VERA BAERVELDT
RESEARCH EXPERIMENTS

2023
EXPLORELAB
GRADUATION

RESEARCH TUTOR:
WING YUNG
TU DELFT

APPENDIX

POINTS OF ARRIVAL

APPENDIX FOR POINTS OF ARRIVAL

THE DOCUMENTED EXPERIMENTS DURING THE EXPLORATION ON HOW TO USE NON-MATERIAL OWN COLOUR IN EXTERIOR ARCHITECTURE

Delft University of Technology
Department of Architecture
MSc. Architecture, Urbanism and Building Sciences

Explore Lab Graduation Studio
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Research experiments - appendix

Student
Vera Baerveldt
4547950

Design Mentor
Peter Koorstra

Research Mentor
Wing Yung

Building Technology Mentor
Matthijs Klooster

APPENDIX

POINTS OF ARRIVAL

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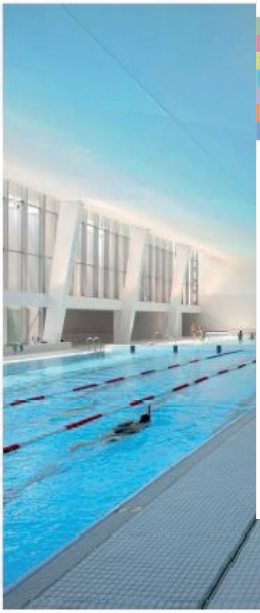


Project Location Year Architect Mater

Swimming Pool - Paris, France - 2014 - Dominique Coulon & Associé

Colouring the tribune space on the right blue shine's a blue light reflection above the swimming pool. The subtleness of the blue reflection is an inspi the colour blue feels very obvious as well.

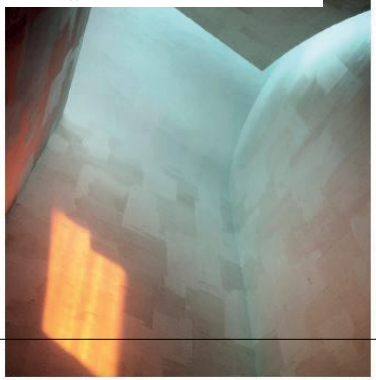
Interesting/inspiration: subtle reflection. Why not as desired: symbolism i

Project Location Year Architect Material of colour

Museum Brandhorst - Munich, Germany - 2009 - Sauerbruch + Hutton - Ceramic

Many coloured ceramic elements are placed with spaces in between them onto the facade. Like the principle of pointillism, the elements all together form a new coloured surface. One that fits well into the colours of the city, because of using many colours, but non of them being too confronting.

Interesting/inspiration: pointilism effect and material. Why not as desired: .



Project Location Year Architect Material of colour

St Ignatiuschapel - Seattle, US - 1997 - Steven Holl - coloured translucent panels

In this building, colour is perceivable without seeing the actual coloured surface. By letting light shine onto the coloured surface and reflect onto the more natural coloured surface, it leaves a subtle, coloured glow that one can perceive in their own way. This is the effect this research is aiming to find, but then possibly in a less 'built up' way.

Interesting/inspiration: the provided perceptive freedom. Why not as desired: too complicated.

1. PROJECT ANALYSIS

See booklet for full analysis

photo or render of project

colour coding of categories

facts on the project

a description on how the colour is applied in the project

pin point of what in the use of colour works positively or negatively for a versatile experience of the building

50 projects have been analysed like this

topics not to focus on

EXTERIOR

theme
level of public confrontation of architecture
oriented on context

exploration
using colour while being less confronting than James Turrell
both using colour and matching the surrounding

project

BIG SCALE TYPOLOGIES

theme
materials suited for big scale production

exploration
tiles, panels, sticks, fabrics?

project


INTEGRATED IN BUILDING DESIGN

theme
facade design
relation of colour and facade
relation of colour and material

exploration
the composition of elements forming facades
the kind and size of the colour(ed elements)
the composition, transparancy, kind of colours

project


CONNECTED WITH CONTEXT

theme
scale of colour to context
colour match surrounding

exploration
how schould the size of coloured elements relate to the context?
what colours match the city? how are these retrieved?

project

topics to focus on

INTERIOR

theory
psychological effect of colours in living spaces
healthcare effects of colour
functionality of colour as safety matter
functionality of colour as space transformer

example
blue causing calmness, red causing aggressiveness
green causing quicker recovery
yellow and black representing warning signs
coloured walls making the space perceived differently

project

SMALL SCALE TYPOLOGIES

theory
coloured houses

example
plaster + paint, bricks + paint, wood +paint

project


ADDED AS SEPARATE ELEMENTS

theory
influencial elements in surrounding
advertising strategies
accents for elements

example
no added colour needed because of the people that add colour
colours showing what is being sold inside
focus on the structure or shape of the space

project

CONNECTED WITH FUNCTION

theory
symbolism
contrasting to surrounding

example
colours as symbol what takes place inside
using screaming colours to require attention

project

2. RESEARCH FRAMEWORK

An overview on what kind of topics are there in the field of colour and architecture to acknowledge them, and what topics to focus on in this research; defining the scope of this research.

topics not to focus on

topics to focus on

WESTERN EUROPEAN CULTURE

theme
- materials suited for western european weather
- colours matching the light conditions of NL/GER

exploration
- *materials that withstand rain and wind*
- *colours chosen based on mostly white and/or blue light.*

project

SOUTHERN OR SCANDINAVIAN CULTURES

theory
- colours embedded in the culture
- colour as part of the traditiondal industries
- weather adjusted colours

example
- *bright colours in for example african culture or other warm cultures*
- *falunröd won from waste ore, used as traditional colour in scandinavia*
- *using blue against insects, using light colours to cool down*

project

APPLIED COLOUR

theme
- colour integrated in material
- colour applied on material
- transparency of colour

exploration
- *how to mix colour into the material*
- *how to add colour on top op de material*
- *the effect of more or less transparency of colour*

project


NATURAL COLOURS OF MATERIALS

theory
- materials have their natural colours
- constrasting the natural colours

example
- *different shades of bricks, gray concrete, wood, etc.*
- *combining gray concrete with brown wood*

project


AT GLANCE VISIBILITY

theme
- colour visible in facade surface

exploration
- *making the colour visible in the straight plain surface*

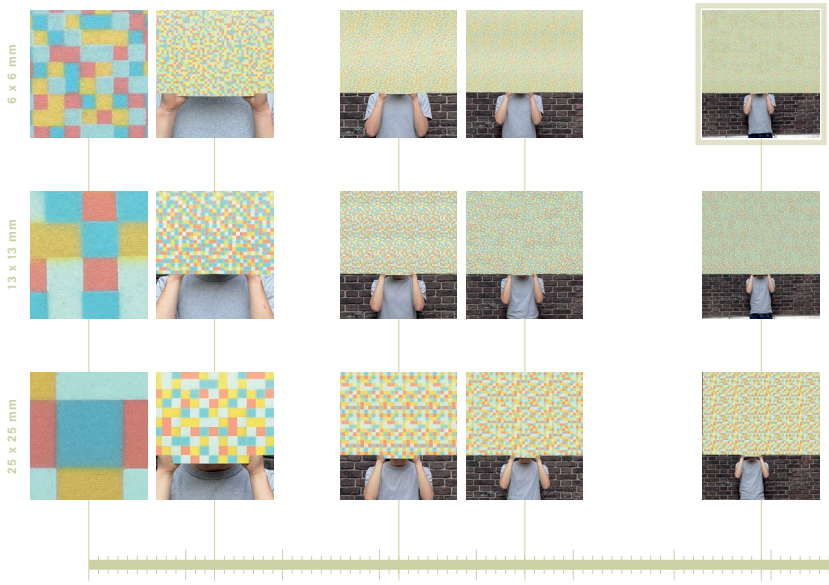
project


OPTIC METHODS

theory
- around the corner
- reflection of coloured light

example
- *from straight the surface seems white, until you move around it*
- *light shining on coloured surface, reflecting colour*

project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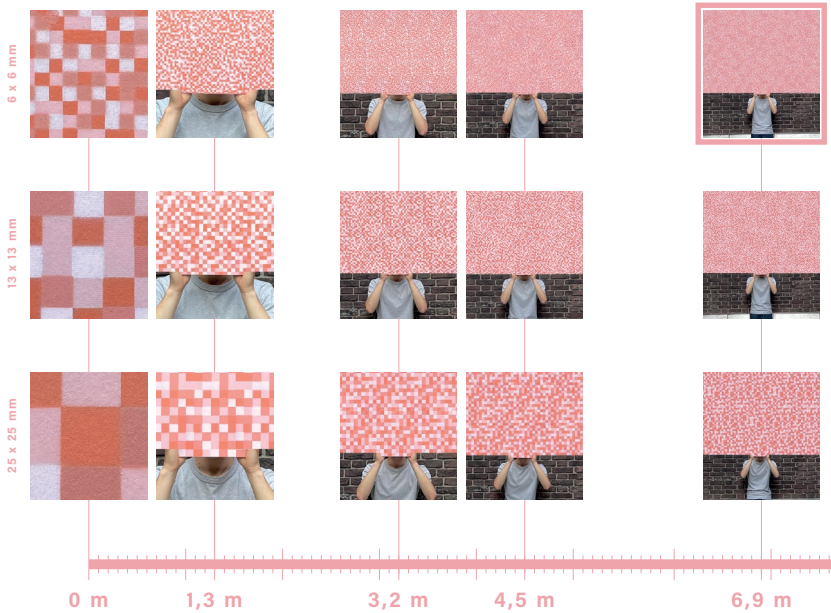
13 x 13 mm
25 x 25 mm
0 m
1,3 m
3,2 m
4,5 m
6,9 m

a

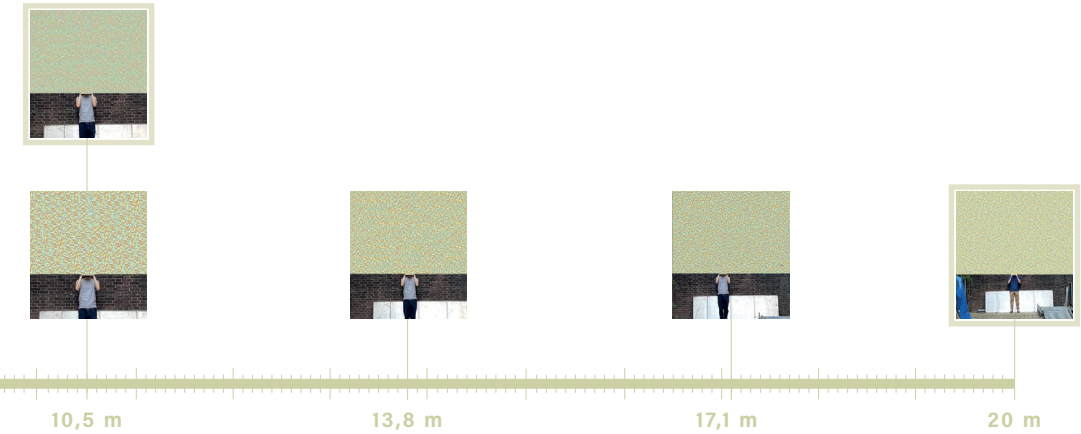

6 x 6 mm
13 x 13 mm
25 x 25 mm
0 m
1,3 m
3,2 m
4,5 m
6,9 m

b

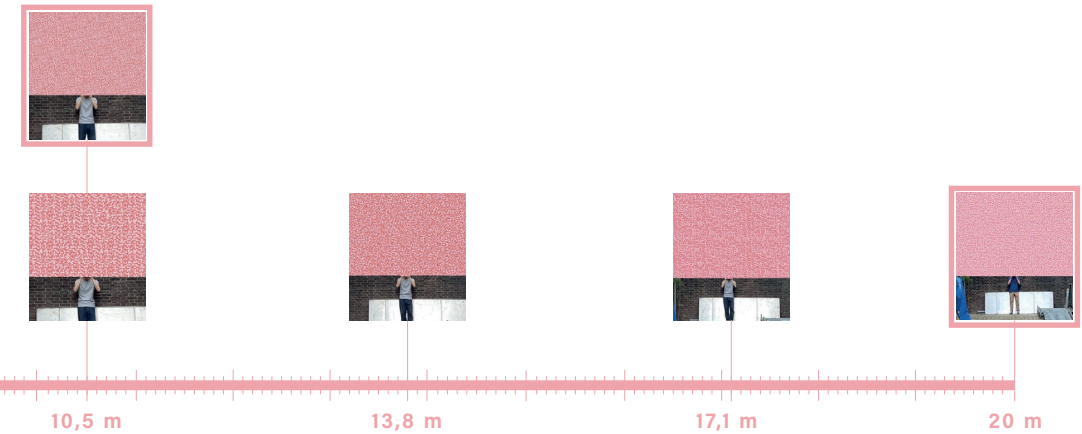
3. BLENDING MOMENT

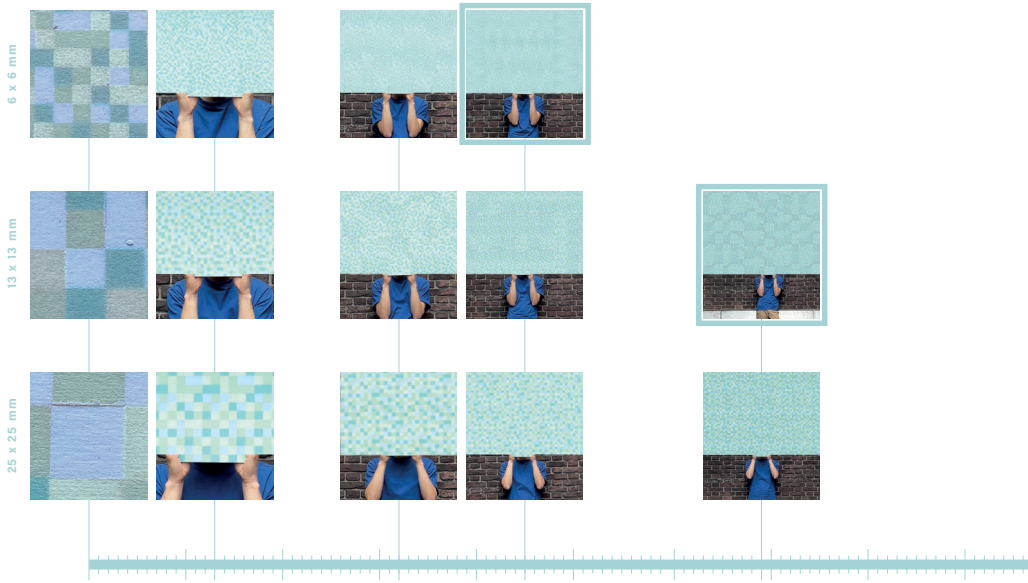
An analysis of how long the distance needs to be for all the pixels to blend into one perceived blended colour.

