PORTFOLIO

Aaron Leonard Merten

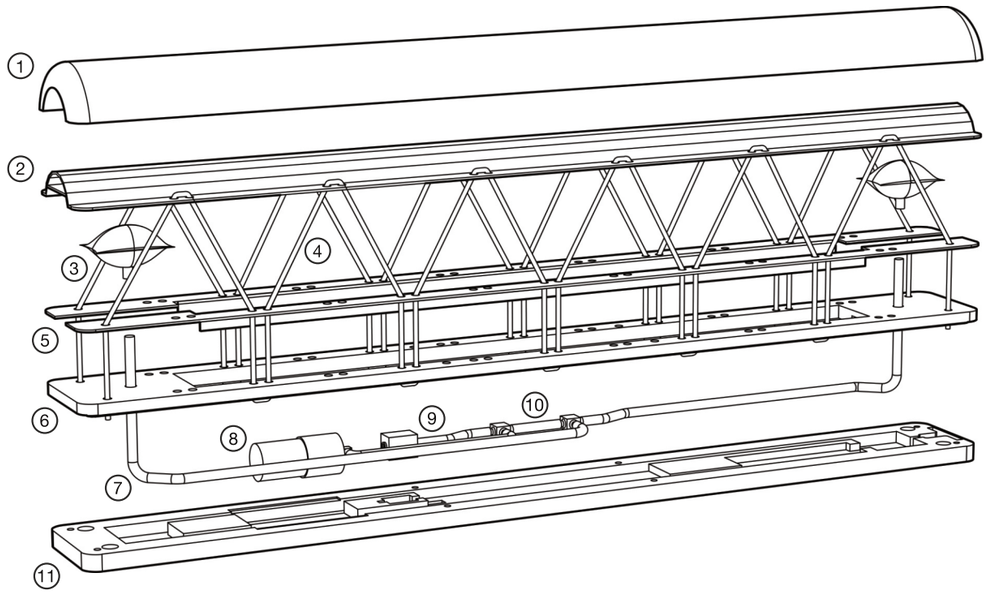
52|17

arm rest with resting period timer

semester	2 (summer semester of 2021)
students	Aaron Leonard Merten | Pascal Stappen | Tom Kemter
supervision	Katrin Krupka M.A. | Susann Paduch M.A. | Dipl.-Design. Timm Burkhardt

model in home position

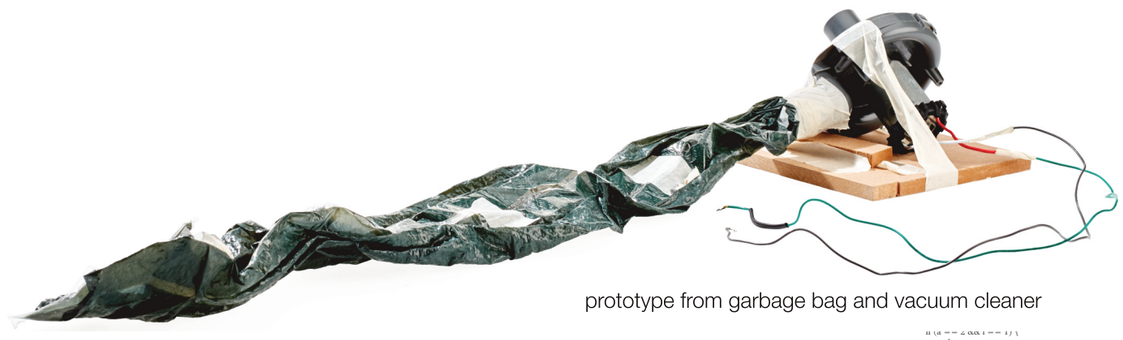
model at peak extension



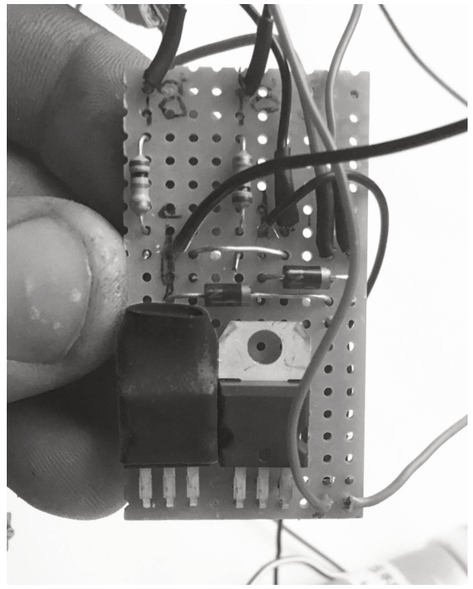
1. foam cover
2. upper bracing
3. bellows
4. elastic band
5. lower bracing
6. upper half of base
7. tube
8. pump
9. solenoid valve
10. coupling connectors
11. lower half of base

CONCEPT

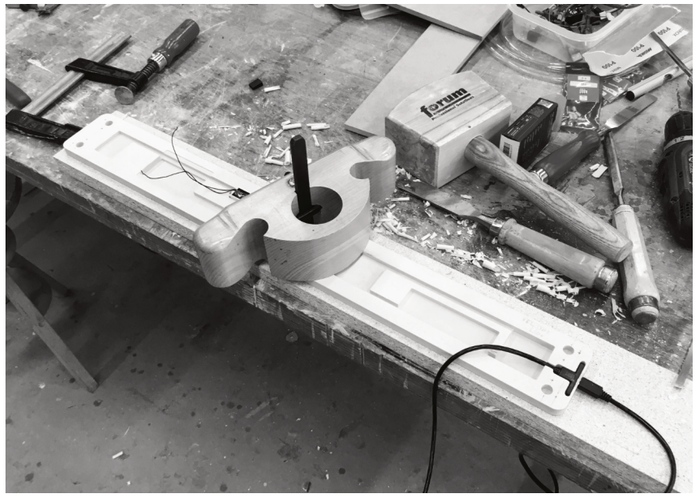
For health and productivity it is beneficial to periodically take short breaks distancing oneself from work matters. A study by the *Draugiem Group* showed that in the test environment, people who work focused for an average of 52 minutes and take an active break for 17 minutes are significantly more productive than the control group. The forearm rest 52|17 reminds people of the important rest periods by enlarging itself after 52 minutes by means of a pneumatic system, thus lifting the arms off the mouse and keyboard. After 17 minutes, an acoustic signal from the pump announces that the timer has started again and the forearm rest returns to its original position. The timer can be paused and resumed anytime by touching a capacitive sensor under the fabric cover.



prototype from garbage bag and vacuum cleaner

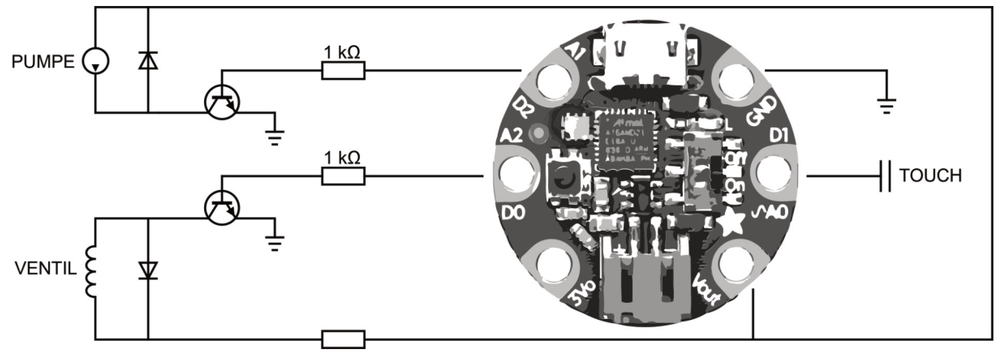


An Adafruit Gemma M0 is used to drive the pneumatics and process the input signals.



