Soirée Pratique: Build your own robot

Session 4: intro Fablab + building a frame

slides + extra information:
http://www.ieee-sb-leuven.be/frame2016
http://www.ieee-sb-leuven.be/soireepratique
https://www.fablab-leuven.be/

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Schedule sumo robot competition

- Monday 10/10 at 19h30:
  - introduction Arduino: the “brains”
- Monday 24/10 at 19h30:
  - sensor session: the “eyes”
- Monday 14/11 at 19h30:
  - motor session: the “muscles”
- Monday 28/11 at 20h00 at FabLab:
  - frame building session: the “skeleton”

- second semester:
  - integration session: frame + motors + sensors combined
  - programming session: the “brains” revisited + tactics
  - training sessions
  - final competition (in March)

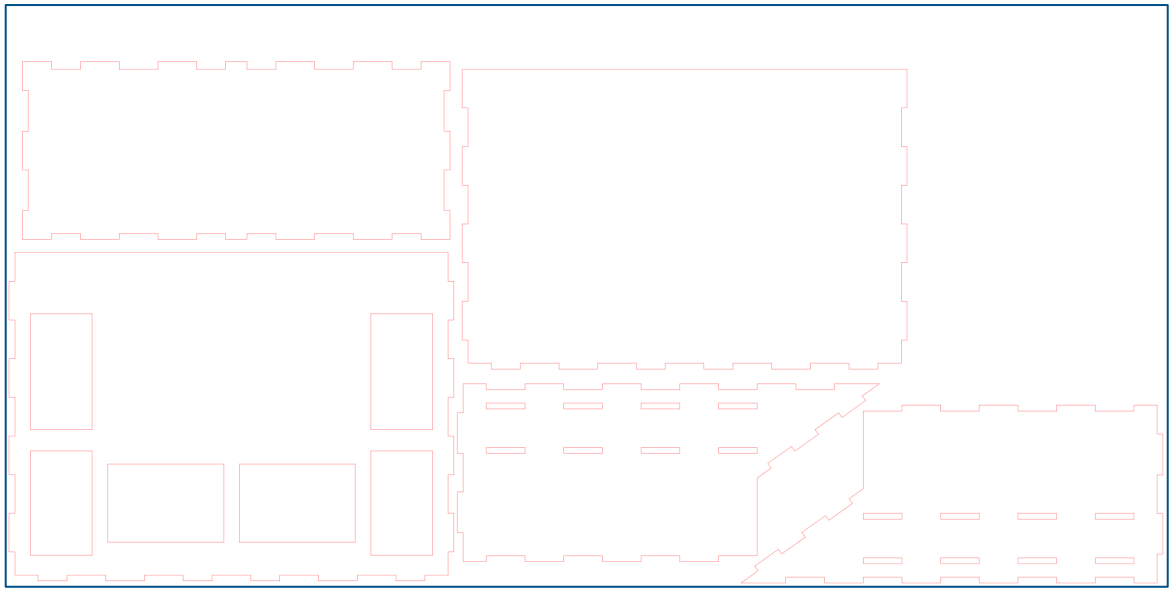
FabLab: introduction

- Open source hardware: use of machines is free (only pay / bring materials)
- Lasercutters, 3D printers…
- Mainly wood (MDF) and plastics (plexiglas)
- site with info: https://www.fablab-leuven.be/

- Normally always open during working hours

Building the Sumo frame

- For the frame we use the laser cutter
- Can fit plates up to 600mm length, 300mm width
- Input is a drawing with thin lines where red lines will be cut and **black lines** are **engraved**
  - example:



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Making drawings for laser cutting

