather.
In the crafting technique's attitude comparison, an extra parameter (wet moulding) was added as the vegetable tanned leather can be moulded only using water and will keep the form when it dries. Only vegetable tanned leathers, which are absorbent, can be used for wet moulding.

All crafting techniques carried out with the vegetable tanned leather were unchallenging and trouble free.

CRAFTING TECHNIQUES APTITUDE COMPARISON

COW LEATHER CHROME COW LEATHER VEG TANNED

POOR EXCELLENT

Split
Skive
Glue
Fold
Stitch
Steam/Heat
Sand
Lasercut
Last
Wet moulding

DESIGN AND SCALABILITY REFLECTIONS

The vegetable tanned leathers have outstanding durability, and contrary to some chrome tanned leathers they age beautifully over time, providing longevity to the final product. Consumers are used to materials and products being extremely uniform and hardly developing over time. In this aspect the vegetable tanned leathers challenge the end buyer as they react to handling and time.
Still, only 10% of the world's total amount of tanned leathers are vegetable tanned, since the tanning process is considerably longer for vegetable tanned leathers. Achieving consistent quality and colour fastness has been a challenge, but by replacing chrome and heavy metals with chemicals, vegetable leathers are now closer to being suitable for a scaled production. At the same time, more consumers are interested in the ancient techniques of tanning with plant extracts, such as bark, wood, berries, roots and leaves, producing far less harmful waste and a biodegradable leather as a result.

LASER CUTTING - HOW TO

LEATHER TYPE	THICKNESS	POWER	SPEED	CUT FROM BACKSIDE
VEG. TANNED LEATHER	2.5 MM	100	20	YES

- Change the speed according to the thickness of the material (the leather workshop has a thickness gauge tester).
- Always have enough material to run many tests, as settings can vary a lot.
- Remember your pattern will be reversed if you cut from the backside.
- Some materials develop residue around the cut parts, so test cut from both front and back, to see the difference.
- If residue is visible on front after cutting, it can often be removed with a moist cloth.
- It is recommended to cut coated materials from the backside.
- Power default is set to 100 (max), regulate the speed of the laser instead. The slower, the more it cuts through.
- If you are cutting through the material, it is best to run at low speed or cut the pattern twice.
- If you only need to engrave, it is recommended to still cut with max power (100) but at faster speed.

Uncoloured lining and blue upper vegetable leather

Lining and upper pattern parts

Testing laser cut

Uncoloured vegetable tanned lining

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

The vegetable tanned leather has no limitations when it comes to choosing pattern placement on shoe. As described, it can be wet moulded, which opens up further possibilities in the crafting process, such as moulding directly on the last, instead of ordinary lasting. This technique is interesting for the artisan or student experimenting with the possibilities of the material, still it is not an approach suitable for mass production, as it requires intensive manual labour.
In this experiment the placement of the vegetable tanned leather is outer and inner base bag of the boot with a laser cut pattern. For this placement the material fulfils all required technical specifications to replace the original material.

ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI*)

Vegetable tanned leather, perhaps because of its long history, is reputed to be an environmentally friendly alternative to chrome tanned leather. So, it might come as a surprise that the two leather types score almost identically when measured in the Higg MSI.
In all types of leather processing, it is important to point out that standardization, regulation and transparency are key factors in reducing environmental impacts. There is a huge difference in each tannery's approach to the environmental impact their product represents, and it is therefore the responsibility of the designers to be aware of these differences, in the raw material supply chain, before choosing their material.
In this experiment, vegetable tanned leather was used from two tanneries, each with a different supply of raw hides. One tannery uses only locally produced hides, which are by-products of meat production. Thereby, every single hide can be traced and marked, from farmer to finished leather.
The second tannery has achieved Gold Rating from The Leather Working Group, which assess chemical, waste, water management and safety matters relating to the tannery.
In this experiment their vegetable tanned skins are uncoloured, which could also have a positive impact on the environment, as tanning/colouring can be an environmentally burdensome part of the leather processing.
*In the comparison it is attempted to measure as correctly as possible, but as the index has many different data sources with different assumptions, caution needs to be taken.

SOURCES - SIMILAR MATERIALS - LEARN MORE

https://reconleather.com/leathers-in-the-lab/neo-nude • https://lamajogarvet.com • https://eco-age.com/news/real-leather-vs-fauxhere-what-you-need-know • https://msi.higg.org/sac-materials • https://www.goldbarkleather.com/sourceblog/the-basics-of-wet-forming-leather • ECCO IGV/Publication

VEGETABLE TANNED SALMON LEATHER

UPCYCLED LOCAL WASTE

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

Salmon leather is a beautiful material, that is fairly easy to work with, once a few precautions in the crafting methods are being followed.
The leather is thin and can be difficult to stitch using leather sewing machines, but using a thinner needle often solves the problem.
It is unfit to be split and skived, however this is not required, due to the fabric properties.
Glueing and folding are all easily done and the material responds trouble free to pleats and other folding techniques, but with the open scale structure the edges and folds tend to become uneven. Laser cutting works perfectly and makes sharp edges and patterns.
As with splitting and skiving, sanding is not recommended as the material is too thin.
What is tricky with the salmon leather is its huge variety in stiffness and softness of the individual skin, making the stretch very difficult to control. For shoemaking and flat lasting it is recommended to make a full reinforcement of the fish leather, also in the light of the material being as thin as 0.4-0.7 mm.
Contrary to what may be expected, the fish leathers are extremely strong. This is because the fibre structure of fish skin runs crosswise, rather than parallel as in cowhide. The tensile strength of fish leather reaches up to 90 Newtons.
Be aware that some fish leather types, such as wolf fish, shrinks when heated and steamed, making them unfit for some production methods like conditioning with steam.

CRAFTING TECHNIQUES APTITUDE COMPARISON

COW LEATHER CHROME — SALMON LEATHER

POOR — EXCELLENT

Split
Skive
Glue
Fold
Stitch
Moisture/Sweat
Sand
Lasting
Last

DESIGN AND SCALABILITY REFLECTIONS

More than 20 different fish species are capable of producing fish leather. Each with their own specific size, appearance and suitable properties set in relation to the design. It is therefore important to point out that this experiment is based on salmon leather, with its unique properties.
Fish skin are still a rare type of leather, and only randomly used in the footwear industry. This might be due to the fact that many fish leathers are small in size, complicating the optimal utilisation resulting in a greater amount of waste. This is a shame as the fish leathers hold a vast amount of environmental advantages and could turn an otherwise waste product into a business opportunity. It has similar appearance to exotic leathers such as snake and crocodile. Historically used in high-end products.
For educational and smaller production purposes, it is possible to do the tanning process yourself. As this was not done in this experiment, a "how to" was not developed, but can be found in the source links.

LASER CUTTING - HOW TO

LEATHER TYPE	THICKNESS	POWER	SPEED	CUT FROM BACKSIDE
SALMON LEATHER	0.7 MM	100	70	YES

• Change the speed according to the thickness of the material (the leather workshop has a thickness gauge tester).
• Always have enough material to run many tests, as settings can vary a lot.
• Remember your pattern will be reversed if you cut from the backside.
• Some materials develop residue around the cut parts, so test cut from both front and back, to see the difference.
• If residue is visible on front after cutting, it can often be removed with a moist cloth.
• It is recommended to cut coated materials from the backside.
• Power default is set to 100 (max), regulate the speed of the laser instead. The slower, the more it cuts through.
• If you are cutting through the material, it is best to run at low speed or cut the pattern twice.
• If you only need to engrave, it is recommended to still cut with max power (100), but at faster speed.

Different fish leathers — Salmon leather with cut out tongue pattern part — Laser cut salmon leather — Finished salmon leather tongue

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

The skin surfaces are often very small, hides of salmon are 60 to 65 cm. long and 8 to 12 cm. at the widest point. These proportions make it challenging to use the leathers even for small pattern pieces, as pattern pieces often are in shoe making. This calls for creativity in terms of pattern making or placement on style and often results in salmon leathers being used for smaller leather goods or in patchwork-like compositions.
Be aware that the direction of the scales further complicates the placement of the pattern parts.

For this pattern the salmon leather was used for the tongue of the boot, and the size of the fish leather was the determining factor in the placement, more than a replication of the original design.

ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI)

Fish leather can unfortunately not be measured in the Higg MSI, which is a shame as it could be very interesting to see the performance when compared to chrome tanned cow leather.
The skin of vegetable tanned salmon used in this project are sourced from salmon farms in the Nordic countries. The proliferation of fish farms has increased the availability of fish leather and the skins are derived from a waste product, making only the tanning process an additional possible emission factor.

