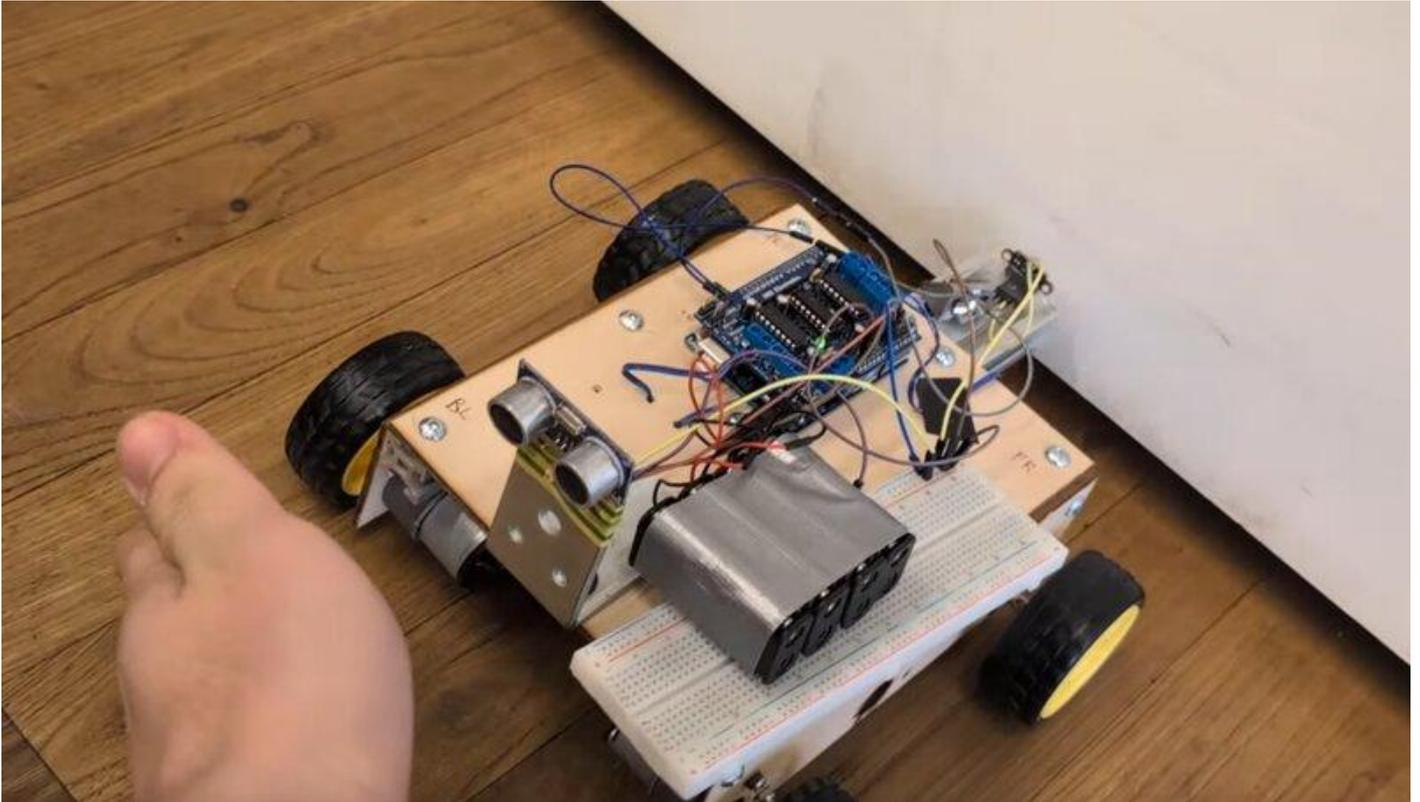


# Week 13: Molding & Casting

- regional review
- machine presentations
- local class
- Materials
- Chocolate

# regional review

## SAM



## Forrest



## Kirsjanis

<https://gitlab.com/kriwkrow/pico-nc>



# Patrick



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[https://player.vimeo.com/video/1077886799?h=215f8d35e9badge=0&autoplay=0&player\\_id=0&app\\_id=58479](https://player.vimeo.com/video/1077886799?h=215f8d35e9badge=0&autoplay=0&player_id=0&app_id=58479)

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[https://player.vimeo.com/video/1077928886?h=3a2d704a62badge=0&autoplay=0&player\\_id=0&app\\_id=58479](https://player.vimeo.com/video/1077928886?h=3a2d704a62badge=0&autoplay=0&player_id=0&app_id=58479)

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<https://www.canva.com/design/DAGIT7vD1CA/bbiWMnfEYs4sIltCdsIM9A/watch>

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<https://www.youtube.com/embed/sVUsoqN4CzQ?si=hTxIXIbVTvjTlvSG>

[https://www.youtube.com/embed/sVUsoqN4CzQ?si=ci7gNEyZHg\\_7RYRV](https://www.youtube.com/embed/sVUsoqN4CzQ?si=ci7gNEyZHg_7RYRV)

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# local class

[guerilla guide to CNC machining](#)



<https://lcamtuf.coredump.cx/gcnc/>

[https://player.vimeo.com/video/707650918?badge=0&autoplay=0&player\\_id=0&app\\_id=58479](https://player.vimeo.com/video/707650918?badge=0&autoplay=0&player_id=0&app_id=58479)

<https://thenounproject.com> (not free anymore ☹️)

How to a make Crystal Clear Ice Sphere

<https://www.smooth-on.com/product-line/mold-max/?quicksearch>

<https://fabacademy.org/2021/labs/kamplintfort/students/mattissen-gerhard/assignments/week15/>

<https://fabacademy.org/2021/labs/kamplintfort/students/mattissen-gerhard/assignments/week18/>



[https://fabacademy.org/archives/2015/eu/students/postma.ronald/02\\_progress/week\\_09.html](https://fabacademy.org/archives/2015/eu/students/postma.ronald/02_progress/week_09.html)