For the second prototype a housing from polyurethane was milled and adjusted by hand due to changes in component layout.

```
#include "Adafruit_FreeTouch.h"
Adafruit_FreeTouch cap = Adafruit_FreeTouch(A0,
OVERSAMPLE_1, RESISTOR_50K, FREQ_MODE_NONE);

int c;
int C = 900;
int R = 0;
int P = 2;
int V = 0;
int a = 0;
int l = 1;
int s = 0;
int o = 0;
float W = 0.2;
float B = 0.2;
long ta = 0;
long  ts = 0;
long  tc = 0;
int lf = 0;
long  tw = 0;
long  tb = 0;
long  tW = 0;
long  tB = 0;


void setup() {
  Serial.begin(115200);

if ((a == 2 && l == 1) \
  a = 1;
  s = 0;
  ts = millis();
  digitalWrite(P, HIGH);
  delay(250);
  digitalWrite(P, LOW);
  delay(250);
  digitalWrite(P, HIGH);
  delay(250);
  digitalWrite(P, LOW);
}

switch (s) {
  case 0:
    break;
  case 1:
    switch (o) {
      case 0:
        if (lf == 0) {
          ta = millis();
          lf = 1;
        }
        tw = millis();
        tW = tw - (tc - ts) - ta;
        if (tW >= W) {
          tW = 0;
          tw = 0;
          tB = 0;
          tb = 0;
          ta = 0;
          ts = 0;
          tc = 0;
          o = 1;
          lf = 0;
          R = 1;
        }
        break;
      case 1:
        if (lf == 0) {
          ta = millis();
          lf = 1;
        }
        tb = millis();
        tB = tb - (tc - ts) - ta;
        if (tB >= B) {
          tW = 0;
          tw = 0;
          tB = 0;
          tb = 0;
          ta = 0;
          ts = 0;
          tc = 0;
          o = 0;
          lf = 0;
          R = 0;
        }
        break;
    }
    break;
}

switch (R) {
  case 0:
    digitalWrite(V, LOW);
    digitalWrite(P, LOW);
    break;
  case 1:
    digitalWrite(V, HIGH);
    digitalWrite(P, HIGH);
    break;
  }
}
```

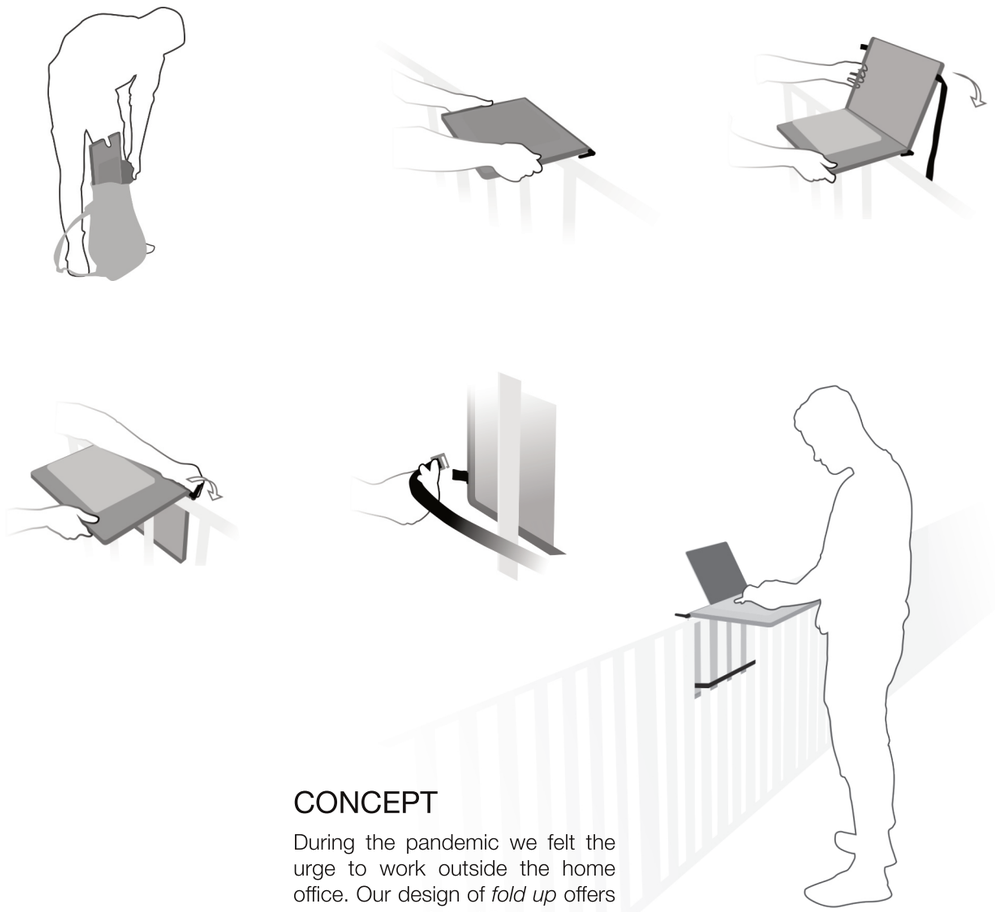


Aaron Leonard Merten

fold up

mobile work surface with content retainer

semester	2 (summer semester of 2021)
students	Aaron Leonard Merten | Pascal Stappen | Tom Kemter
supervision	Katrin Krupka M.A. | Susann Paduch M.A.