SOURCES - SIMILAR MATERIALS - LEARN MORE

http://www.atlanticleatherlc.is • https://calvin.com/pages/special-projects • https://www.nienkehoogvliet.nl/product/fish-leather-boots/ • https://kadk.dk/sites/default/files/project-downloads/program_redigeret.pdf • https://bagsofethics.org/fibre-focus-fish-leather/ • ECCO EUV/Publication

CONIFER LEATHER + HORN OVAL RING BUCKLES

BIODEGRADABLE VEGAN ORGANIC MATTER LOCAL

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

Conifer leather:
This crafting experiment with conifer leather searched to replace EVA foam as insole material and as a volume-adding foam in the tongue part of boot. The conifer leather comes in four different versions, and the one with the most volume was selected for this project.
No aptitude comparison was made as it makes no sense to compare directly with leather as the material was not used for upper. Instead the goal was to seek an alternative to EVA foam with similar properties. The conifer leather has been developed a great deal since the first proto version of the material in terms of both colour, surfaces and thicknesses. As this experiment was conducted with the earliest of the material proto versions, and as it strived for the material to be used as an EVA foam substitute, it is worth mentioning that the newer versions of the material could easily be tested using the same parameters as genuine leather. The materials can be crafted like leather and can be sanded and treated like wood.

Horn buckles:
The original metal buckles are replaced with horn buckles. The oval rings buckles were cut from pieces (4,5 x 14,5 cm) of horn from the metal workshop. In this experiment the oval rings were cut with a 3 mm. router on a router table. The oval rings could possibly have been cut with the laser cutter, but this was not tested. Horn has the technical properties of hard wood, only more ductile, with the strength placed longitudinally.

DESIGN AND SCALABILITY REFLECTIONS

Conifer leather:
Conifer leather and foam are developed by a Danish company. The conifer tree needles are an unused natural source of fibre with potential qualities in local availability and the physical properties to compete with leather. The pine needles are bound by a natural and compostable binder, making this biotechnical composite degradable and re-castable.
It is only due to the lack of a different colour option and the shying technical properties of the conifer leather foam (soft and bouncy) that it was not used as upper. The leathers can be developed into some extremely interesting materials, and in terms of shoe making they hold great potential in replacing both upper leathers and reinforcements as foam, and thermo plastic stiffeners. As it is often discussed when focussing on shoes and sustainability, shoes are complex as they are a mix of materials and many different components. Using a biodegradable foam as conifer foam or even being able to expand the use to cover stiffeners would add to the amount of biodegradable parts in each shoe.

Horn buckles:
Like leather, horn is a bioproduct of the meat industry. In this specific experiment the horn was mostly tested due to availability. Nonetheless it is interesting to replace metal parts as metal-like brass and nickel are both production-heavy and resource-consuming materials. Instead of horn, the metal could also have been replaced with recycled plastic or another upcycled or recycled material with enough strength, to replace metal hardware.

Conifer leather and foam for insole sock — Different stages of cutting the oval ring horn buckles — Thick conifer foam — Testing the conifer foam volume inside the lining

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

Conifer leather:
In this experiment the insole sock and the tongue foam were replaced with the conifer foam.
A self-seal latex glue was used and worked fine.
The pattern parts can be placed in any direction of the conifer leather.
It could be interesting to further experiment with the material to determine if eligible durability for some of the more vulnerable parts of the boot could be reached. Moreover, it would be desirable to test the ability of the foam to regain its original shape and size when used in footwear over time.

Horn buckles:
Though seemingly more fragile than the original metal buckles, the horn replacement stood the test of being tested and steamed in a prototype facility without breaking. That being noted, they do not hold the same strength as the original oval metal rings.

ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI)

The conifer leather and horn buckles cannot be directly measured or compared in the Higg MSI due to lack of data. If compared, it would be adjacent to compare with EVA foam and iron/nickel/brass, respectively.

SOURCES - SIMILAR MATERIALS - LEARN MORE

https://www.naturalmaterialsstudio.com/work/conifer-leather.html • https://msi.higg.org/sac-materials • ECCO EUV/Publication

MYCELIUM + LIQUID NATURAL LATEX

BIODEGRADABLE VEGAN ORGANIC MATTER

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

In experimenting with the mycelium and latex, no aptitude comparison was made as it makes no sense to compare with leather as the materials replace the original TPU/rubber outer sole.
Instead the goal was to achieve an outer sole with an identical form and some of the same properties as the original outer sole. Adding the latex as a durable and resilient outer sole was also an experiment into getting the mycelium to grow into the latex to bind the materials together, which turned out to work very well.
There is an emotional aspect to growing things that should not be underestimated. One thing is crafting your material, growing it yourself adds yet a layer of attachment.

DESIGN AND SCALABILITY REFLECTIONS

Mycelium is the network of mushroom roots growing in an agricultural waste (e.g. hemp) mixture. The Mycelium acts as a natural glue that can bind a biomass together. The mycelium used in this project has cradle2cradle gold certification. In the current edition of the genuine material, the fibres used are small cut hemp fibres, but changed into long, resilient hemp fibres and inoculated with the mycelium, the durability of the grown outer sole would be many times stronger as well as adding flexibility to the construction. As the mycelium grows into and binds the biomass, it is also able to be reinforced by adding organic fibres like a wooden network structure.
The growing material developing strength without mechanical processing opens for many new design possibilities.
There is great potential in further exploring the opportunities of developing the current form of the grow material for creating shoe components as wedge heels and outer soles, all of which can be grown in customized 3D printed moulds.

Needless to say, this part of the project is in the realm of speculative design, and grown outer soles or heel are still far from what is currently used in shoe mass production. That said, the research into applications of mycelium, also in the context of 3D printing, is gaining momentum these years.

SPECIFIC FOR THIS MATERIAL - GROWING - HOW TO GROW MYCELIUM

TOOLS:
• Bowl/Container • Spoon • Flour • Scissors • Sharp object to punch holes • Ethanol • Mould (durable to be baked at 90 degrees, porcelain/silicone/plaster (brushed with shellac) or 3D printed moulds work well) • Grow material • Plastic gloves • Plastic wrap • Oven

METHOD:
1. Clean all working surfaces, tools, growing mould, hands and gloves and the exterior of the bag with ethanol.
2. Open bag with grow material with cleaned scissors.
3. Add 80 g. flour for each kg. grow material to your bowl. You can use the scales in the dye lab on the Textile floor.
4. Add the desired amount of grow material to the bowl and mix thoroughly with flour till fully dispersed.
5. If you choose to add milk paint powder, add it now (see "how to" on page 2) and mix thoroughly till fully dispersed.
6.* Fill the cleaned grow form and press the material together once in a while during the process.
7. Cover with plastic wrap and punch holes for every 3 cm. of surface.
8. Leave form to grow till fully white (approx. 5 days of 21 degrees, not in direct sunlight).
9. Leave to grow in the dark for another 2 days to achieve a soft fluffier, white surface.
10. Bake at 80 °C. for 30-60 min. depending on the size of your form (30 min. for a small form and up till min. 60 for a big).
* If you combine mycelium with a latex, please read the "how to make a natural latex outer sole" before proceeding.

NOTE: As the grow material is a fresh product (living substrate), it needs to be used within 5 days upon arrival. Keep cool and refrigerated (1-7 °C. max).

SPECIFIC FOR THIS MATERIAL - COLOURING - HOW TO USE MILK PAINT POWDER

METHOD:
Follow precise same steps as with growing the mycelium. When mixing the mycelium with the flour, add the milk paint powder and mix thoroughly. As the mixture tends to get drier when adding the milk paint powder, it is recommended to add 1/2 table spoon water per 80 g. mycelium.
Use 5% (2,5 g.) milk paint powder to 50 g. mycelium.
It is not recommended to add more than 8% milk paint powder as it disrupts the mycelium's ability to grow.

Plaster mould of outer sole — Grow material inoculated with mycelium — Mycelium swatches with added milk paint powder — Testing latex and mycelium grown into each other

Layer by layer building latex outer sole — Finished latex outer sole still in plaster mould — Final thick layer of latex before adding the mycelium — Adding grow material to latex layer in mould

Turning white after 3 days of growing in mould — Finished latex/mycelium outer sole — Finished latex/mycelium outer sole — Finished shoe with mycelium/latex outer sole

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

In this experiment the outer sole of the boot was replaced with a grown mycelium sole, combined with a natural latex.
The aim was to best duplicate the complex shape of the TPU rubber outer sole, and for this purpose the grown mycelium proved an interesting material.
The mycelium does not yet hold the strength or durability of the original TPU outer sole. Developing flexibility, water resistance and finally durability to the extent that it could be used in mass production still needs to be explored.

ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI)

The grow material/mycelium cannot be directly measured or compared in the HIGG MSI due to lack of data. If compared it would be adjacent to compare with TPU and/or rubber in this experiment.

