Open Source Low Cost 3D Printing

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http://www.wizards23.net

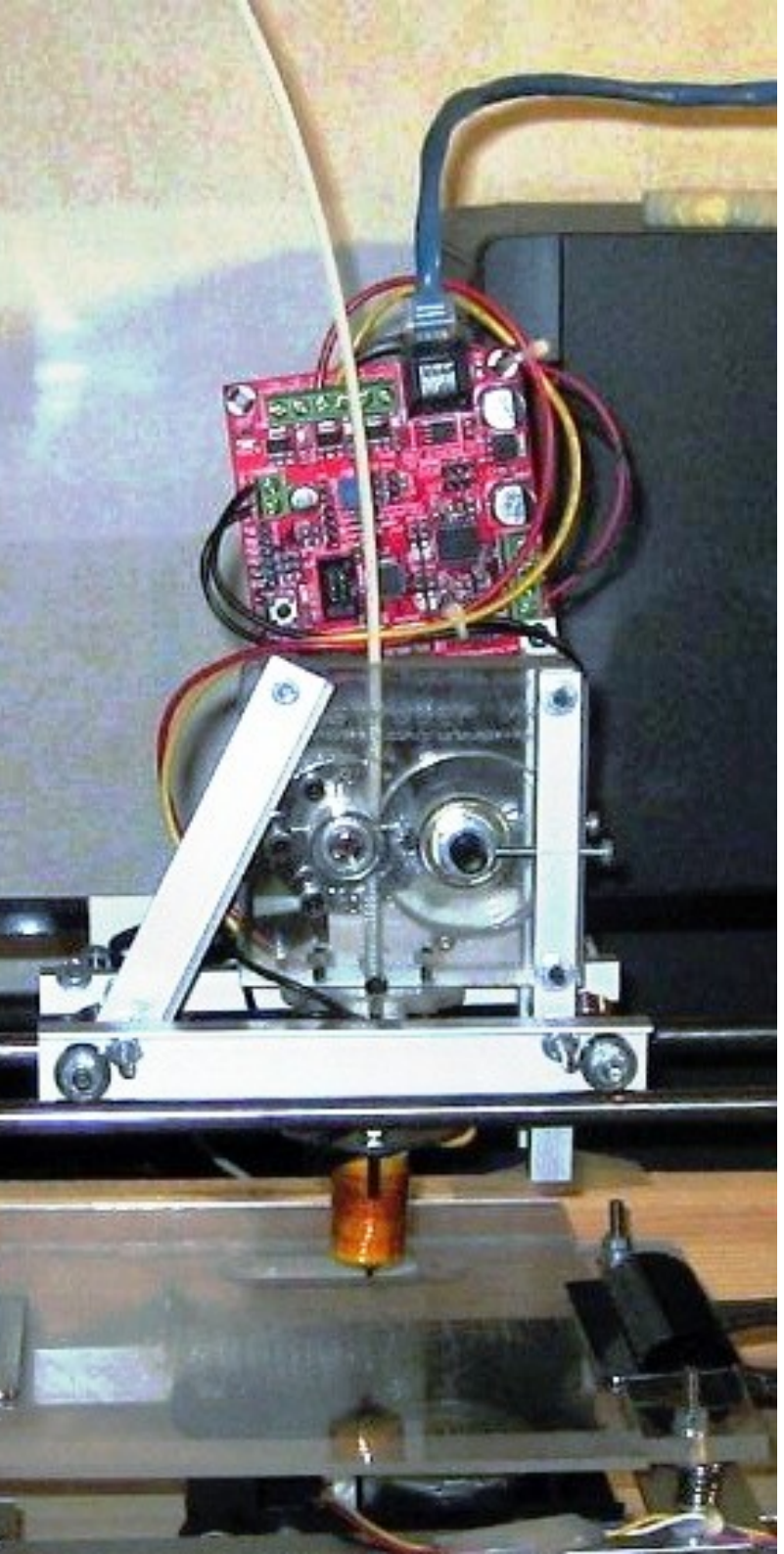
Metalab

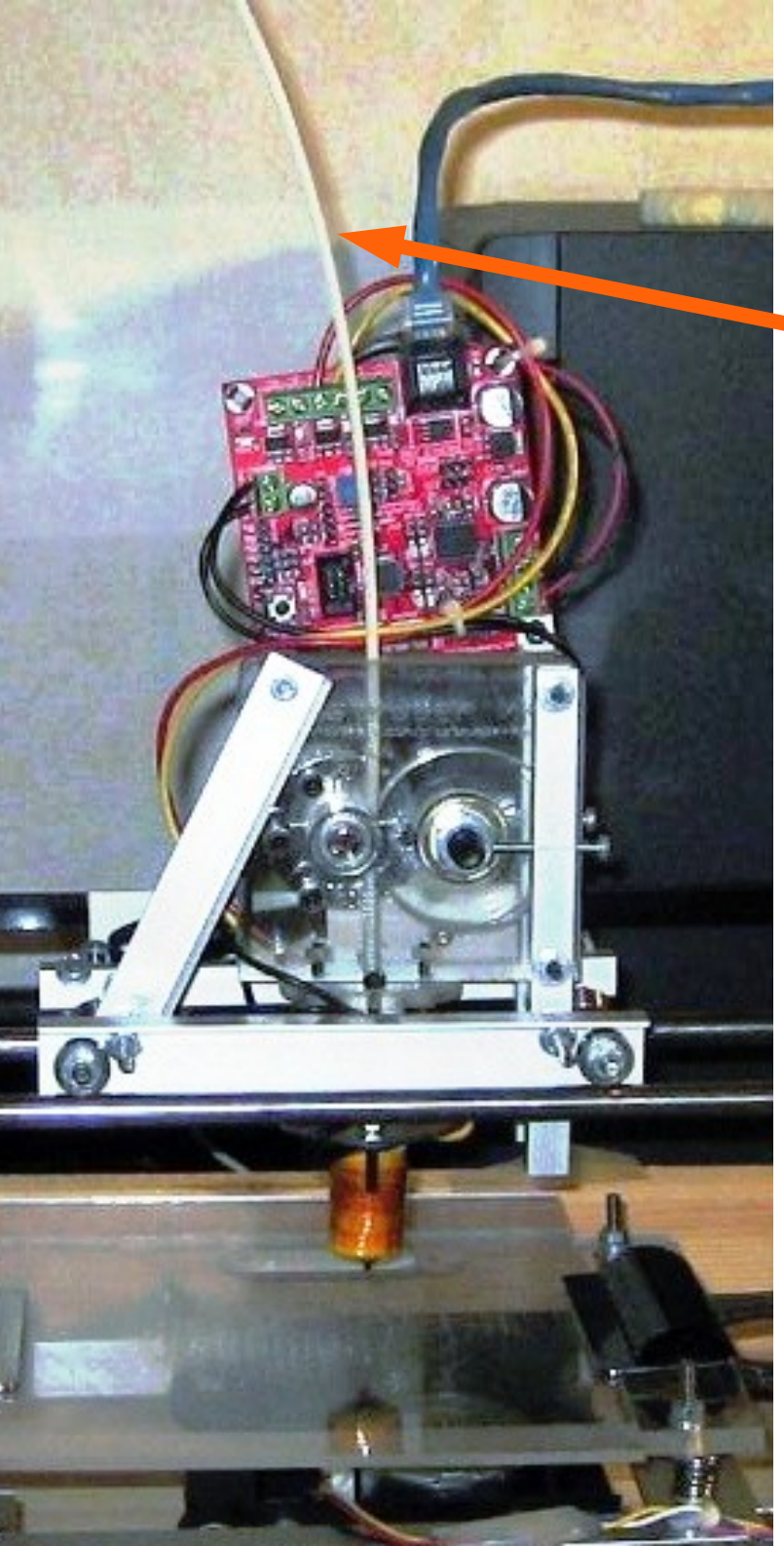
- Offener Raum
- Treffpunkt
- Werkstatt
- Workshops
- Vorträge
- http://metalab.at

METALAB
6
Rathausstraße

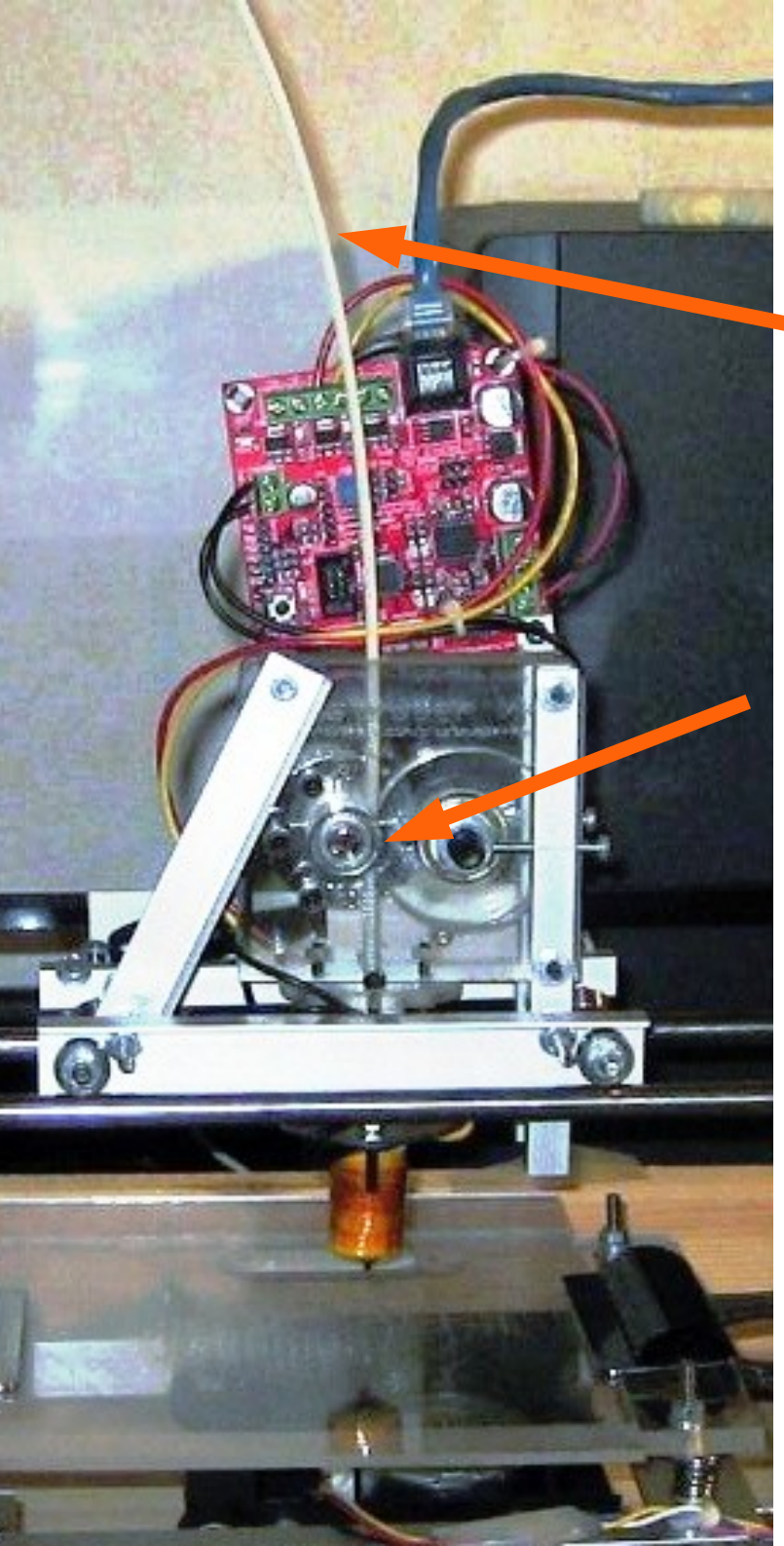
MACHINERY
ARCADE
WHATEVERLAB
CHEM
WC
BAR+KÜCHE
MEDIEN
LOUNGE
HAUPTRAUM
BIBLIOTHEK

Wie funktioniert 3D Druck?



