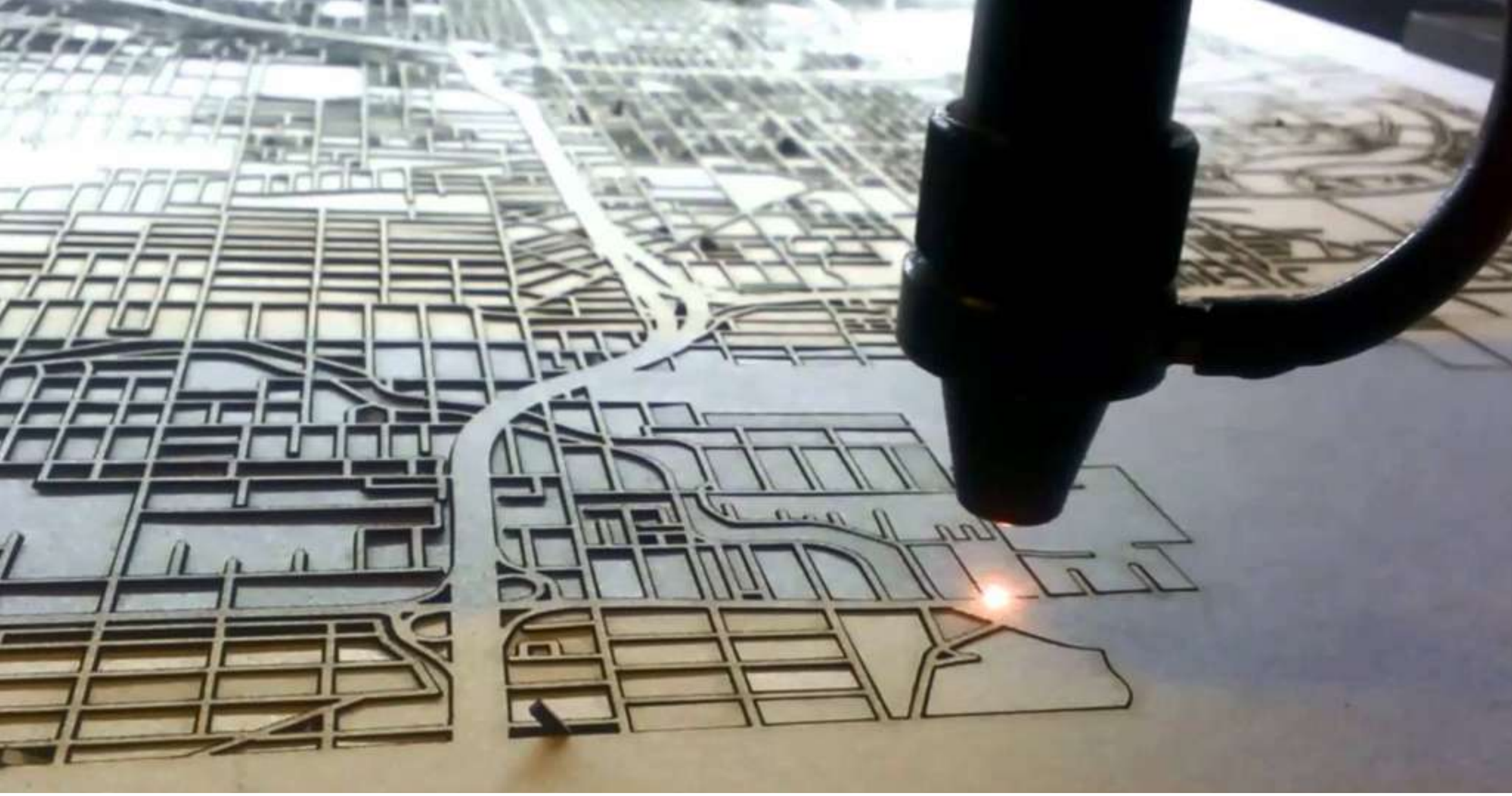
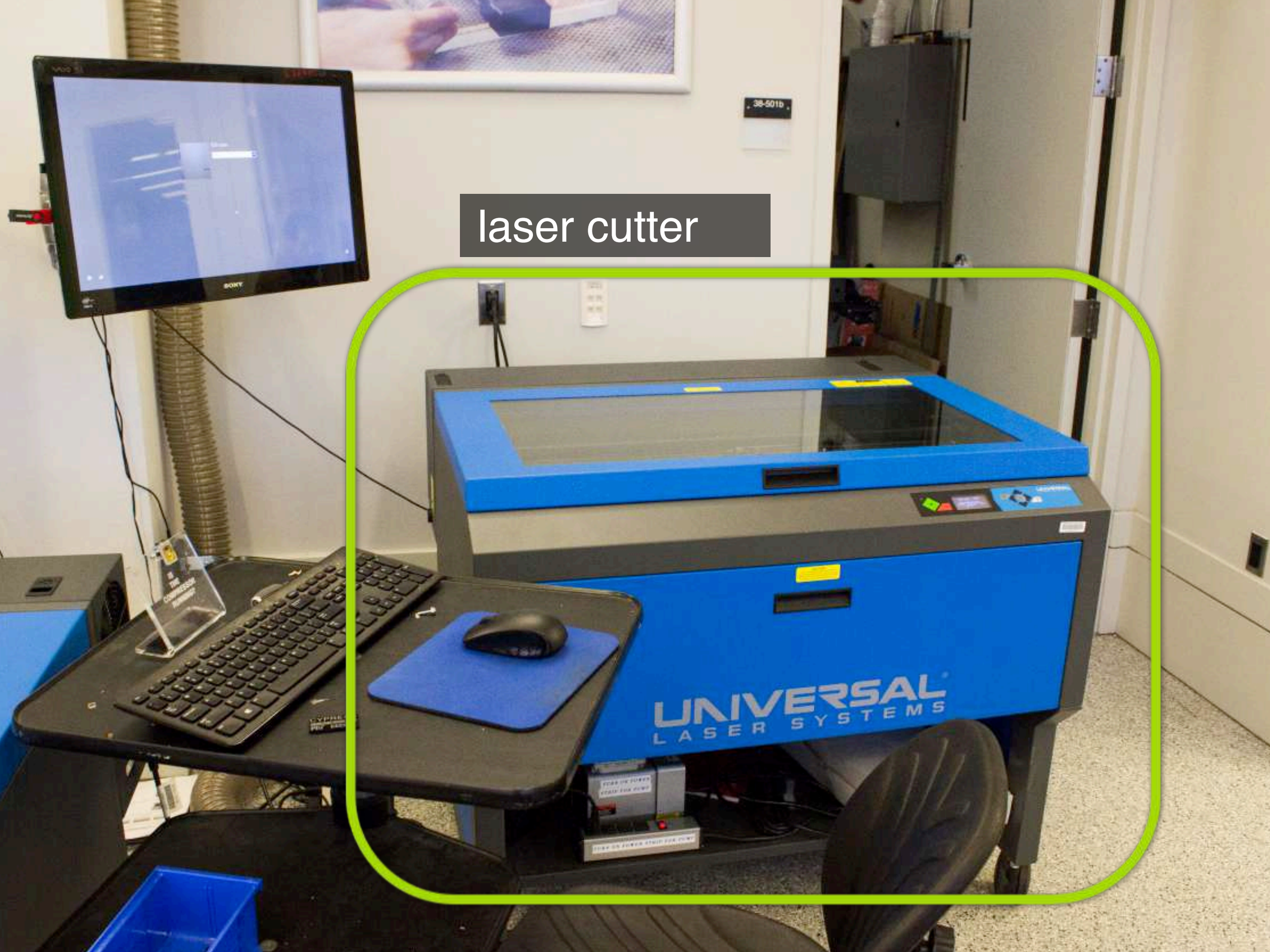