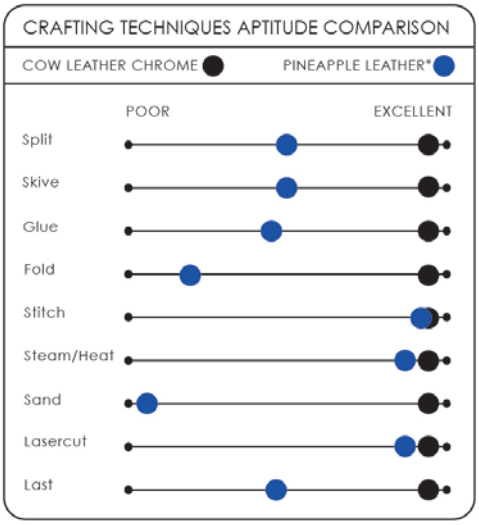
SOURCES - SIMILAR MATERIALS - LEARN MORE

https://revolveindesign.com • https://www.krown.bio • http://shoedesignerbe • http://www.modernmeadow.com • https://www.corpuscoil.com • https://grow.bio • https://s3-us-west-2.amazonaws.com/recovative-website-production/documents/Grow-It-Yourself-Instruction-Manual-v1.0.pdf • https://cornelia.myportfolio.com/tung-footwear • https://msi.higg.org/sac-materials • ECCO EUV/Publication

PINEAPPLE LEATHER*

CRAFTING TECHNIQUES - OBSERVATIONS AND REFLECTIONS

Skiving can be done, but it requires thorough adjustments of the skiving machine, and removing fibres from the backside of the material leaves it weakened. But as the material is quite thick, it is often desirable to skive edged to further craft.
Note that the material is available in two thicknesses (475 and 340 gms.) Splitting tests were conducted, but without success and cannot be recommended. For both splitting and skiving it is obvious that the more finely tuned and professional the machinery, the easier the material is to transform.
Due to the very absorbent backside, it is recommended to use self-seal latex milk (glue) instead of contact and aqua glue.
The use of aqua and contact glue can result in the material absorbing an unsuitable amount of glue, making it difficult to further process.
Folding can be complex, due to the material's thick appearance and crinkled surface, combined with the lack of skiving abilities. It is recommended to skive edges lightly, and in terms of folding it can be useful to steam iron edges to make sharp folds.
Stitching is very straightforward.
Sanding was attempted, but must also be carried out very carefully if tried.
The material does not react negatively to heating or steaming and as it has been tumbled with steam from the manufacture, you should not have any shrinkage.
In this experiment it has not been tested to steam and mould the pineapple leather directly onto a last. It would be interesting to test and to explore new fabrication processes.
As the material has a weft and warp direction, always cut in the warp direction. Furthermore, the company recommends reinforcements by doubling the material when using it for shoes and bags. Again, this holds some contradiction as the material is very thick from the start and not easily skived.
All versions of pineapple leather, (i.e. thick, thinner, metal foil coated) are easily laser cut with great results.
Flat lasting is not difficult. It only takes a bit of practice as the material's volume can be a challenge.



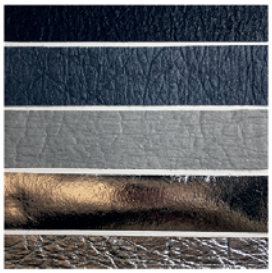
DESIGN AND SCALABILITY REFLECTIONS

*The company developing the pineapple leather does not want the material to be referred to as pineapple leather. Even so, the material is competing in the design field where leathers are often the preferred material, and the company itself refers to the material as being an alternative to leather.
Unlike many of the other plant-based leather replicas, the pineapple leather has been developed to an extent that it offers designers quite a broad product range in terms of colours, surfaces and thicknesses.
The pineapple leather has a very uniform surface that resembles fabric more than genuine leather. However, due to the coating, it is easily associated with the characteristics of leather and accessories.
The base material of pineapple leather is 100% biodegradable. Even so, it has 2 compositions, 80% pineapple leaves fibres and 20% PLA (polylactic acid) fibres and a top coating (petroleum-based resin), making it not biodegradable.
In the context of this project and for industry purposes, it would be desirable to be able to test the material in accordance with the applicable ISO standards within footwear, in order to obtain the best possible basis for data. As this is not possible, the experiments have focused on the crafting techniques.
A complete technical textile test result for the material can be found under sources.

LASER CUTTING - HOW TO

LEATHER TYPE	THICKNESS	POWER	SPEED	CUT FROM BACKSIDE
PINEAPPLE LEATHER	1 MM	100	70	YES

- Change the speed according to the thickness of the material (the leather workshop has a thickness gauge tester).
- Always have enough material to run many tests, as settings can vary a lot.
- Remember your pattern will be reversed if you cut from the backside.
- Some materials develop residue around the cut parts, so test cut from both front and back, to see the difference.
- If residue is visible on front after cutting, it can often be removed with a moist cloth.
- It is recommended to cut coated materials from the backside.
- Power default is set to 100 (max), regulate the speed of the laser instead. The slower, the more it cuts through.
- If you are cutting through the material, it is best to run at low speed or cut the pattern twice.
- If you only need to engrave, it is recommended to still cut with max power (100) but at faster speed.



Pineapple leather in different colours and foils

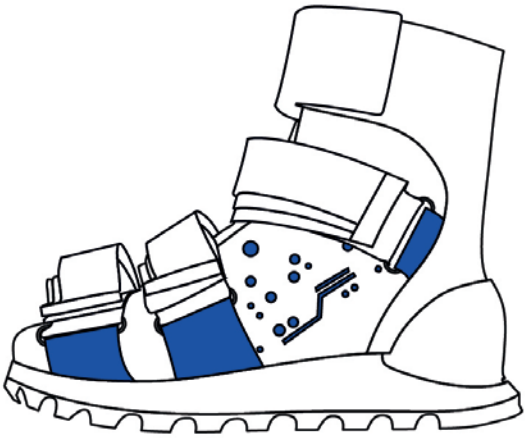
Pineapple leather cut, skived, folded, glued and sewn

Front and back of laser cut pineapple leather

Pineapple leather used as straps and underlay shadow

MATERIAL PLACEMENT ON BOOT (BLUE PARTS)

The pineapple leather is straightforward to use for all pattern parts. To some extent, folded parts, such as straps, tend to get a very bulky appearance, due to the thickness of the material, providing a "built in" reinforcement. Reinforcements by doubling the material when using it for shoes and bags is recommended.
If cut and used with raw edges, the look rapidly tends to get a work appearance, due to the fibre backside. Edges tend to flare if not folded or stitched and turned.
The metal coated versions have a cleaner cut and sharp look around the edges.
As the material has a weft and warp direction, always cut in the warp direction.
The pineapple leather has no limitations when it comes to choosing pattern placement on boot. For this specific design, it is merely a question of design choices, and in this case the straps holding the buckles and the shadow pattern of the outer base bag was the best placement.



ENVIRONMENTAL IMPACT COMPARISON (HIGG MSI*)

Pineapple leather is one of the materials in these experiments, which can be precisely measured using the Higg MSI. The company behind the material has submitted their production data, giving designers the best opportunities for measuring and comparing the material to other materials.
*In the comparison it is attempted to measure as correctly as possible, but as the index has many different data sources with different assumptions, caution needs to be taken.

SOURCES - SIMILAR MATERIALS - LEARN MORE

https://www.ananas-anam.com • https://www.ananas-anam.com/wp-content/uploads/2018/09/FULL-ISO-TESTS-PIÑATEX-ORIGINAL.pdf • https://msi.higg.org/sac-materials • ECCO KUV/Publication • http://made-from-malai.com/material-range/ • https://desserto.com.mx • https://www.bananatex.info

06 Generative Surfaces

Patrick Bomholt

Generative Surfaces and Procedual Modelling: Tools for Creators or Data Nerds?

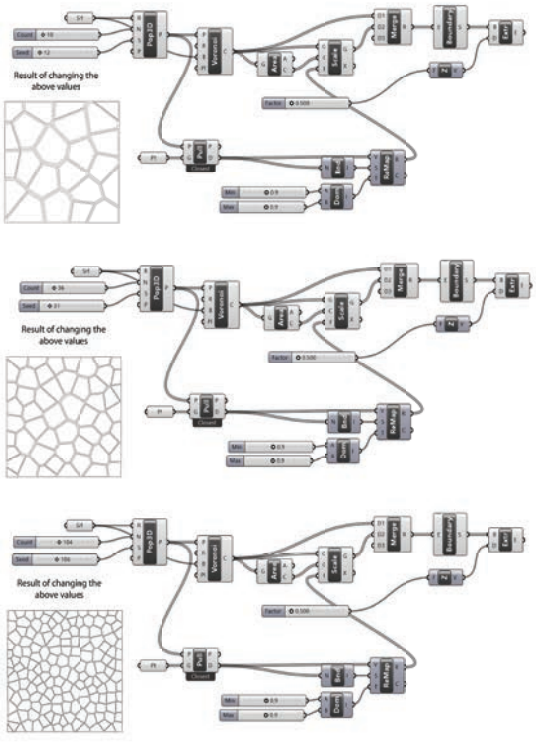
Modelling complex geometry in CAD programs can be a tricky affair. There is a lot to consider as curves, surfaces and solids blend together to create the final model, and usually it can be hard to adjust complicated surfaces or constructions after finishing commands have been made.

Contrary to traditional CAD modelling, where you start with curve geometry or solid modelling, algorithmic aided design will start off with a set of functions and algorithms, which contains specific actions and functions that twist, extrude, flow and deform points, curves and surfaces to the will of the user – but only if they manage to understand the construction principles.