diverse colour palette
3 different sizes

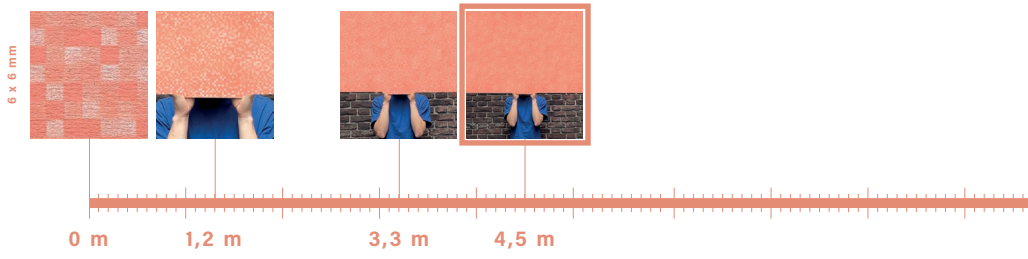


smaller scope of colours:
warm colours
3 different sizes



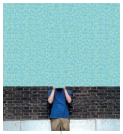


c



d

smaller scope of colours:
cold colours
3 different sizes



10,5 m

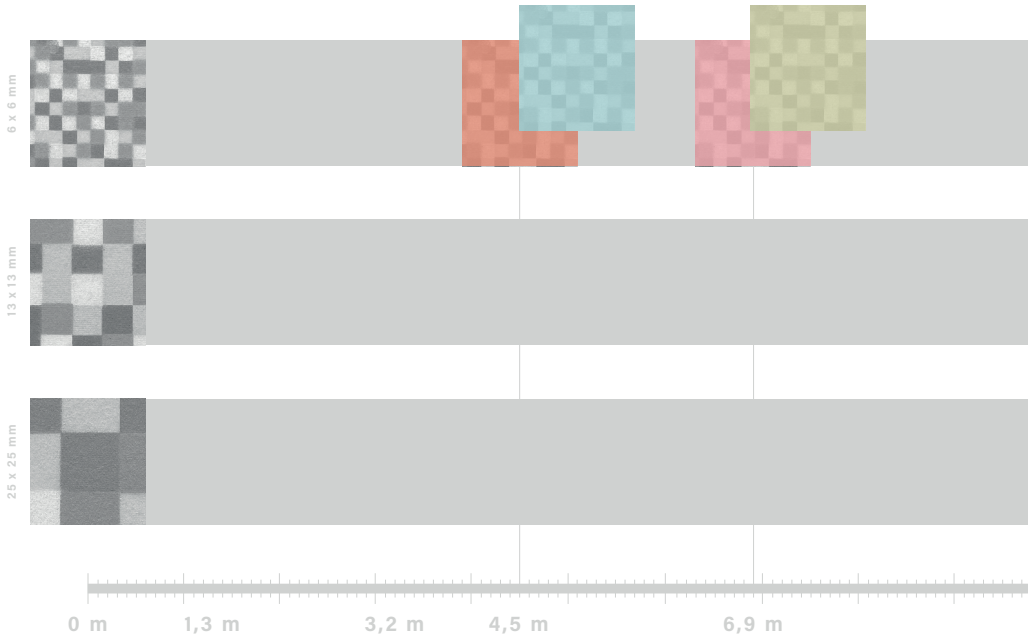
13,8 m

17,1 m

20 m

1 colour
different intensities

20 m


6 x 6 mm
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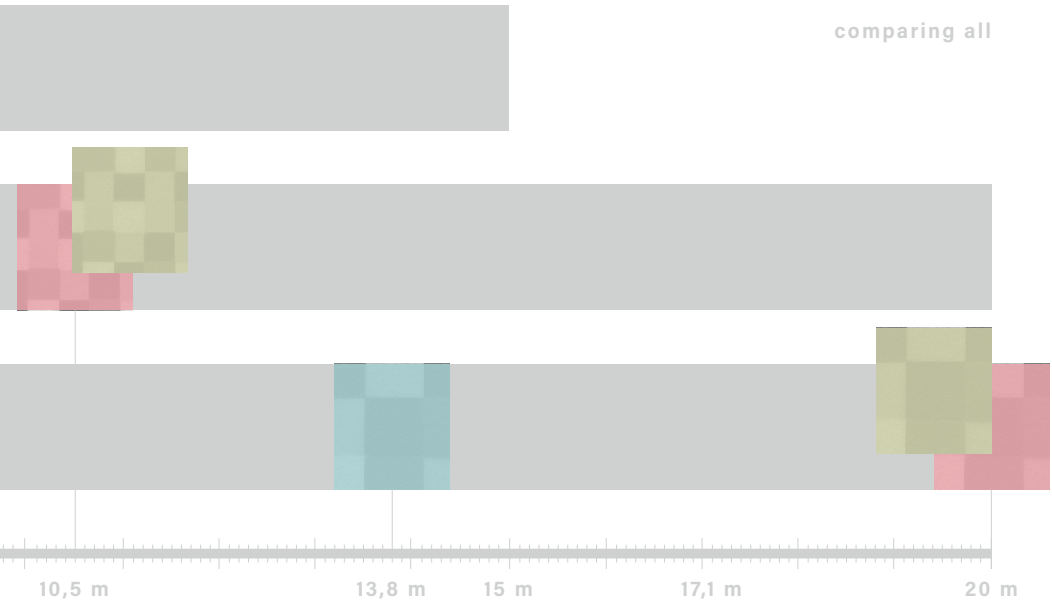
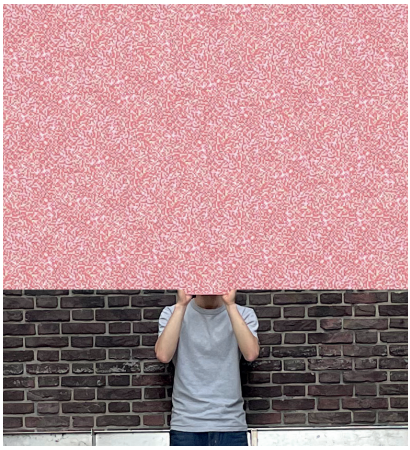
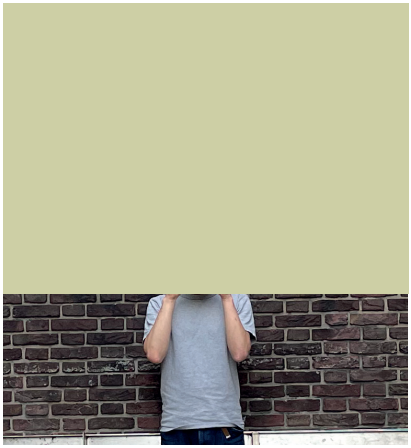
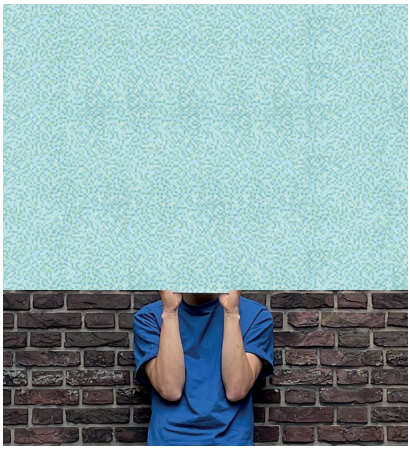
25 x 25 mm
0 m
1,3 m
3,2 m
4,5 m
6,9 m

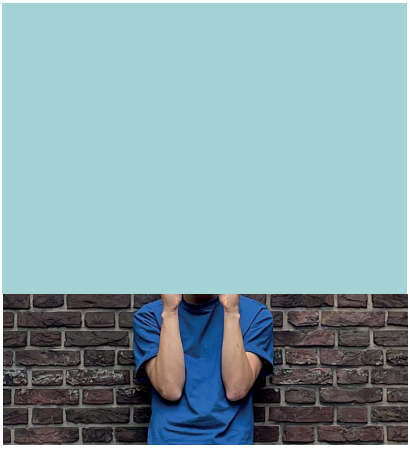

comparing all
10,5 m
13,8 m
15 m
17,1 m
20 m

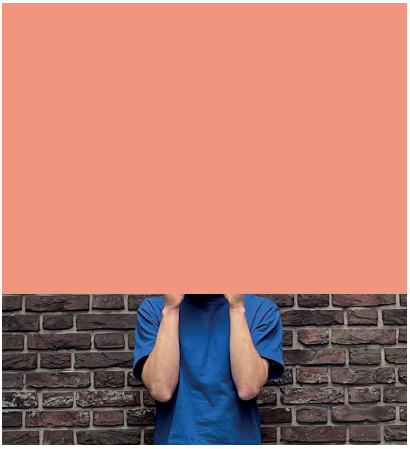




4. PIXELS VS. FLAT COLOUR

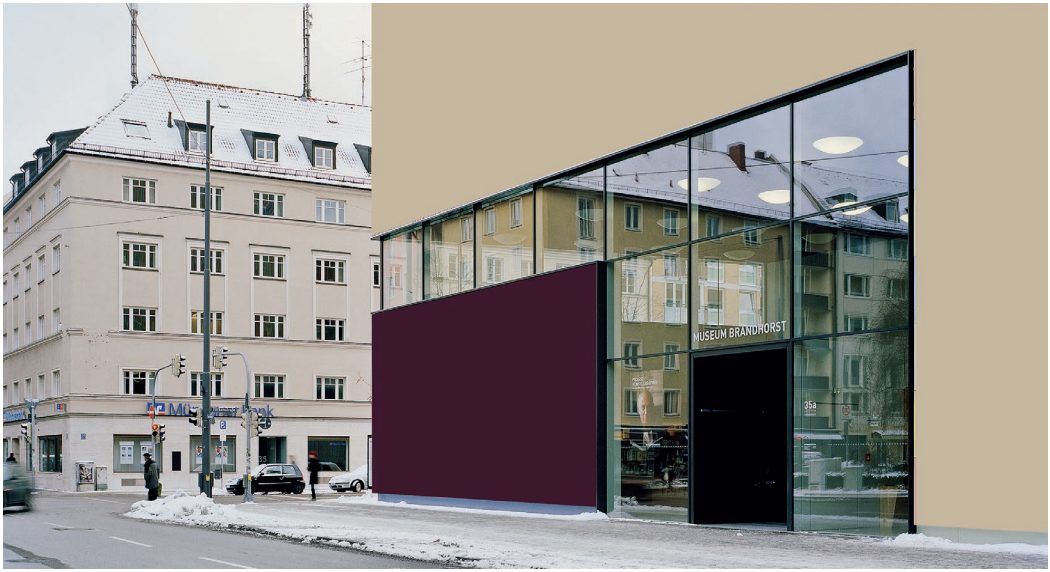






Museum Brandhorst, Munich, Germany

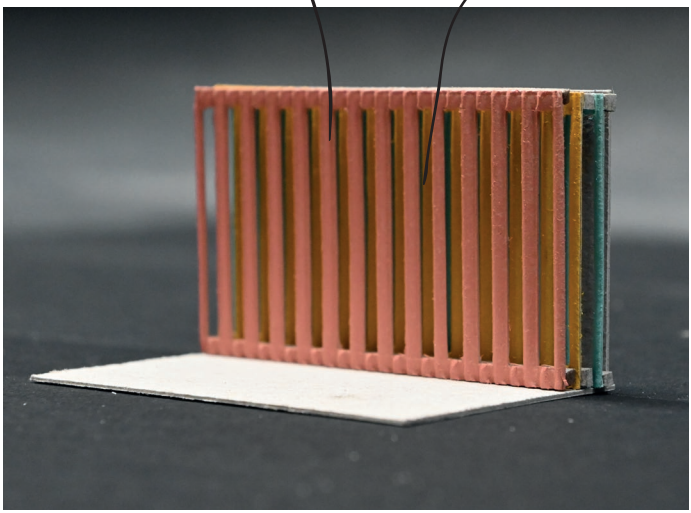
5. PIXELS VS. FLAT COLOUR IN BUILDING

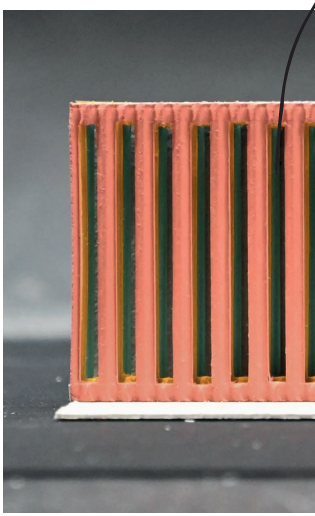


Penitentiaire Instelling ‘De Schie’

Red is always the main colour

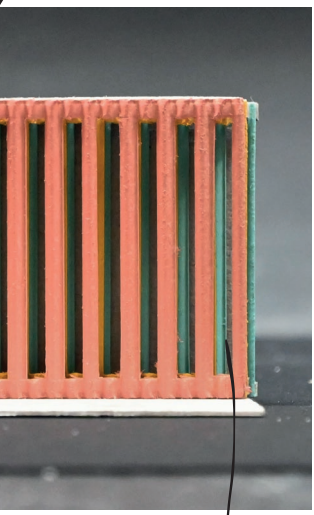
Yellow is a bit visible



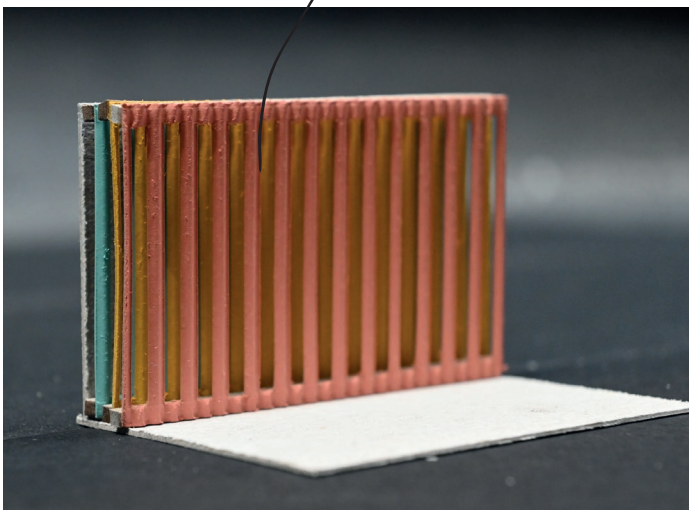


The movement alongside the surface will show the colours, the movement perpendicular won't

Nothing of the other colours is visible too much shadow and a straight (view) angle onto the surface.

