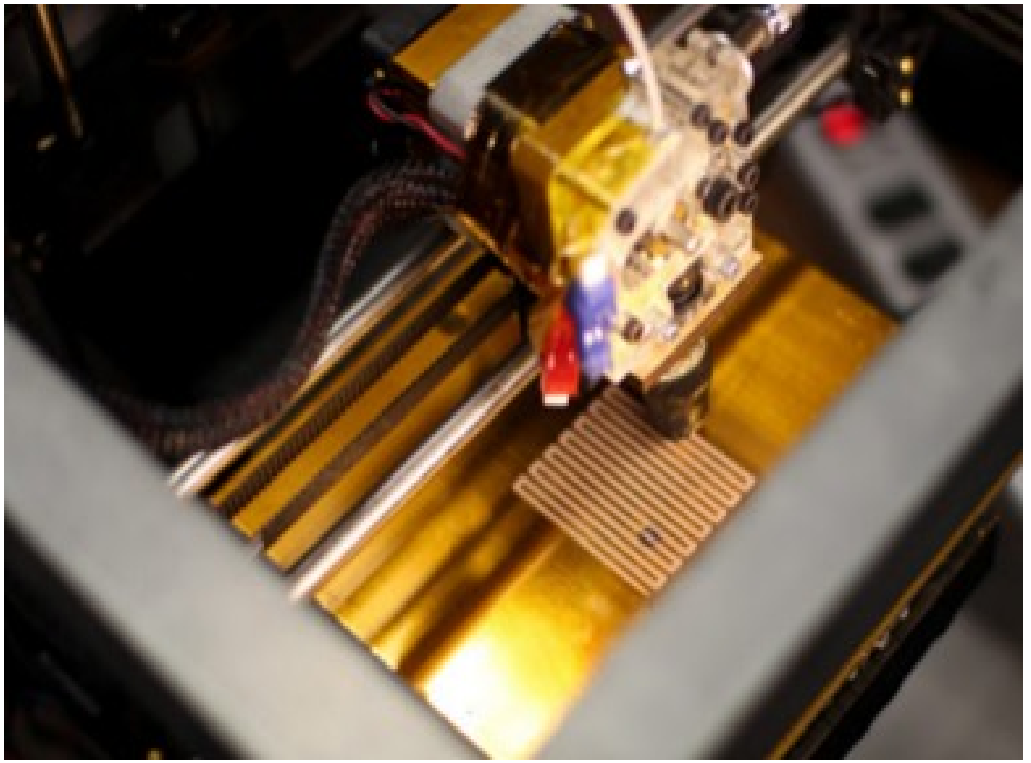
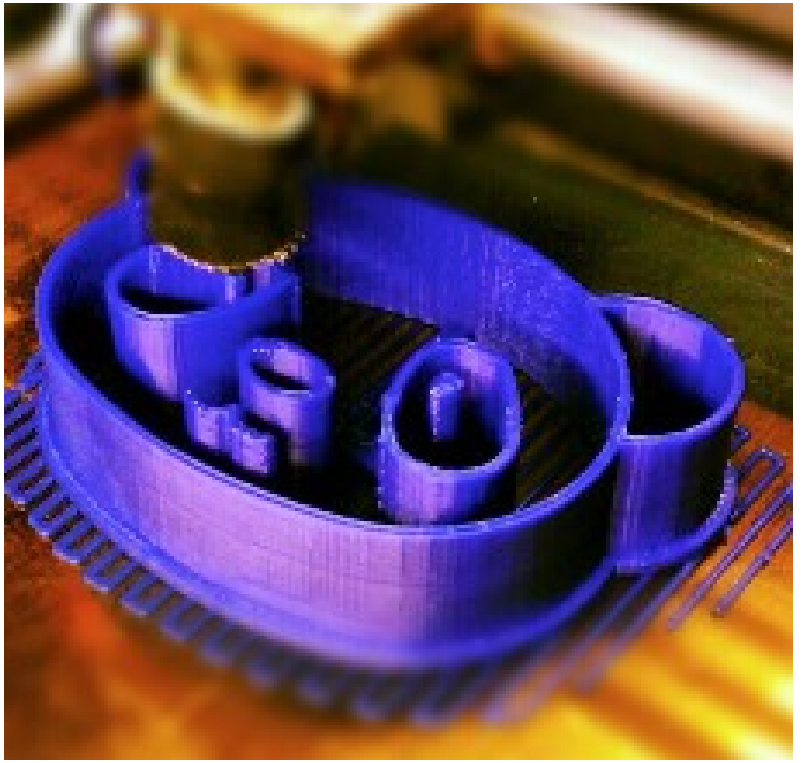
Makerspace Urbana

Make-a-tion:
3D Printing Workshop

July 13 2013

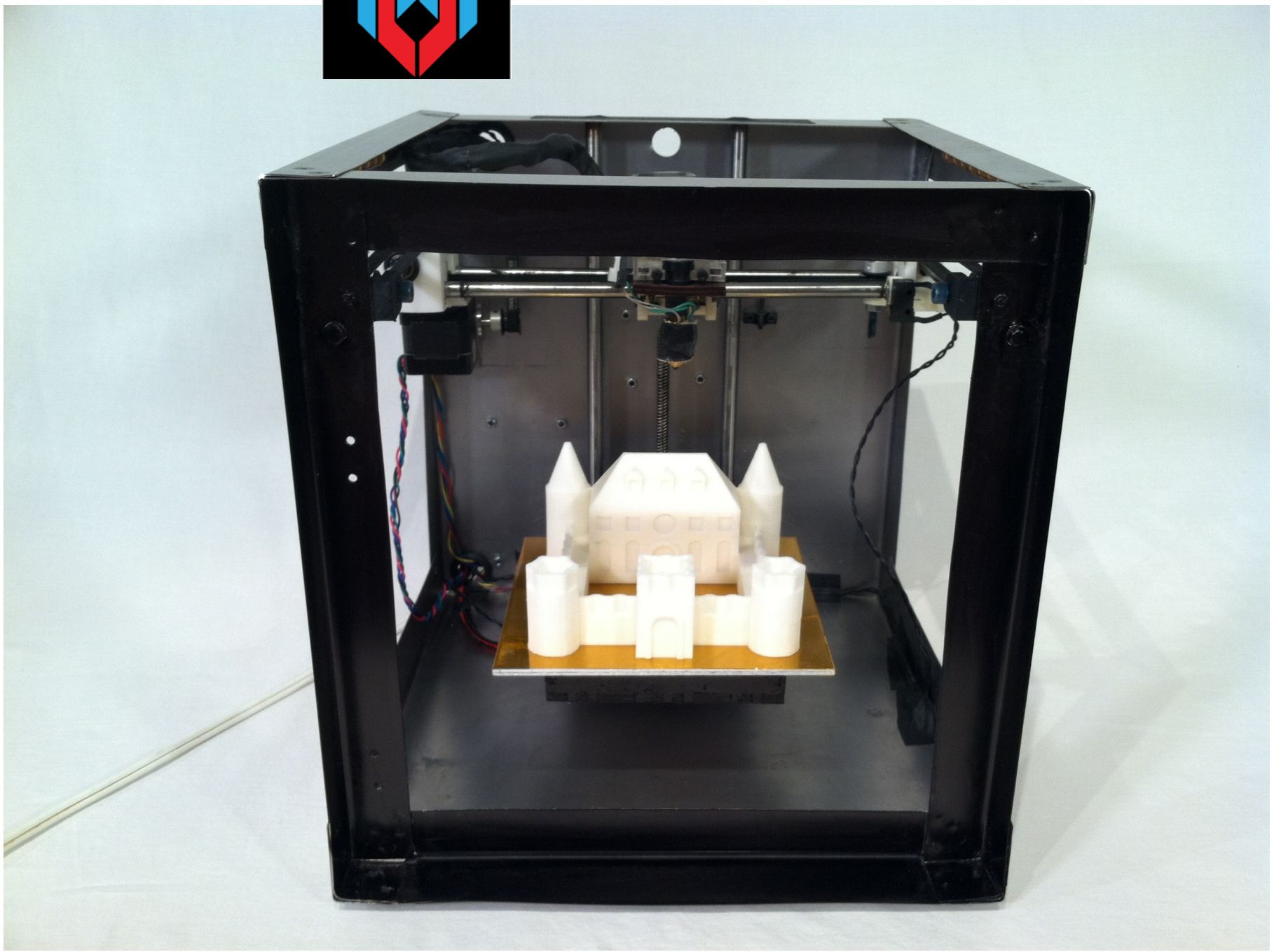
James H. & Jeff P.
w/ help from Brian W.





The 3D printing revolution is now!

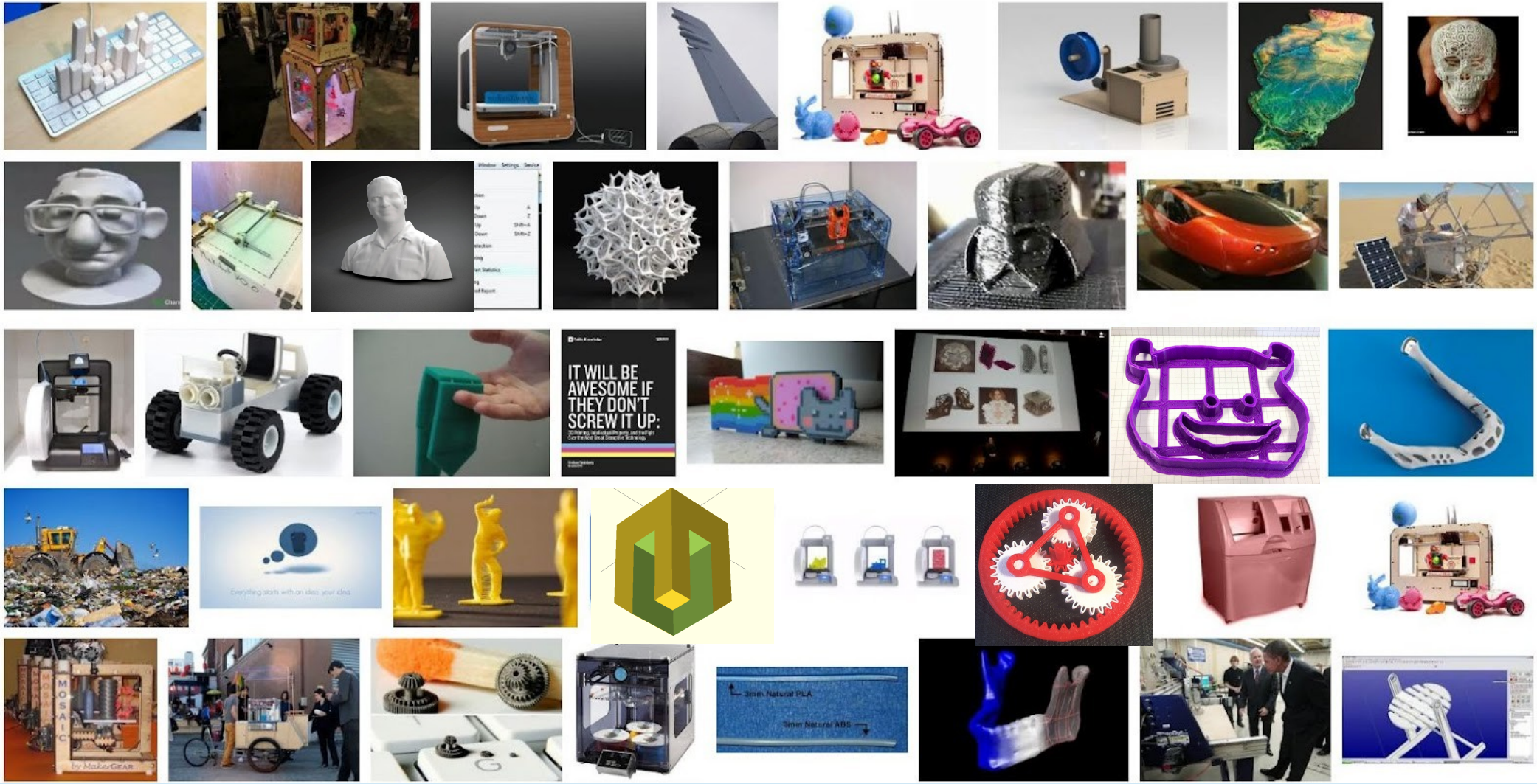
's Solidoodle



How does it work?