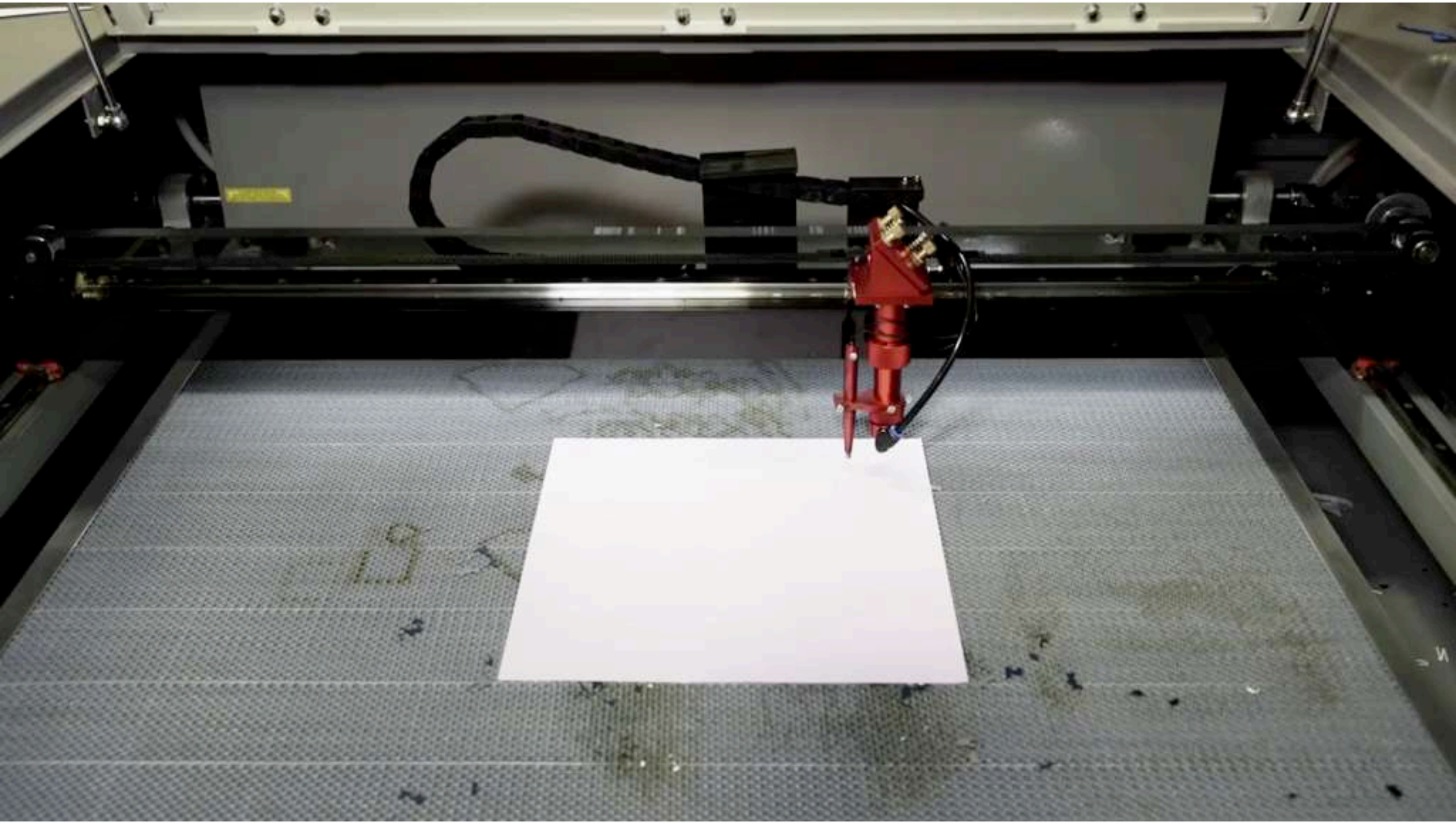
Laser Cutting for Starters

6.S063 Engineering Interaction Technologies

Prof. Stefanie Mueller | MIT CSAIL | HCI Engineering Group

laser cutter





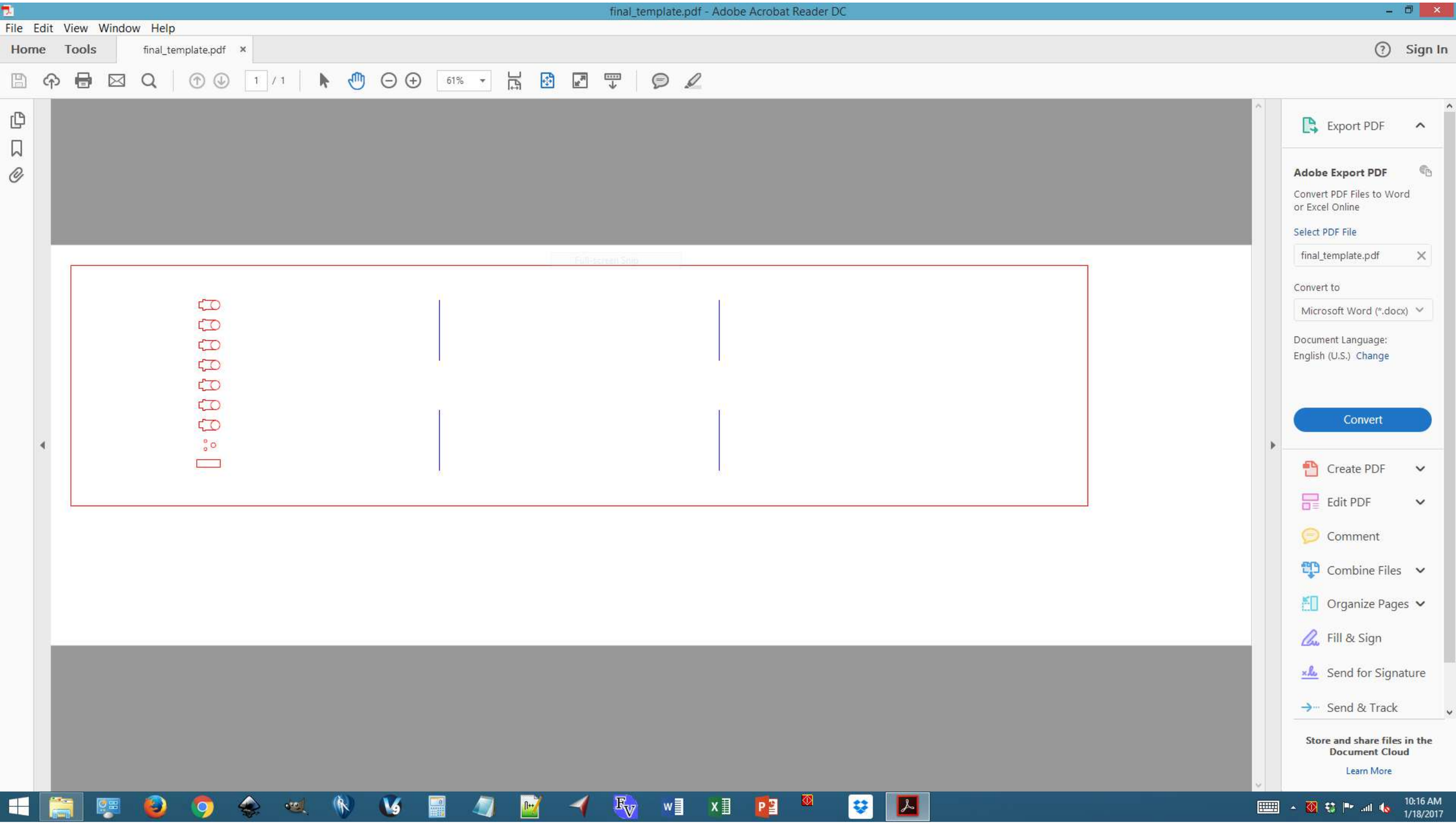
benefits::

fast (good for design iteration)

easy to learn and get started!

how can I laser cut something?

create a 2D vector drawing



final_template.pdf - Adobe Acrobat R

File Edit View Window Help

Open... Ctrl+O

Create PDF Online...

Save Ctrl+S

Save As... Shift+Ctrl+S

Save as Other

Send File

Revert

Close Ctrl+W

Print... Ctrl+P

2 C:\Users\EDS\Downloads\laser test (1).pdf

3 E:...\laser cutter temp...multitouch pad.pdf

4 E:...\laser cutter temp...multitouch pad.pdf

5 E:\PT1pdf.pdf

View All Recent Files...

Exit Ctrl+Q

61%

Print

Printer: PLS6.75 Properties Advanced Help

Copies: 1

Print in grayscale (black and white)

Save ink/toner

Pages to Print

All

Current page

Pages 1

More Options

Page Sizing & Handling

Size Poster Multiple Booklet

Fit

Actual size

Shrink oversized pages

Custom Scale: 100 %

Choose paper source by PDF page size

Orientation:

Auto portrait/landscape

Portrait

Landscape

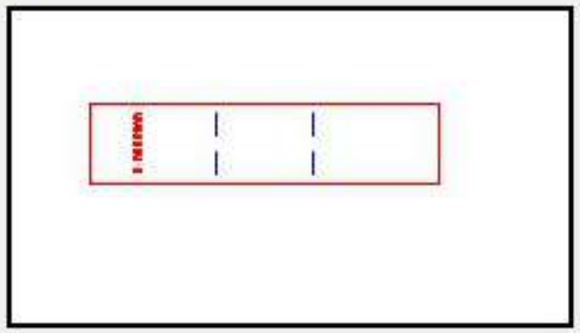
Comments & Forms

Document and Markups

Summarize Comments

Scale: 100%

32 x 18 Inches



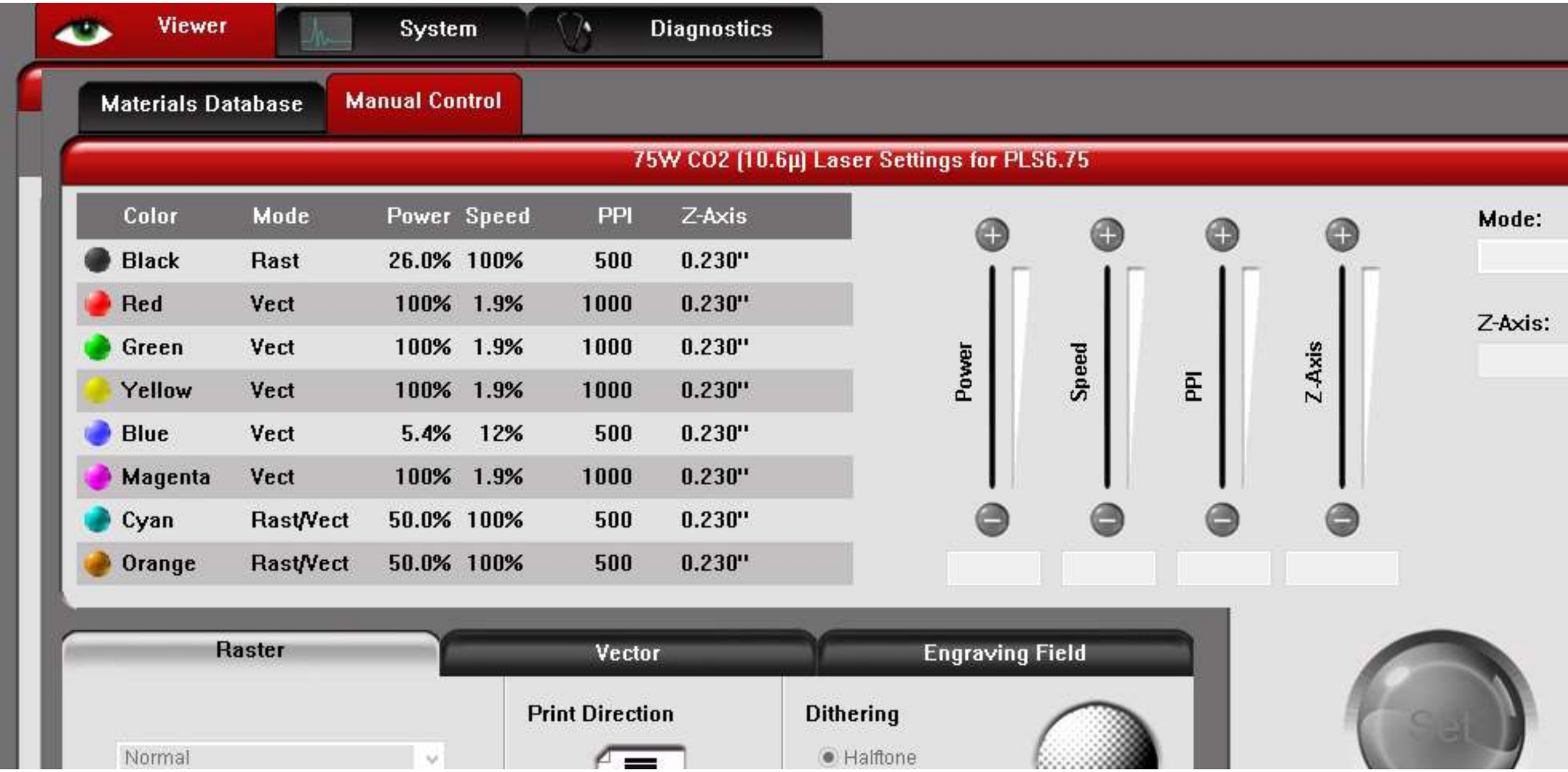
< >

Page 1 of 1

Page Setup...

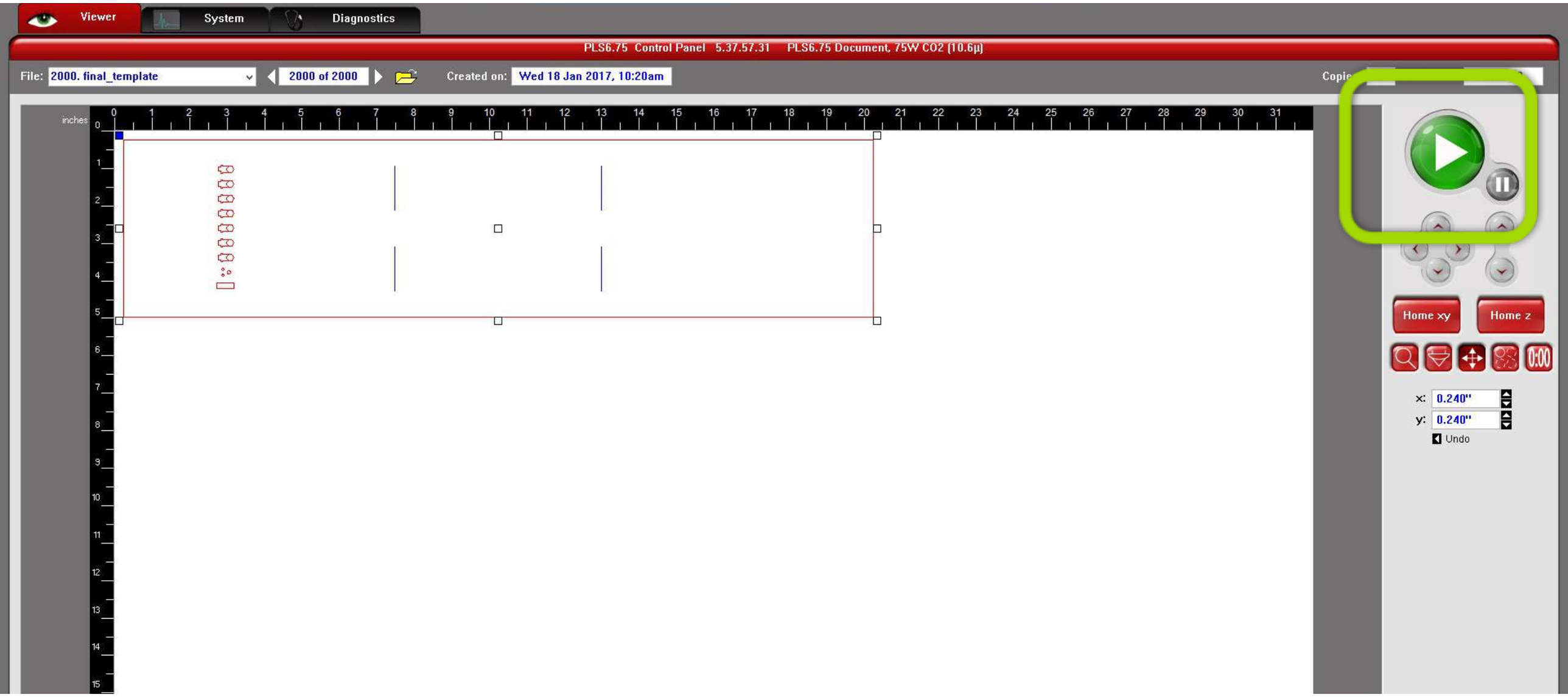
Print Cancel

define power, speed of laser
(different for each material)



laser cutter control panel: hit cut button

(looks different for each laser cutter model)