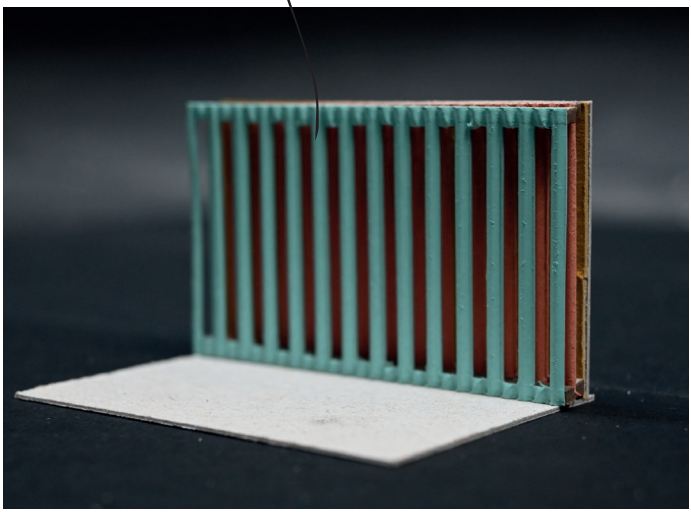


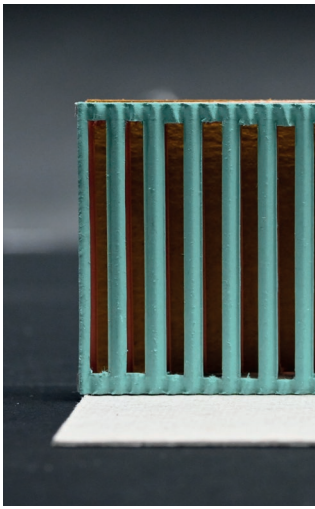
Yellow is visible because of the angle



Blue is visible because of light shining in on the side.

Blue is the main colour

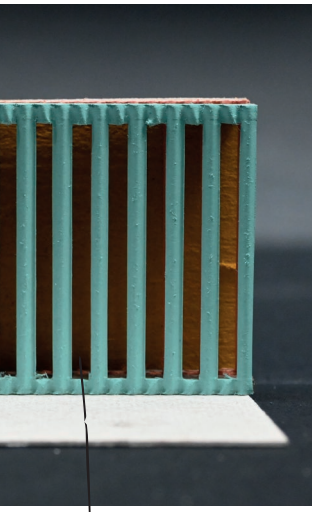


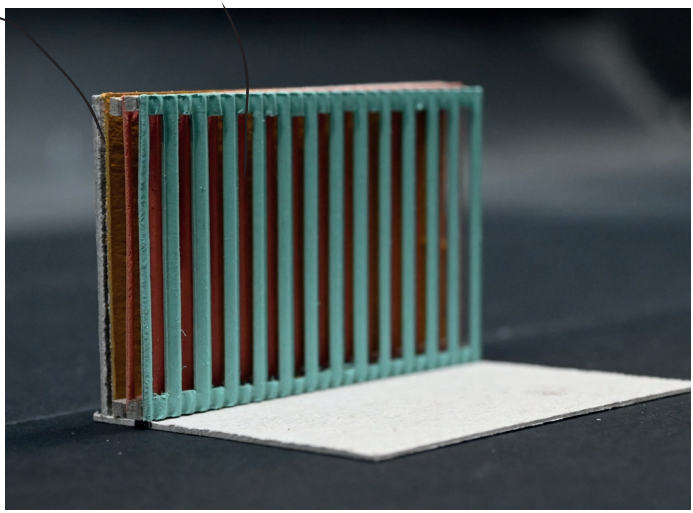


Perpendicular movement (when approaching a building) does not show the versatile experience that the colours have on offer.

yellow is never really visible.

Even under an angle the second colour is not visible, it is too dark.

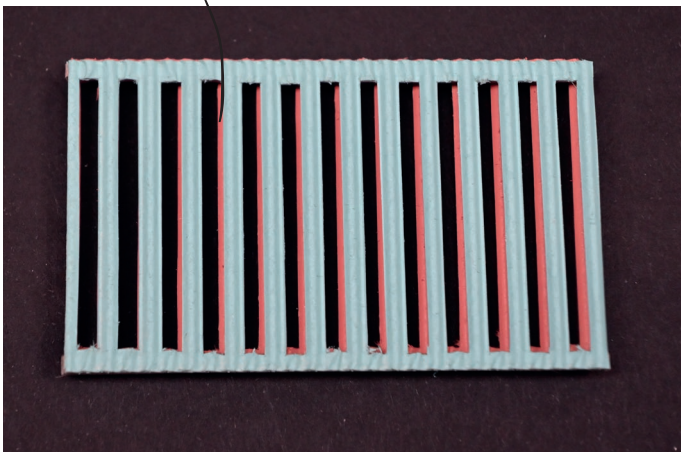


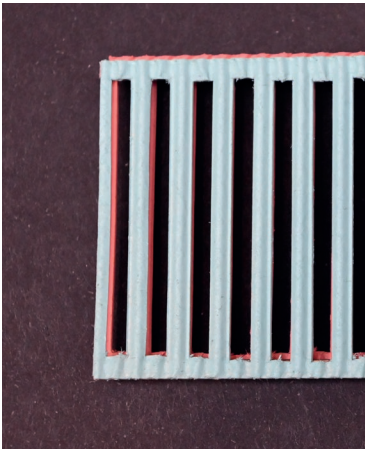


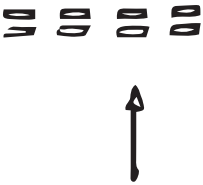
only parallel movement could have an effect.

But the lack of light makes this difficult.

Depending on your angle to the surface, you would see more or less of the second layer.

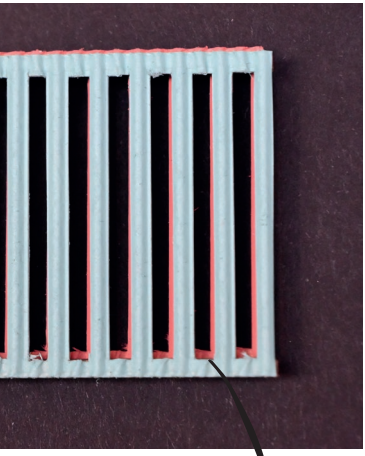


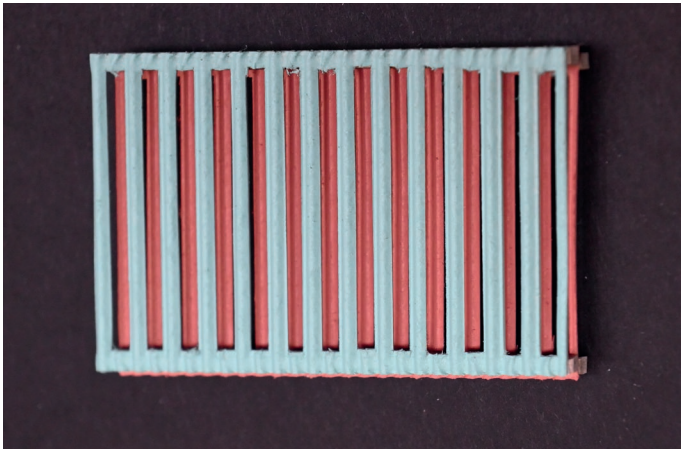




Because of the build-up of this system, still, only the parallel movement matters.

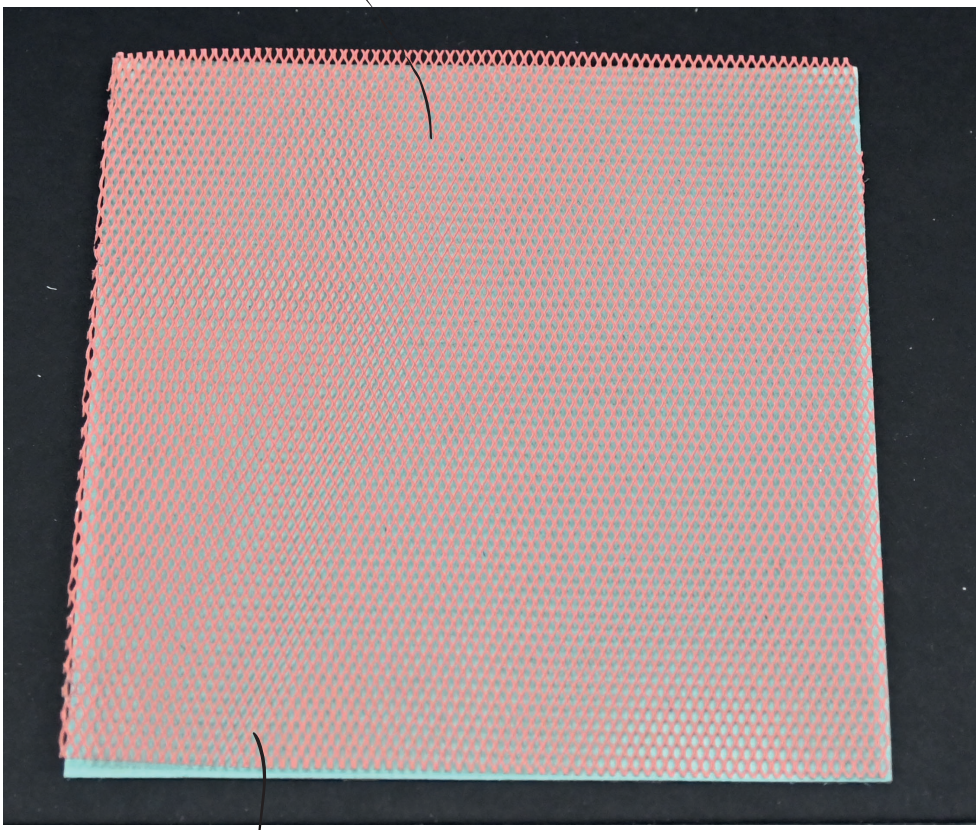
what happens when the layers are not aligned behind each other?





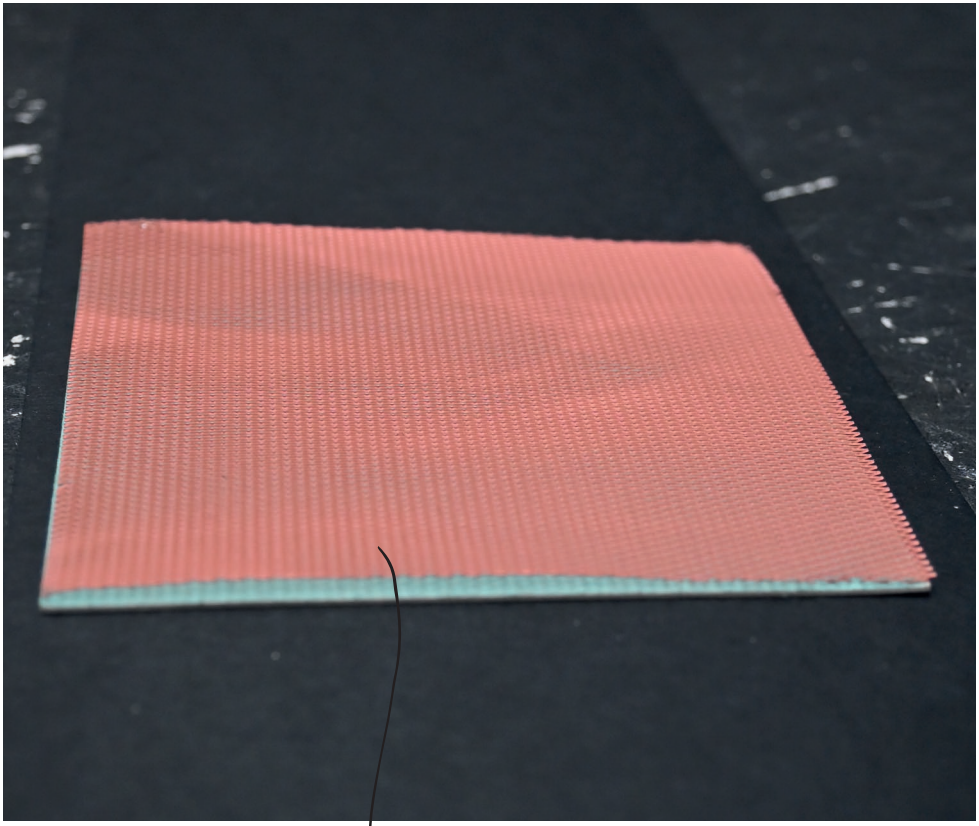
only from a very sharp angle you would see red.

From straight forward, the light blue background really blends in with the red perforated surface



the colour you see is really a new colour, a mixed one almost. Is this the right effect?

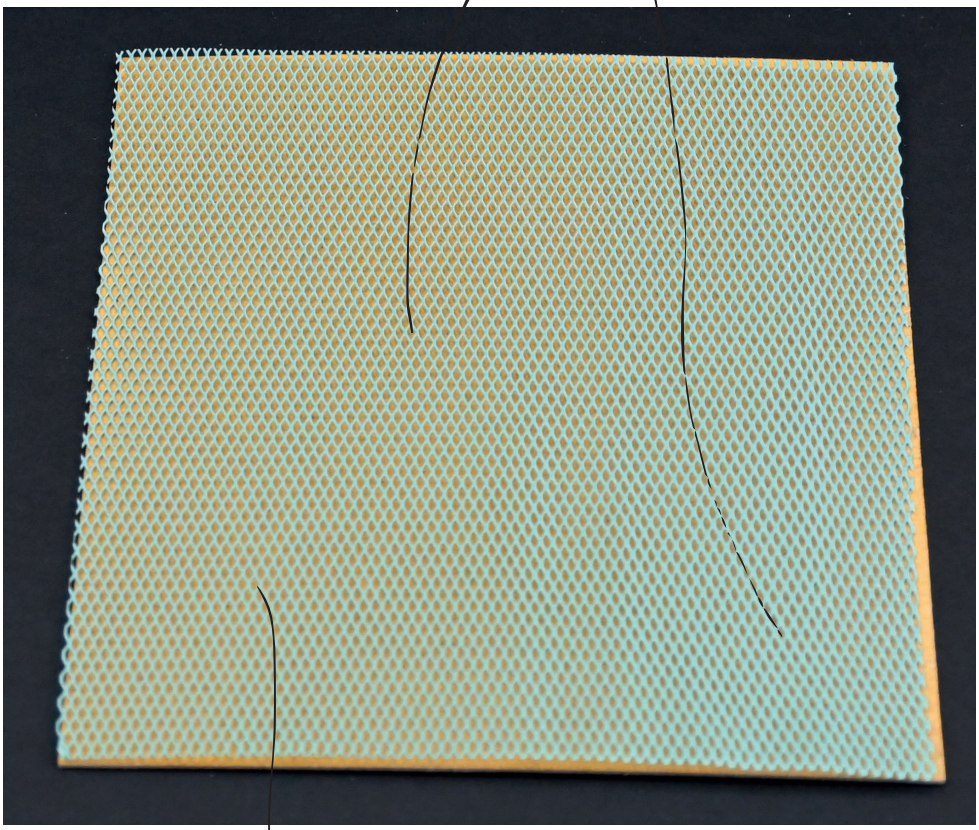
Compared to previous tests, this looks at a smaller pixel, bigger surface.