The world of algorithmic aided design has been around for years, but has mostly been used by architects to change the height of a building, the number of windows, and twist of a curve and to check the amount of beams to use in a construction. However, before it became a commonly used tool in architecture, it was used by programmers and was called visual programming.

Visual programming lets users describe complex programming using visual illustrations that make it more easily approachable to others besides programmers.

In the pictured example, you can see how easily you can change a geometry, in this case a population of voronoi patterns in a boundary box. By changing the values of the count – number of cells – and the seed – variation of the pattern – you can quickly make a complicated pattern, bake it to a solid geometry that you can use in your design, or create a new version with a different look.



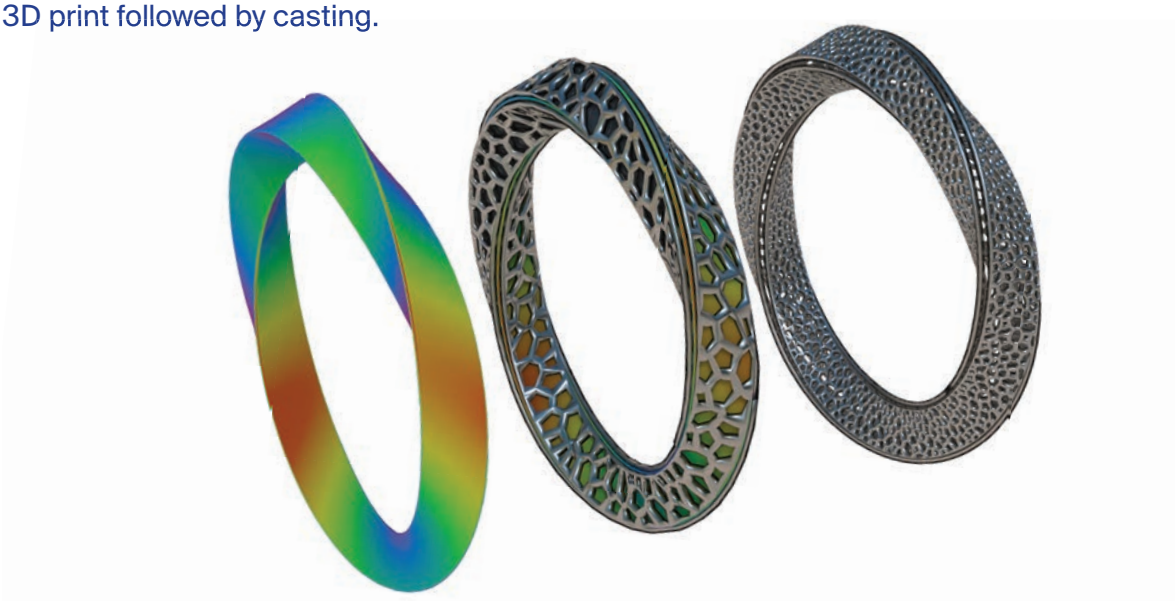
Is this a Tool for Designers?

Well, yes and no. Parametric design opens an entirely new set of possible tools and ways of designing, but the real magic comes when designers start working together with people who analyze data and are able to create custom algorithms. In many cases of professional use, the software can be used to create shock-absorbent structures and material-saving 3D printed designs. Such as the N-E-E-R-V-O-U-S Project by New Balance, where designers and engineers worked alongside data analysts to create a data-driven open-cell lattice structure that was engineered to be both light-weight and highly shock-absorbent.

In terms of mastering the program, it needs a concentrated study of the area and a deep understanding of the program to achieve useful and advanced results.

The key insight from this project came from 3rd-year BA Industrial Design student, Ludvig Samsing Wiese, who dove into the tool to create procedural jewelry meant for 3D print followed by casting.

When I first found out about Grasshopper, I quickly understood that this piece of software would be very convenient to know in the future. In my design projects, I often draw inspiration from textures, patterns, shapes, formations or even ratios taken from nature. With millions of years in the field, nature is the best designer of us all, and we should take as much inspiration from it as we can. I implemented Grasshopper in my designs to develop parametric design features that I would not be able to make without it. It could be something as intricate as a texture over millimetre-thin surface on a jewellery or a window transformation on a skyscraper. The possibilities are endless, and being able to always do small adjustments and tweaks as you go, makes the process even more intuitive.

