Scaling Textiles
Block 4. Prototype

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Introduction

This OER aims to provide students within higher education with a better understanding of the parameters that define the experience (visual, tactile and structural) of a textile surface and how systematic changes of these parameters (3 bindings and 3 different base materials) influence the experience.
A better understanding of these parameters is important when developing textile prototypes using advanced textile technology. One thing is understanding the technology, but even more important is that the students understand the criteria they can design with. Especially when acknowledging that textile technology (also advanced textile technology) originates from craft that is industrialised. Many of the products we produce on machines today, could also be made on hand looms or even small frame looms as applied in this activity.
Consequently, this activity provides students with basic, hands-on understanding of the parameters that define a textile surface: How they can be investigated and modified in prototypes, how students can learn from prototypes and how prototypes can help them to evolve a design. This is valuable and necessary craft-based knowledge, that then can be applied in the advanced textile technology sector.

In the activity each student group will investigate following broad inquiry:

How is the experience (visual, tactile and structural) of a simple woven structure influenced when changing thread thickness and type of weave binding?

by constructing three different weaving techniques: A plain weave, a panama weave and a twill weave. Each technique will be woven with a cotton macrame cord of 4, 6 and 8 mm.

That means as a result each group will have constructed following 9 woven structures:

1. Plain weave, 4 mm (Student A)
2. Plain weave, 6 mm (Student A)
3. Plain weave, 8 mm (Student A)

4. Panama weave, 4 mm (Student B)
5. Panama weave, 6 mm (Student B)
6. Panama weave, 8 mm (Student B)
7. Twill weave, 4 mm (Student C)
8. Twill weave, 6 mm (Student C)
9. Twill weave, 8 mm (Student C)

Practical advice
We advise groups consisting of three students each.
We further recommend that one student of each group is responsible for one weaving technique and that you start with the 8 mm cord.

Example:
Group 1 consists of student A, B and C.
Student A is responsible for the production of 3 plain weaves.
"Plain weave 1" uses 8 mm cord, "plain weave 2" uses 6 mm cord and "plain weave 3" uses 4 mm cord.
Student B is responsible for the production of 3 panama weaves
"Panama weave 1" uses 8 mm cord, "panama weave 2" uses 6 mm cord and "panama weave 3" uses 4 mm cord.
Student C is responsible for the production of 3 twill weaves
"Twill weave 1" uses 8 mm cord, "twill weave 2" uses 6 mm cord and "twill weave 3" uses 4 mm cord.

Structure of the OER:
• Goals
• Background
• Terminology
• Activity

Keywords
Textiles, Weaving, Textile logics, Scaling, Architecture, Industrial Design.

Goals

The OER has a primary and a secondary goal.

Primary goal
The primary goal is to provide design disciplines with another background than textile design with knowledge and hands-on understanding of the design parameters that define a textile surface and the innovation potentials they offer within their discipline/field of application when using advanced textile technology.

Secondary goal
The secondary goal is to nurture examples: prototypes and methods that can inspire others to cross-disciplinary cooperations across textile design and architecture/industrial design.

Learning outcomes

Knowledge:
• An understanding of textile properties, techniques and logics and how the interplay of these influence the conceptualisation of and design with textiles, combining function, form and aesthetic expression
• An understanding of the potentials and limitations of weaving

Skills:
• Use concepts, procedures and methods for working design-led and practice-based with textiles through hands-on experience
• Make prototypes that are comprehensible and transparent for others, to allow them to learn from failures or to transfer knowledge from one context to another context

Competences:
• To learn how to transfer doing and thinking from one discipline to another to foster cross-disciplinary cooperation

Background:

The activity is removed from the complexity of application.

Through de-contextualisation the OER aims to provide students with a better understanding of textile techniques, their aesthetic expressions, structural properties and application possibilities.

Constructing the different weavings will demonstrate the students how:

- the binding co-defines the aesthetic expression,
- changes of thickness of the material base (cotton macrame cord) change the tactility
- and how the combination of bindings and cord thickness influences the functional properties of the construction (stretch / flexibility, density / transparency).

