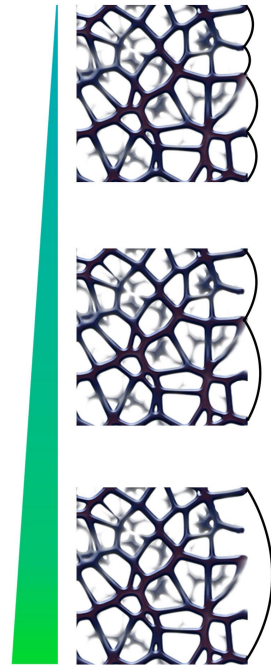




Section



Cushion resolution

STRATEGY 1

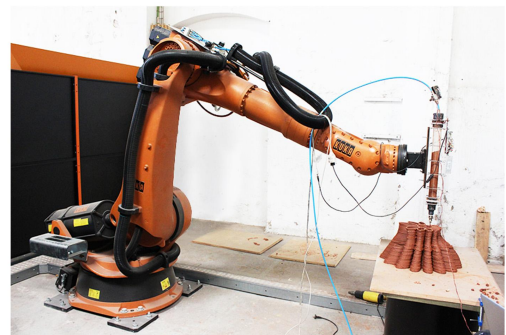
Pros:

- Producing the product in one take

Cons:

- Air tightness cannot be guaranteed
- Adhesion between two different materials can be a weak point

Note: TPE/TPU has been chosen because they are from the same 'family', which hopefully creates a stronger joint between the materials



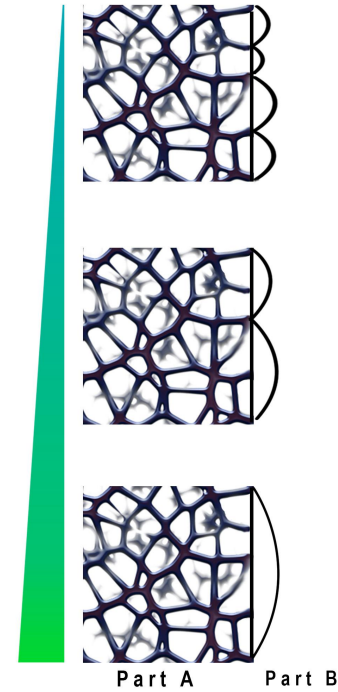
The strategy is to 3D print the structure in one take, with two different kinds of plastics. For the structure a harder and stiffer material, and for the inner cushions a flexible (balloon like) plastic.

Material:

- TPE (semi-flexible, melt temp: 220-260 °C)
- Thermoplastic Polyurethane (polyether) (TPU)



Section



Cushion resolution

STRATEGY 2

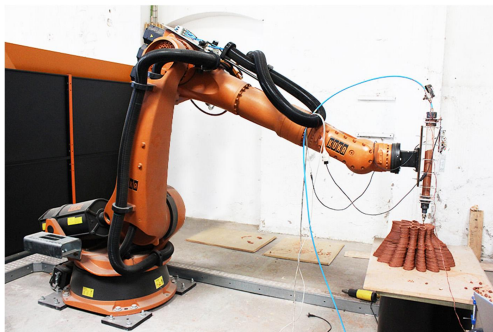
Pros:

- The hard and soft parts can be produced separately, thereby less production space is required. (less difficulty in setup).

Cons:

- Adhesion between the two parts need to be solved
- Difficulty in placing the cushions afterwards
- Thicker sheet material is required to weld the cushions together.

Note: the chosen materials also have potential to be used as in strategy 3. Printing the ETFE on top of the cushions.



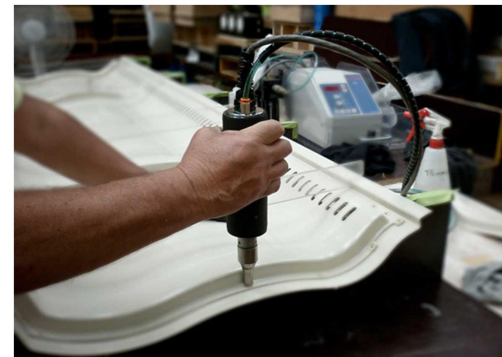
3D printing

The second strategy is to 3D print the hard structure first. Inside this hard structure the cushions are placed, which consists out of two foils welded together, which are inflated afterwards.