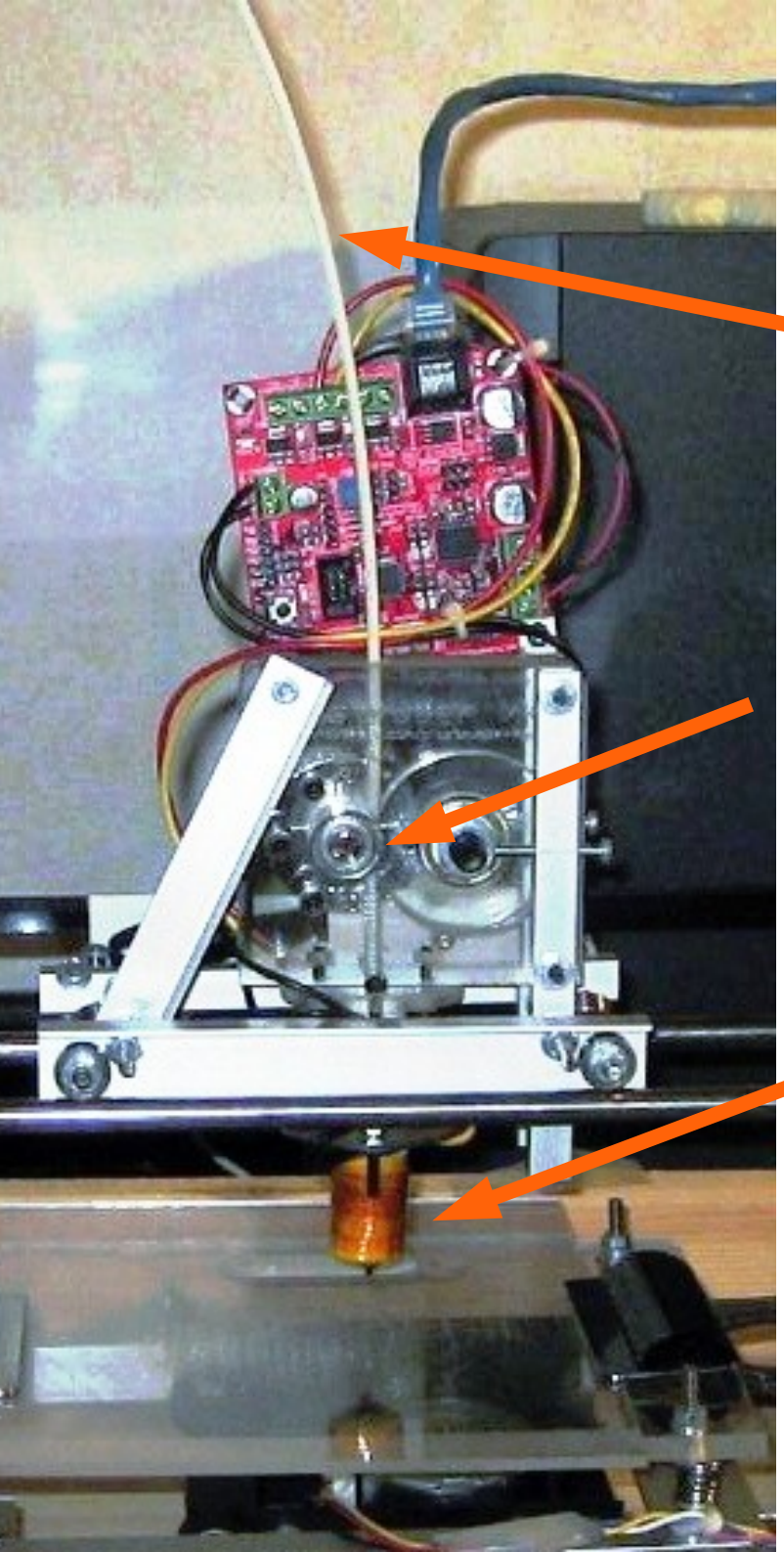


Rohmaterial: Thermoplastik
ABS, PLA, …
3mm Ø



Rohmaterial: Thermoplastik
ABS, PLA, …
3mm Ø

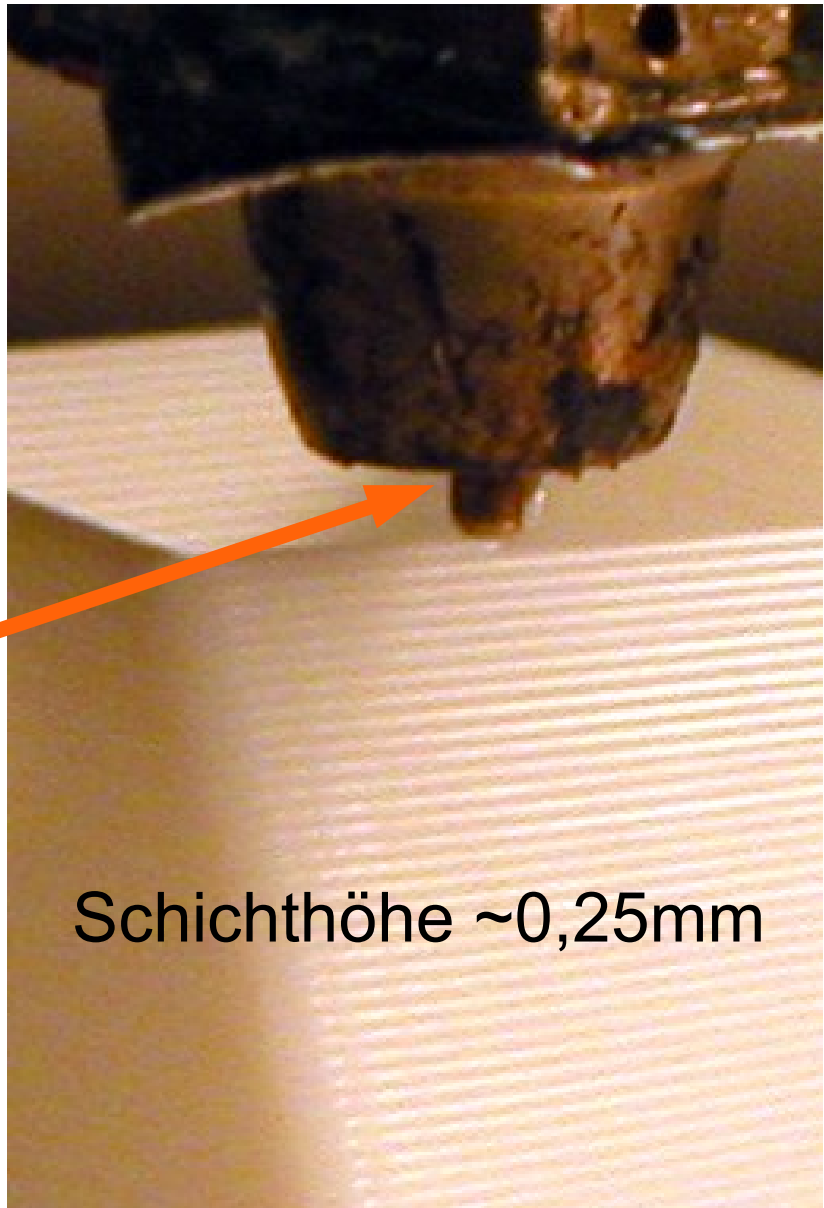
Materialtransport
über Zahnräder



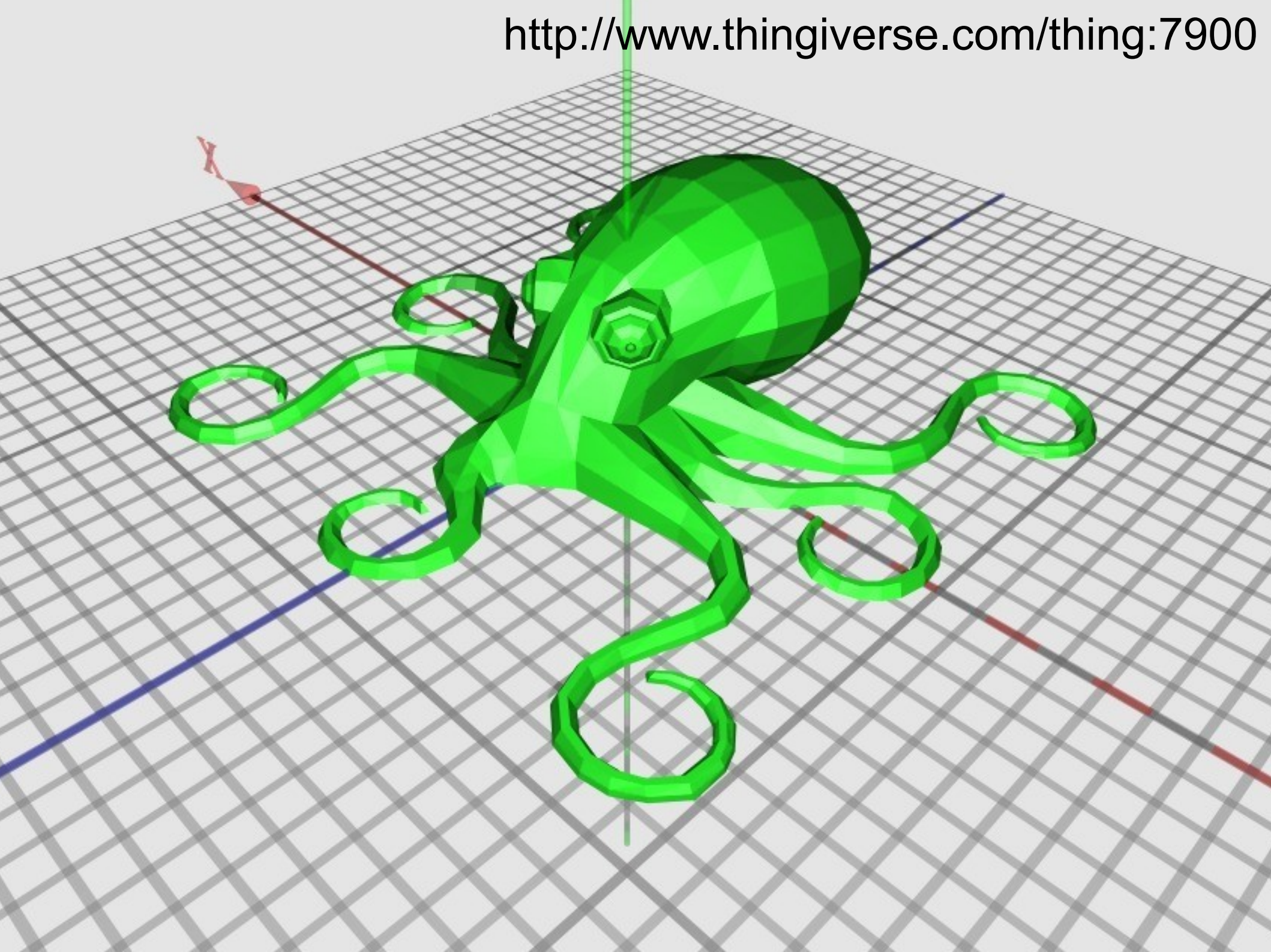
Rohmaterial: Thermoplastik
ABS, PLA, …
3mm Ø

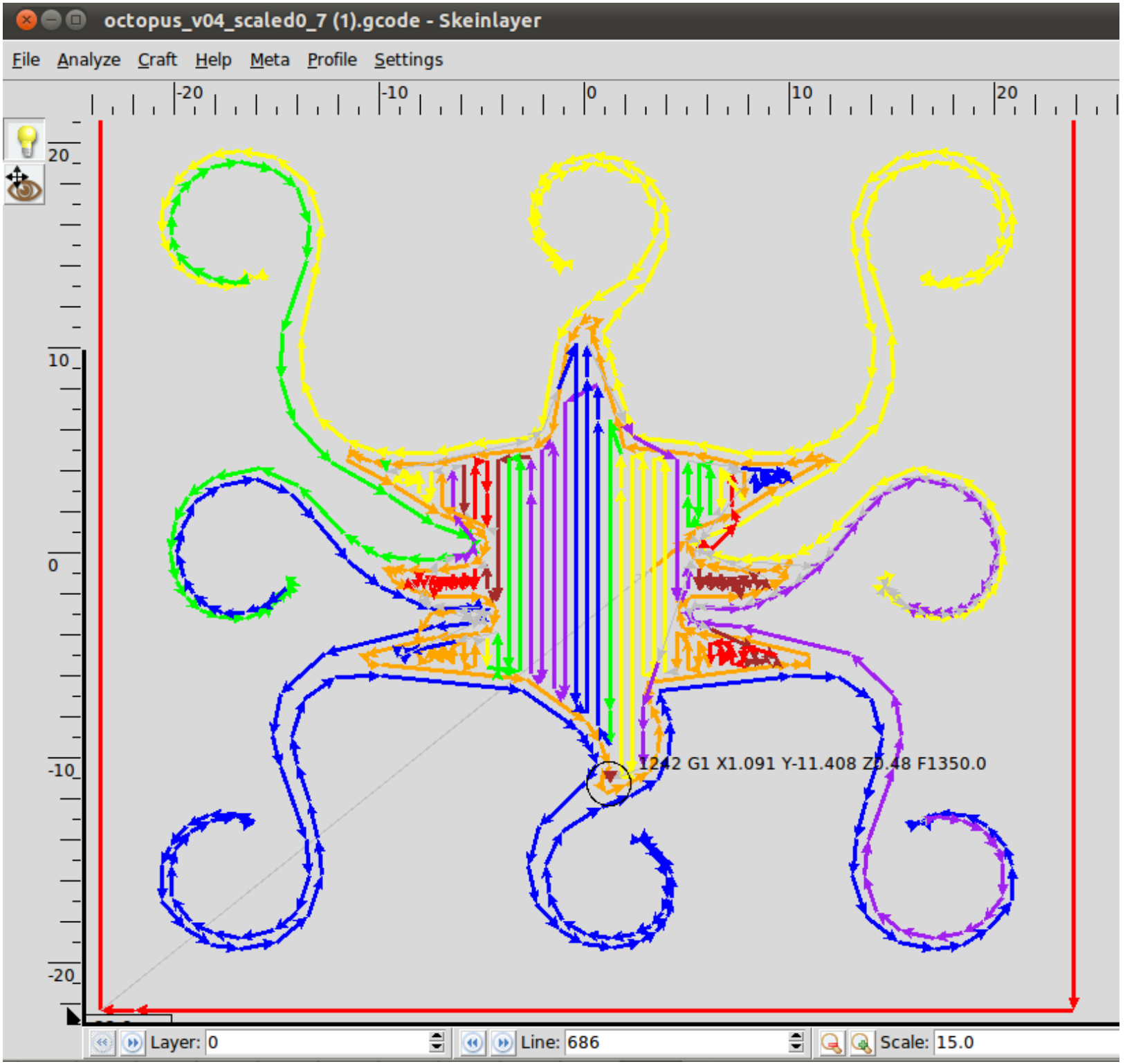
Materialtransport
über Zahnräder

“Hot End”
230°C
0.4mm Düse



Schichthöhe ~0,25mm


http://www.thingiverse.com/thing:7900


octopus_v04_scaled0_7 (1).gcode - Skeinlayer
File Analyze Craft Help Meta Profile Settings
-20 -10 0 10 20
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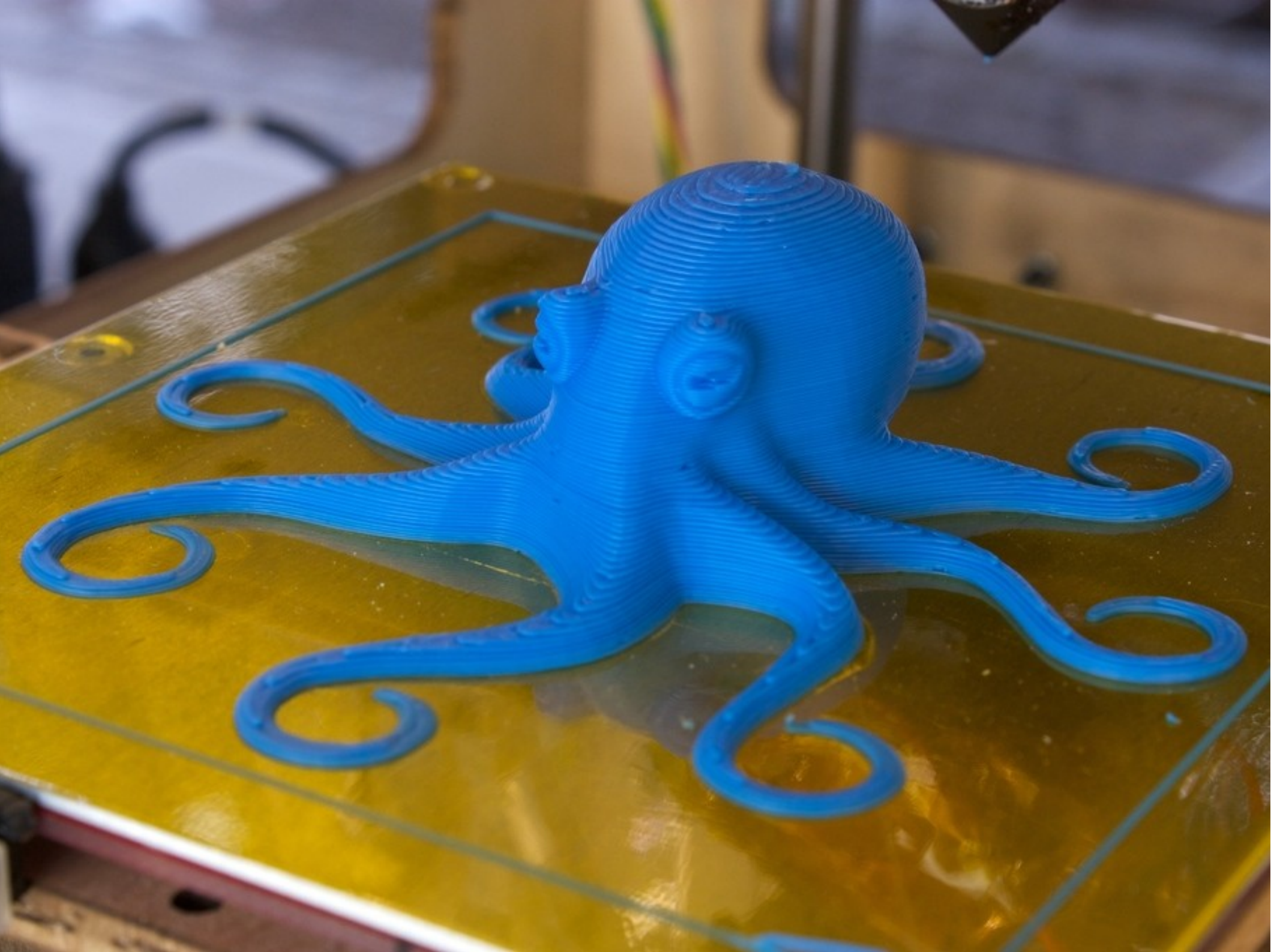
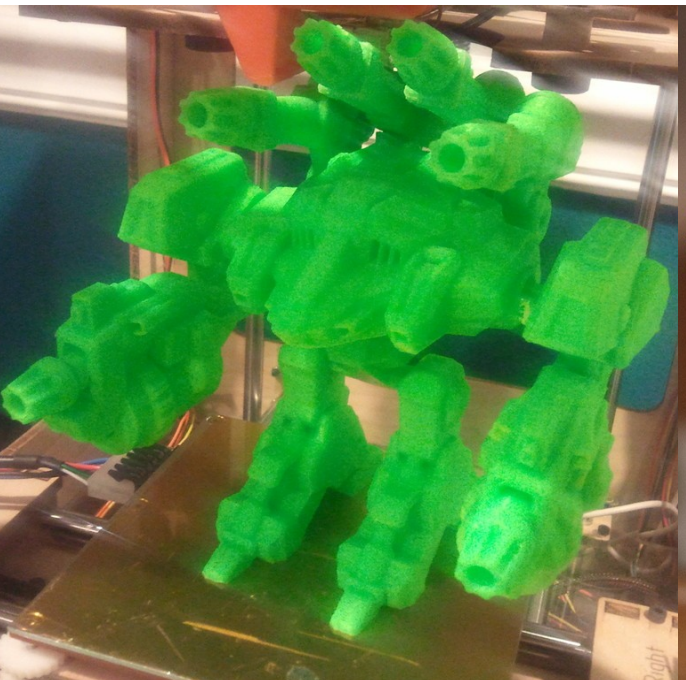
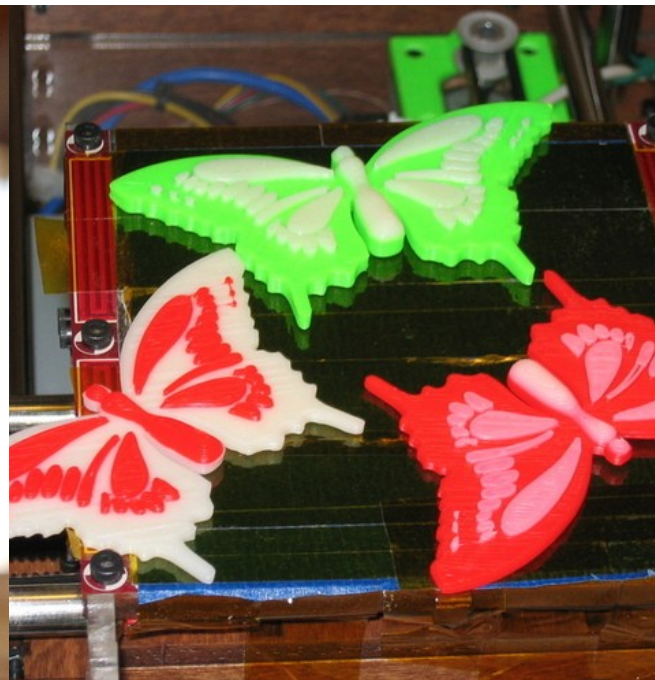
Line: 686
Scale: 15.0