Example:
A plain weave is usually characterised as defined and firm , while a twill weave packs the yarns tighter, giving a more narrower construction with a diagonal stretch and a soft drape.

Terminology

Weaving
Weaving can be defined as “Two systems of yarn interlacing 90° into each other, warp yarns in length direction and weft, or filling, yarns in width way” [1, pp. 3].

Plain Weave
Plain Weave is the most simple woven construction, where weft and warp are crossing each other.

Panama
Two threads in warp are followed by two threads in werft.

Twill
Twill is a type of textile weave with a pattern of diagonal ribs.
The used example is a 2/2 (2 werfts/2warps) twill. The offset of each row forms the diagonal pattern.

Selvedge
It is a “self-finished” edge or piece of fabric which keeps it from unraveling and fraying

Textiles
As described by English architectural researcher Marc Garcia [2] the tern “textile” originates from “Latin “texere”, meaning to weave, connect and/or construct” [1, p. 6].

Textile Logics
Textile logics defines a conceptual framework concerned with the development of new structural models and concepts for architecture, learning from the use and theories of textile technology and textile techniques. Key protagonists of textile logics are Philip Beesley ; Johan Bettum; Mette Ramsgaard Thomsen; and Lars Spuybroek [3, pp. 27-28].

Draft (or binding)
Weaving techniques are represented in bindings or drafts. A weaving draft is a graphical representation how weft and warp interlace.

[1] A. Kärrmann and I. Rydin, An outline of weaving and woven fabrics. Borås, Sweden: Kompetenskompaniet, 2005.
[2] M. Garcia, “Architecture + Textiles = Architextiles,” Architectural Design, vol. 76, no. 6, pp. 5–11, 2006.
[3] A. Mody, “Textilisations of Light: Using Textile Logics to Expand the Use of LED Technology From a Technology of Display Towards a Technology of Spatial Orientation,” PhD dissertation, Danish Royal Academy of Fine Arts, School of Architecture, Copenhagen, Denmark, 2016.

Activity

How is the visual, tactile and structural experience of a simple woven structure influenced when changing thread thickness and weaving technique?

As described in the “Introduction” each group will explore above broad question by constructing three different weaving techniques: A plain weave, a panama weave and a twill weave. Each technique will be woven with a cotton macrame cord of 4, 6 and 8 mm.

The following slides work as a step by step guide through the activity.
The guide is structured into following slides:

Page 11-12: Defining weaving and plain weave, panama weave and twill weave
Slide 9 and 10 define weaving and the three weaving techniques: Plain weave, panama weave and twill weave by providing a 1-sentence-definition, a graphical representation and a picture of the woven structure.

Page 13-14 : Preparation
Similar to a cooking recipe, slide 11 and 12 deal with preparation.
Slide 11 provides a list of materials and tools, while slide 12 specifies the preparations of the frames.
You have to prepare 3 frames in total: One frame per weaving, which is used three times: for a 4 mm binding, 6 mm binding, 8 mmm binding.

Page 14-19: Design
Slide 13 -18 deal give step by step instructions for the design phase, the making of the 9 weavings.
Each weaving is described by 2 slides, framing the procedure and outcome through text descriptions, process images and images of the outcome.

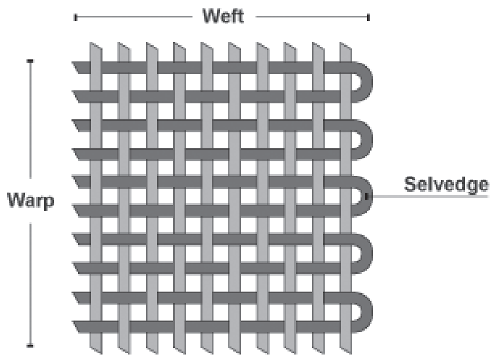
Page 20: Reflection and presentation
While the previous slides gave a step by step introduction to how to produce the 9 weavings, this slide
provides guidance how to analyse, reflect and discuss your prototypes.

Page 21: Conclusions
This slide summarizes what the students learned through this activity.

Page 22+: Future perspectives - potential contexts of application
The last slides provide inspiration on how this activity could be further investigated in different contexts of application.

