brick 47°

Facts
Act
Process
Impact

by Esther Betz

Facts

Berlin counts as an urban heat island. This means that the temperature in the city is higher than the surrounding (+ 6 C°).
One reason for this are dark surfaces.

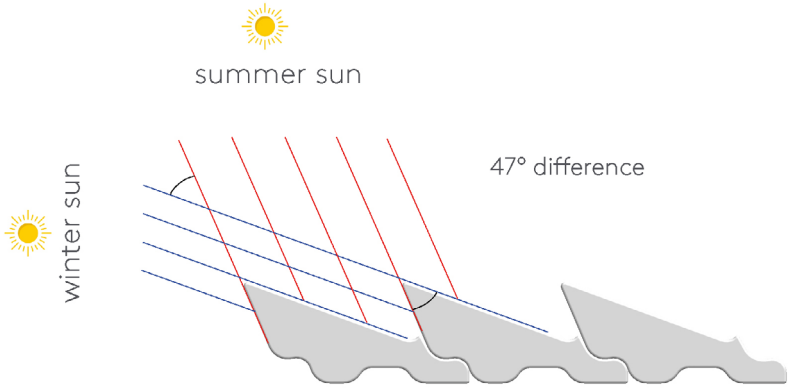
2018 died 20.200 people in Germany because of heat (Ø 19,82°C)

Act

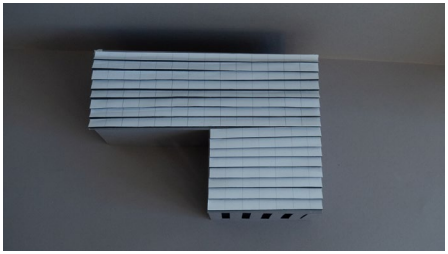
Act

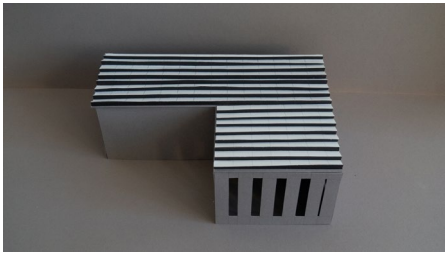
brick 47° is a flat-roof ceramic tile that cools in summer because it's illuminated by the white side and warms in winter because of the black side.
The sun angle of incidence differs by 47° between summer and winter.

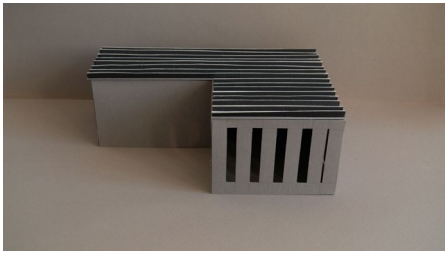
Act



Act







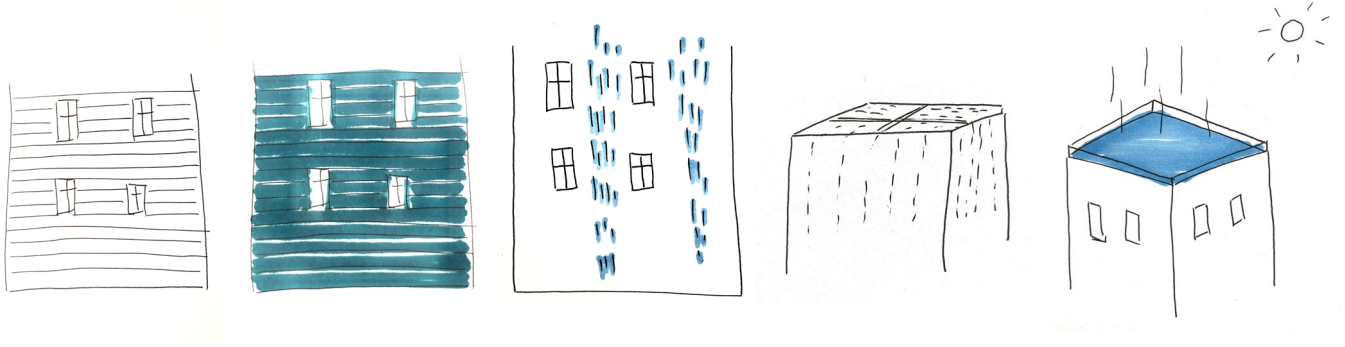
Process

Research

Silver linden tree:

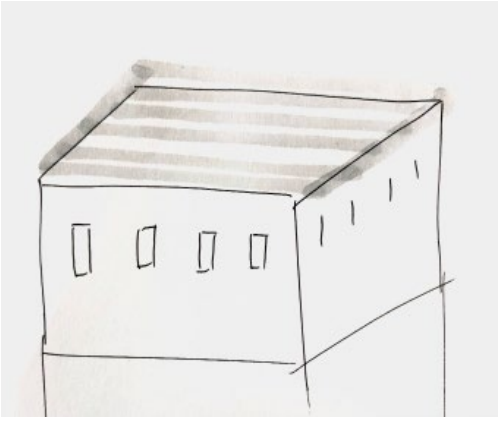
- has one side bright and reflective and one side dark.
- in strong sunlight leaves turn to bright side
- mechanism to protect the temperature and water balance

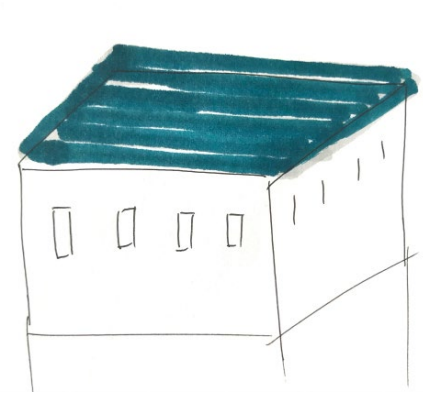
Process



different ideas

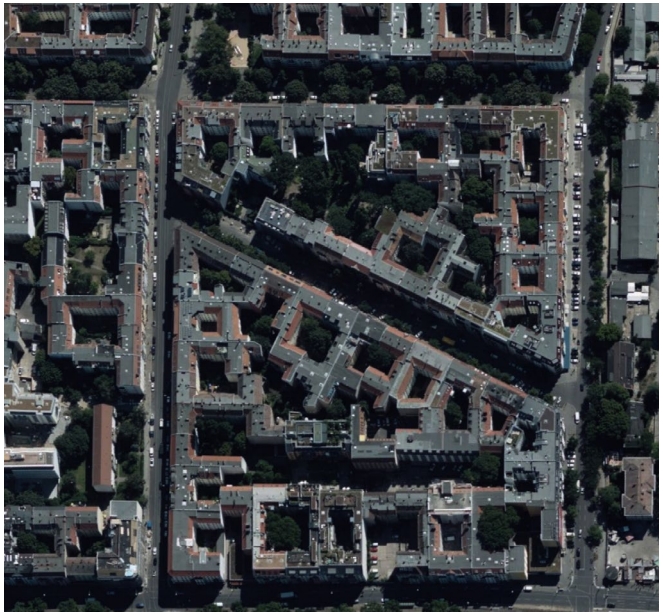
Process





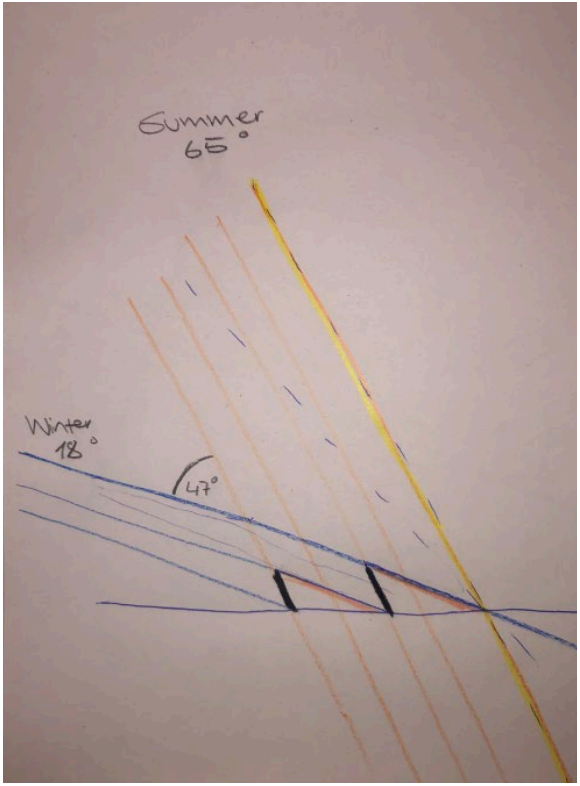
first sketch

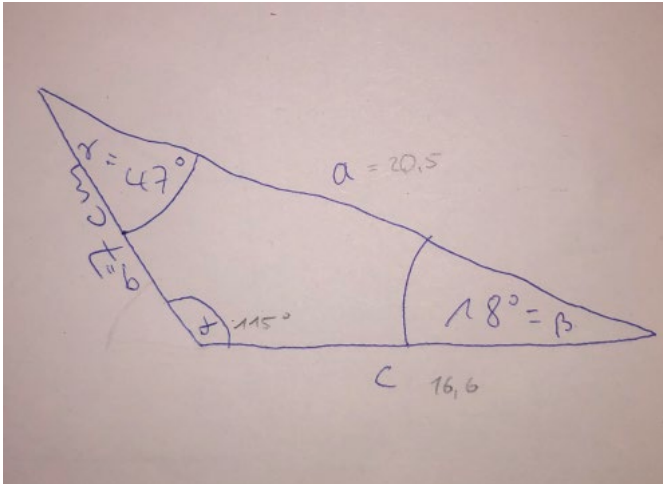