http://www.youtube.com/watch?v=nhULZQaT-Hs

3D printed Objects

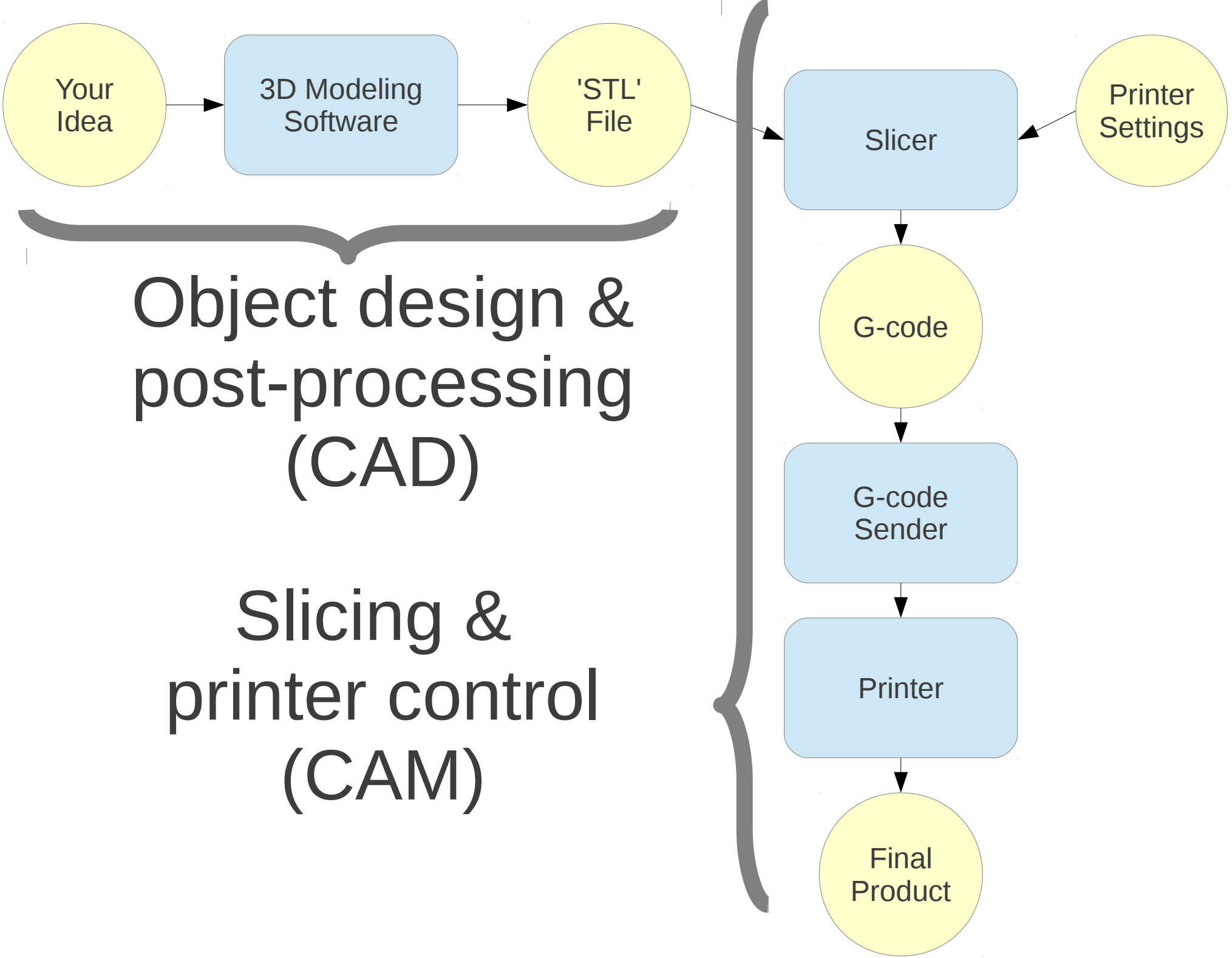


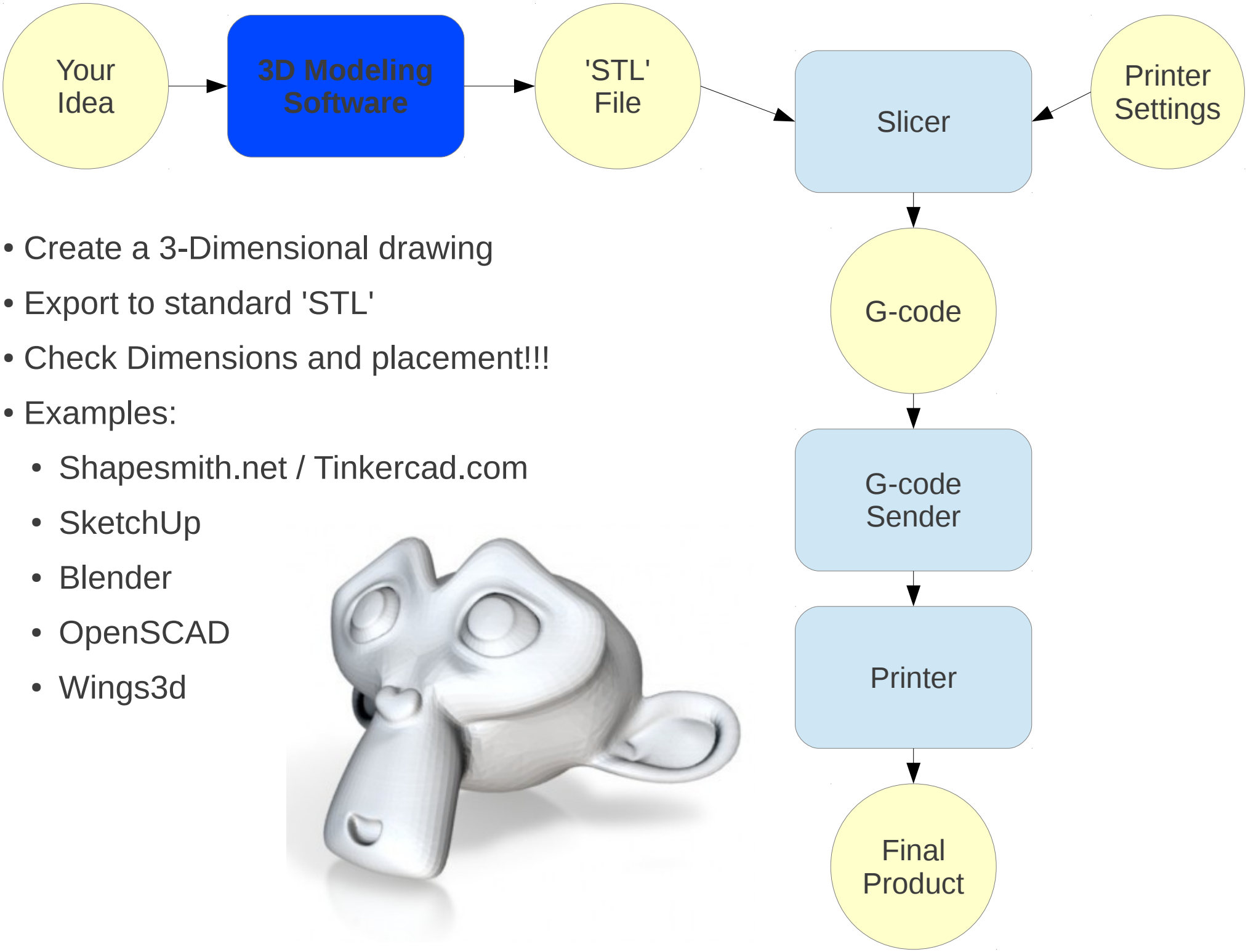
What is needed to be a 3d maker

- Motivation, willingness to learn
- Consideration and patience
- Use of free, open source software
- Your object in STL format

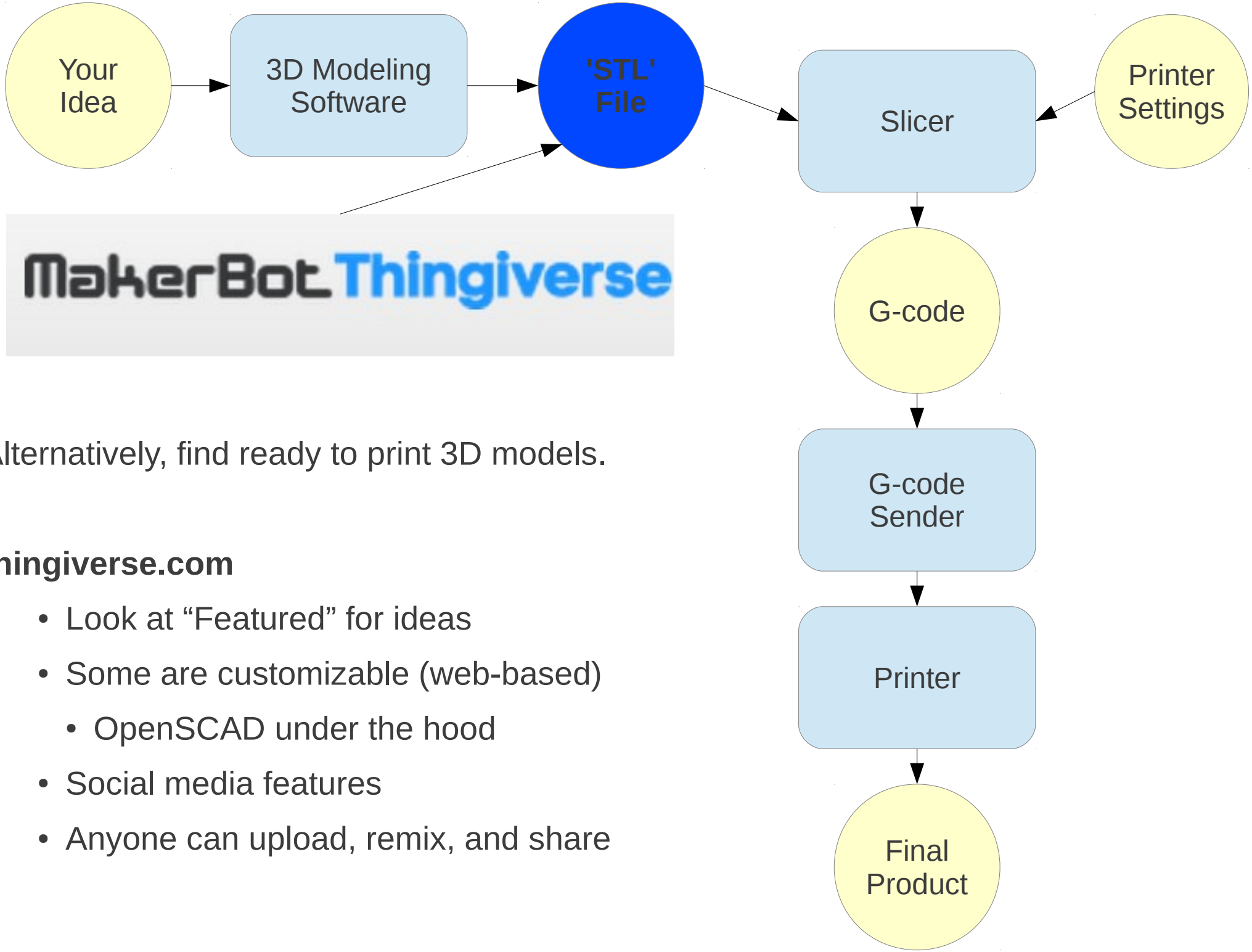
Makerspace Urbana

- MU's 3D printer (Solidoodle)
- Plastic (ABS or PLA)
- $1 suggested donation
- Tweaking of object, setup and profile


Your Idea
3D Modeling Software
'STL' File
Slicer
Printer Settings
G-code
G-code Sender
Printer
Final Product
Object design & post-processing (CAD)
Slicing & printer control (CAM)



- Create a 3-Dimensional drawing
- Export to standard 'STL'
- Check Dimensions and placement!!!
- Examples:
  - Shapesmith.net / Tinkercad.com
  - SketchUp
  - Blender
  - OpenSCAD
  - Wings3d



Alternatively, find ready to print 3D models.

thingiverse.com

- Look at “Featured” for ideas
- Some are customizable (web-based)
  - OpenSCAD under the hood
- Social media features
- Anyone can upload, remix, and share

bottle opener Search Advanced Search

Showing things containing the words: **bottle opener**

Search Results (93 things)

Pocket Coin-Op Bottle Opener by br3ttb

(Note: There's now a better, tapered version. **I recommend that you print this instead**: http://www.thingiverse.com/thing:12348) I was ashamed Thingiverse. So ashamed. I presented the Mighty Bottle Opener as the pocket equivalent to Starno's Coin-Op. It wasn't. It isn't. I just wasn't able to find a reliable way to protect the plastic.…

Published: Aug 25, 2011 on Aug 25, 2011
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Luther College Norse Bottle Opener by smb1985

This is a bottle opener that uses a penny, and it has the shape of the Luther College Norse logo!