Wozu 3D Druck?

- Digitalisierung für physische Objekte
  - Austausch im Internet
  - Open Source 3D Designs
  - Individualisiert statt massenproduziert





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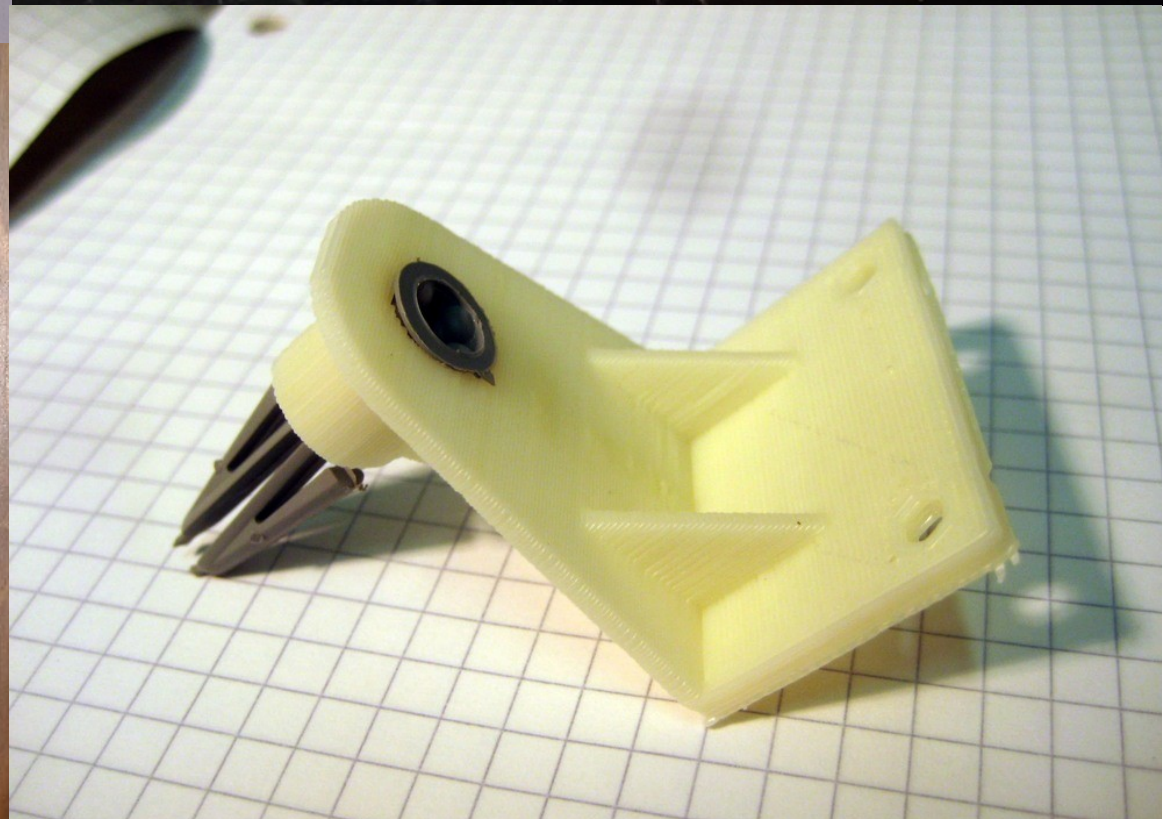
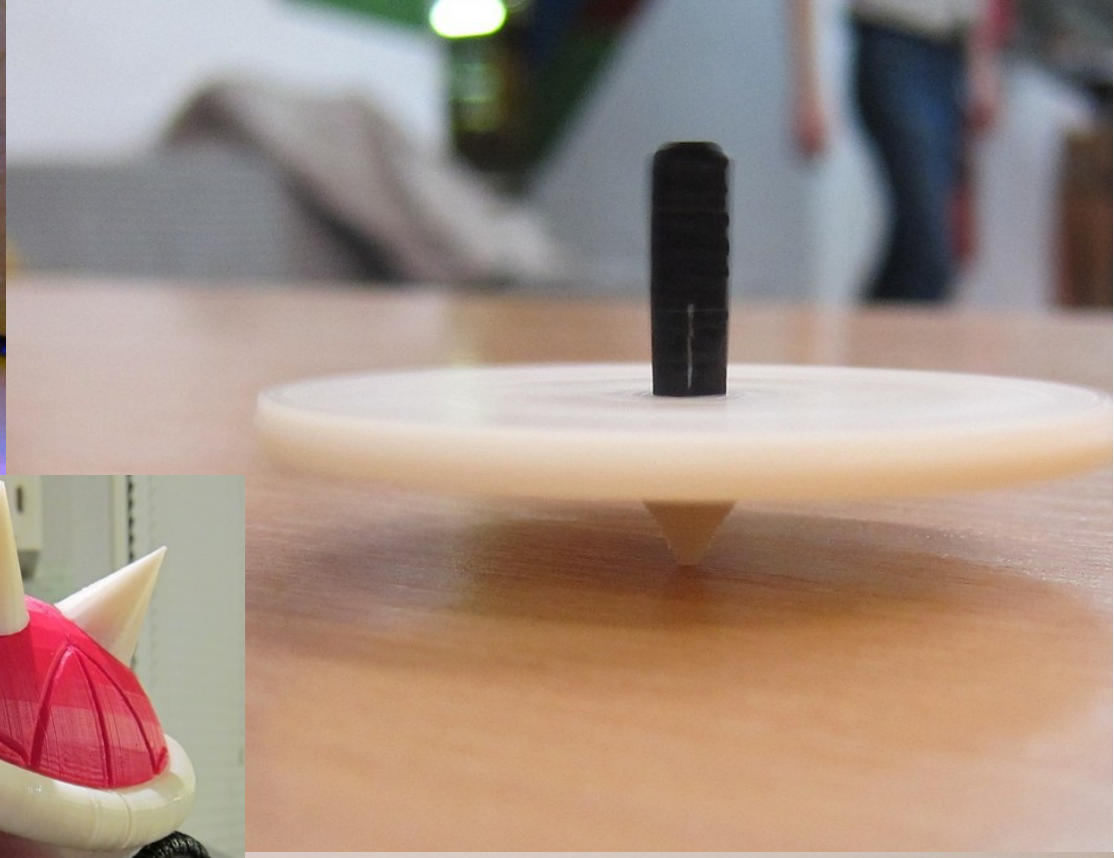
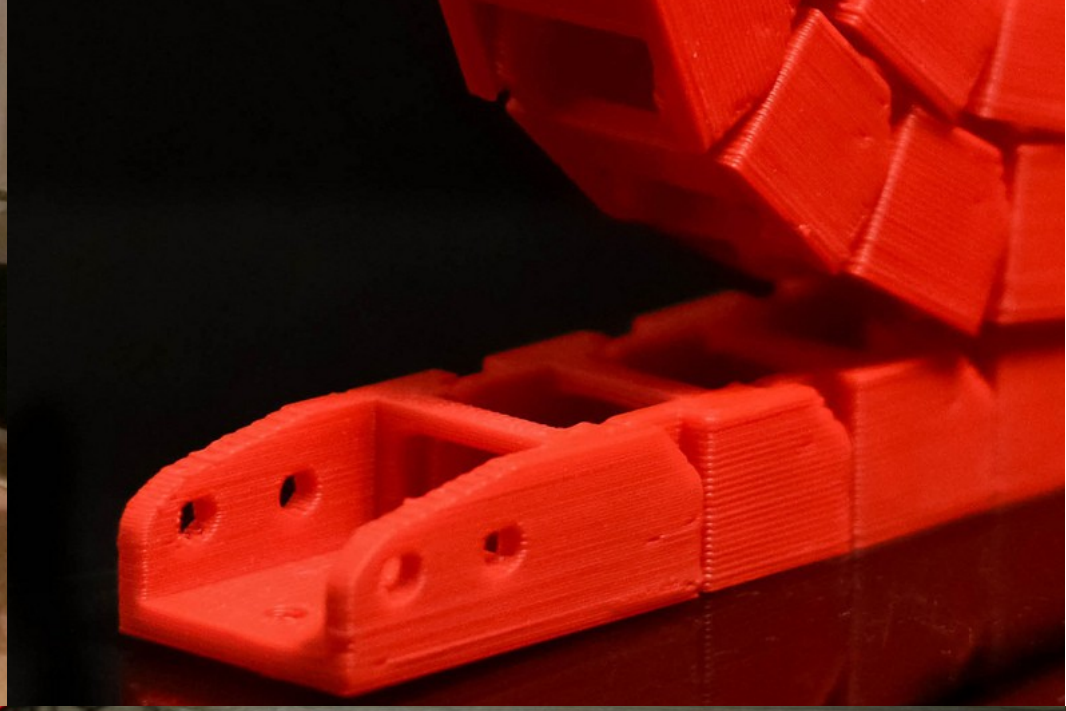
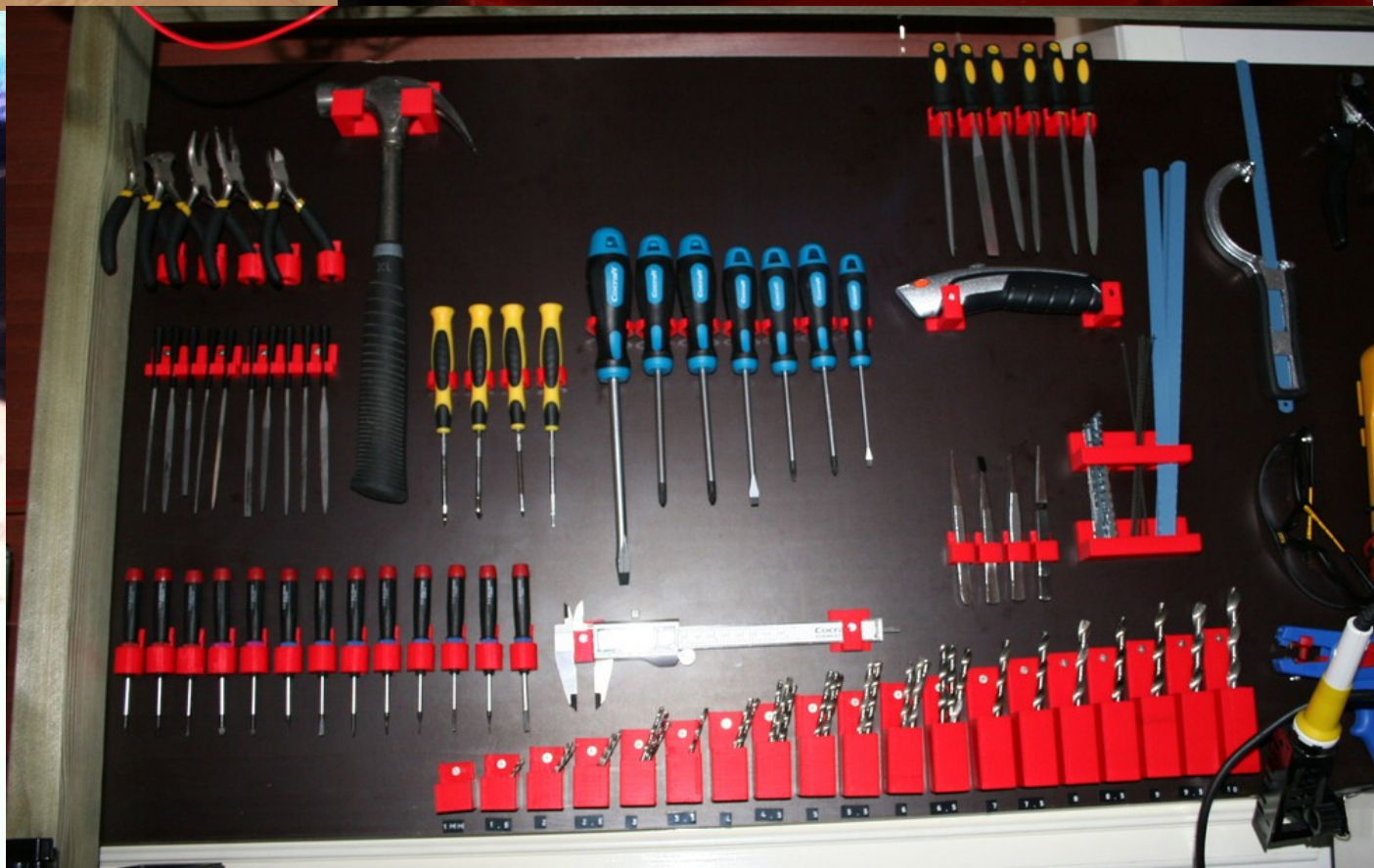
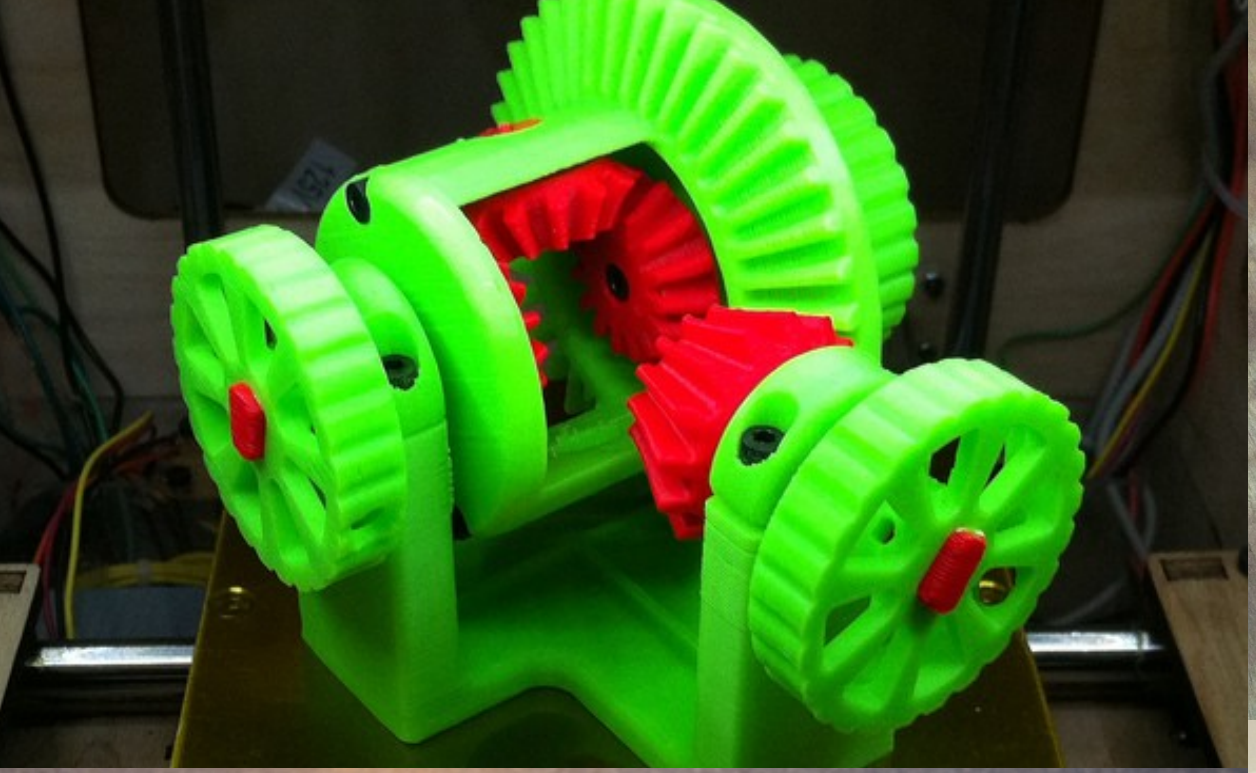
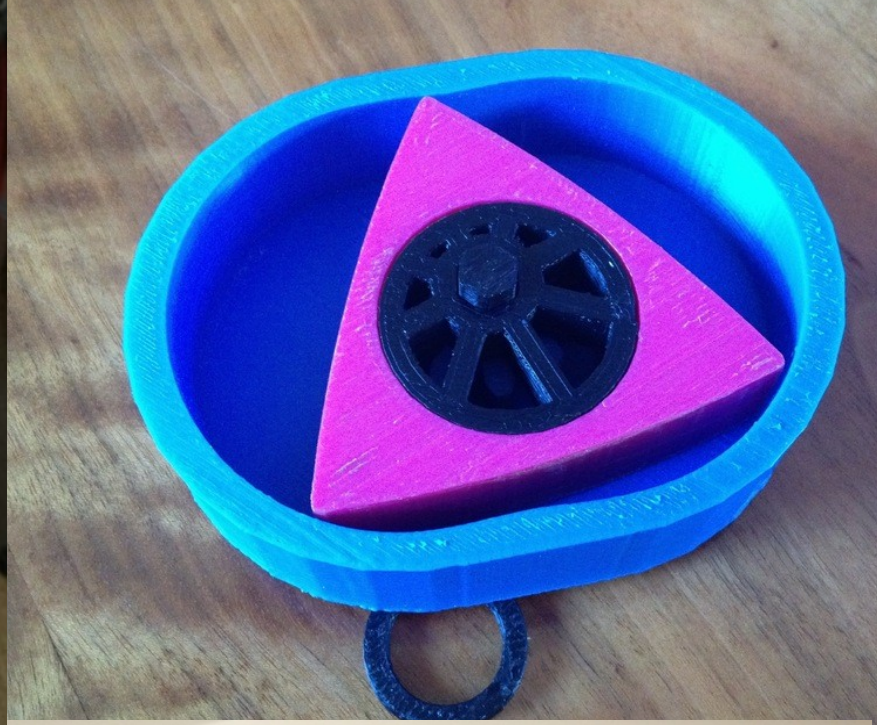