CAUTION

homework

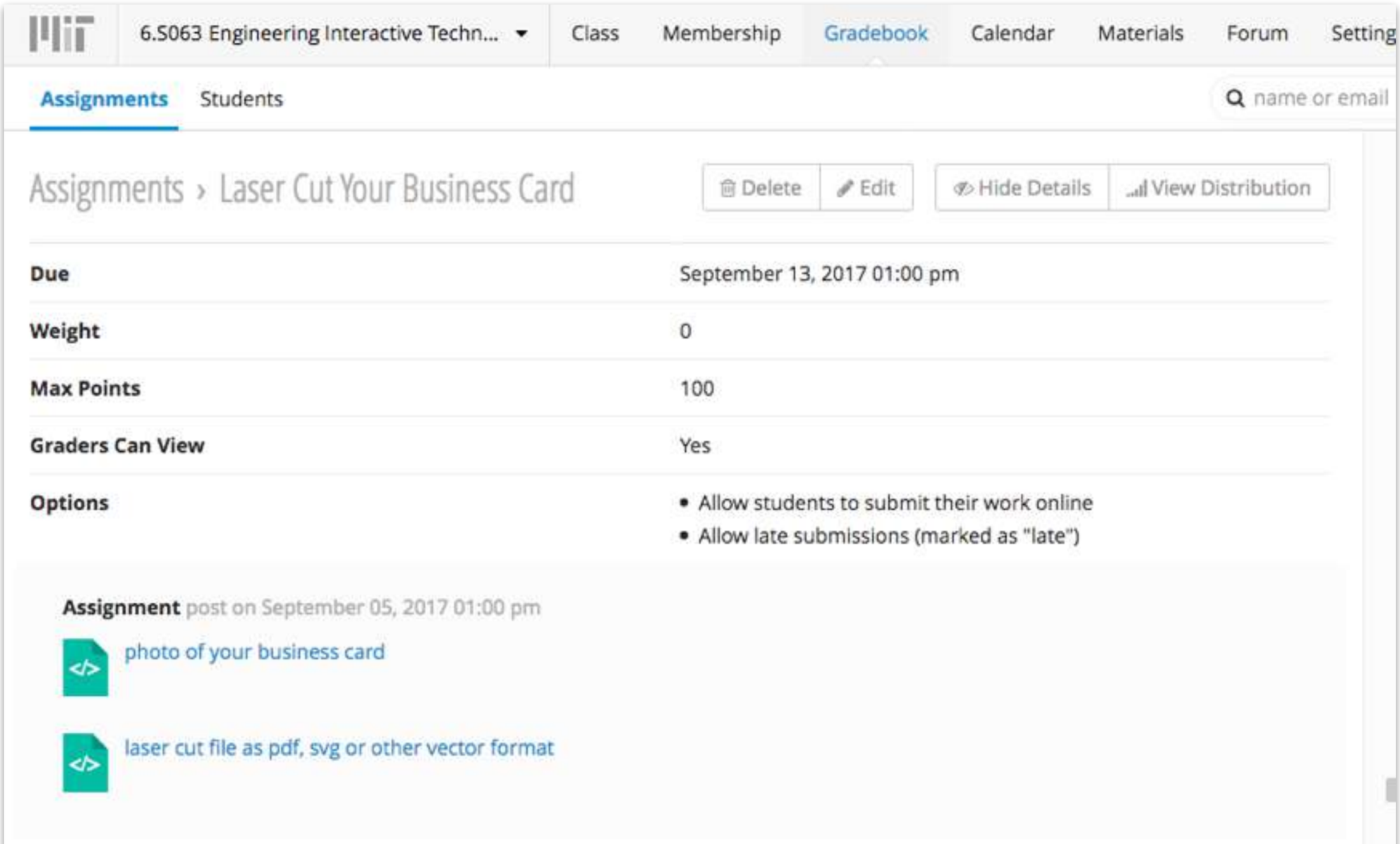
until next wednesday

laser cut your own business card::

homework until next wednesday (Sept. 13)
pass / no pass (not graded)

deliverables::

- bring your card to class on wednesday (Sept. 13)
- upload a photo of your card to gradebook
- upload the laser cut file to gradebook



what we do today to get you started:

- live demo laser cutting in small groups (5-10 people)
- getting your 2D drawing program to work
- which materials you can use and where to get them
- how to access laser cutters on campus

which materials to use

most common materials::

paper

cardboard

wood

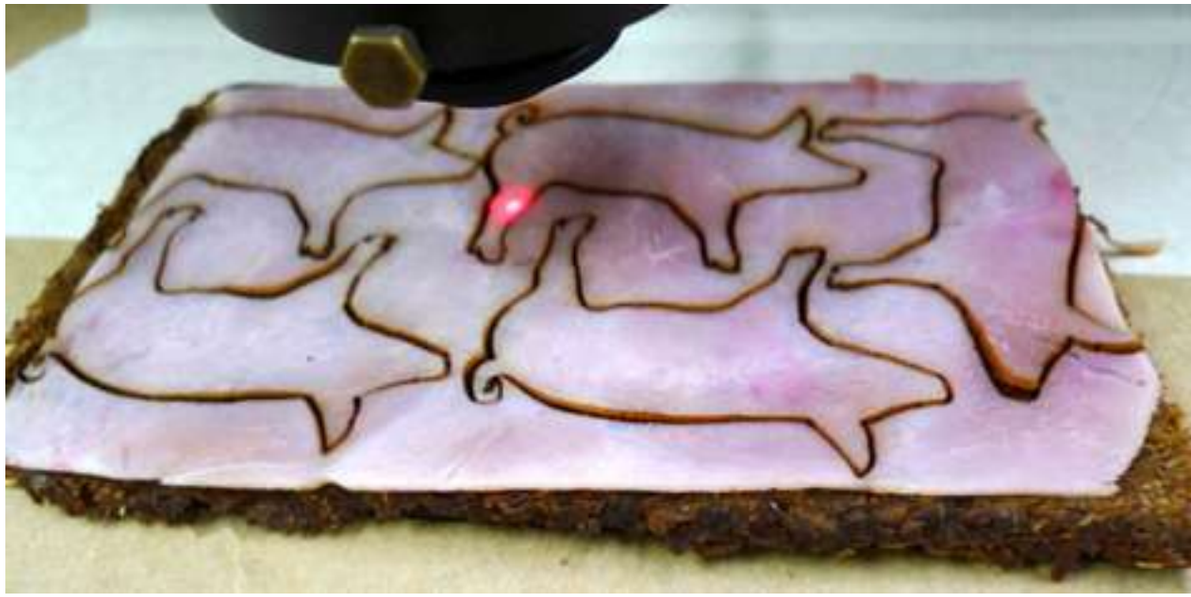
acrylic

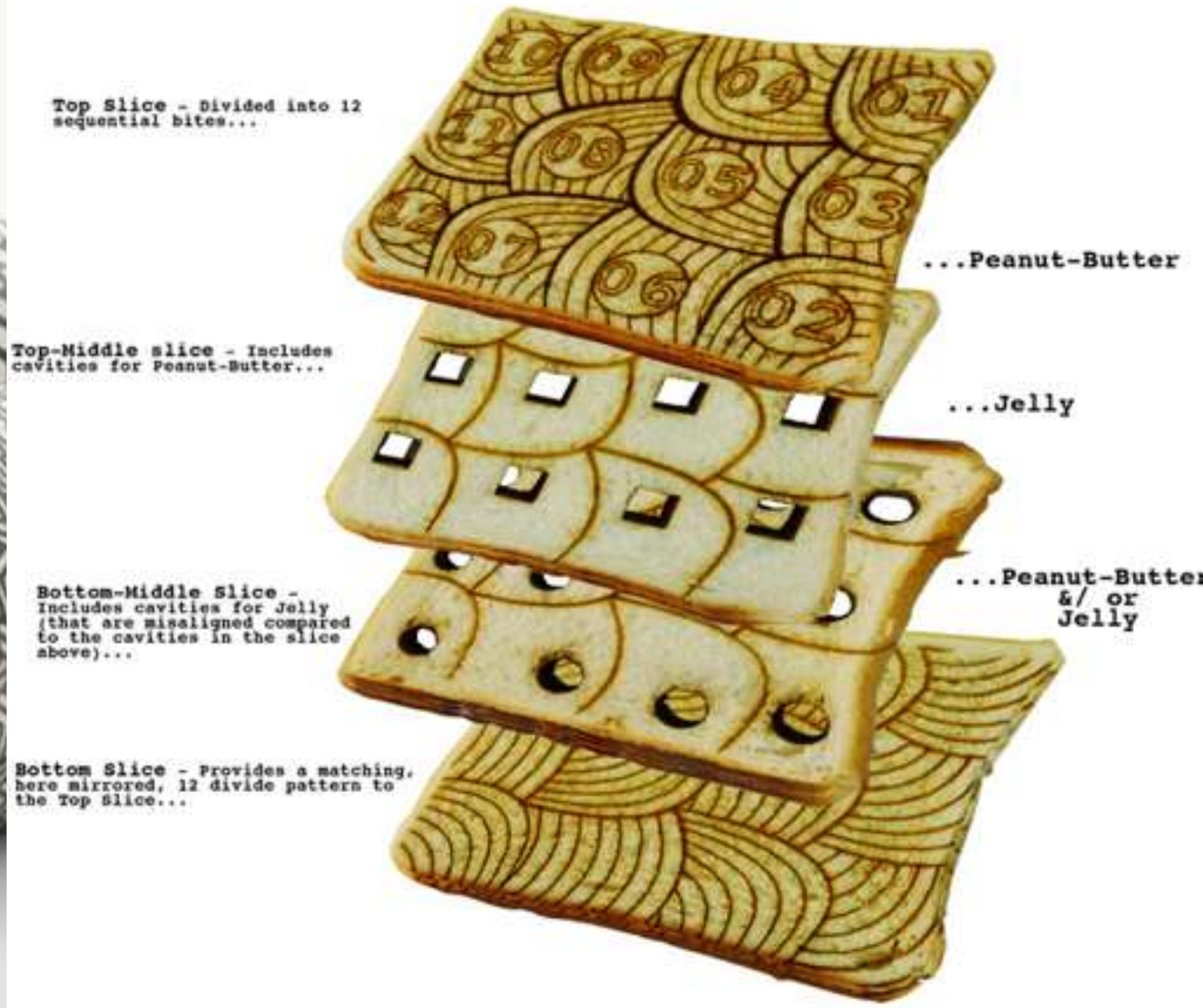
what other materials can we laser cut?