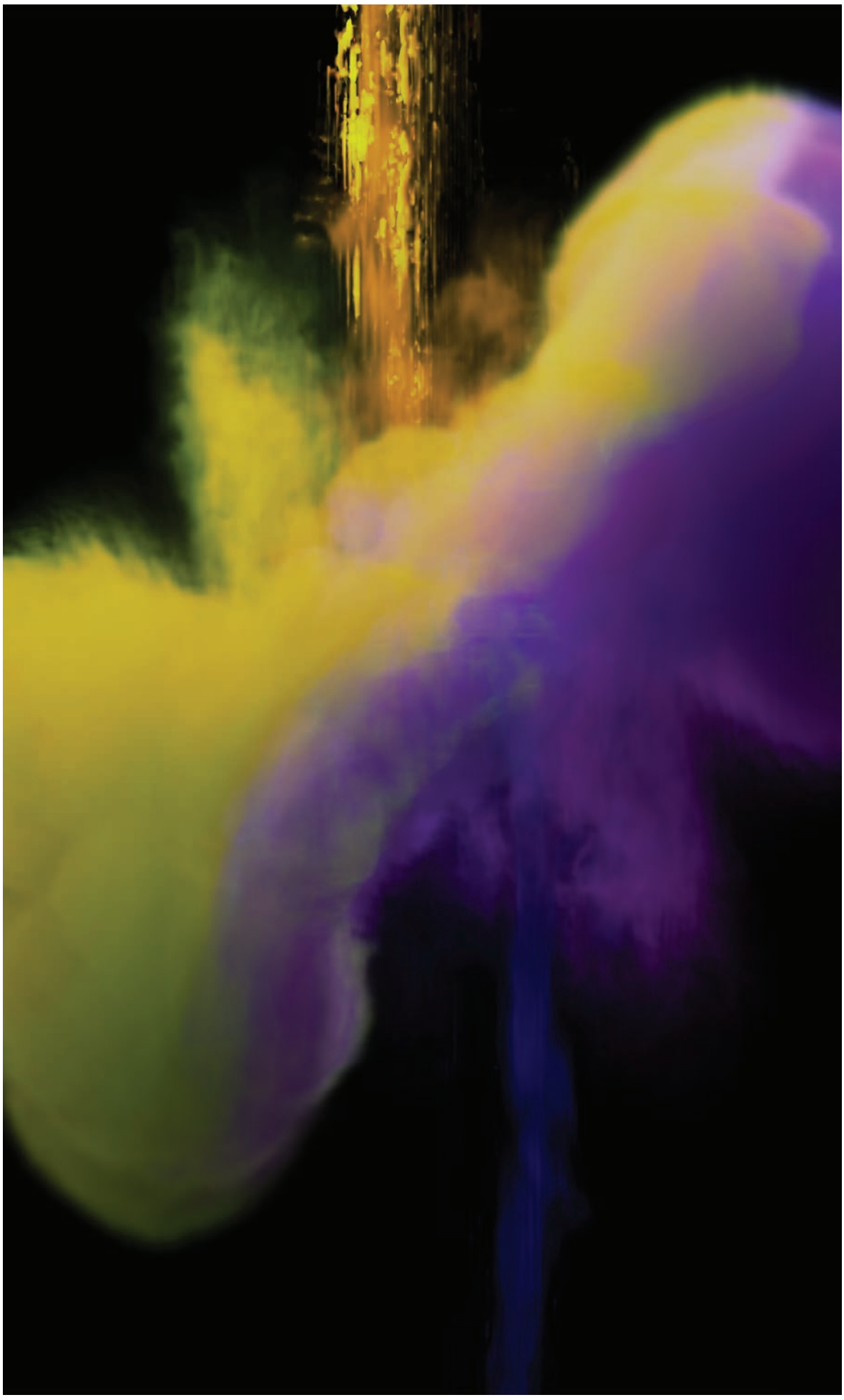


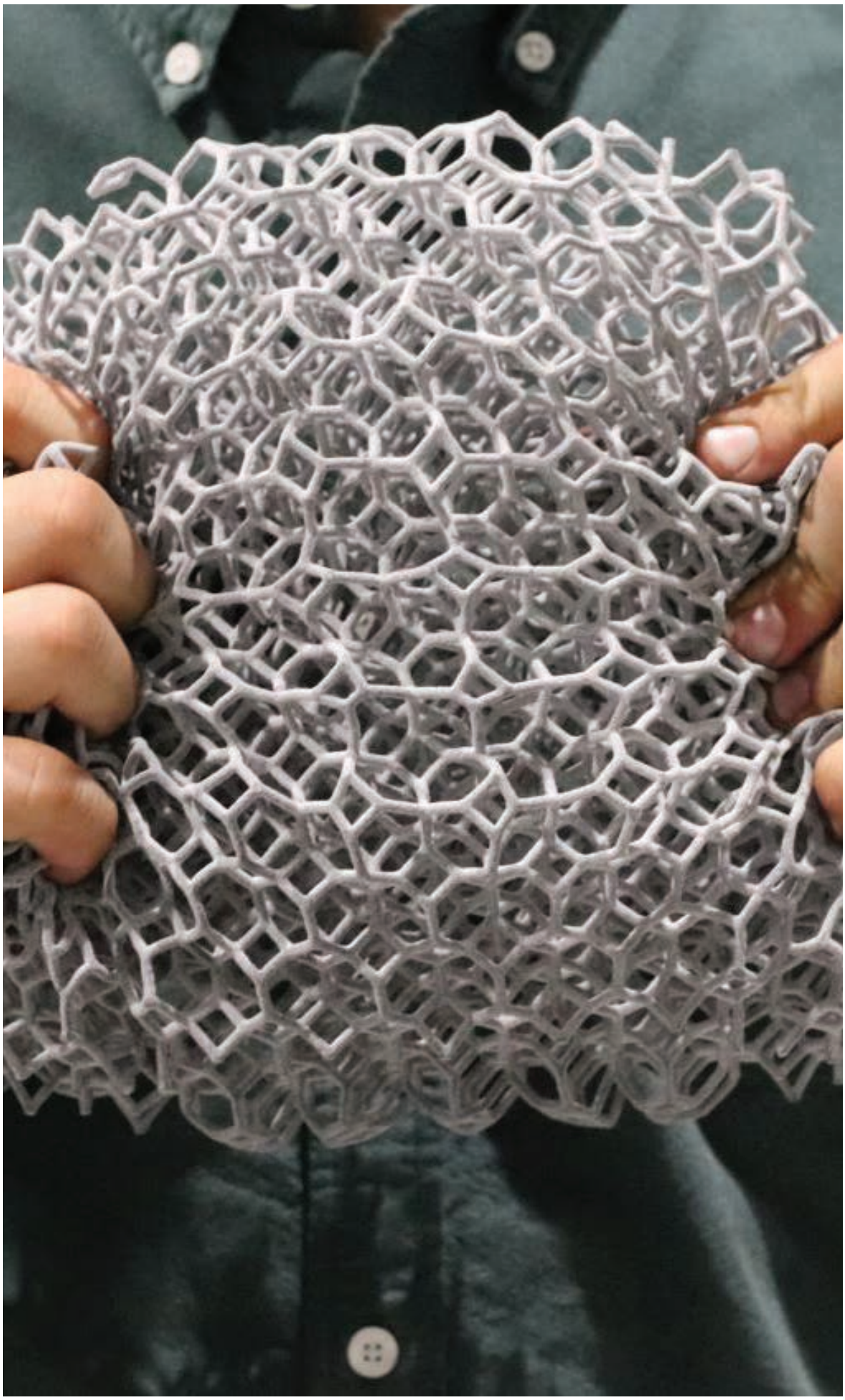
The World of Nodes and Algorithms

Grasshopper is not the only program to access the world of algorithmic modelling. A large amount of 3D programs has implemented this way of thinking and creating content. In some cases, this is called “node based modelling”, which refers to the network of nodes that contains functions that connects to each other to create results such as seen in Grasshopper.

Programs like Houdini, Blender and Unity all contain possibilities to use algorithms. In the world of CGI, this makes a world of difference in the workflow as particle simulations, fluid simulations and world building relies heavily on being able to tweak the result to perfection in an instant, instead of having to remodel or recreate the geometry from scratch.

Though the power of simulation does not always seem useful for designers, it should not be underestimated as it can create powerful visuals that can afterwards be baked into solid geometry, which we can use to 3D print or, with the right amount of preparation, cut on the CNC to create a castable mold.





Application for designers

The application of generative geometry can be widely used across design disciplines.

> Industrial designers can quickly iterate surfaces to create pattern variations on a design and extend this process to create a long line of different iterations that shows different looks and feels of the object.
>
> Accessory designers can create complex lattice structures or abstract surface variations that can be scaled up and down to make 3D printed jewelry that can be used to create molds for casting.
>
> Graphic designers can suddenly create realistic water, smoke, fire and particle simulations that can be used in visual art and VFX and CGI.

So, really, the question is not whether this is a tool for designers, but if we as designers should use this tool. And the answer is a clear 'yes'. Our craft is ever-evolving and we cannot afford to stand still when it comes to learning new tools. And though this tool might not represent handcraft in the traditional sense, it is just a matter of utilizing it and integrating it in our ever-expanding toolbox, and eventually it will help us create better designs.

It's time for designers to fully embrace the digital tools and explore possibilities that has been around for years, and not just hang on to traditions of the past, can be a limiting way of thinking and it hinders us from pushing boundaries. Digital tools are here to help and assist us in our work, and understanding the importance of technology aided aesthetics, can help designers push boundaries, in places where non digital crafts, would never be able to reach.

It's time for connect properly with the digital tools at hand.

It's time for a revolution.

07 Leather & Stripes

Maria Kirk Mikkelsen

Tell it All with Leather and Stripes

To be a Storyteller with Materials Instead of Words

An author uses language to tell stories and create moods. Similarly, a musician uses notes just as a product designer uses materials and colours to tell stories and create moods. Authors, musicians or designers all create stories from their unique material based on a desire to pass on their stories to other human beings.

When a product designer tells stories, she works with visual and tactile expressions. She considers colours and materials and carefully selects them based on what she wants to express. Already at the beginning of the design process, she has considered what she wants with her design. Is it dramatic or calm? Is it whimsical or serious? Based on these considerations, she composes colours and materials into an expression that conveys precisely this design's distinctive narrative. This procedure applies not only to the artistic, independent designer with an exclusive handmade collection. It is also applicable to the ordinary industrial designer who must design for a production company with a focus on sales and bottom line.

Over the past 10 years, a new design discipline known as CMF design has emerged. CMF design is short for colour, material and finish design. In larger companies, there are entire CMF departments that participate in strategic decision making regarding the company's product range [14]. The need for this relatively new design discipline has arisen from the knowledge that the product manufacturing in colour and material is the communicative externals or appearance of the design, which the user quickly reads and interpret. Here, the narrative of the design is manifested and the CMF design will convey not only the present design, but also the underlying brand. The brand's values and visions must, so to speak, be visible in the products' CMF strategies. Therefore, it is important to train the designer's narrative authority and ability to communicate through materials.

Narrating Materials Aesthetics

This article describes the project Narrating Material Aesthetics, which contributes to the study of the designer's narrative authority, partly through an analysis of students' work and partly through a design experiment. The project has been carried out as an artistic research project. That means it has been completed by a designer whose use of design methods and reflective practice generates new knowledge about design.

What is a narrative? We usually understand 'to narrate' as 'to tell (a story) in detail' [15]. It is a discipline that traditionally belongs to the verbal language. But the word 'narrative' is also often used in the context of design processes to describe the way the designer installs meaning in a product. A product narrative can be defined as 'the potential for a product to communicate or initiate the telling of a story' [16]. One can say that for the designer 'to narrate' means 'to shape (a story) in detail'.

What is a material? Most professions have a material with which they create. Musicians use notes to create music and scientists use data to create knowledge. Materials are 'the elements, constituents, or substances of which something is composed or can be made' [17]. In the project Narrating Material Aesthetics, materials are defined as the materials that a CMF designer works with. Specifically, in this project, it is leather.

What is aesthetics? There are various definitions of aesthetics that relate to both beauty and sensation. Mads Nygaard Folkmann argues that we can talk about aesthetics in design when design objects 'seek to appear attractive or seek to challenge our senses or understanding' [18]. In the project Narrating Material Aesthetics, the experiments are discussed based on four concrete understandings of when something appears attractive or challenges our senses by focusing on: Harmony, Trend, Sensation and Experience [19].


LARGE ELEMENTS
UNTRADITIONAL MATERIAL
COLOUR CONTRASTS
MULTIPLE MATERIALS
COMPOSITE FORM
UNTRADITIONAL MAT.
UN-PROCESSED MAT.
TRADITIONAL MATERIAL
FEW MATERIALS
SMALL ELEMENTS
MULTIPLE MATERIALS
NOT-RECOGNISABLE
COMPLEX SHAPE
COLOUR CONTRASTS
LARGE SHAPES
COMPLEX SHAPE
FEW MATERIALS
MONOCHROME
PROCESSED
FUNCTIONAL
TRADITIONAL MATERIAL
SMALLER SHAPES
SIMPLE SHAPES
SMALL ELEMENTS
HOMOGENIC FORM


COMPLEX SHAPES
MANY MATERIALS
CONTRAST IN MATERIALS
LARGE SHAPES
COMPOSITE FORM
MANY MATERIALS
LARGE SHAPES
TRADITIONAL MAT.
SIMPLE SHAPES
PROCESSED
FEWER MATERIALS
SIMPLE SHAPE
SMALLER SHAPES
MONOCHROME
HOMOGENIC FORM
NOT RECOGNISABLE
UN-PROCESSED MAT.
UNTRADITIONAL MAT.
NOT- RECOGNISABLE
MULTIPLE MATERIALS
COMPOSITE FORM
LARGE ELEMENTS
SMALL ELEMENTS
COLOUR CONTRASTS
PROCESSED
HOMOGENIC FORM
TRADITIONAL MAT.

