

Personal 3D Printing

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Status Report: 2014

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ed.nisley@pobox.com
softsolder.com

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Poughkeepsie Day School
Mini Maker Faire
November 2014



Upcoming Events

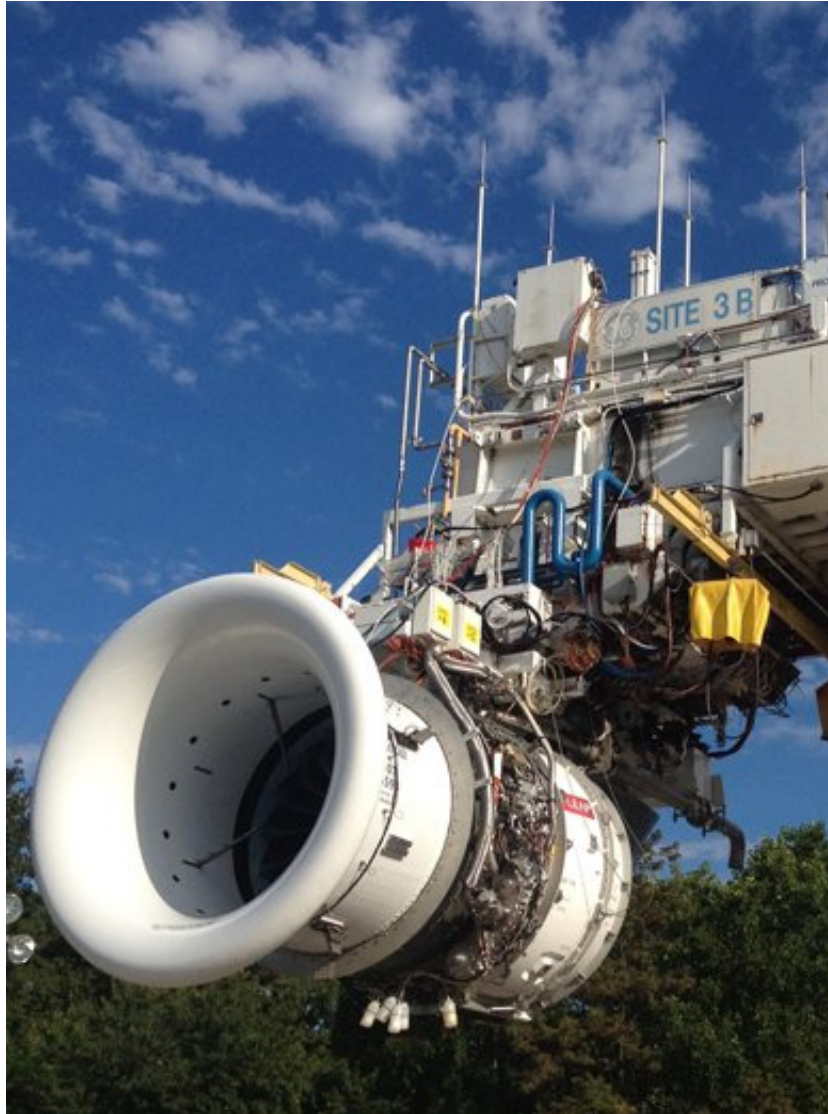
- What They Say
- What They **Don't** Say
- Personal 3D Printing
- Predictions
- Tchotchkes!



What They Say



3D Printed Jet Engines!



<http://www.gereports.com/post/74545239240/ge-started-testing-next-gen-jet-engine-with-3d-printed>

3D Printed Clothing!



<http://www.dezeen.com/2013/03/07/3d-printed-dress-dita-von-teese-michael-schmidt-francis-bitonti/>

3D Printed *Scanty* Clothing!



<http://continuumfashion.com/N12.php>

3D Printed Guns!



<http://blog.solidconcepts.com/industry-highlights/worlds-first-3d-printed-metal-gun/>

3D Printed Food!



<http://www.naturalmachines.com/>

3D Printed ... uh ... Food!



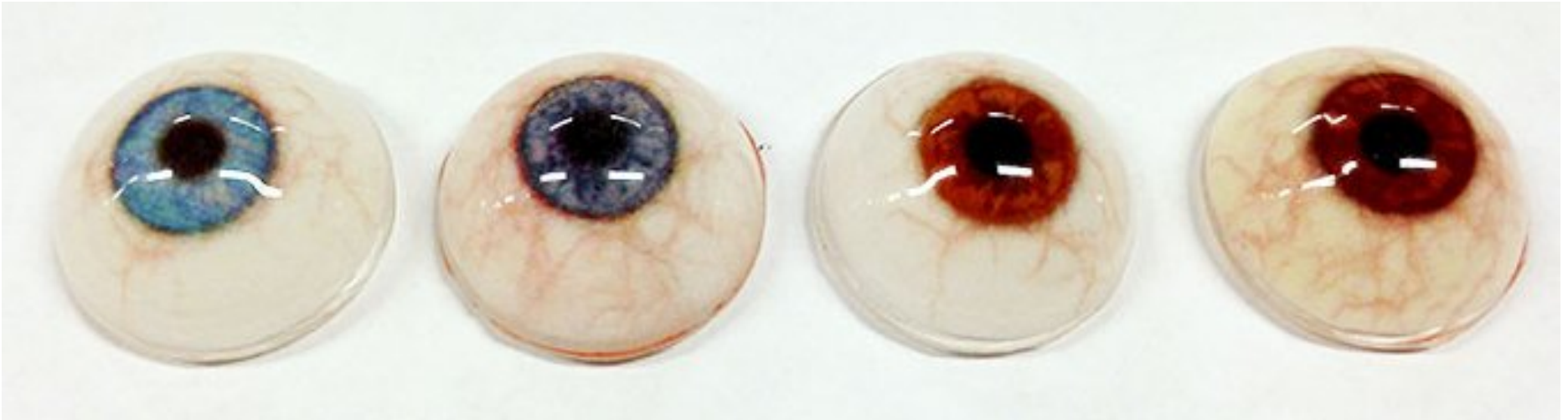
<http://3dchef.nl/2014/04/10/eat-lead-in-my-case-you-can/>

3D Printed Kidneys!

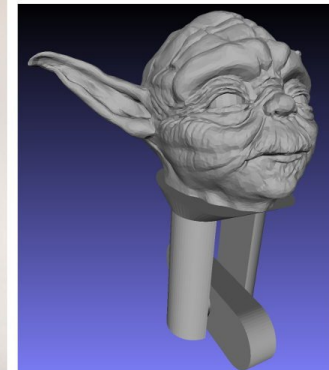
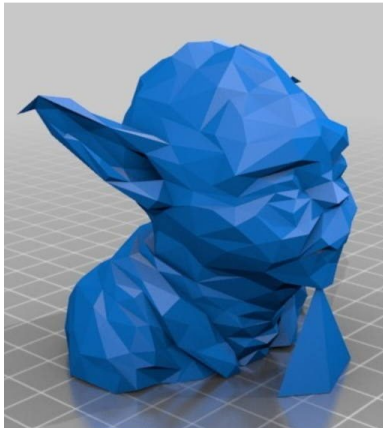


<http://inhabitat.com/incredible-medical-advancement-as-scientists-produce-living-kidney-using-3d-printer/>

3D Printed Eyeballs!



3D Printed IP Infringement?



<https://www.thingiverse.com/tag:Yoda>

What They Don't Say

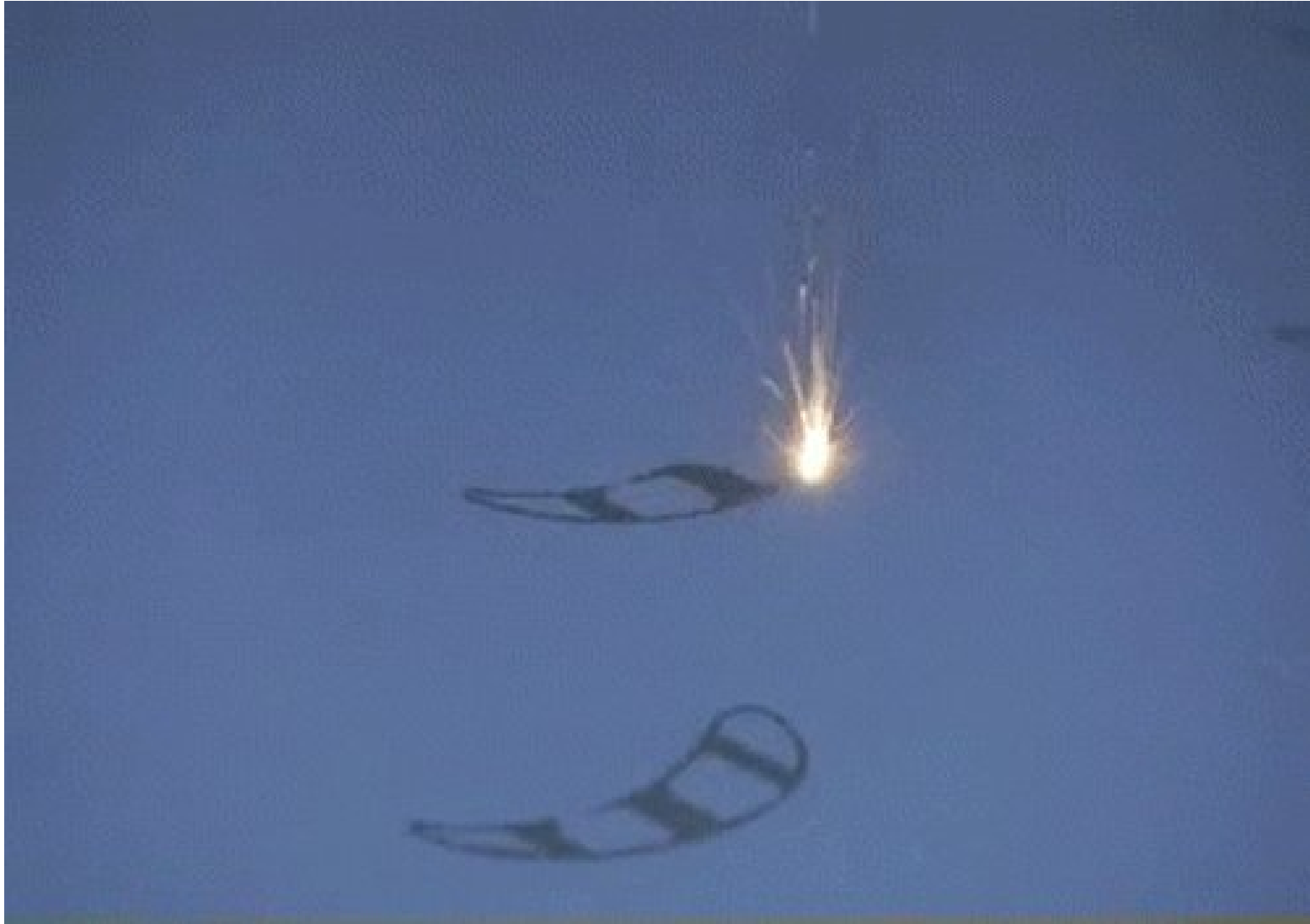


GE LEAP 3D Printed Fuel Nozzle



<http://www.gereports.com/post/80701924024/fit-to-print>

DLSM 3D Printing: Titanium Powder



<http://www.gereports.com/post/74545196348/joined-at-the-hip-where-the-3-d-printed-jet-engine>

3D Printing: Not Just Plastic Crap

“The gun is 45ACP.

It's rifled and the rifling was built directly into the part [...] using 3D Printing.

This gun has NOT BEEN MACHINED.”



After guns are outlawed, only machinists will have guns



<http://americanlongrifles.org/forum/index.php?topic=16823.0>

“Dress” ... With Manual Assembly

“The 3D-printed dress was then painstakingly polished and lacquered black, and then 12,000 black Swarovski crystals were hand applied ...”