Published: Sep 2, 2012 on Sep 2, 2012
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Mighty Bottle Opener by br3ttb

UPDATE: I've been unable to find a reliable way to protect the plastic with this design. If you're using PLA, keep reading; people have had good results. If you're printing with ABS however, I recommend using this updated design: http://www.thingiverse.com/thing:11025 The Coin-Op Bottle Opener (http://www.thingiverse.com/thing:1842) is awesome…

Published: Jun 16, 2011 on Jun 16, 2011
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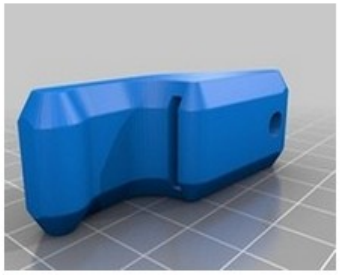

M8 washer-operated Bottle Opener by Erik

I spent my last penny, so I needed to (p)improvise this thing :) No seriously, the penny is the most expensive part of this bottle opener, so I decided to reduce its cost drastically. Well, actually, I simply didn't have any US coins at my disposal and even a penny makes for a pretty bulky bottle-opener, so I decided to use what every Mendel hacker…

Published: Feb 24, 2011 on Feb 24, 2011
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Your Idea

3D Modeling Software

'STL' File

Thingiverse

Slicer

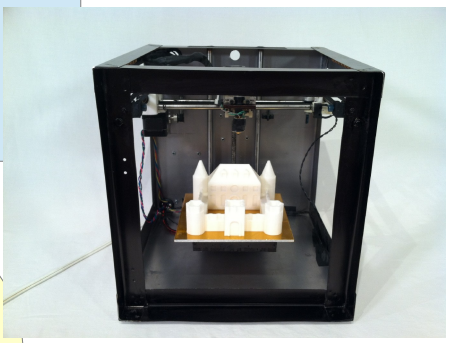
Printer Settings

Makerspace Urbana

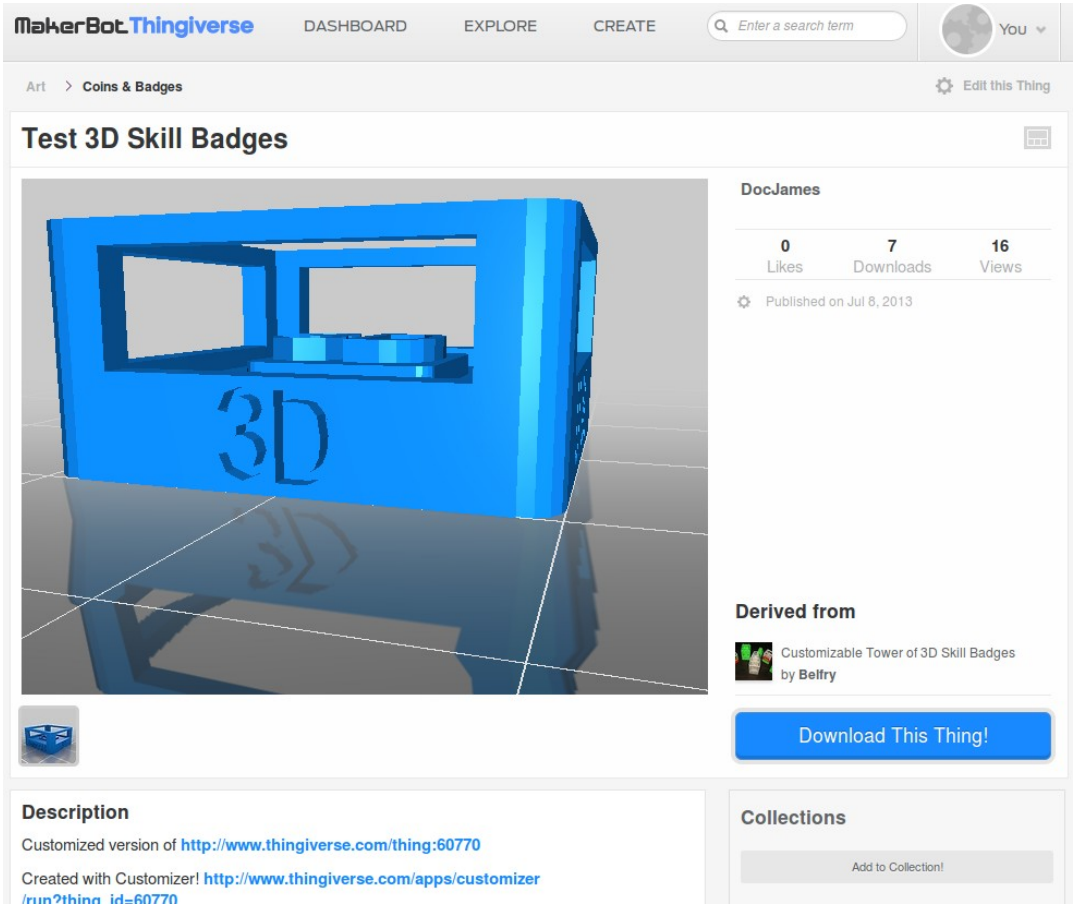
G-code

G-code Sender

Printer



Final Product



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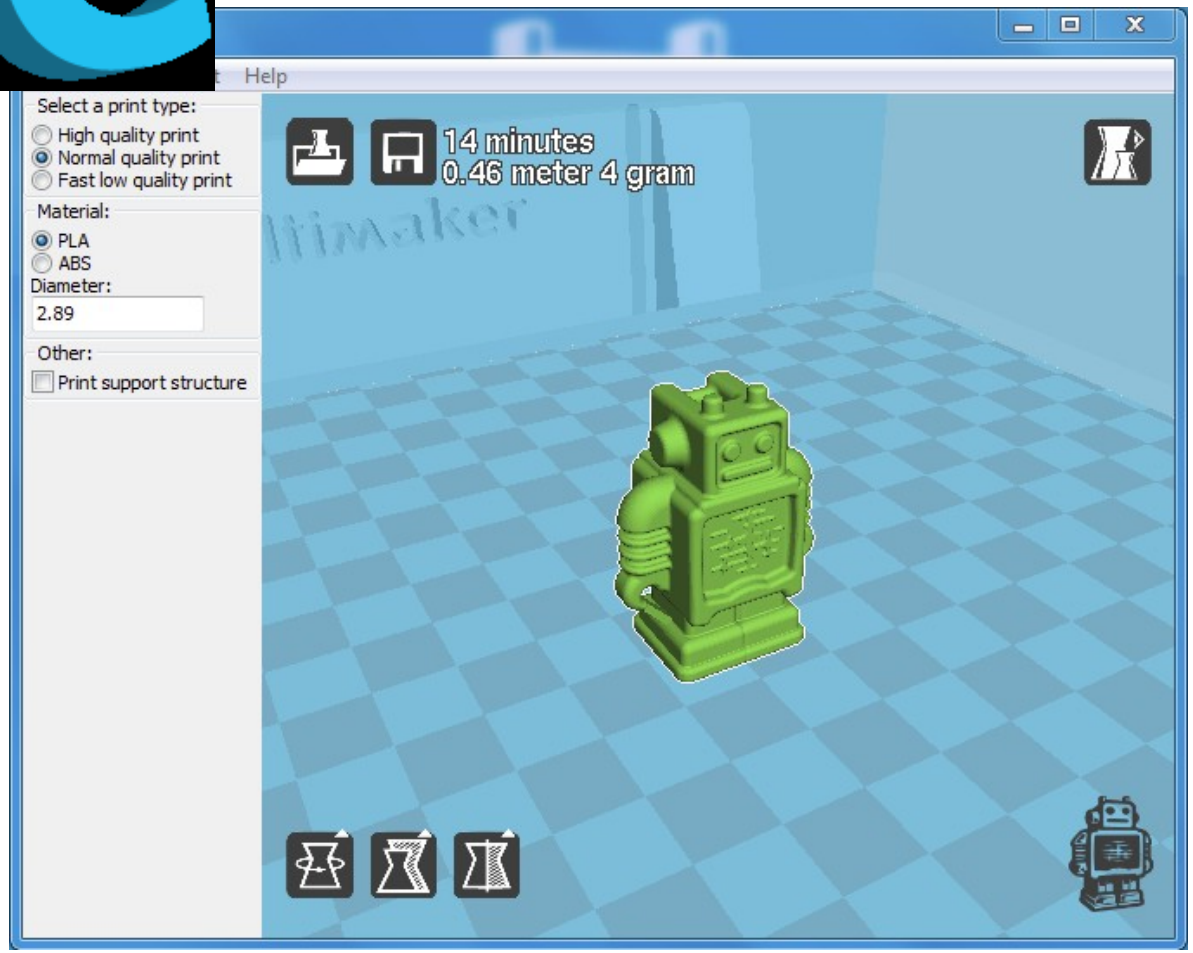
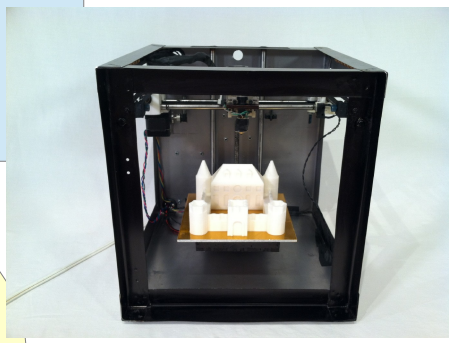