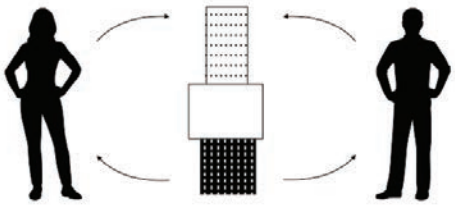
The Students Work with the Mild and the Wild

For the past ten years, Design School Kolding and the shoe brand ECCO have engaged in a strategic partnership. Every year, as part of this partnership, a student workshop is held during which, students develop concepts for shoe collections and produce prototypes for each collection. Each workshop has had a special theme. In 2013, the theme was the notion of 'wild & mild'. The incentive to work with this contrast was to use the fashion world's differentiation between Haute Couture and Pret á Porter to draw the students' attention to the difference between unique and commercial products. Students were asked to design a shoe collection in which one shoe had to be 'wild' and one shoe had to be 'mild'. 'Wild' represented Haute Couture, and here the students' design concepts or narratives could be conveyed using the most expressive means. 'Mild' was conversely representing Pret á Porter, where the essence of the design concept had to be boiled down to a minimum in a commercial shoe [20].

The project Narrating Material Aesthetics conducted a comparative analysis of the students 'wild and mild' shoes to investigate whether there are common features in the students' choices regarding form and material to create a 'wild' and a 'mild' expression, respectively. The findings are gathered in a matrix with a total of four lists. The lists are not conclusive but indicate principles that appear several times in the comparison between 'wild' and 'mild'. Common to both the 'wild' and the 'mild' shoes is that all forms of expression can be present. There are both geometric and organic shapes as well as several types of materials and colours. The differences lie in how these shapes and materials are composed. The 'wild' shoes are generally more complex with larger and more shapes, there are several and unconventional materials as well as stronger colour contrasts. In contrast, the 'mild' versions are dimmed in both form and materials, with smaller and fewer shapes and with traditional, more processed materials with fewer colour contrasts.

	WILD	MILD
Form:	Composite Large elements Complex shape	Homogenic Small elements Simple shape
Material:	Multiple materials Untraditional Colour contrasts Un-processed	Few materials Traditional Monochrome Processed

The Experiment

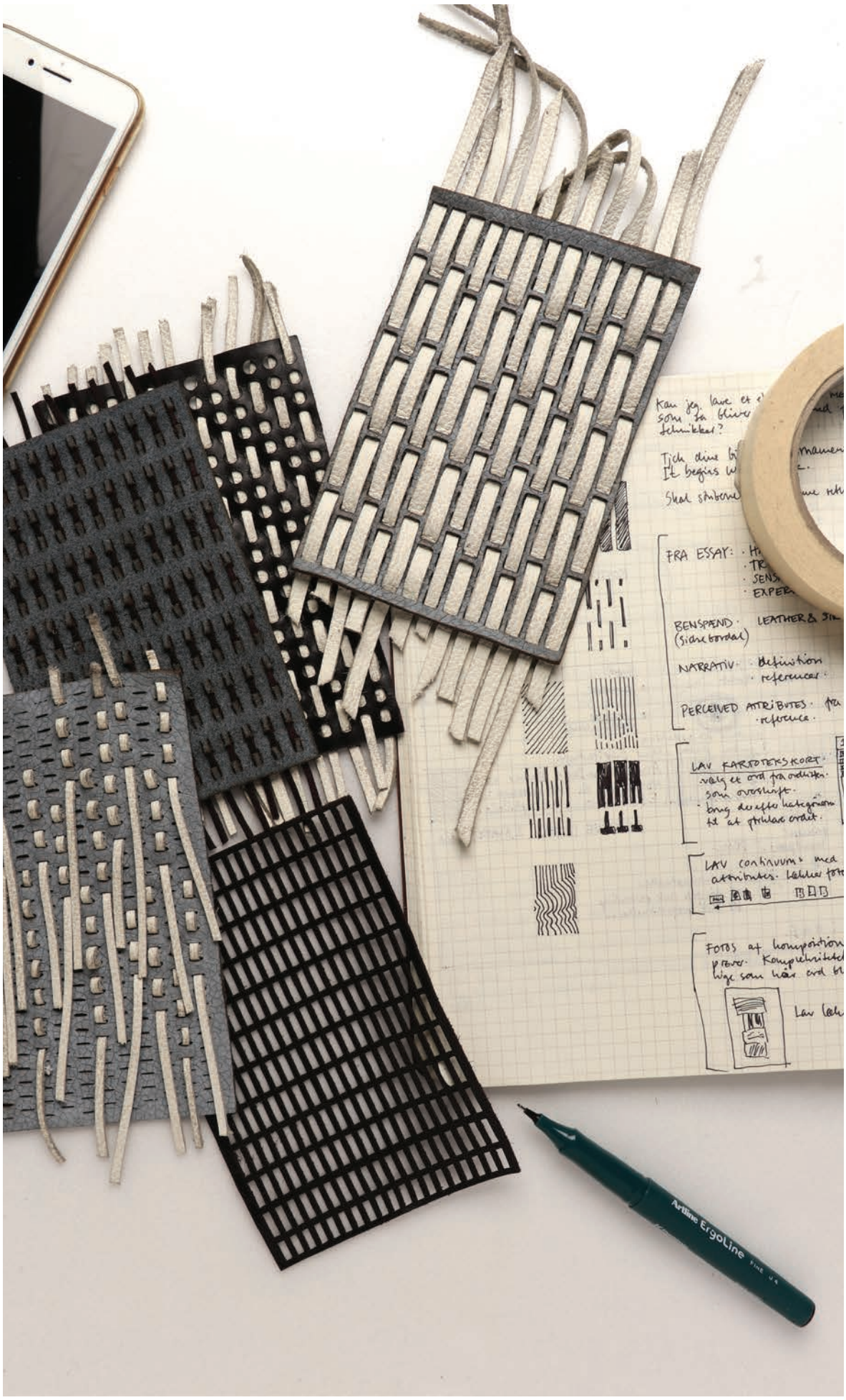


The artistic research project Narrating Material Aesthetics also includes a designerly experiment. The purpose of the experiment is to focus on how the CMF designer uses materials to create visual narratives, and whether other people read narratives according to the designer's intentions.

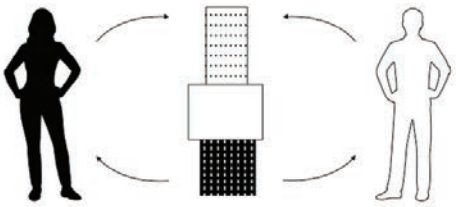
That is, does the design give the user an aesthetic experience similar to the designer's? Is there a match between the designer's narrative and his intention towards the user's perception? The illustration shows the designer on one side of his design and the user on the other. Are they experiencing the same thing?

The experiment is structured as an intermediate between a systematic and an exploratory experiment (8). Systematic is understood to mean an experiment that has both variable and constant parameters. In the experiment in Narrating Material Aesthetics, the constant parameters are the choice of leather as a consistent material, four colours, cutting and weaving as techniques as well as variations of the stripe as a visual idiom throughout. Applying constant parameters makes it easier to compare the results of the experiments. The use of the leather and the other constant parameters can also be seen as a creative constraint that forces the designer to think in new ways in terms of expressing the design narrative.

Elements of the exploratory experiment are simultaneously present in this experiment. The explorative is characterized by an open approach to the experiment that is initiated on the basis of a wonder formulated by: what if? This free approach is particularly evident in the processing of the materials, as this process is not subject to any formalised workflow but is based on the designer's own ingenuity and curiosity. The experiment consists of four phases and one conclusion.