<google>

<30 second brainstorming>

unconventional materials…
food…





never cut materials::

that are **flammable**
create **toxic fumes**

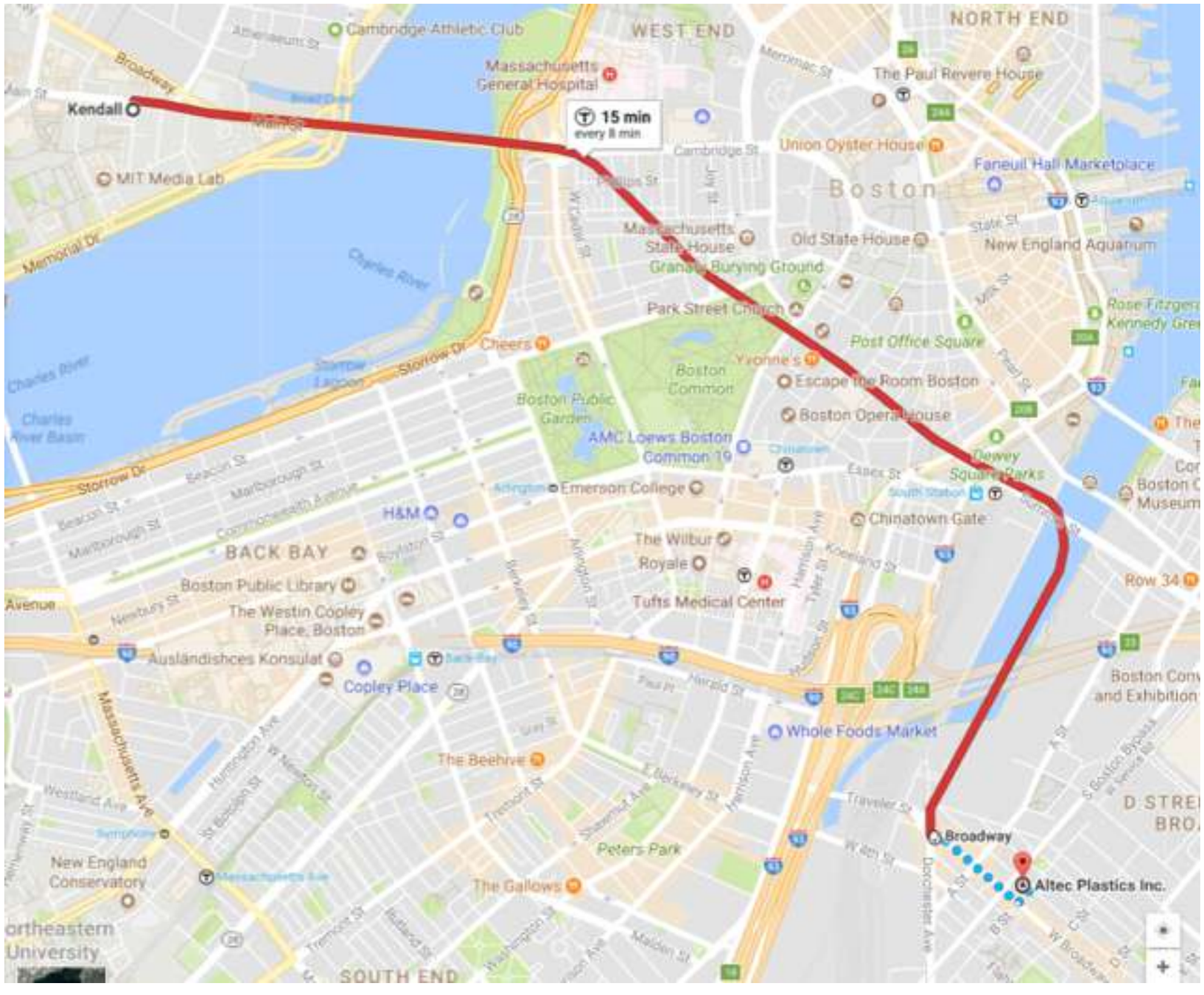
if you are not sure, **ask the shop manager!**

can we laser cut metal and glass?

no we can’t, at least not on the machines we have, but high-power industrial laser cutters can.

where to buy materials

buy materials here in Boston (15 min on redline):



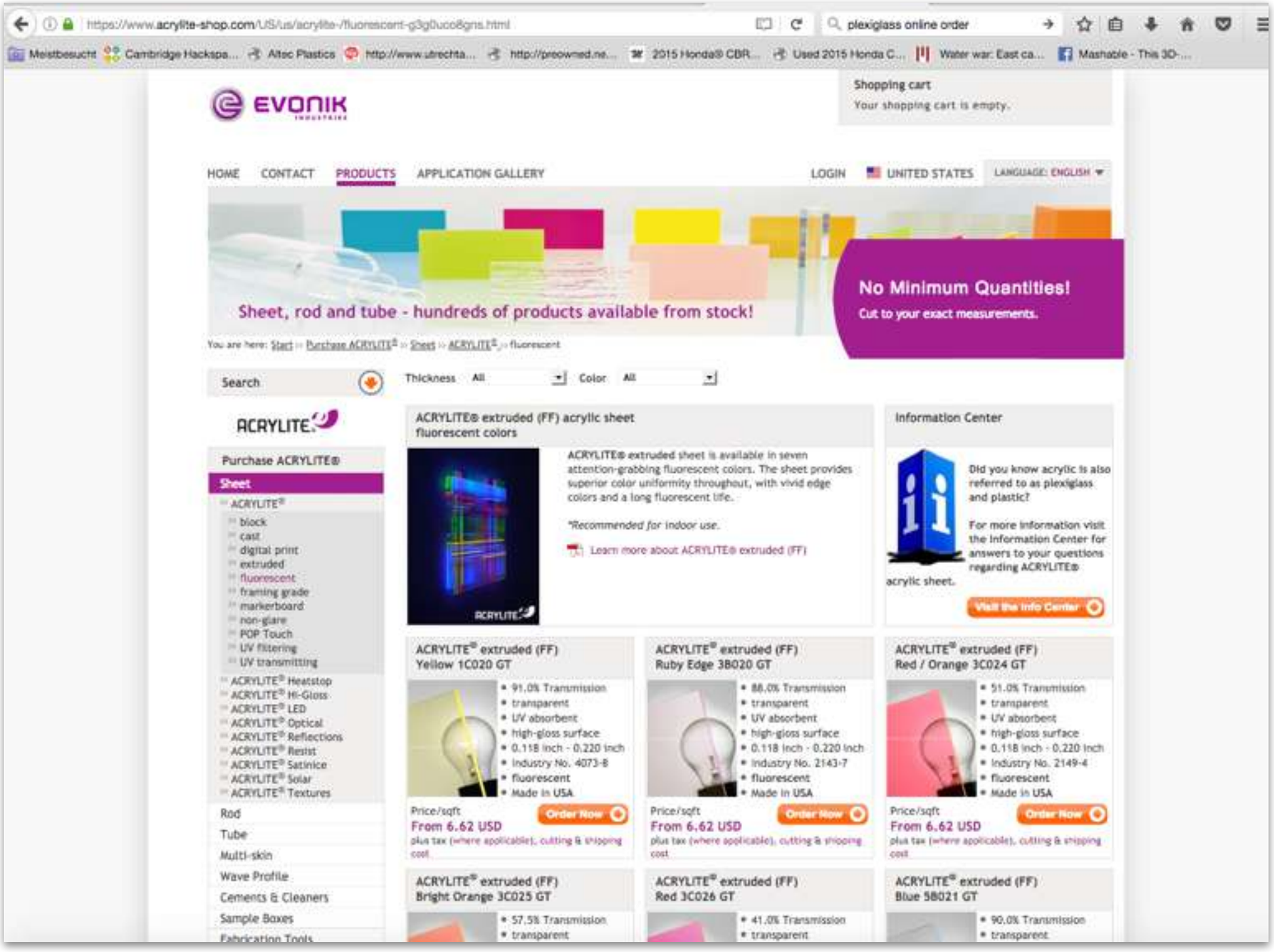
Altec Plastics
116 B St
Boston, MA 02127

both **cast** and **extruded** acrylic are fine

Altec Plastics

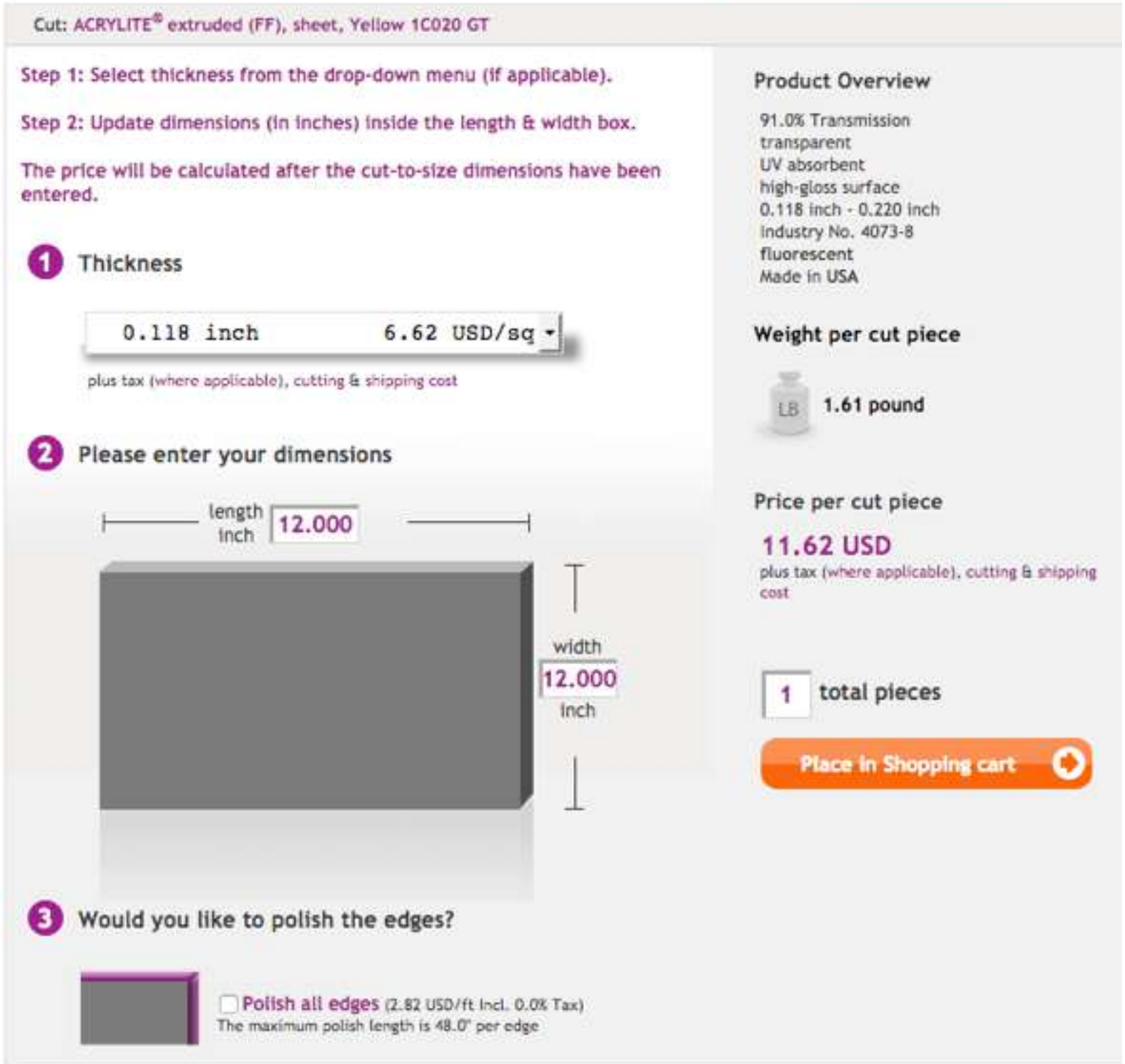
116 B St
Boston, MA 02127

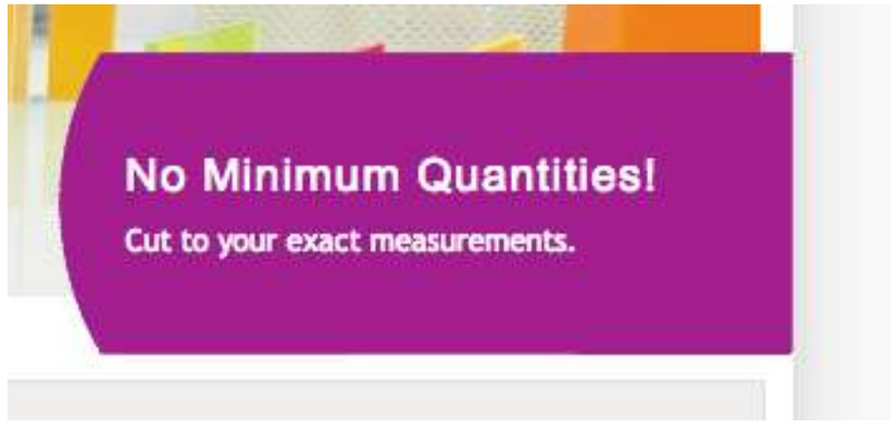
buy materials online:



https://www.acrylite-shop.com/US/us/acrylite-/fluorescent-g3g0uco8gns.html

buy materials online:





expensive shipping
(group orders?)