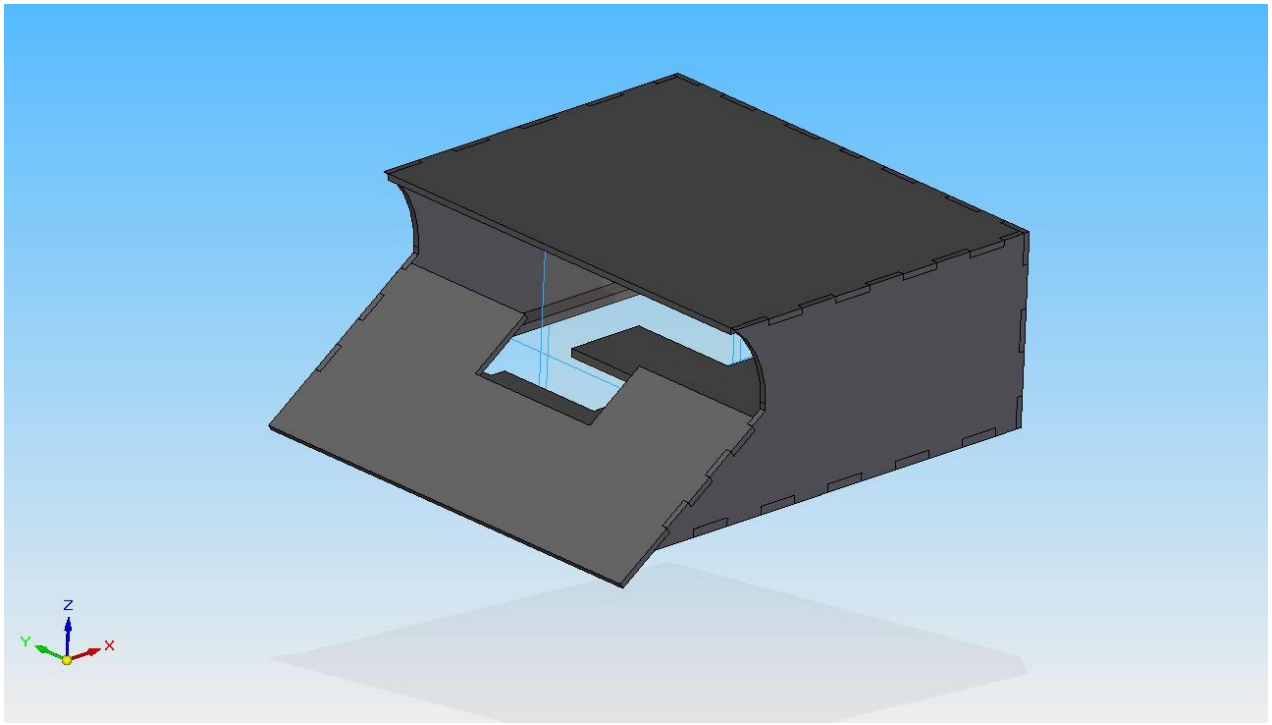
Two possibilities to obtain drawing:

1) Make a drawing directly in Inkscape:
   - https://inkscape.org/nl/ (free and open source) -> output: vector graphics file .svg (like pdf)

2) Make assembly in Solid Edge or similar CAD program first and then Inkscape
   - make assembly -> make a drawing -> fit components on 600x300mm sheet -> print in pdf -> open in Inkscape
   - in Inkscape you can still make some small adjustments e.g. draw some circles for holes
   - advantage of CAD -> easy to check that everything fits in 3D