The red and blue have a big light-dark contrast, maybe the blue should be front

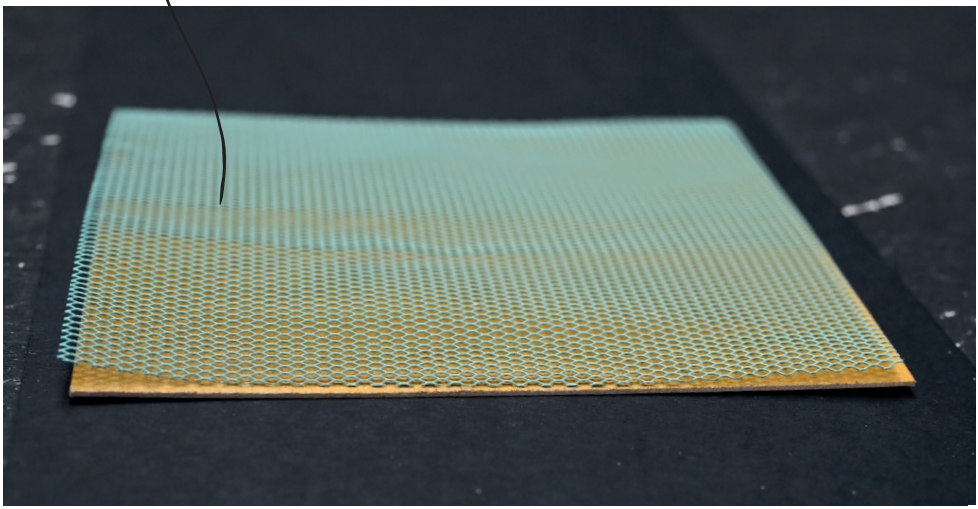
From an angle, the red becomes much more dominant, because it fills most of what you can see.

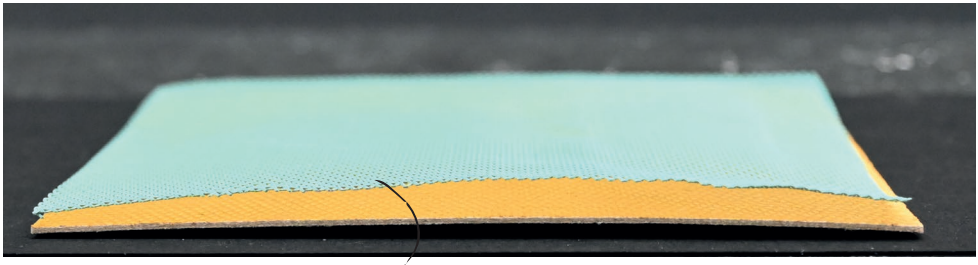
Shapes in the mesh itself can also cause a colour gradient within the surface.



The contrast between blue and yellow, is smaller and therefore is more possible to blend and work harmoniously together.

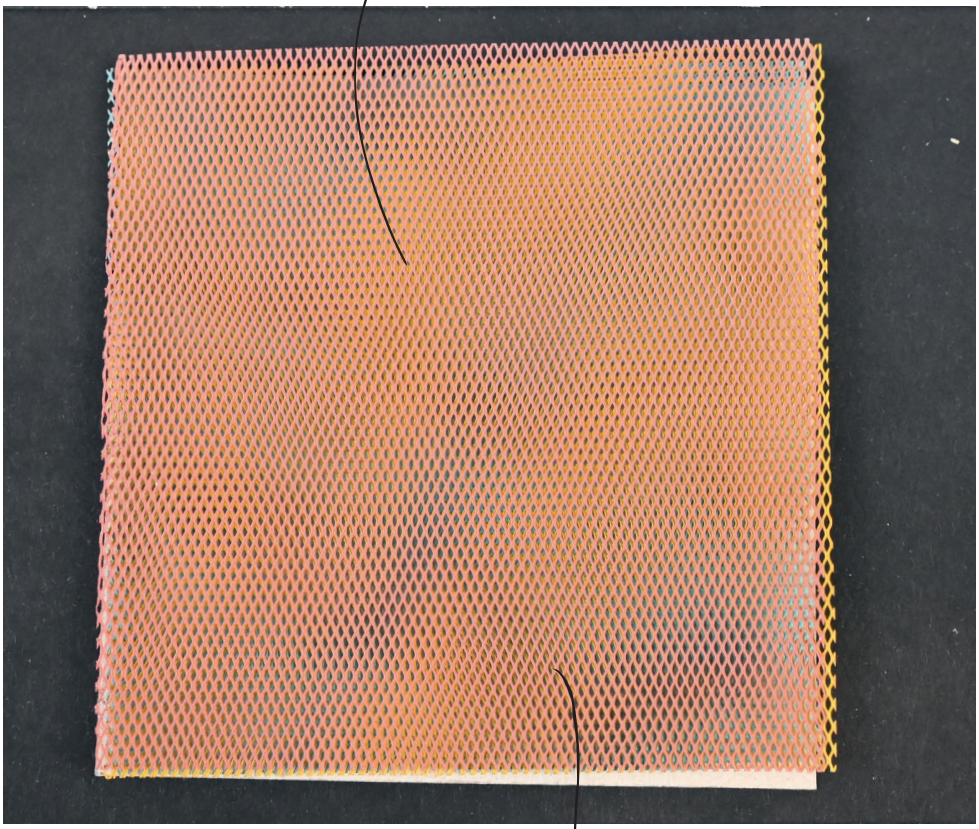
Also from an angle
the yellow still shows





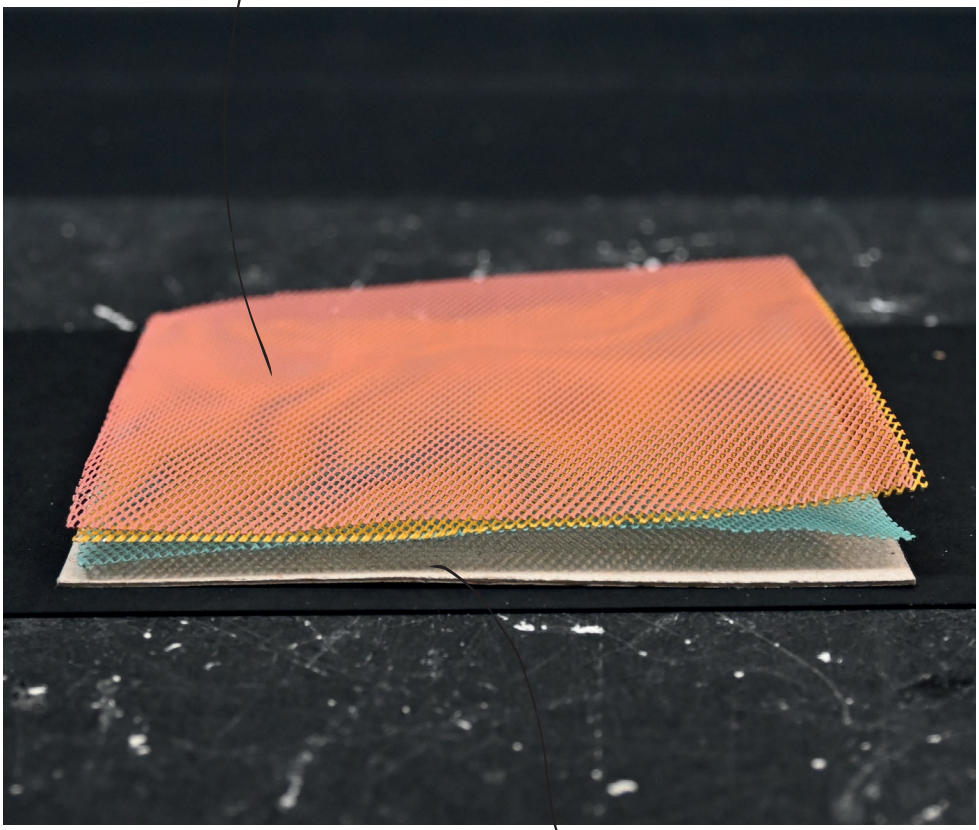
Only from a very sharp
angle the yellow
isn't visible anymore.

Besides the front colour, the individual colours disappear. They are hardly identifiable.

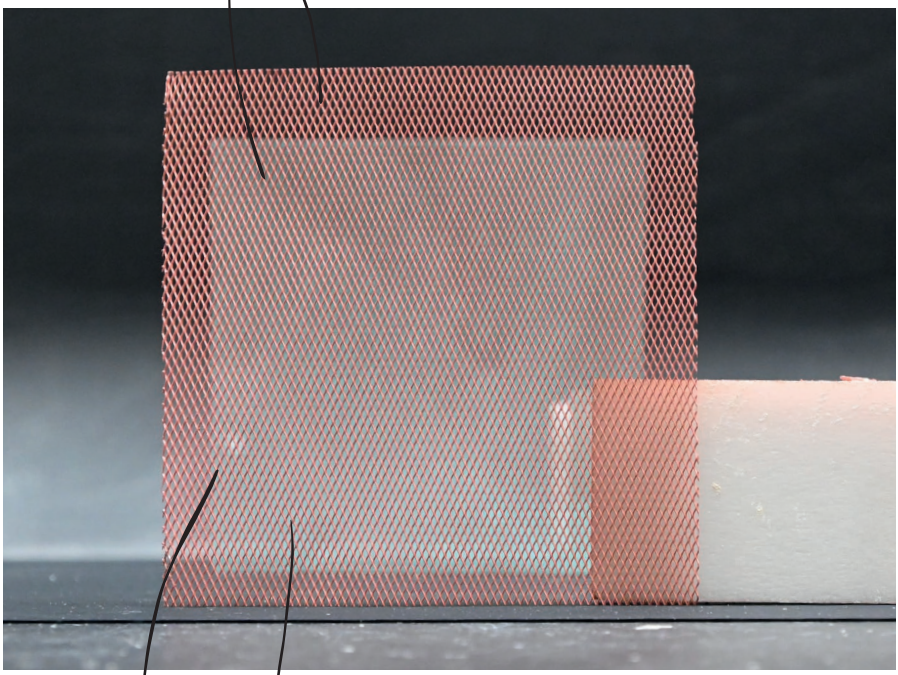


Because of deformations in the surface, a spotty coloured surface emerges

Layers, multiple perforated surfaces, small distance



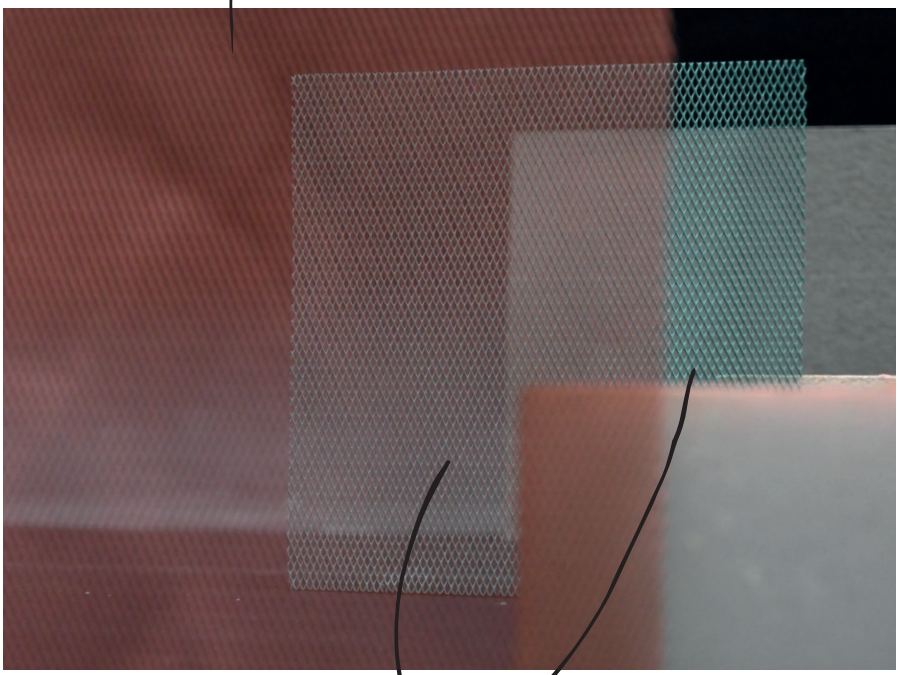
Here is clearly visible what the effect is of the second layer. It blends well with the front colour.



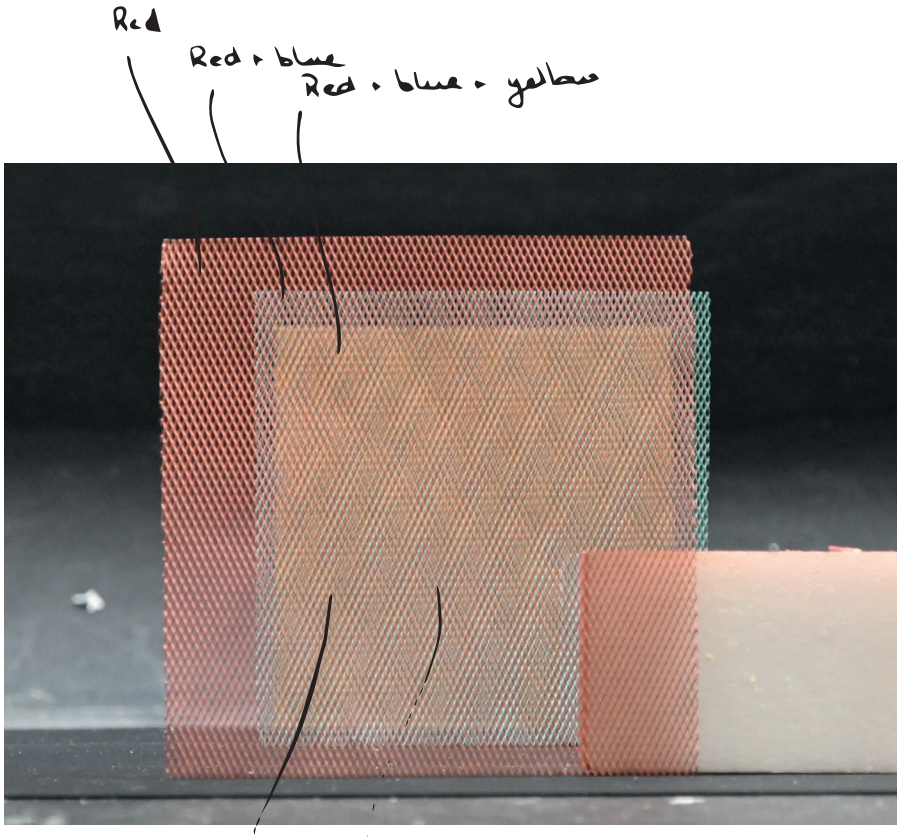
Red becomes less dominant because of this distance

But the blue is not identifiable anymore as own colour

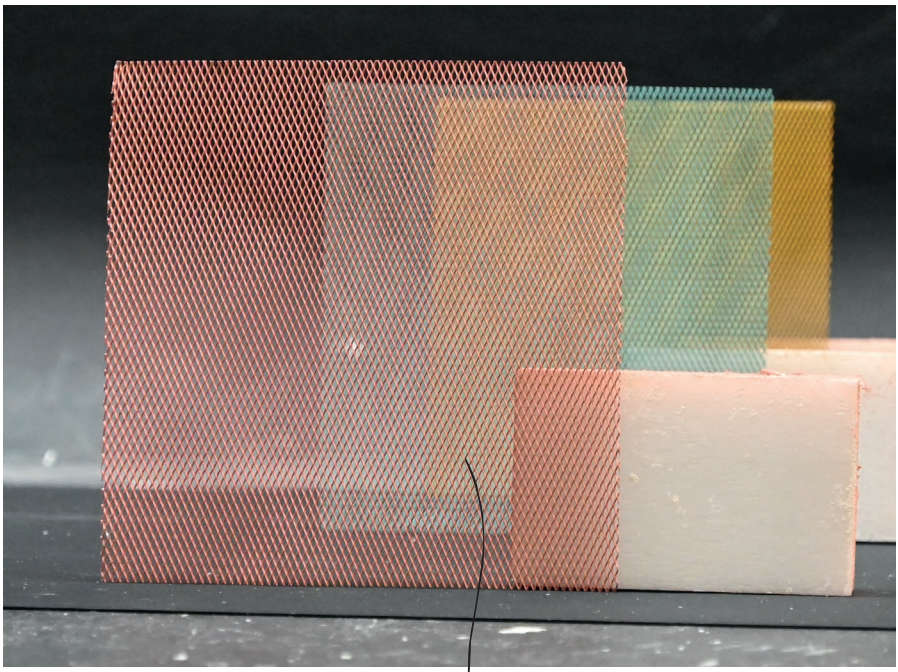
What happens when there is more distance between the layers?