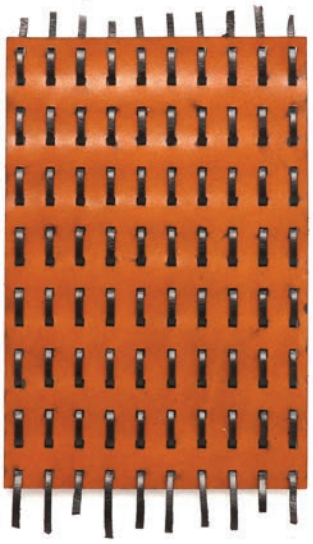

FRA ESSAY:
BENSPÆND
(sidestrikket)
NARRATIV
PERCEIVED ATTRIBUTES
Artline ErgoLine

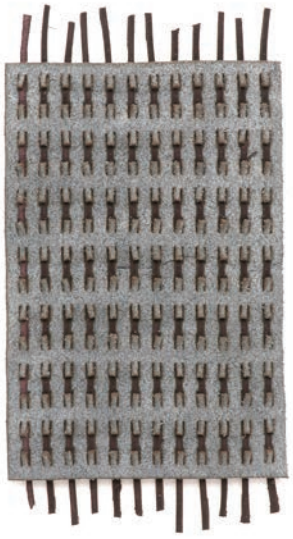
Phase 1: Narrating Material or Designing with Leather and Stripes

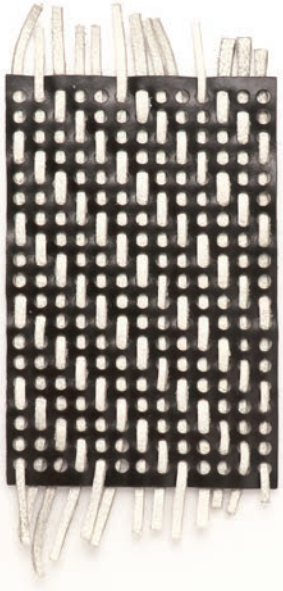


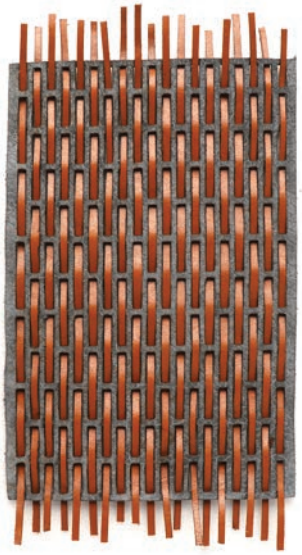
We can refer to the design process as the designer's reflective conversation with her material [22]. For this metaphor to make sense, we must understand the situation as an exchange of information between the designer and the material. This information is, respectively, the designer's processing of the material (the designer informs the material by doing something to it), and, respectively, the material that communicates back to the designer through the aesthetic expressions she has created.

This first phase of the experiment represents the designer's dialogue with the material and consists of an open approach with free, fabulating and divergent working methods. A series of twenty leather samples, with the stripe as the visual expression, are created during this phase. The designer constantly tries in different ways to create 'mild' and 'wild' expressions in the material within the limitations of the leather and stripes. The designer therefore pushes the understanding of a stripe as parallel lines with various lengths and widths to the extreme.





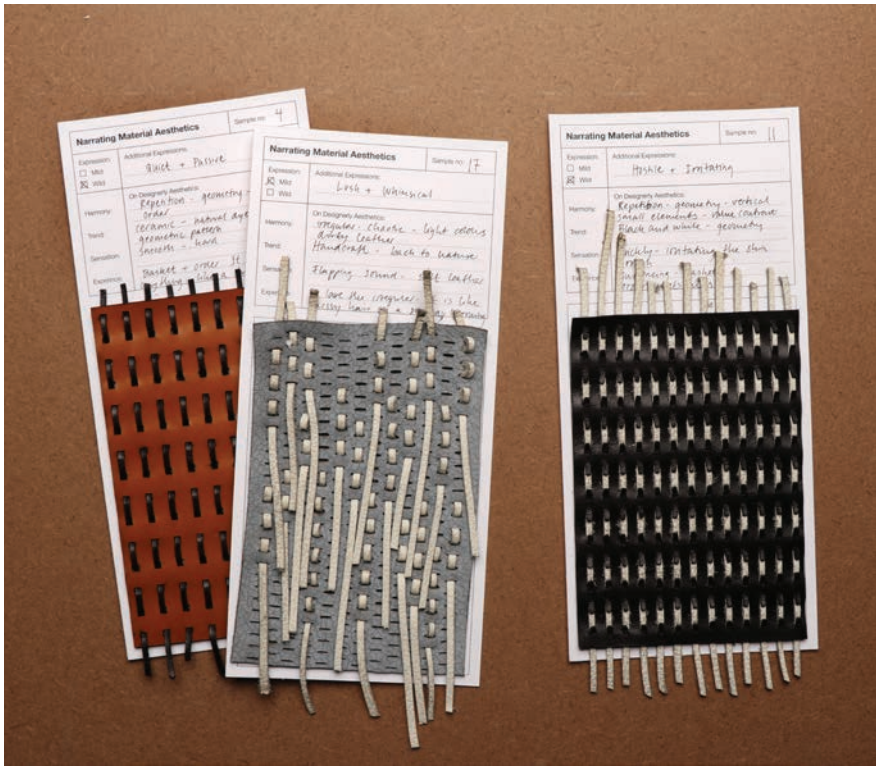




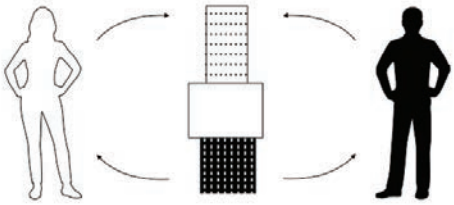
Phase 2: Analysis of Material Narration

This phase consists of an analysis of the created leather samples or material narrations. The designer steps out of the divergent state and assesses her own work. This analysis is done by filling in an index card for each material sample. The index card describes the expression of the material sample on the basis of designer aesthetics by focusing on Harmony, Trend, Sensation and Experience.

In this phase, the narrative is expanded from ‘wild’ and ‘mild’ to also including a number of additional adjectives. These are partly based on the designer’s analysis, but are at the same time an expression of subjective judgment and relate back to the considerations and choices made by the designer already in the creation of the material tests. The first two phases form a unified whole and are an interaction between creation and reading, between synthesis and analysis. This interaction takes place in the design process as a wordless or silent dialogue between the designer and the material.

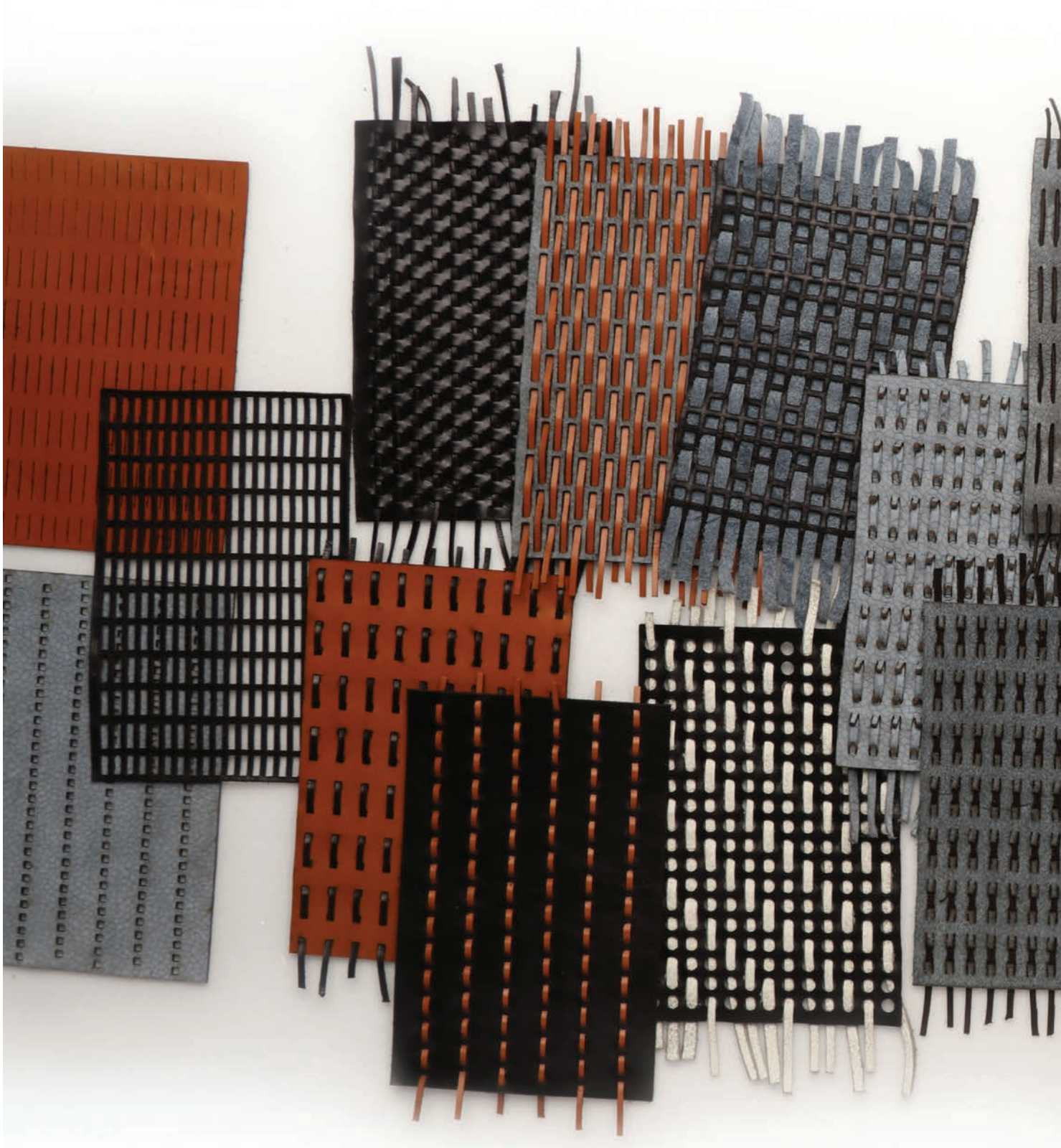


Phase 3: The User's Aesthetic Experience of Material Narration



In the previous two phases, the designer has been both creative and analytical. The designer has both created an expression and read it. But the designer creates for others and therefore, in the third phase of the experiment, focus is placed on the relationship between the design and the user. The user also engages in a dialogue with the design: The design gives the user an aesthetic experience. At the same time, the user applies the design and creates new relationships and contexts.