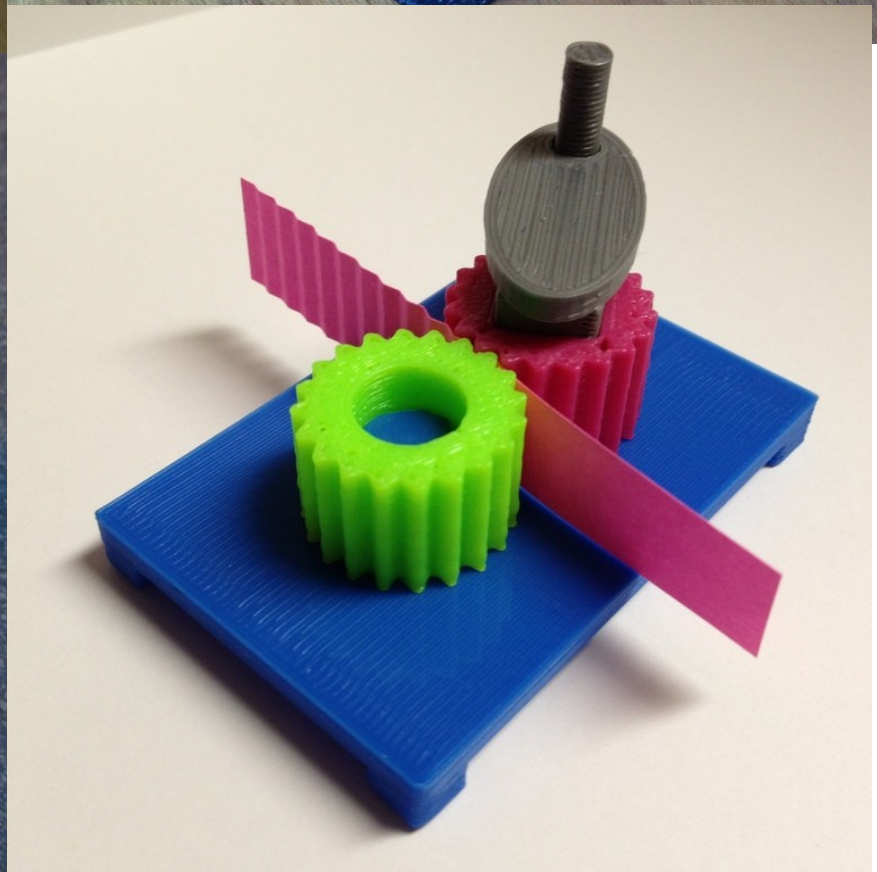


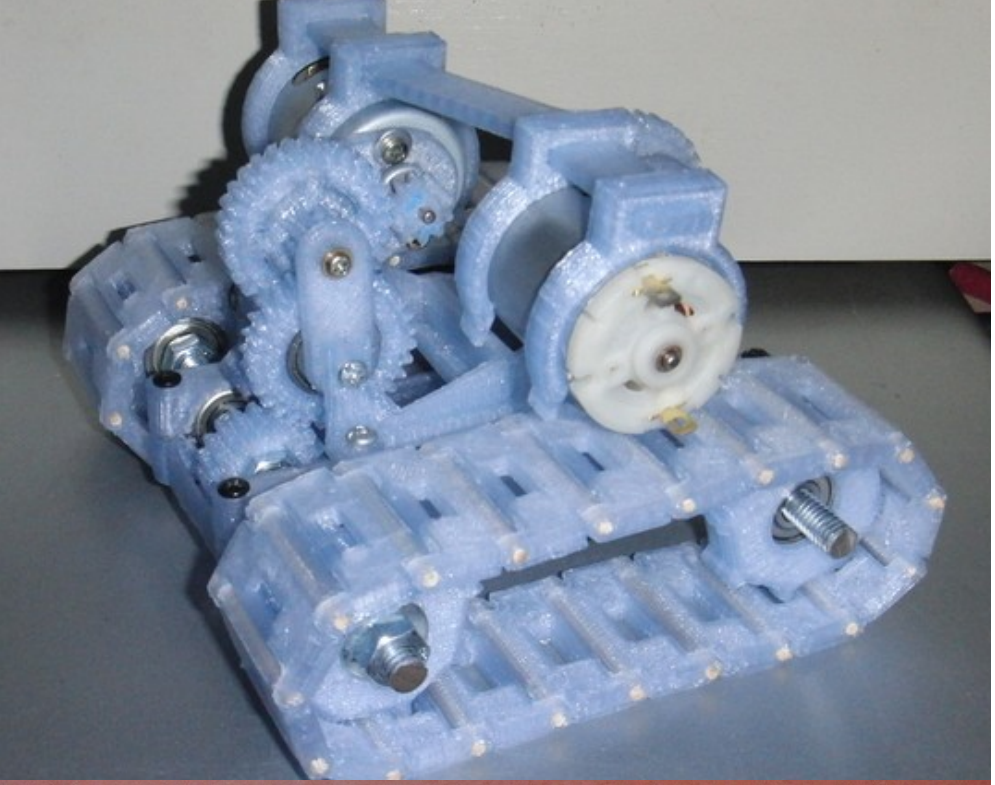


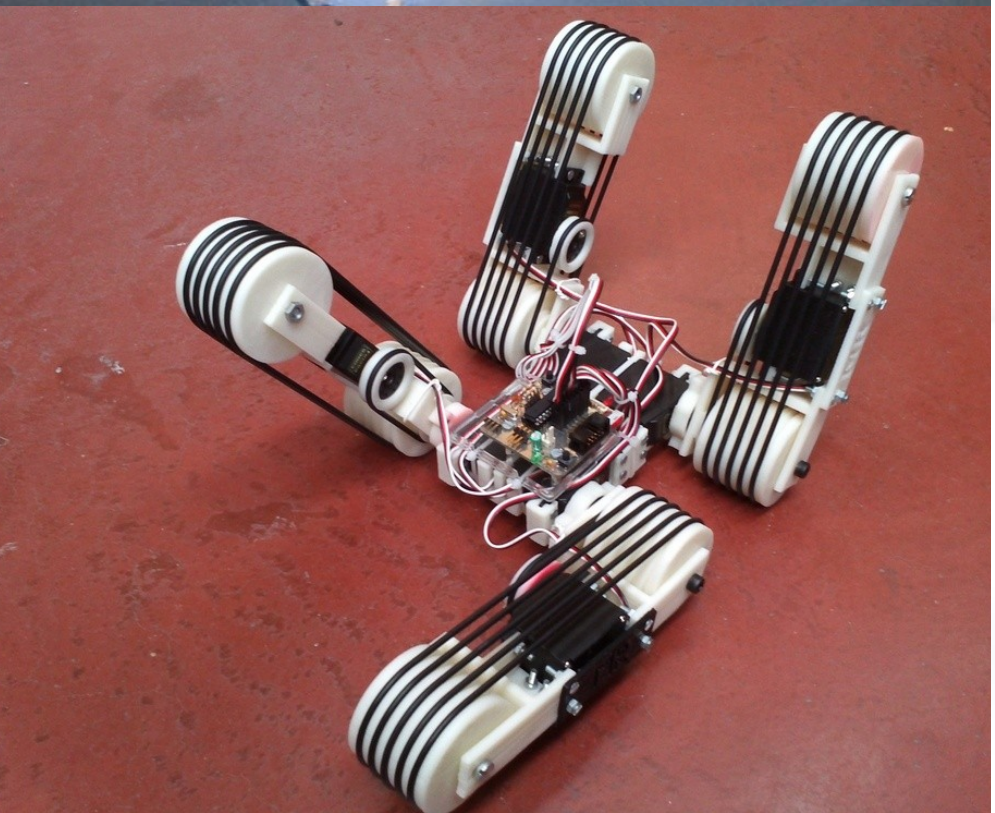


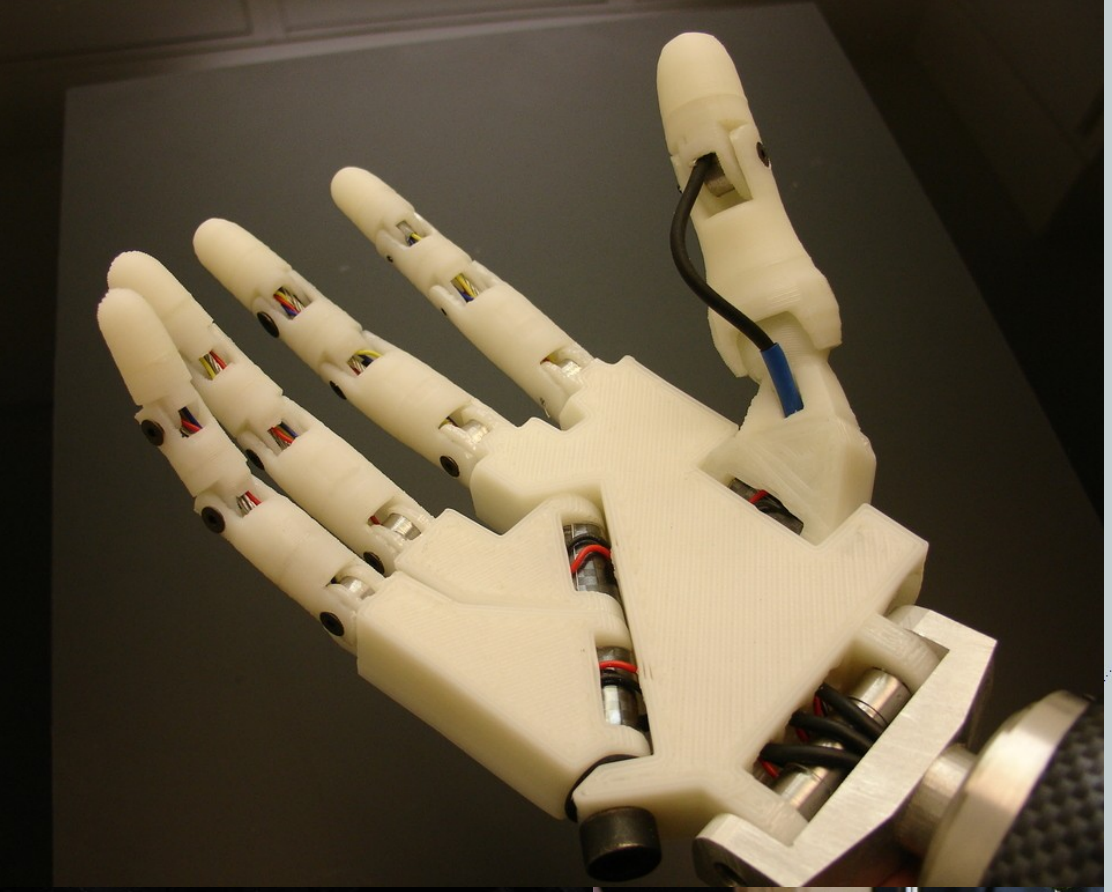


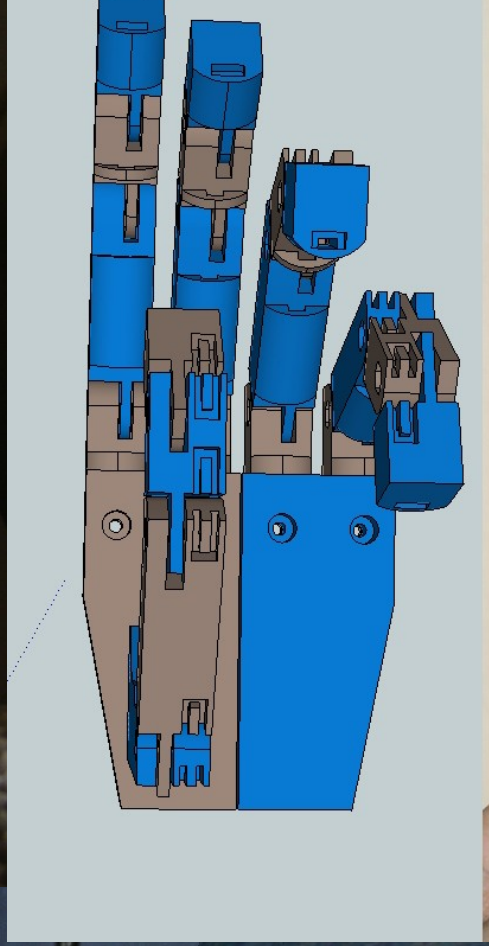


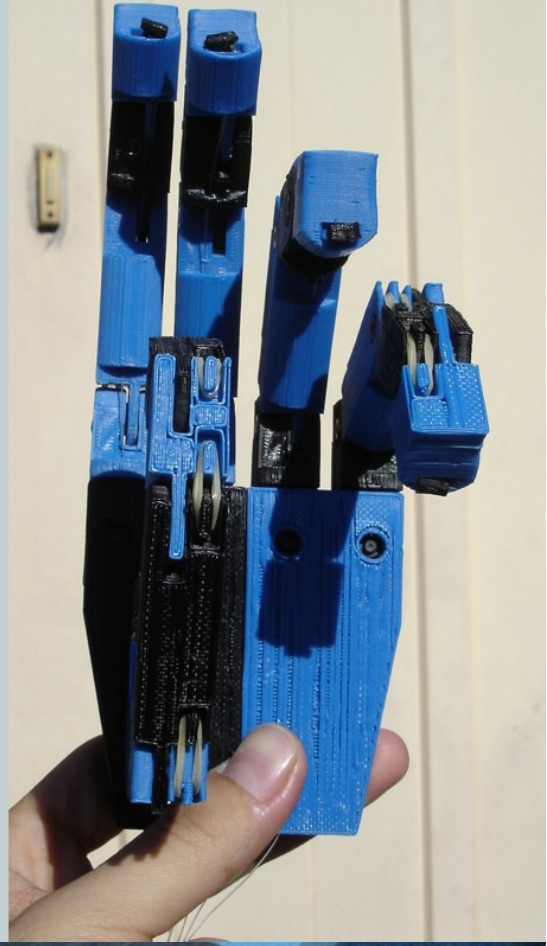


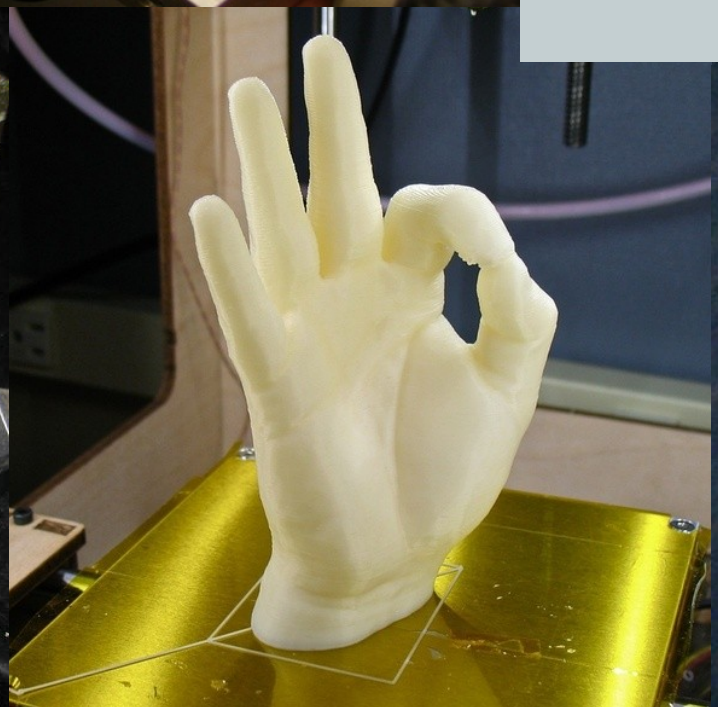




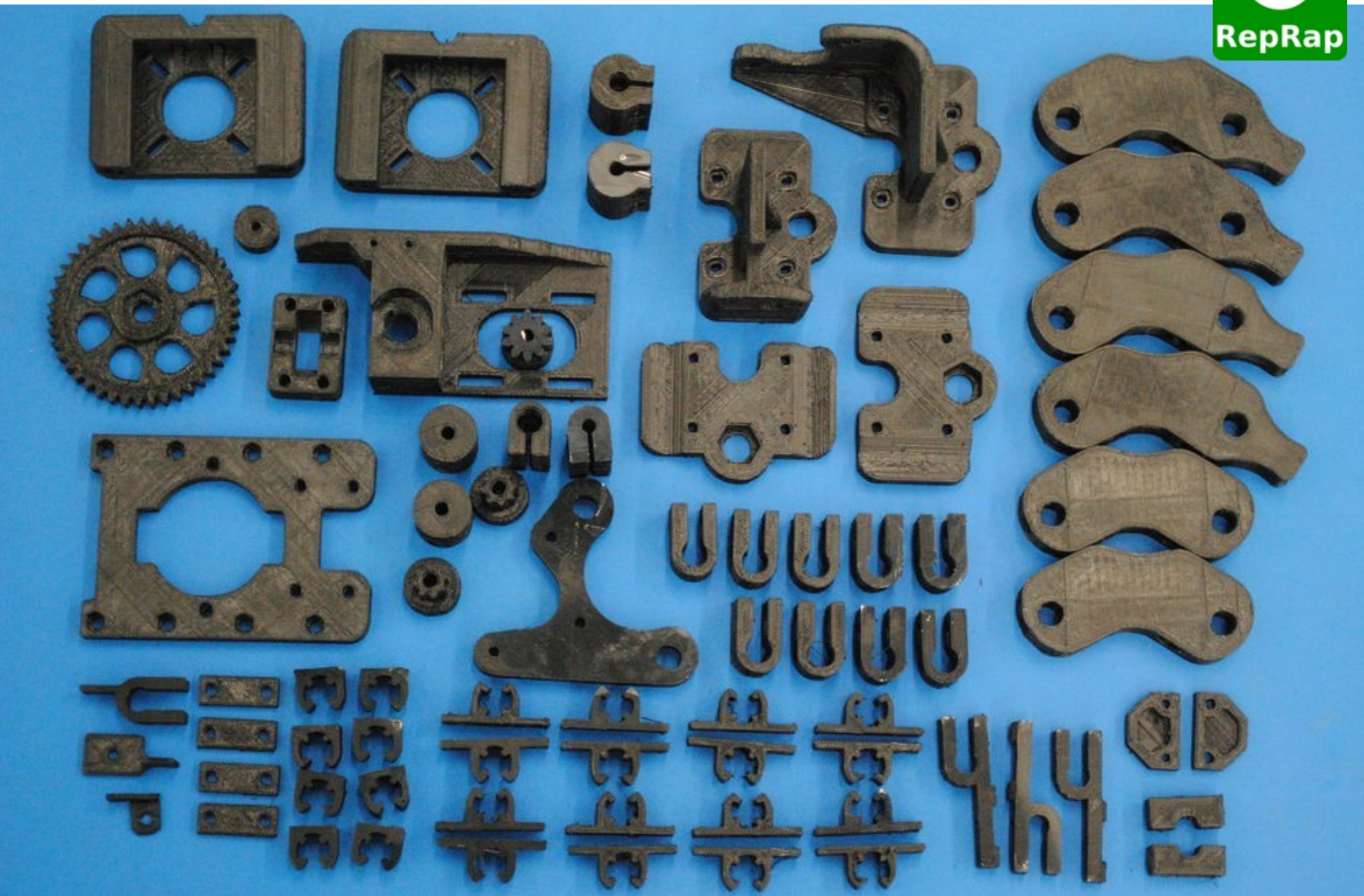


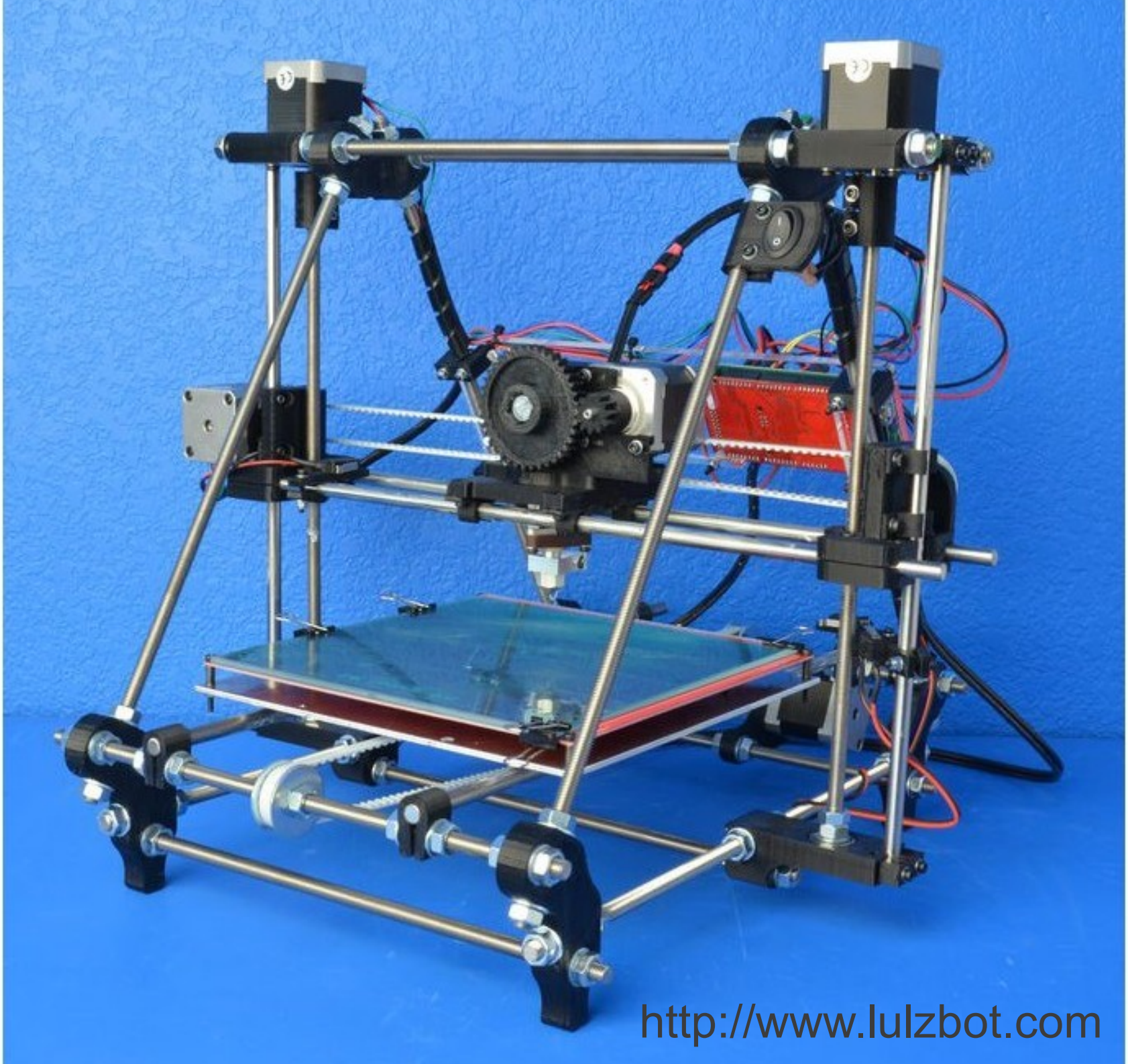






RepRap – Open Source 3D Printer




http://www.lulzbot.com

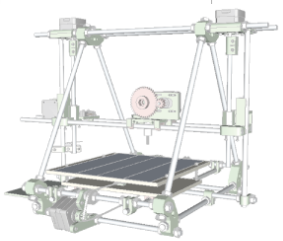
RepRap – Open Source 3D Printing

- **Rep**licating **Rap**id Prototyper (http://reprap.org)
- Ziel: Entwicklung der Hardware und Software die für 3D Druck benötigt werden
- Software und Baupläne frei verfügbar (GNU)
  - Viele Verbesserungen durch die Community
  - Kostengünstige, kommerzielle 3D Drucker

RepRap Family Tree

v3.3 (07-01-2012)

Emmanuel Gilloz