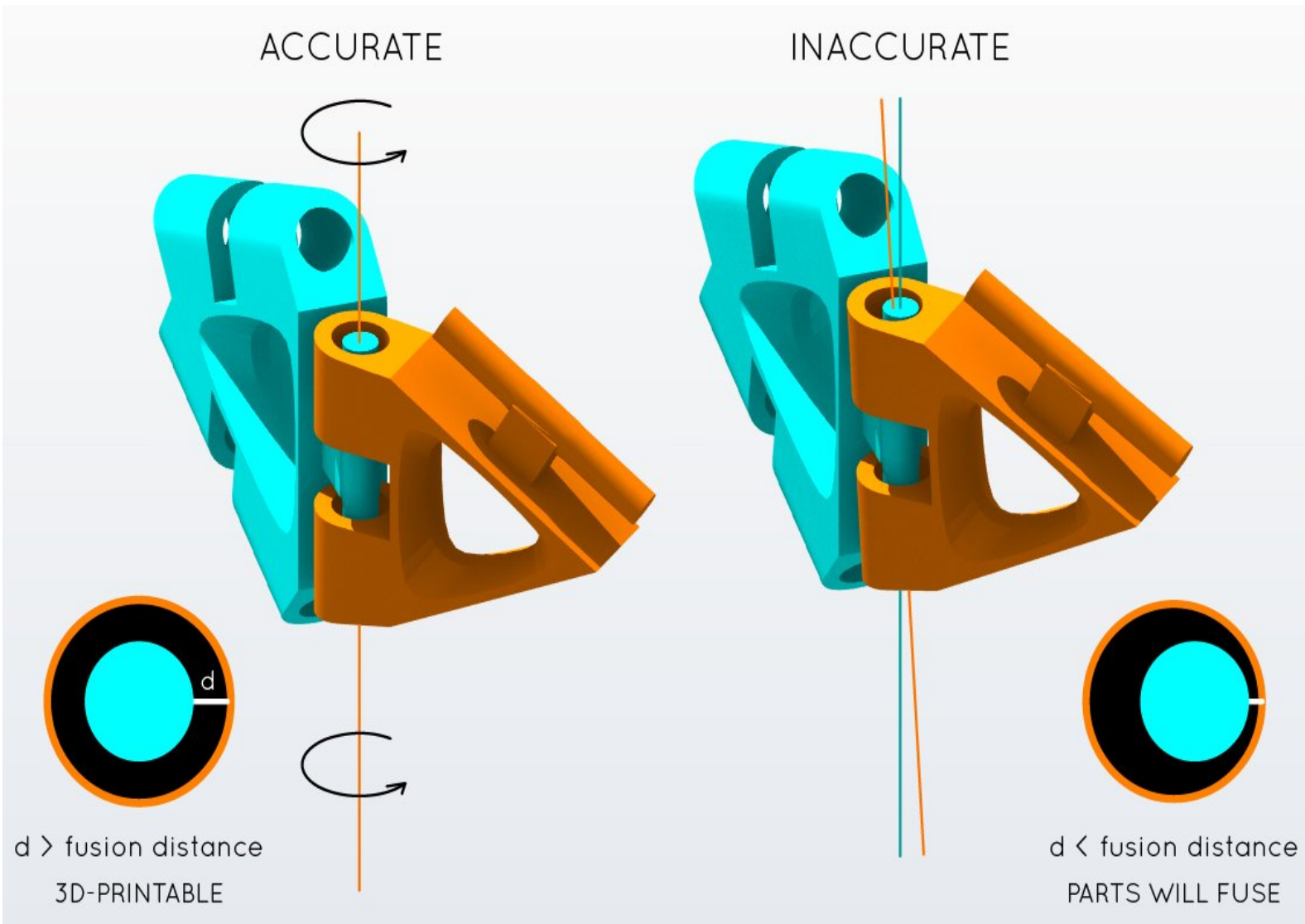


Fully 3D Printed Kinematics Bodice



<http://n-e-r-v-o-u-s.com/blog/?p=4780>

Kinematics Bodice Element



SLS Nylon Powder: Printing



<http://design-milk.com/3d-printing-the-internet-awesome-a-chat-with-shapeways/>

SLS Nylon Powder: Extraction



<https://www.flickr.com/photos/51579195@N02/7937643508/in/photostream/>

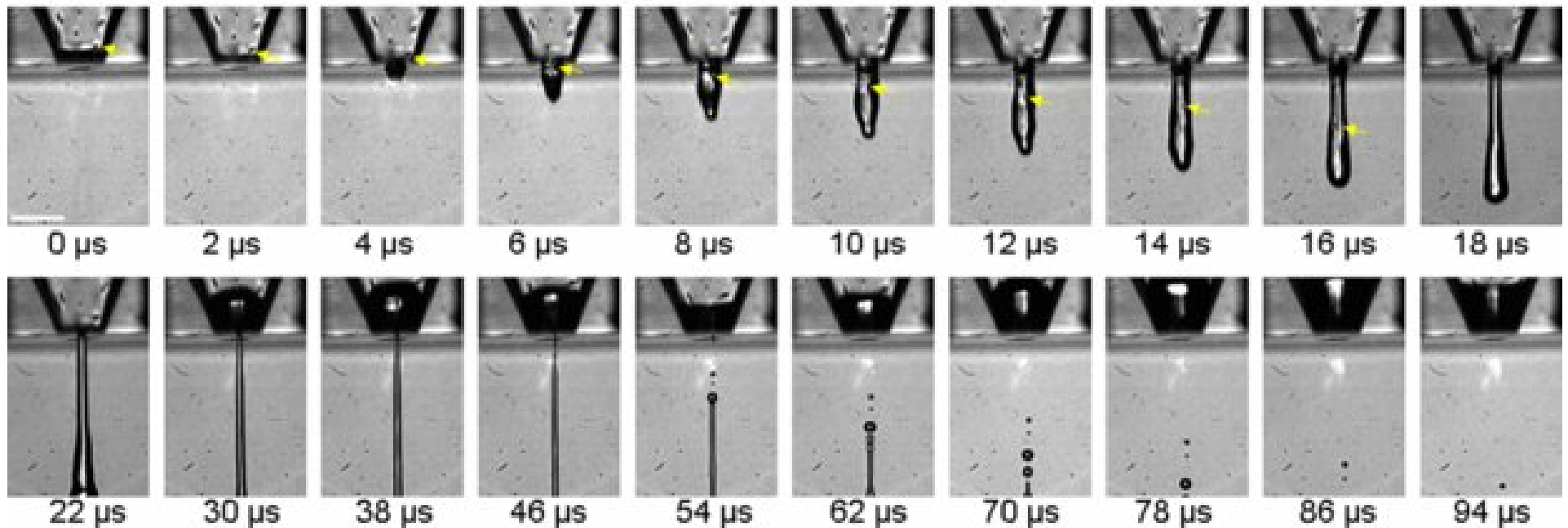
SLS Personal Protective Equipment



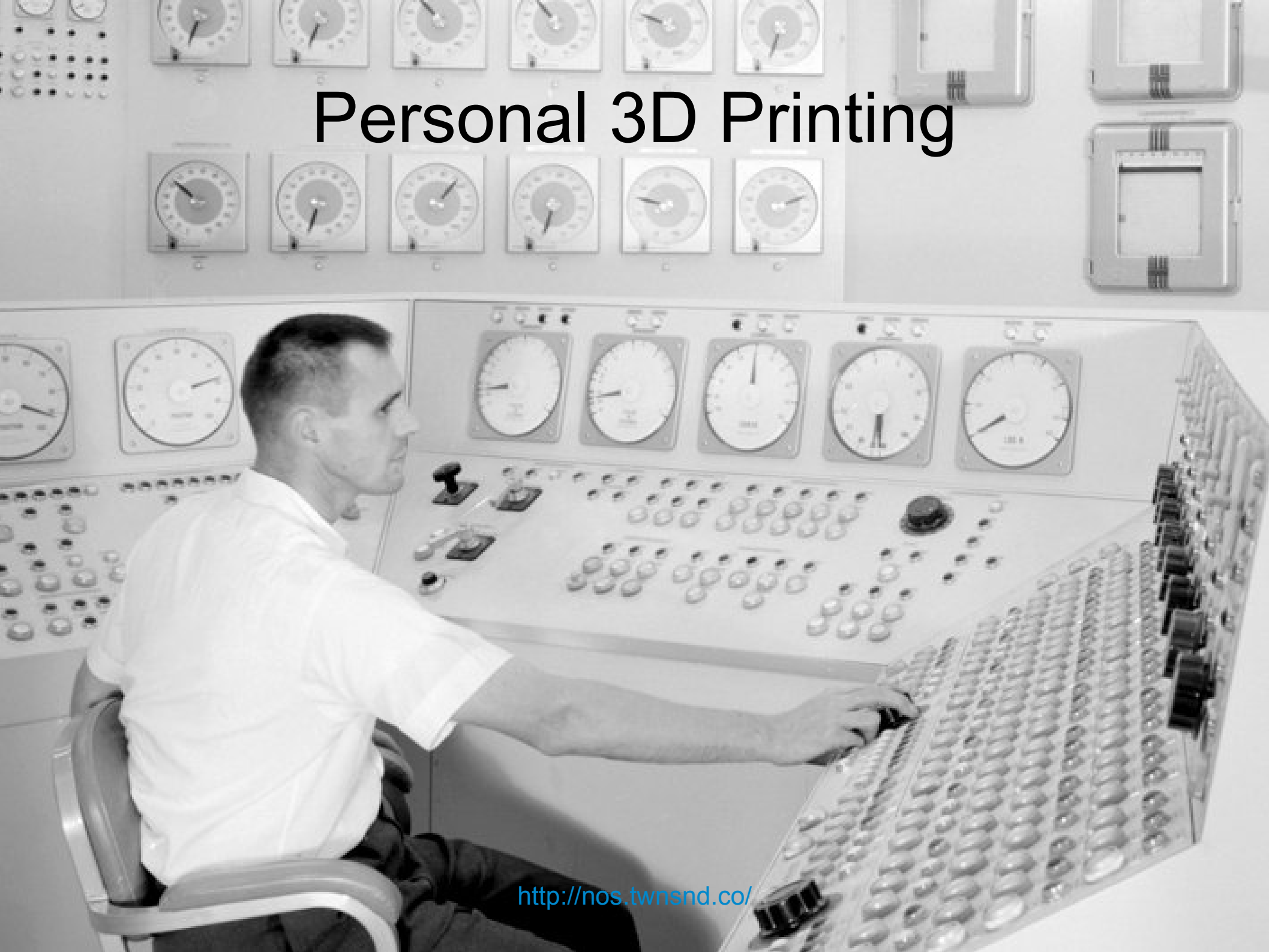
<https://www.youtube.com/watch?v=qJuTM0Y7U1k>

3D Printed Cellular Structures

(B) Retinal cell printing



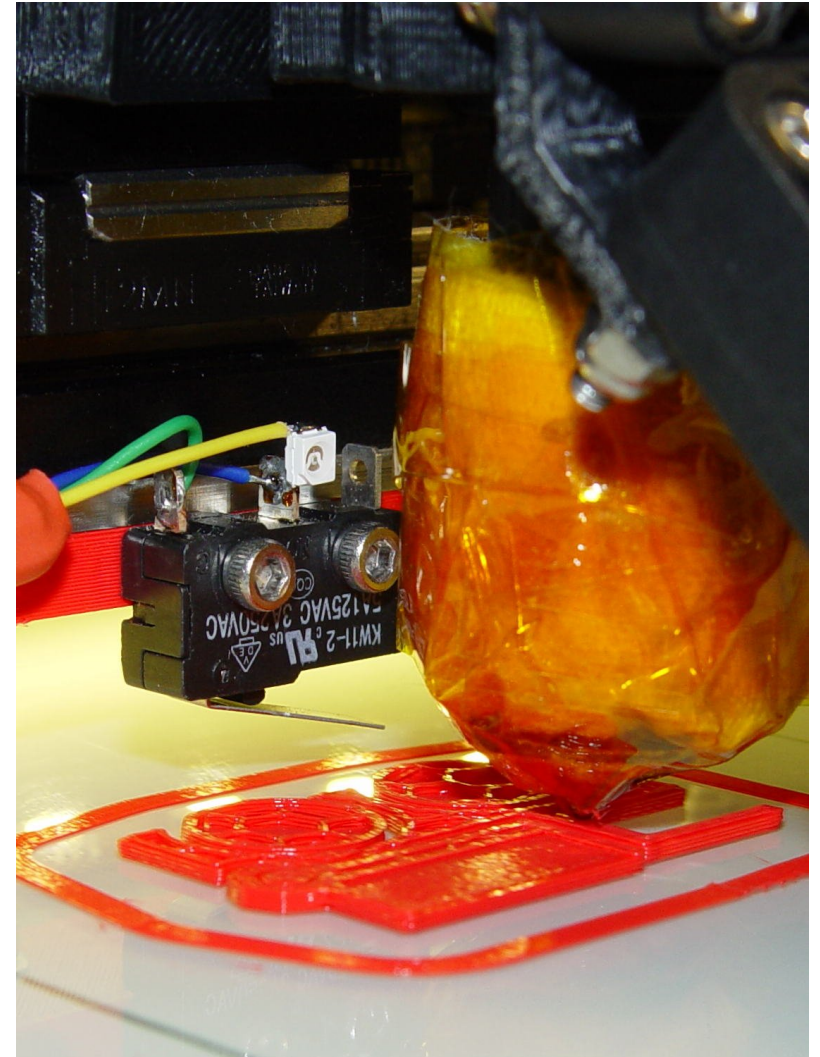
Personal 3D Printing



<http://nos.twinsnd.co/>

What Is **Personal** 3D Printing?