Because here it shows the difference between the blended and the source blue.

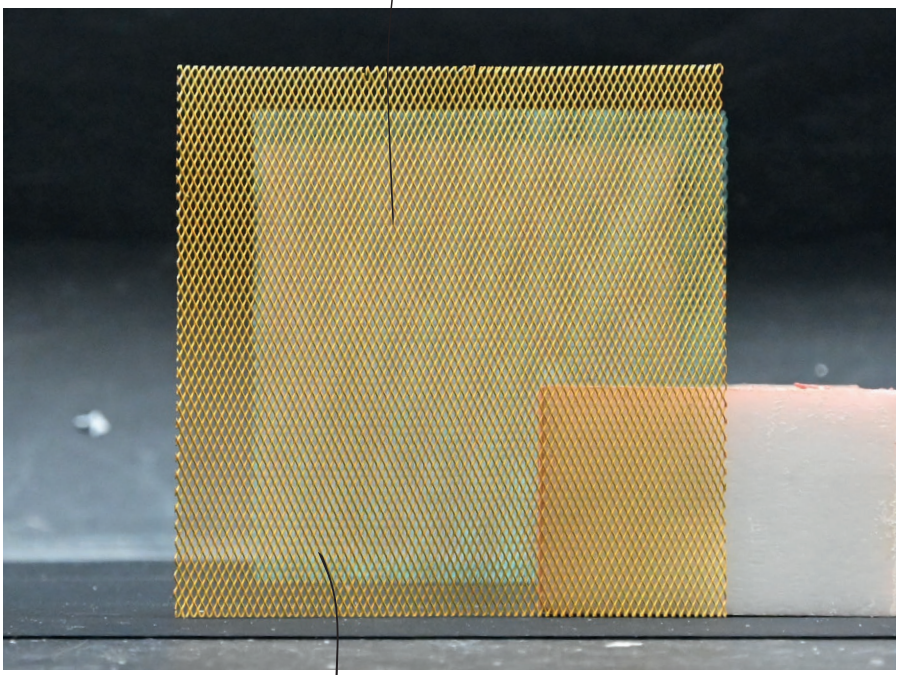

Red
Red + blue
Red + blue + yellow
Mixed, new colour
Distortion effect becomes stronger again

Big inbetween spaces,
three layers



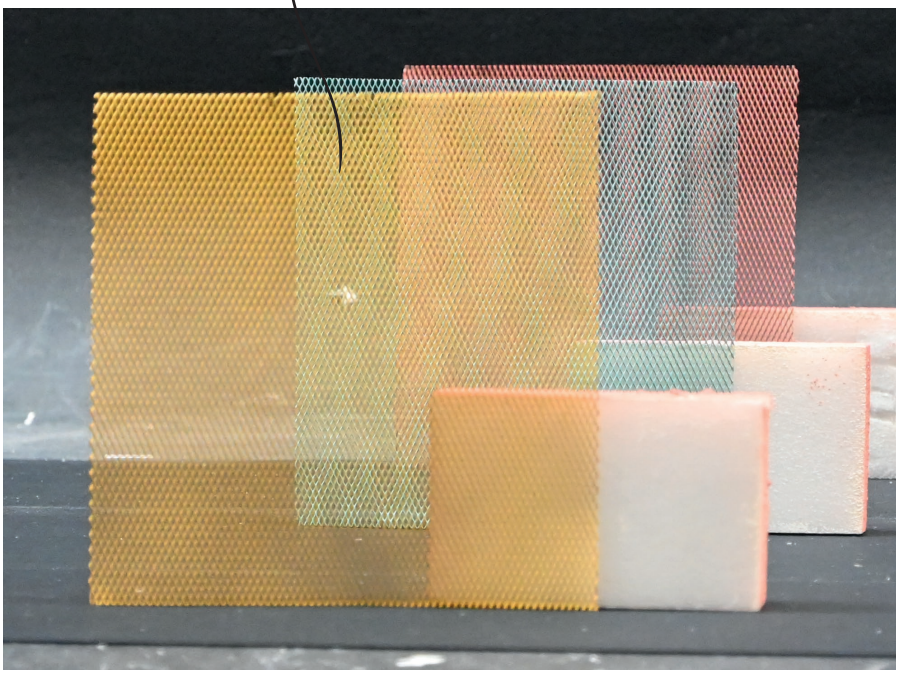
Only with a great
great close up view
it would be possible
to identify individual
colours.

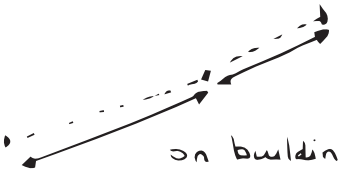
With the yellow on the front, the red on the background is completely invisible



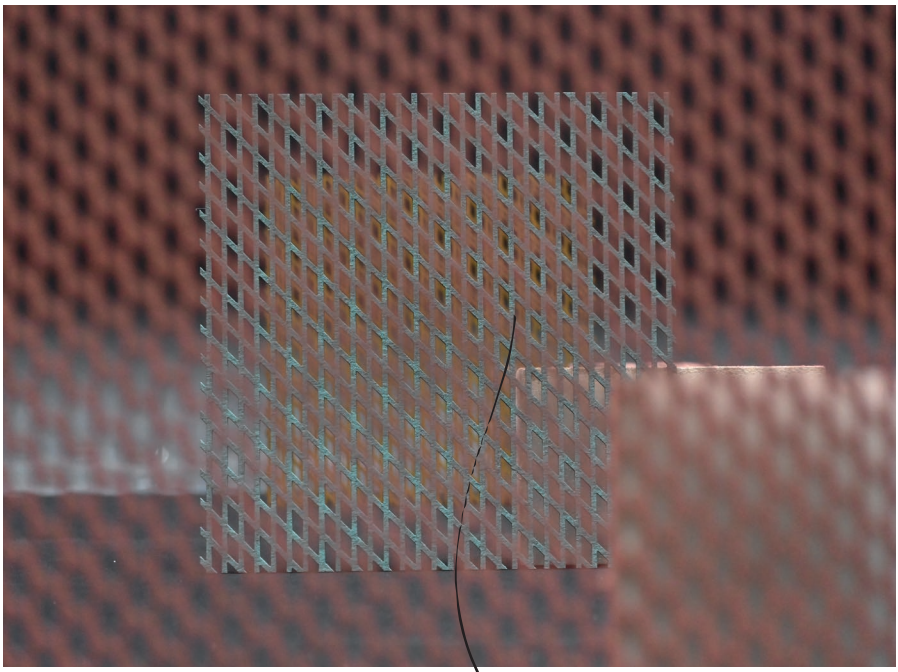
Same as previous, one mixed colour.
The individual colours are not identifiable.

Rethink the ratio of the wired mesh. It seems to be too fine for the individual colours to be visible.

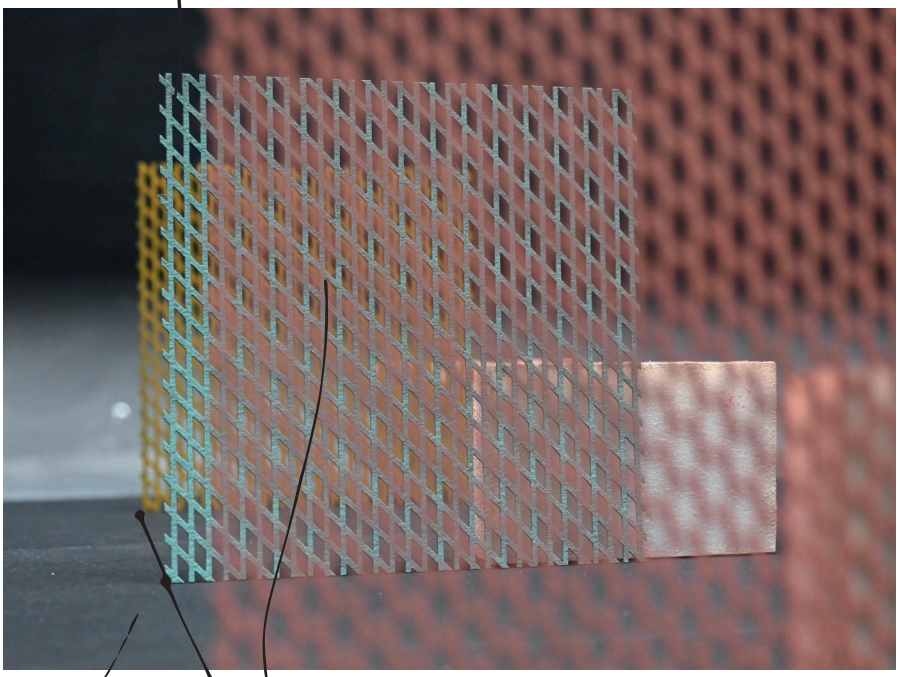




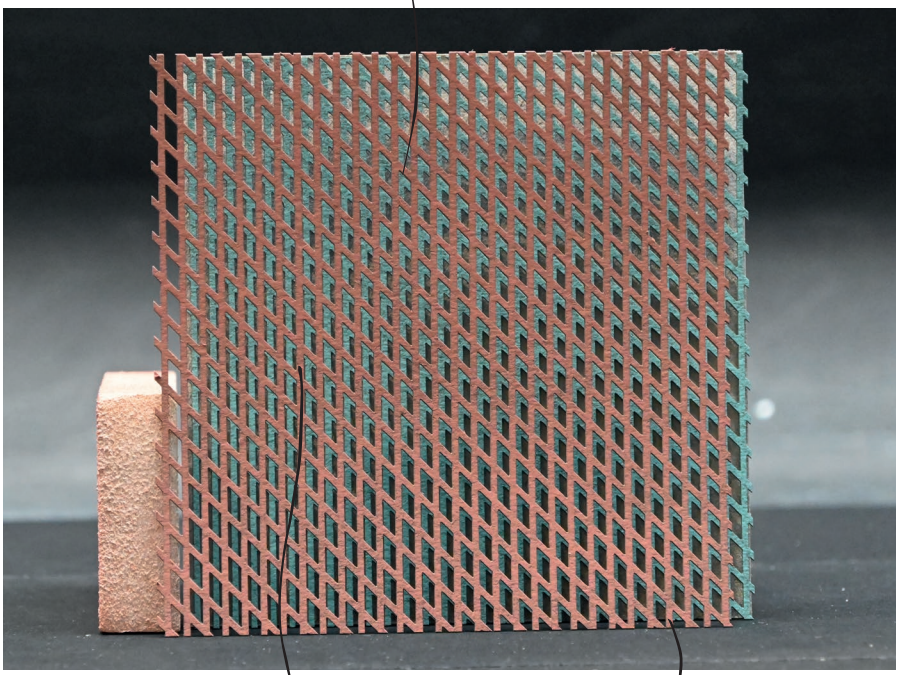
on building scale these distances would take up a lot of the plot.



All three colours are visible but blend as well

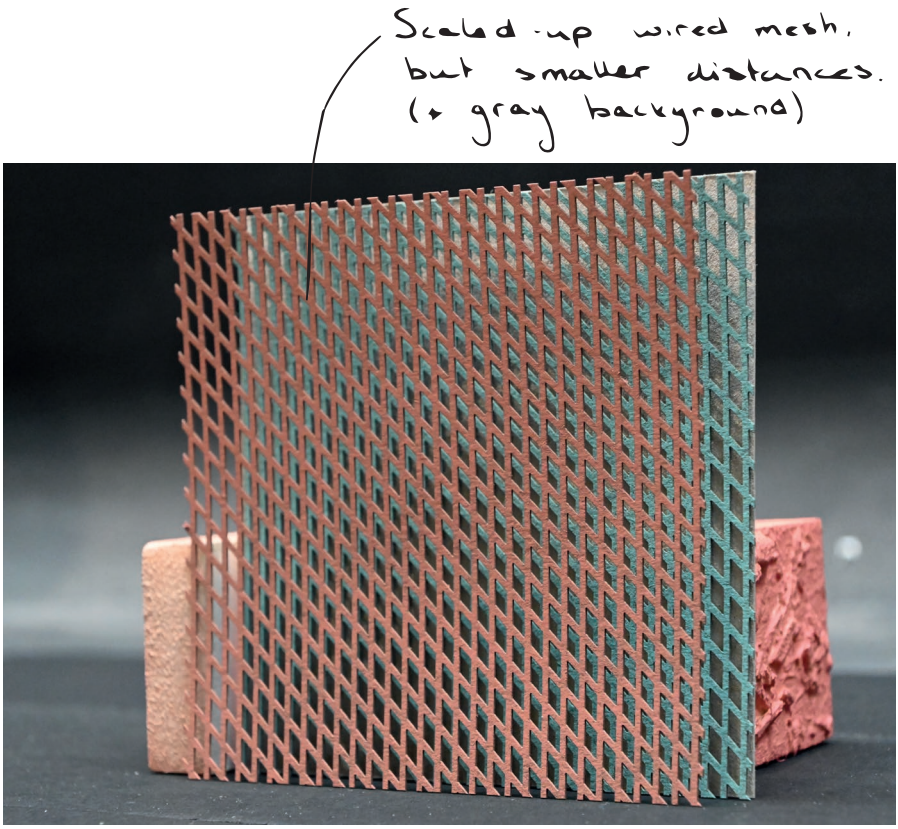

Scaled up the ratio of the wired mesh.
When viewing from more close-up, it is visible how the individual colours take part in the system.
distances would still be big.

