NEW

GROWLAY Filament
print 3D objects and let biological cultures grow

1. grass; moss
2. fungus ; mildew
3. lichen
4. mycelium
5. pharma-cultures, mother cells

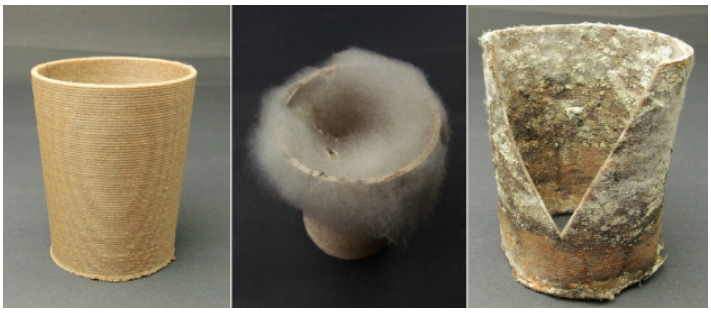
GROWLAY works like a breeding ground. Add seeds or spores to them and they will grow.

GROWLAY properties:

- GROWLAY is microcapillary. Its cavities absorb and store water, dissolved liquid nutrients or fertilizer. Promoted because of the capillary action throughout the printed object.
- Mold grows through the open-cell capillaries and forms a mycelium.
- Seeds of grasses can get caught and grow in Growlay.
- Spores find room to germinate in small cavities. (see SEM-Pics)
- Roots cling to the structures of the object filling.
- Even lichens grow on Growlay. These usually grow preferentially on stones of walls or trees.
- GROWLAY can be sterilized (for food use and research) with gases or wet (but not thermally)
- For color differentiation, objects printed with Growlay can be subsequently colored with food colors.
- absorptive carrier for agents

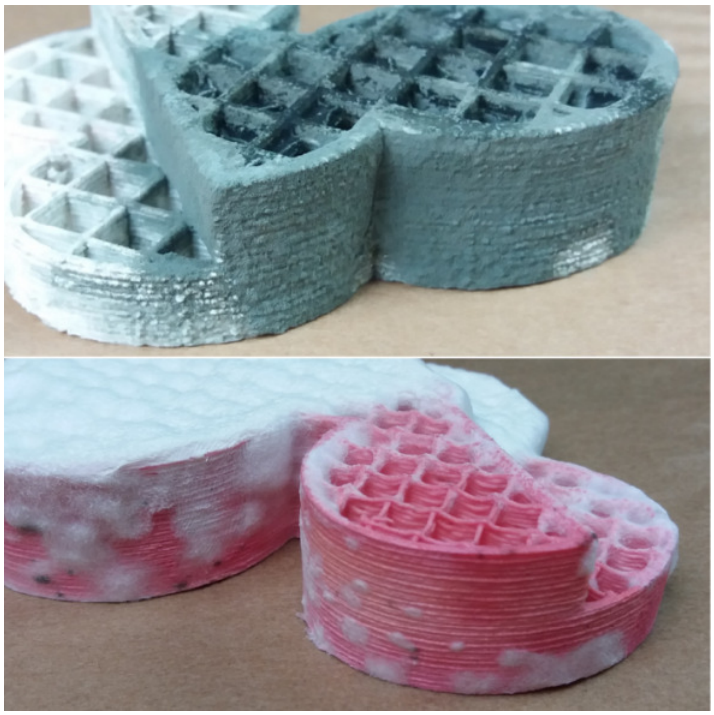
GROWLAY is available in the functionally different versions white and brown

- Version white is an experimental filament & fully compostable
- The brown version contains not only pores but also built-in "food" in the form of cell material which is needed for growth

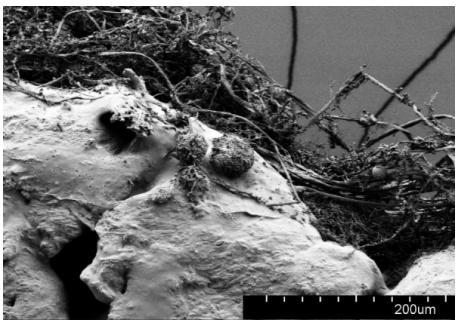


left: fresh printed GROWLAY**brown**
middle: cotton-like mold growth
right: slow-growing lichen

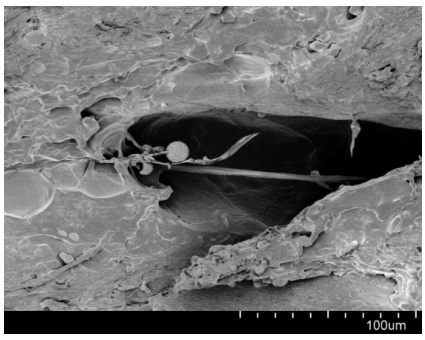
GROWLAY after some days with grass seed put on it



above: Gorgonzola chees (blue) grows on GROWLAY
below: white cheese



pics by scanning electron microscope
4) SEM, Lichen inside GROWLAY (Flechte)



5) SEM, Lichen inside GROWLAY

6) SEM, white Cheese inside GROWLAY

GROWLAY - two versions

GROWLAY-white pure porous

- ***compostable*** polymer
- with open capillaries
- white filament
- experimental filament for experienced users

GROWLAY-brown porous +woodparticles

- ***not compostable***
- with open capillaries

+ polymer contains ***organic nutrients*** (wood particles)