- **You own the printer**
 - All the parts
 - All the hassle
- **You control the results**
 - Maybe the solid model, too
 - All the control parameters
- **No kit-building required**
 - Unless you prefer **DIY**



December 2010: Botacon Zero

- “First Annual”
 - This is typical...
- Terrific energy
 - In a lousy venue
- Pre-alpha printers
 - Show what you had
- Thing-O-Matic!
 - Announced September



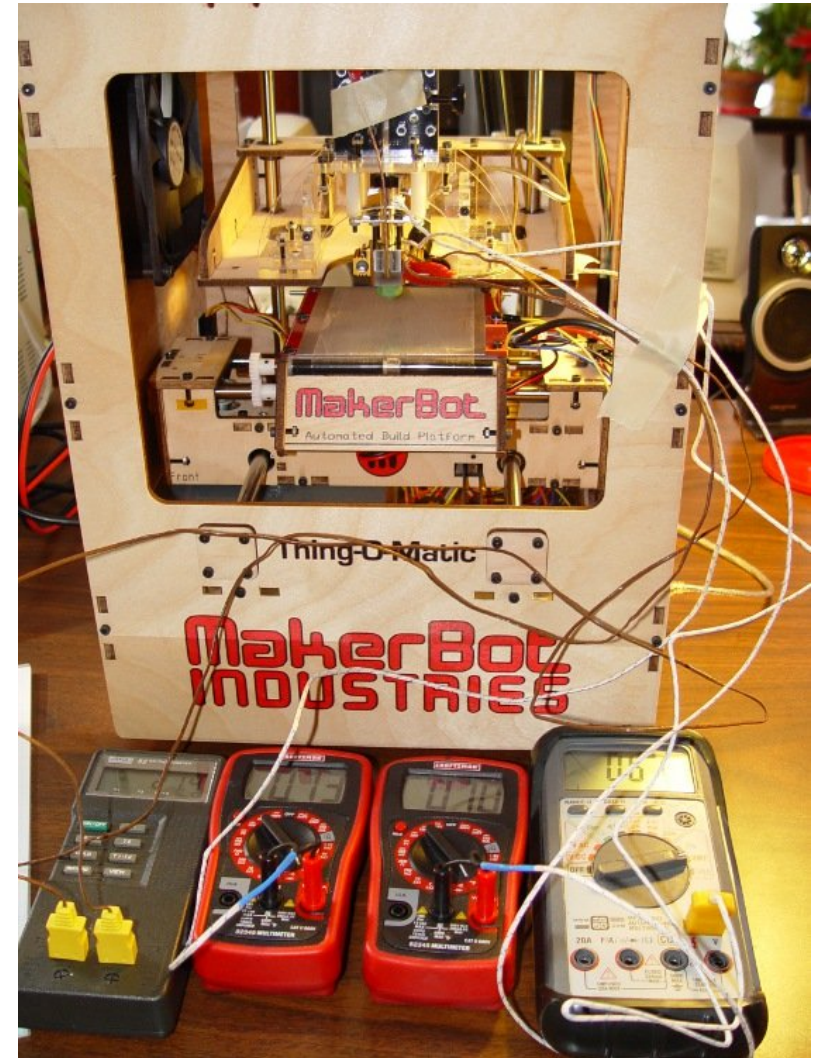
Makerbot Thing-O-Matic

- “Super Cupcake”
 - All the upgrades
 - Plus *innovations*
- Seemed most stable
 - Of a motley assortment
 - Beware pre-alpha *anything*
- Arrived 24 Dec 2010



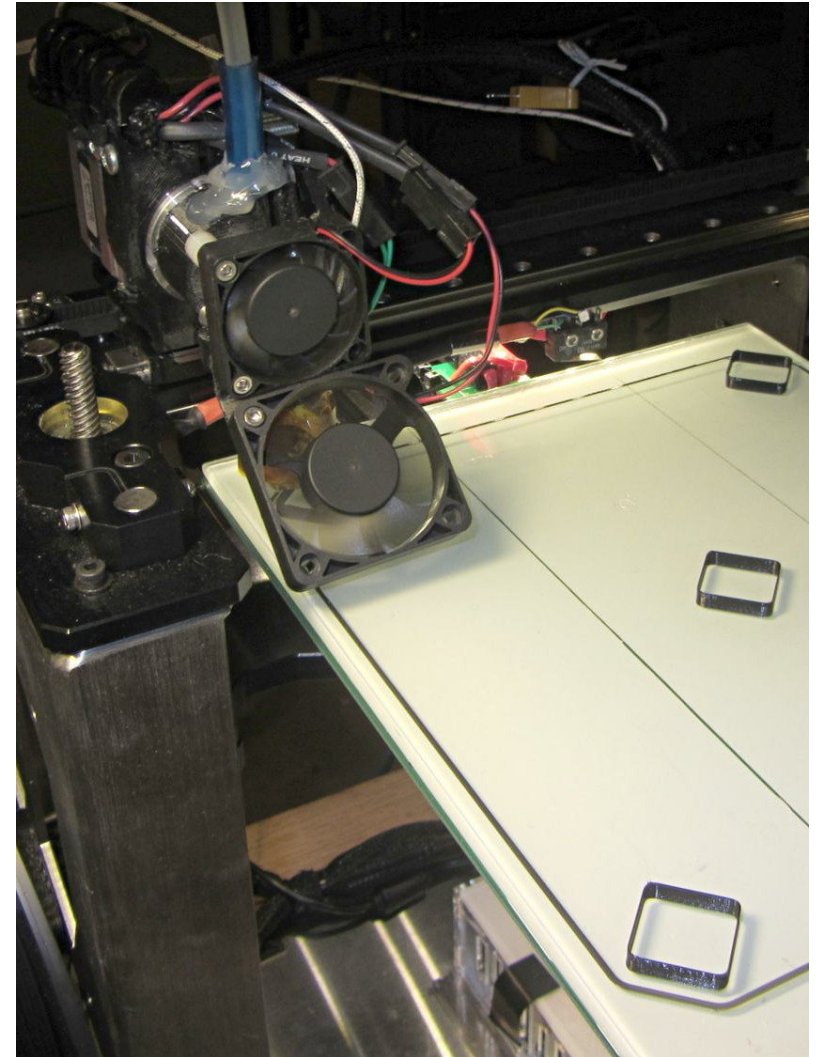
Thing-O-Matic 287

- Some innovations worked!
- Six months of redesign
 - Some not really needed
 - Most absolutely vital
 - Complete write-up
- State of the art when done
 - For mid-2011, anyway
- Now at Squidwrench
 - With all-new electronics

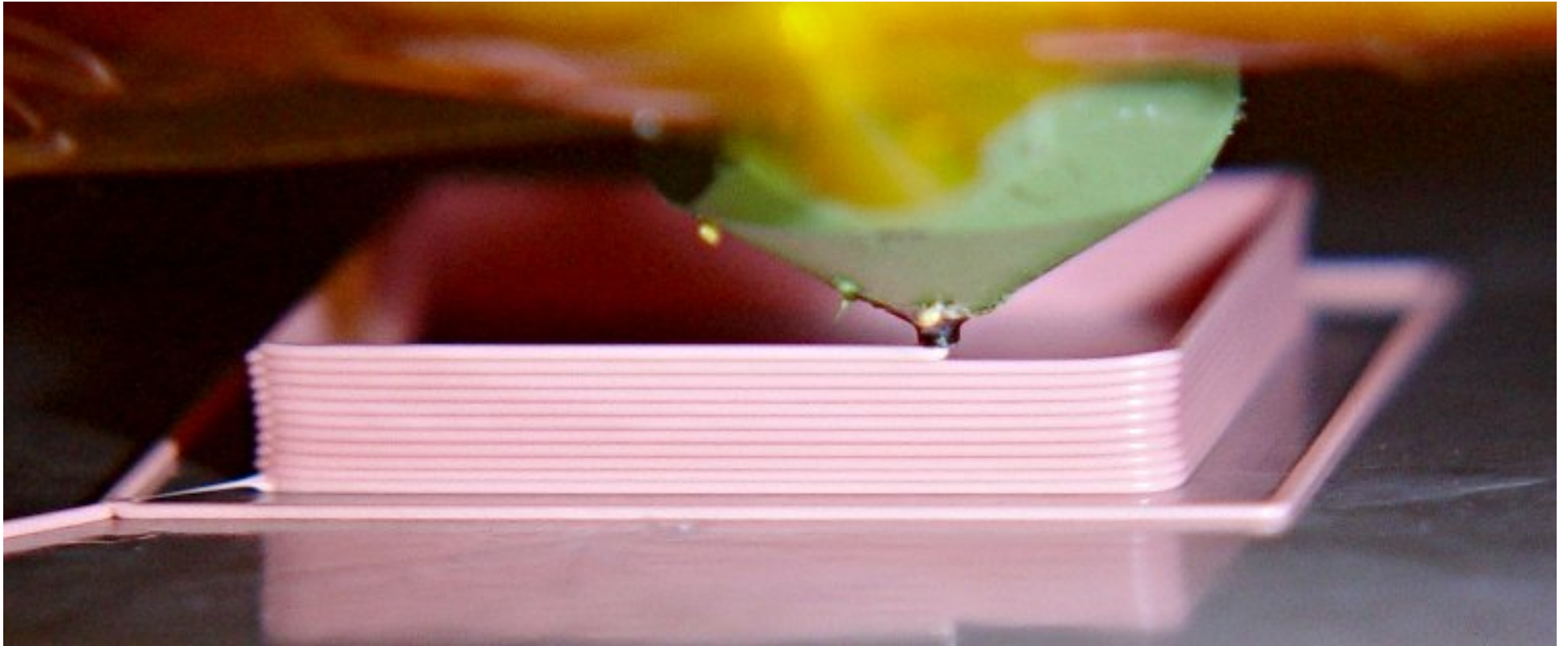


Makergear M2

- Everything worked!
 - Rigid frame
 - Good electronics
- Plus a few tweaks
 - Complete documentation
- State of the art
 - For mid-2013, anyway



Personal 3D Printing

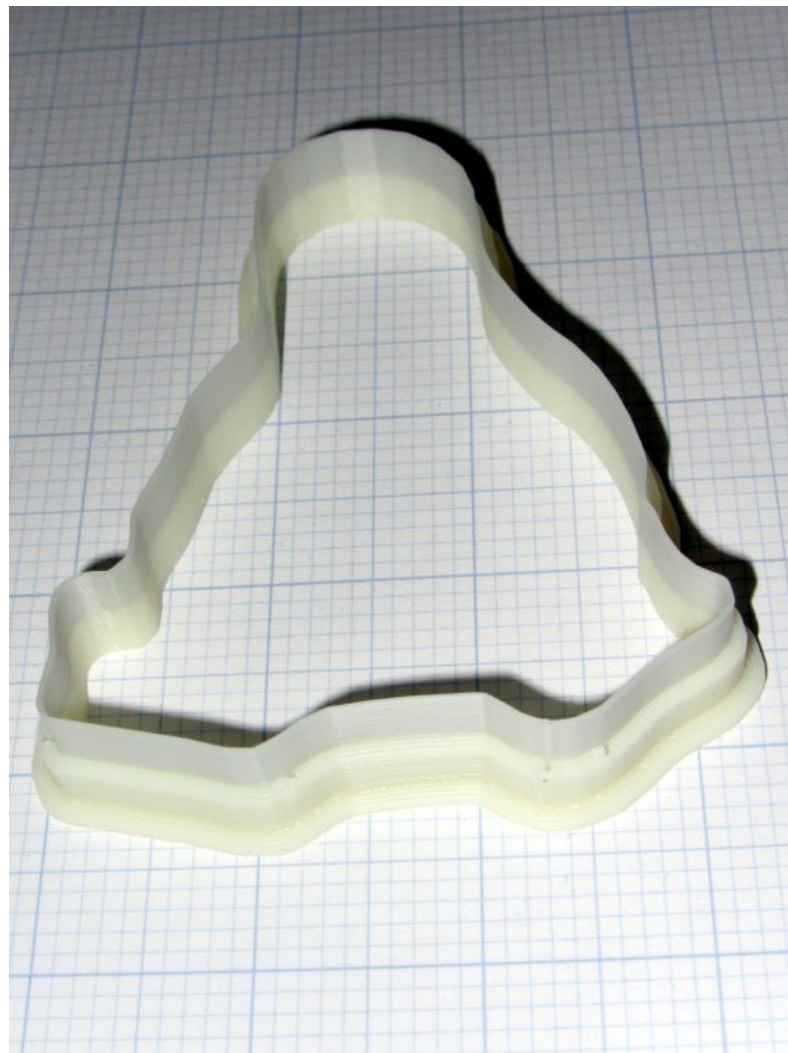


- Building things with a hot-melt glue gun
 - A very **small** glue gun: nozzle 0.2 to 0.6 mm dia
 - A very **hot** glue gun: 190 to 230 °C = 350 to 450 °F