- Working
- Experimental
- Concept
- Other oshw project
- Commercial

- Common
- Less common
- Work in progress

RepRap Stammbaum

A.R.N.I.E
Tommelise
RepStrap
Zaphod

Darwin
- lasercut /wooden Darwin
- casted Darwin
- Ponoko lasercut Darwin
- McWire
- Lego RepStrap
- FTIStrap
- JunkStrap
- Eiffel
- T-Rep
- Darwin Sampo
- LeBigRep
- Kludgebot
- Contraptor
- Doboz
- Cartesio
- Cartesio v04
- Doombot
- Betzbot
- Gunstrap
- Mantis 9.1

Megamendel
- Apollo
- Metal Mendel
- Catalyst
- Foton
- Mendel v2
- Orca v0.2
- Orca v0.3
- Orca v0.4
- Bigfoot
- MendeLego
- Big Mendel
- The Future Is 3D 16x16"
- The Future Is 3D 12x12"
- Vik's mendel
- Techzone Mondo

Sells Mendel
- Wolfstrap
- Isaac Mendel
- Techzone Mendel
- Kiwi M5 Mendel Battle Tank
- VertX
- Prism

Mini-mendel
Huxley
- Huxley eg
- SeeMeCNC H-1
- Techzone Huxley
- Integrated Parametric RepRap