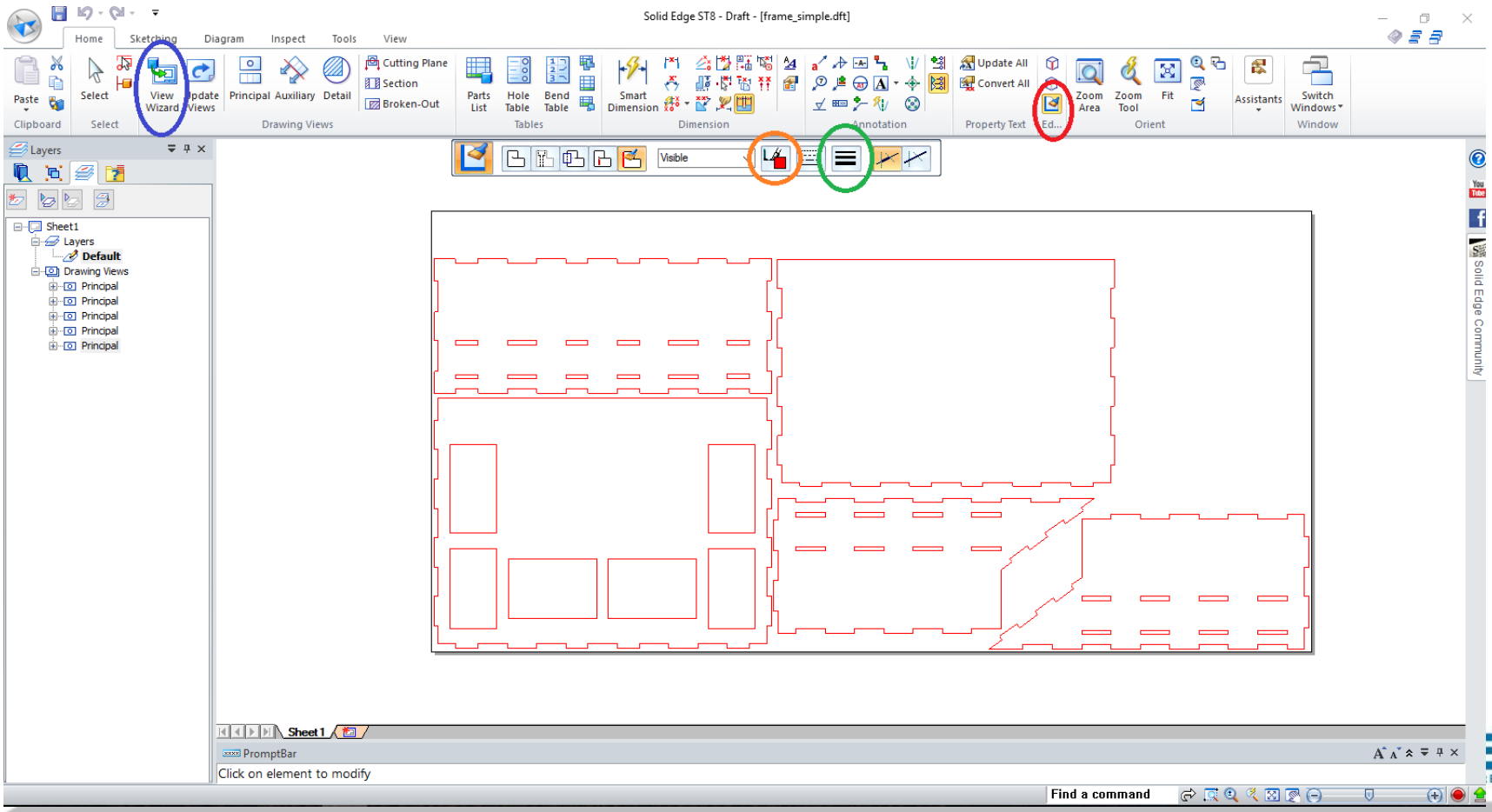
Making drawings for laser cutting

example part 1: make a Solid Edge assembly first



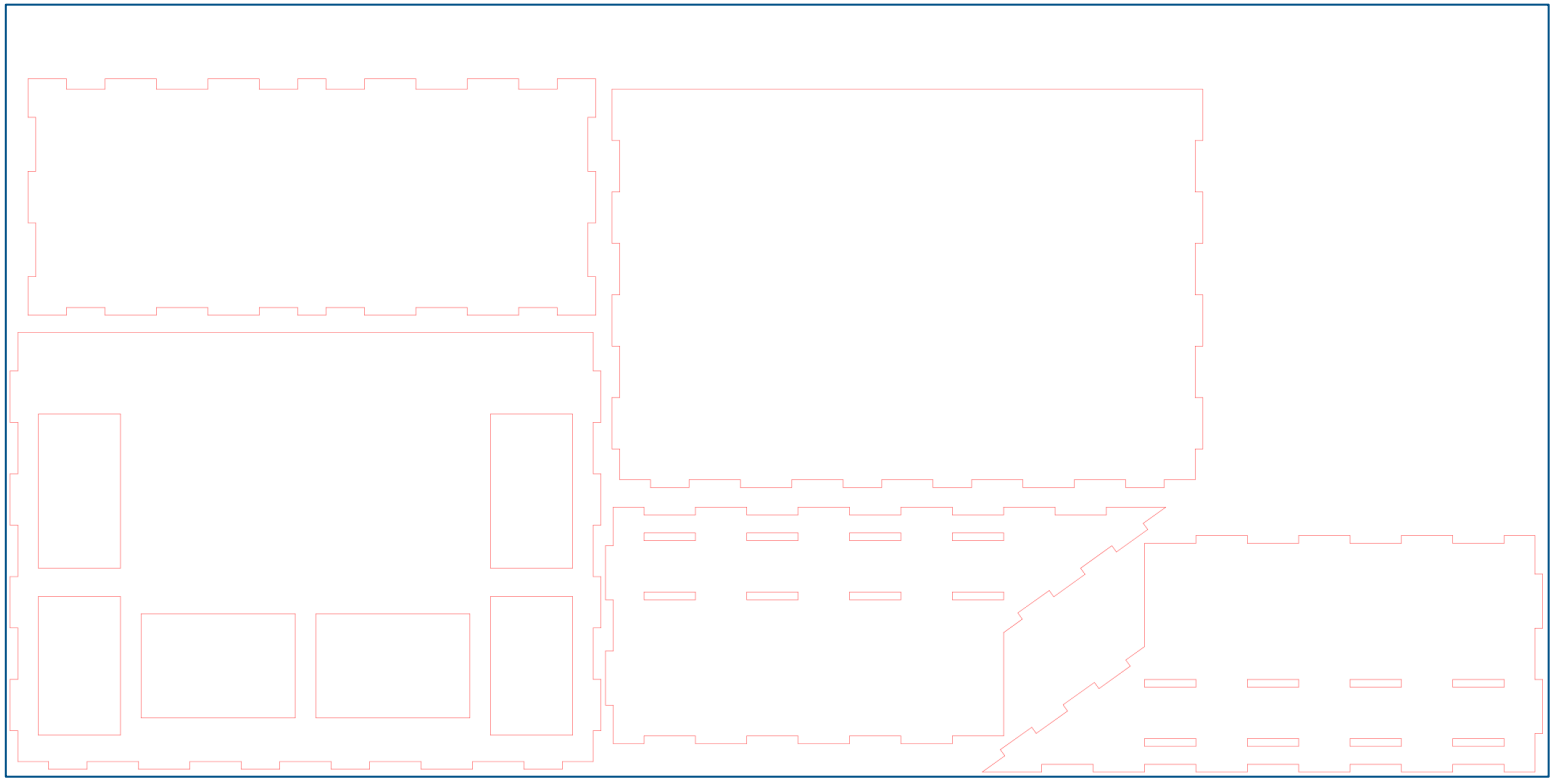
Making drawings for laser cutting

example part 2: convert Solid Edge assembly to draft, load components in view wizard, and make the lines thin and red