Because you can never be on a straight angle with every point on the surface there is a big variety in what you see over the surface

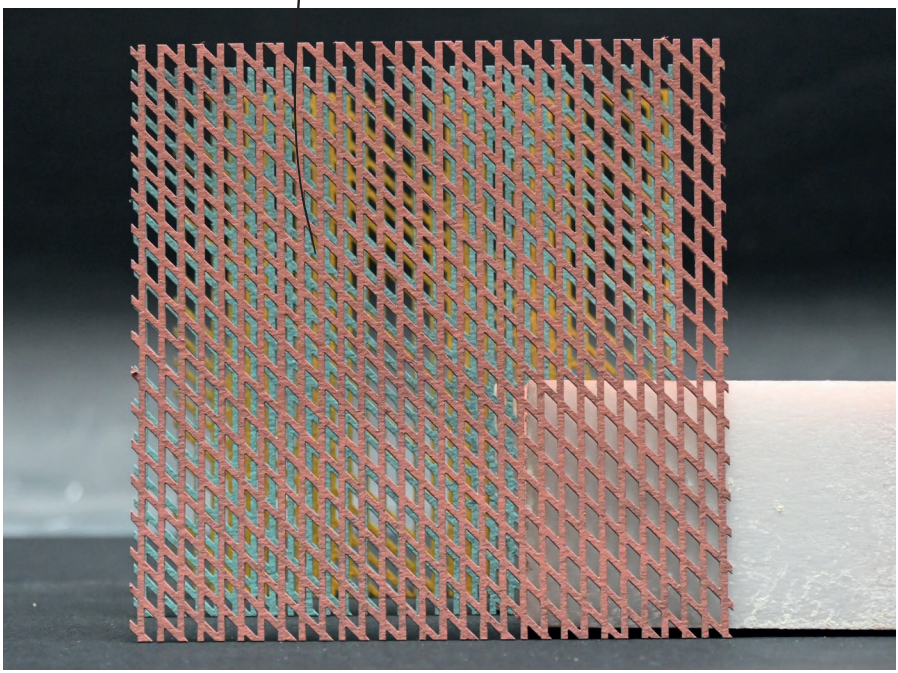


clearly visible blue

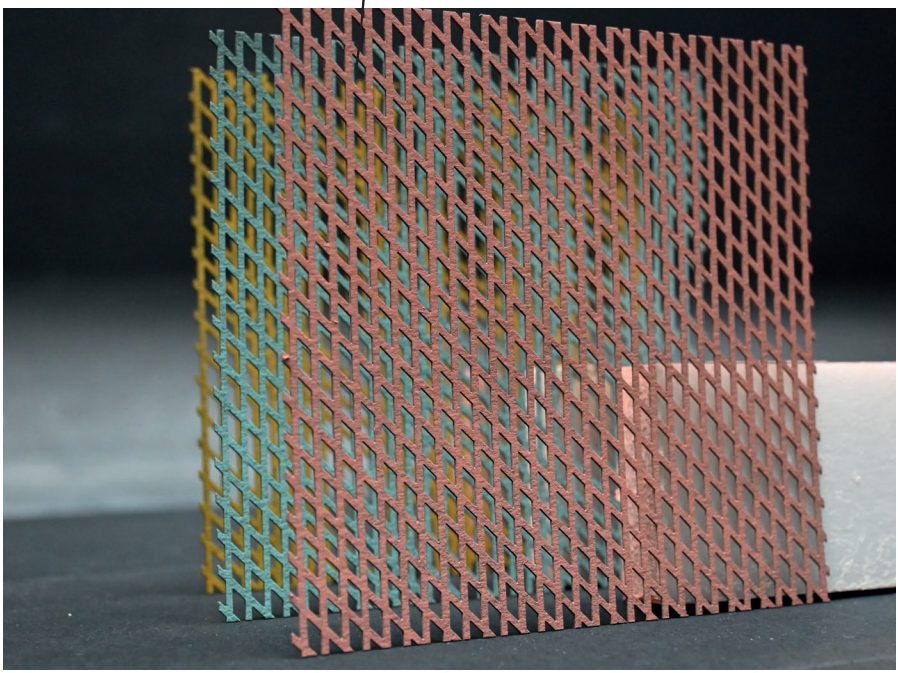
less visible blue

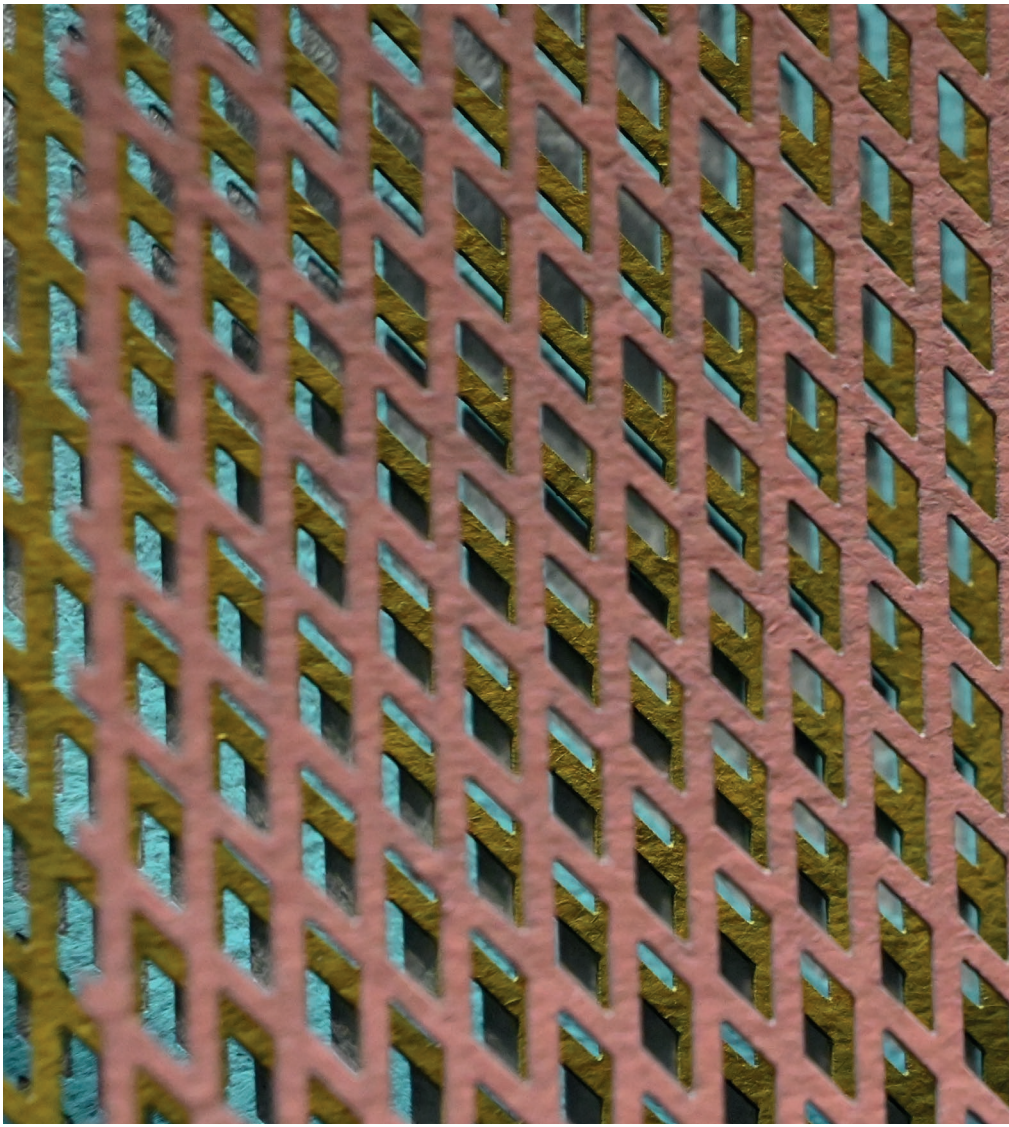

Scaled-up wired mesh,
but smaller distances.
(+ gray background)

Mixed colour is harder to identify because of no background, but individual colours are there.

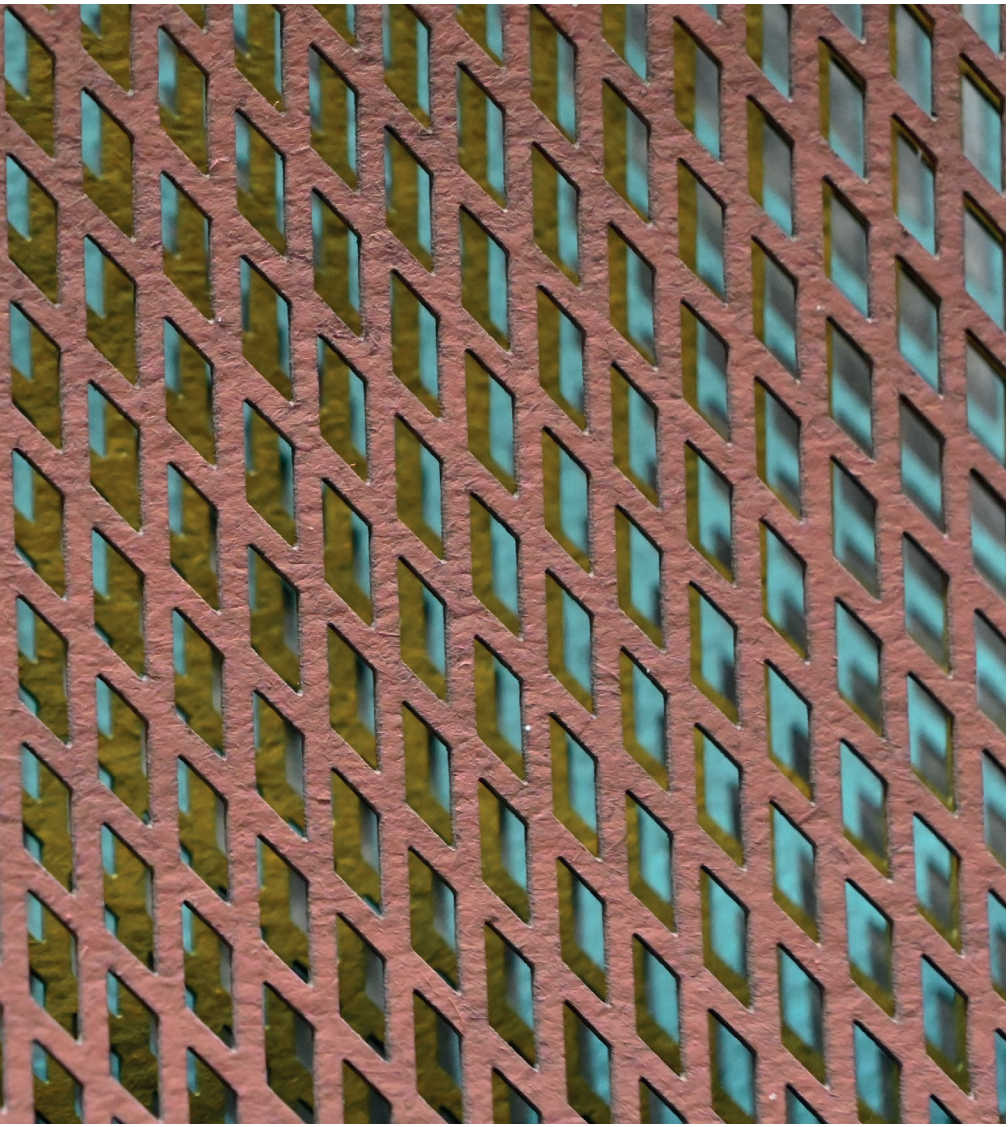


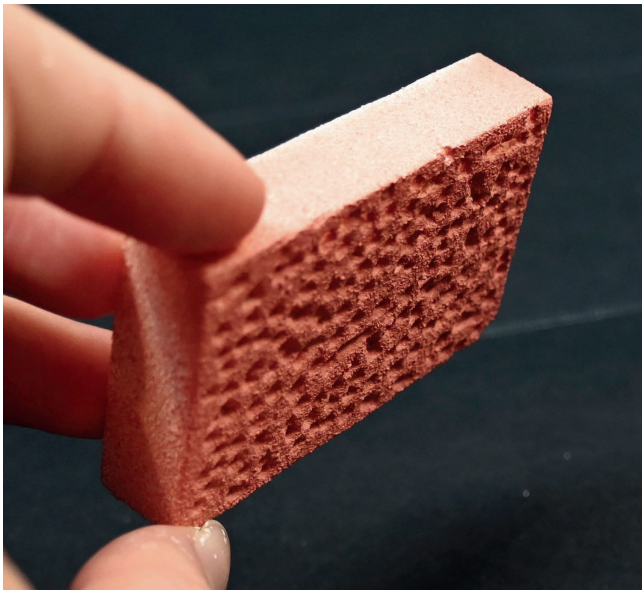
Three layers of scaled-up wired mesh, with no background

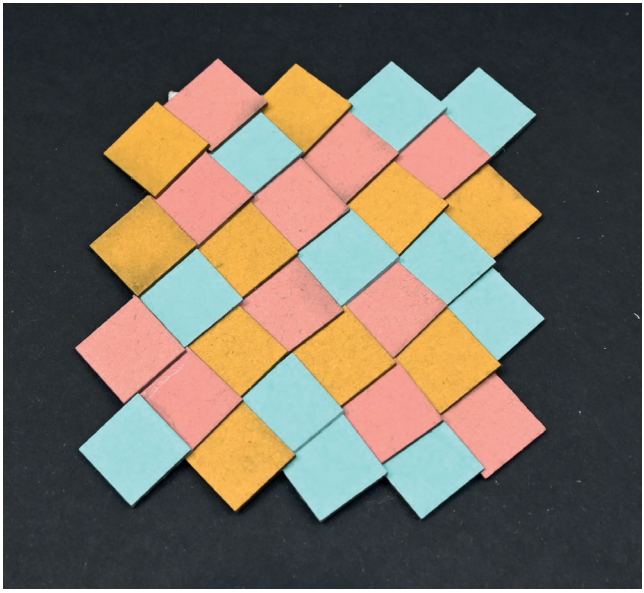


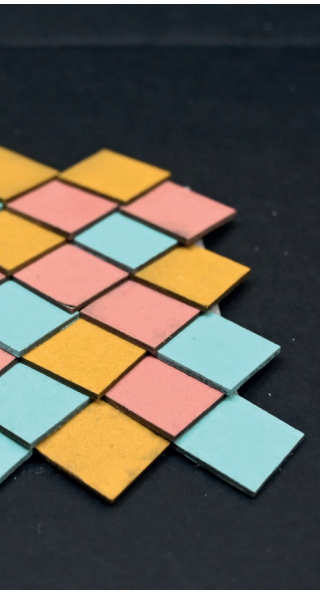


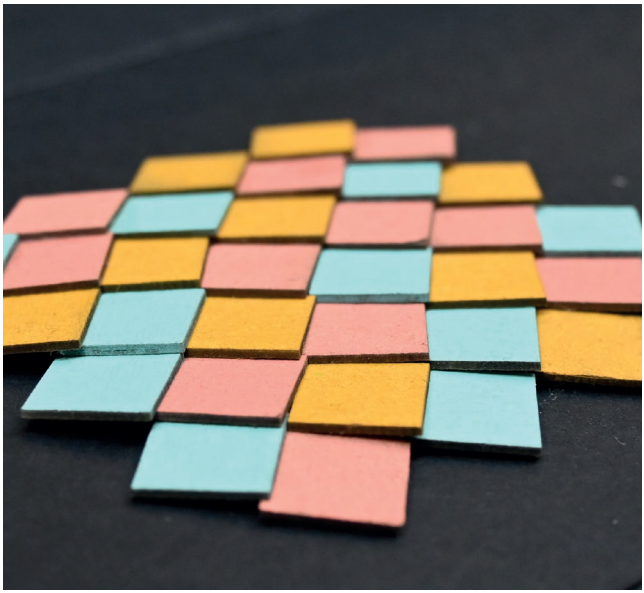
Layers, multiple perforated surfaces, small distance