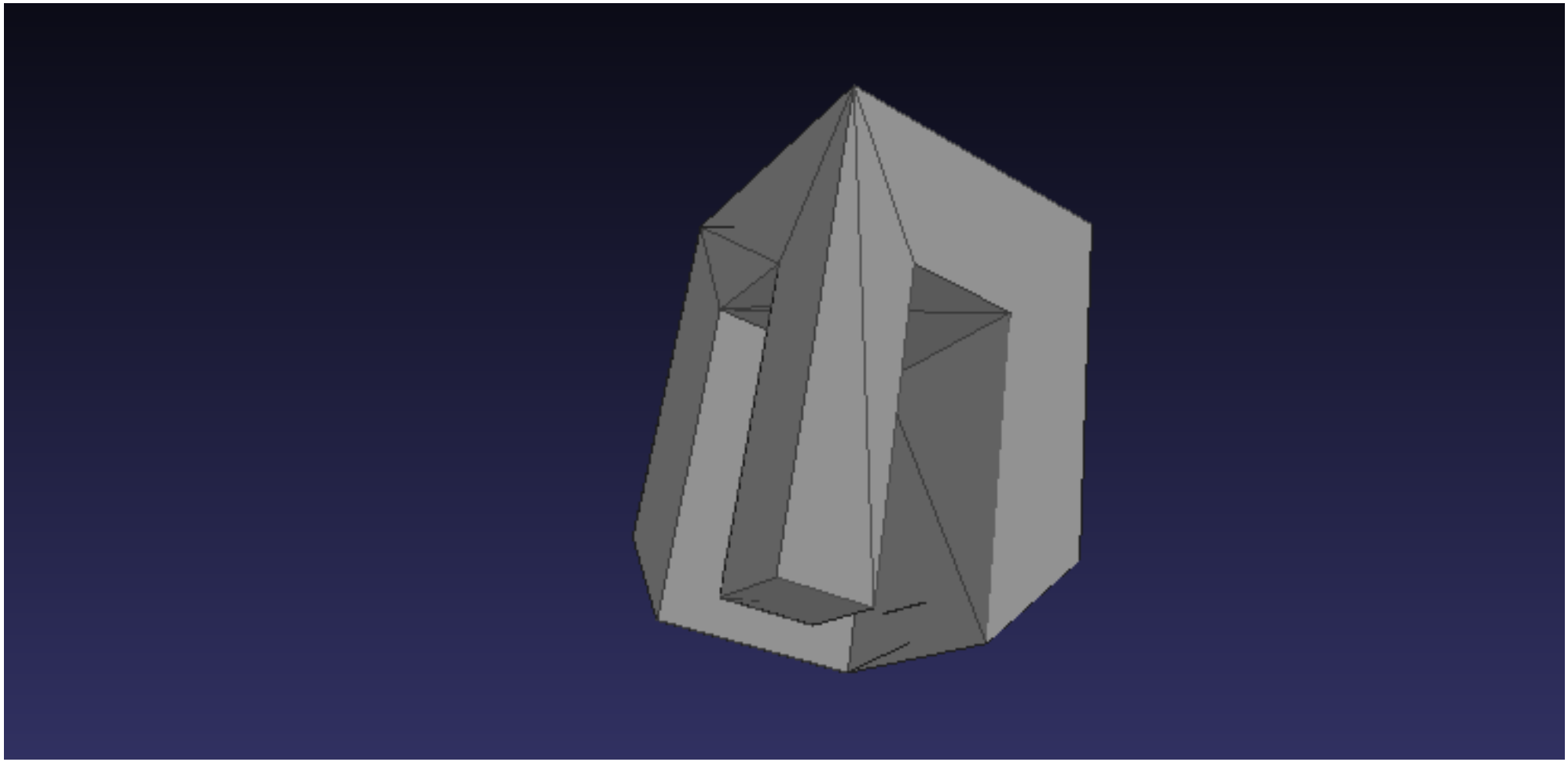
Generate your own STL

1) Log in or register at Thingiverse.com
2) http://www.thingiverse.com/thing:60770
    1) “Open in Customizer”
    2) Suggested settings
        1) 1 badge, 20mm
        2) Your name, date, UM, whatever you would like
    3) “Create Thing”
3) Wait for it to finish (few min.)

or edit OpenSCAD file of the same design
or pick out from the selected objects
or use your own (<5 min print time please)

STL file format

- STL = STereoLithography
- Define a surface with triangles (3 points)



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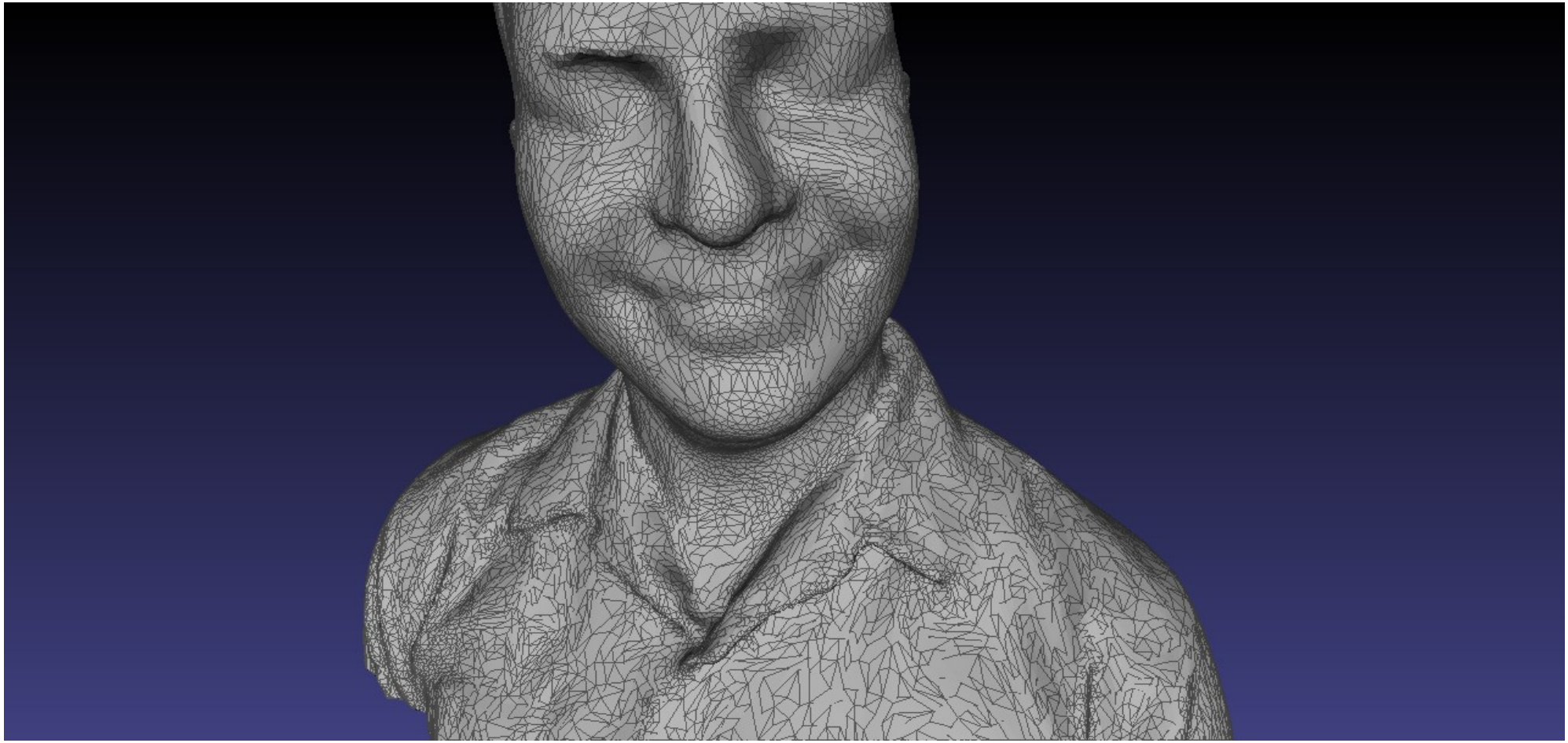

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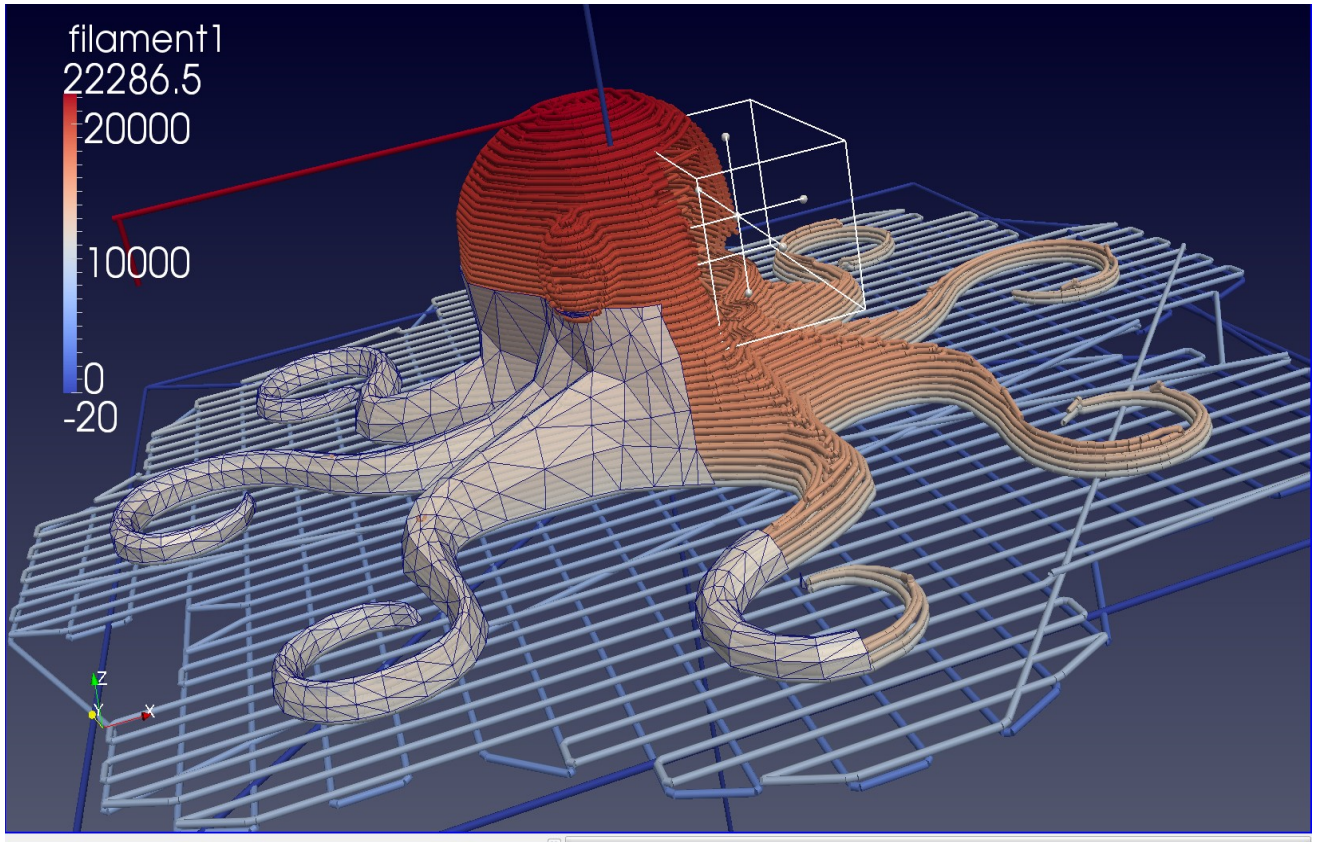