<http://www.thingiverse.com/thing:2064>

3D Printing Up Close

Tux Cookie Cutter
The Movie

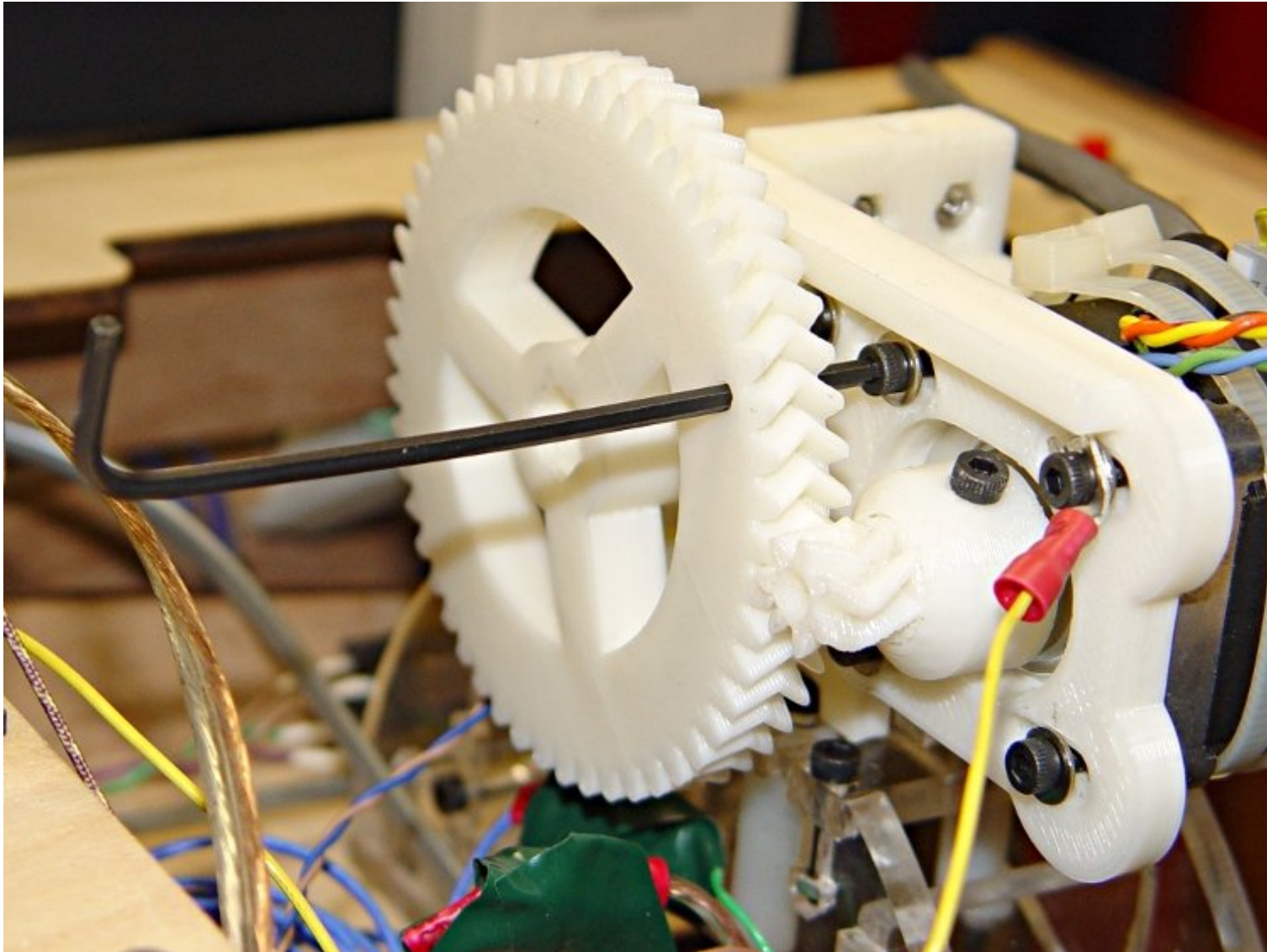


3D Printed Jet Engine



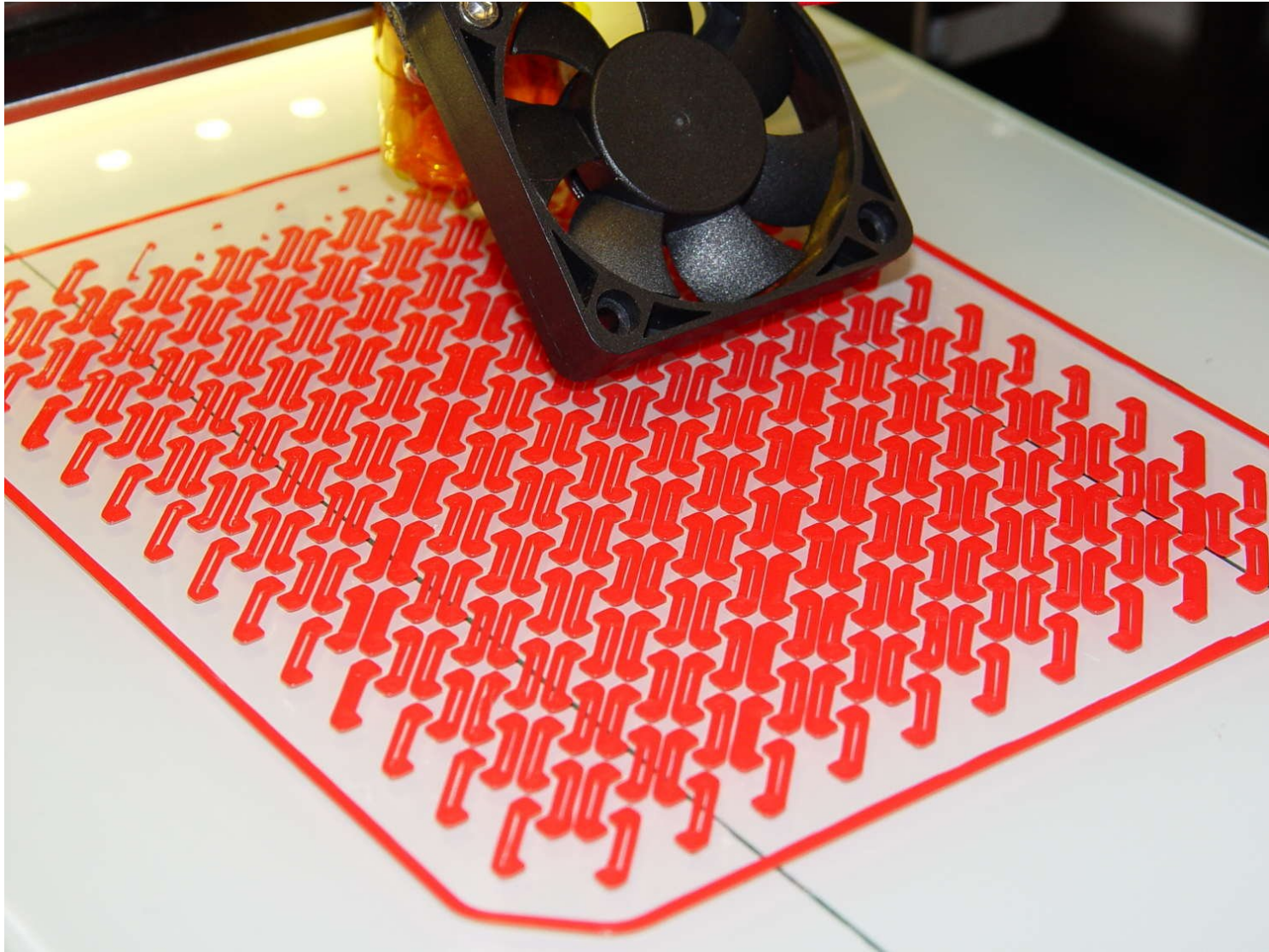
<http://www.thingiverse.com/thing:114468>

3D Printed Machinery



<http://softsolder.com/2011/03/21/thing-o-matic-stepper-extruder-first-steps/>

3D Printed Chain Mail



<http://softsolder.com/2013/04/30/printed-chain-mail-subtractive-mode/>

3D Printed Furniture



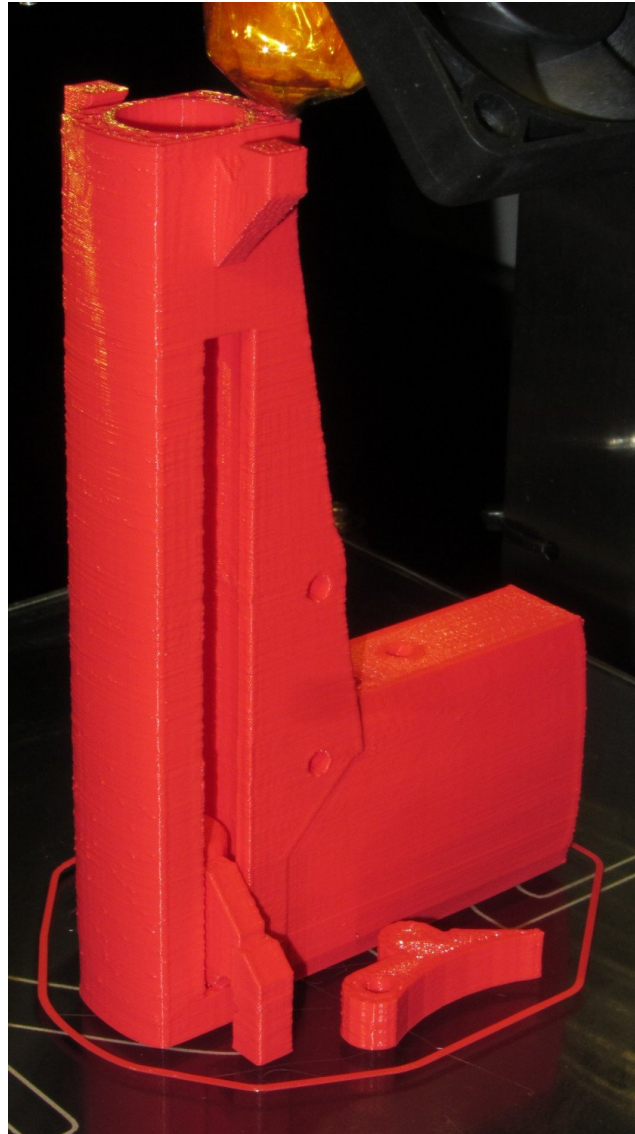
<https://groups.google.com/d/msg/makergear/XKXmgSuXftg/RDHqXVtN3BcJ>