1. Activity
Defining Weaving and plain weave, panama weave and twill weave

As introduced in the previous overview this slide and the next slide define weaving and the three weaving techniques you will construct: Plain weave, panama weave and twill weave.



Weaving can be defined as “Two systems of yarn interlacing 90° into each other, warp yarns in length direction and weft, or filling, yarns in width way” [1, pp. 3]

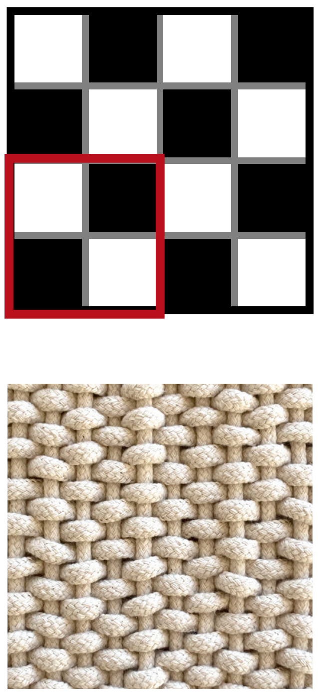
[1] A. Kärrmann and I. Rydin, An outline of weaving and woven fabrics. Borås, Sweden: Kompetenskompaniet, 2005.

Weaving techniques are represented in bindings or drafts. A weaving draft is a graphical representation on how warp and weft interlace.

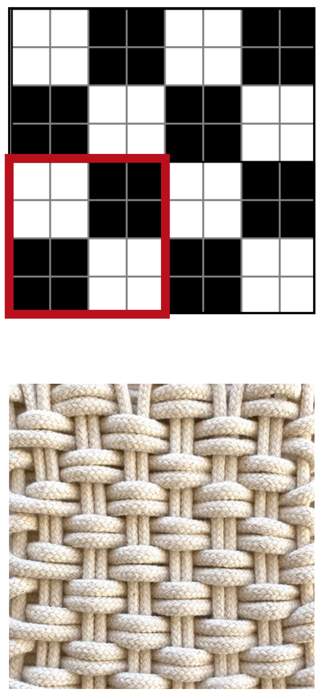
Below graphical respresentations of plain weave, panama and twill are shown: Outlined in red the draft is narrowed down to one repeat. Each square represents how a warp and werft thread interlace. Black means that a warp thread is lifting, while white means that warp thread is lowered and weft thread is above.

As described in the paragraph “Terminology” plain weave is the most simple woven construction, where weft and warp are crossing each other, while in panama weave two threads in warp are followed by two threads in weft. Twill is a type of textile weave with a pattern of diagonal ribs. The used example is a twill weave 2/2, where 2 werfts are followed by two warps. The offset of each row forms the diagonal pattern.

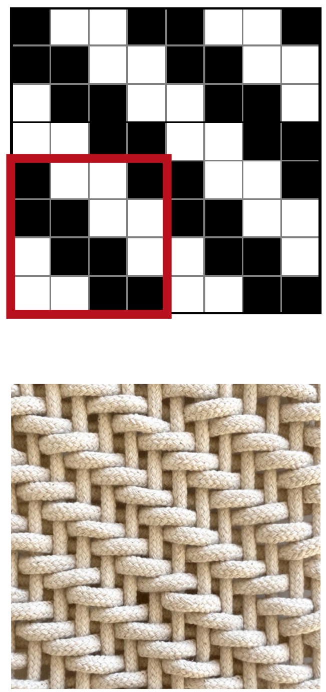
Plain weave 1/1



Panama 2/2



Hopsack 2/2



Activity
Materials, tools and preperation

Like in a cooking recipe this slide and the following first present a list of materials and tools, and then specify how you prepare the necessary frames, before you can start the activity.

You have to prepare 3 frames with different distances in between the nails.
On each frame the same cotton macrame cord (4, 6 or 8 mm) is used to contruct the three weaving techniques.