Process



comperation Berlin vs Santorini

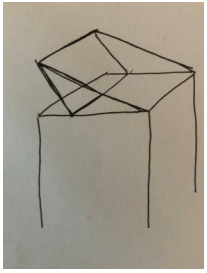
Process

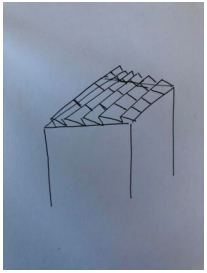


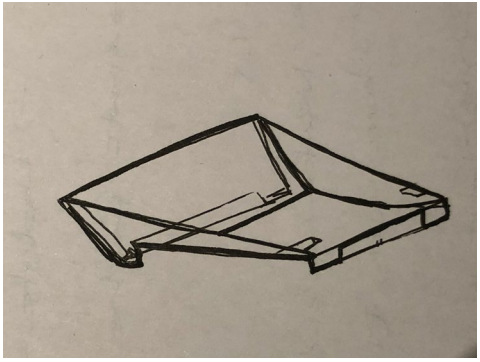


visualising idea and calculating

Process

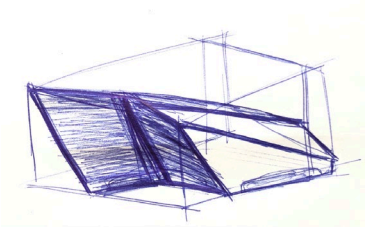






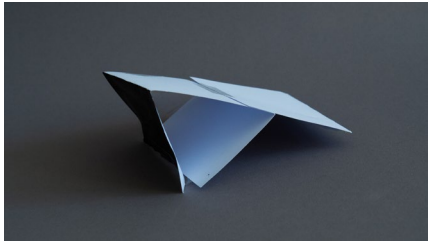
drawings

Process



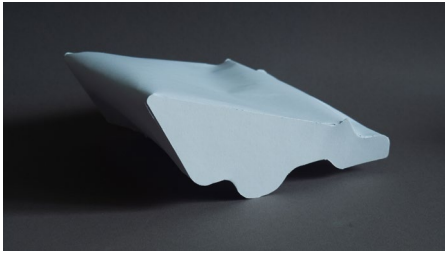
angle would give
stability, but
many corners