3D Printed Furniture



<https://groups.google.com/d/msg/makergear/XKXmgSuXftg/RDHqXVtN3BcJ>

3D Printed Gun



<http://softsolder.com/2013/10/22/nerf-pistol-red-pla-version/>

3D Printed Bomb



<http://3dprint.com/23900/3d-printed-bomb/>

3D Printed RoboHand



<https://www.youtube.com/watch?v=WT3772yhr0o>

3D Printed Cyborg Beast

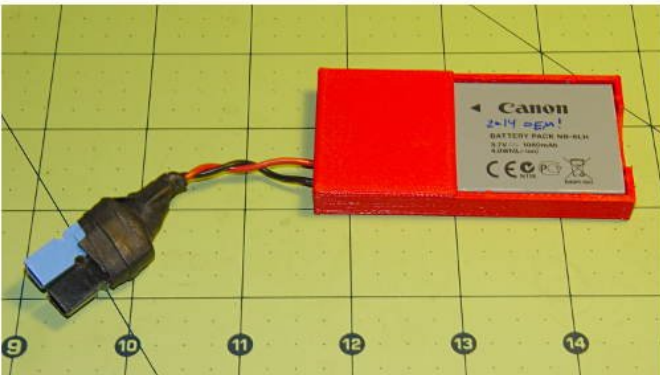


<http://www.thingiverse.com/thing:261462>

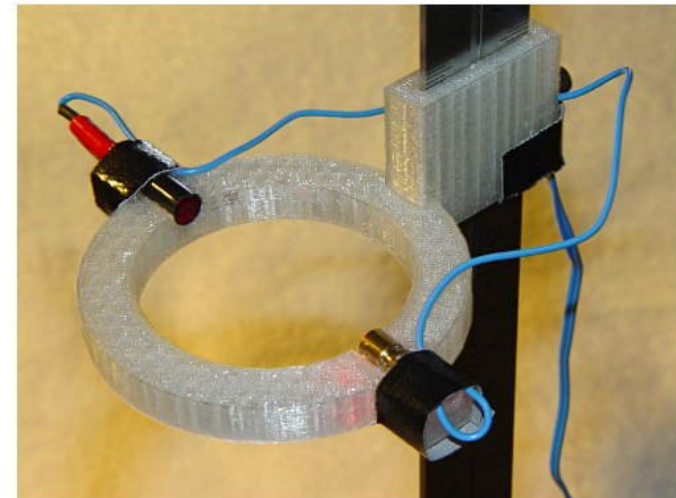
3D Printed Cyborg Beast



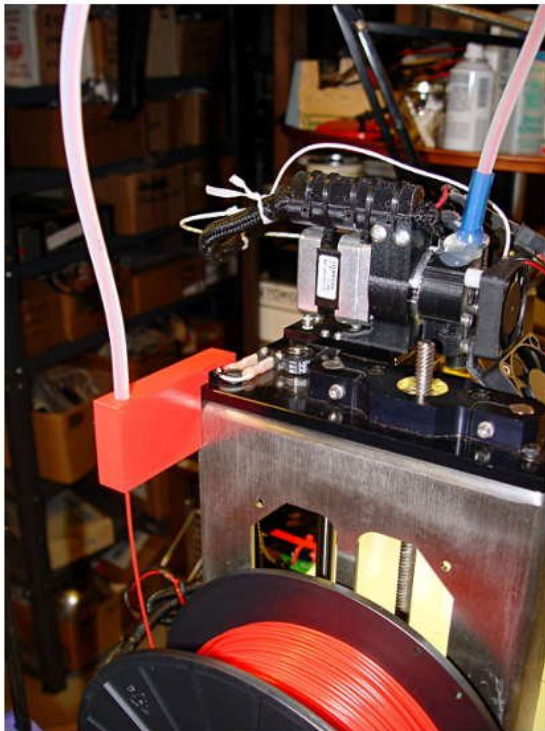
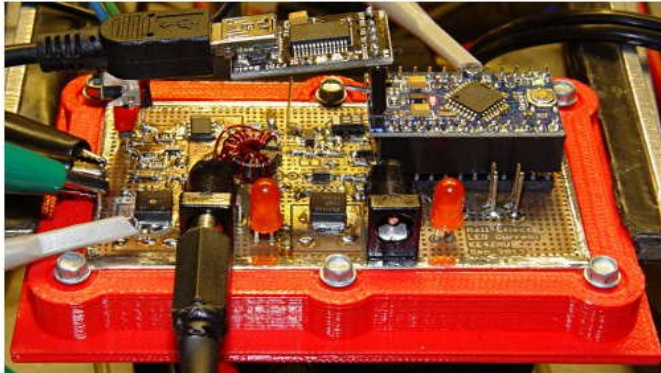
<http://www.thingiverse.com/thing:261462>



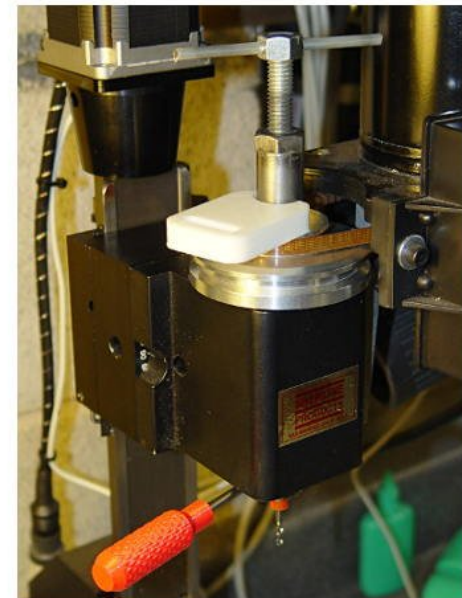
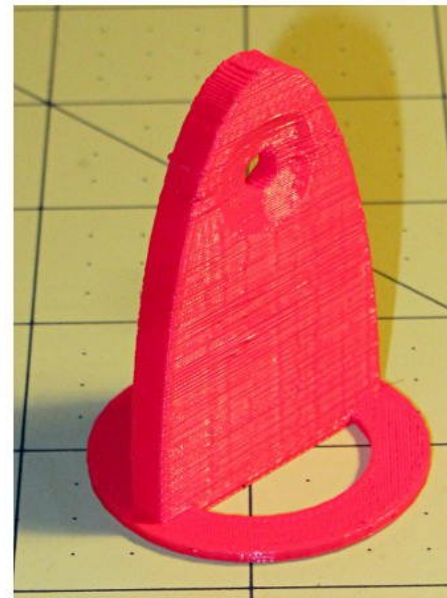
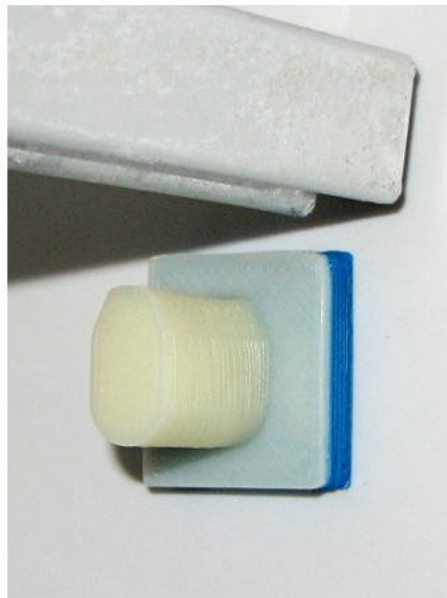
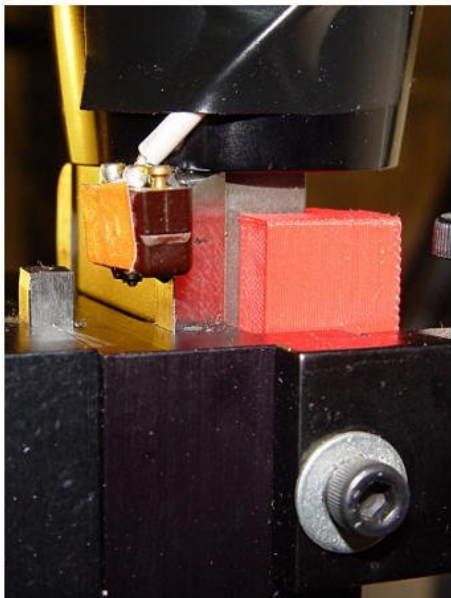
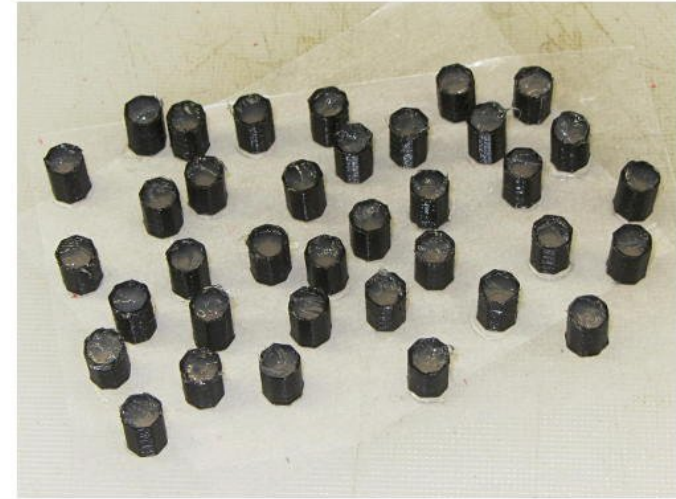
Why I Own A 3D Printer - 2



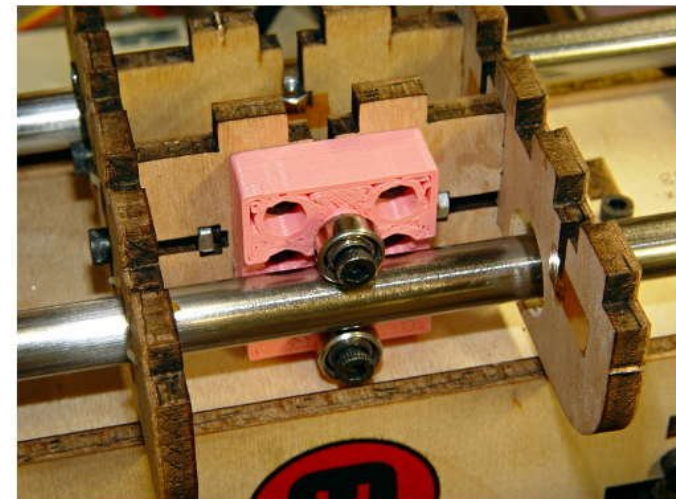
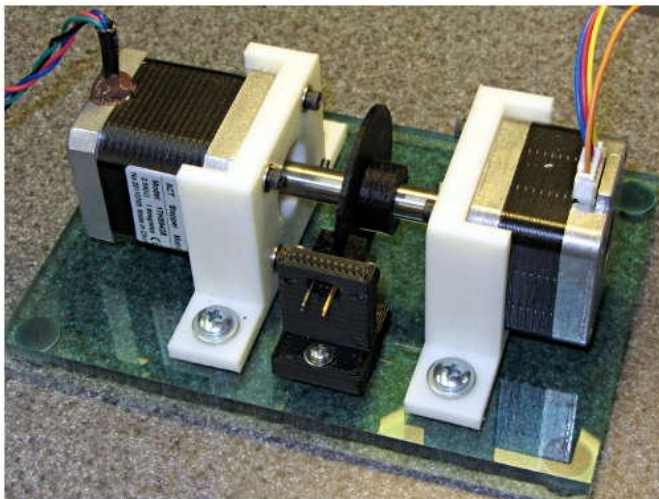
Why I Own A 3D Printer - 3



Why I Own A 3D Printer - 4



Why I Own A 3D Printer - 5





3D Printed Business Case




<http://forum.makergear.com/viewtopic.php?f=2&t=45&p=245>
<http://www.rccrawler.com/forum/scale-parts/469111-lights-out-r-c-off-road-trailer-kit.html>

3D Printed Business Case


**CristinsCookies**
[Favorite Shop](#)




[Favorite](#) **Like this item?**
Add it to your favorites to revisit it later.




Cristin's Cookies
www.cristinscookies.com

[zoom](#)

[Request a custom order](#) and have something made just for you.

**3.75" Roger the Robot
"You.Are.A.Love.Machine" COOKIE
CUTTER**
\$6.00+ USD [Ask a Question](#)
Quantity:
Add Tutorial Cards
[Select an option](#)
Overview

- Handmade item
- Material: Food Safe PLA Plastic
- Made to order
- Feedback: [793 reviews](#)
- Ships worldwide from San Jose, California

 This shop accepts Etsy Gift Cards

[Add to Cart](#)

<http://www.cristinscookies.com/> <https://www.etsy.com/shop/cristinscookies>

3D Printed Business Case

3.75" Roger the Robot

**"You.Are.A.Love.Machine" COOKIE
CUTTER**

\$6.00+ USD

Ask a Question

Quantity

1

Add Tutorial Cards

Select an option

<http://www.cristinscookies.com/> <https://www.etsy.com/shop/cristinscookies>

3D Printed Business Case

Shop Owner



Cristin's Cookies

San Jose, CA,
United States

Have a question?
[Contact the shop owner.](#)

Shop Info

 [CristinsCookies](#)

Opened on Dec 27, 2012

[About](#)

[Policies](#)

[Seller Information](#)

[Reviews](#)

★★★★★ (810)