<https://fabacademy.org/2020/labs/leon/students/adrian-torres/week15.html>

[ferris File-A-Wax 148x88x37mm](#)

<https://youtu.be/wMRSPXt48CI?si=QapaiAiej4CBpQQa>

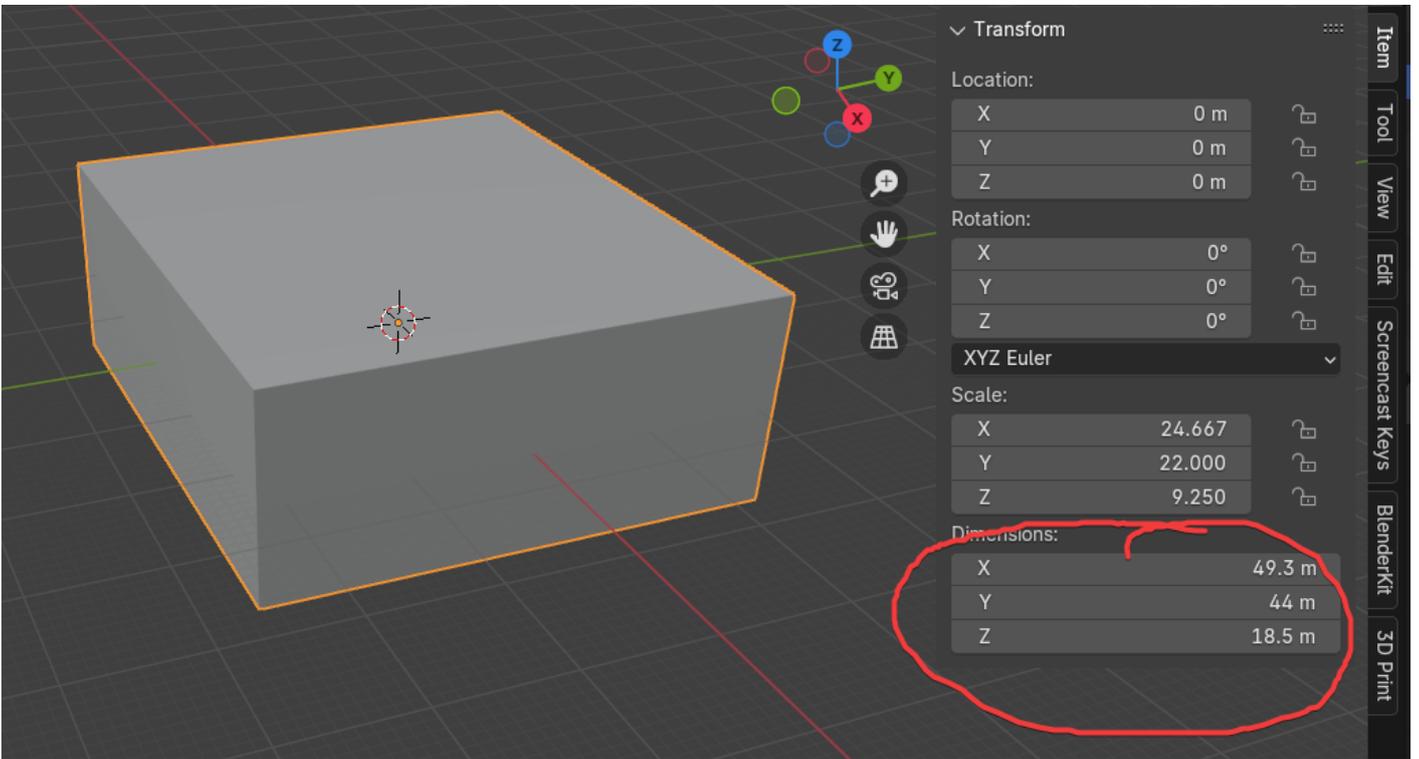
[3D Printed Injection Molds - The Craftsman Steady Craftin](#)

