TEXTILE AS SCAFFOLD

MAKING CRYSTALS

Materials suited to grow crystals are those with an open weave: linen, silk, jute, net... As long as there's air between the fibers.

Cooling down the crystals slowly makes them stronger. Rapid temperature changes make them more brittle

RECIPES WITH ALUM

* Put tap water in the stove to heat
* Add alum until the solution is saturated, so until no more alum can be dissolved. Maghenita started with 100gr of alum and about 1 liter of water.

[TIP: don't move the textile once the solution has been poured over it, as the crystals in formation will break.]

She keeps adding alum (100gr each time) until the solution is saturated. Total amount: 450 gr.

[TIP: heating the resulting crystals will turn them from transparent to translucent white]

[TIP: crystals leftover from a batch can be redissolved in water and reuse.]

* She places a piece of fabric in a petri dish, and pours the hot solution over it. The fabric shouldn't touch the bottom of the petri dish. Tape can be applied to one side of the fabric to prevent crystals from growing there.

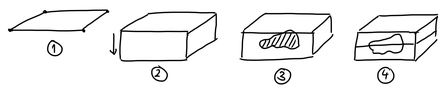
VARIATIONS:
→ Adding colorant to the solution before pouring it
→ Adding conductive paint (1 tbsp per 100 ml water)
→ Place seed crystals on top of the fabric that's been soaked. More crystals will grow around them.
→ Grow crystals in different structures: macramé, animal bones... as long as it's porous.

The recipe is the same for all the other crystals.

IDEA: make water resistant patterns on the fabric, making a path for the crystals to grow.

MOLD MAKING

① Draw a curve → Square, circle, polygon...
② Extrude 3cm (or the desired thickness. → Extrude closed planar curve (Extrude Crv)
We use 3cm because that's the thickness of the foam available). The mold can also be constructed by several layers. More on that later.
③ Shape inside the extrusion + boolean difference → Sphere, cube, etc + boolean difference
④ Split in two parts. → SrfPt (surface plane) + split



Additional notes:
A hole can be made to insert filling in the mold.

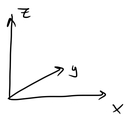
Also, the inside shape doesn't need to be fully coated, it can have another shape inside to end with a hollow final structure.

CNC MILLING

Basically a drill attached to a 3 axis frame.
We're using as material 3cm thick foam.

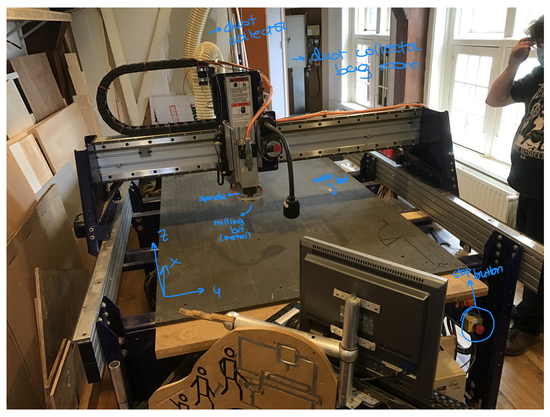
This is a dangerous machine! It doesn't tell you if you're making mistakes, so it will burn the building if you tell it to.

It is better to work with the machine alone because it needs focus and a lot of attention.



It has x, y and z axis like other machines, but it has no housing. The CNC room should be kept as clean as possible and without food or drinks.

Don't touch the machine when it is moving, as it is powerful enough to harm limbs. Also, the bed should be clear of material when moving the machine.



The dust collection bag should be checked before starting a job to see if it is full.

The material to be milled is fixed in place with screws. If the milling bit touches the screws while milling, it will create sparks that can cause a fire, especially when a hot or burning wood chip gets to the dust collection bag, which is a perfect environment for fire.

If there's any suspition of the screws and milling bit touching, the machine has to be stopped.

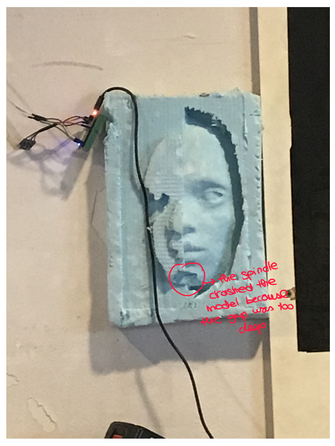
Also, anything that gets entangled with the spindle will get pulled with great force. For that reason: hair up and anything should be hanging (think clothes, jewelry...).

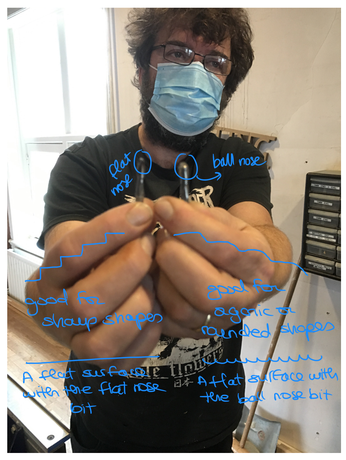
To prevent accidents when changing the milling bit, the tool for that is attached to the key that turns on the machine.
After you're done using the machine, the workshop should be vacumed and properly cleaned.