https://www.acrylite-shop.com/US/us/acrylite-/fluorescent-g3g0uco8gns.html

costs::

paper
cardboard
wood
acrylic

cheap low-fi prototyping

$10-$20 per sheet
$10-$20 per sheet

depending on thickness

accessing laser cutters on campus (and beyond)

International Design Center (IDC)::

card access:

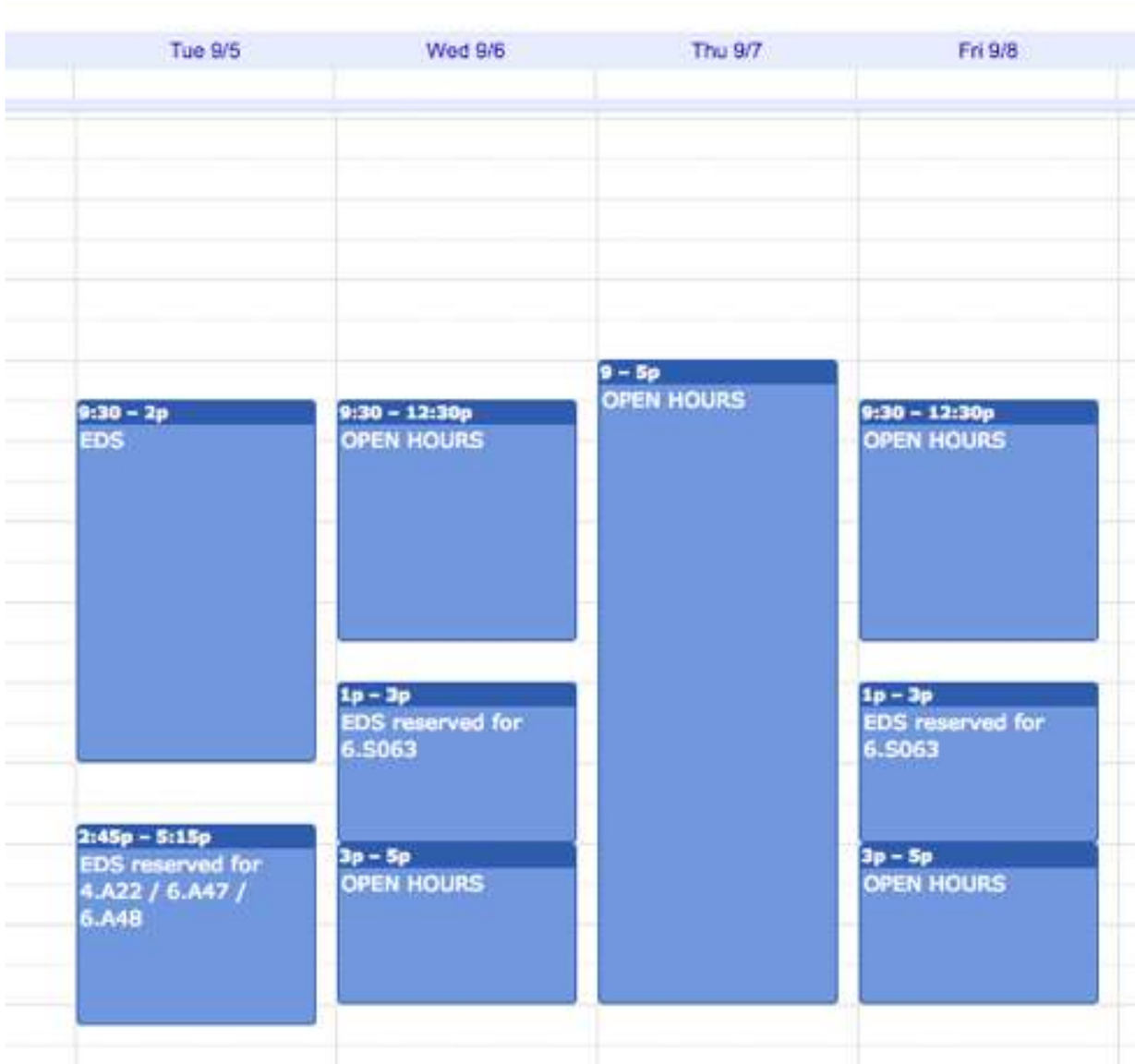
to the shop: 8am - 5pm, mondays - fridays
to the main space: 24h, including weekends

Engineering Design Studio (EDS, 38-501)::

typically 9-5pm, mondays-fridays, but their times vary
check their calendar for ‘open hours’

(no card access required)

http://eds.mit.edu/hours



where else can we laser cut?

< any thoughts? >

MIT's Makerspaces

Makerspaces at MIT (and many universities) are usualy one of three types. They all have similar maker tools, but their community elements differ, and they are purposesd and managed in a different way:

- **Machine shops** - Spaces that specialize in training/mentoring/making on creation of complex systems and/or fine-detailed components. Interaction with staff (skilled machinist educators) is their key value, so they specialize in quality of maker education/work vs. quantity of students served.
- **Project makerspaces** - Spaces that primarily support class projects. These spaces usually contain more resources to facilitate collaboration, i.e. meeting space and open working space. The key value of these spaces is in their abililty to integrate specific resources that enable programmed, curriculum-based learning.
- **Community makerspaces** - Prioritizes fostering unrestricted making via a community effort. The community serve as stewards of the space/resources and educate users in safe making practices. The key value of these spaces is the communities' ability to facilitate access to more users, particularly early/novice users.

Recent News

Project Manus Joins Social Media
Fri, 04/28/2017
Get Mobius and win a chance to go to the Diablo Glass School
Wed, 04/12/2017
ISAM 2016 Highlight Video
Wed, 04/12/2017

more

Contact Us

Project Manus Central Office

MIT Mobile Möbius

By Massachusetts Institute of Technology

Open iTunes to buy and download apps.

View in iTunes

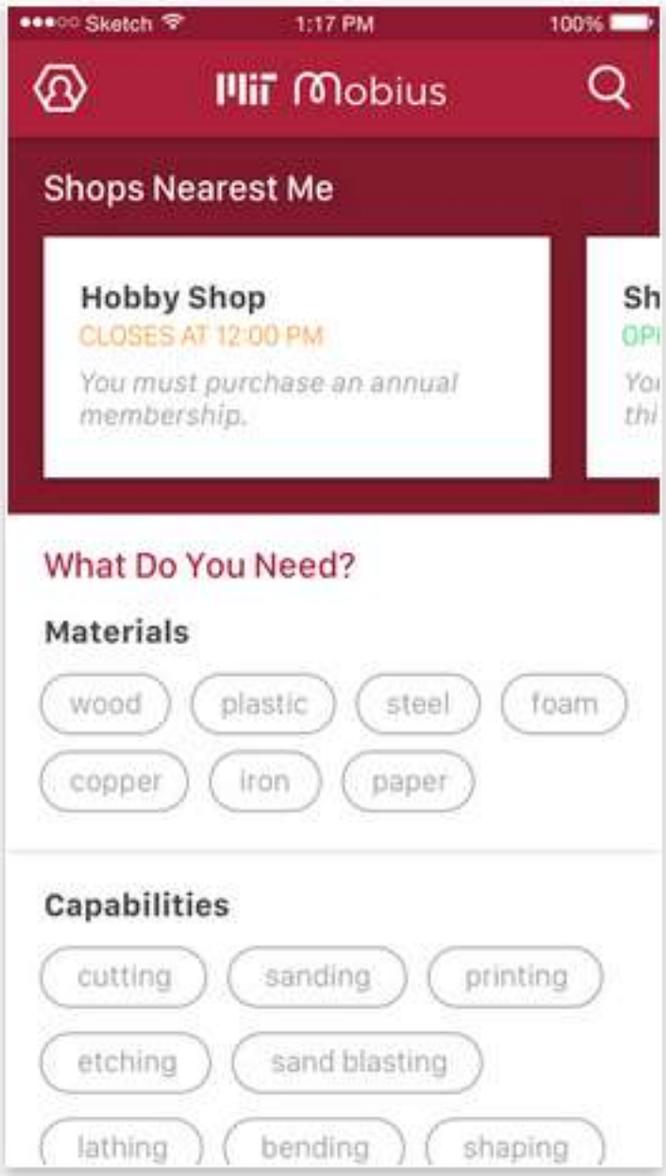
Description

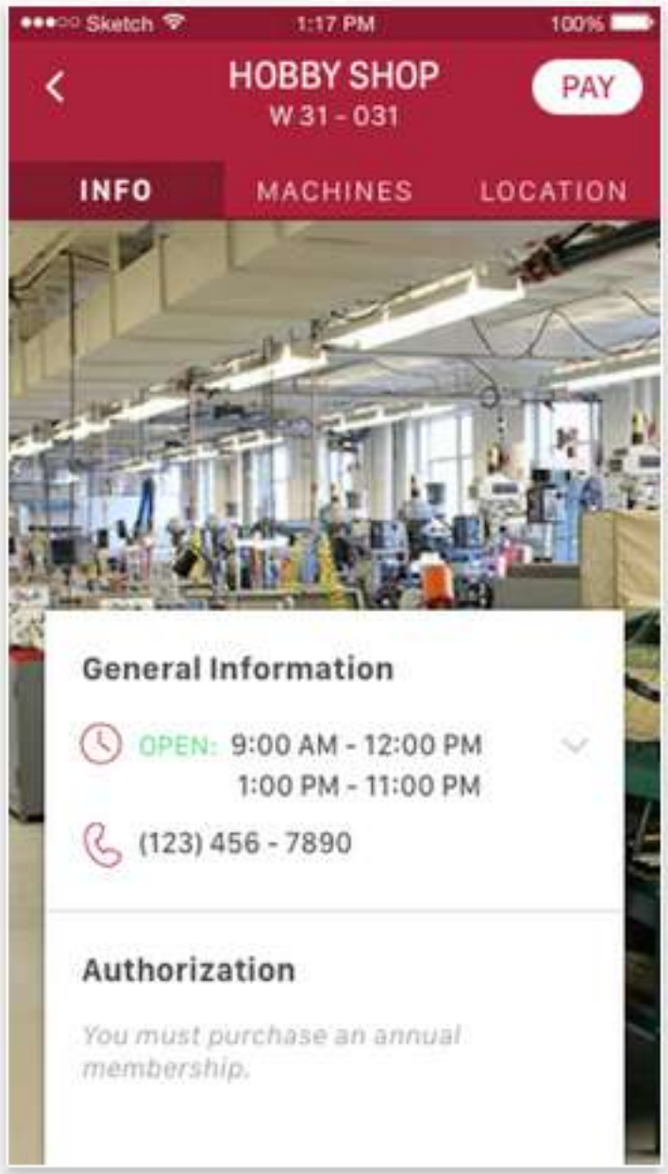
MIT Mobius is an app that enables students and st
laboratory resources on the MIT campus. Users are
training/authorization levels and requirements.