- ***higher*** tensile strenght
- ***more rigid*** as version –white- ;
- increased temperature stability

the filament can be printed just as easily as Laywood, brown filament // for any user

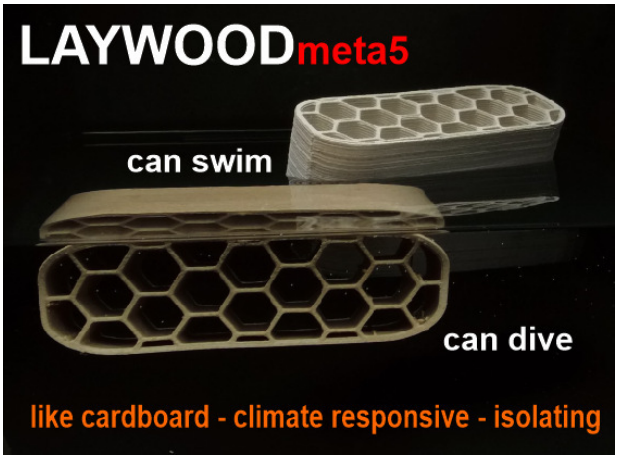
LAYWOODmeta5

1. floats on water, light as Balsa after rinsing in water, can swim, can dive, sucks water fast
2. porous, density: ~0.5 gr/ccm; rough, feels as cardboard
3. thermal isolating, low thermal conductivity
4. climate responsive (elongation)
5. absorptive carrier for agents

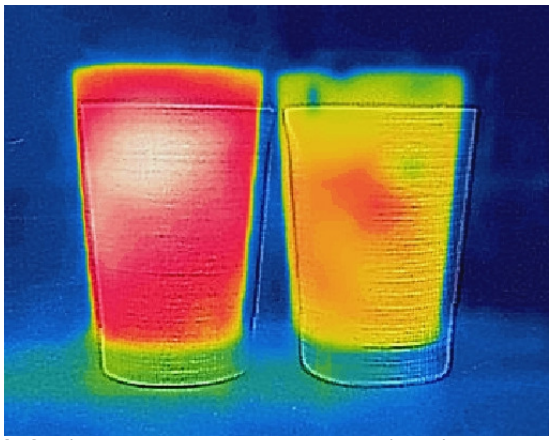
- print at: 225 – 250°C, cold! plattform,
- zero warp, sticks well as ABS at plattform
- only 50% density of standard 3d printing filaments
- contains open cell pores inside after rinsing with water for 2 days, dry the object with a fan, not in oven
- cell structure as mycellium
- possible to paint with waterbased inks

https://www.3ders.org/articles/20170920-kai-parthys-new-laywoodmeta5-3d-printing-filament-is-climate-responsive-and-floats-on-water.html

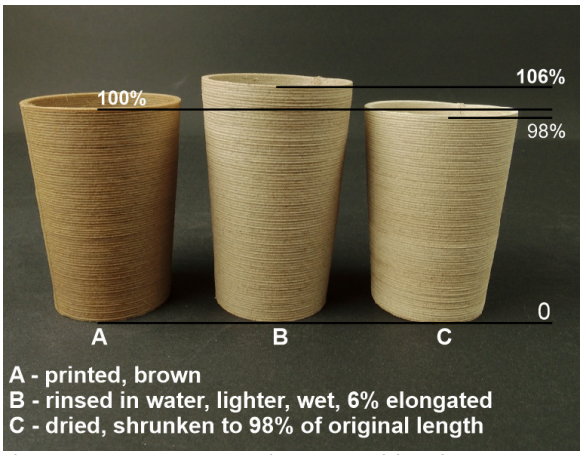
THE NEW ORIGIAL



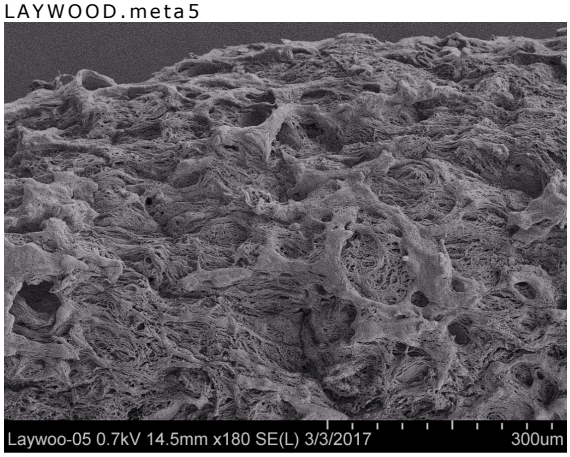
thermal isolating because of pores
low thermal conductivity



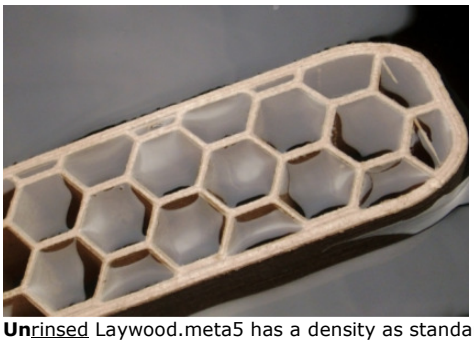
left: hot water in a cup wrapped with massive Original Laywood
right: hot water in a cup wrapped with porous LAYWOOD.meta5