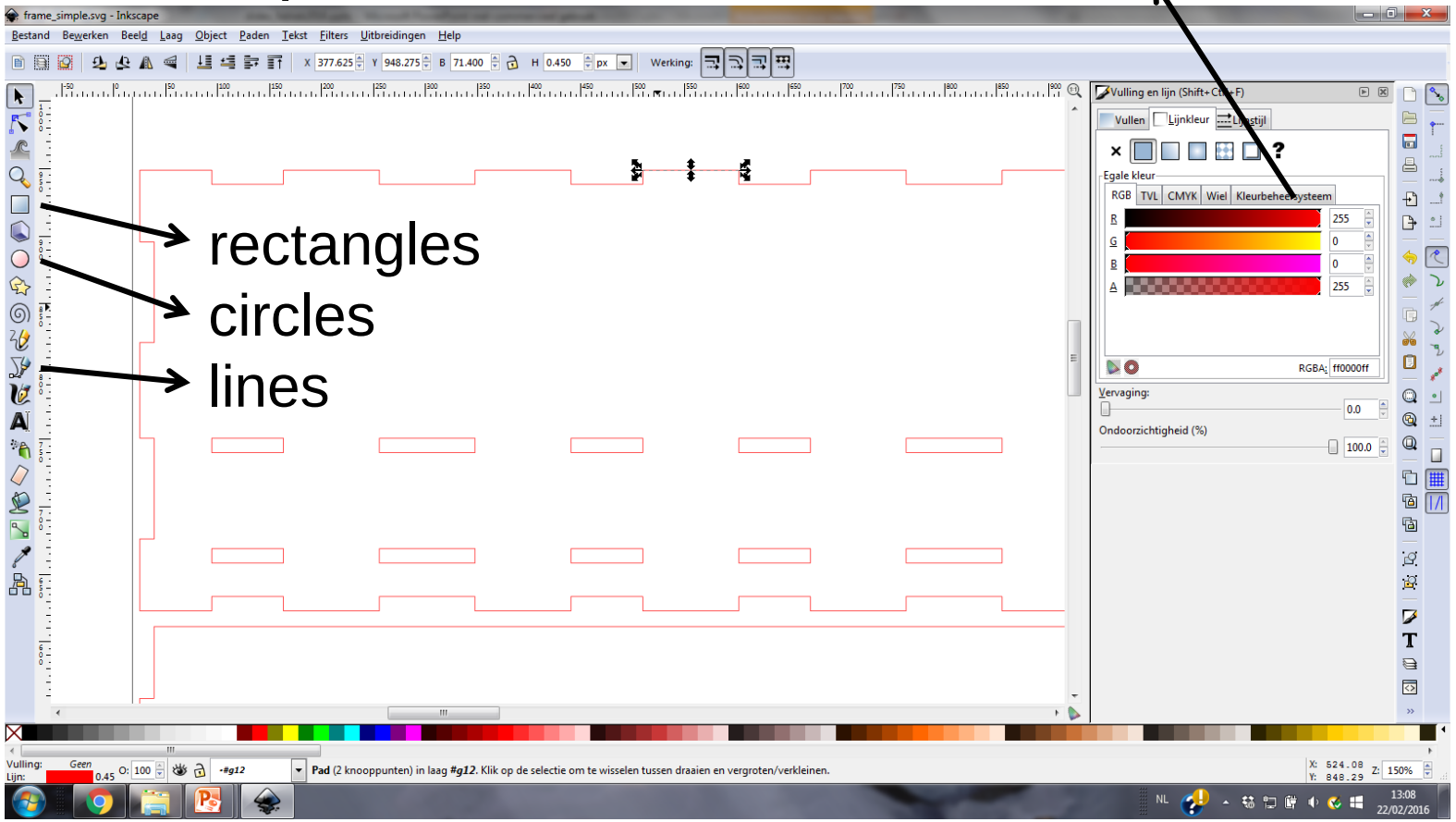
Making drawings for laser cutting

example part 3: load the resulting drawing in Inkscape (but you can also skip step 1 and 2, and directly draw in Inkscape)



Making drawings for laser cutting

- Inkscape:



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Making drawings for laser cutting

- Inkscape further information: https://inkscape.org/nl/learn/tutorials/
- Ask for help
- Important points of attention:
  - Red = cut: RGB = 255, 0, 0!!
  - Black = engrave: RGB = 0, 0, 0!!
  - Draw circles for making room for cables, LEDs, bolts…