# Lifecasting:

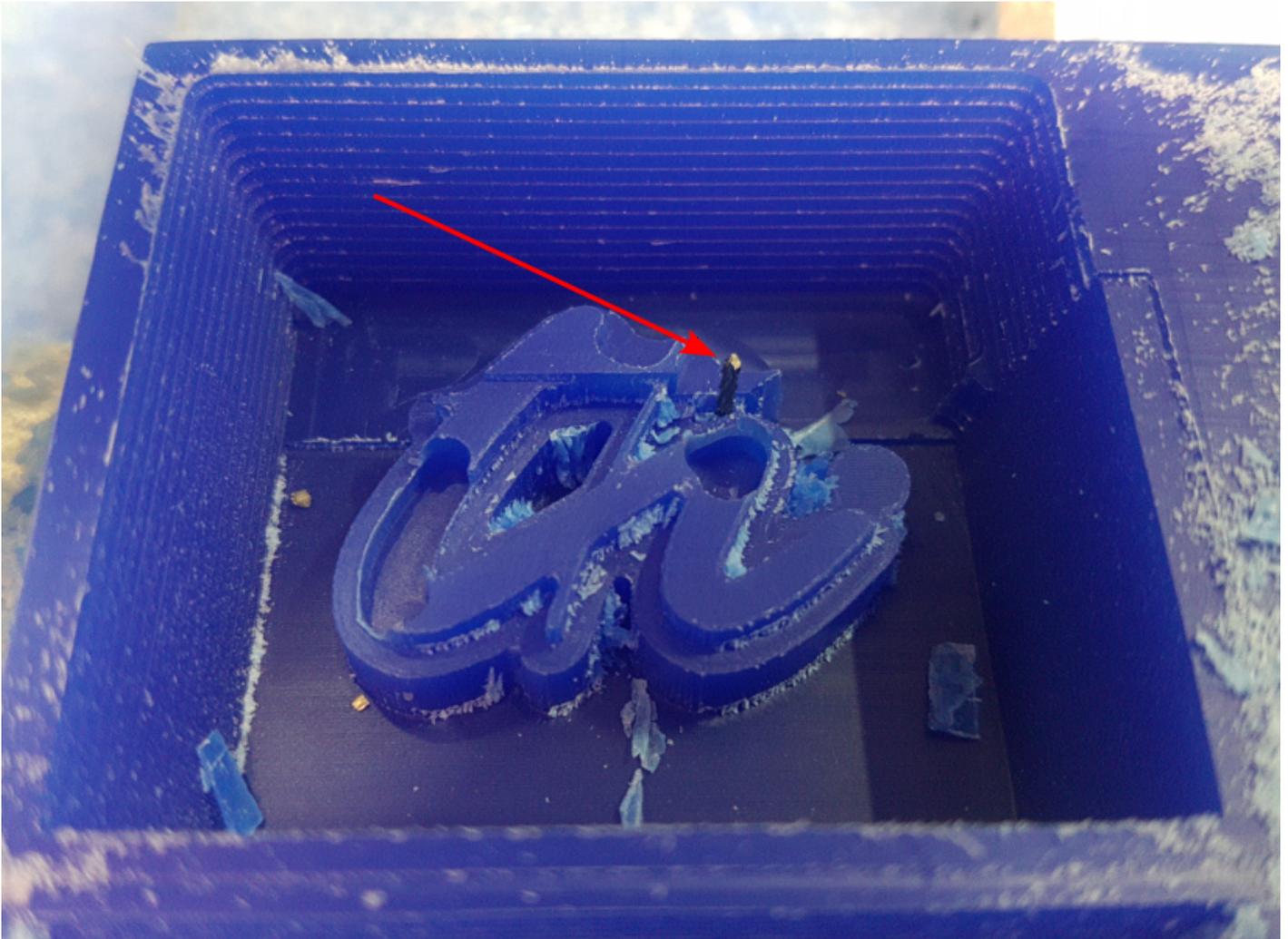


## Blender - mods

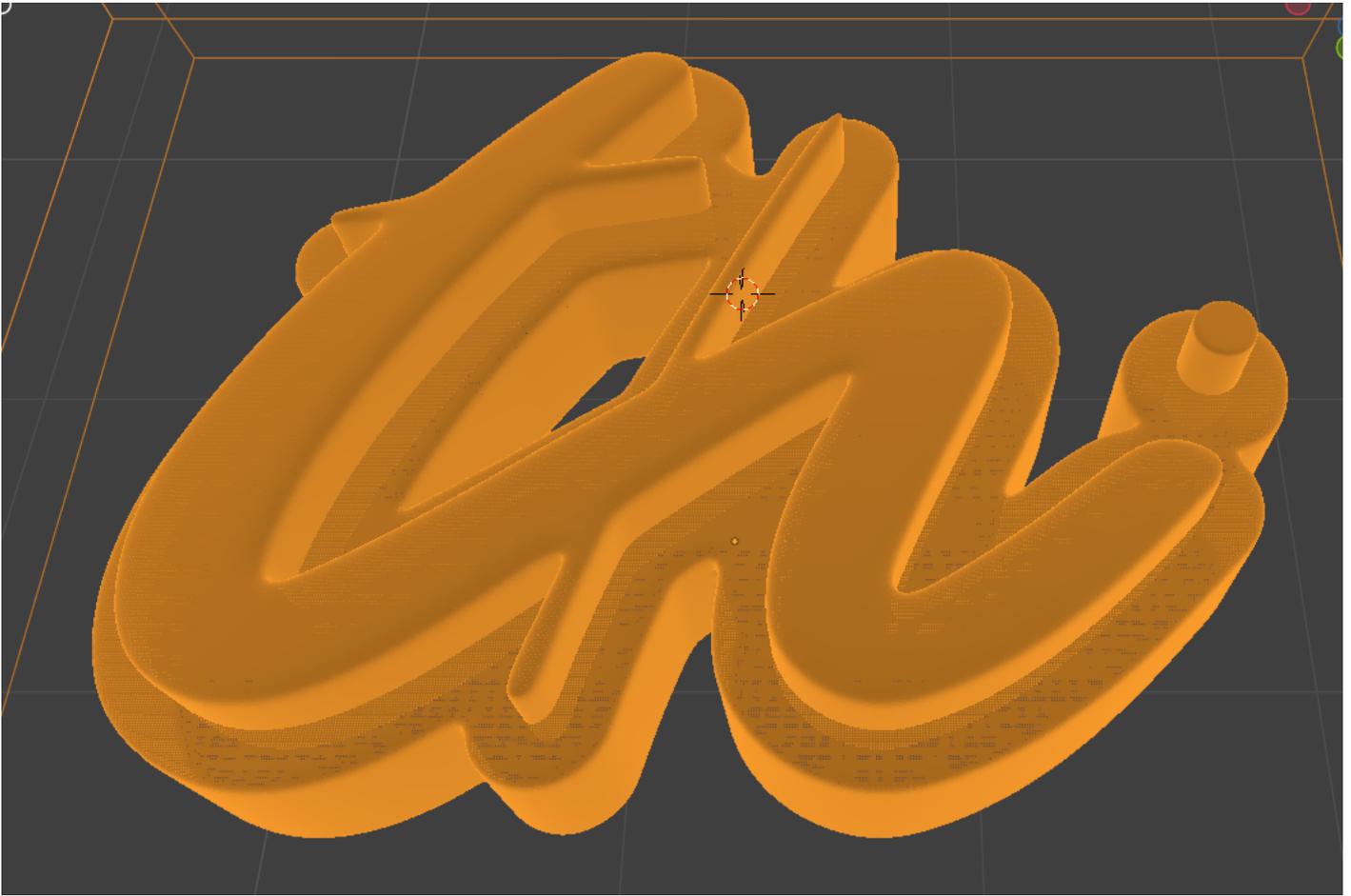
If you model your part in blender, you should start with a cube 49.3333 m x 44 m x 18.5 m in size.