MIT Mobile Möbius Support ›

What's New in Version 2.0

– Added the ability to make purchases with Credit
– Bug fixes and improvements





Want to use our new Laser Cutter + CNCs and 3D Printers? Checkout our memberships, and see what we have to offer!

Cambridge Hackspace

what

We are a growing maker space in the center of Somerville, MA. We have a 1200sqft space catering to enthusiastic makers, and hold weekly meetings where we get together and make things. We have a Laser cutter, CNCs, 3D printers, and a range of other tools for our members to use.

why

We've started the Cambridge Hackspace to provide a physical space where people can gather and work on their projects, have access to larger or expensive tools (like the 3D printers, and laser cutter), and provide a place where the community can share their knowledge.

who

Anyone and everyone is welcome. Whether your thing is software, electronics, woodwork, or knitting, we provide a space where you can meet fellow makers, to learn, and be inspired. We hold workshops every month so you can learn new skills.

where

We are located in Union Square, Somerville [address]. We hold events every week, our next meeting is on Tuesday, 29 Aug @ 06:30pm - Check our events page for future events. You can also like our Facebook page and follow us on Twitter (@HackCambridge)

Join Cambridge Hackspace

Become a Cambridge Hackspace member, join us and help support our efforts to get bigger and better.

Become a Member

if you try a new space,
please tell us about your experience :).

sign the safety hand out

sign the **safety** hand out first

Revision 2.4

Department of Electrical Engineering & Computer Science

Electrical Safety

for Staff and Students in EECS Department Teaching Laboratories (D

NEVER WORK ALONE

If you will be working with energized circuits or equipment **over 50 volts peak or 5** sure that at least one other person can see you and hear you. In case of emergen any institute phone [**617-253-1212** from cell phones]; and notify the stock clerk o duty.

VOLTAGE RULES

All EECS Department Teaching Laboratories lab kit voltages are **below 50 volts DC**. (OSHA permits "unqualified persons" to work on such circuits with "awaren which is what this document is.)

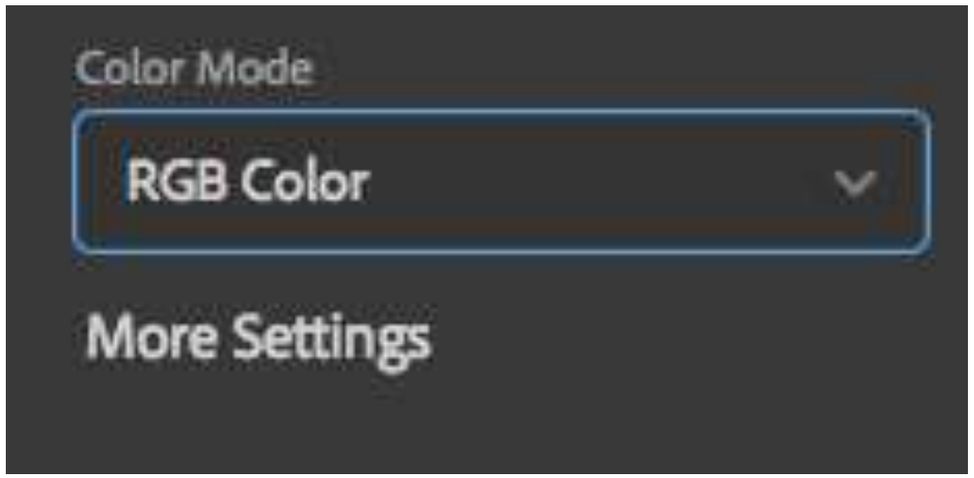
If you intend to work on a project using power sources **over 50 volts peak or 50 v** first **secure permission** from your Faculty or Staff Instructor; and take an ***Familiarization class*** from either David Lewis [38-501, 617-653-5629] or Karl Bergg 0272] **before** any work on the project begins.

No power tools or energized machine tools are to be used in the Teaching Laborat review by David Lewis and Karl Berggren and the Course Instructor.

PREVENT ACCIDENTS: FOLLOW THIS ADVICE

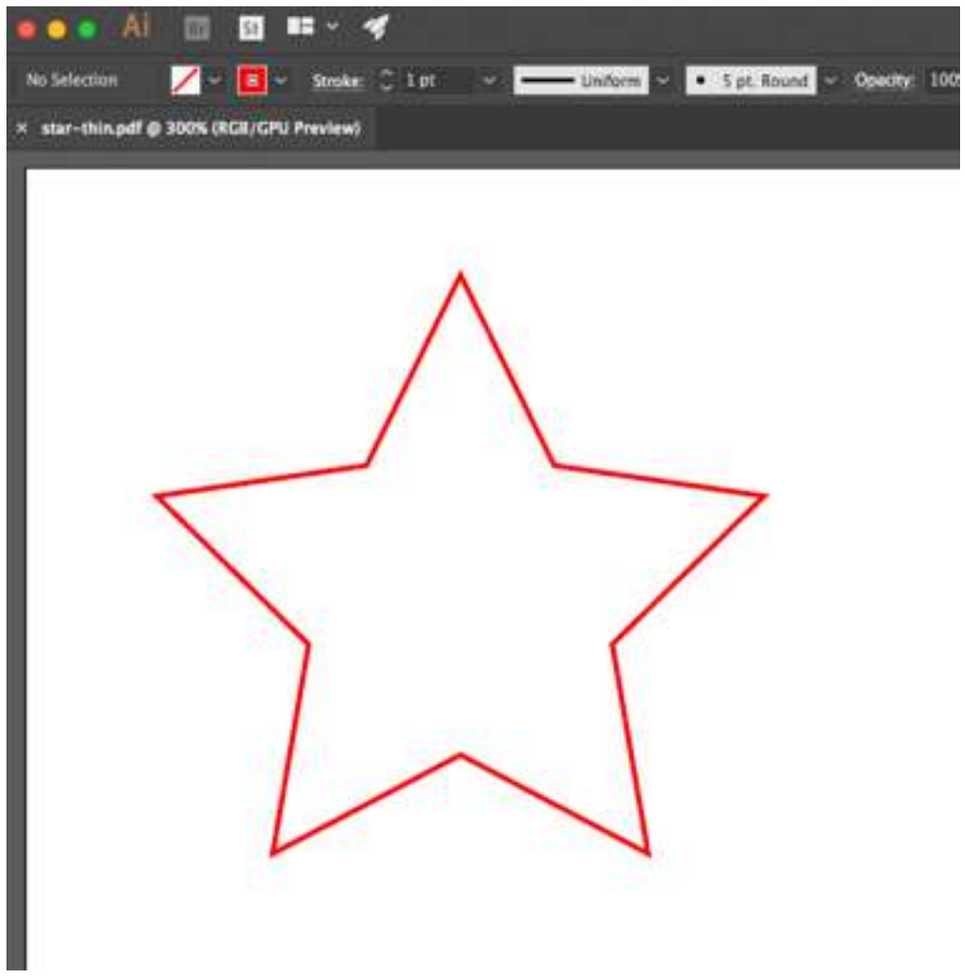
- Never hurry. Work deliberately and carefully.
- Connect to the power source **LAST.**
- If you are working with a lab kit that has internal power supplies, **turn the ma OFF** before you begin work on the circuits. Wait a few seconds for power su discharge. These steps will also help prevent damage to circuits.
- If you are working with a circuit that will be connected to an external power **power switch of the external supply OFF** before you begin work on the circuit.
- Check circuit power supply voltages for proper value and for type (DC, AC, energizing the circuit.
- Do not run wires over moving or rotating equipment, or on the floor, or st walkways from bench-to-bench.
- Remove conductive watchbands or chains, finger rings, wristwatches, etc., and c pencils, metal or metal edge rulers, etc. when working with exposed circuits.
- When breaking any high-voltage or high current inductive circuit open the sw hand and turn your face away to avoid danger from any arc which may occur terminals.

setup your 2D drawing program



document color mode::

RGB is correct, CMYK is wrong



line color::