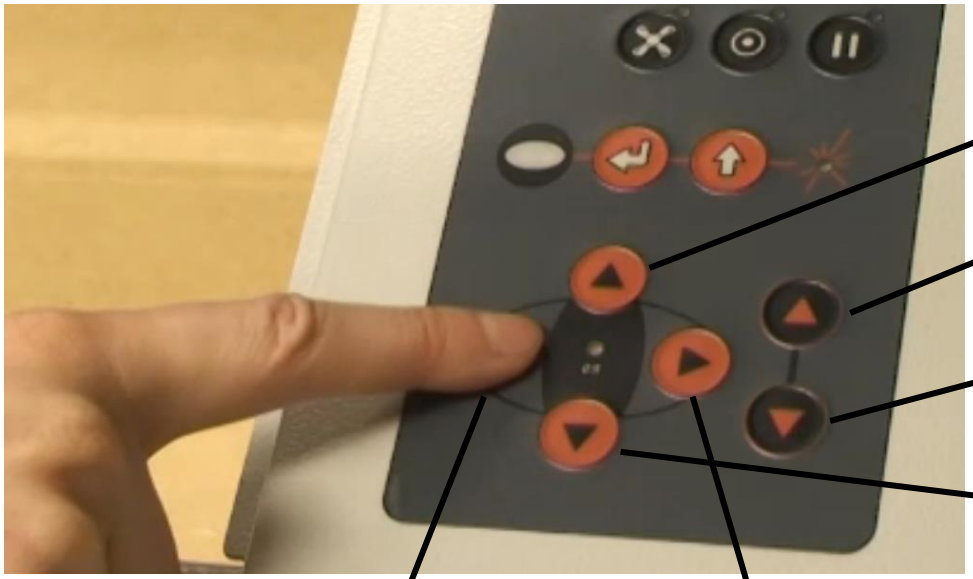
Building the Sumo Robot frame

Where to start now?

1. Use one of the standardframes if you are not interested in designing your own
   - Design 1 - Solid Edge CAD files: http://www.ieee-sb-leuven.be/sites/default/files/bp_files/sumo_frame_files.zip
   - Design 2 - Inkscape drawings http://www.ieee-sb-leuven.be/sites/default/files/bp_files/sumo_frame2_files.zip
   - Just open it, print, and you're ready!
2. Start from the standard frame and customize it to gain an edge over your competitors!
3. You can also design your own frame completely from scratch if you have a creative idea!

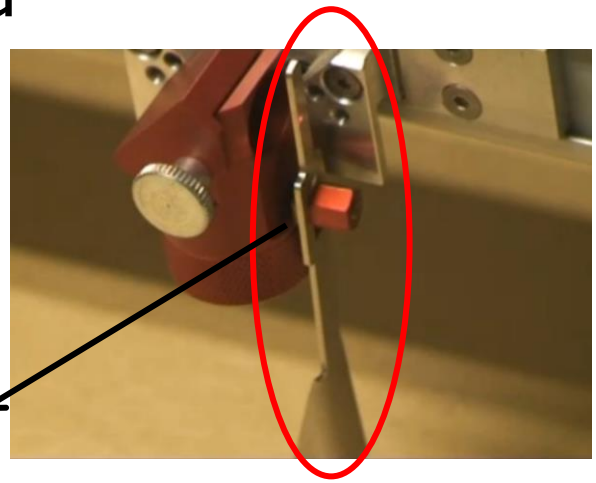
Operating the laser cutter

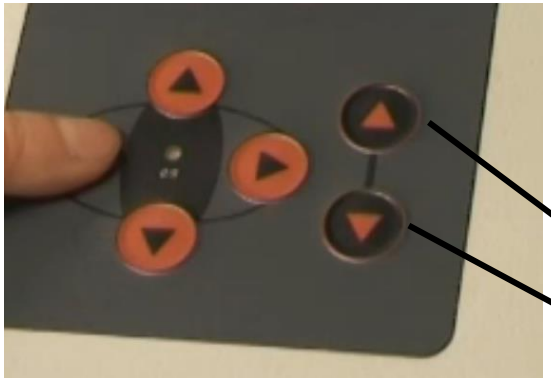
- Hardware:
  - Buttons to move laser cutter head