Hmm...I was just about to document the blender - mods - workflow when this happened:



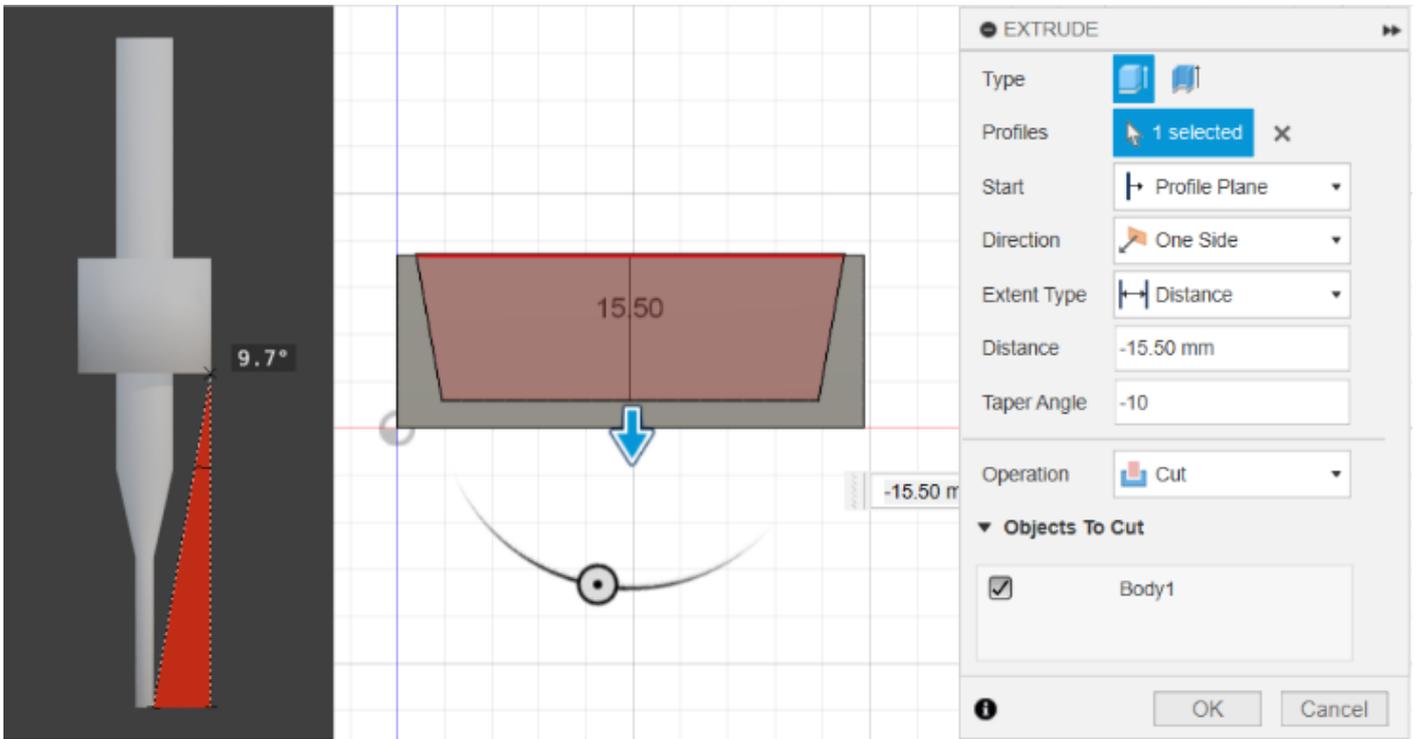
If the roughing doesn't enter in a hole and the finishing is 5 mm deeper, the tool breaks.