Process







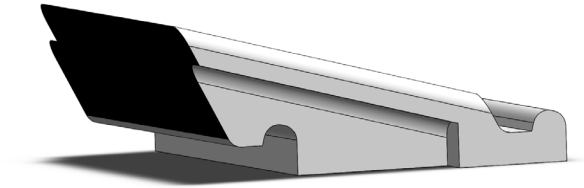

Process

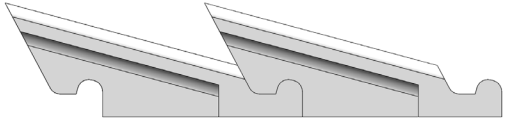
material:

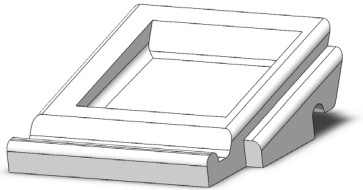
	blech:	blech/ceramics:	ceramics:	plastic or bitumen:
Pro	• light weight • easy to produce • affordable • winter side could be made black with ethanol	• positive effects of both could be used (getting hot in sun > winter & takes quite a ling time to heat up > summer)	• makes the best effect in cooling and heating • easy to color black an white with color pigments • weight would be enough to hold it itself on roof • i could use traditional techniques for brick construction • could give the costumer space to decide on glazing (water absorbing -> more work or sealed -> less work)	• very easy with coloring • easy forming • light weight • stable • easy to make push-or click system for example • not very sensitive
Con	• gets hot with sun! > smaler effect/ no effect? • need to color it • could use recycled material • could get rusty whith time • becaus of lightweight: need to connect brick to the roof surface	• would mix 2 Materials • to not mix it up: click mechanism • --> would be more work for roofer	• will get durty with time • need to be careful with weight • high energy in burning process	• gives microplastic particles to earth • mental thing: i wanna be sustainable - i don´t want to use plastic/bitumen

others:
schieferplatte (natural black)> expensive + bad for push systems
basalt(natural black) > expensive +
carbon (natural black)> very expensive