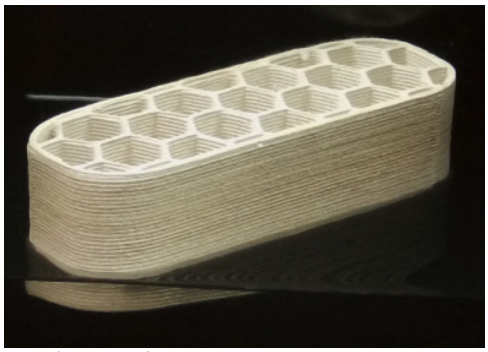
climate responsive with reversable elongation
if wet or dry



scanning electron microscope / micro porous



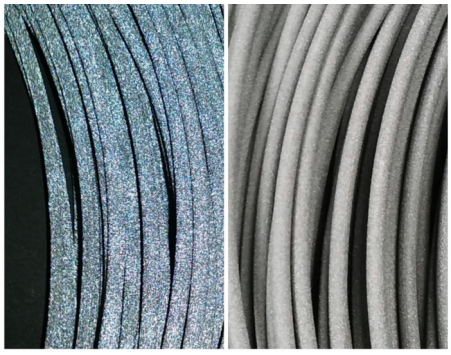
Unrinsed Laywood.meta5 has a density as standard thermoplasts of about 1.1 gramms per ccm, thats why printed objects will dive in water

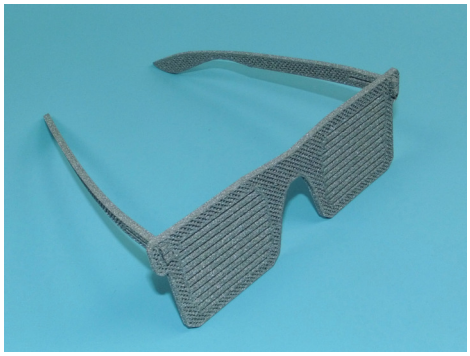


rinsed Laywood.meta5
floating on water

REFLECT-o-LAY

FOR DESIGNERS





FOR DESIGNERS

retro-reflective objects - what things may you print?

- fashion accessoires,
- savety gadgets for bikers
- to sew on patches,
- laser reflective big distance marking points
- parts for experimental cars

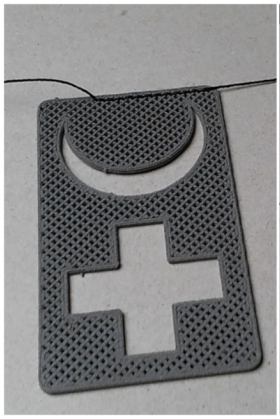
they will „glow“ when lighted up by other light beams at road or highways. The filament is flexible and filled with millions of reflective pigments.
This pigments occour as little dots out of the ourface of filament and ofcourse after printing. They send incoming light back, as the drawing describes.

printing:

- 0.4 mm nozzle, sticks well at roughened PET-Tape and most other,
- cold to 60° plattform
- 210°C / cold (20°C) or hot plattform
- best refl. effect with low !!! feeding rate

retro-reflective, flexible, sew-able

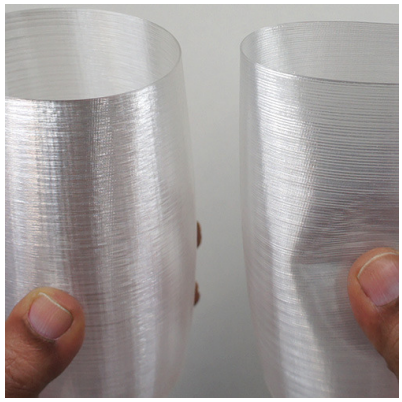
FOR DESIGNERS

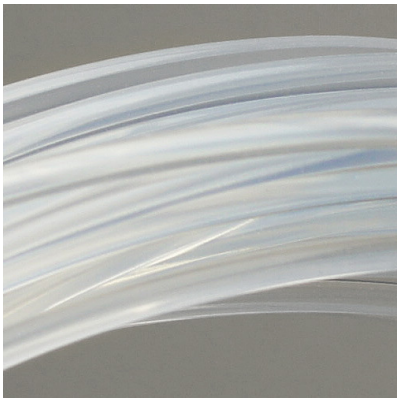


- http://3druck.com/3d-druckmaterialien/42582-3942582/
- http://3dprintingindustry.com/2016/02/25/new-reflective-filament-shines-light-kai-parthys-3d-printing-brilliance-part-1/
- http://www.3ders.org/articles/20160229-kai-parthy-reveals-new-reflect-o-lay-3d-printable-filament-that-reflects-light-in-the-dark.html

BENDLAY-series (1 tough, 2 flex)

CLEAR AS GLASS





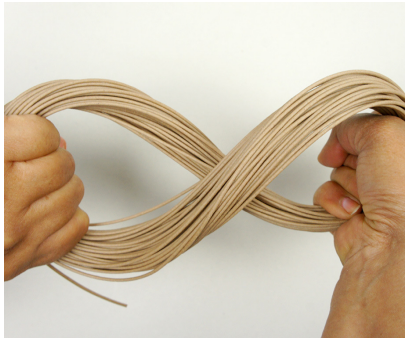
BENDLAY tough vs. BENDLAY flex clear, tough, flexible, bendable,

- http://www.3ders.org/articles/20130614-bendlay-a-new-clear-tough-and-bendable-3d-printer-filament-from-germany.html
- http://www.3ders.org/articles/20150114-laywoo-d3-inventor-kai-parthy-unveils-bendlay-flex-3d-printing-filament.html
- https://3druck.com/tags/bendlay/