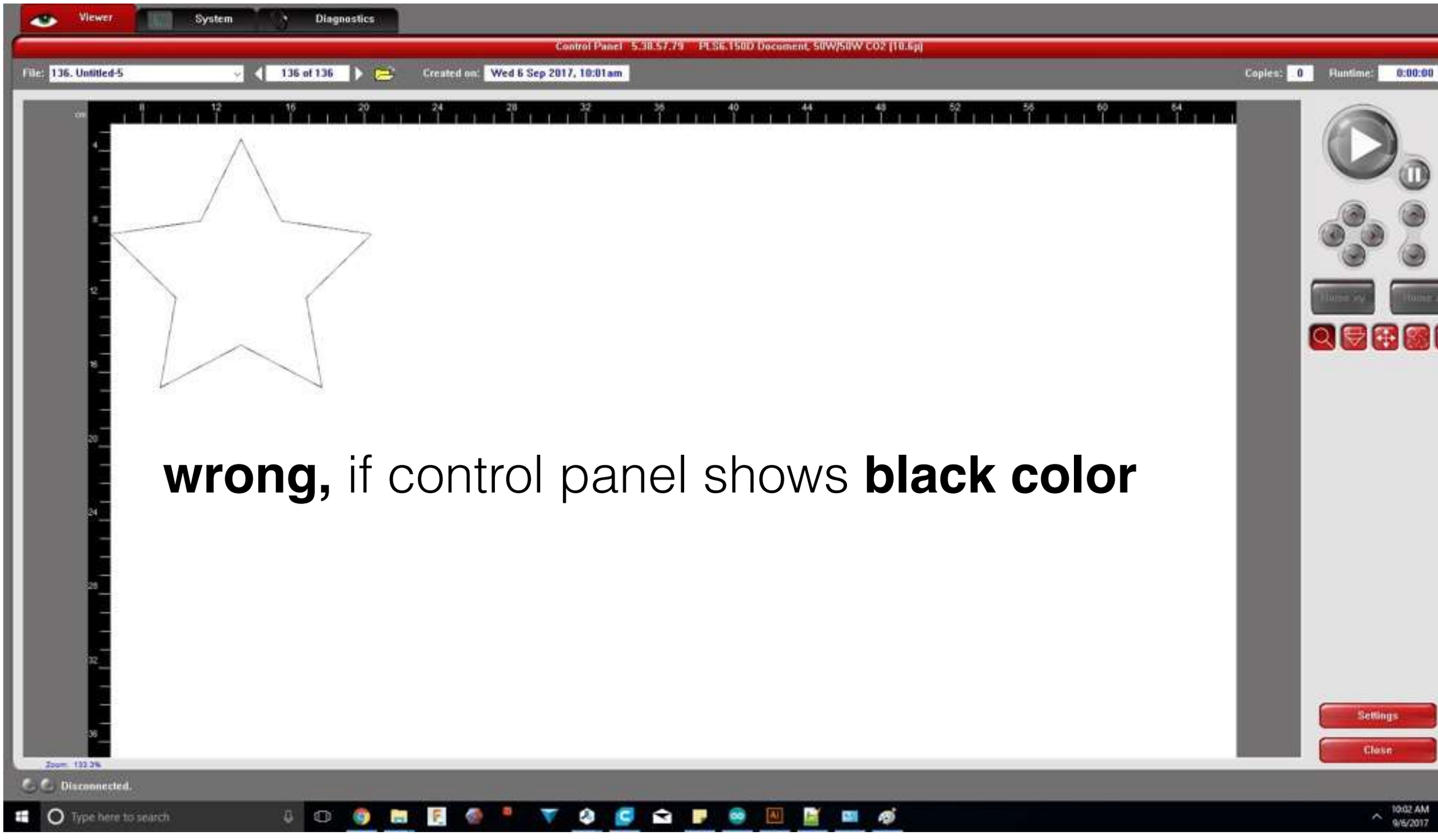
red

R = 255

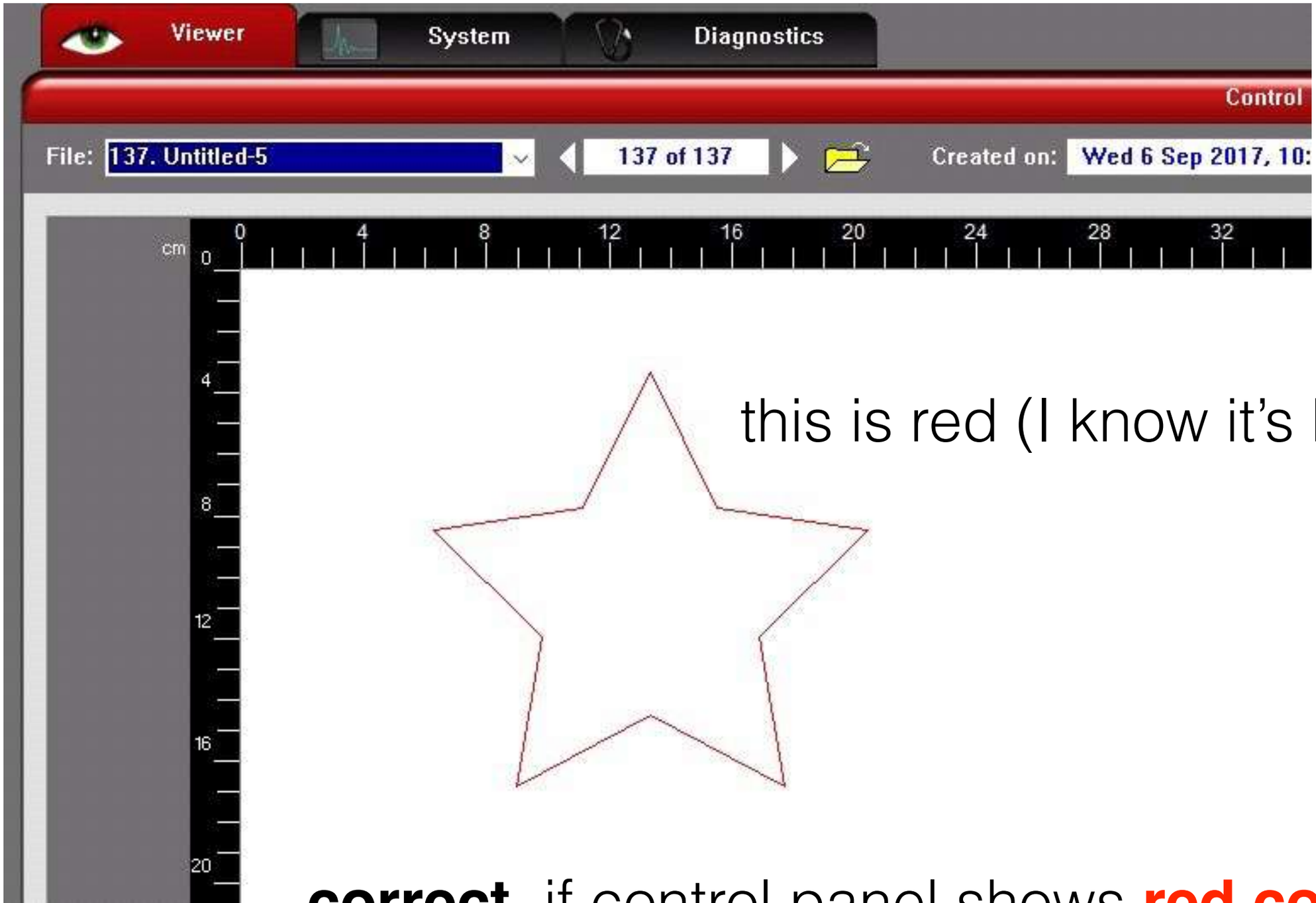
G = 0

B = 0

#FF0000



wrong, if control panel shows **black color**

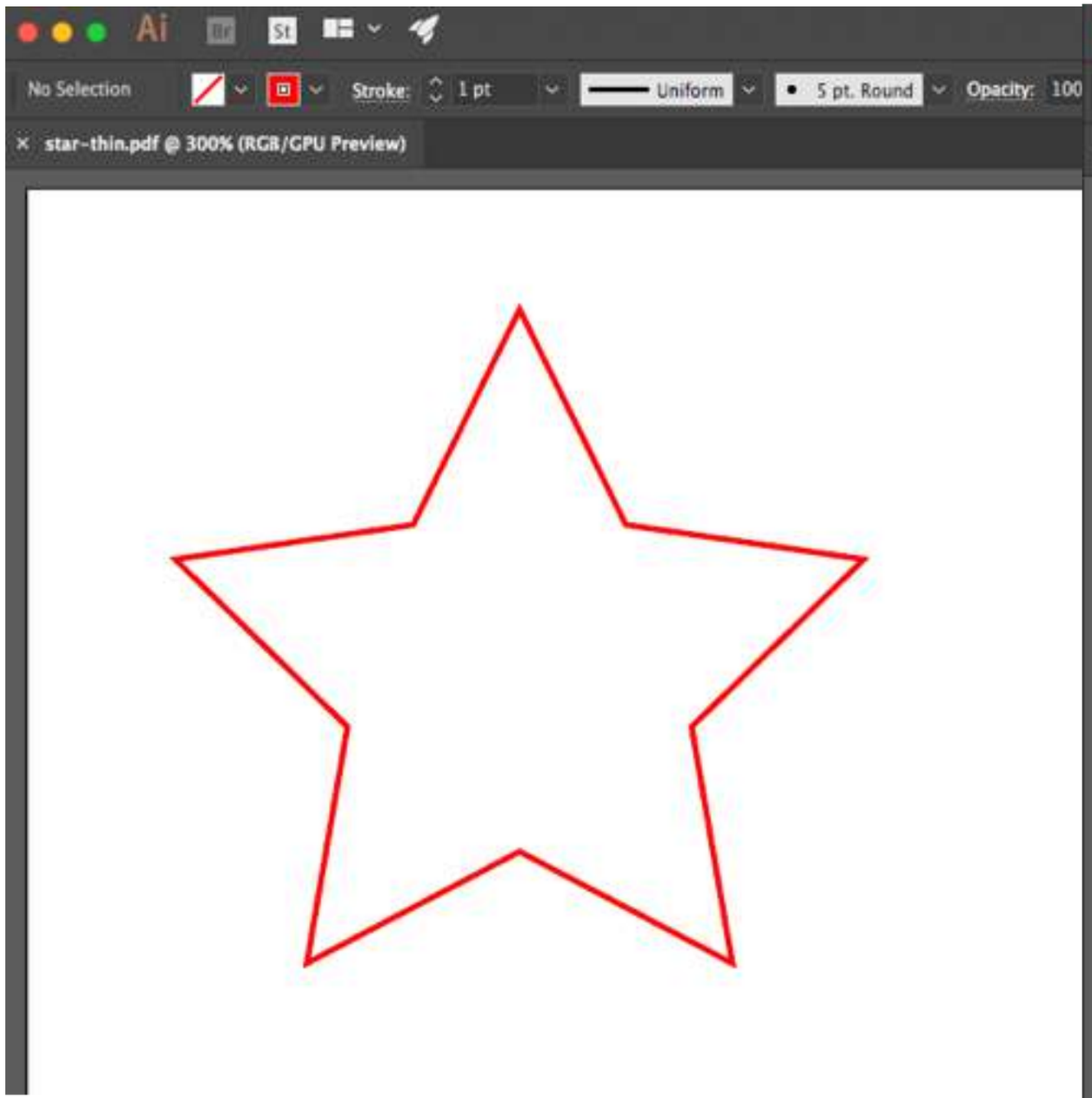


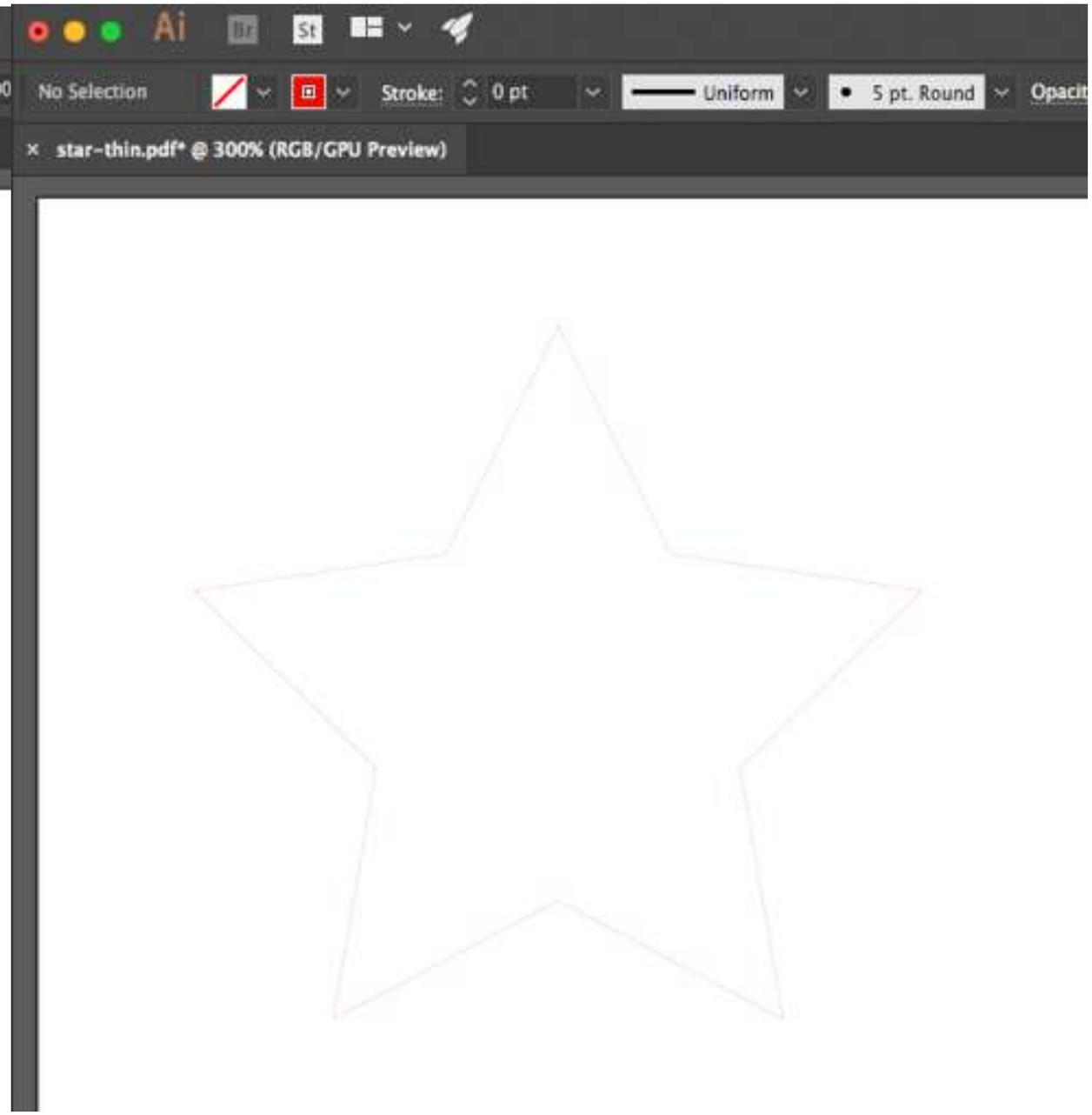
this is red (I know it's hard to see)

correct, if control panel shows **red color**

Adobe Illustrator::