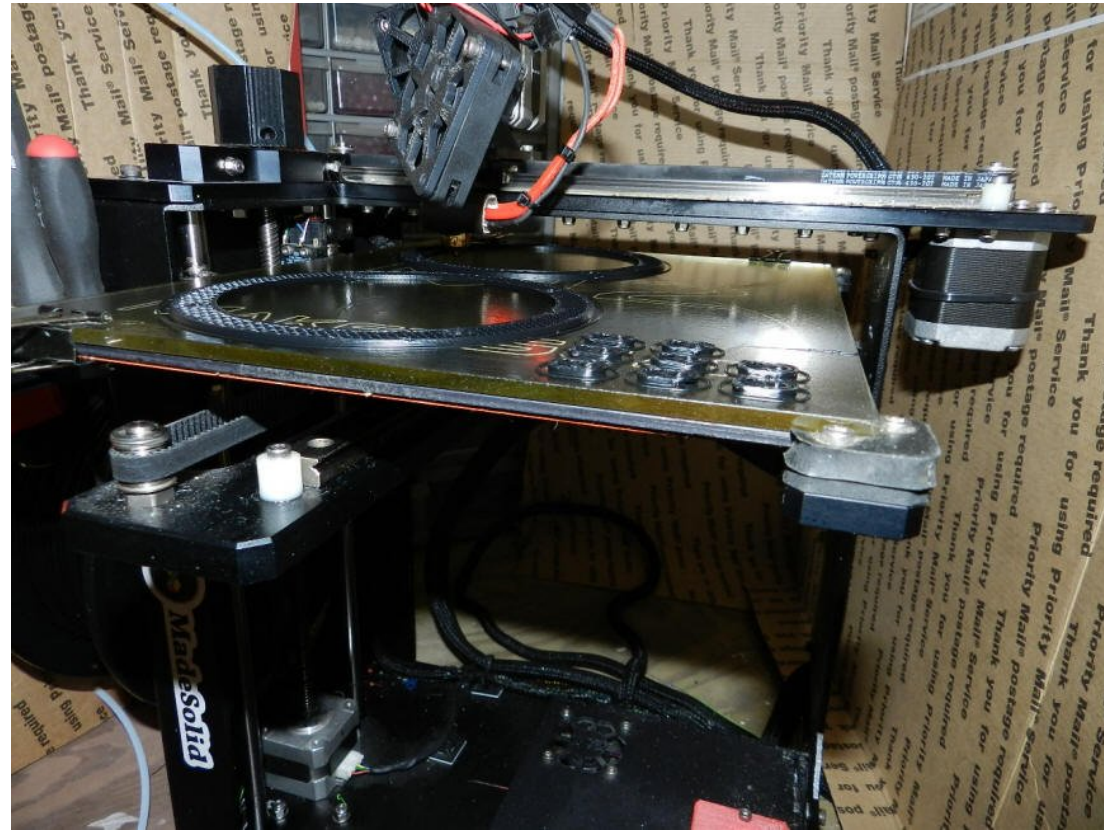
4,062 sales

<http://www.cristinscookies.com/> <https://www.etsy.com/shop/cristinscookies>

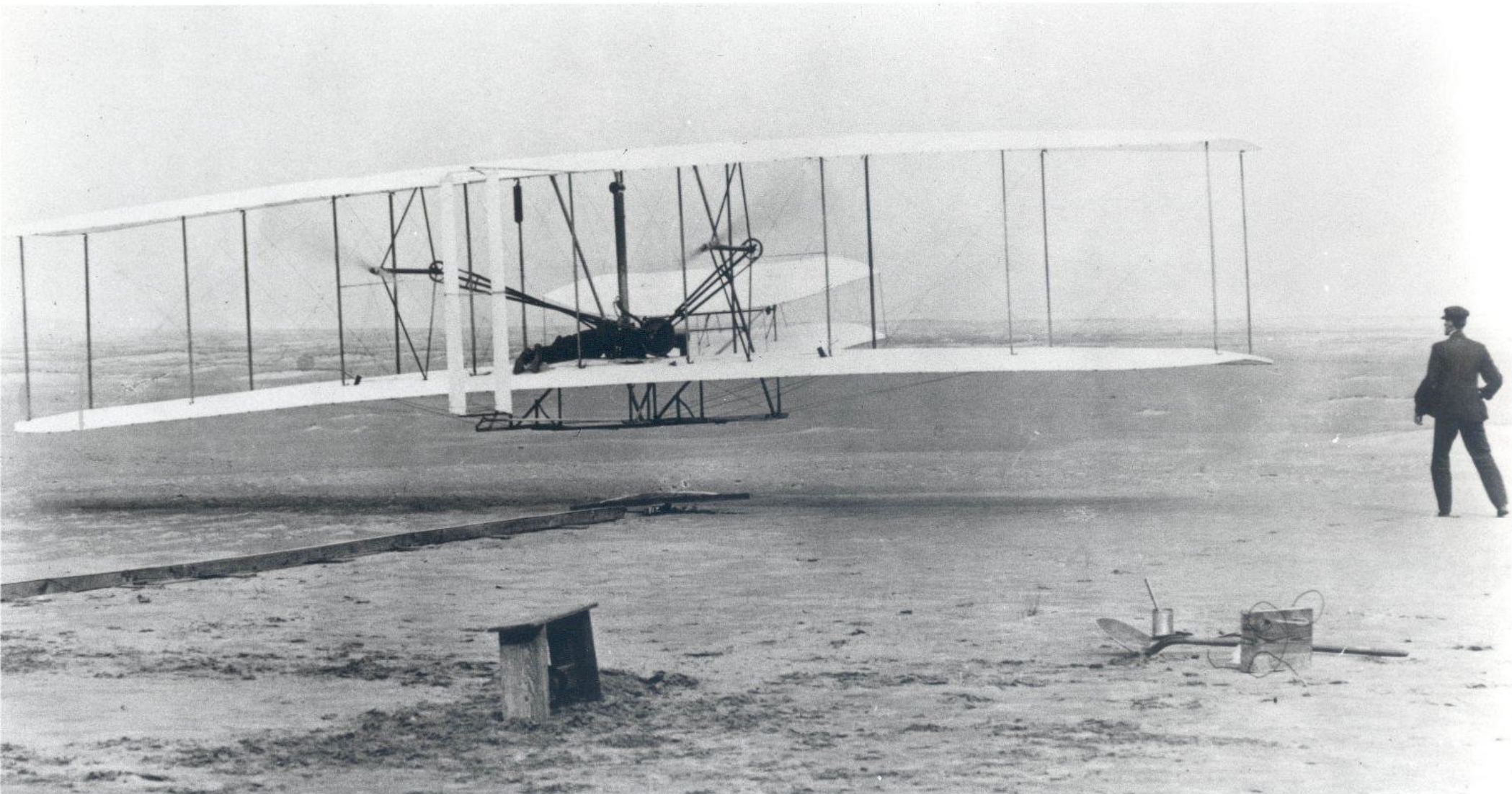
3D Printed Production

“My M2 makes 14 dollars every 90 minutes, less expense for juice and filament.

Low side would be 6 bucks an hour, for a 10 hour print day, 60 bucks and it don't bitch about working conditions, or hourly wage, works on holidays and never calls in sick.”