LAYWOO-D3 / LAYBRICK lowest warp / tree-ring effect

Sept. 2012

THE ORIGINALS



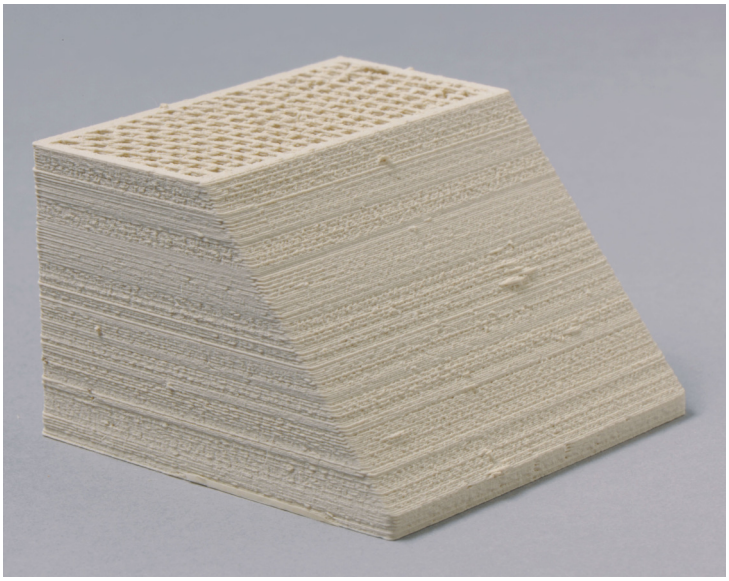
LAYWOO-D3 / 170 – 245°C

LAYWOOD-FLEX / 190 – 250°C

- http://www.3ders.org/articles/20120920-laywoo-d3-new-fdm-filament-can-print-wood-with-tree-rings.html
- https://3dprintingindustry.com/news/the-last-wood-bender-kai-flexes-his-new-wood-3d-printing-filament-49540/
- http://www.3ders.org/articles/20150513-kai-parthy-is-back-with-laywood-flex-a-flexible-version-of-laywood-3d-printer-filament.html

LAYBRICK lowest warp / tree-ring effect

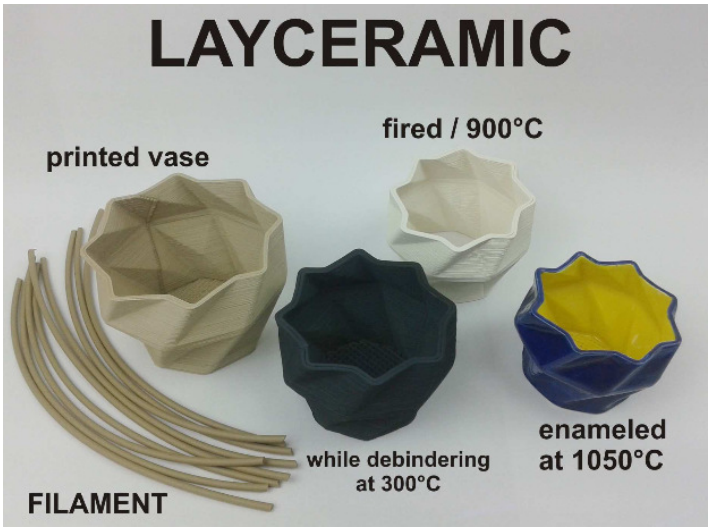
THE ORIGINALS

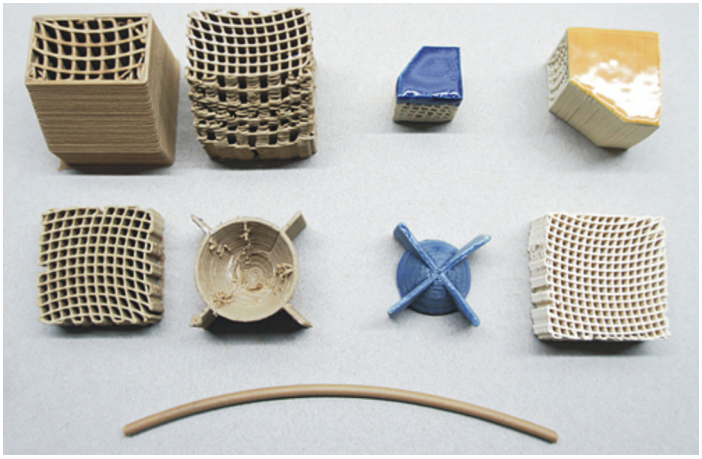


- http://www.3ders.org/articles/20130527-laybrick-a-new-rough-3d-printer-filament-near-zero-warp.html
- https://3dprintingindustry.com/news/laybrick-a-new-filament-from-the-creator-of-laywoo-d3-12164/
- https://3druck.com/objects/laybrick-neues-sandsteinartiges-filament-2110754/

LAYCERAMIC

CERAMIC / POTTERY





- https://www.dropbox.com/s/3mst782b64mutzb/LAYCERAMIC-Instructions-7-2017-public.pdf?dl=0
- *http://www.3ders.org/articles/20140310-3d-printing-branches-out-with-new-clay-based-filament-for-ceramics.html*
- *https://3dprintingindustry.com/news/3d-printing-filament-kai-parthy-24978/*