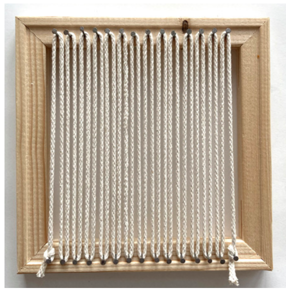
List of parts:

- Three frames, 20 x 20 cm
- cotton macrame: 4, 6 and 8 mm.
- a hammer
- a scissor
- nails in three sizes
- a pencil
- a ruler

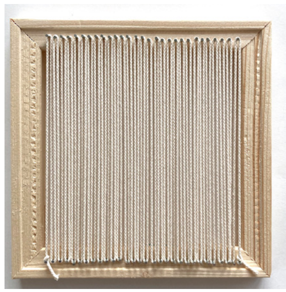
Preperation of frames

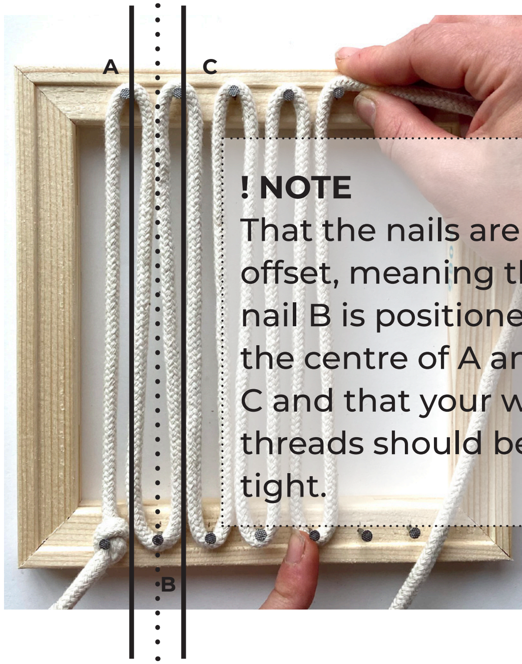
6 mm thread -2 cm distance between warp threads

4 mm thread - 1 cm distance between warp threads



2mm thread - 0,5 cm distance between warp threads



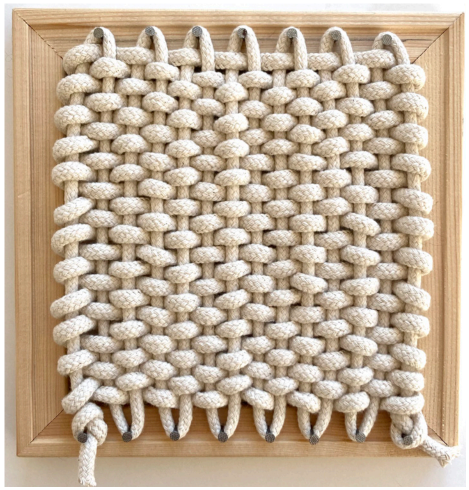


! NOTE
That the nails are offset, meaning that nail B is positioned in the centre of A and C and that your warp threads should be tight.

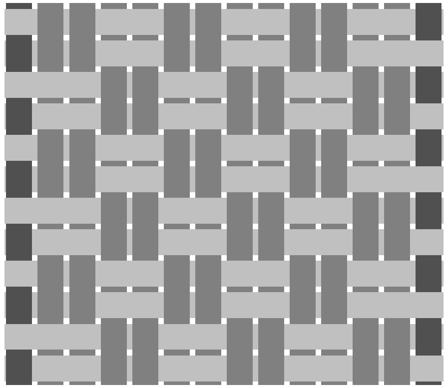
! NOTE
Do not worry about length, as you just can continue with a new thread (as shown above).