To use the machine, safety goggles and ear plugs have to be worn.

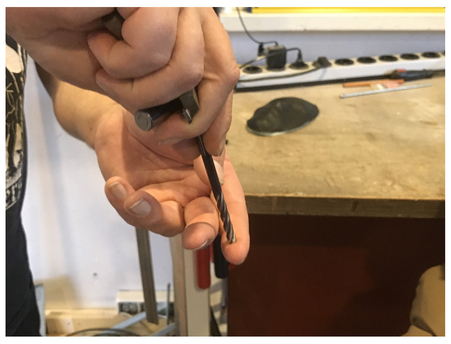
122 x 244 x ~20 cm

Usually, 4.5 cm is as deep as you can mill in a single piece of material.

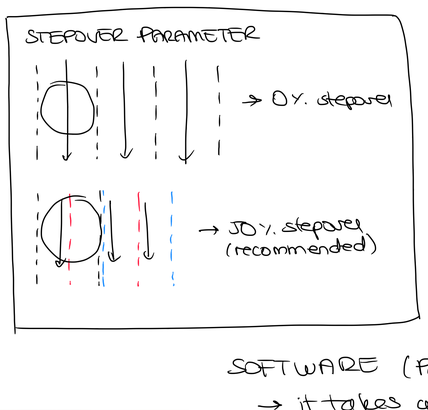




Flute → drilling bit to cut
↳ 2 flute = 2 sharp edges
↳ 4 flute = 4 " 4
etc



There are different flutes depending on the number of blades and the diameter.



SOFTWARE (Partworks or Vcarve)

→ it takes an STL and translates it to a gcode.
→ We'll use Vcarve shopbot edition (later we used Partworks bc Vcarve wasn't cooperating)

Steps:

① Open program and create new file
② Select material. We're using foam.
Important to remove the metal film from the side that is going to be milled.
Henk cuts a piece and measures its dimensions.
We need precise measurements.

③ Set the anchor point in the software (the 0,0 position).
④ Select Machining resolution to standard
⑤ Select the material on the dropdown.
⑥ Import 3D model to be milled.
Import > File
⑦ Place the model in the material as you desire. The software will show if there are errors in the resulting job.

If you click "Fit to material", it will scale the model to fit the dimensions of your material.
⑧ Roughing toolpath settings. This phase will remove big chunks of material.
8a. Select the milling bit. All the available milling bits are in the program and can be selected.
8b. Select stepover (recommended 50%)
8c. Select spindle speed (10 000 rpm for foam). To know the right number you have to test on your material. Hard materials need a slower spindle speed.
8c. Plunge rate: 120 for foam. The denser, the slower it should be.
There are more parameters but these are the main ones.
⑨ Finishing toolpath. The path that will refine the surface to make it smooth.
⑩ Cut out toolpath. We're not using it.
⑪ Preview machining.
⑫ Save the file. If you're using a different milling bit for roughing and for smoothing, you need to have two separate files.
It is a good idea to put the dimension of the milling bit on the name of the file.

OPERATING THE MACHINE

① Clean any remaining material bits from the bed. Having material could push the material up which can translate in errors while milling.
② Fix the material to the bed with double sided tape. (For foam). For wood we would use screws.
Make sure the bed is flat, sand any imperfections if any. To ensure it doesn't move, Henk also builds a wooden frame around the material and screws it in place.
③ Turn on the machine
④ Open Shopbot software
↳ Press "k" to open a control panel. Then you can move the axis of the machine with the keyboard.
↳ Set the 0,0 of the machine. It is the reference point for us to know where the machine starts. ⇒ Button: set zero x,y
When pressing the button, a loud noise will happen and the machine starts moving.
↳ Set the anchor (starting point of the job). (x,y)
It is set manually pressing "Job home" and moving the spindle with the keyboard to the starting place on our material. The milling bit has to be attached to the spindle to locate the anchor precisely.
Make sure the drill bit is sticking out enough to be able to drill as deep as we need.
Put the plastic cover down over the material using a lever on the back of the spindle. Place the milling bit and tighten it. Put the plastic cover up again.
Then we set the 0 for x, y on the software.
↳ Set the z height with the calibration tool.
The metal plate has to touch the drilling bit. It acts like an end switch. Press the button on the software, loud sound happens, z axis moves until it touches the tool.
Then lift the z axis to prevent it from hitting the material or damaging the milling bit.
(Remember, press k on the keyboard).
You can make a mock run with a raised z axis so it mills on the air
↳ Once the z is ready, turn on the dust vacuum. Then turn on the machine.
↳ Set the rpm of the spindle on the machine (we set to 100).
↳ Turn on the vacuuming.
↳ Press start on the software.
↳ When it is finished, turn off everything, remove the key and clean the workshop.