Operating the laser cutter

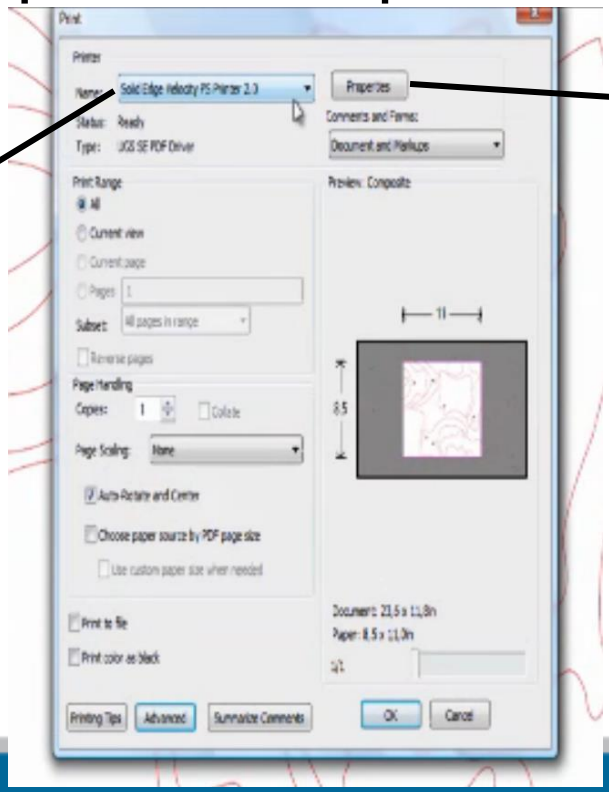
- Hardware: calibrate laser head
  - Move plate down + insert mdf plate
  - Put calibration piece on lid
  - Move plate up slowly, until it hits the calibration piece





Operating the laser cutter

- Put drawing on USB and insert it into laser cutter computer
- Software
  - Open your pdf/inkscape drawing
  - print



properties

printer should be ok (trotec engraver)

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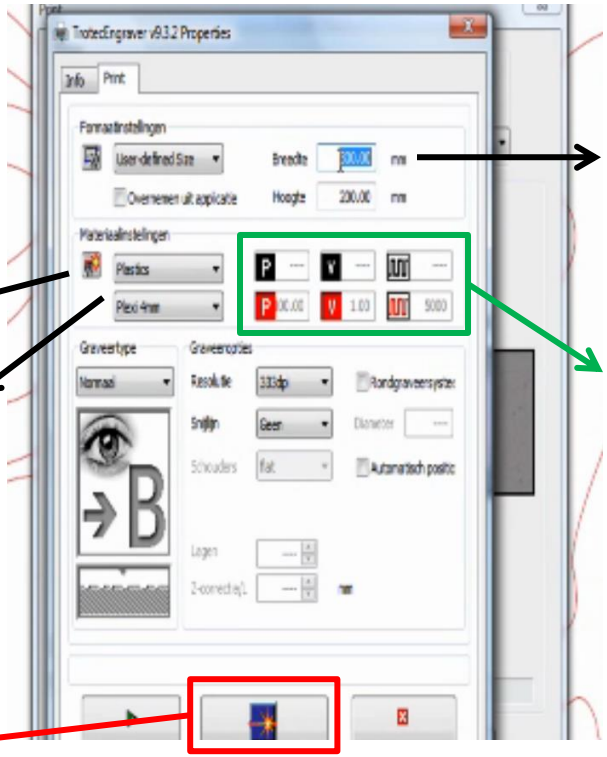
Operating the laser cutter

- Software
  - Adjust properties + press OK (pick a name)



Set width and height of plate

material = wood

mdf 3mm (thickness your plate)

Setting for material and thickness (predefined for each material!!)