Result

Plain Weave. From left to right: 4-6-8 mm thread

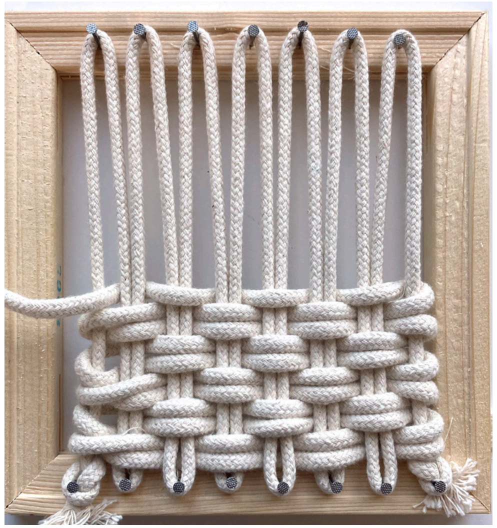


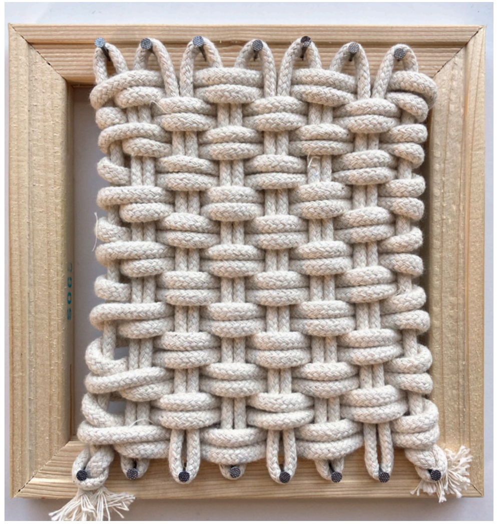
2. Activity
Design Phase: Panama weave



Procedure
Construct your panama weave. Following the draft according to the images below, showing a panama weave with the 6 mm thread. Groups of warp and weft threads are interlaced so that they form a simple criss-cross pattern. Each group of weft threads crosses an equal number of warp threads by going over one group, then under the next, and so on.
Start with 8 mm, then use 6 mm thread and finally 4 mm.

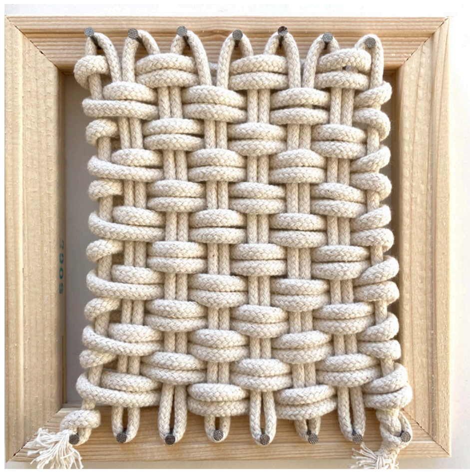
Note how a selvedge is constructed in left and right side (dark grey warp threads).