http://code.google.com/p/gcode2vtk/

Your Idea

Thingiverse

'STL' File

Slicer

Printer Settings

Makerspace Urbana

G-code

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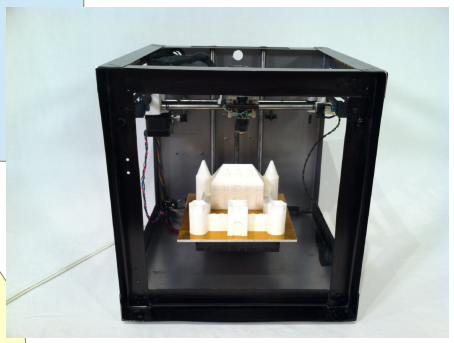
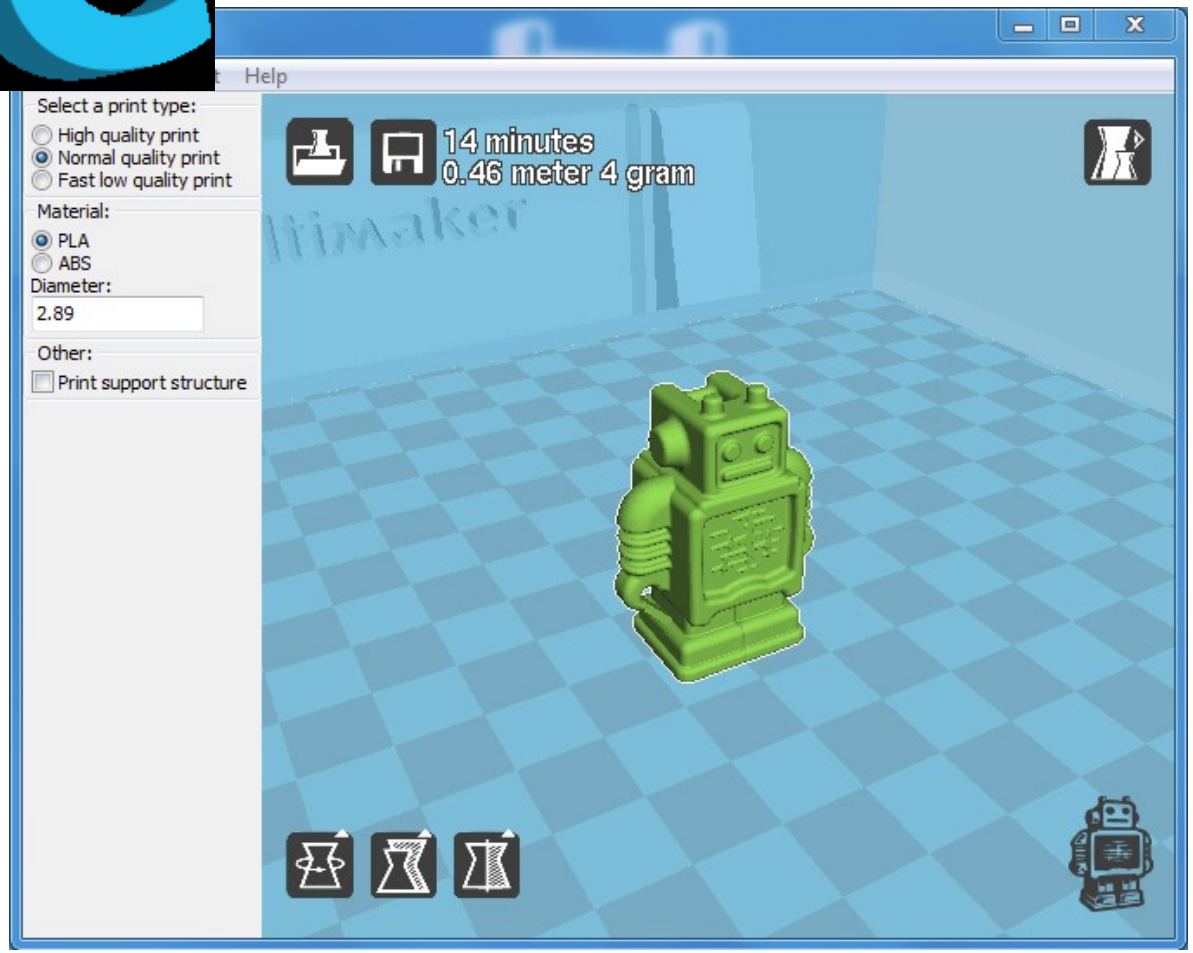
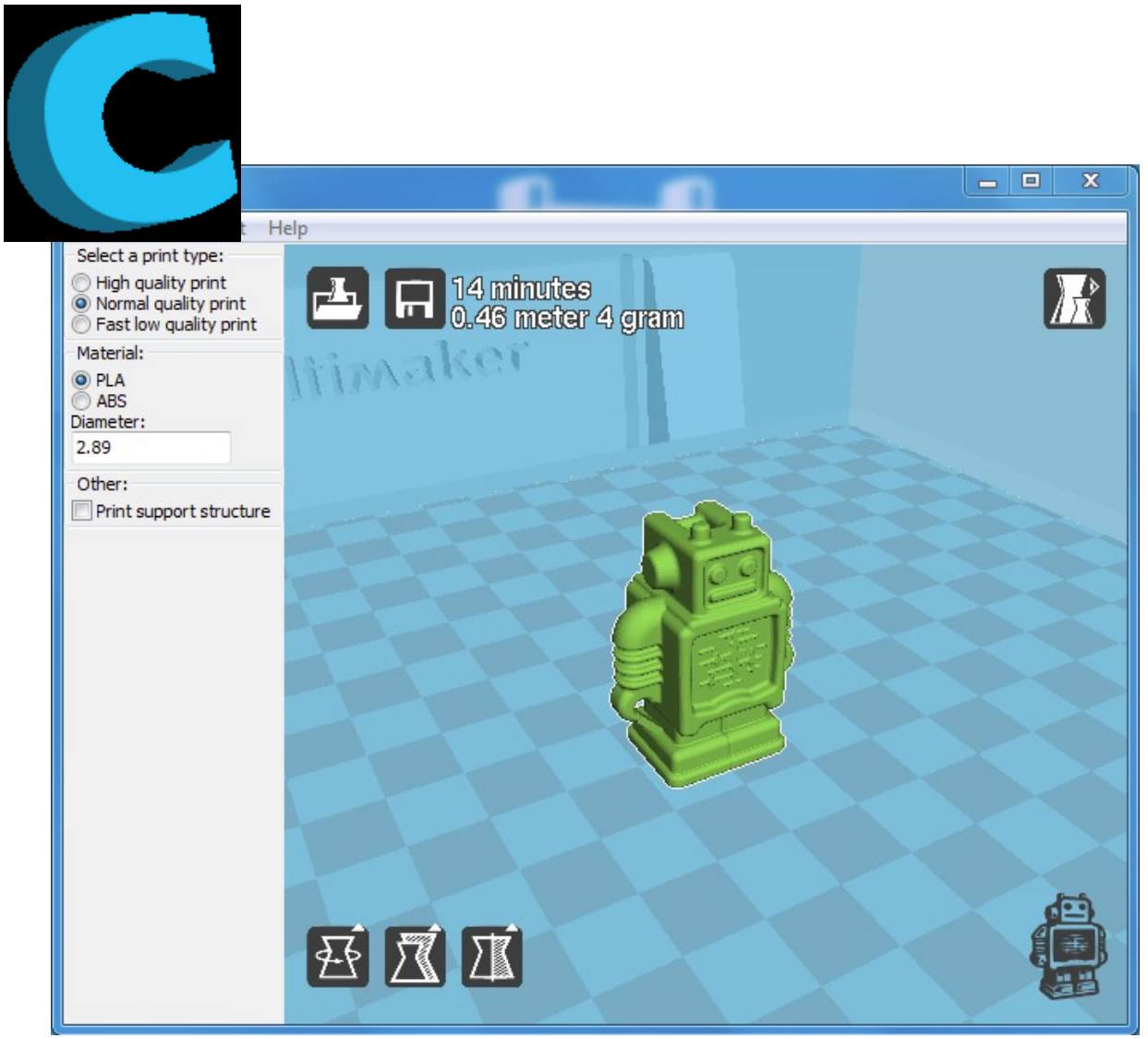
Printer



Final Product



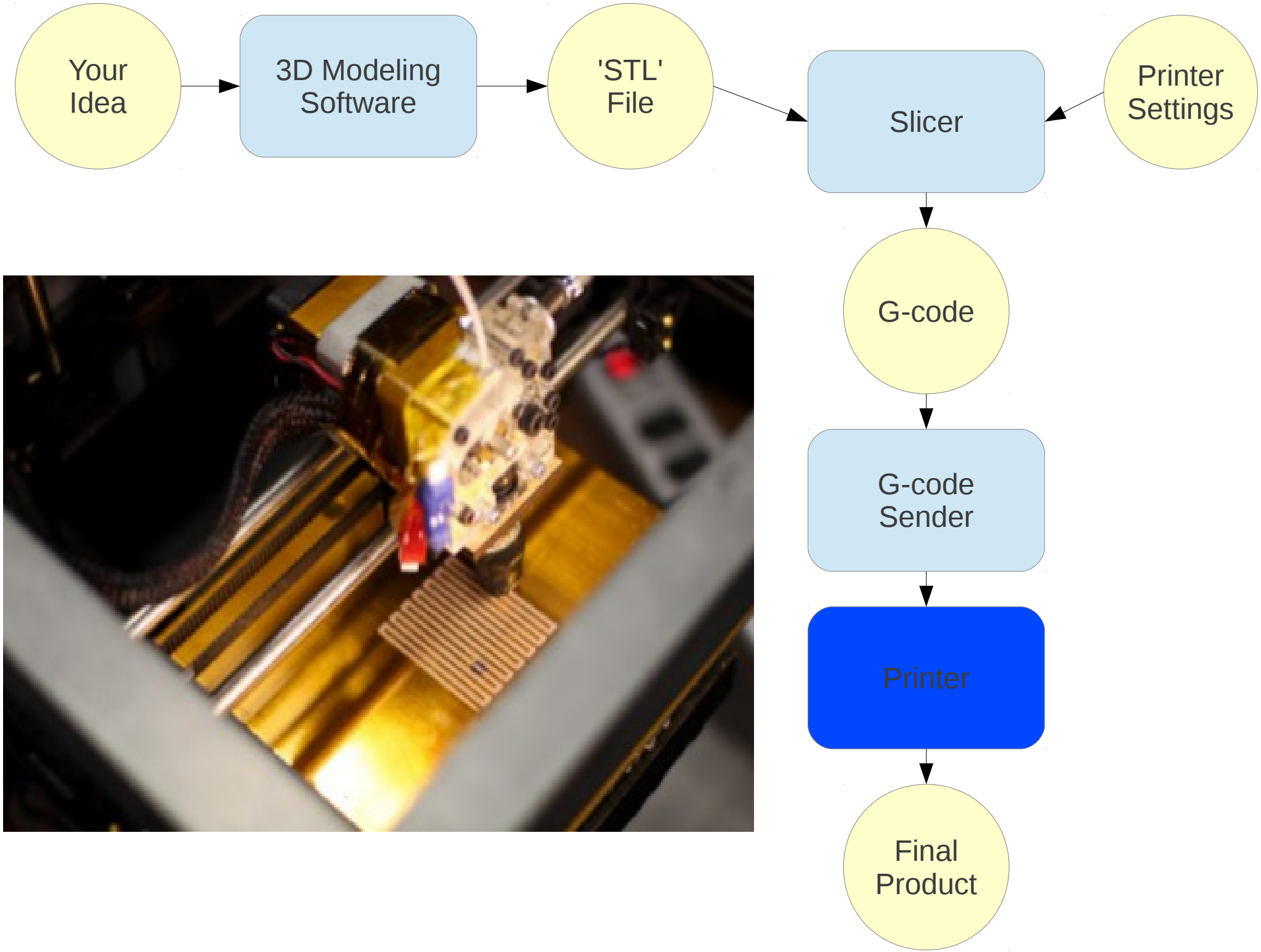
Cura Demo


Help
Select a print type:
High quality print
Normal quality print
Fast low quality print
Material:
PLA
ABS
Diameter:
2.89
Other:
Print support structure
14 minutes
0.46 meter 4 gram

Print your object

From steps listed on handout:

7. Run Cura
8. Load the profile you want
9. Load your STL object
10. Make sure it is flat on the printing surface, check for overhangs and problem meshes
11. (optional) save your gcode
12. Start print dialog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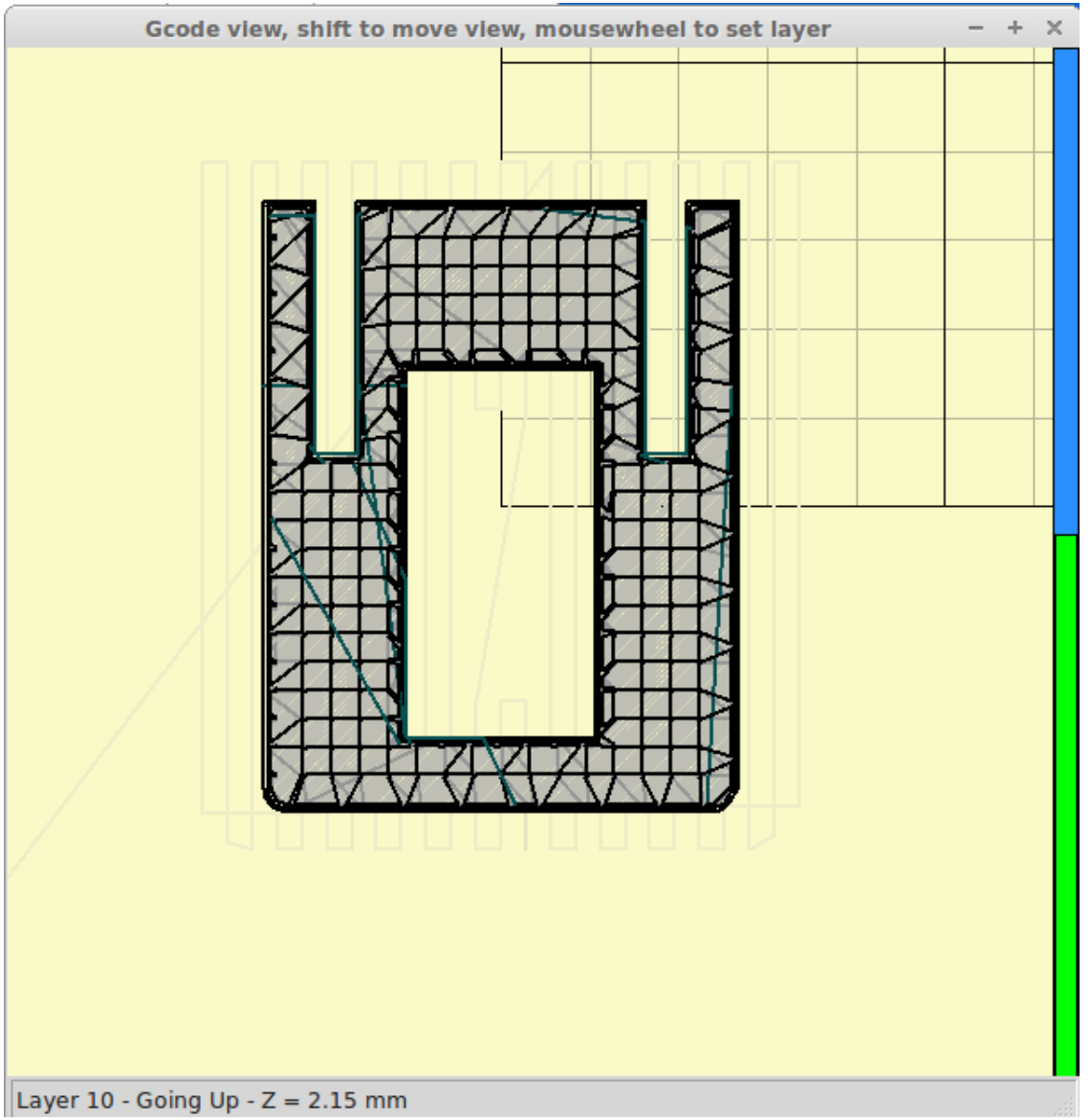
G-Code

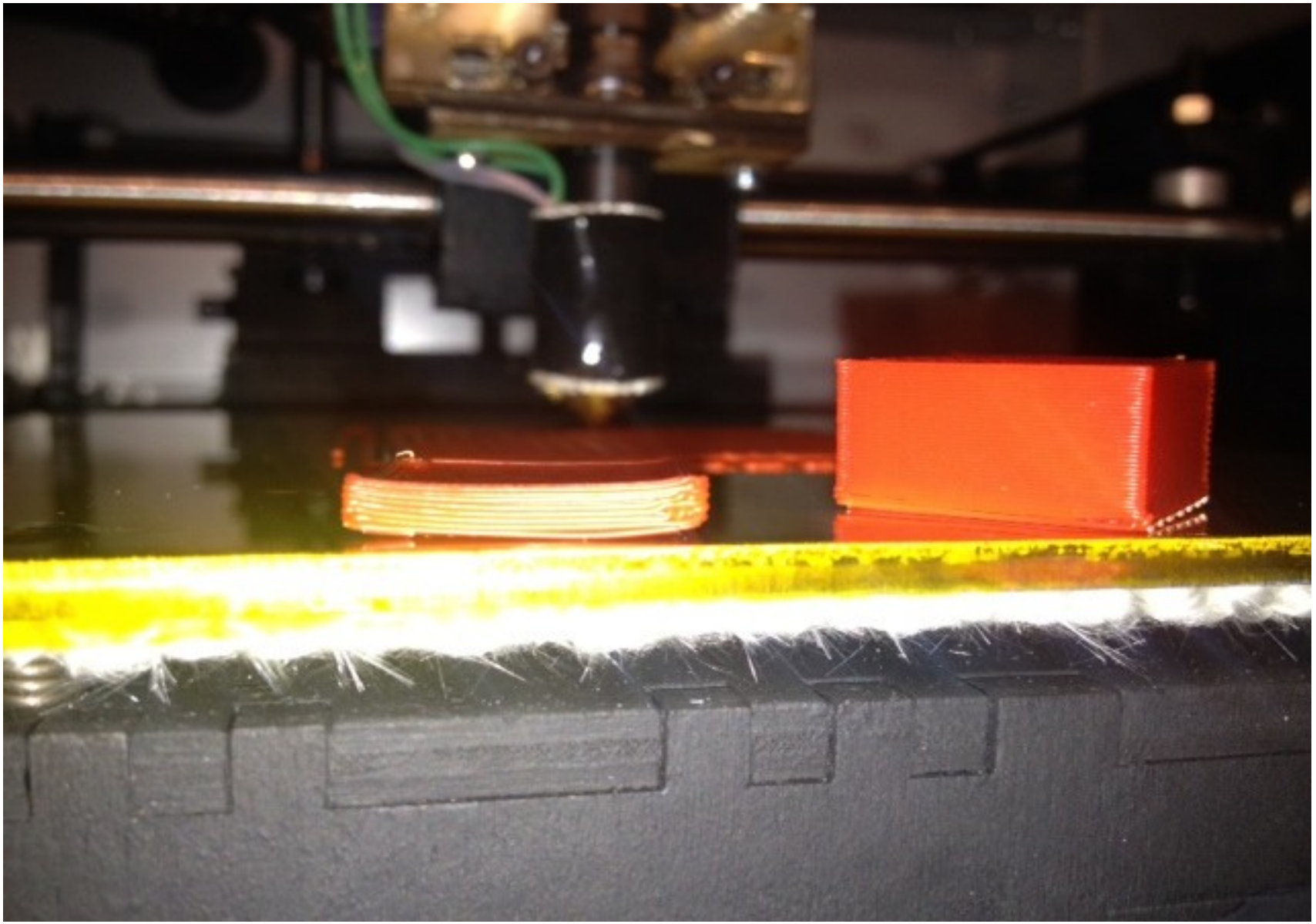
frontChassis_export.gcode

```
 S1.0
 S2.1
M104 S190.0
G1 X5.6 Y38.68 Z0.6 F2400.0
G1 F600.0
G1 E0.65
G1 F2400.0
G92 E0
G1 X5.6 Y-38.68 Z0.6 F750.0 E12.9972
G1 X8.4 Y-38.68 Z0.6 F750.0 E13.4676
G1 X8.4 Y38.68 Z0.6 F750.0 E26.4647
G1 X11.2 Y38.68 Z0.6 F750.0 E26.9351
G1 X11.2 Y-38.68 Z0.6 F750.0 E39.9323
G1 X14.0 Y-38.68 Z0.6 F750.0 E40.4027
G1 X14.0 Y38.68 Z0.6 F750.0 E53.3998
G1 X16.8 Y38.68 Z0.6 F750.0 E53.8702
G1 X16.8 Y-38.68 Z0.6 F750.0 E66.8674
G1 X19.6 Y-38.68 Z0.6 F750.0 E67.3378
G1 X19.6 Y38.68 Z0.6 F750.0 E80.3349
G1 X22.4 Y38.68 Z0.6 F750.0 E80.8053
G1 X22.4 Y-38.68 Z0.6 F750.0 E93.8025
G1 X25.2 Y-38.68 Z0.6 F750.0 E94.2729
G1 X25.2 Y38.68 Z0.6 F750.0 E107.27
G1 X28.0 Y38.68 Z0.6 F750.0 E107.7404
G1 X28.0 Y-38.68 Z0.6 F750.0 E120.7376
G1 X30.8 Y-37.0 Z0.6 F750.0 E121.2861
G1 X30.8 Y38.68 Z0.6 F750.0 E134.0011
G1 X33.6 Y38.68 Z0.6 F750.0 E134.4715
G1 X33.6 Y-33.64 Z0.6 F750.0 E146.6219
G1 F600.0
G1 E146.0219
G1 F750.0
G1 X-33.6 Y-34.48 Z0.6 F3000.0
G1 F600.0
G1 E146.6719
```

Plain Text ▼ | Tab Width: 4 ▼ | Ln 29, Col 38 | INS

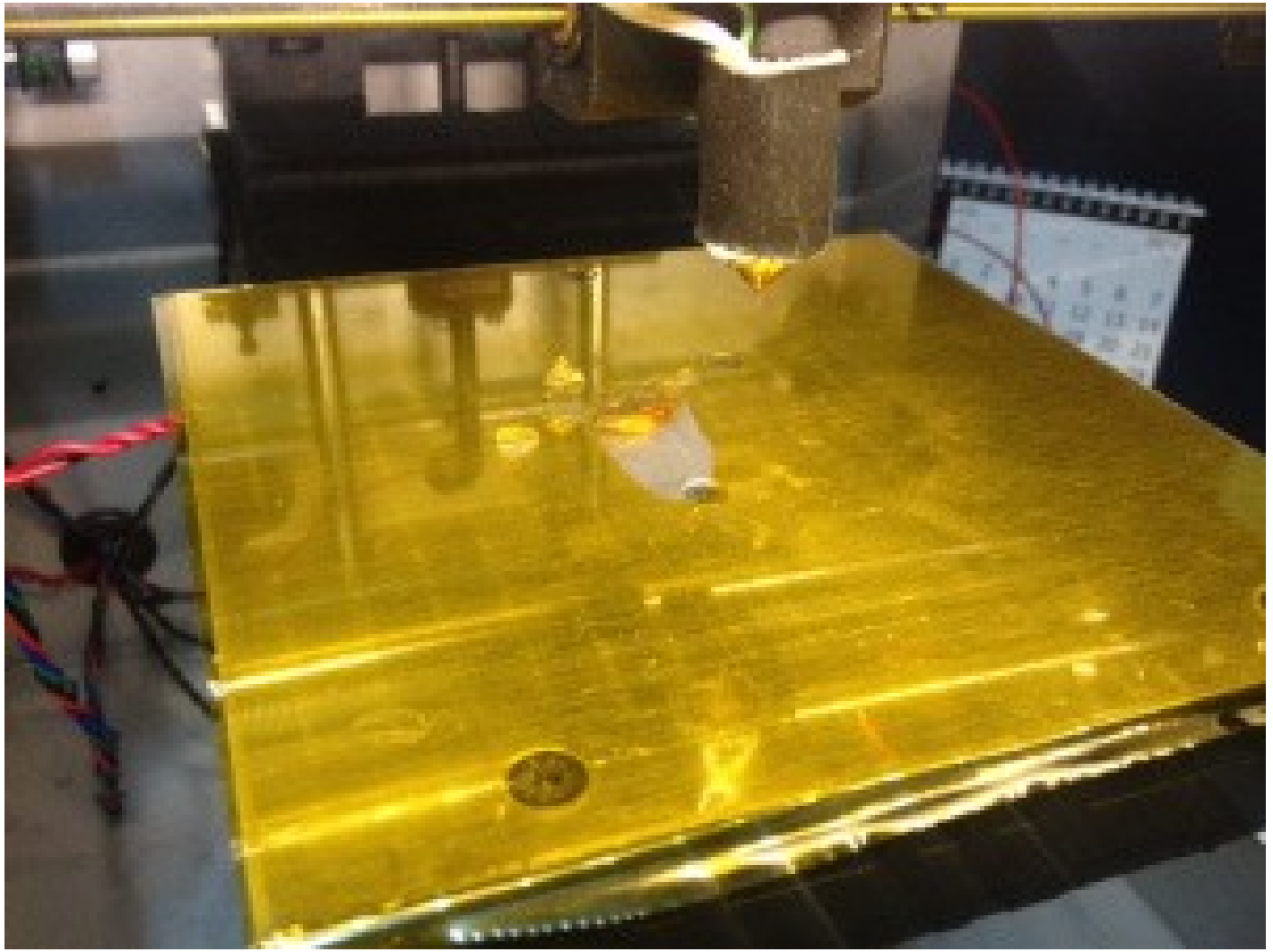


Heated stage is critical for print quality!