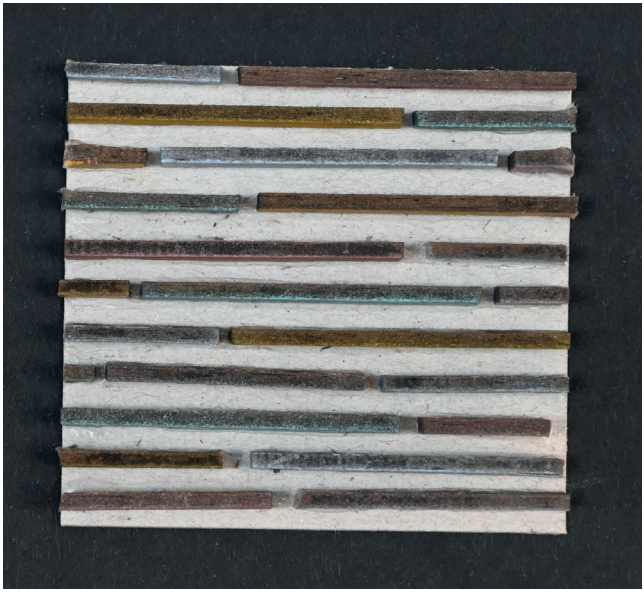


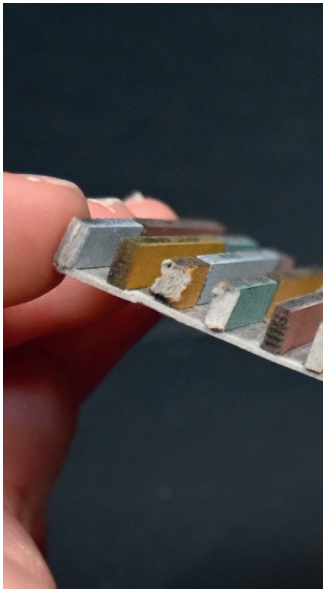


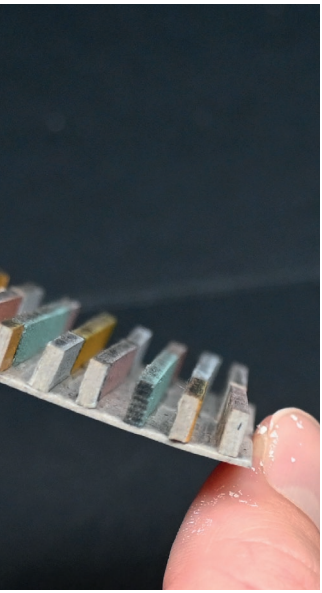


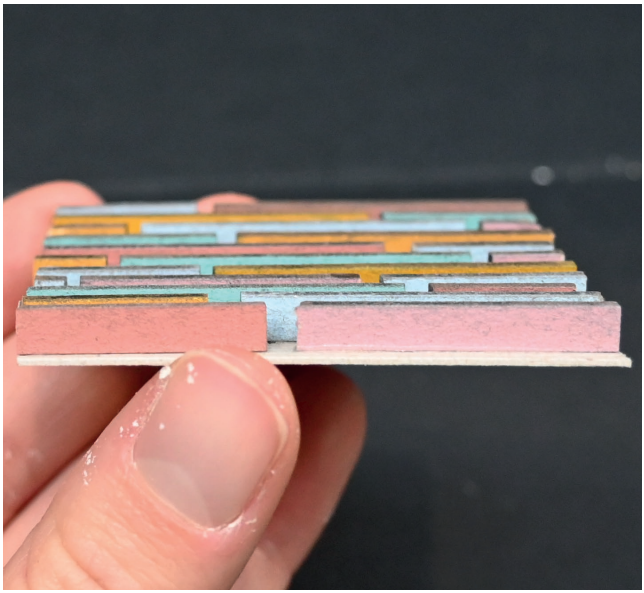




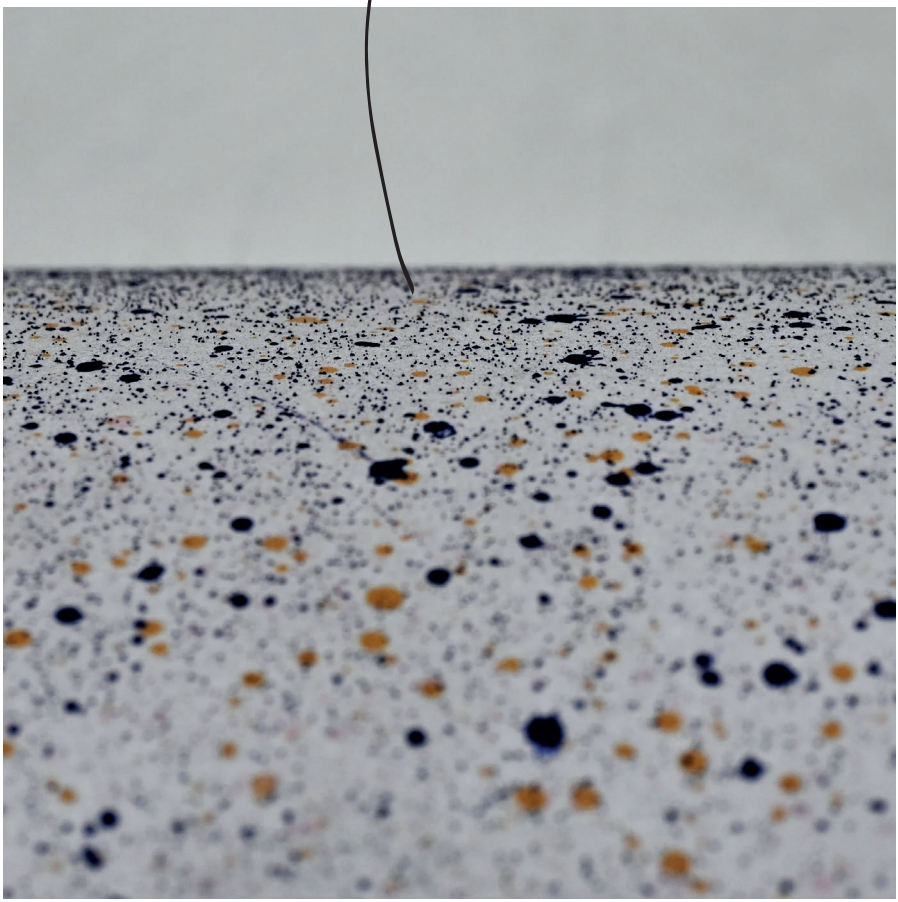


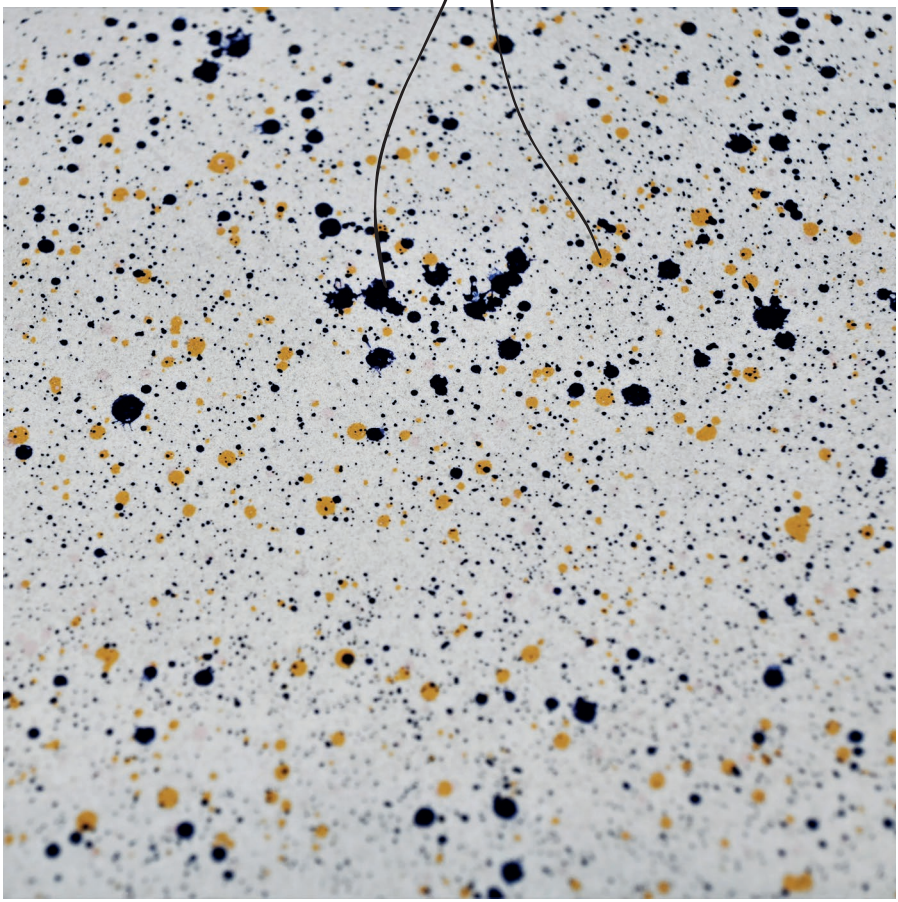




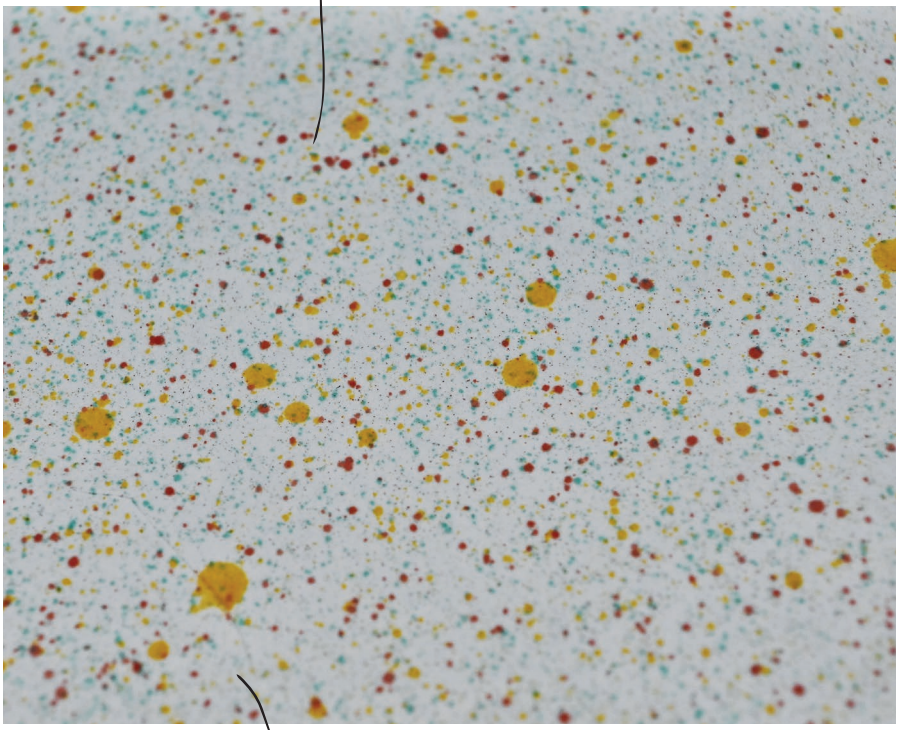


Because of the thickness of the spots, looking at the surface from an angle, shows differences in density.



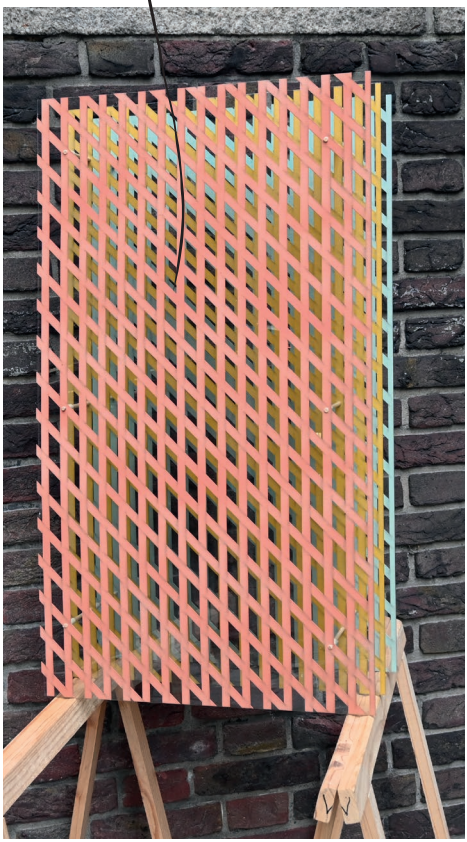

Two contrasting
colours on a
white background

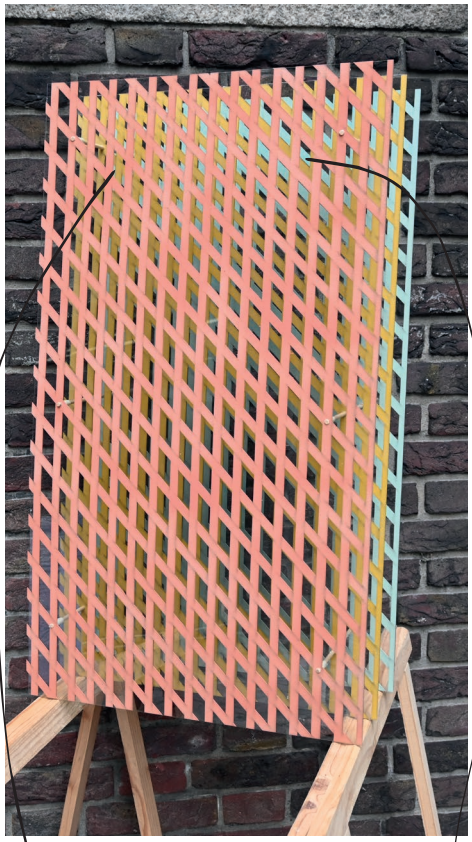
much lighter colours, less contrast between colours