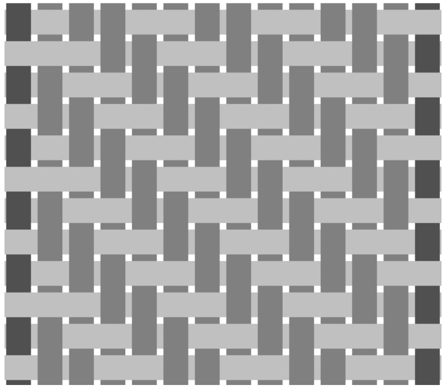


Result

Panama Weave. From left to right: 4-6-8 mm thread

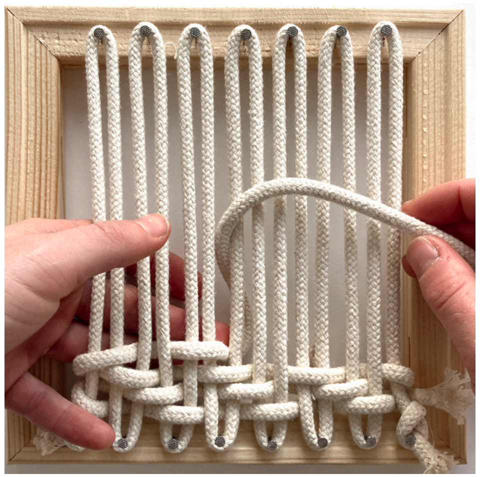


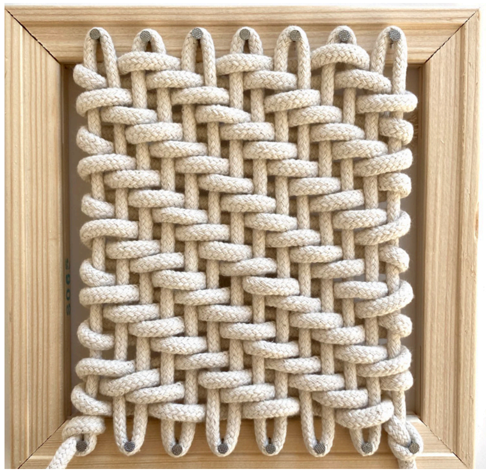
3. Activity
Design Phase: Twill weave



Procedure
Construct your twill weave. Follow the draft according to the images below, showing a twill weave with the 6 mm thread. A twill weave can be identified by its diagonal lines. This is a 2/2 twill, with two warp threads crossing every two weft threads. The offset at each row forms the diagonal pattern.
Start with 8 mm, then use 6 mm thread and finally 4 mm.

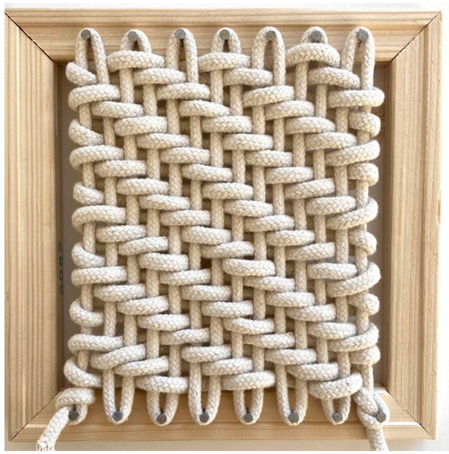
Note how a selvedge is constructed in left and right side (d. grey warp threads)





Result

Twill Weave. From left to right: 4-6-8 mm thread



4. Activity
Reflection and presentation

While the previous slides gave a step by step introduction to how to produce the 9 weavings, this slide provides guidance how to analyse, reflect and discuss your prototypes

Reflection

Please consider

- Visual experience of the surface experience
    - Open/closeness
    - Density/transparency
    - Thickness
    - Visual qualities and associations
- Tactility of the surface experience
    - Soft/hard
    - Strong/fragile
    - Tactile qualities and associations
- The structural qualities and properties of the surface
    - Strength
    - Flexiblility
    - Elasticity
    - Durability

Presentation

Plenum presentation and feedback

We advise:

* 5-10 min. per group, incl. feedback with group A giving feedback to B etc.

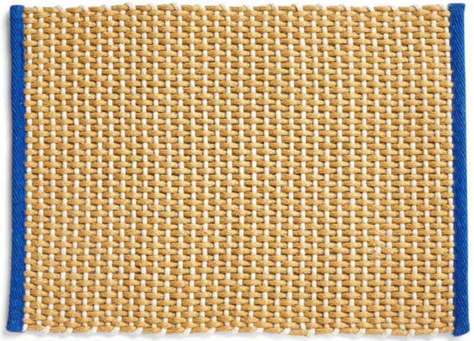
Conclusion

The key result of this OER is that students gain a better understanding of the parameters that define the experience of a textile surface and how systematic changes of these parameters influence the experience.

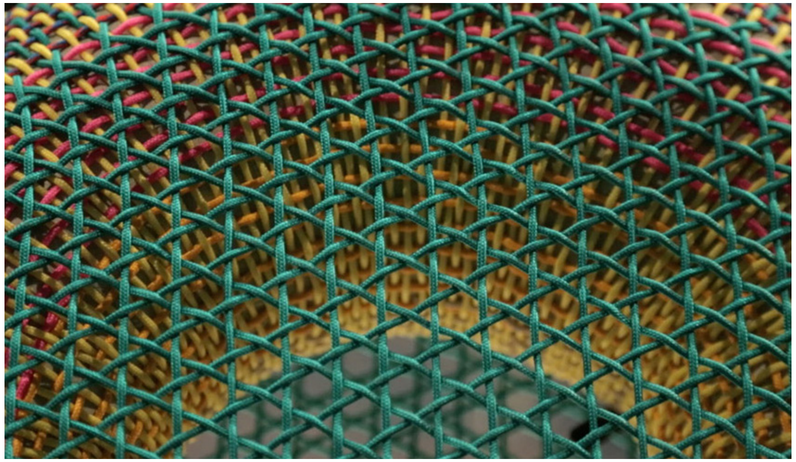
Concretely, the activity provides students with a basic, hands-on understanding of these parameters: How they can be investigated and modified in prototypes, how students can learn from prototypes and how prototypes can help them to evolve a design.
This is valuable and necessary craft-based knowledge, that then can be applied in the advanced textile technology sector.