http://solidoodletips.wordpress.com/2012/07/30/confessions-of-a-3d-printing-newbie-what-not-to-do/

Let stage cool to remove sample



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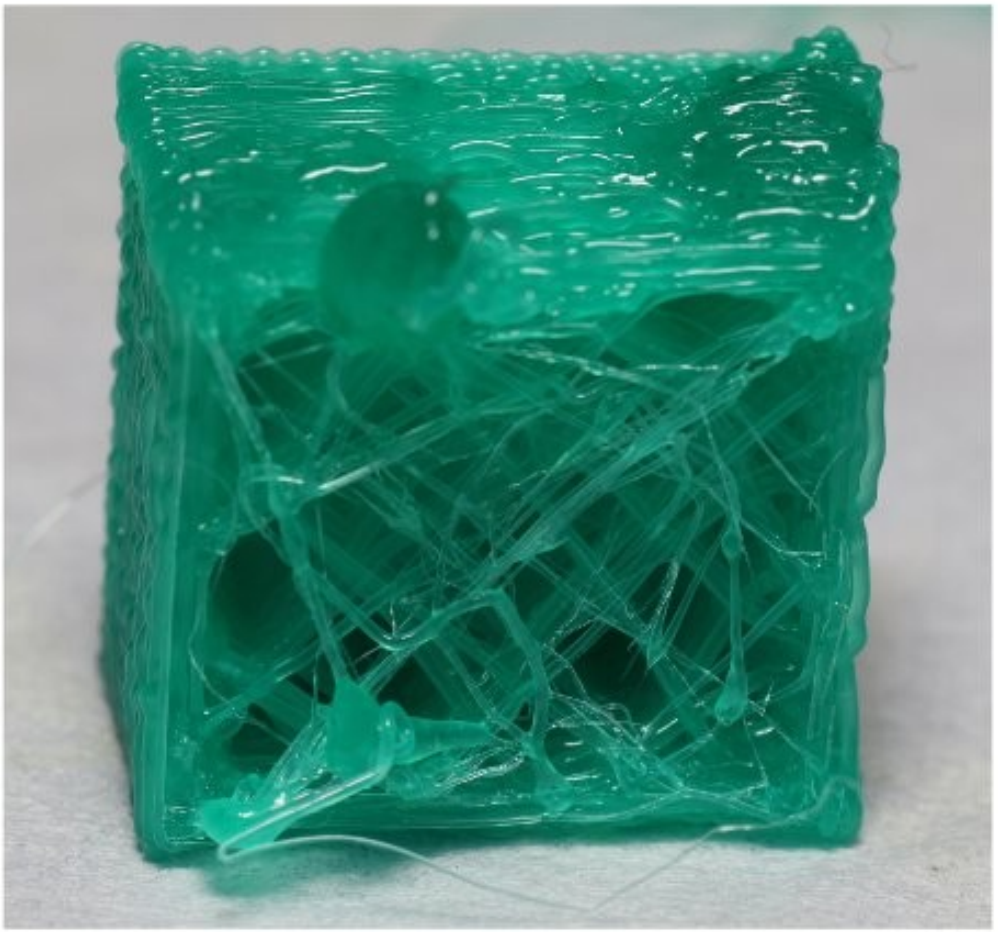

Your Idea

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'STL' File

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G-code

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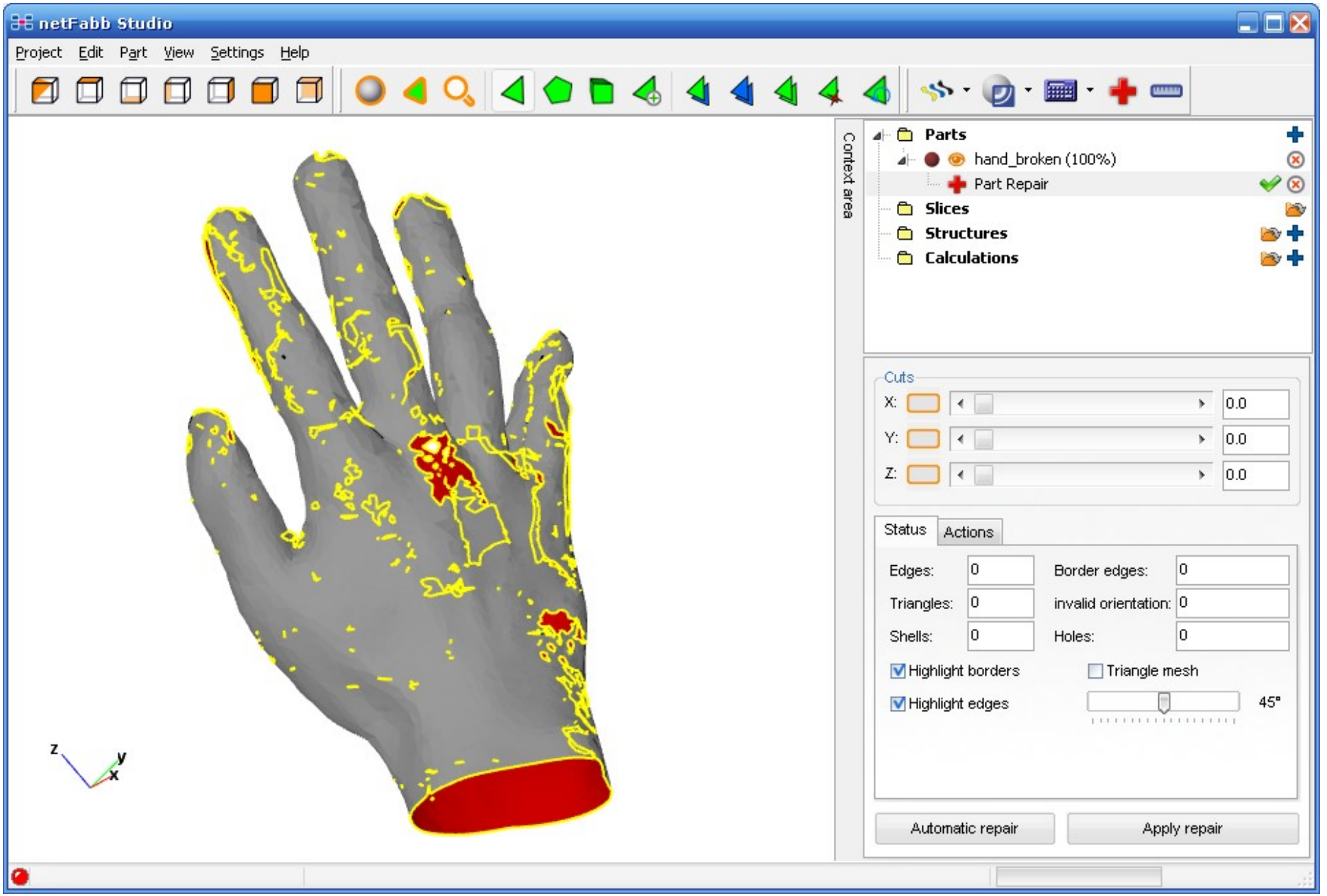
Final Product

Tune Settings!

STL problems:

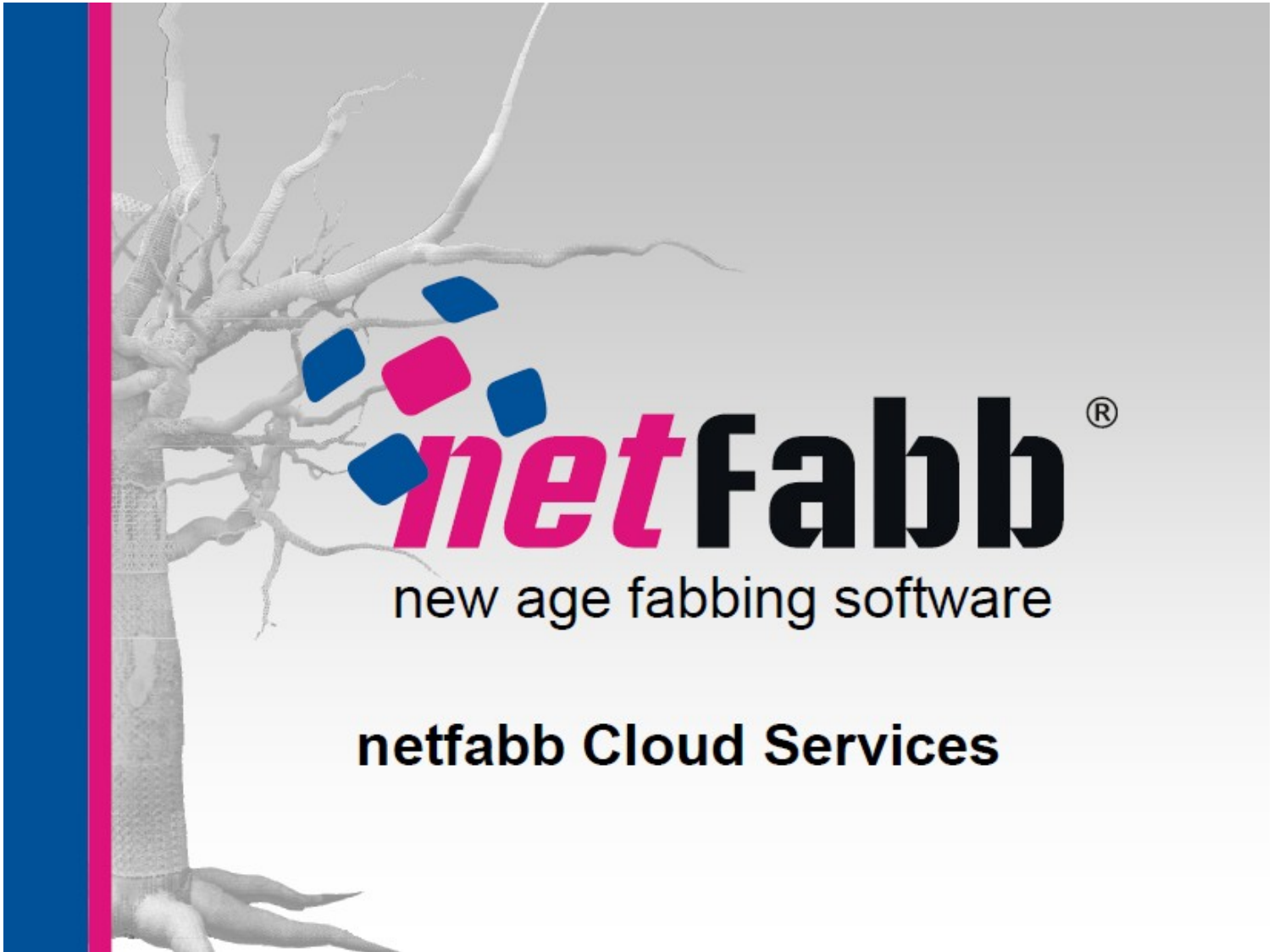
Fix with original program, netfabb, meshlab, blender, etc.