Huxley Seedling
- Rusty Huxley
- RepRapPro Huxley
- eMaker Huxley
- Huxley MD

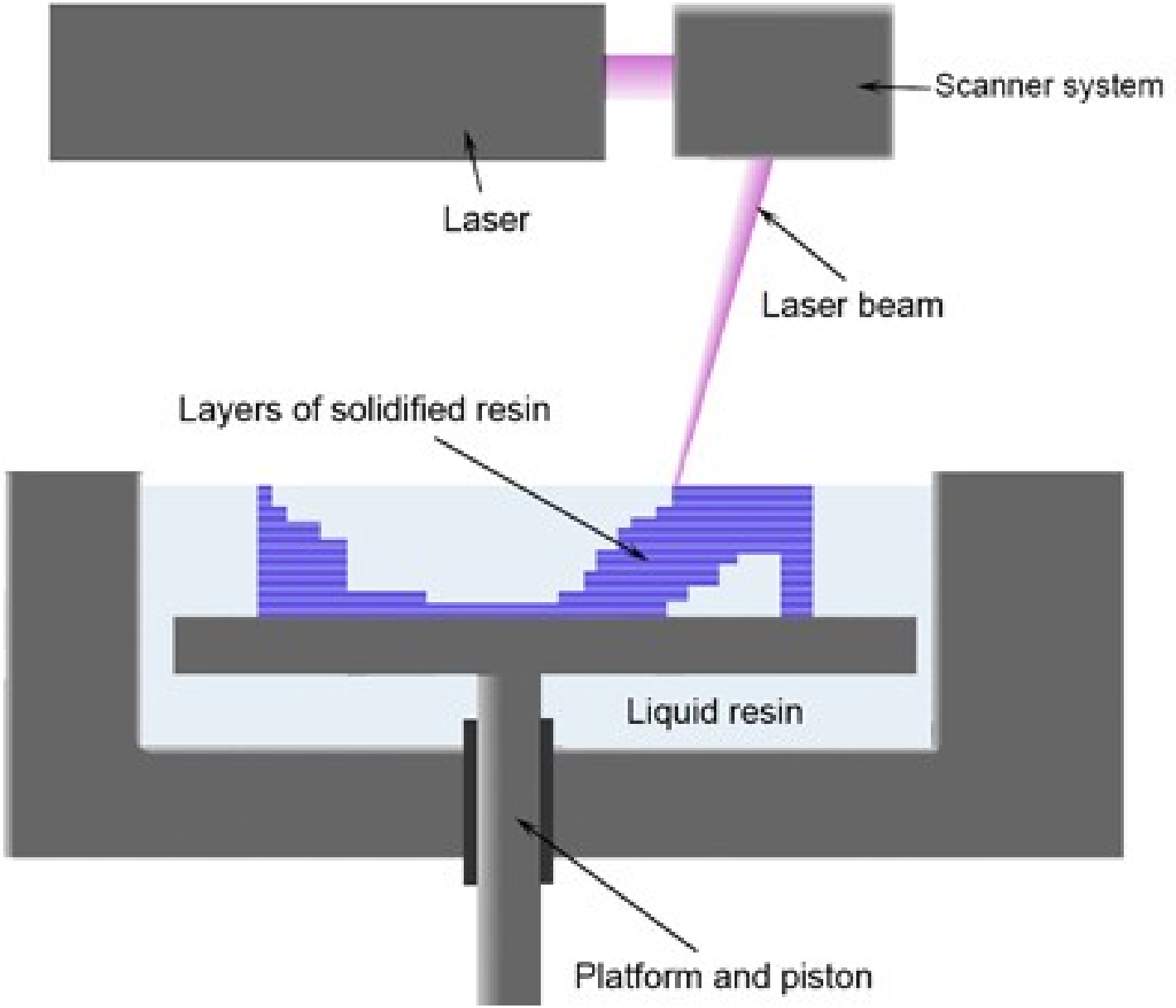
Malthus
- Mixtape mendel

Prusa Mendel
- Portable collapsible RepRap
- Printf.bot
- Printrbot+
- PrintrBot
- Makergear Prusa
- Clonedel
- RepRap 1x2 Shortcat
- RepRap 1x2 Tallcat
- RepRap 1x2
- Gen-X
- Silvercat
- Test Tube mendel
- Repstrap Jibaro
- Prusa Air 2
- Prusa Aire
- MendelMax
- Ronthomp Mendel
- Artimachine's reprap
- Helium Frog
- Prusa 2
- Sloth Mendel
- a metal Prusa
- Build-a-tron 2
- Galileo
- LongBoatPrusa
- Vlad Tepes
- GRRF Protos
- Yarr
- Prusa 12
- AdriansPrusa
- Mini Prusa
- Robundel
- OpenHybridMendel

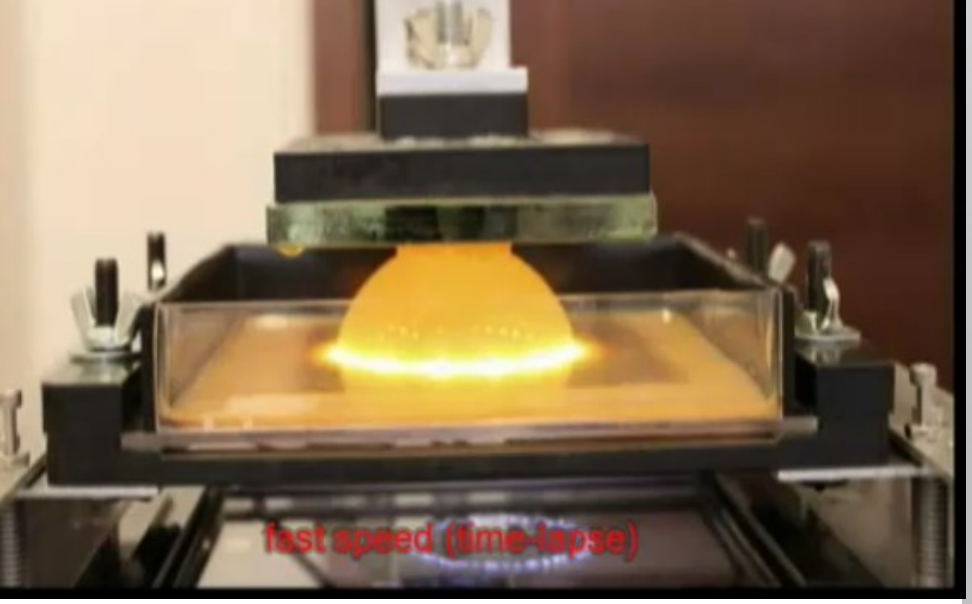
- RepOlaRap
- Fransisco
- Bonsai RepStrap
- Columbus
- MultiRep
- IKBot
- Sugarsnap
- Snapdragon
- Type A Printer MK1
- IceBot
- Action68's vertical-x-axis-reprap
- Nophead's design
- Mendel 90
- Rook
- Fabbster
- FoldaRap
- MakeNub Builder
- Tilt Printer
- Felix 1.0
- Cube (3ds)
- Up! 3d printer
- Makergear Mosaic
- Shapercube 1.0
- Shapercube 2.0
- Solidoodle
- Fablicator
- Sumpod 3d
- Daedalus 3d
- Cube Vector
- Bldldk's X2
- Ultimaker
- Large Ultimaker
- Minimaker
- Part-Y
- Kinirap
- K'nexStrap
- Sharebot
- Tom-Boy
- Cube
- Makerbot Thing-o-matic
- Makerbot Cupcake
- Cupcakestrap
- SuperCupcakeMK2
- SuperCupcakeMK3
- Rapman Pro
- Bfb 3000
- Bfb 3000 Plus
- Bfb 4000
- Rapman
- Rapman 3.2
- Adderfab
- A5 Powderbed printer
- MetalicaRap
- Rap@Home
- Fabaroni
- Fab@home Model 1
- Model 1.2
- Model 2
- CandyFab 4000
- CandyFab 5000
- CandyFab 6000
- J.Veloso's homemade uv3dprinter
- J.Veloso's uv3dprinter
- 3dlpPrint
- Lemon Curry
- Formlabs
- Yazzo Polybot Raspberry
- Yazzo Polybot Cranberry
- Yazzo Polybot Derivative

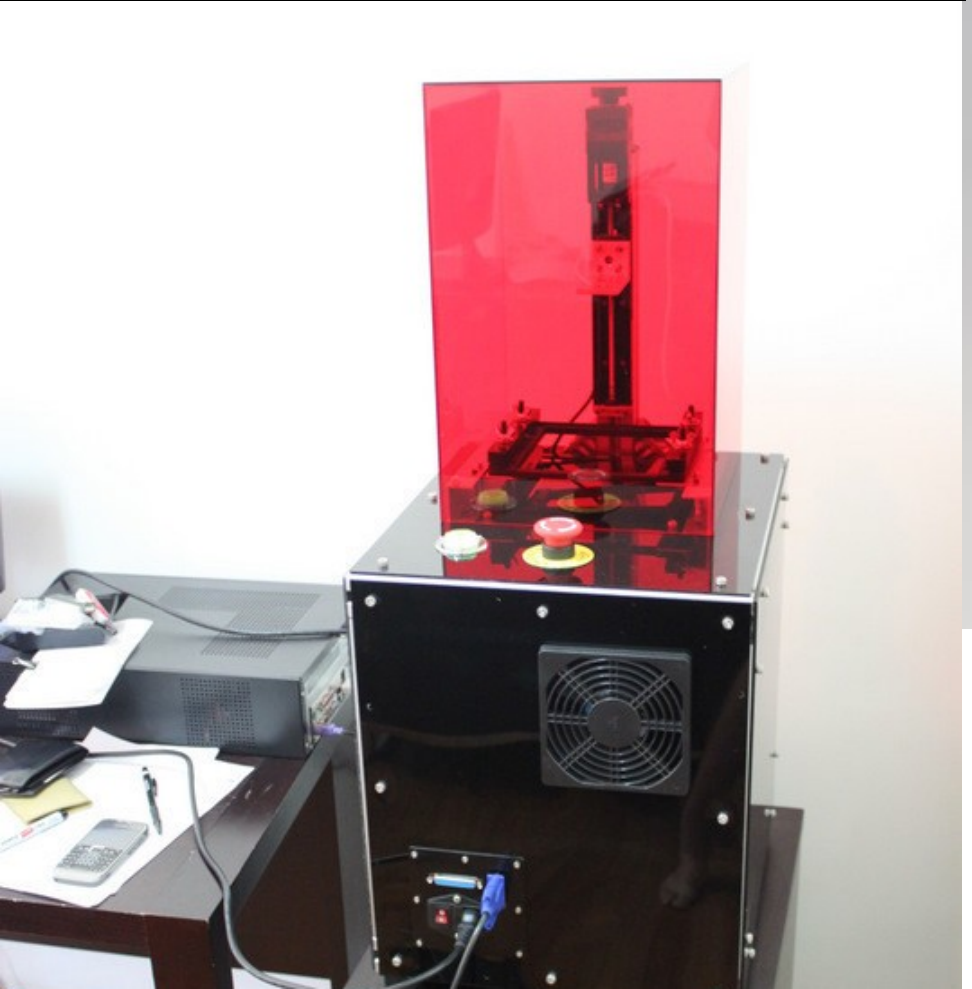
Weitere 3D Druck Technologien

Flüssigkeitsbasierte Verfahren



Quelle: http://en.wikipedia.org/wiki/File:Stereolithography_apparatus.jpg



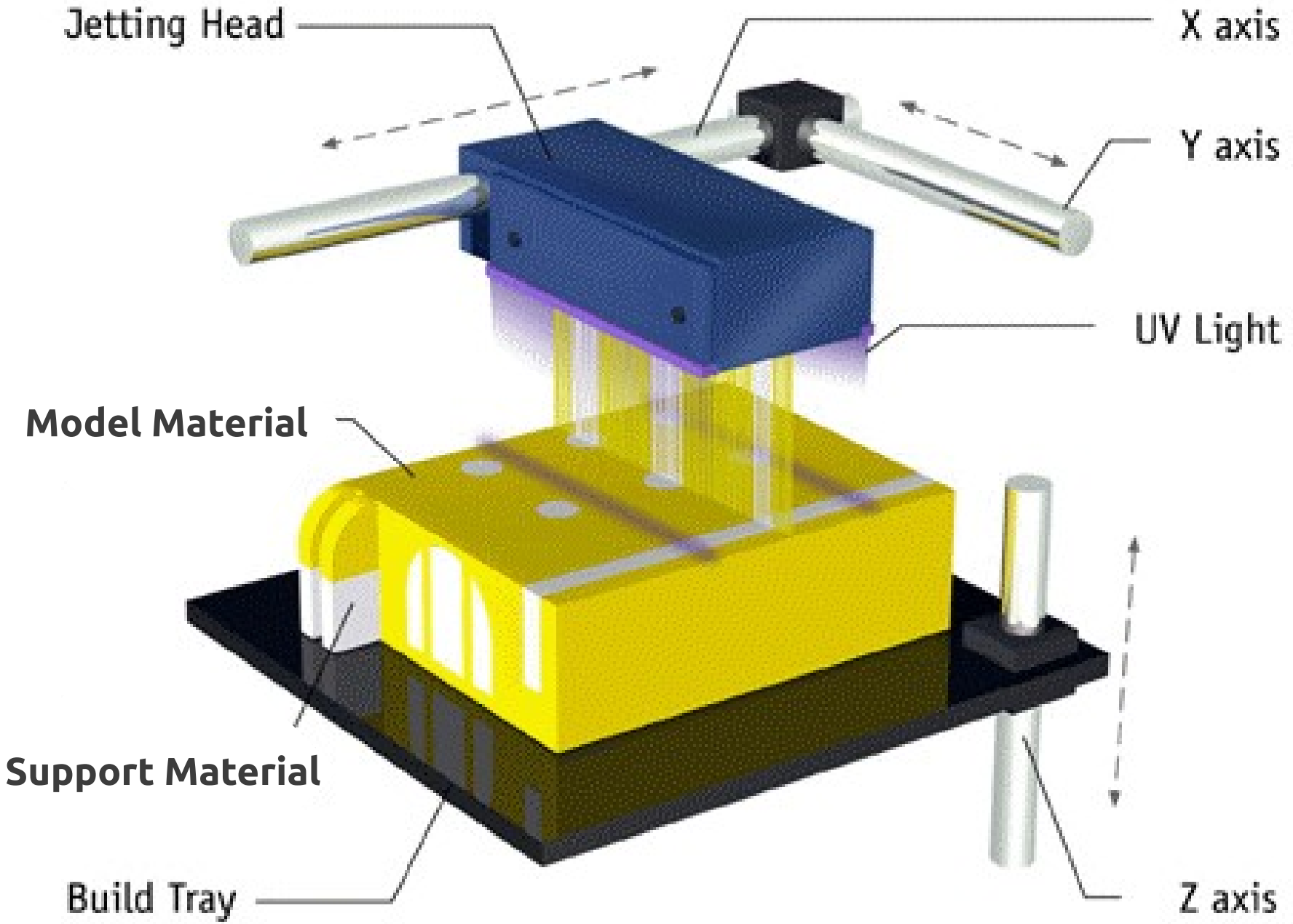


$1,999 kit (without projector)

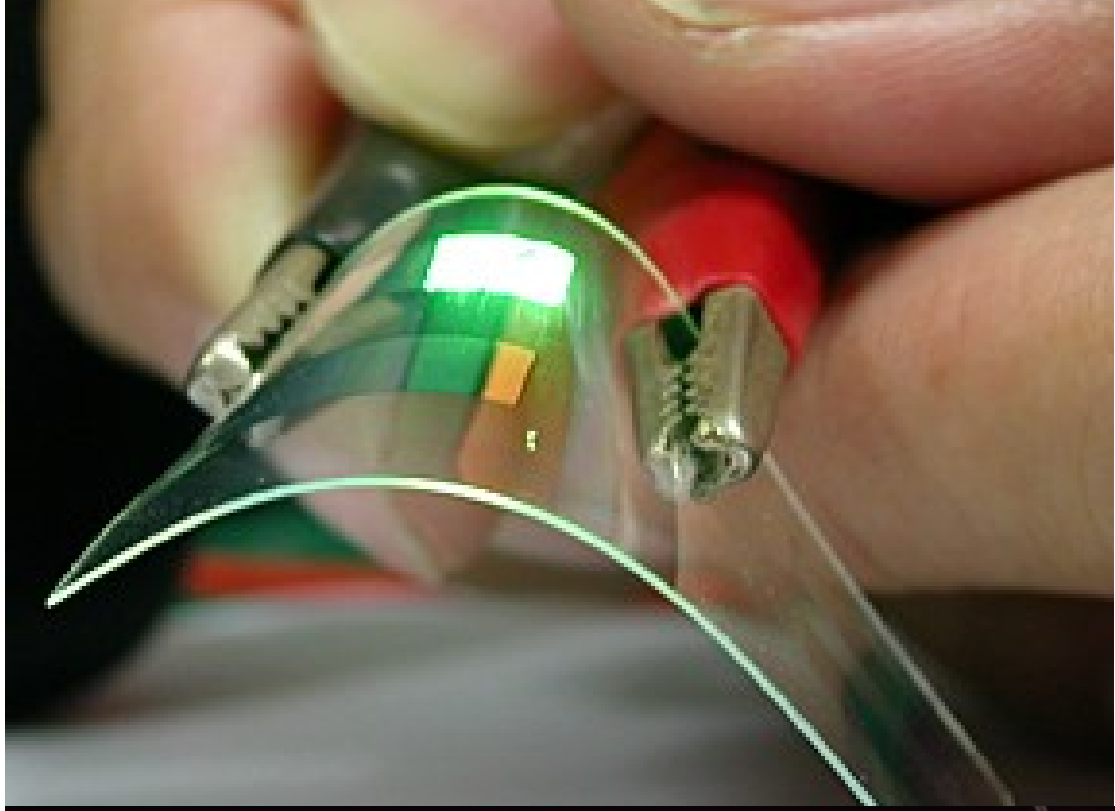
http://3dhomemade.blogspot.com
http://www.indiegogo.com/veloso3dprinter