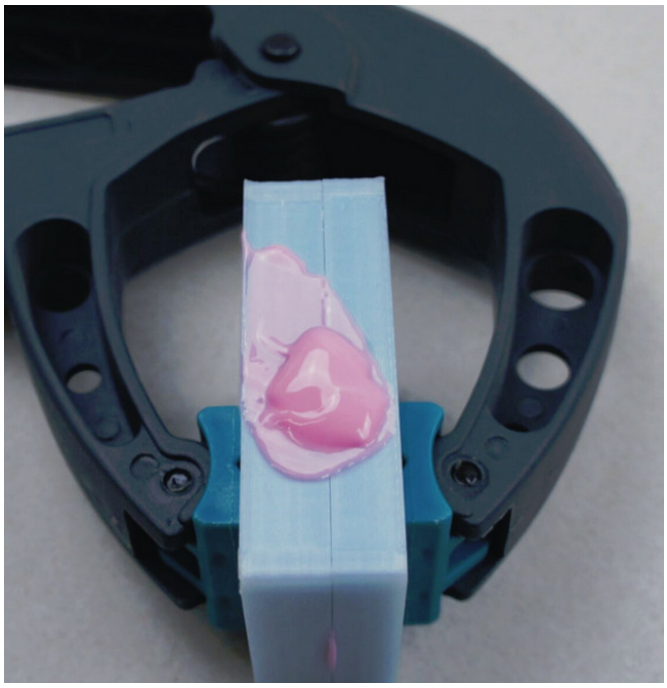
MOLDLAY / wax-alike / for lost wax casting / permanent mold casting

CASTING

for lost wax casting
bronze , silver

permanent mold casting
for 2 component resins too

CASTING

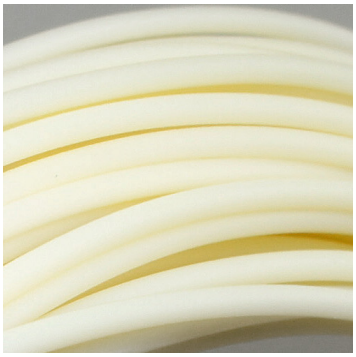


super dimension stabil, stiff, rigid at room temperature; near zero warp, printable without heated bed, print at 170 – 180° C,
heated bed max. 40°C, treat your mold at ~ 270°C in an old baking oven only, the wax flows restless out the mold, similar as hot paraffin,

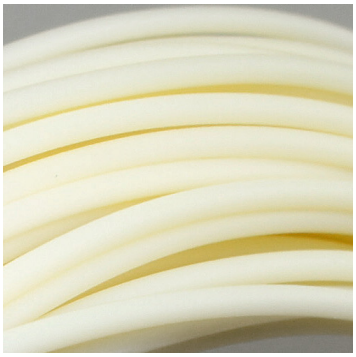
- http://www.3ders.org/articles/20150128-filament-wizard-kai-parthy-unveils-his-new-moldlay-wax-3d-printing-filament.html
- https://3dprintingindustry.com/news/industrial-manufacturing-desktop-new-moldlay-3d-printing-filament-42481/
- https://www.youtube.com/watch?v=3RdwKWXnbrM
- https://3druck.com/3d-druckmaterialien/moldlay-kai-parthy-stellt-filament-fuer-giessverfahren-vor-5129578/

POROLAY-series patent pending / experimental filament / to print porous, felty structures; print foams, floatables, leather-likes, extendables