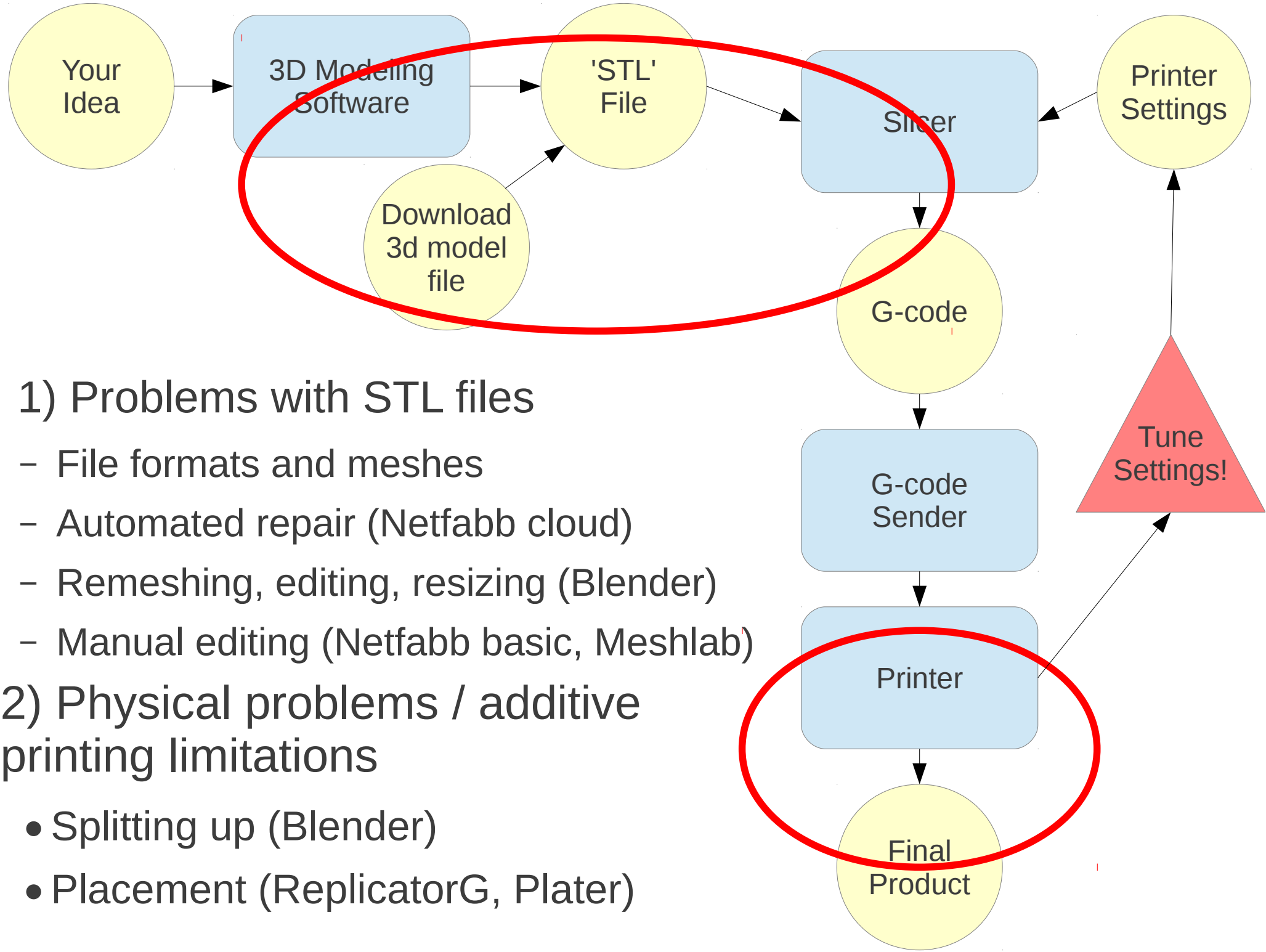


http://www.netfabb.com/stl_repair_fixing.php

Automated Repair with Netfabb

http://cloud.netfabb.com/





1) Problems with STL files

- File formats and meshes
- Automated repair (Netfabb cloud)
- Remeshing, editing, resizing (Blender)
- Manual editing (Netfabb basic, Meshlab)

2) Physical problems / additive printing limitations

- Splitting up (Blender)
- Placement (ReplicatorG, Plater)

Finishing your print

- Sanding
- Acetone
- Polishing

http://solidoodletips.wordpress.com/2012/10/24/diy-smoothing-station/

Reminders

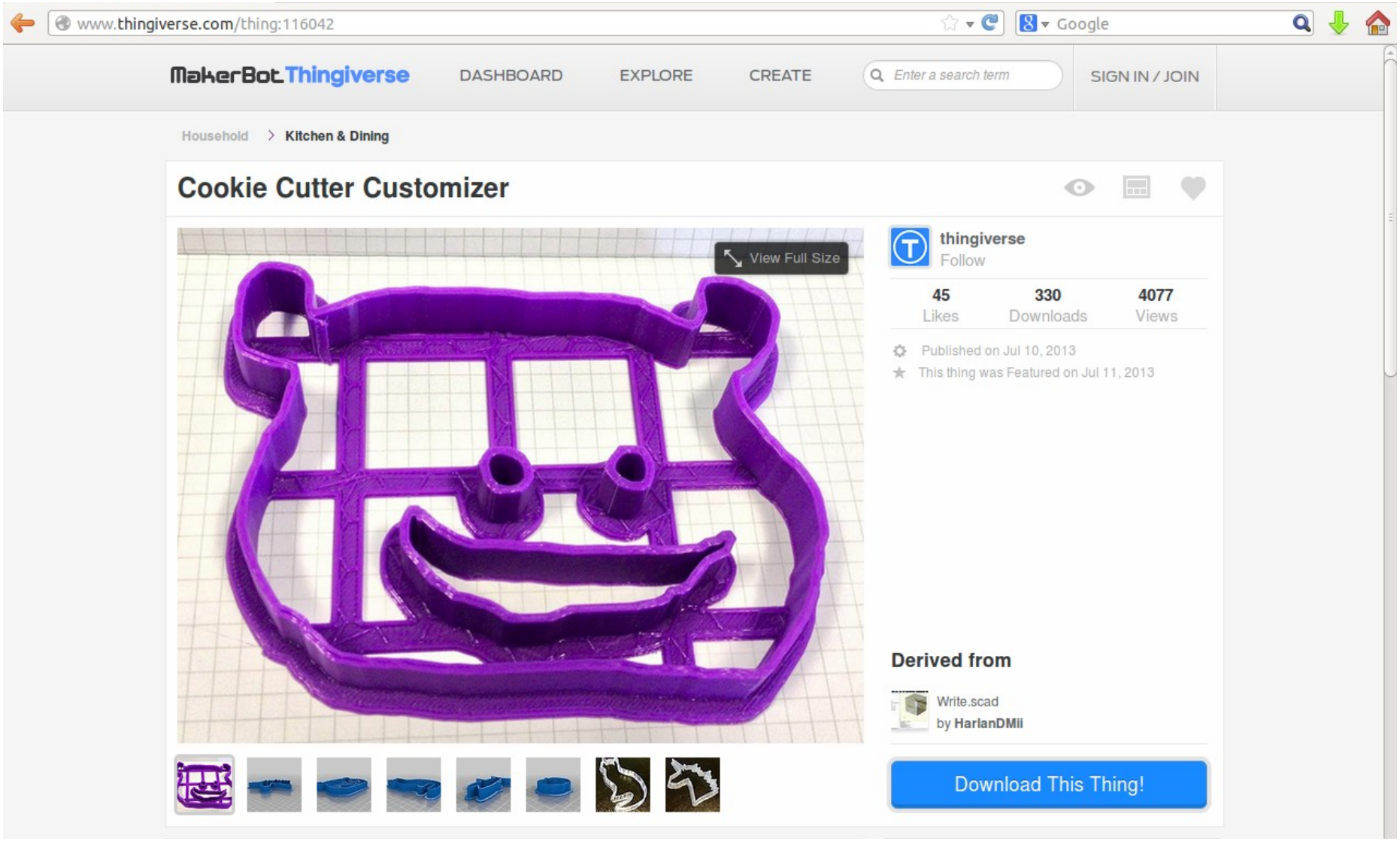
Do's:

- Ask questions if you aren't sure
- Be considerate of others
- Emergency power-down if it makes awful noises
- Keep an eye on the printer while running, especially the filament feeding
- Double-check that you are using the profile you want
- Donate to keep the space and printer sustainable
- Share what you print!

Dont's:

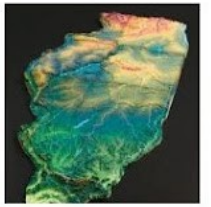
- Extrude or retract without first heating up the printhead
- Print objects that are too big for the bed, or too tall
- Move the printhead past it's range of motion
- Scrape the printbed, or pry up hot prints
- Leave the printer on, or keep it hot unnecessarily
- Make a tangle of the filament

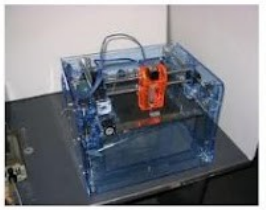
Suggested practice:

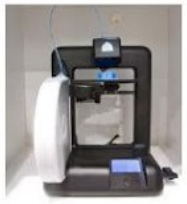


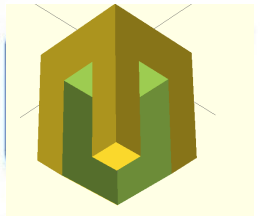
www.thingiverse.com/apps/customizer/run?thing_id=116042

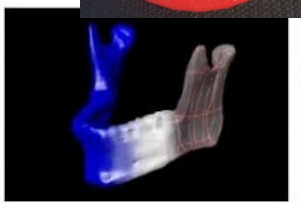
What do you want to make?



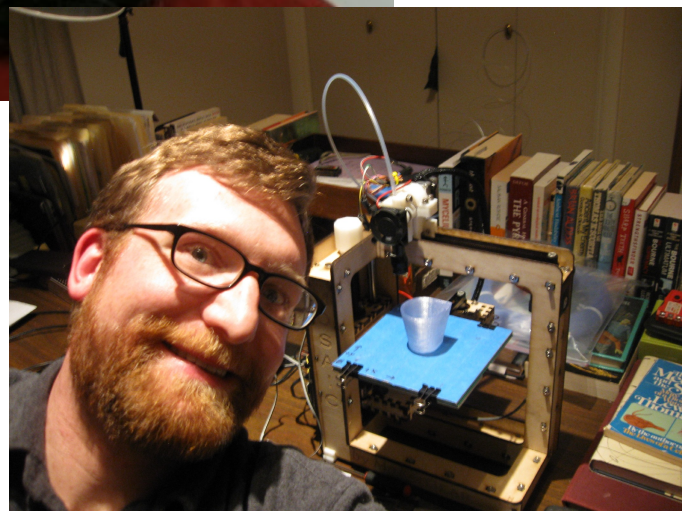








Learn More – meetings on:



- Pronterface howto
- Slicing tips and progs.
- Cleanup and fixing
- Downloading & sharing
- Sketchup, Blender howto
- CAD programs howto
- Firmware and Gcode
- Pictures → 3D models
- 3D scanner build
- Casting from prints
- Building your own printer
- Many many more . . .

Other upcoming Make-a-tion Workshops

July 27

11am Soldering I/II + Post-It speakers

3pm AdaFruit LED Clothing/Glowing Chuck Taylors

Aug 10

11am Pewter casting

3pm DIY BrewYOBeer

Aug 24

11am Home Router Hacking

3pm Arduino Robotics

Aug 31

End of Summer Make-a-tion Party