white background doesn't show much contrast with the used colours

Most transparancy, not many layers visible because of straight view

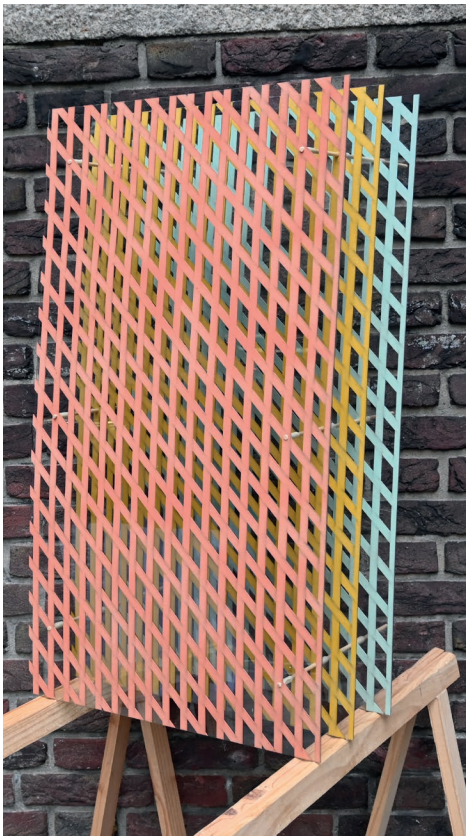


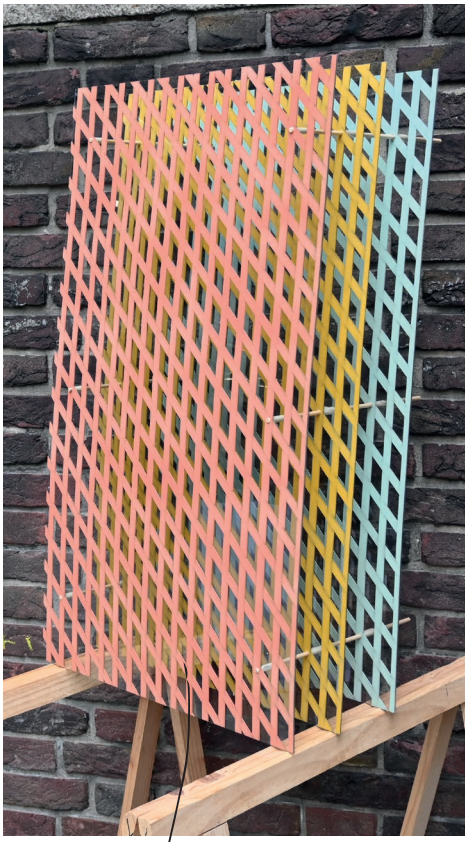


yellow

blue

Showing the different colour compositions depending on the parallel movement to the surface.

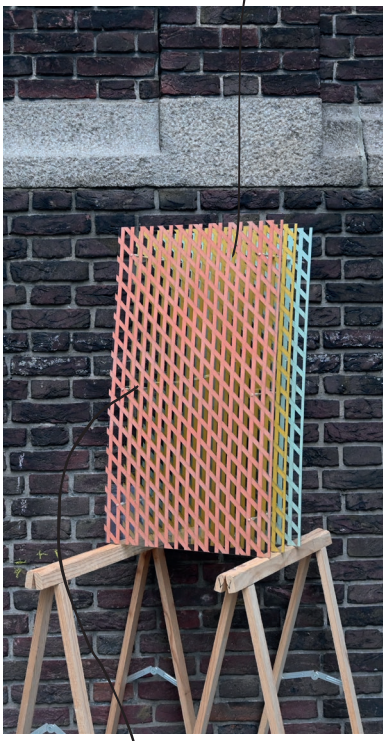


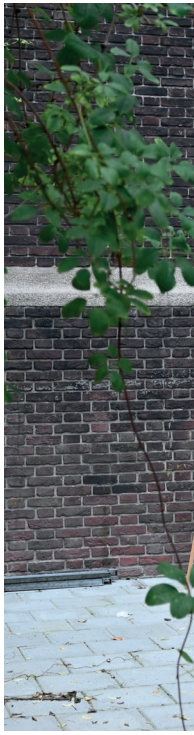


Mostly red

All colours individual visible

some yellow visible





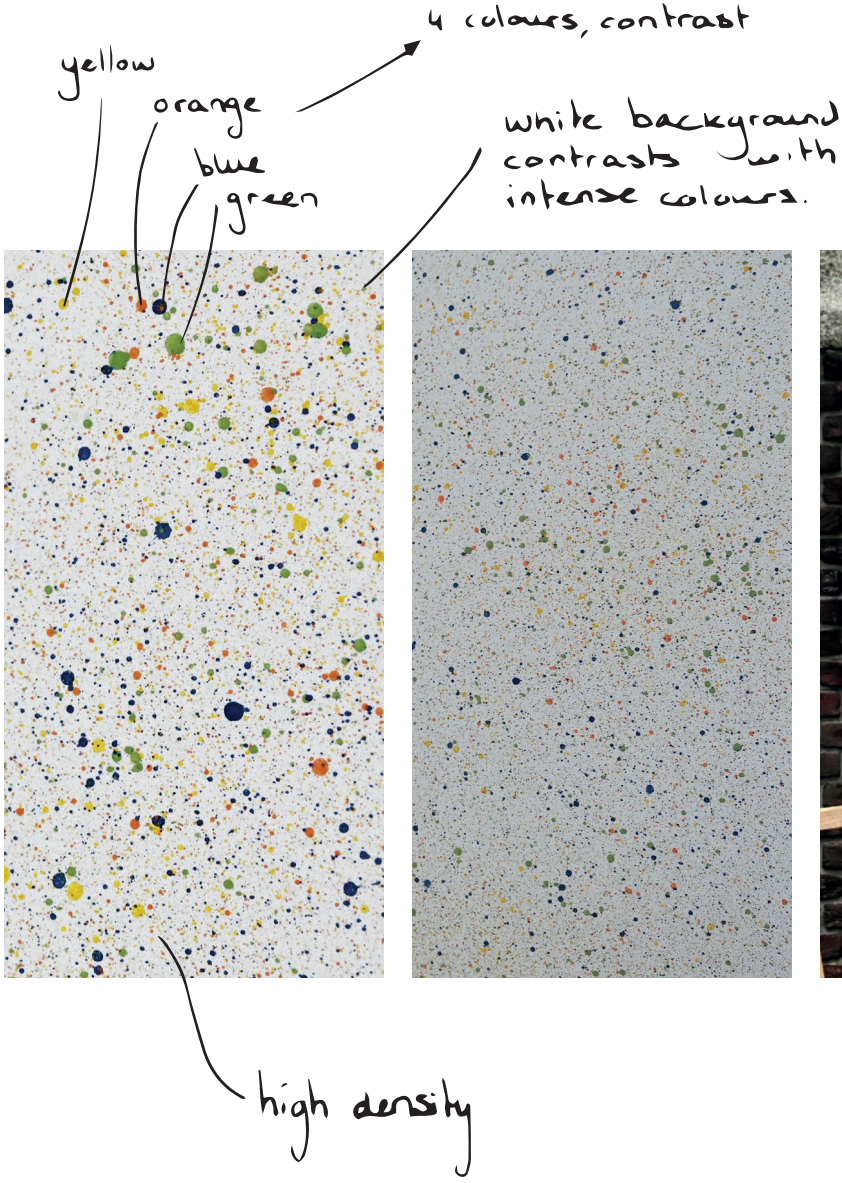
dark background makes it already hard to see further layers

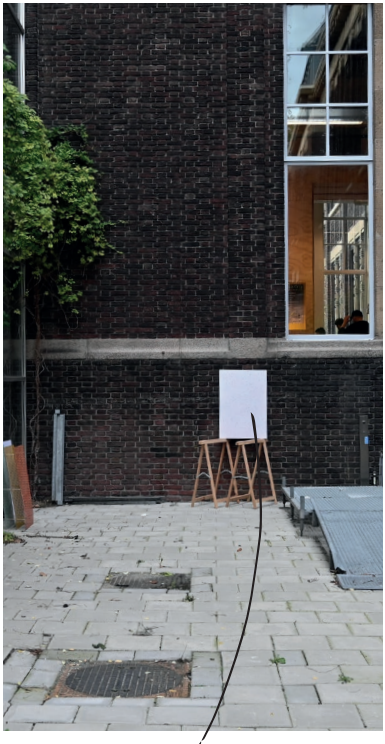
layers, 1:1 scale

showing perpendicular movement and the effect on the colour experience

only red visible

blended?

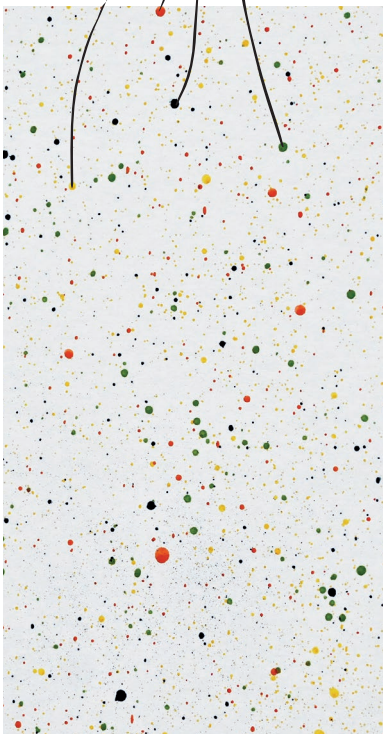

4 colours, contrast
yellow
orange
blue
green
white background contrasts with intense colours.
high density



Some spots visible,
but not much to identify

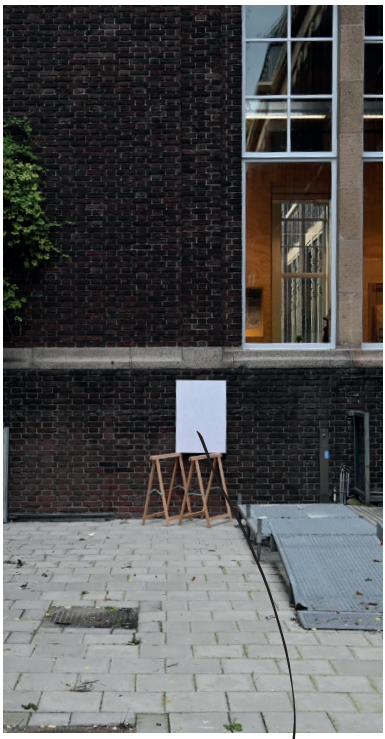
could be perceived
as white

same colours
as previous, but
less dense ⟶ less spots per area



visible, but
not easy to
identify.

lower density of spots. makes the needed distance for blending shorter.



white

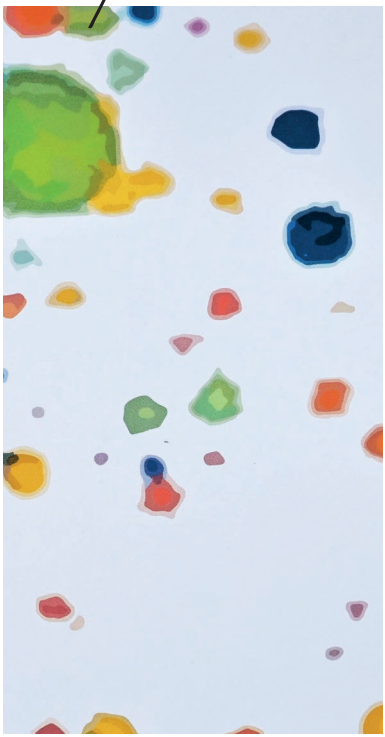
Almost impossible to see spots.

orange, green, yellow
No contrasting with
the background (dark blue)

No contrasting spots (to the background) make the needed distance for blending shorter.

Even though the discovered differences in composition and colour, all of the last three tests blend too soon for building scale.

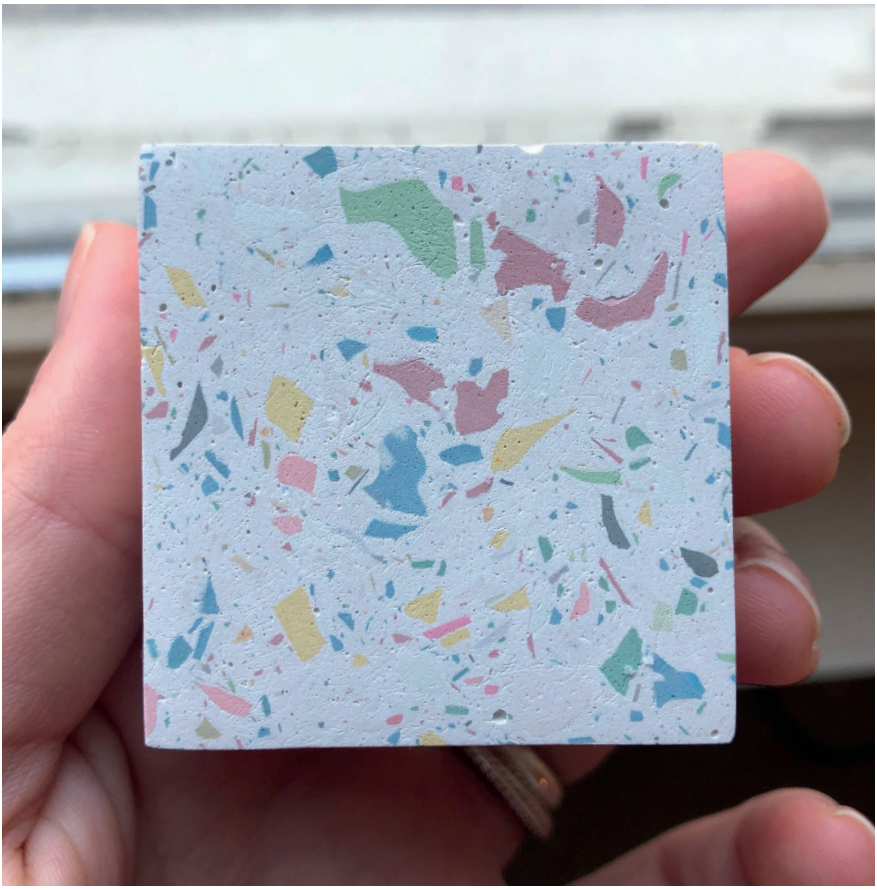
Pixels enlarged, but still placed by coincidence



sizes of pixels vary in size
↳ contributes to coincidental character

Where previous tests started to look more and more white, this still has clear spots.

still the spots are clearly visible
Also the colours can still be identified.



experimenting with possible pixel sizes and densities

8. MATERIAL REPRESENTATION

A possible representation of material.
Using gypsum to represent a medium that can carry little chips of a material with contrasting colours.
When designing, the continuation of these tests can help finding the right colour for the medium and the sprinkles, the right size of pixels and the right density.

experimenting with possible base colours

creating a library of coloured chips