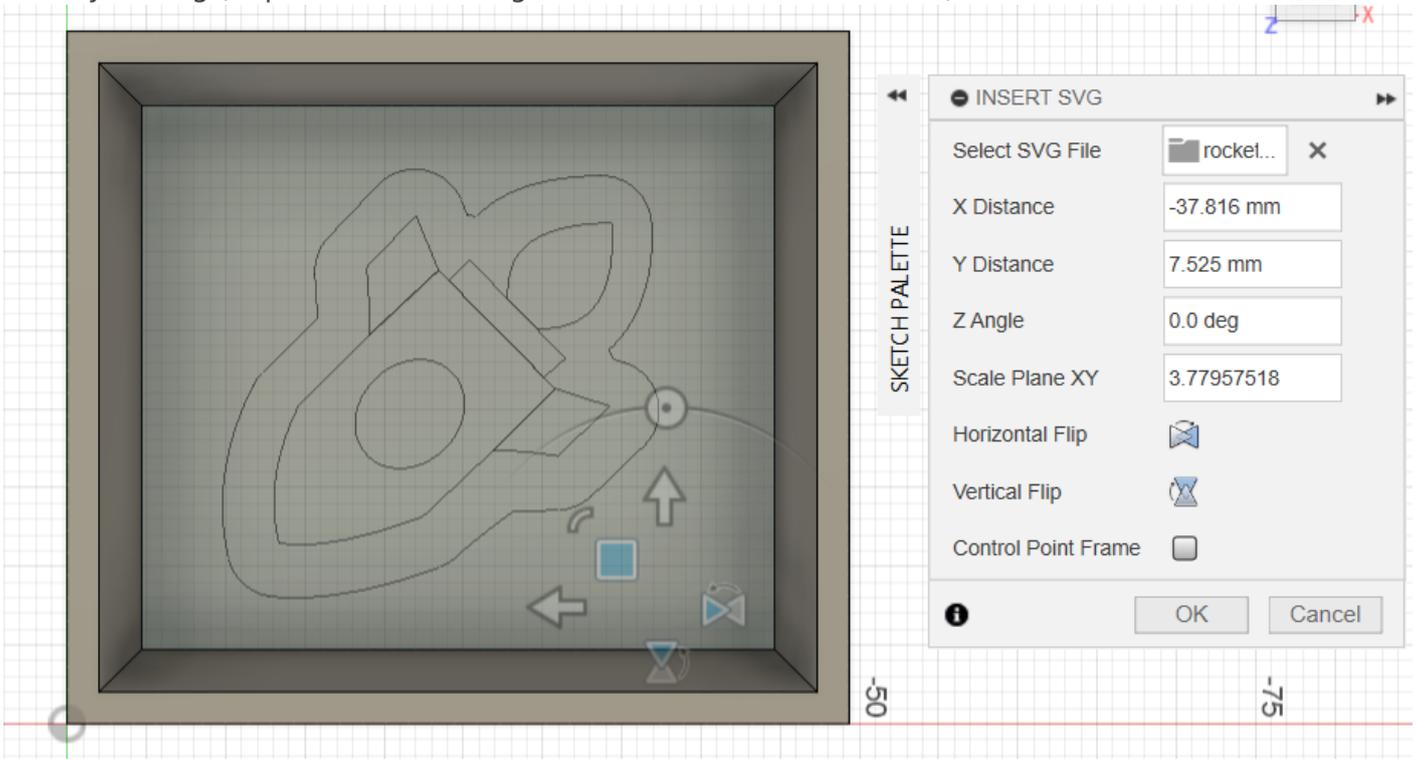
Let's use Fusion

# Fusion

Extrude a box 49,3333 mm x 44 mm x 18,5 mm Create a cavity 2mm from the edge, 15,5 mm deep. If you give the sidewalls a 10° draft angle, you won't be able to hit it with the 1mm mill.



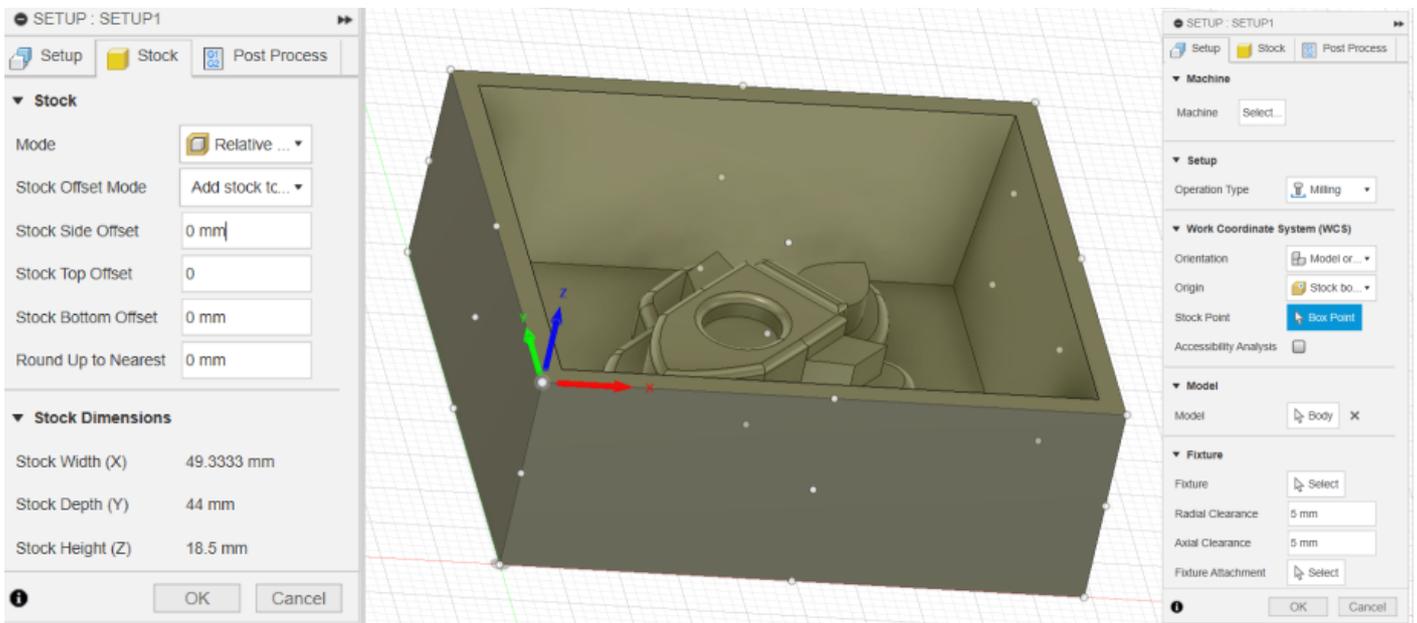
Place your svg (imported with the right scale factor of 3,77957518)



and extrude it.



In the Manufacturing workbench we create a setup, with a stock of 0-offset and the origin bottom-left at the upper corner:



For the roughing I use "Adaptive Clearing" with the following settings:

ADAPTIVE : ADAPTIVE1

**Tool**

Tool: Select...  
#5 - Ø3.175mm...

Coolant: Flood

**Feed & Speed**

Preset: Default pres...  
Spindle Speed: 5000 rpm  
Surface Speed: 49.8728 m/min  
Ramp Spindle Speed: 5000 rpm  
Cutting Feedrate: 1000 mm/min  
Feed per Tooth: 0.2 mm  
Lead-In Feedrate: 1000 mm/min  
Lead-Out Feedrate: 1000 mm/min  
Transition Feedrate: 1000 mm/min  
Ramp Feedrate: 333.333 mm/min  
Plunge Feedrate: 333.333 mm/min  
Plunge Feed per Re...: 0.0666667 mm

Shaft & Holder

ADAPTIVE : ADAPTIVE1

**Geometry**

Machining Boundary: None

**Stock Definition**

Define Stock By: Stock bo...