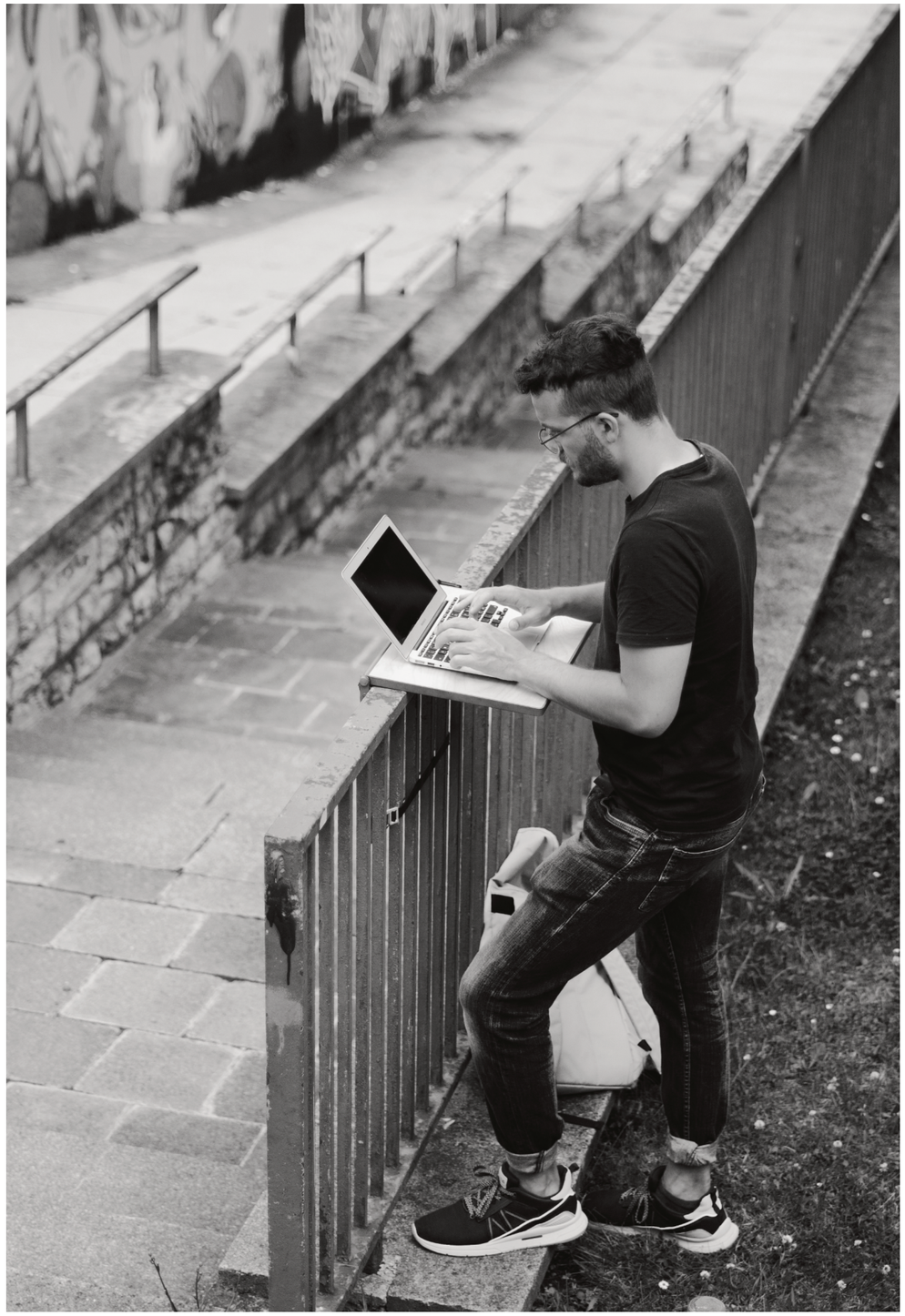


CONCEPT

During the pandemic we felt the urge to work outside the home office. Our design of *fold up* offers an approximately A3-sized work surface for this purpose. With the help of a fold-out frame and adjustable strap it can be attached to various railings. A net allows for work utensils such as a laptop or writing pad to be clamped to the base for secure transport.

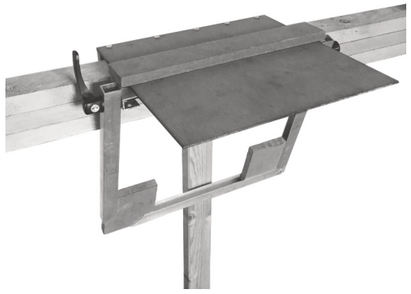
the aluminium casted buckle can be hooked into the strap loop single-handedly

the joint is locked by the use of an adjustable clamping lever



application example

PROTOTYPE 1



The first prototype unified all functions in one mechanism.

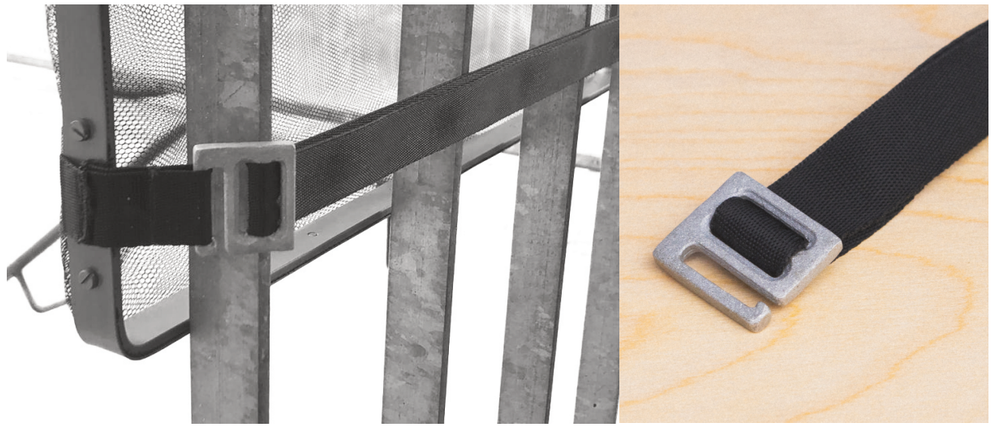
PROTOTYPE 2

For the second prototype the mechanisms were split into separate assemblies and simplified.

PROTOTYPE 3

During construction of the third prototype we noticed that the mounting mechanism did not work as the steel frame was too heavy and flexible.

PROTOTYPE 4

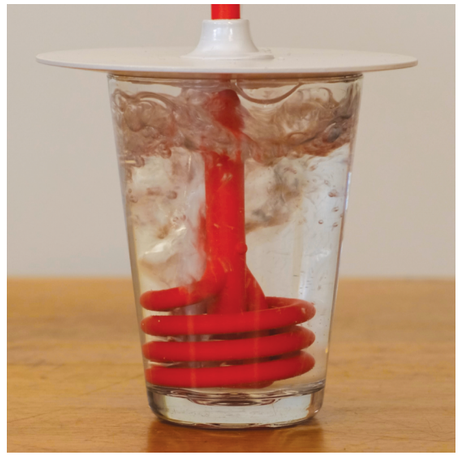


In the fourth prototype the clamping mechanism was replaced by a belt and buckle.

SENKO

safe and repairable immersion heater

semester	3 (winter semester of 2021)
students	Aaron Leonard Merten | Michel Schneider | Johannes Schütz
supervision	Prof. Martin Kuban | Susann Paduch M.A.