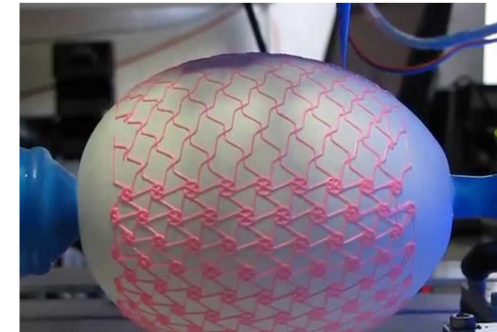
Materials:

Hard structure: ETFE

Soft structure: Thermoplastic Polyurethane (polyether) (TPU)

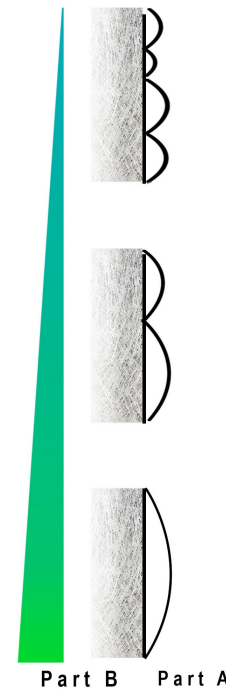


Welding





Section



Cushion resolution

STRATEGY 3

Pros:

- Cushions can be used as a mold, thereby serving a function during the production process and as a final product.

Cons:

- Thicker sheet material is required to weld the cushions together.
- Requires a large (spacious) setup



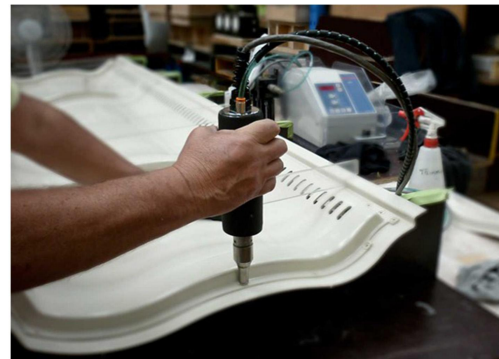
Fiberglass reinforcement

The third strategy is to weld the cushions first and inflate them. On top of these cushions a layer of resin with fiberglass as reinforcement is being placed.

Materials:

Hard structure: G10/FR4 (Fiberglass reinforced resin)

Soft structure: Thermoplastic Polyurethane (polyether) (TPU)



Welding



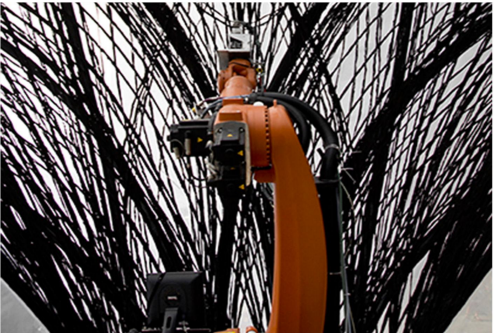
Section



Cushion resolution

STRATEGY 4

- Pros:**
- Cushions can be used as a mold, thereby serving a function during the production process and as a final product.
- Cons:**
- Thicker sheet material is required to weld the cushions together.
 - Requires a large (spacious) setup
 - Carbon fiber is expensive



Carbon fiber reinforcement

The fourth strategy is to, just like the third strategy, to weld the cushions first and inflate them. On top of these cushions you glue your carbon fiber reinforcement, which becomes your structure

Materials:
 Structure: Carbon fiber
 Soft skin: Thermoplastic Polyurethane (polyether) (TPU)



Welding