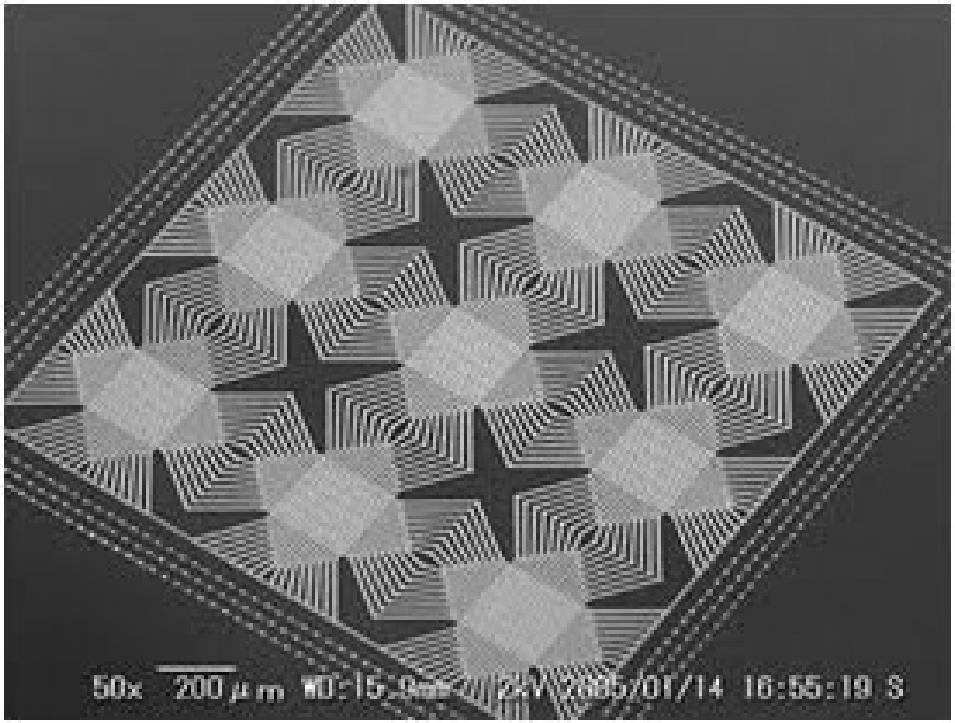
World’s Smallest 3D Printer (TU Wien)
Klaus Stadlmann and Markus Hatzenbichler
http://3dmicroprinter.com

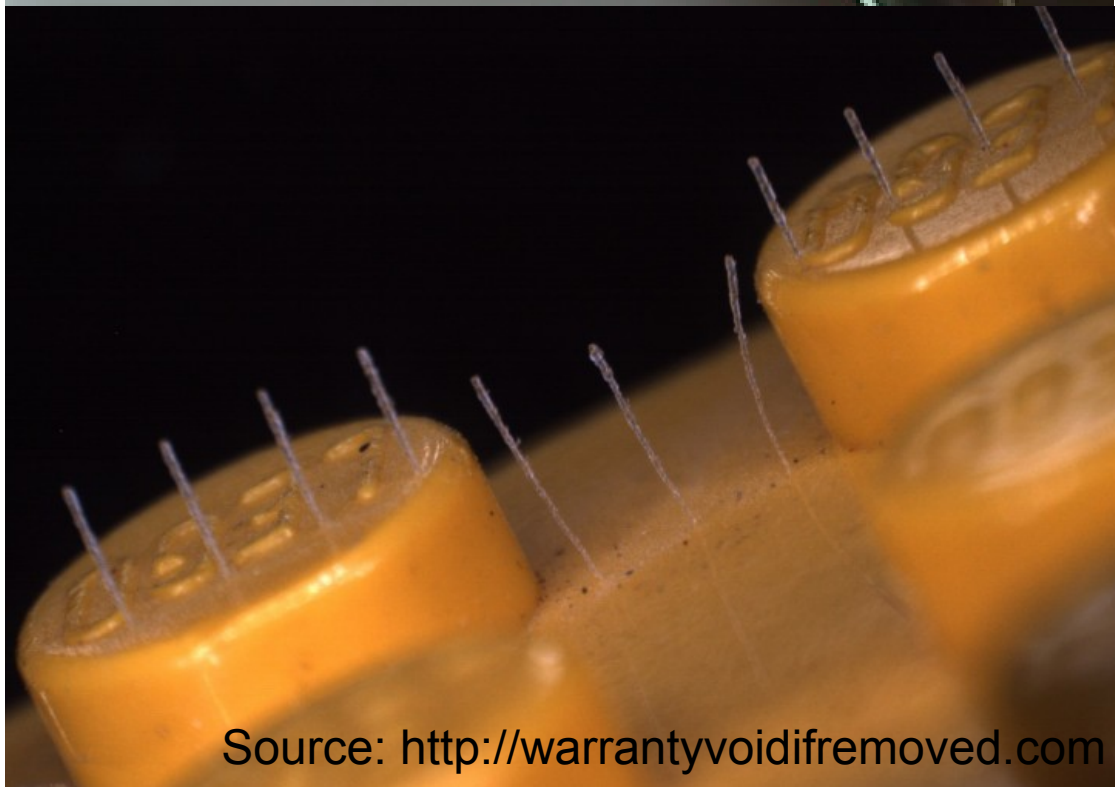
Inkjet 3D Druck



© 2007 Objet Geometries Ltd.

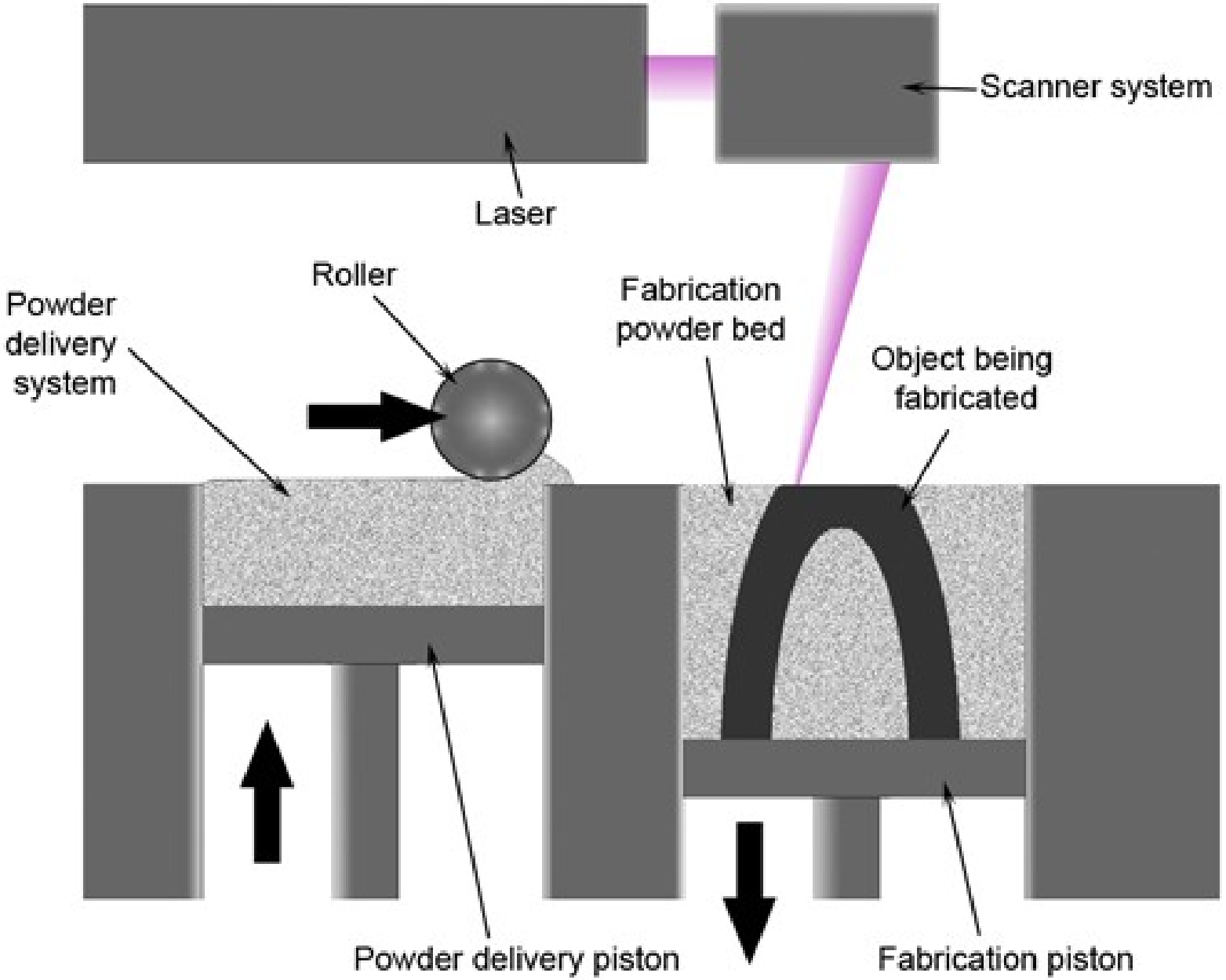




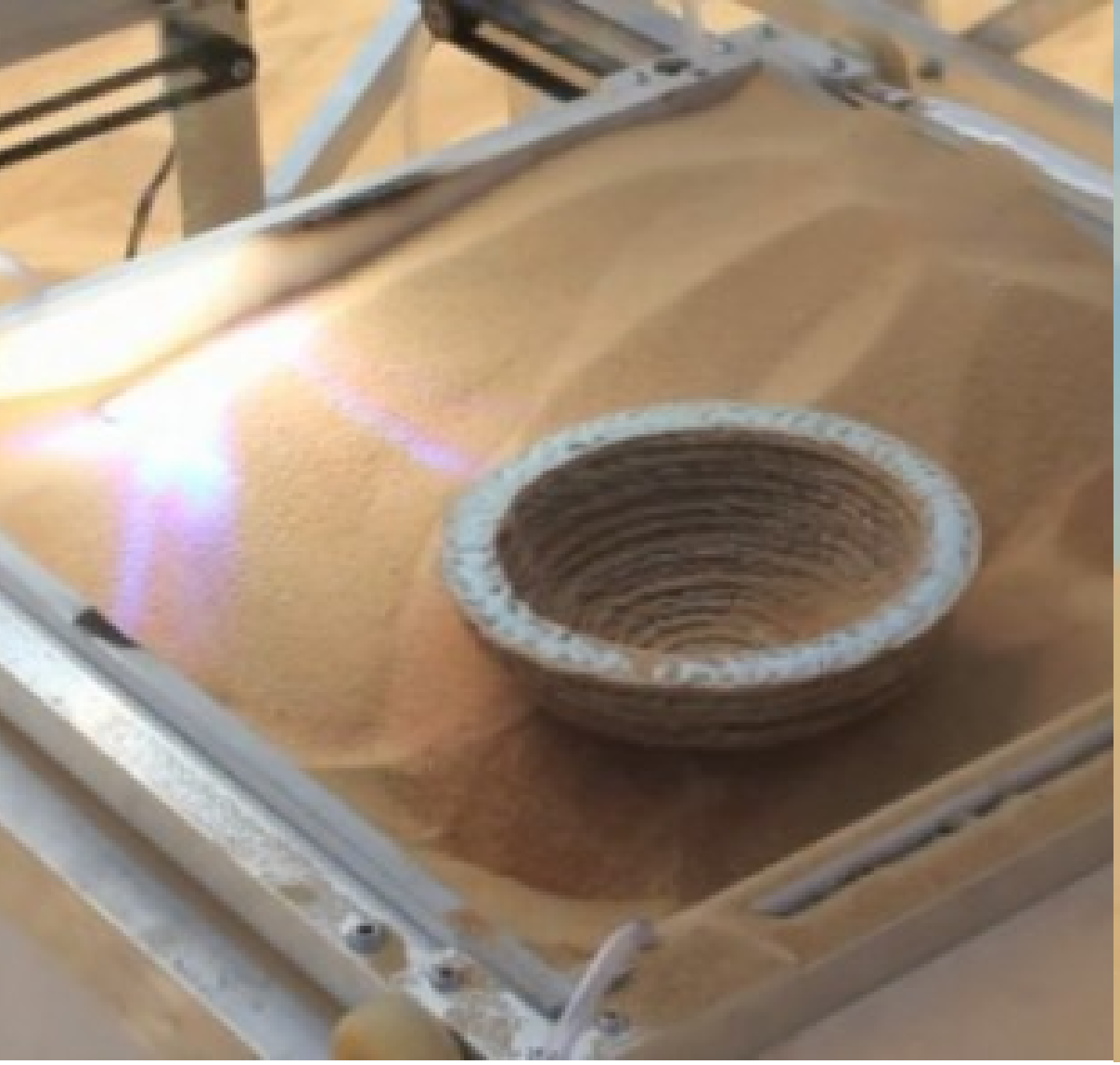


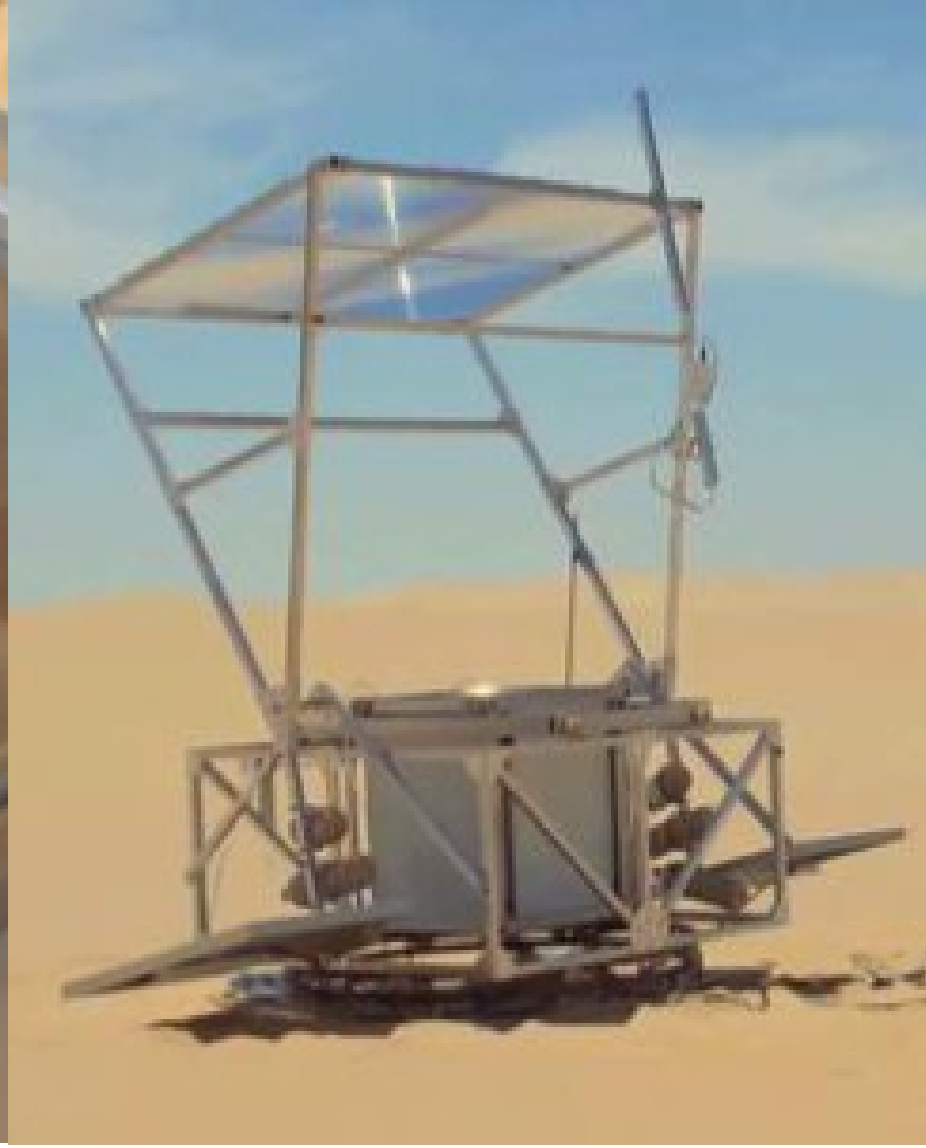
Source: http://warrantyvoidifremoved.com