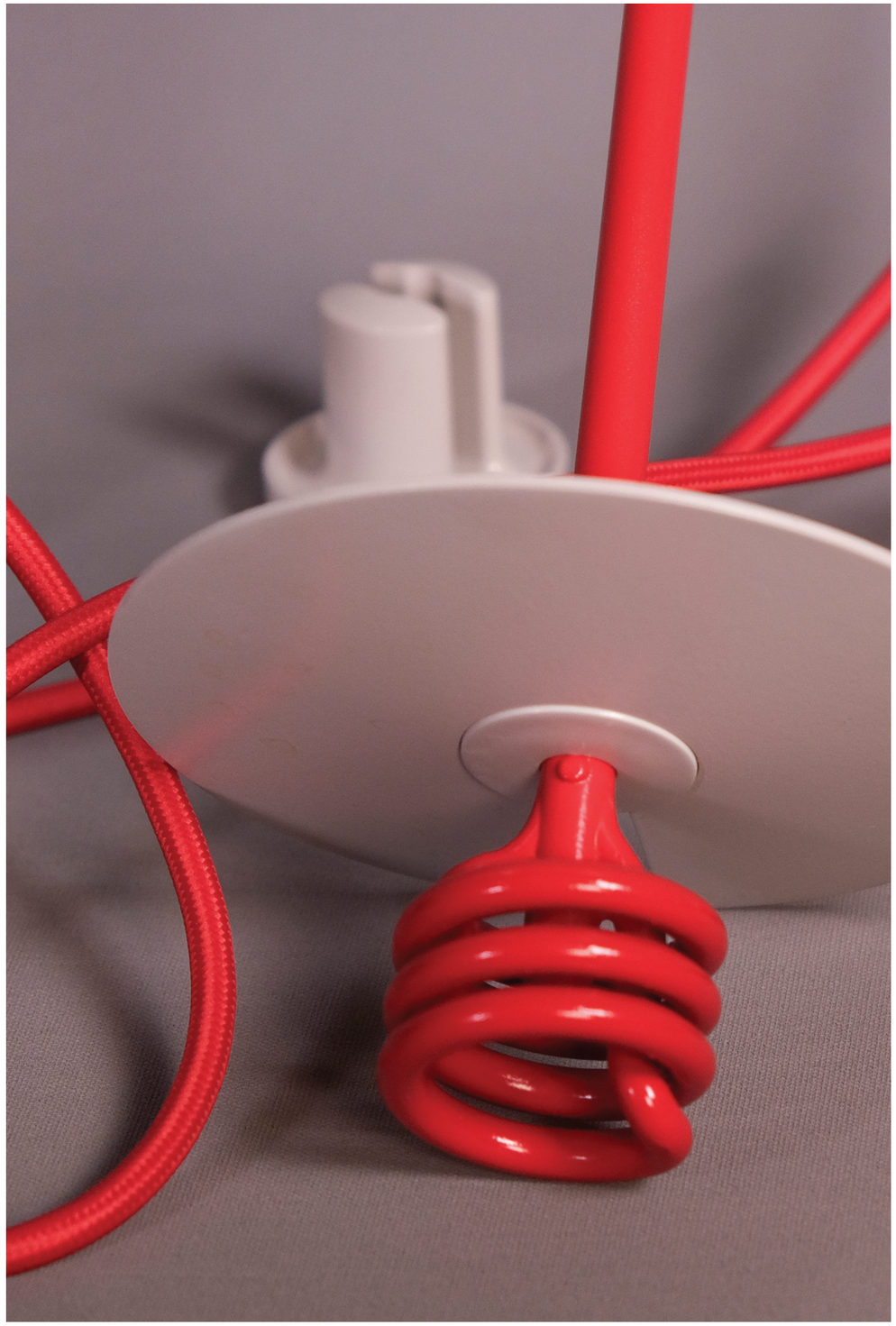


The shape of the immersion heater and lid are designed to be used with a variety of different vessels.

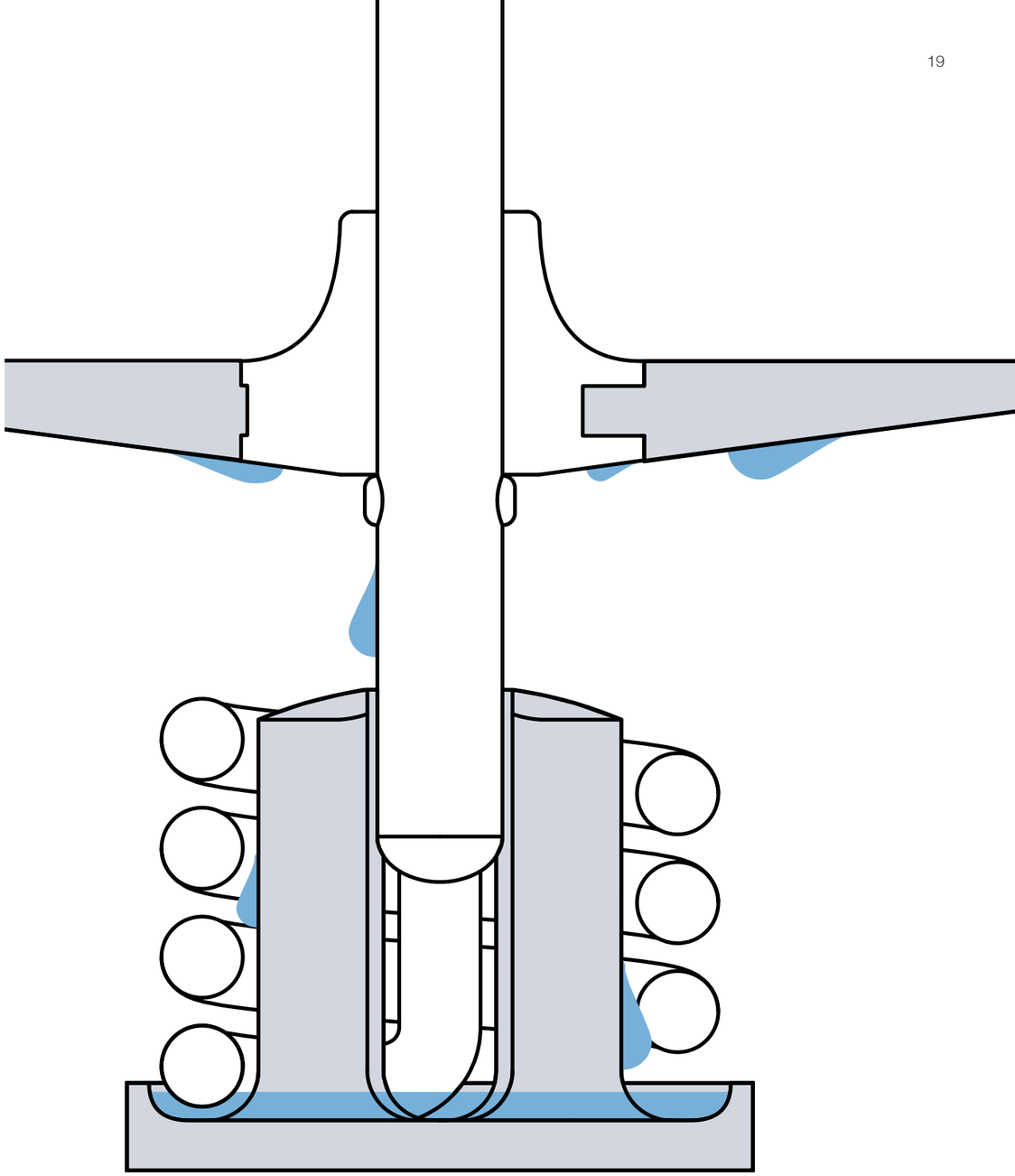
CONCEPT

Boiling water is an everyday process for which a dedicated household appliance - the electric kettle - has become a fixed part of the basic kitchen equipment. For our design of SENKO, we revisited the principle of the immersion boiler in order to reduce the waste of energy and water by heating excess water. Users heat the water directly in the vessel they will later use instead of the designated container of the kettle and thereby avoid misjudging the desired volume of water. In the design, a clear language of forms and a reduced colour concept were used to guarantee comprehensible user guidance. This way both, the correct use of the product is clearly communicated and the technical functionality is revealed, thus simplifying the process of repair.