As the activity is removed from the complexity of application, to allow a focus on “what defines a textile surface/ a design”, the following slides show how learnings from the activity can be further developed within different fields of application.

Activity
Future perspectives: Potential contexts of application
Product design



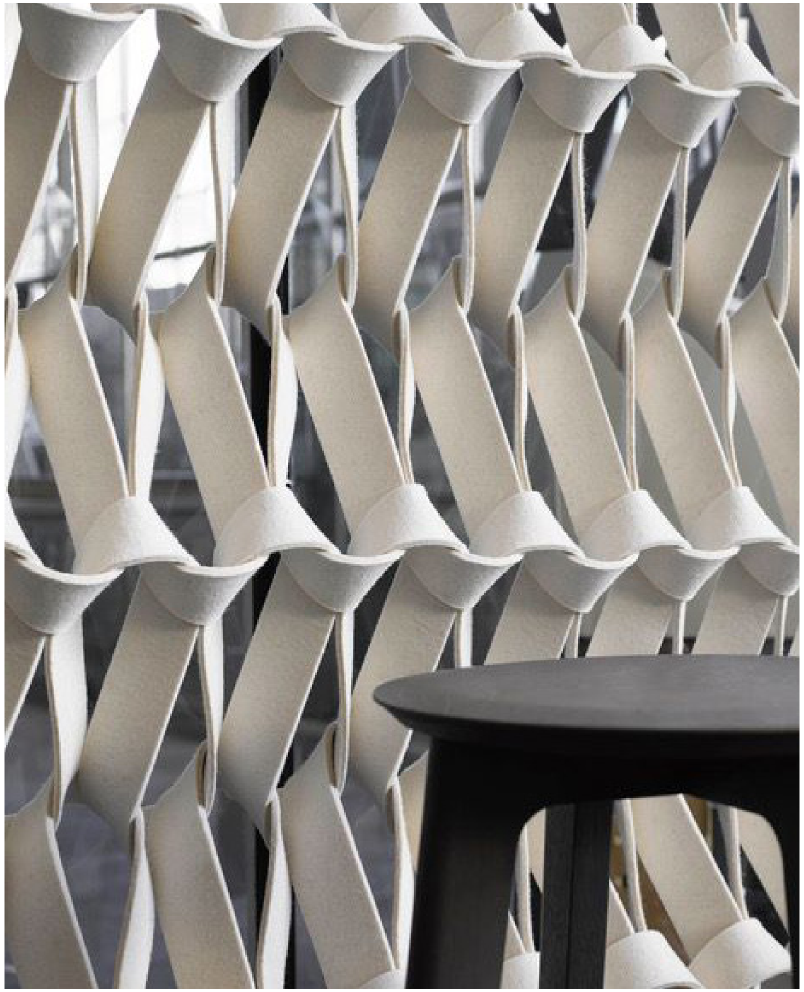
Activity
Future perspectives: Potential contexts of application
Furniture design