POROUS / 4D



LAYFOMM-40



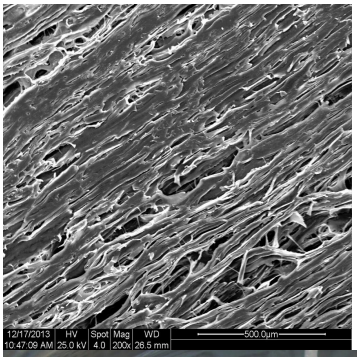
LAYFOMM-60

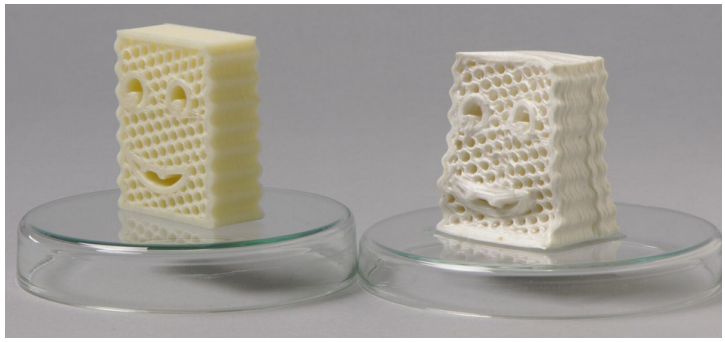
GELLAY

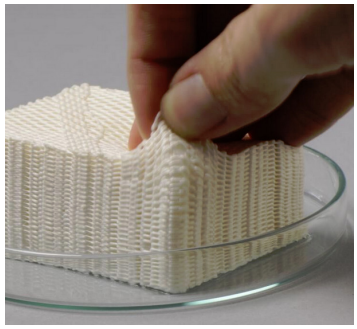
LAYFELT

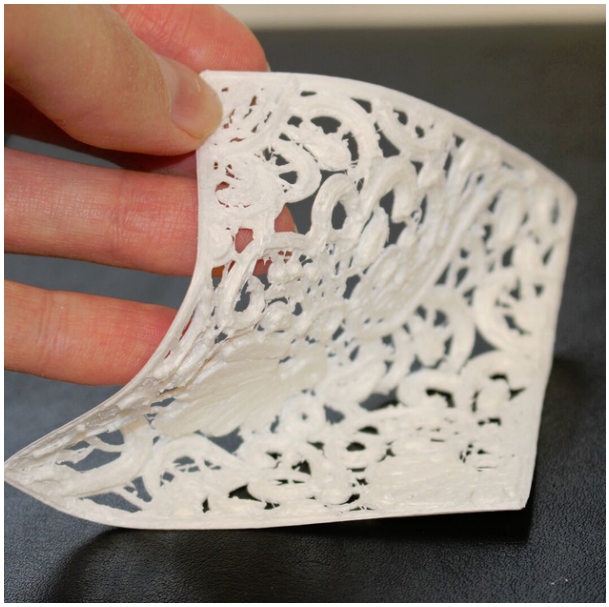
SOPHISTICATED

POROUS / 4D / POROLAY









POROLAY series / **LAYFOMM-40 / LAYFOMM-60 / GELLAY / LAYFELT**

- https://3dprintingindustry.com/news/kai-parthy-gets-felty-foamy-porous-poro-lay-line-filaments-21636/
- http://www.3ders.org/articles/20131222-printing-porous-and-fibrous-3d-objects-with-new-filament-line-poro-lay.html
- https://www.youtube.com/watch?v=2w-9KvBHago
- https://www.youtube.com/watch?v=Pkaus3DN2w0

FOR EXPERTS

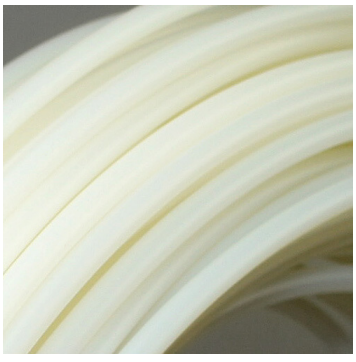
magnetic to magnets, filled with **carbonyl-iron**

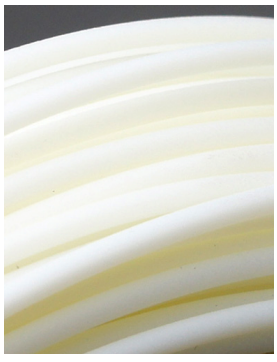
DI-ELECTRO-LAY, filled with TiO2 72%

- http://www.3ders.org/articles/20140627-fdm-printing-ceramic-filled-polymers-for-electromagnetic-applications.html

smartABS / PLA-Y-SOFT / CHAMBERLAY

BEST FOR ROUTINES





smartABS
- enhanced inter-layer adhesion
- low warp at cold bed
- 235°C
- smoothable with aceton

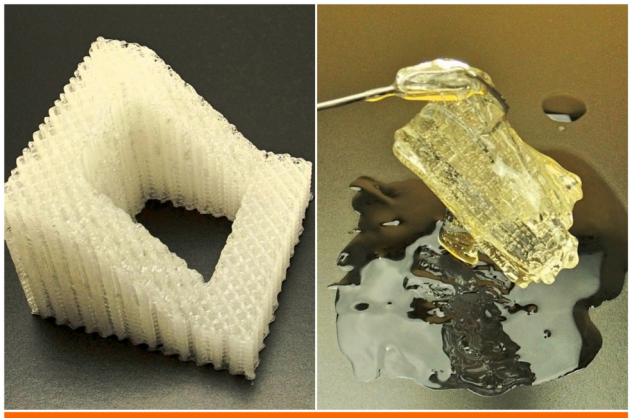
PLA-Y-SOFT
- soft PLA
- high % of bio material
- of cource lowest deformation at cold bed

CHAMBER-LAY
water-soluble filament to print support-structures
print-temp: 225 – 245°C
improved adhesion to ABS, PC
dissolvable in cold water
build room temp-stability 115°C

LAY-AWAY support series

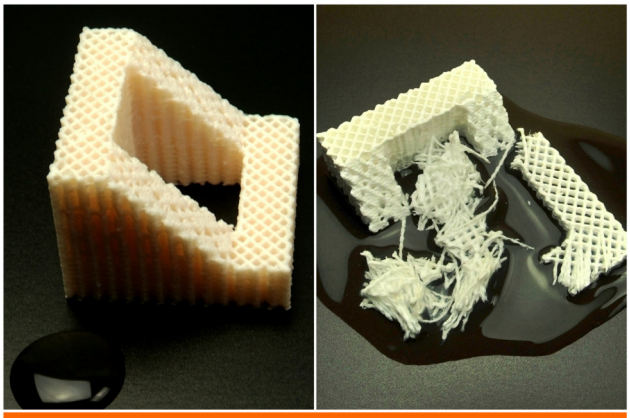
SUPPORT FILAMENTS

FOR EXPERTS



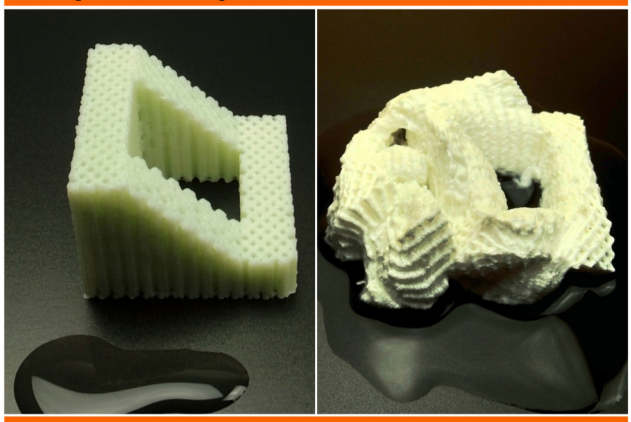
ETHY-LAY

- dissolve restless with alcohol
- total clear, cold plattform
- for sensitive bio prints
- print-temp. 165C