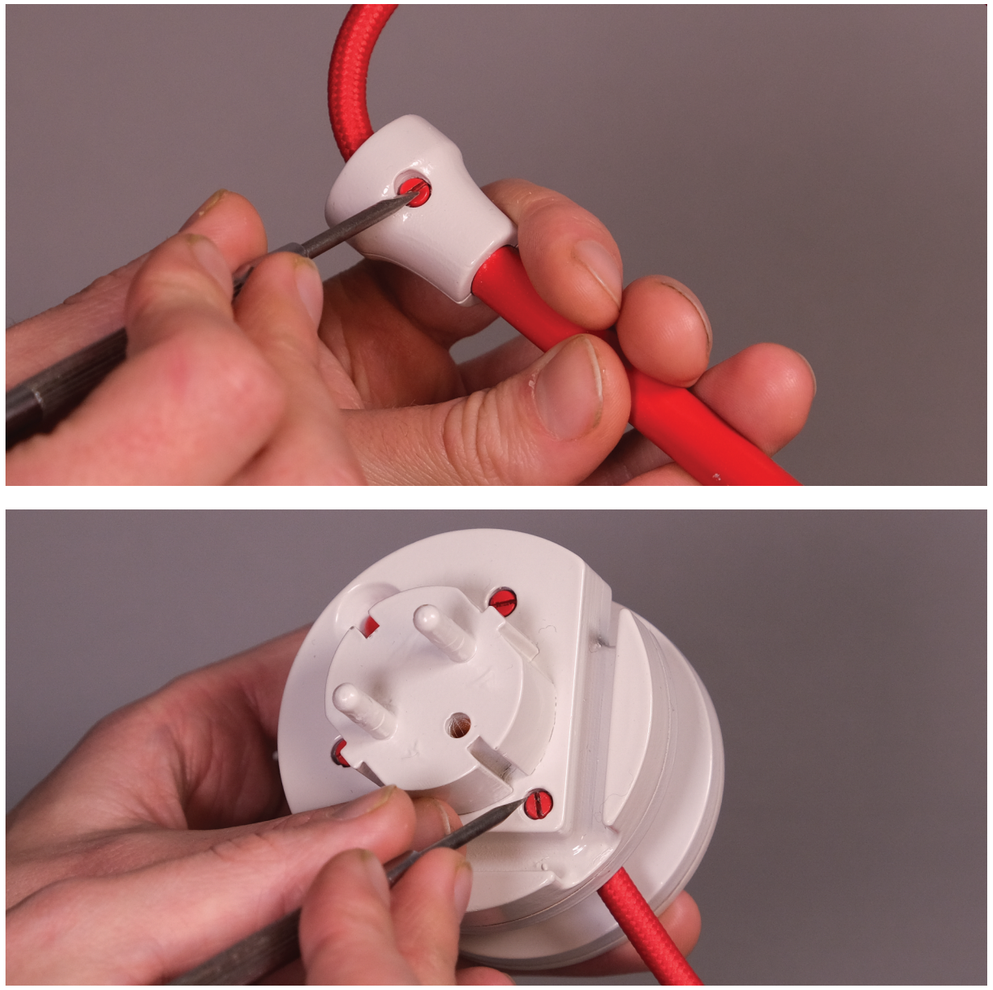
The power supply features a knob and dial for startup and temperature adjustment as well as a cable holder for flexible adjustment of the cable length.



The heating element joins form-fittingly with the home, allowing the immersion heater to be stored safely.



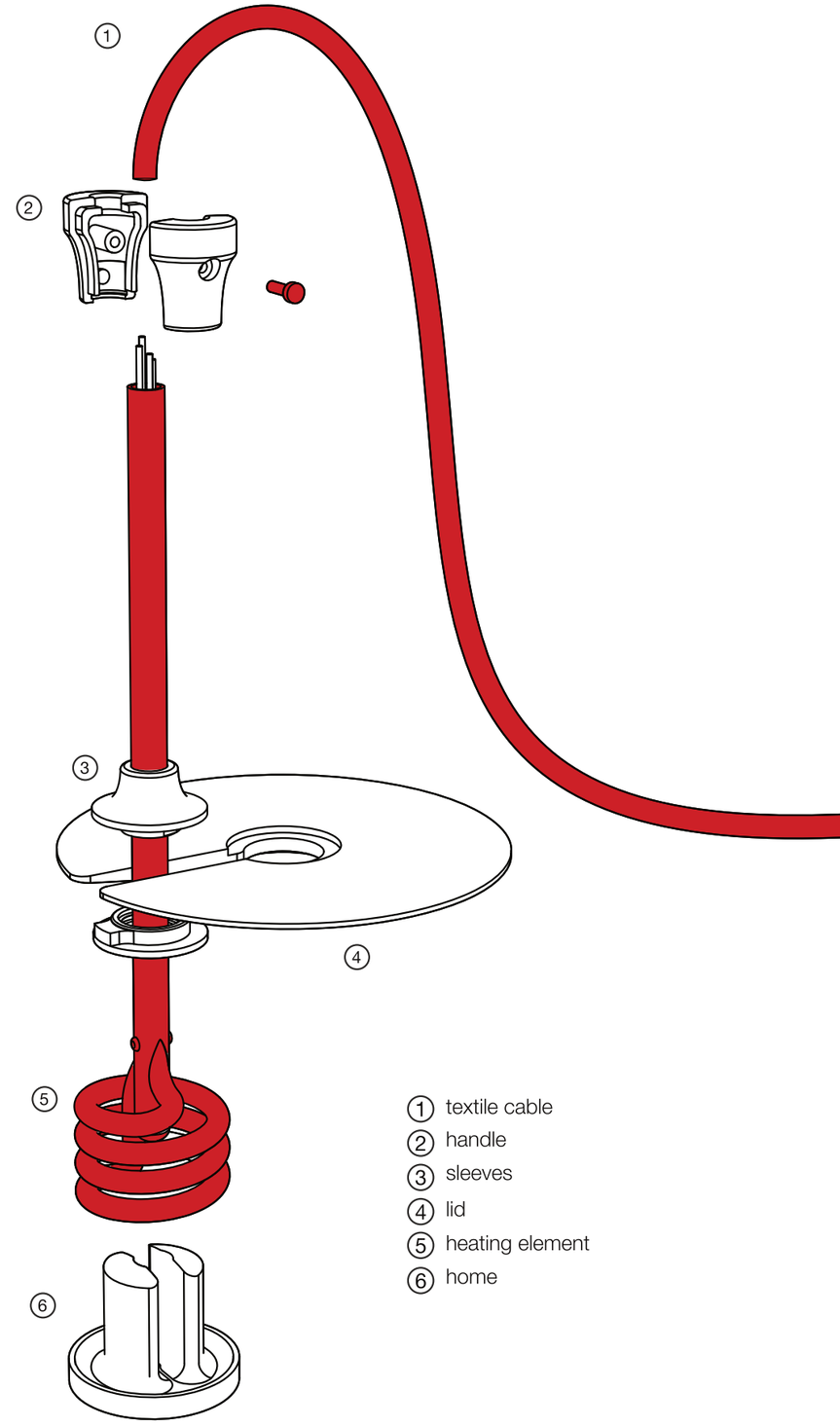
The lid greatly increases the energy efficiency of the immersion heater by retaining convection heat and reflecting radiant heat. Due to the inclination of the lid condensate and dripping water is collected in a groove of the home.