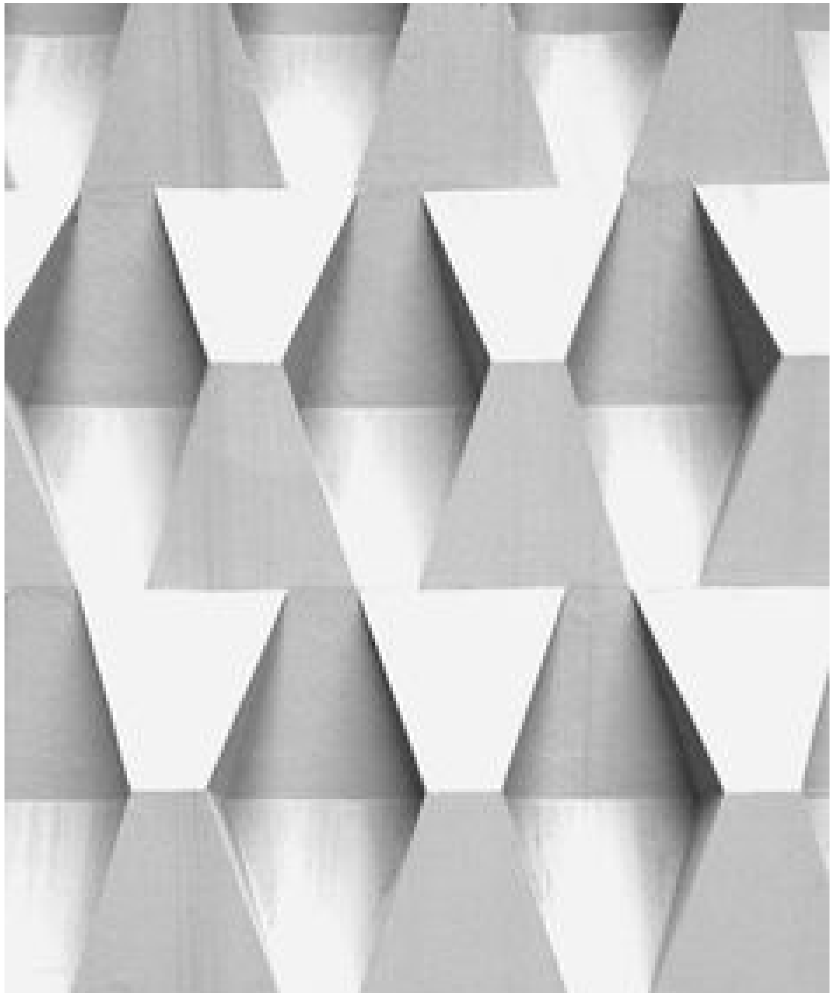
Bertjan Pot weaves shoelaces around inner tubes to create inflatable seats for Nike

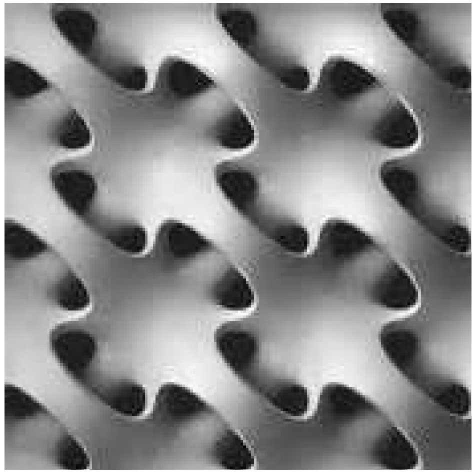
Activity
Future perspectives: Potential contexts of application
Textile space dividers





Activity
Future perspectives: Potential contexts of application
Architectural facades



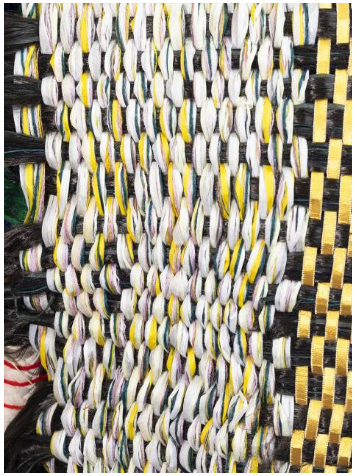
Activity

Future perspectives: Potential contexts of application

Spatial constructions (architecture)

Activity
Future perspectives: Potential contexts of application
Spatial constructions (art)



Hella Jungerius, Interlace (La Fayette 2019)

Visit http://destexproject.eu/ to see the rest of the intellectual outputs of the project

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