Pulverbasierte Verfahren

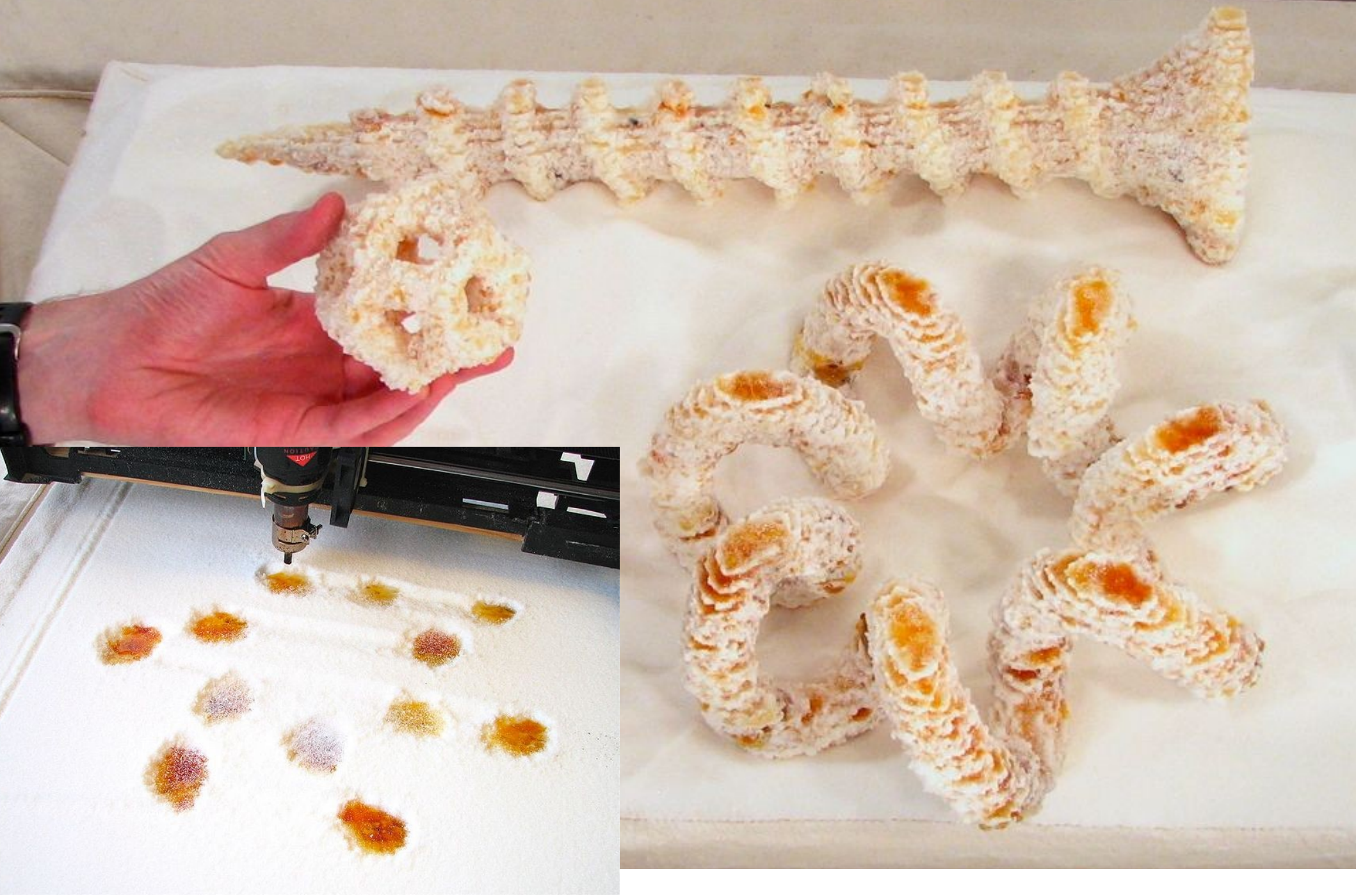


Quelle: http://en.wikipedia.org/wiki/File:Stereolithography_apparatus.jpg





Markus Kayser - SolarSinter Project
http://www.markuskayser.com/work/solar-sinter



http://www.evilmadscientist.com/article.php/candyfab

Auswirkungen

thingiverse.com

Who's Making What?

View More Made Things

Yoda - Lite
Made by Wulfnor
1 hour ago

Pawns - Lovecraft Collection
Made by twotimes
3 hours ago

Fruit Fly Trap Jar Lid
Made by leadingzer0
4 hours ago

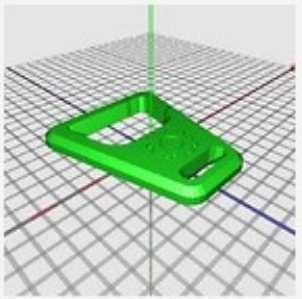
Parametric airless tire derivative
Made by pchretien
5 hours ago

Bender, Futurama
Made by jbheren
5 hours ago

Newest Derivatives

View More Derivatives

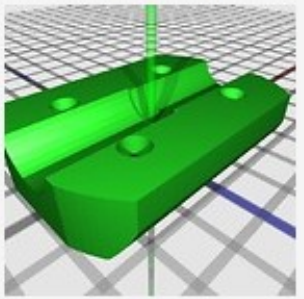
GoPro ski stick mount
Created by Mostley
4 hours ago



Interlock Churchkey
Created by beardicus
7 hours ago

Greg's X Carriage with Quick Change Clip System
Created by SimCity
8 hours ago

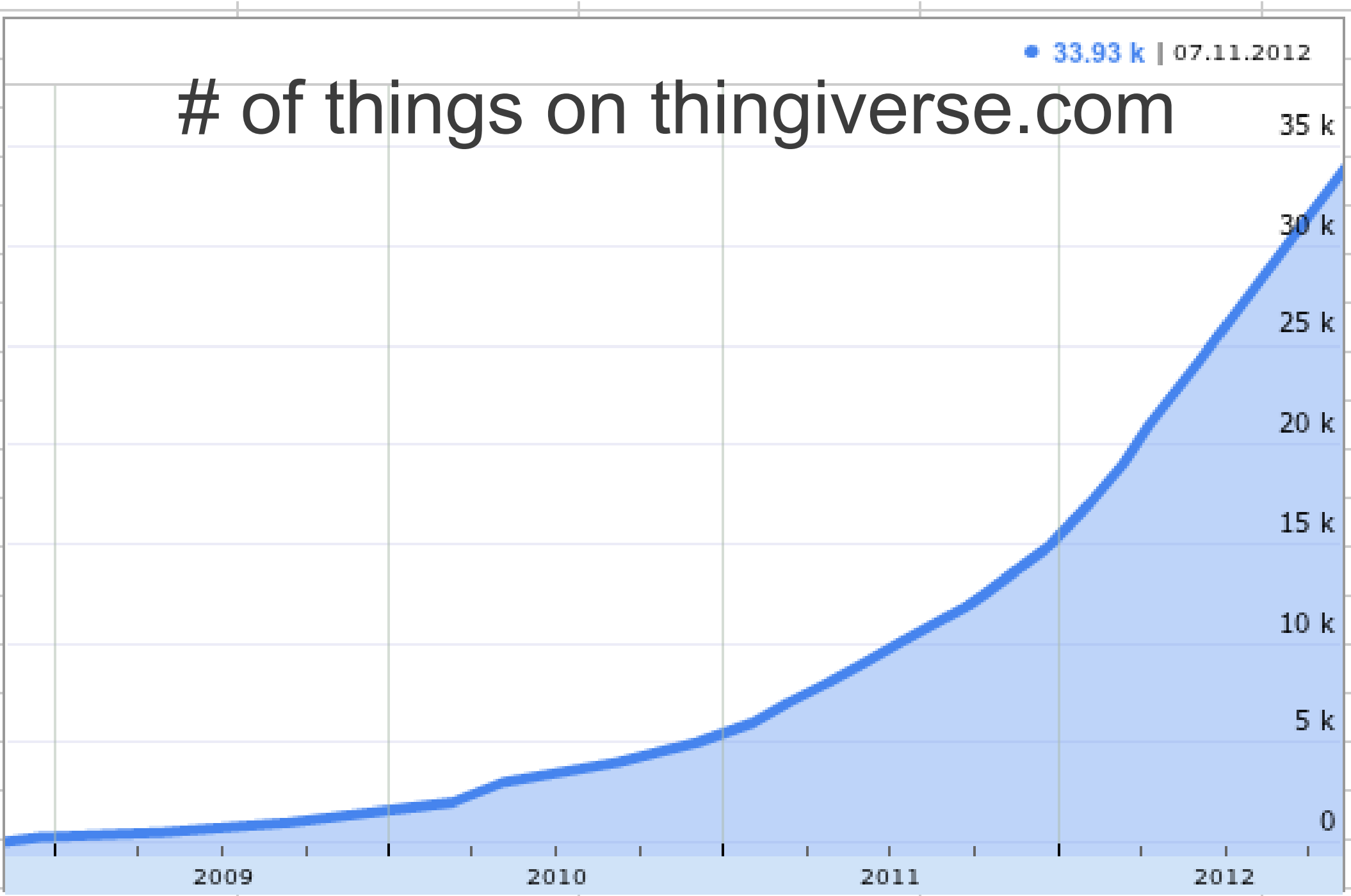
CR2025 Battery Holder
Created by QuantumConcepts
8 hours ago



Symmetrical Prusa Z coupler
Created by triffid_hunter
15 hours ago

Popular Things

View More Popular Things


33.93 k | 07.11.2012
# of things on thingiverse.com
35 k
30 k
25 k
20 k
15 k
10 k
5 k
0
2009
2010
2011
2012

Auswirkungen

- Kaufhaus → Thingiverse
- Konsumenten → Produzenten

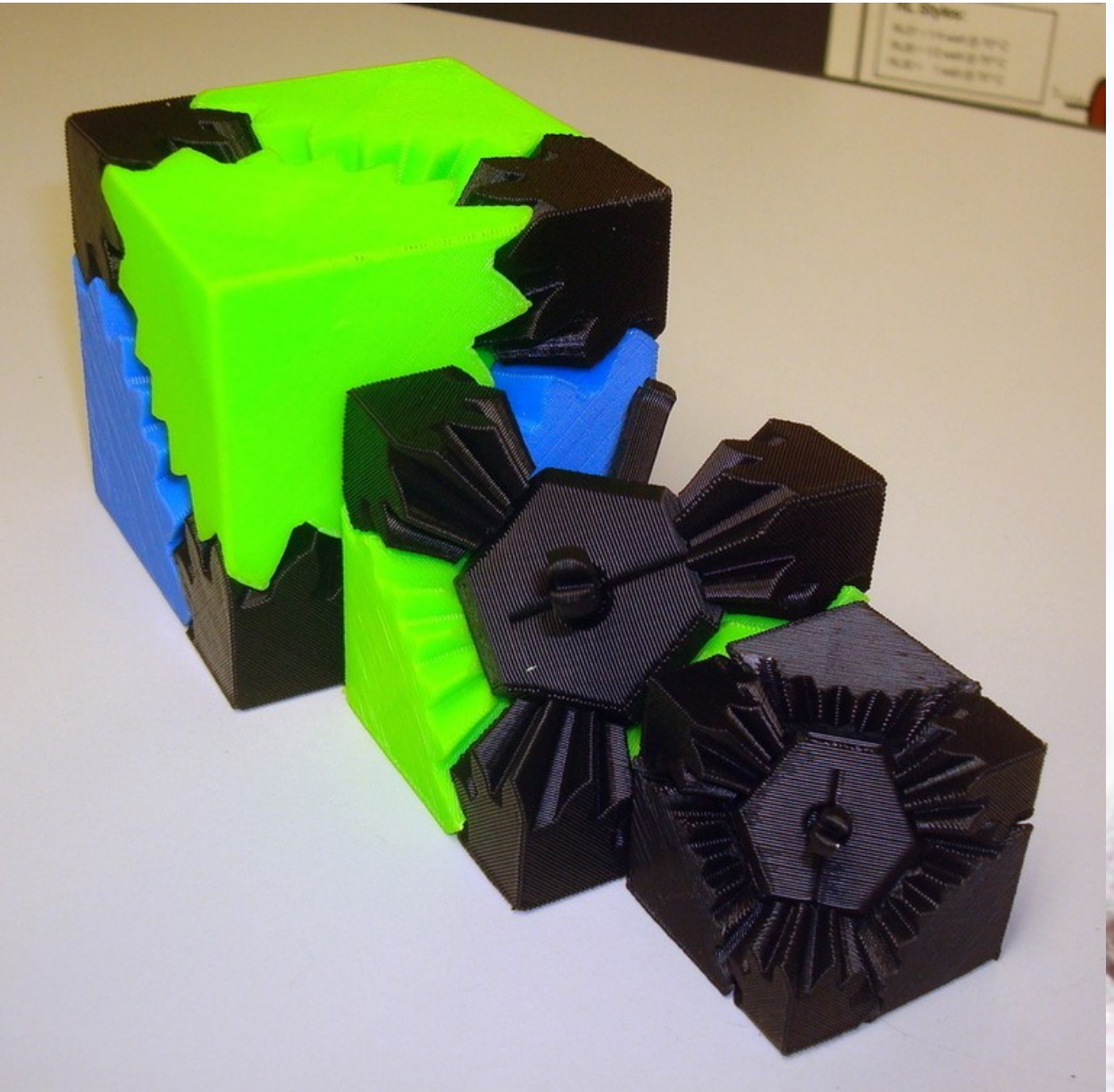
- RepRap Motto:Wealth without Money

- 3D Drucker als Haustier

Auswirkungen

- Grossrechner → PC
- Rapid Prototyping → Personal Fabrication

Fragen?



Related Projects

- Filabot - http://filabot.com
  - Produziert aus Kunststoffabfällen Plastikdraht, welcher für 3D Druck verwendet werden kann
- 3D CAD
  - OpenSCAD – http://openscad.org
- 3D Scanner
  - Fabscan (open source) - http://hci.rwth-aachen.de/fabscan
  - Autodesk 123D Catch (gratis)- http://www.123dapp.com/catch

Links

- Low cost Open Source 3D Printer
  - http://www.makerbot.com
  - http://reprappro.com
  - http://www.lulzbot.com
  - http://www.felixprinters.com
  - http://printrbot.com
  - http://blog.ultimaker.com
- Closed Source
  - http://www.solidoodle.com
  - http://www.bitsfrombytes.com
  - http://pp3dp.com
  - http://cubify.com
- Flüssigkeitsbasierte Verfahren
  - http://formlabs.com/
  - http://3dhomemade.blogspot.com
  - https://nano-cemms.illinois.edu/materials/3d_printing_full
  - http://3dlprint.com
  - http://www.robhopeless.com