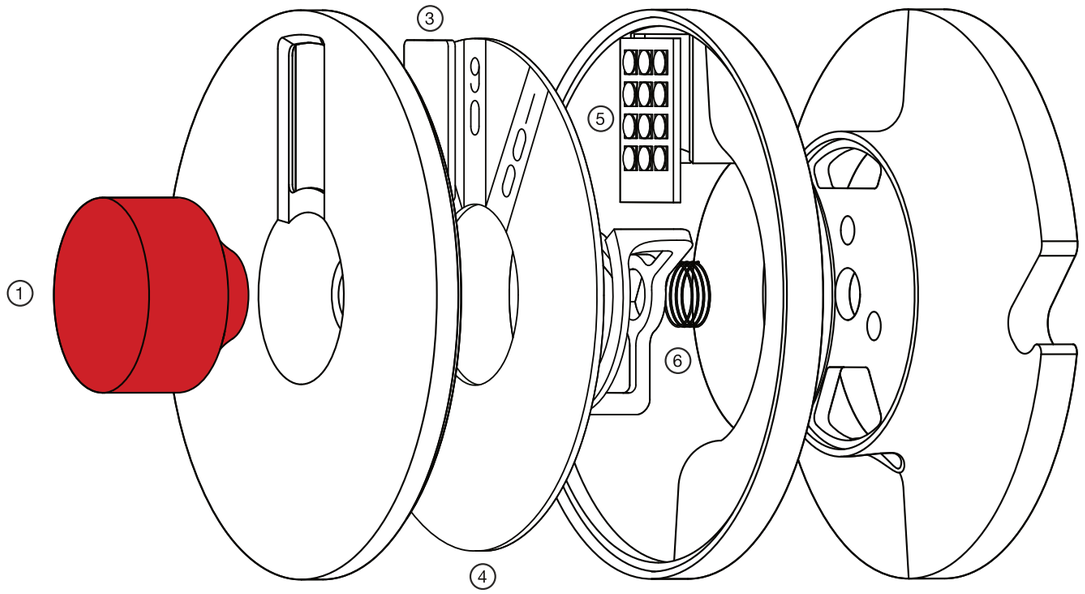
Repair of the product is encouraged and facilitated by design.