Process

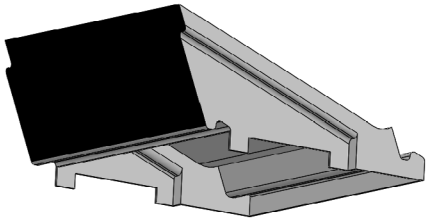


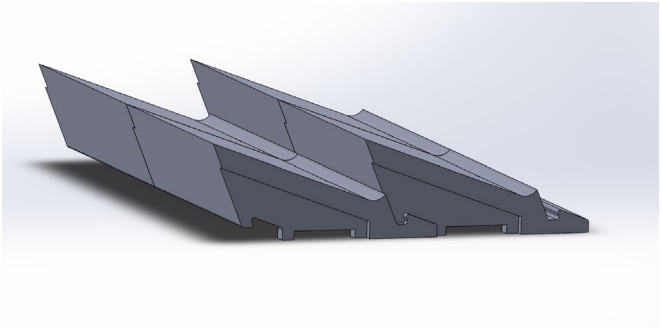


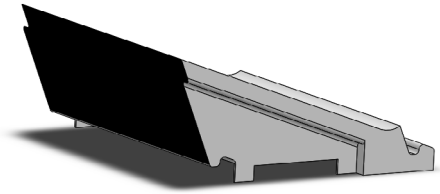


decided to not
go for the water
storage

Process

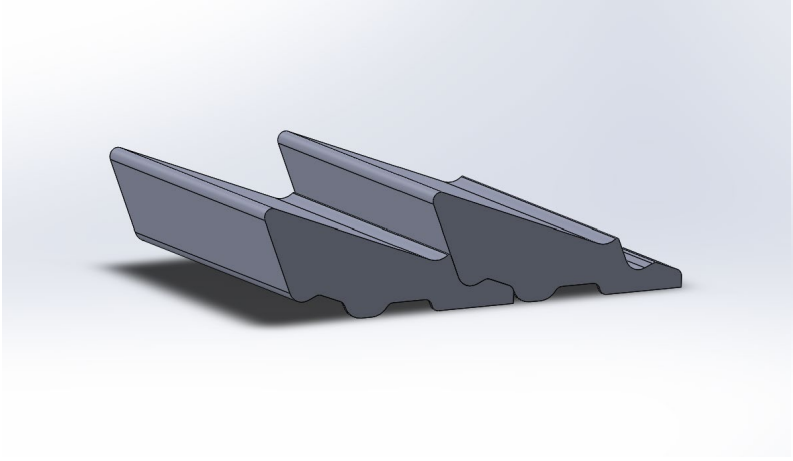


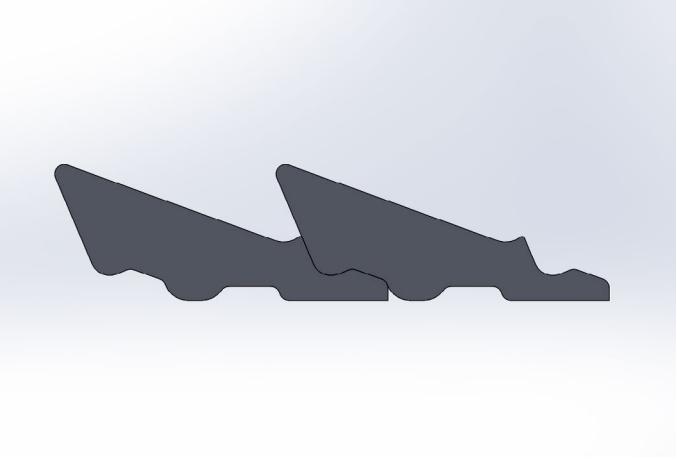




to many edges
to thin
front leg to small

Process



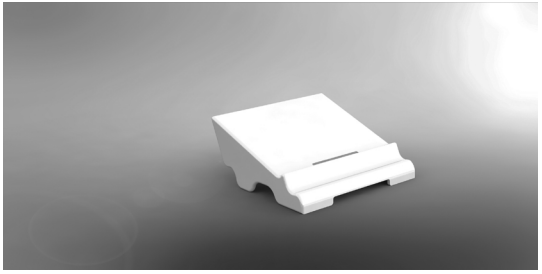


would fall over

Process

to big

Product



Product

Product

Product

Ceramics

13,5 cm x 30 cm x 30 cm

1 cm thickness

8-12 kilogram

glazed - less dirt and leaves

elevation easier to clean

for existing flat roofs -> not water proof

adapt existing drainage system

Product

Production:

ceramics stoneware

for example »tierra blanca 2202«

a multi-part negative mold to press the mass into shape

- important: mold needs to be bigger than desired size, because of shrinking process while burning (about 10-15% bigger)

let dry and burn on high temperature

glaze front side black and other sides transparent

Impact

milder winters

- less usage of heaters

- less Co2

2°C colder summers

- roofs have 33% influence on urban heat island effect

- less heat deaths

- prevent air conditioners:
  prevent massive damage to environment because of energy consumption and leaking fluorocarbons (greenhouse effect 23,000 times higher than Co2)

University of Arts Berlin

Design & Social Context

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