OK button

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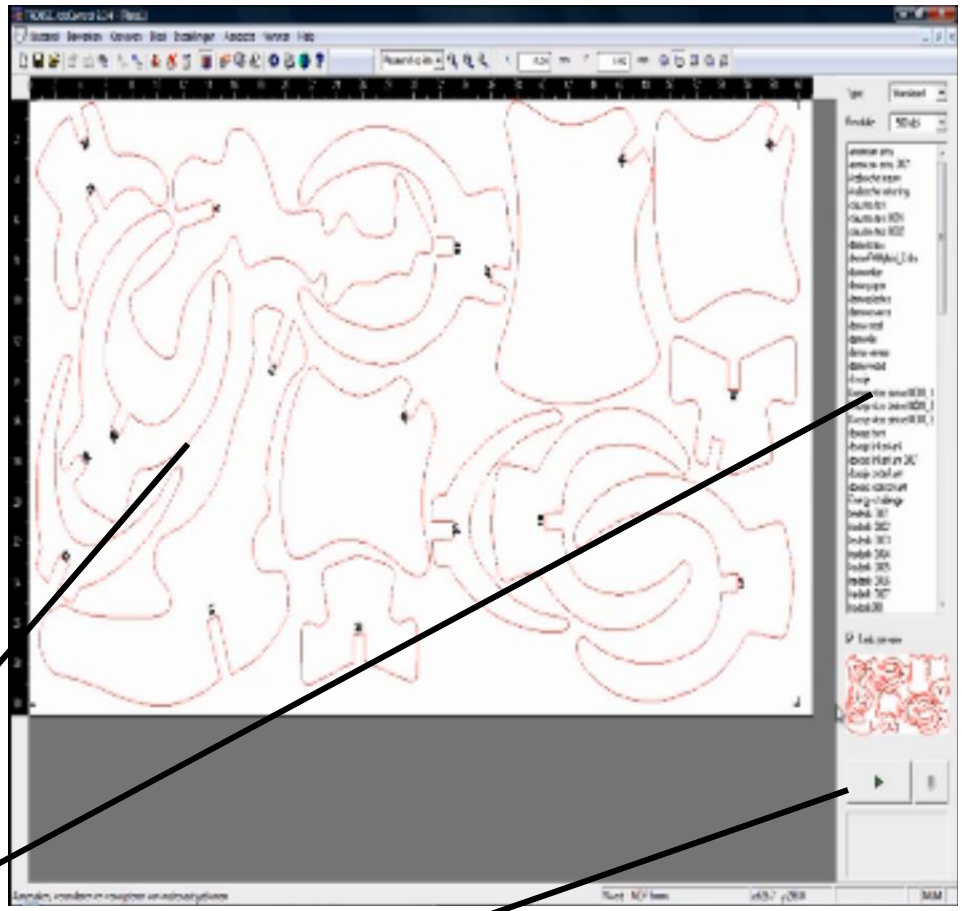
Operating the laser cutter

- Software
  - Then press print or OK (send to job control)
  - Go to Trotec job control
  - Start cutting when everything looks fine

Trotec job control



preview

Available jobs (pick your job name by double clicking)

Start cutting

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How much for the materials?

- MDF plate 600x300mm (wood):

3mm	4mm	6mm	9mm
1€	1,5€	2€	3€

- Plexiglas plate 600x300mm (plastic):

2mm	3mm	4mm	5mm	6mm	8mm
5€	7€	9€	11€	13€	17€

- The machines themselves are always free to use

Next Soiree Pratique

- next session will be next second semester:
  - integration session: frame + motors + sensors combined
  - programming session: the “brains” revisited + tactics
  - training sessions
  - final competition (in March)
- date will be announced through regular channels:
  - bakske (VTK), facebook group, website IEEE student branch, flyers, mail, ...
- See you all the next session!