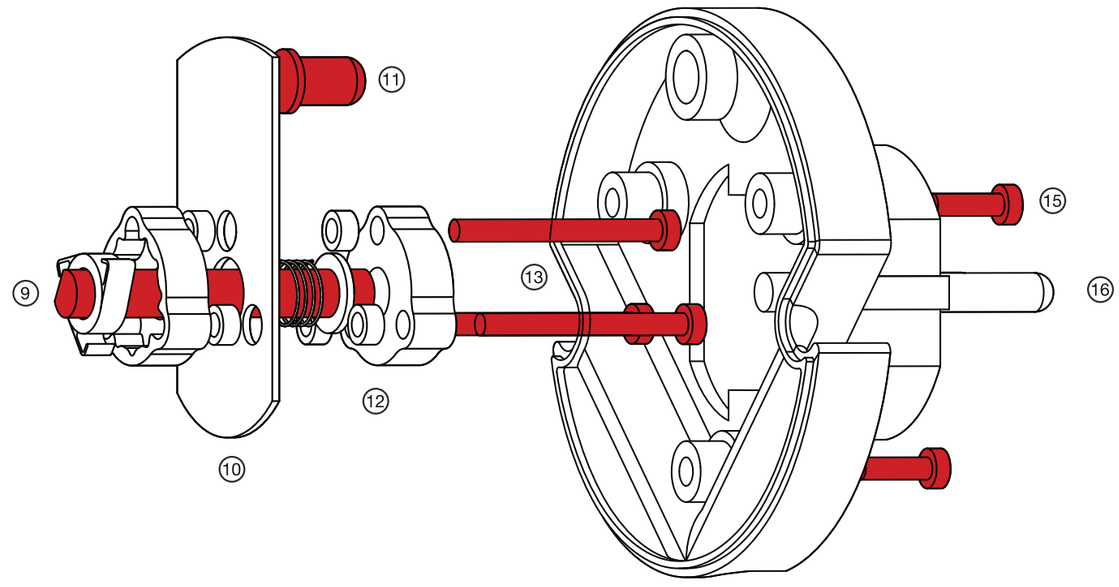
REPAIRABILITY

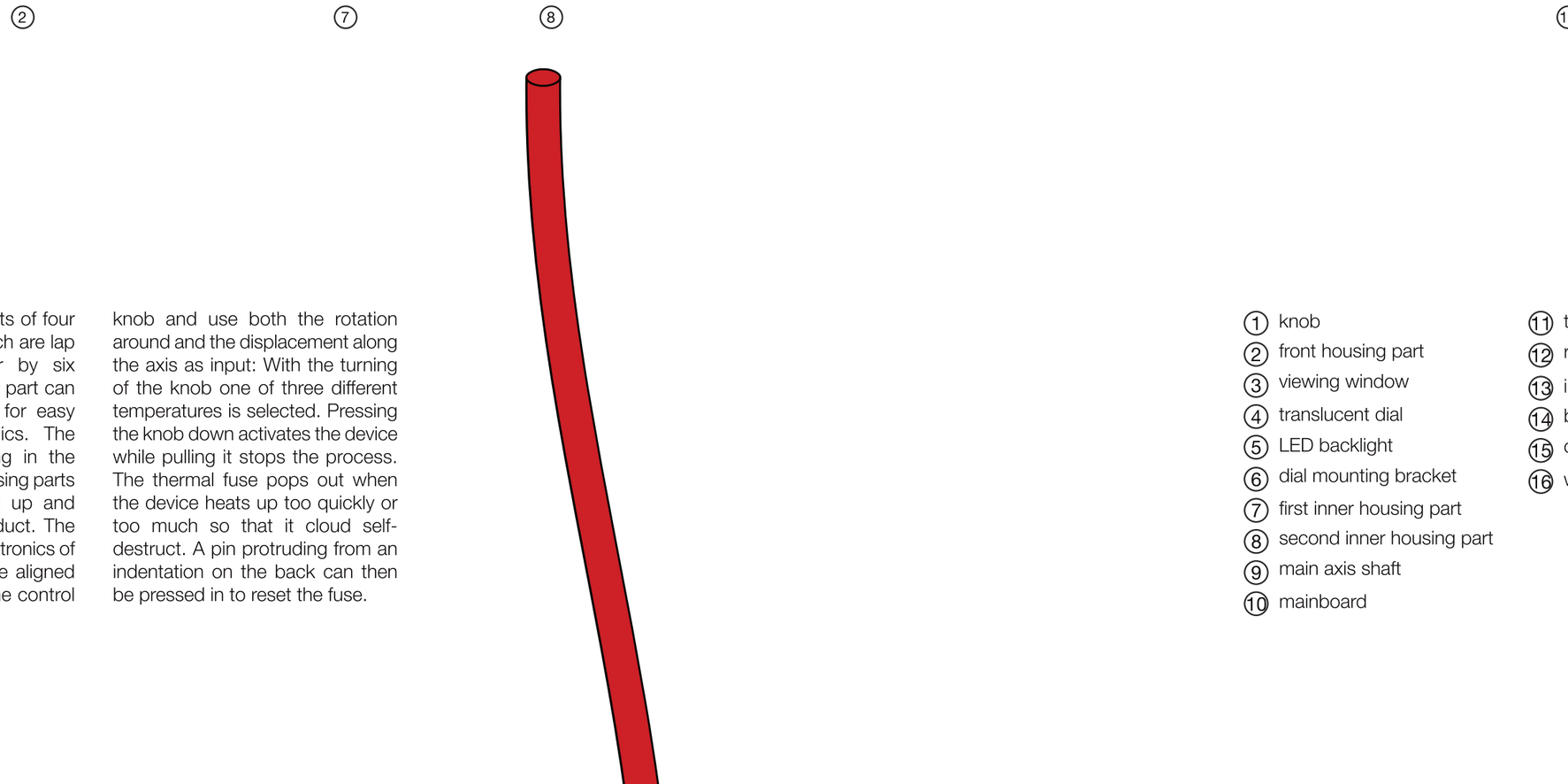
Regarding the repairability of the product we wanted to guarantee the safety of the users without denying them the possibility to fully intervene in their device or discouraging them from doing so. The colour concept emphasises the screws equally to the controls and encourages disassembly of the device. Instructions, video footage and CAD files included with the product allow for a spectrum of repairs from completely DIY to full-service. The textile cable as the largest wearing part can be exposed by loosening just four screws and replaced without interfering with the electronics. The three screws on the bottom of the power supply only loosen the parts necessary for replacement and can only be loosened when the device is unplugged.



1. textile cable
2. handle
3. sleeves
4. lid
5. heating element
6. home







ASSEMBLY

The power supply consists of four plastic housing parts which are lap joint and held together by six screws. The rear housing part can be detached separately for easy access to the electronics. The cable leaves the housing in the taper of the two inner housing parts where it can be wound up and clamped into the cable duct. The entire mechanics and electronics of the power supply unit are aligned with the central axis of the control knob and use both the rotation around and the displacement along the axis as input: With the turning of the knob one of three different temperatures is selected. Pressing the knob down activates the device while pulling it stops the process. The thermal fuse pops out when the device heats up too quickly or too much so that it cloud self-destruct. A pin protruding from an indentation on the back can then be pressed in to reset the fuse.

1. knob
2. front housing part
3. viewing window
4. translucent dial
5. LED backlight
6. dial mounting bracket
7. first inner housing part
8. second inner housing part
9. main axis shaft
10. mainboard
11. thermal fuse pin
12. rotary switch
13. inner screws
14. back housing part
15. outer screws
16. wall plug

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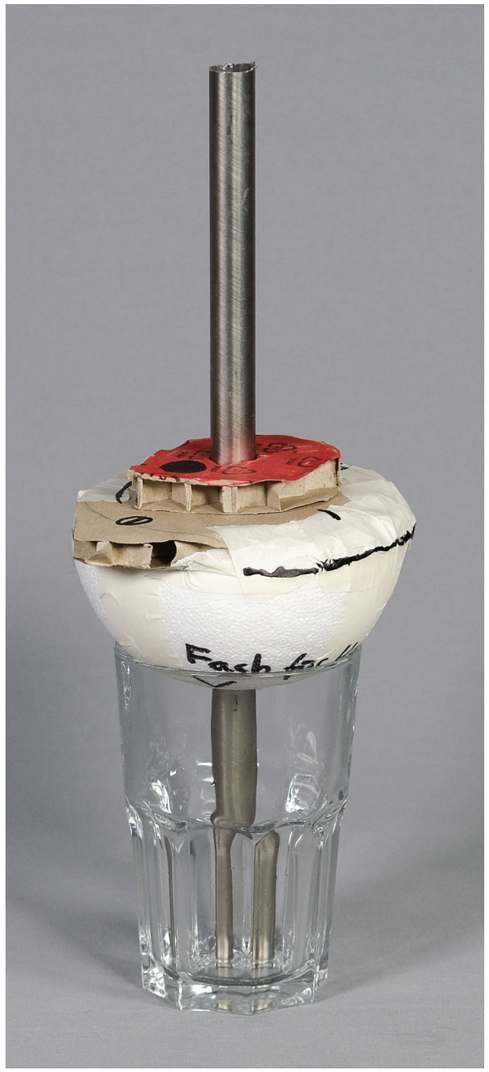


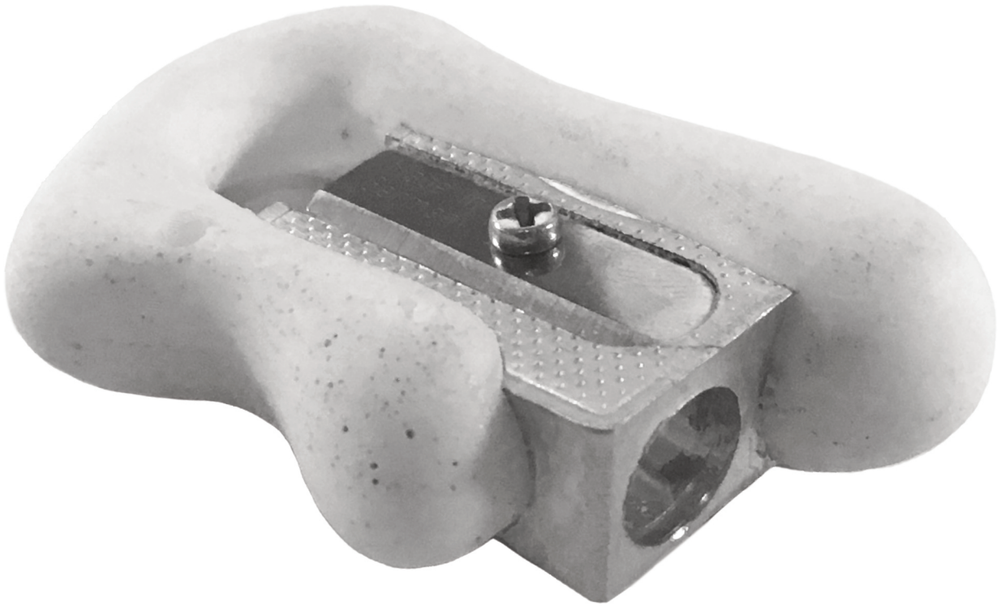
At the beginning of our form-finding process, we experimented with a commercial immersion heater.