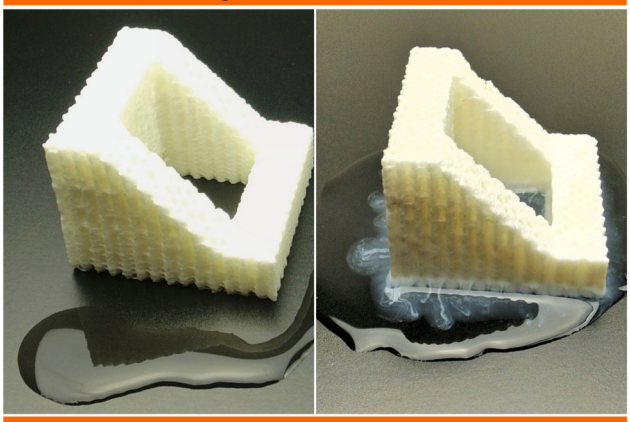
HIGH-T-LAY

- for hot build room 100C, printT ~240C
- fast dissolve in water
- forget HIPS-Limonene stink
- remove flaky residute with brush



LAY-CLOUD

- dedicated for flexible prints
- best polyurethane adhesion
- cloudy residute, simply drops
- printT ~240+-5C



LAYaPVA

- best print viscosity, printT ~230C
- stabile at long tool-change periods
- improved thermal stability
- very fast dissolvable

SUPPORT FILAMENTS

ETHY-LAY

- **dissolve restless with alcohol**
- total clear, cold plattform
- for sensitive bio prints
- print-temp. 165C+
- store dry, if wet – dry in oven at max. 50°C

LAY-CLOUD:

- dedicated for flexible prints
- best **polyurethane adhesion**
- cloudy residute, simply drops
- printT ~240+-5C
- store dry,

dry in oven at max. 80°C, 3-4 hours

NEW 2018: CHAMBER-LAY (115°C)

- water-soluble filament to print support-structures
- print-temp: 225 – 245°C
- improved adhesion to ABS, PC
- dissolvable in cold water
- build room temp-stability **115°C**

HIGHT-T-LAY:

- for hot build room **100°C**, printT ~240C+
- fast dissolve in water
- **forget HIPS-Limonene stink**
- remove flaky residute with brush
- store dry,
- if wet - furthermore easy to print, you hear quiet crackle,
- dry in oven at max. 90°C, 3-4 hours

LAYaPVA

- advanced print viscosity, printT ~230C
- stabile at long tool-change periods
- improved thermal stability
- **very fast dissolvable**
- store dry, if wet – dry in oven at max. 70°C
- if wet, not as soft as yellow standard PVA

- http://www.3ders.org/articles/20160428-kai-parthy-is-back-with-lay-away-series-of-soluble-support-filaments-for-fdm-3d-printing.html
- https://www.3printr.com/38505-5938505/
- http://3dprintingindustry.com/2016/04/28/lay-away-a-series-of-un-ordinary-support-filaments-for-fdm/

SOLAY dedicated for rubber-things, as shoes-soles, allows vintage optic

FOR DESIGNERS

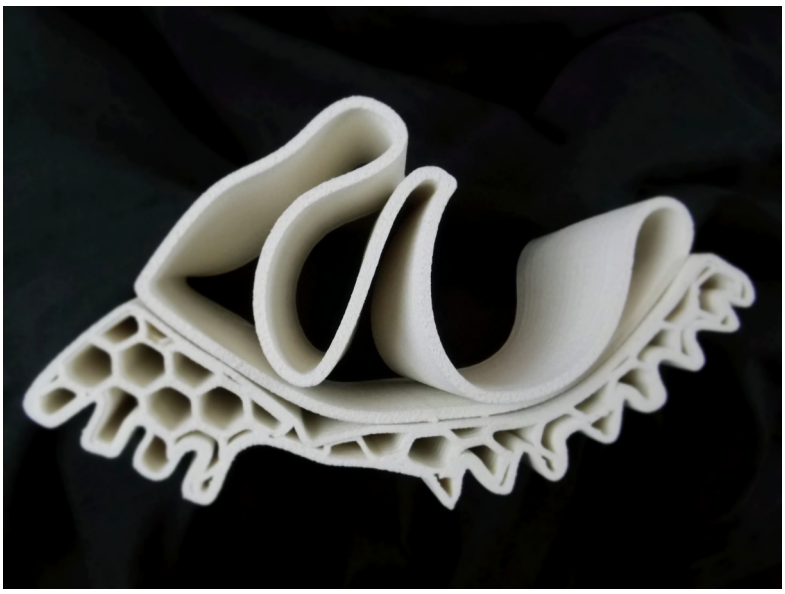
FOR DESIGNERS

- elastic as caoutschouc
- Shore A / ~ 90
- high filled with nature born organic pigments (over 30%)
- paintable with permanent markers
- colorable with inks (ethylalcohol marker inks)
- make your *vintage style*
- as stone washed effect / blue jeans effect
- for dampers, running shoes, experimental shoe-wear