stroke thickness = 0.0001





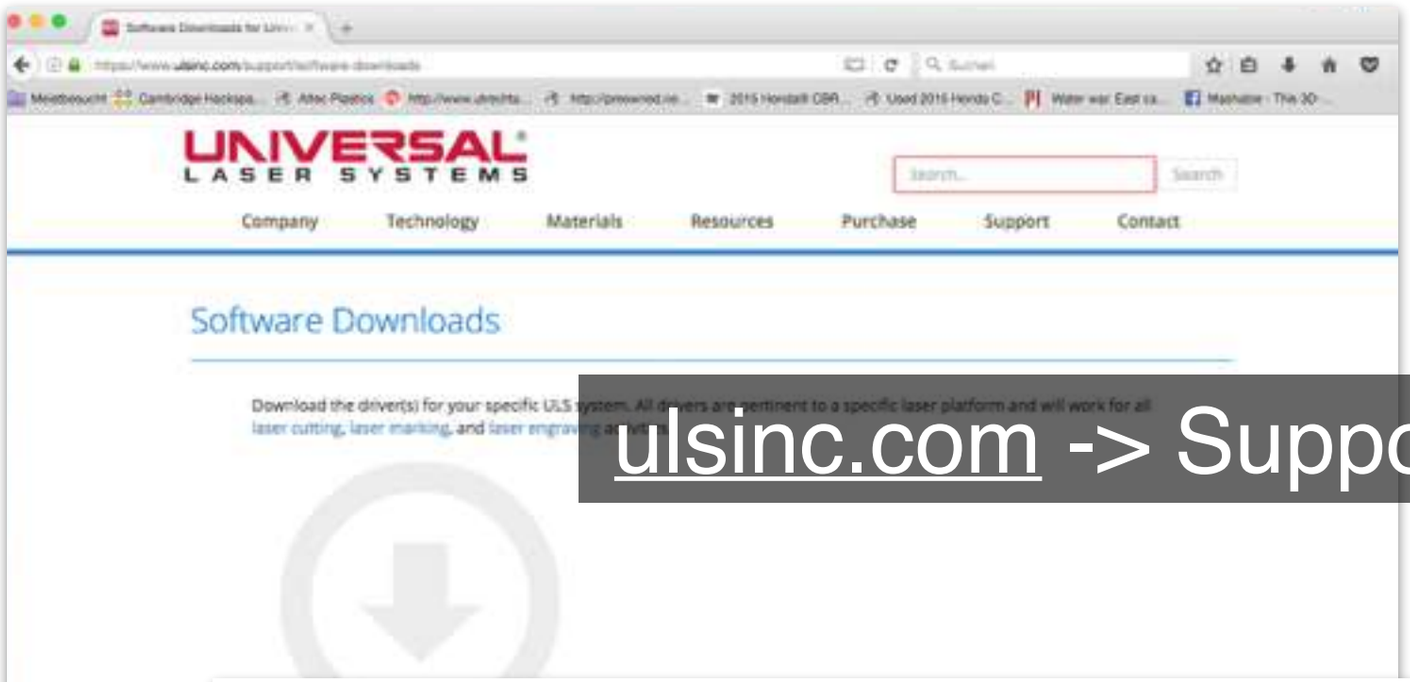
Inkscape::
everything correct, use as is

OpenDraw (Open Office)::
everything correct, use as is

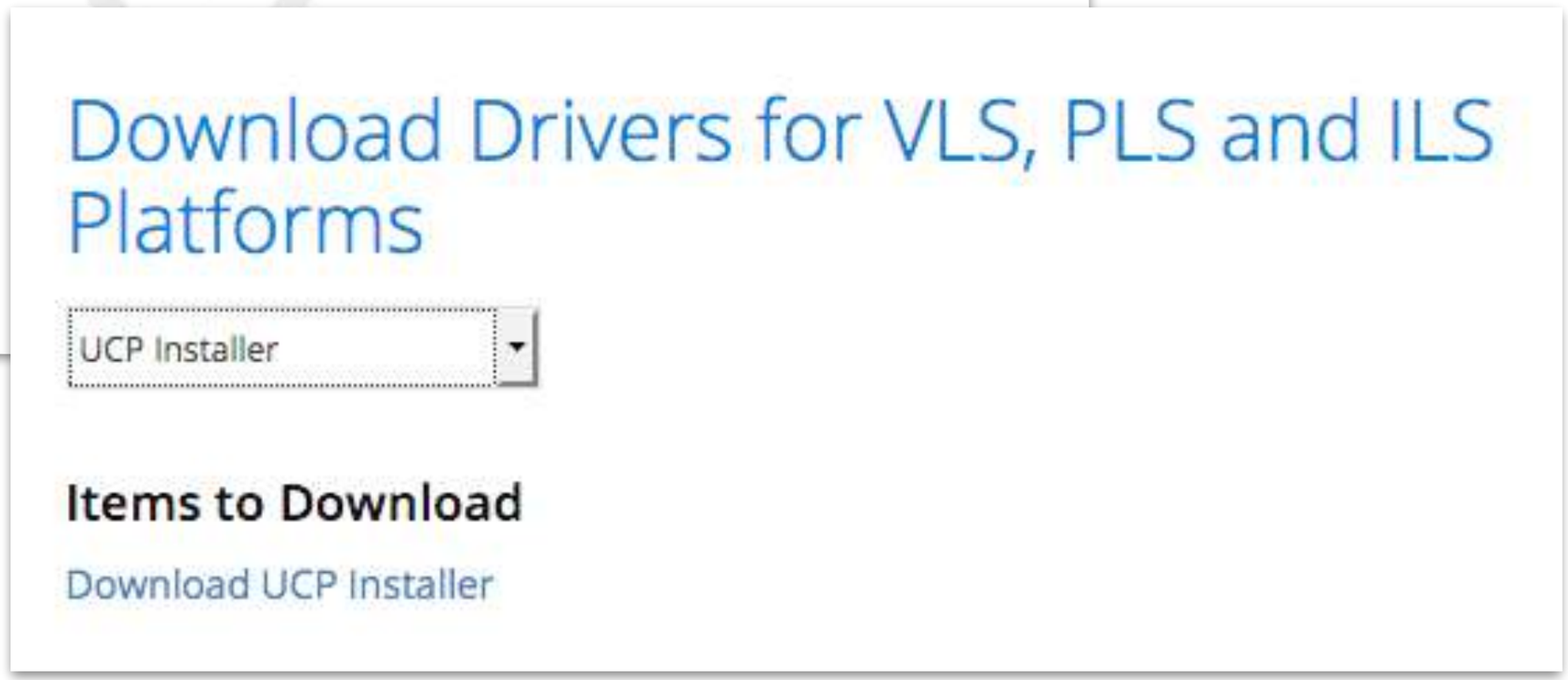
if you want to use **text**
you need to **convert it to a path** first

how can I **test my settings?**

Windows only!
you can also test on Jared's machine



ulsinc.com -> Support -> Software Downloads



final_template.pdf - Adobe Acrobat R

File Edit View Window Help

Open... Ctrl+O

Create PDF Online...

Save Ctrl+S

Save As... Shift+Ctrl+S

Save as Other

Send File

Revert

Close Ctrl+W

Print... Ctrl+P

2 C:\Users\EDS\Downloads\laser test (1).pdf

3 E:...\laser cutter temp...multitouch pad.pdf

4 E:...\laser cutter temp...multitouch pad.pdf

5 E:\PT1pdf.pdf

View All Recent Files...

Exit Ctrl+Q

61%

Print

Printer: PLS6.75 Properties Advanced Help

Copies: 1

Print in grayscale (black and white)

Save ink/toner

Pages to Print

All

Current page

Pages 1

More Options

Page Sizing & Handling

Size Poster Multiple Booklet

Fit

Actual size

Shrink oversized pages

Custom Scale: 100 %

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Orientation:

Auto portrait/landscape

Portrait

Landscape

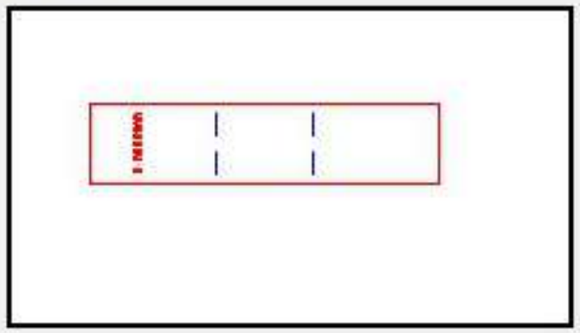
Comments & Forms

Document and Markups

Summarize Comments

Scale: 100%

32 x 18 Inches



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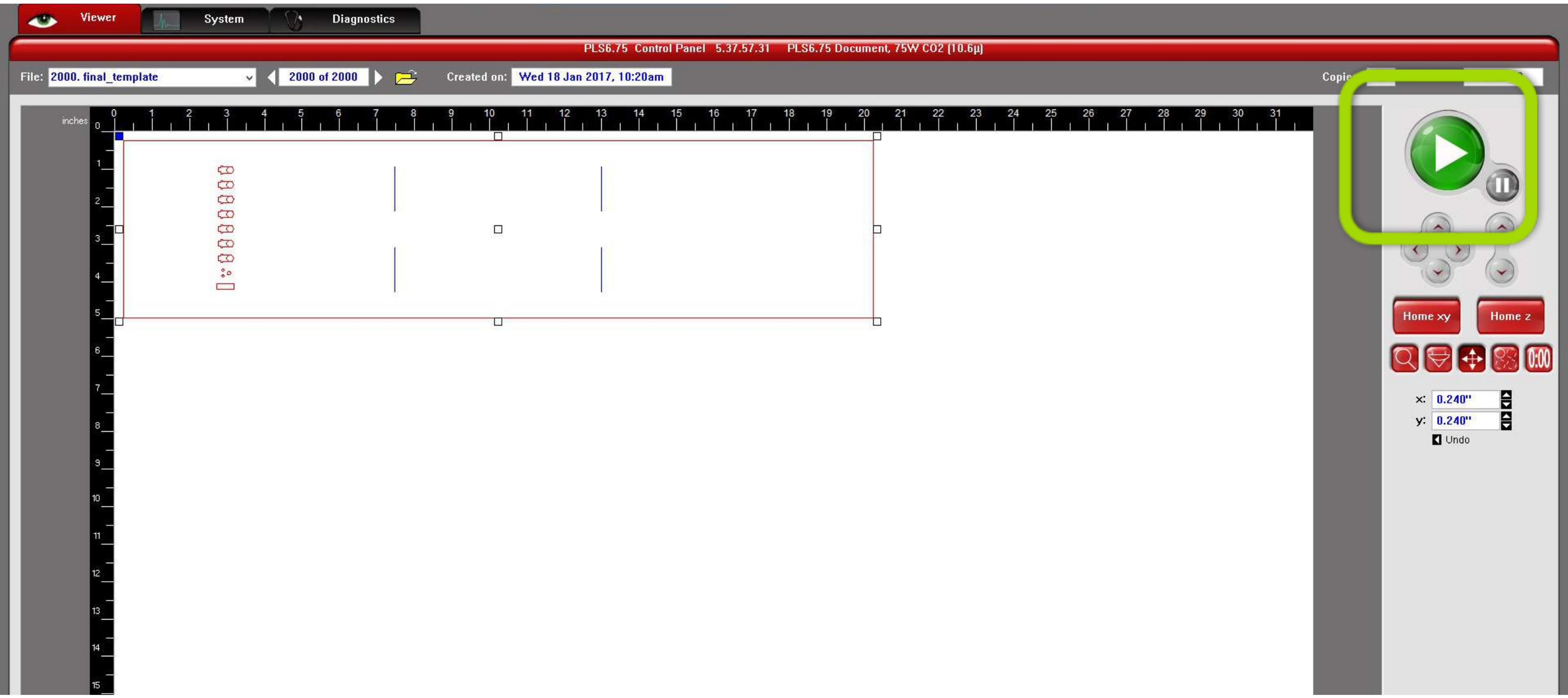
Page 1 of 1

Page Setup...

Print Cancel

line is red? you are ready to laser cut!
line black? your drawing settings need adjustment



in groups of 5,
let’s laser cut

friday::
we will be at EDS (38-501)

- augmented reality
- some laser cutting tips & tricks for your home work

end.