In a cyclical process, we increasingly defined the requirements for the product in order to progress from the abstract form to the concrete detail.

guss

aluminium and resin casted form study

semester	3 (winter semester of 2021)
students	Aaron Leonard Merten | Kira Becker
supervision	Prof. Martin Kuban | Susann Paduch M.A.

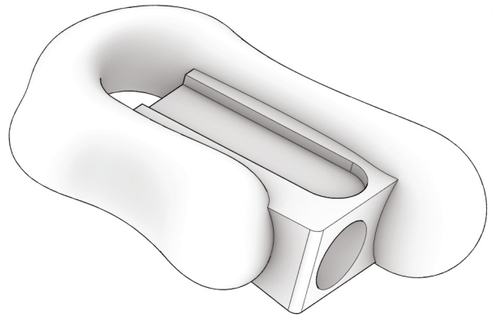


EXERCISE

In an exercise on casting methods, two extensions for existing objects were to be designed. In contrast to the static appearance of the sharpener which stems from the various machining processes, I wanted the cast to appear soft and flowing. I tried out different handle shapes in several 1:1 models and then studied proportions and curves in a larger 10:1 model. Based on a 3D scan of the model, I constructed a corresponding 3D model in order to print the positive for mould making. As an attachment for a screw cap we designed a pour-out and pour-in that can be used at a shallow angle, for example when filling up the bottle in a narrow sink. Two pieces of cast aluminium are screwed together and sealed in the contact area. Since the castings are designed with a non-planar dividing line, a base was used for the sand mould.

from sketch to model...

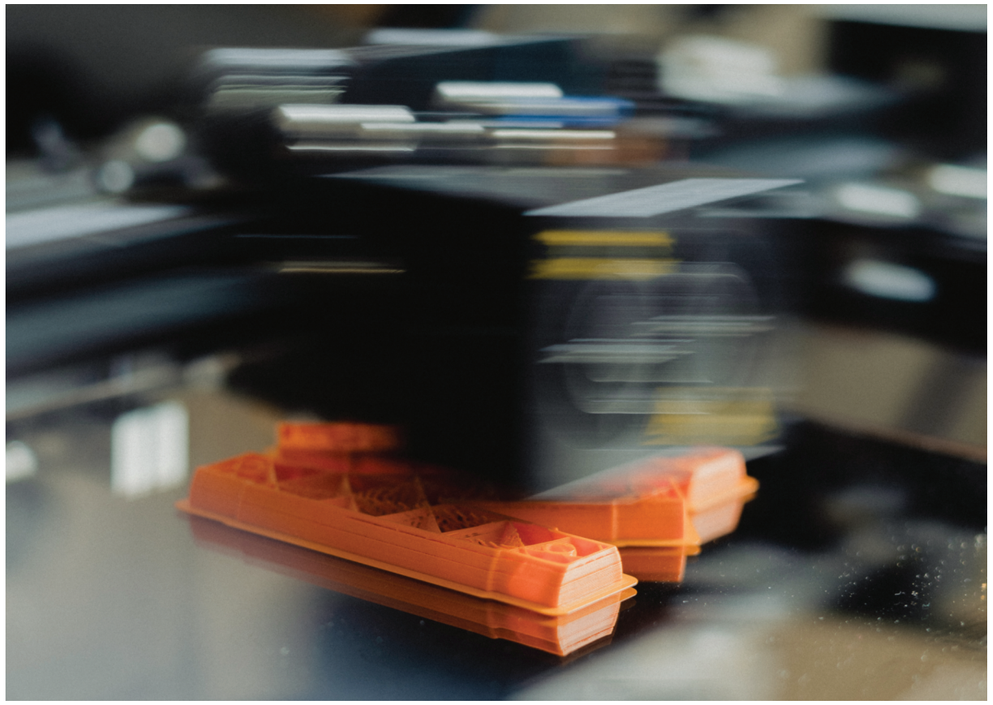
An initial 10:1 model was used to study the shape of the sharpener-attachment.



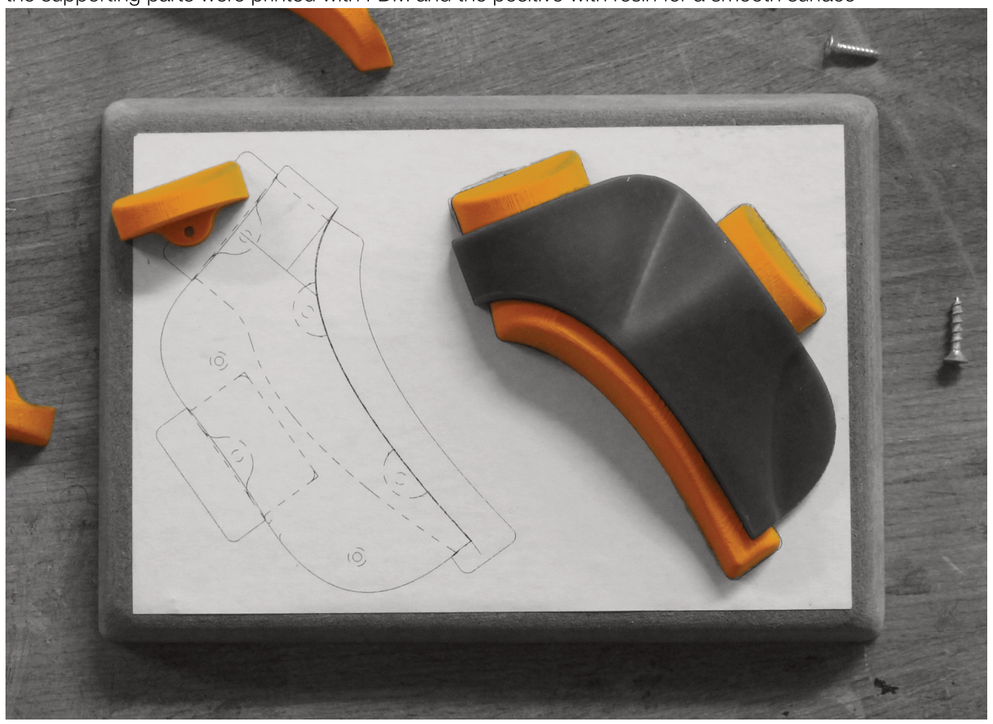
From 3d-scan data I constructed a digital 1:1 model using Rhino 3D.

FDM printing was used to make a positive for the silicone vacuum-casting.

The resin was casted around the sharpener held in place by positioning pins.



the supporting parts were printed with FDM and the positive with resin for a smooth surface



this mould which doubles as a positioning template was used in the aluminium sand-casting

The free-form shape was designed with curve nent-works in Rhino 3D.