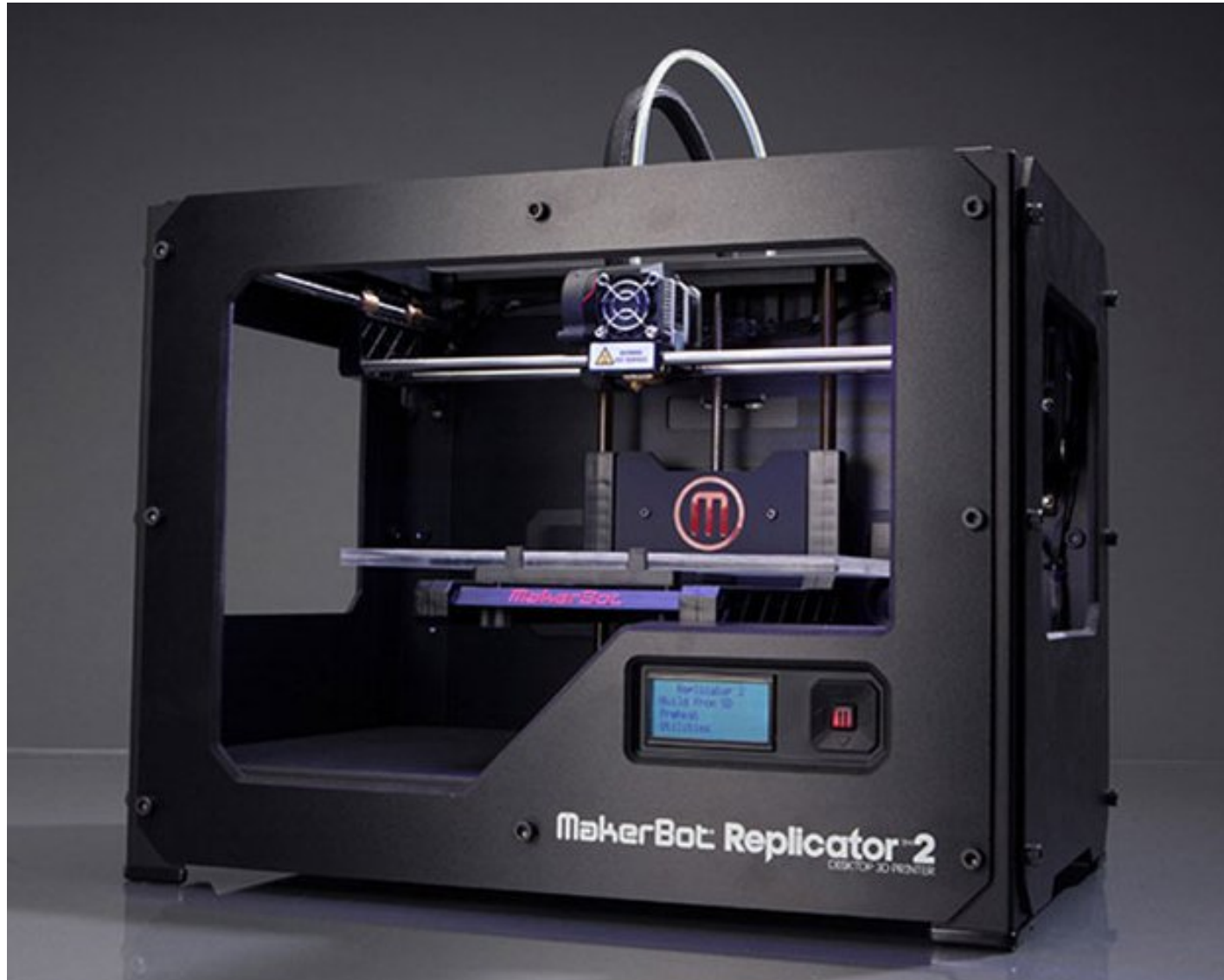


The Future of Personal 3D Printing



<https://secure.flickr.com/photos/nasacommons/13066334164/>

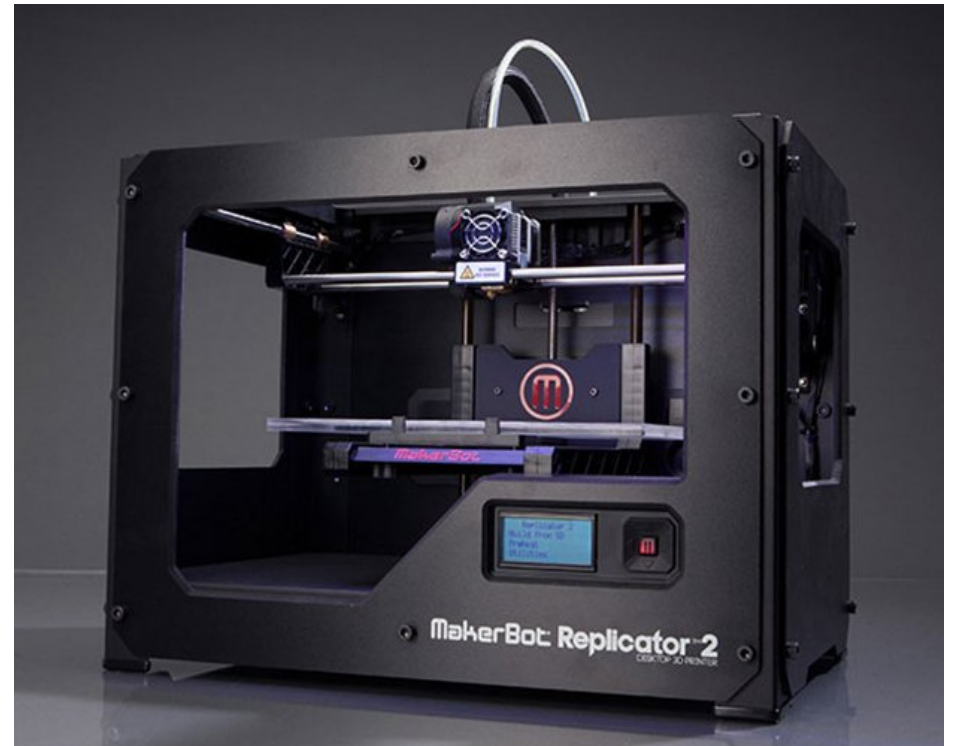
Makerbot Replicator 2



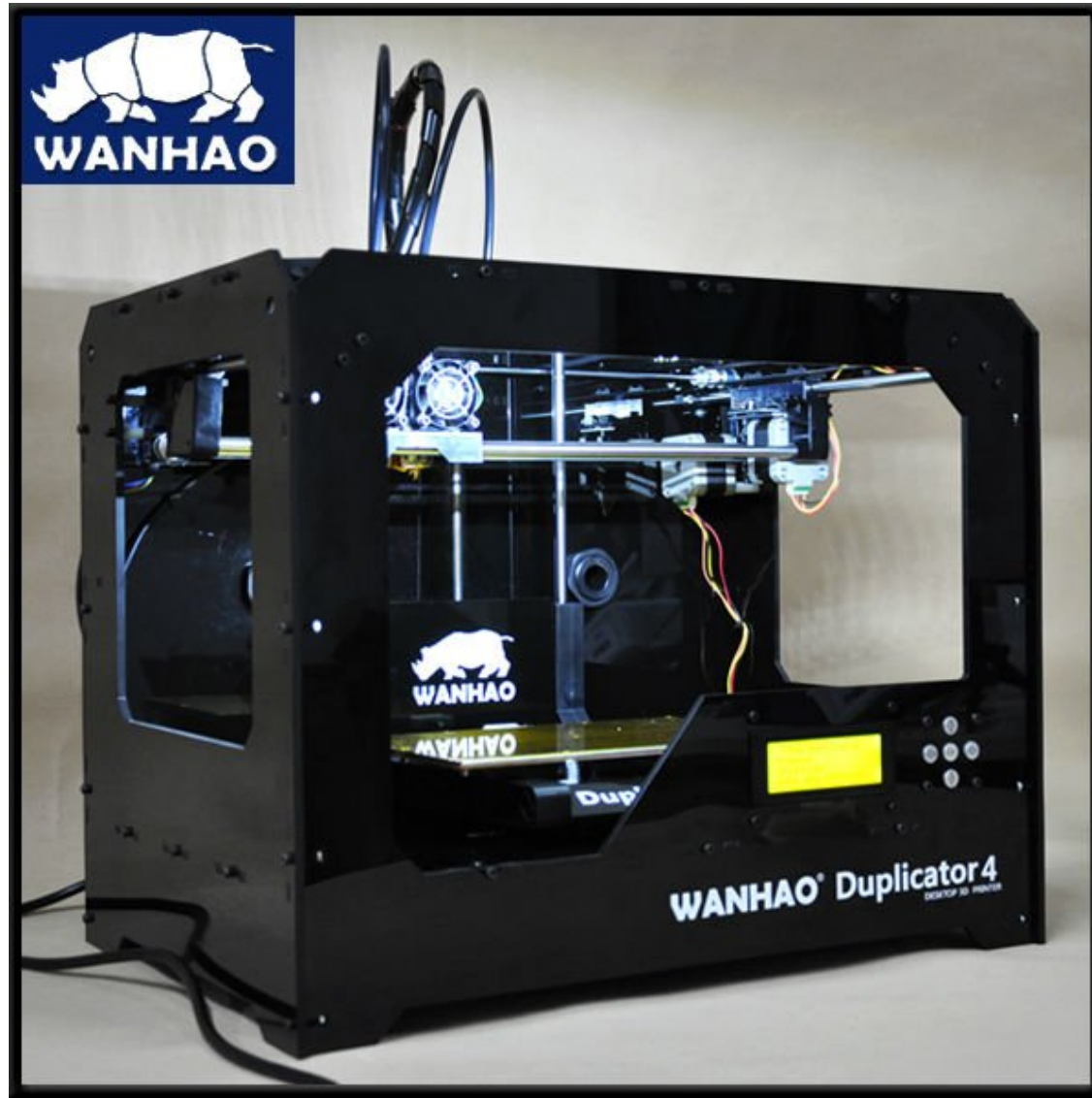
<http://store.makerbot.com/replicator2>

Makerbot Replicator 2

“For the Replicator 2, we will not share the way the physical machine is designed or our GUI because we don’t think carbon-copy cloning is acceptable ...”



WanHao Duplicator 4



<http://www.alibaba.com/showroom/wanhao-duplicator-4.html>

WanHao Duplicator 4

**WANHAO**

Jinhua Wanhao Spare Parts

2nd Year | Gold Supplier

★ Lighting service
★ Quality guaranteed

CE certification

Home | **Product Categories** | Company Profile | Warranty | User Manuel | Contacts

Home > Product Categories > Ungrouped > 3D printer 2 daul extruder newest version duplicator 4



WANHAO Duplicator4

3D printer 2 daul extruder newest version duplicator 4 WANHAO MK8
ABS PLA filaments

 Add to Inquiry Cart ★ Add to My Favorites Share to:  

US \$1,041.05

Min. Order: 1 Set

Quantity: Sets

Shipping Cost: **US \$200.87 / Set to United States by Express FedEx IE** ▼

Processing Period: Within 15 working days after payment.

Escrow Payment: Accepted

Buy Now



<http://www.alibaba.com/showroom/wanhao-duplicator-4.html>

SLA Printing: Win

Funded! This project was successfully funded on Feb 3.



FSL3D



▶ **PLAY**

**LAST
DAY**

383

backers

\$819,535

pledged of \$100,000 goal

0

seconds to go



Project by

**Full Spectrum
Laser**

**Las Vegas,
NV**

<https://www.kickstarter.com/projects/fsl/pegasus-touch-laser-sla-3d-printer-low-cost-high-q>

3D Printed IP Infringement

3D Systems has applied for patents for the following innovations and technologies:

- the rapid prototyping and manufacturing system and method
- radiation curable compositions useful in image projection systems
- compensation of actinic radiation intensity profiles for 3D modelers
- apparatus and method for cooling part cake in laser sintering
- radiation curable compositions useful in solid freeform fabrication systems
- apparatus for 3D printing using imaged layers
- compositions and methods for selective deposition modeling
- edge smoothness with low resolution projected images for use in solid imaging
- elevator and method for titling solid image build platform for reducing air entrapment and for build release
- selective deposition modeling methods for improved support-object interface
- region-based supports for parts produced by solid freeform fabrication
- additive manufacturing methods for improved curl control and sidewall quality
- support and build material and applications

3D Printed Food: Fail

Funding Unsuccessful This project's funding goal was not reached 2 days ago.



196

backers

\$80,279

pledged of \$100,000 goal

0

seconds to go



Project by

**Natural
Machines**

Miami, FL

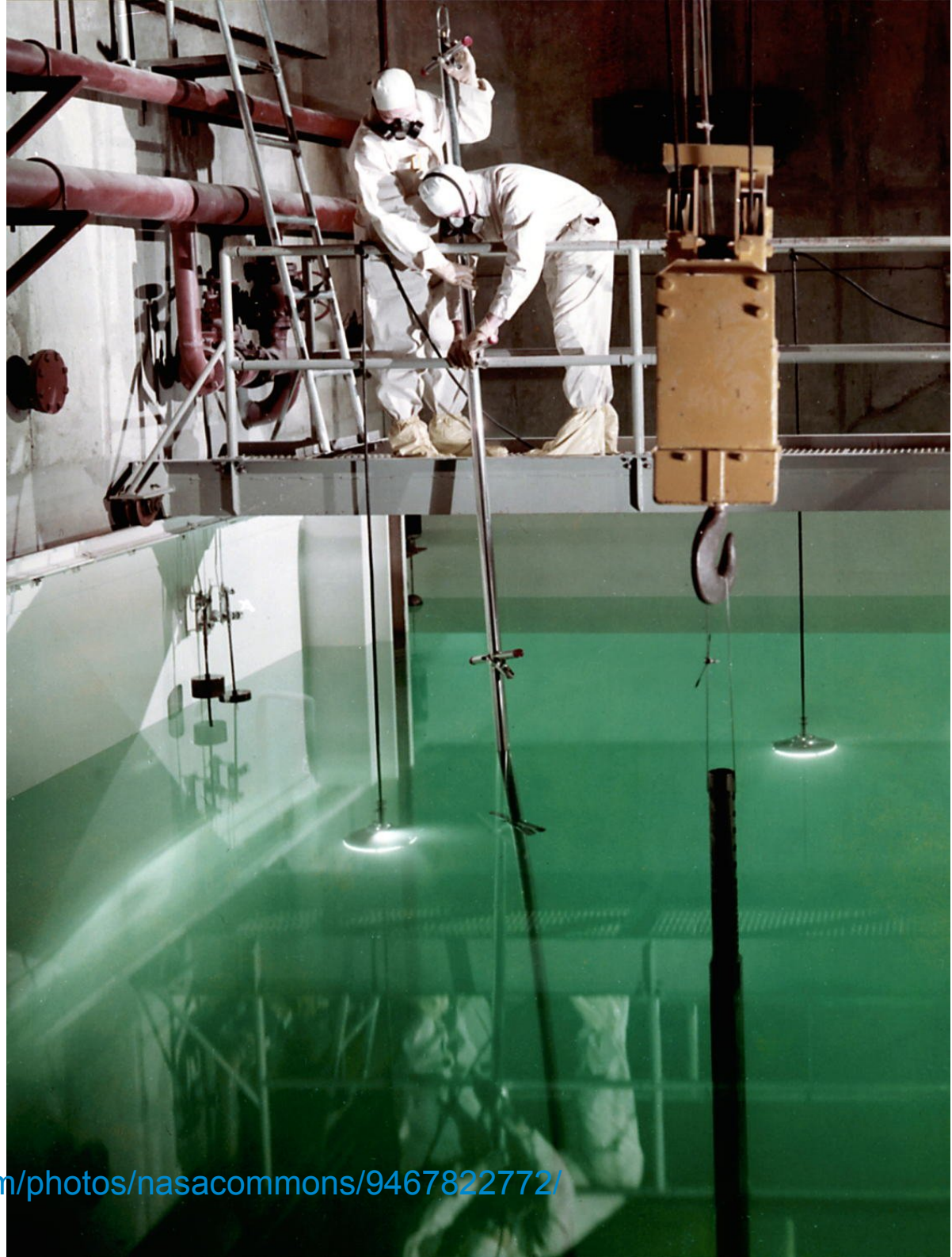
<https://www.kickstarter.com/projects/456763017/designed-for-healthy-eating-foodini-a-3d-food-printer>

The Future of Personal 3D Printing

- Low end = Fused Filament
 - Friendly, cheap, **slow**
 - Barely good enough
- Retail = SLA Photopolymer
 - Razor + **Blade\$** business
 - Prosumer appeal
 - Low end will repeatedly fail
- Business = Laser Sinter
 - It's an industrial process!



Tchotchkes!



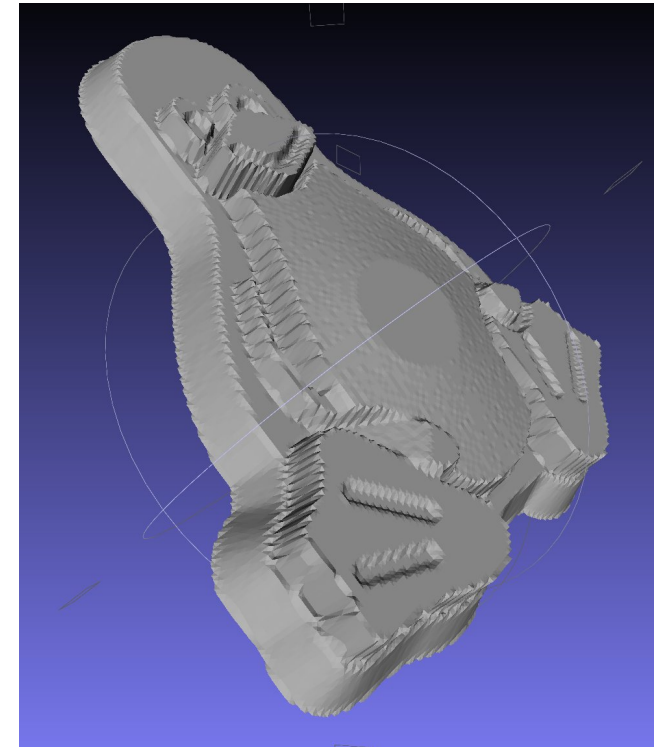
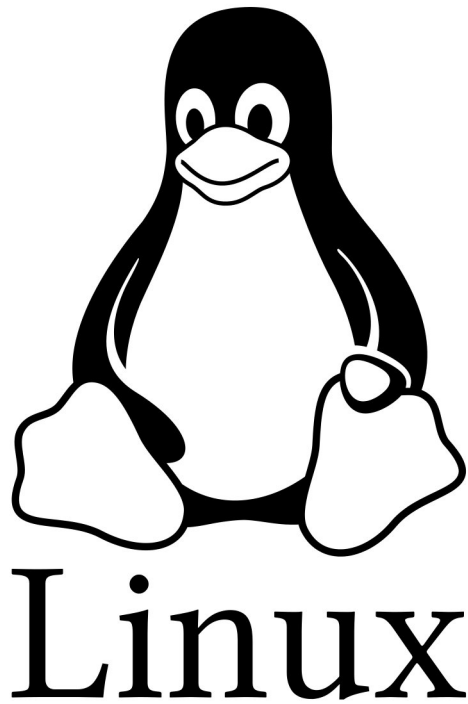
<https://secure.flickr.com/photos/nasacommons/9467822772/>

These Are Engineering Samples!