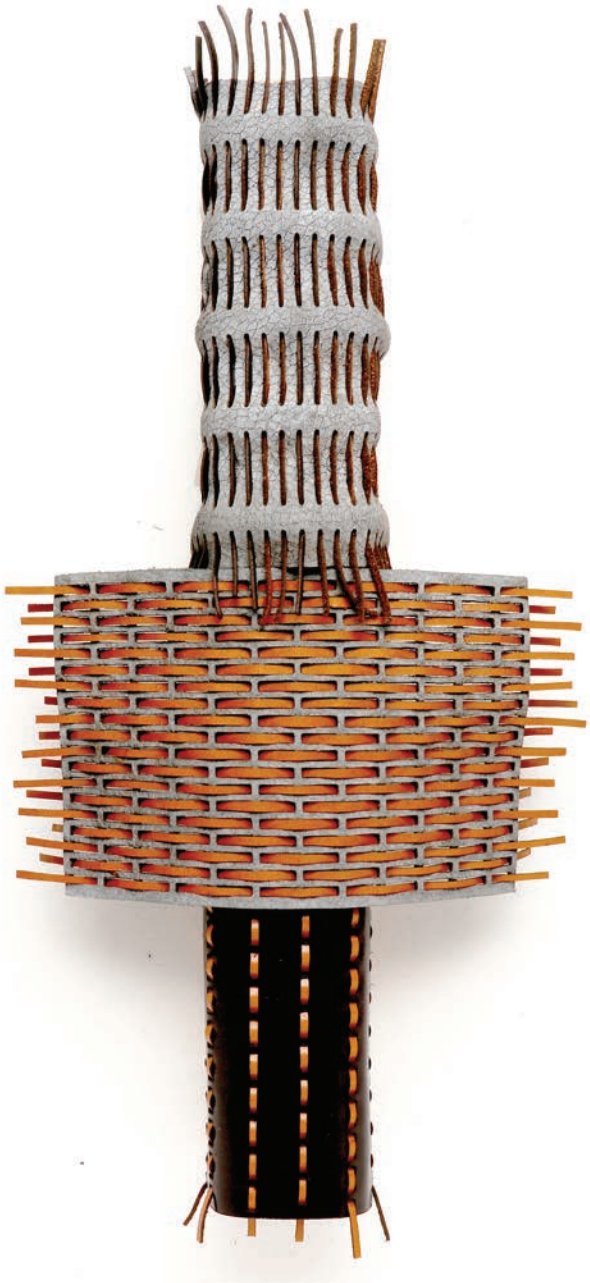
To learn whether others read the material samples the way the designer does, a number of people are asked to be test persons and as such make a spontaneous assessment of the material samples. This is done by the test person first ranking the twenty material samples on a continuum from 'mild' to 'wild'. Thus, a comparison is made between the different samples. By using comparison as a method, the notion of 'mild' and 'wild' are not experienced as absolutes but relative to each other. Subsequently, the test person pairs the material samples with expressive words from a list. These words describe the test person's aesthetic experience of the materials or how the person interprets the narrative of the materials.

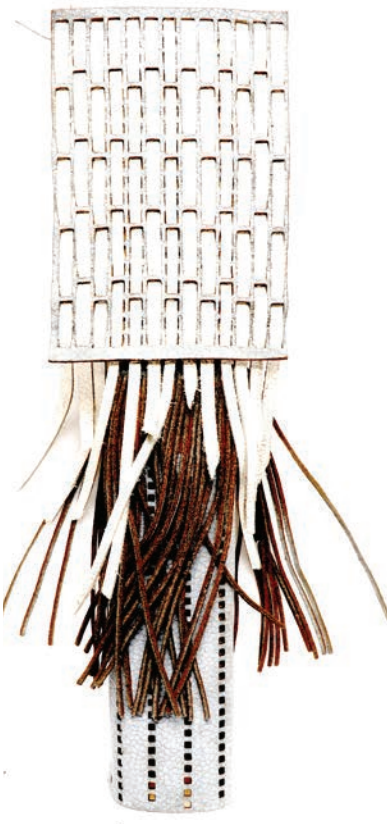


This layout is done by a test person ranking the twenty material samples on a continuum from ‘mild’ to ‘wild’

Phase 4: Material Compositions

The fourth and final phase of the experiment is, just as the first phase, a creative and exploratory phase with a free and uncritical approach. A number of compositions are created using the material samples. This increases the complexity, similar to when words are put together into sentences or when several instruments play together. The same complexity is seen when materials are combined in a finished design with form and function. Where, in the previous phases, the narrative lies in the creation of the individual material, the narrative now lies in the composition of materials. These compositions appear as visual statements that are influenced by the words they appear with.





Phase 5: Conclusions

The final part of the experiment consists of a conclusion on the different phases. Reflection on action [23] is used to formulate six insights. The first three relate to content in relation to the purpose of the experiment; the focus is on how the CMF designer uses materials to create visual narratives and whether other people read the narratives according to the designer's intentions. The next three insights relate to the methods used in the experiment.

1 There is alignment between the principles of the analysis of the students' work and the designer's way of expressing 'wild' and 'mild' in the experiment. However, the analysis shows that the principles are not conclusive but have a more general nature of guidelines.

2 There is predominantly consistency between the designer's and the test persons' interpretation of the narratives in the material samples. The continuums of 'mild' to 'wild' are very alike. The additional expressions are more ambiguous. Most times, the test persons choose words with meanings that come close to the designer's choice of words. In some cases, test person's choose words with contradictive meanings.

3 The final work with material compositions proves to be where the narrative unfolds the most. When the various material samples are put into play with each other, the complexity increases. It could be interesting to do a second roll of the phases, so that the material compositions would undergo an analysis based on the index cards and test persons' interpretations.

4 Working with constant parameters such as leather, weaving and stripe can be compared to a creative constraint, forcing the designer to create entirely new expressions. The parameters could be changed and either narrowed down or broadened. What would happen to the experiment and the narrative if it had to be expressed only in black and white or if the stripe should be a straight line? Or what would happen if more materials were included?

5 The index cards are useful for the designer to distance herself from the material samples and look more objectively at what is present. They are easy to complete; however, the collection of samples and associated index cards become very personal as it is the designer's own experience that is registered under Designerly Aesthetics. They could, with advantage, be developed and involve other approaches for examples semiotic signs.

6 In phase 3, where other people are involved, one could question the method of giving the test person a number of words to choose from. Does this affect the test person's choice? Conversely, if the person has to find words himself, will he then be limited by his own vocabulary?

Future

The work with the project Narrating Material Aesthetics lies in the intersection of a number of design research fields: storytelling, material, aesthetics and design processes. It is a complex field that calls for more and more in-depth studies. But the project invites us to consider the work on the material and the appearance of design as being more than just styling. Material experiences can be the basis for deep, sensory experiences and, like the great stories in life, they help shape our reality as the designer narrates them with careful attention.

Proposals for Next Level

When we assess and combine the output of each individual artistic research project, the full project becomes an indicator of how knowledge development on material aesthetics, digitalization and sustainability relate and could be analysed from a joint perspective in terms of reaching a 'next level'.

Designers' ability to build relatable and engaging narratives through material aesthetics is a key factor if we are to succeed in prolonging product lifetimes, optimizing usage, minimizing resource use and reducing overconsumption, and here digital means and expressions will grow in impact and blend with traditional ones. Therefore, explorations into linkages between digital means and possibilities, aesthetic narratives and sustainable strategies are relevant to pursue for the future.

In this pursuit, designers and companies have a dual responsibility: they must re-direct aesthetics from its role as a tool for promoting a buy, use and throw away culture in order to appropriate aesthetics for a buy/borrow/lend, use, love, keep or share culture. Furthermore, they must realize and address that any material decision has a potential impact on the world. Materials come with consequences, somewhere and for someone, when they are extracted, processed and transported globally.

On a practical next level, we find that establishing a materials explorations laboratory between ECCO and Design School Kolding, a kind of 'Minding Materials Space', could anchor the joint ambition within material innovation and design, which obviously exits on both sides. The space could function as a place for securing, hosting and studying material endeavours and activities and making them visible to the world online and through direct engagement.

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