Model

**Avoid/Machine Surfaces**

View Absolute Values:

Surface Groups: Group

Name	Radial	Axial
Model	0 mm	0 mm

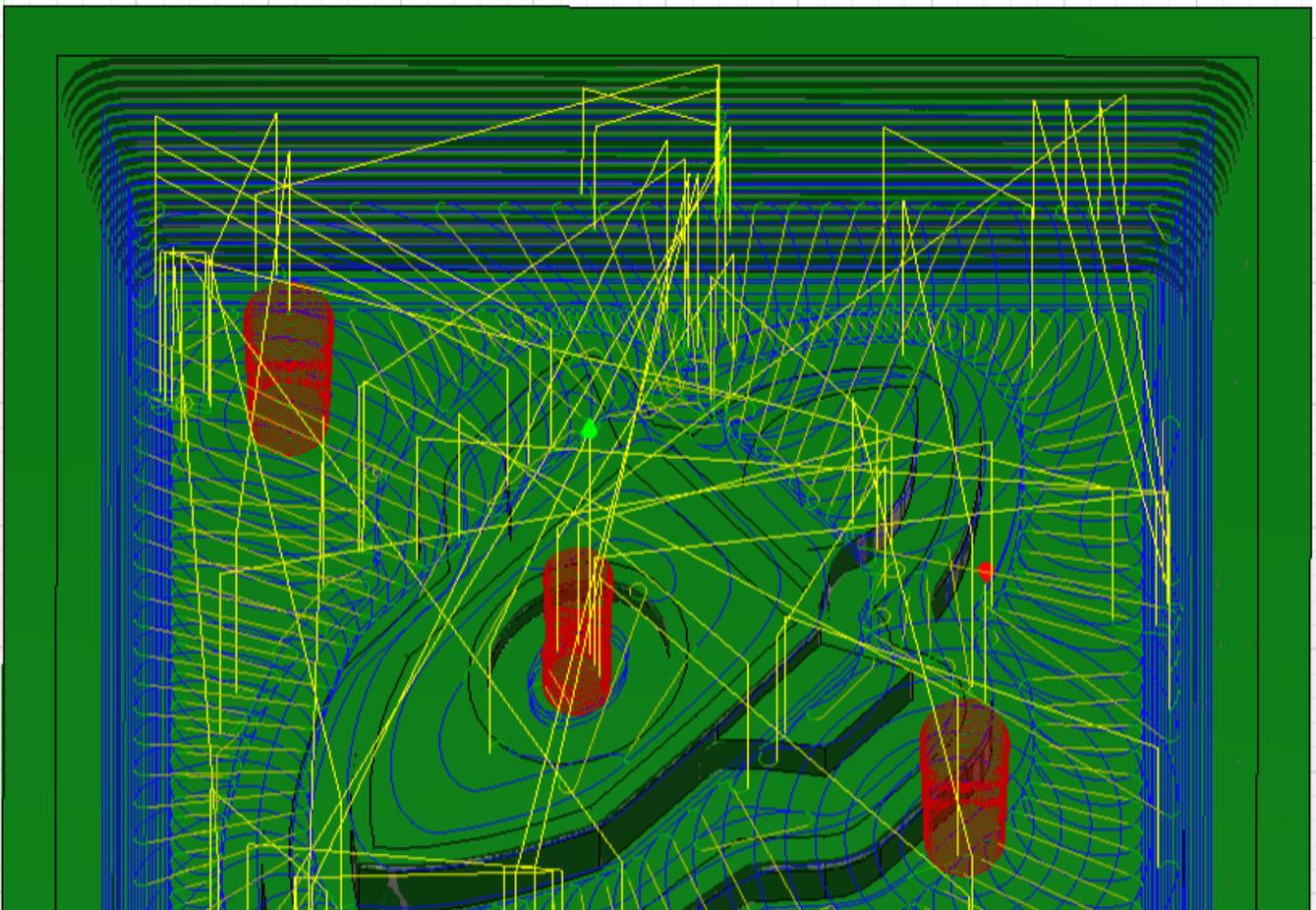
Total Radial Stock Tr...: 0.5 mm  
Total Axial Stock To L...: 0.5 mm

ADAPTIVE : ADAPTIVE1

**Passes**

Tolerance: 0.1 mm  
Machine Shallow Areas:   
Optimal Load: 1.27 mm  
Both Ways:   
Minimum Cutting Radi...: 0.3175 mm  
Machine Cavities:   
Use Slot Clearing:   
Direction: Climb  
Maximum Roughing S...: 7.9375 mm  
Fine Stepdown: 0.79375 mm  
Flat Area Detection:   
Minimum Stepdown: 0.0001 mm  
Minimum Axial Engag...: 0 mm  
Order by Depth:   
Order By Area:

Stock to Leave  
 Fillets

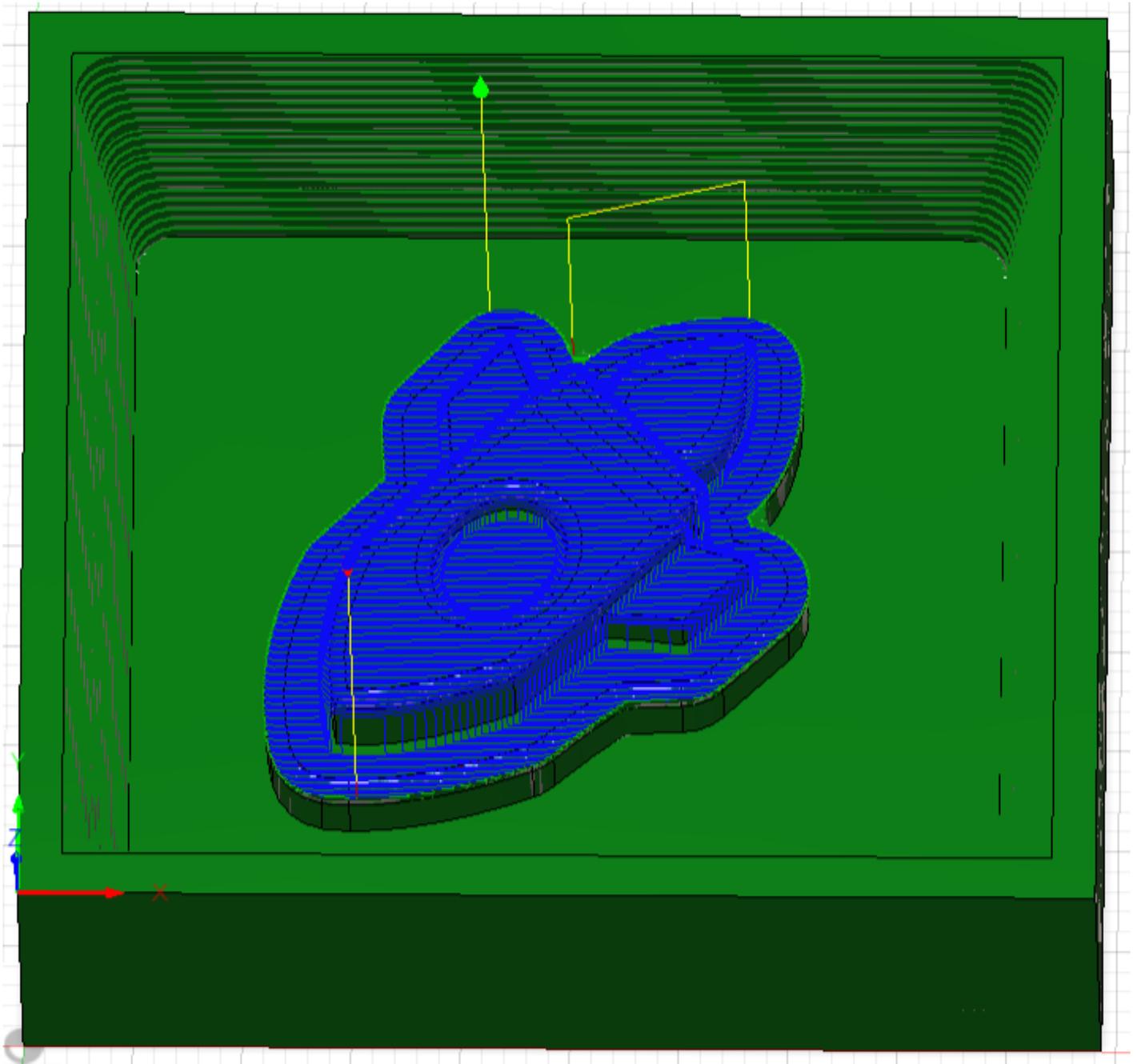


For the finishing I use Parallel:

The image displays three panels from a CAD software interface, all titled "PARALLEL : PARALLEL1".

- Left Panel (Tool & Feed & Speed):**
  - Tool:** Select... (dropdown), #3 - Ø1mm flat... (text), Coolant: Disabled (dropdown).
  - Feed & Speed:** Preset: PCB/Carbor... (dropdown); Spindle Speed: 12000 rpm; Surface Speed: 37.6991 m/min; Ramp Spindle Speed: 12000 rpm; Cutting Feedrate: 500 mm/min; Feed per Tooth: 0.0208333 mm; Lead-In Feedrate: 500 mm/min; Lead-Out Feedrate: 500 mm/min; Transition Feedrate: 500 mm/min; Ramp Feedrate: 333.333 mm/min; Plunge Feedrate: 333.333 mm/min; Plunge Feed per Re...: 0.0277778 mm.
  - Shaft & Holder:** Unchecked checkbox.
  - Buttons: OK, Cancel.
- Middle Panel (Geometry):**
  - Machining Boundary: Selection (dropdown).
  - Machining Boundary...: Select (button), X (close).
  - Closed Chain 1 (highlighted).
  - Tool Containment: Tool cent... (dropdown).
  - Additional Offset: 0 mm.
  - Contact Point Bounc...: Unchecked checkbox.
  - Contact Only: Checked checkbox.
  - Slope: Unchecked checkbox.
  - Rest Machining: Unchecked checkbox.
  - Model: Unchecked checkbox.
  - Buttons: OK, Cancel.
- Right Panel (Passes):**
  - Tolerance: 0.01 mm.
  - Machine Steep Areas: Unchecked checkbox.
  - Add Perpendicular Pa...: Unchecked checkbox.
  - Simple Ordering: Unchecked checkbox.
  - Pass Direction Referenc...: Select (button).
  - Pass Direction: 0 deg.
  - Stepover: 0.1 mm.
  - Cusp Height: 0.07071 mm.
  - Direction: Both w... (dropdown).
  - Up/Down Milling: Both (dropdown).
  - Multiple Depths: Unchecked checkbox.
  - Stock to Leave: Unchecked checkbox.
  - Fillets: Unchecked checkbox.
  - Smoothing: Unchecked checkbox.
  - Feed Optimization: Unchecked checkbox.
  - Buttons: OK, Cancel.

The central preview window shows a 2D model of a part with a green highlighted boundary, indicating the selected geometry for the operation.



Total time is 23:27

# Materials

## General

- important information
  - pot life: how long do we have between mixing two components together and pouring
  - cure time: how long it takes to harden
  - post cure (but not so important)
  - mix ratio
  - what if someone gets it on their skin/in their eye/mouth
  - what protective equipment is needed?
    - protective mask?
    - fume hood?
    - goggles?
    - long sleeves?