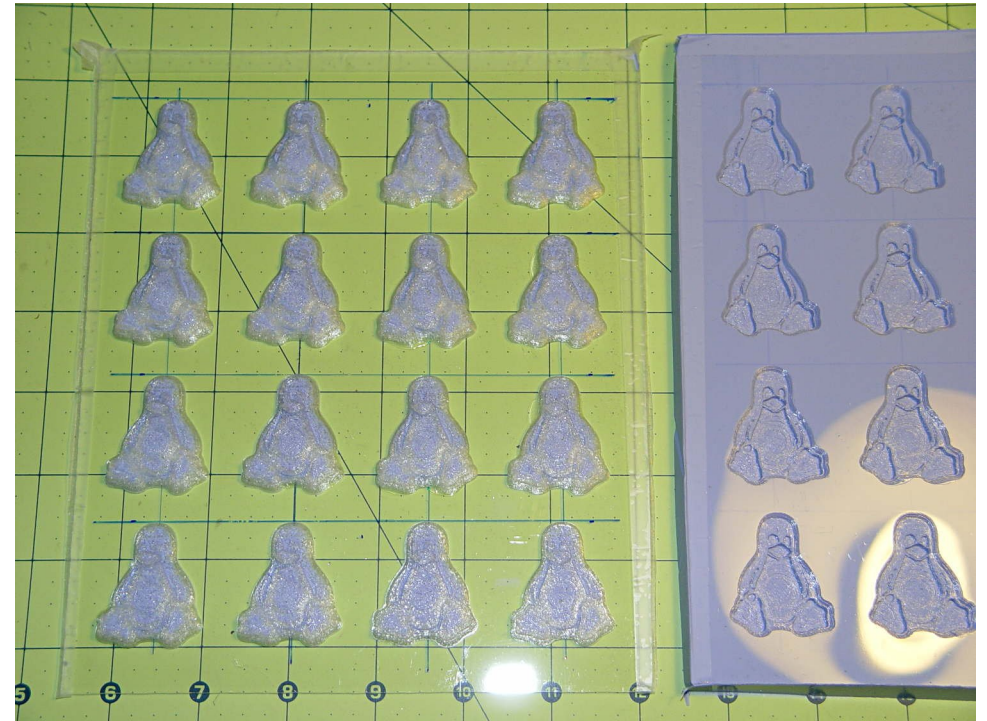
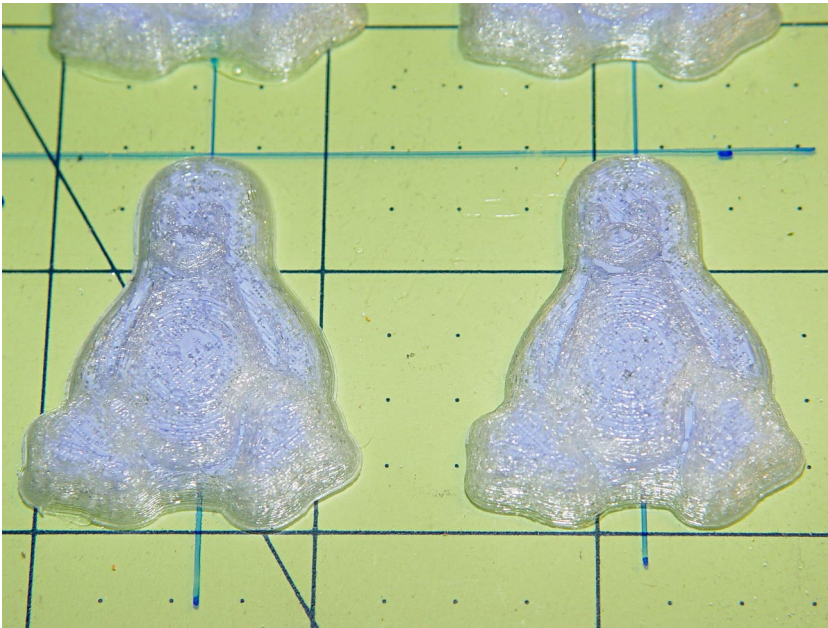


<http://softsolder.com/2014/04/09/chocolate-molds-tempering-and-pouring/>

B&W → Height Map → Solid Model

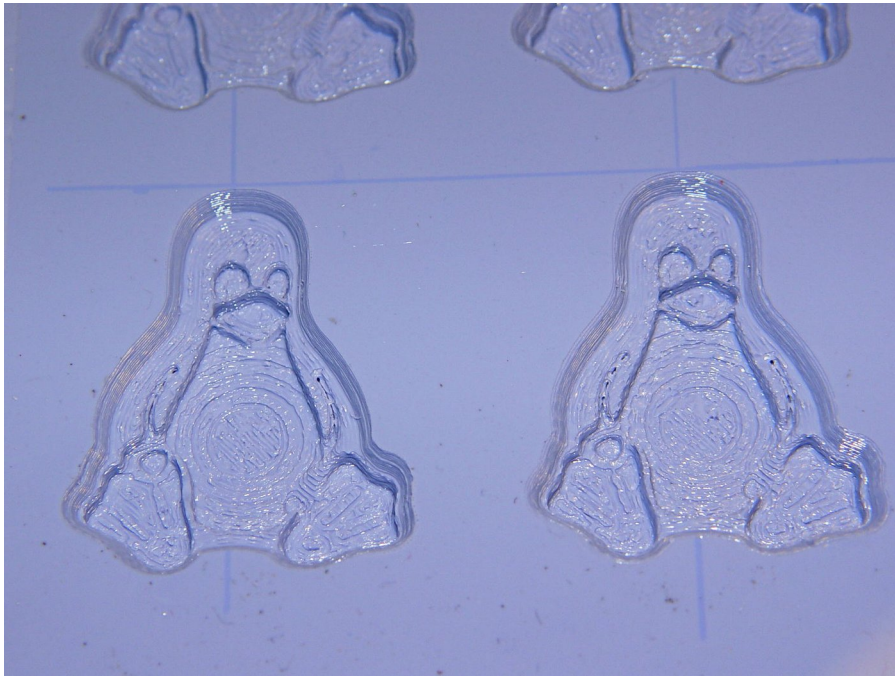


Solid Model → Silicone Mold



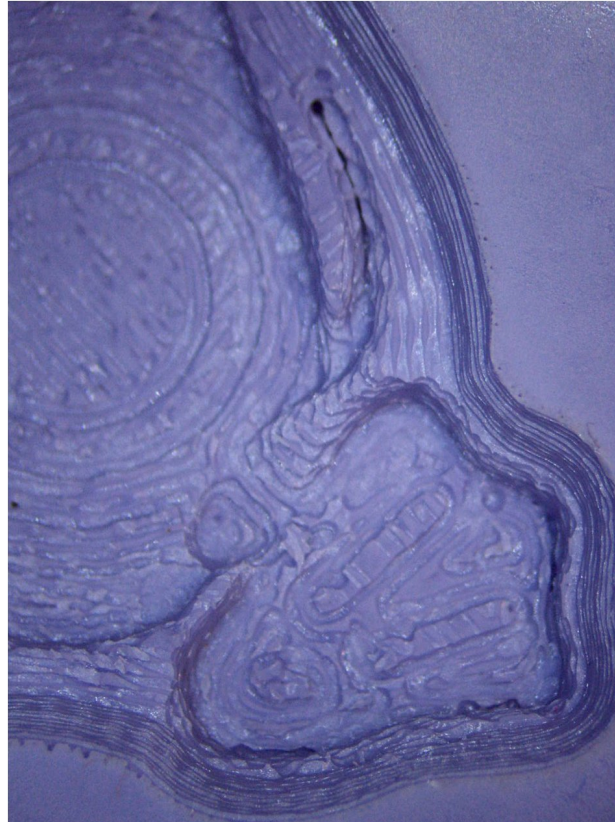
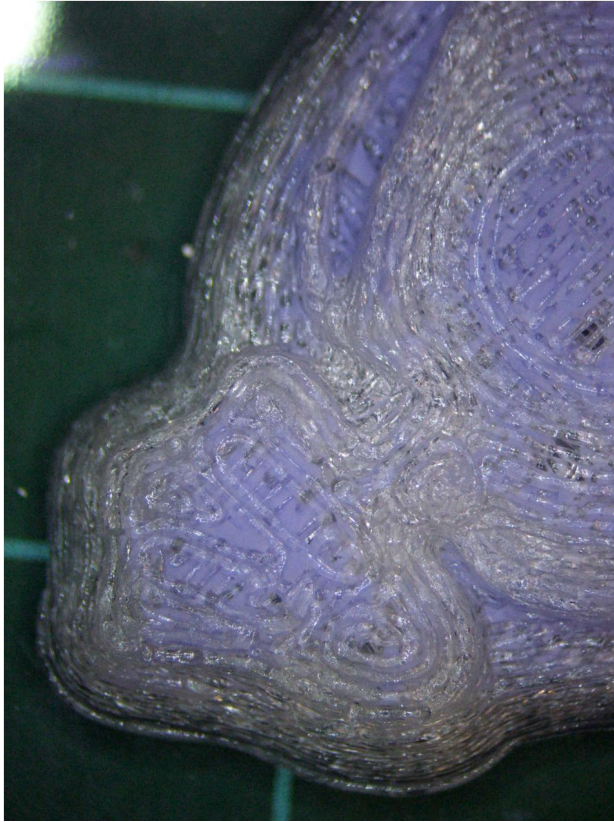
<http://softsolder.com/2014/04/08/chocolate-molds-acrylic-base/>

Silicone Mold → Chocolate!



<http://softsolder.com/2014/04/09/chocolate-molds-tempering-and-pouring/>

PLA → Silicone → Chocolate!



Chocolate Bloom = Cocoa Butter



<http://softsolder.com/2014/04/09/chocolate-molds-tempering-and-pouring/>

Questions?

Copyright-ish Stuff

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[whatever that is]

The rest is my own work



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San Francisco, California, 94105, USA.



Ed Nisley

Say “NISS-lee”, although we're on the half-essed branch of the tree

Engineer (ex PE), Hardware Hacker, Programmer, Author

[The Embedded PC's ISA Bus: Firmware, Gadgets, Practical Tricks](#)

Circuit Cellar www.circuitcellar.com

Firmware Furnace (1988-1996) - Nasty, grubby hardware bashing

Above the Ground Plane (2001 ...) - Analog and RF stuff

Digital Machinist www.homeshopmachinist.net

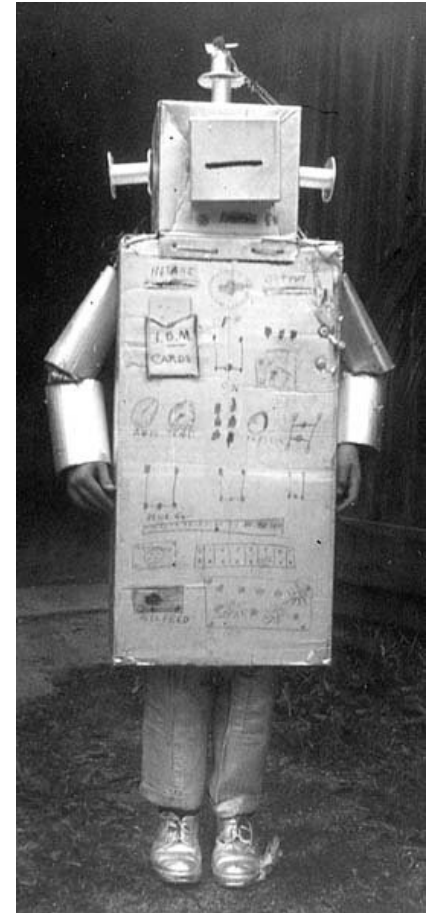
Along the G-Code Way (2008 ...) - G-Code, math, 3D printing

Dr. Dobb's Journal www.ddj.com

Embedded Space (2001-2006) - All things embedded

Nisley's Notebook (2006-2007) - Hardware & software collisions

Blog: The Smell of Molten Projects in the Morning
softsolder.com



September 1962



If you
can't read this
then
make a new friend
'way up front