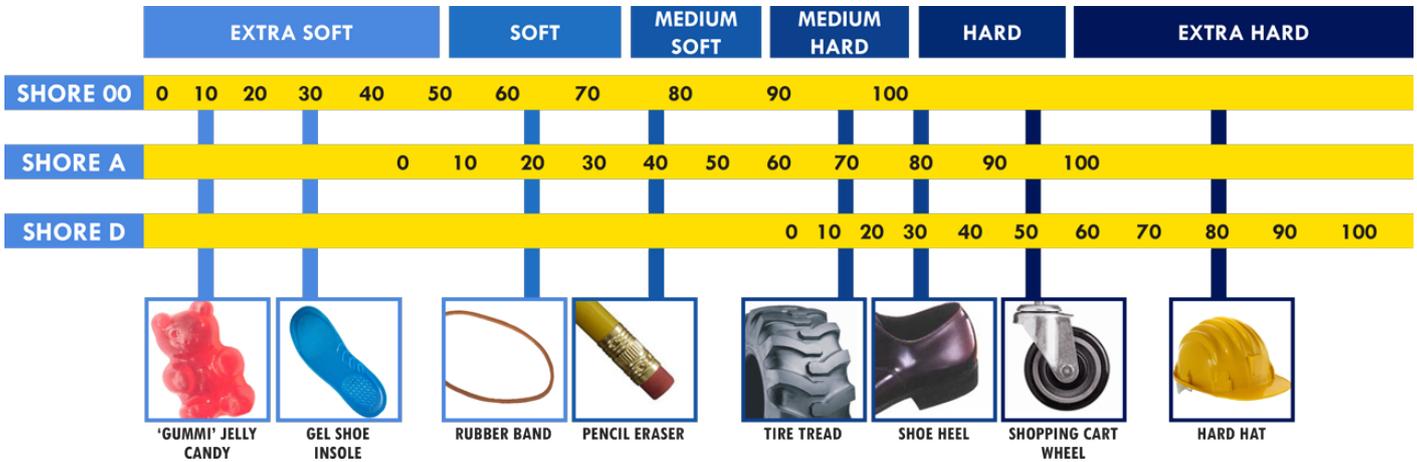
## Specification

Material	Pot Life	Cure time	Mix Ratio	Useful Temp (max)	Useful Temp (min)	Heat Deflection Temp	Shore Hardness
Mold Star 15 SLOW	50 min	4 h	1:1	232 °C	-53 °C	-	15A
Mold Star 30	45 min	6 h	1:1	232 °C	-53 °C	-	30A
Sorta-Clear 37	25 min	4 h	1:1	-	-	-	37 A
Smooth Cast 305	7 min	30 min	1:1	-	-	50 °C	70 D
Smooth Cast 326	7-9 min	60 min	1:1	-	-	50 °C	72 D

## General Info about (Shore Hardness Scale)

- The **Shore 00** Hardness Scale measures rubbers and gels that are *very soft*

- The **Shore A** Hardness Scale measures the hardness of flexible mold rubbers that range in hardness from very soft and flexible, to medium and somewhat flexible, to hard with almost no flexibility at all. *Semi-rigid* plastics can also be measured on the high end of the Shore A Scale
- The **Shore D** Hardness Scale measures the hardness of *hard* rubbers, semi-rigid plastics and hard plastics.



# Safety Information

## Mold Materials

- **Mold star 15 slow cure**

- safety
- use in properly ventilated area
- Safety glasses, long sleeves and rubber (vinyl only! Latex will inhibit the cure of the rubber) gloves
- store in room temperature (23°C) (warmer reduces shelf life)
- mixing container should have straight edges and flat bottom
- mixing sticks should be flat and stiff
- product has a limited shelf time!

**IMPORTANT:**

- avoid contact with eyes, slight transient irritation possible
- flush with water 15 min and seek medical attention
- remove from skin with waterless hand cleaner, then soap and water

- **Mold Star 30**

- safety
- same as mold star 15

- **SORTA-Clear 37**

- safety
- same as mold star 15

IMPORTANT:

- use only with adequate ventilation

## Cast Materials

- **Smooth-Cast 326**

- safety
- store in warm environment (23 °C )
- liquids are moisture sensitive and will absorb atmospheric moisture
- mixing container should be clean and made out of metal, glass or plastic
- mixing in a well ventilated area
- safety glass, long sleeves and rubber gloves to minimize containment risk
- test application is recommended!

**IMPORTANT:**

“ ⚠️WARNING: Known to the state of CA to cause cancer, birth defects or reproductive harm

- PART A (YELLOW):
- contains diphenyldiisocyanate
- SUSPECTED OF CAUSING CANCER
- vapors can be significant if heated or sprayed may cause lung damage and sensitization
- only use with adequate ventilation!
- contact with eye and skin may cause severe irritation!
- flush eyes with water for 15min and get immediate medical attention
- remove from skin with soap and water
- PART B (BLUE):
- is irritating to the eye and skin
- avoid prolonged or repeated skin contact
- flush eyes with water for 15min and get immediate medical attention
- remove from skin with soap and water

- **Smooth-Cast 305**

- safety
- wear safety glasses, long sleeves and rubber gloves to minimize contamination risk
- only in well-ventilated area

IMPORTANT:

⚠️ WARNING: Known to the state of CA to cause cancer, birth defects or reproductive harm

- PART A:
- IRRITATING TO EYES, SKIN & MUCOUS MEMBRANES
- contains Methylene Diphenyl Isocyanate
- SUSPECTED OF CAUSING CANCER
- do not get in eyes and mucous membranes
- do not take internally
- do not breathe fumes
- use only with adequate ventilation
- WEAR CHEMICAL RESISTANT GLOVES AND EYE PROTECTION !!
- PART B:
- not that contagious
- CAUTION: HOT!!
- GETS HOT WHEN MIXED (100 °C), cool before handling

off the shelf materials:

- **chocolate**
- **candle wax**
- **soap**
- **nougat**

# Chocolate

We have the <https://springlane.de/products/sous-vide-garer-henry-inkl-vakuumierer-und-vakuumiertuten>