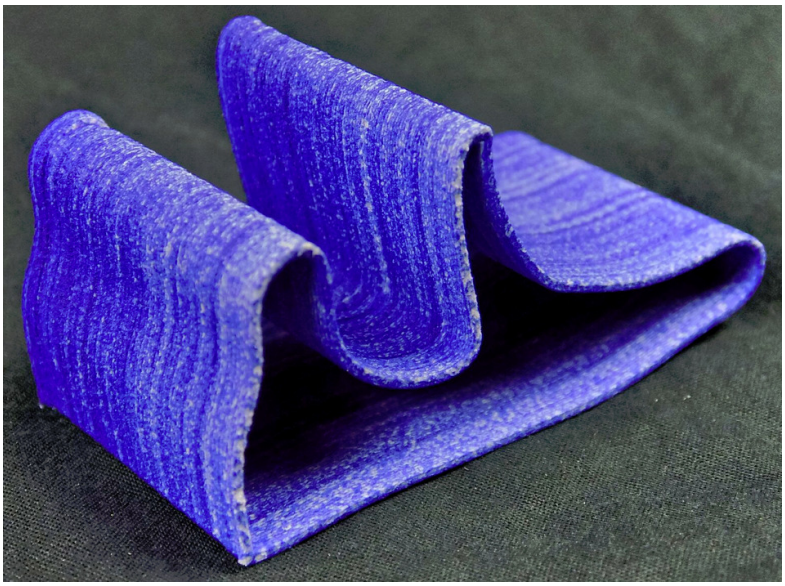
printing:

- 0.4 mm nozzle, sticks well at roughened capton and most other, cold to 60° plattform
- 0.2 mm layer, thicker the more rough surface
- 175°C to 190° white colour, goes brownish when long under heat,
- rough and easy to feed filament
- experimental filament

FOR DESIGNERS



VINTAGE



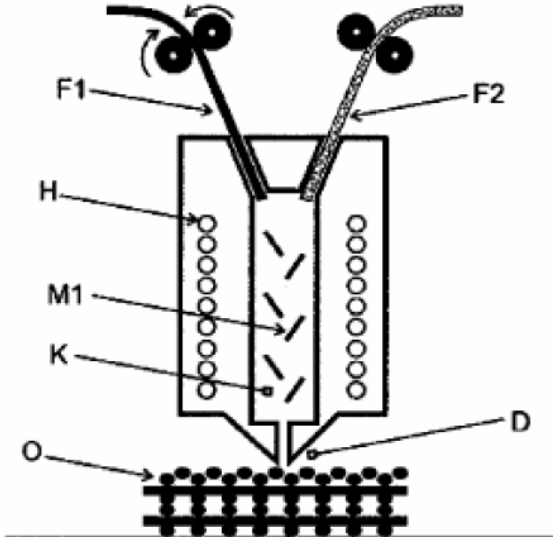
- https://3druck.com/3d-druckmaterialien/solay-neues-elastisches-3d-druckmaterial-aus-der-rubberlay-serie-von-kai-parthy-0440295/
- http://www.3ders.org/articles/20151215-kai-parthy-unveils-rubber-like-solay-3d-printing-filament-for-your-future-shoes.html

selected 3D-printing INVENTIONS by Kai Parthy

hot ends / concepts / patent applications

EARLY BIRD

dual colour - dual filament hot end / concept



german patent application from 2010
first concept for a hot end to blend filaments

Multi-Filament Printhead

filled: **16.12. 2010**
published: 21.06.2012
DE102010054824A1

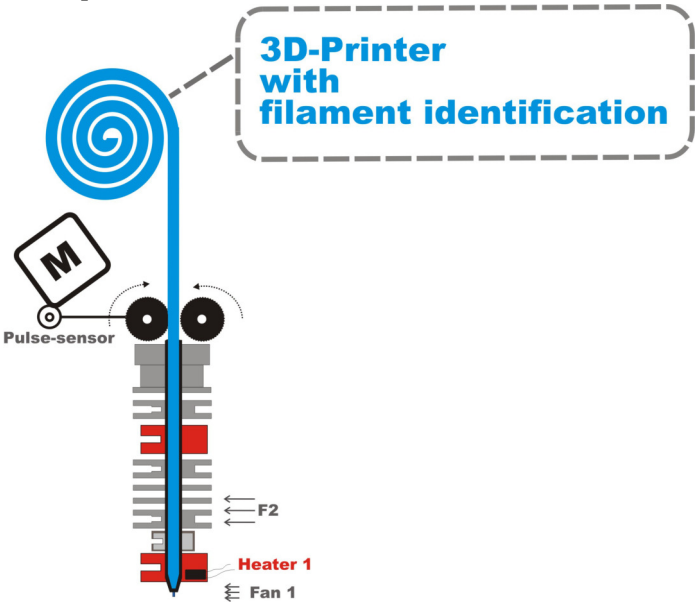
M1: static or dynamic mixing elements

[EN] Print head for rapid prototyping printer for extruding thermoplastic or reactive ...

[DE] Druckkopf für FDM-Verfahren mit mehrfacher Drahtzufuhr und Mischkammer zum Erzeugen von Objekten aus Polymerblends

HOT END CONCEPT

complex hot end with lab inside / concept / patent pending



filament detecting?

Each filament has specific viscosity-properties of it´s molten mass,
if we know the pressure & temperature under which the filament is feeded trough the feed-channel and the nozzle,

what for ?

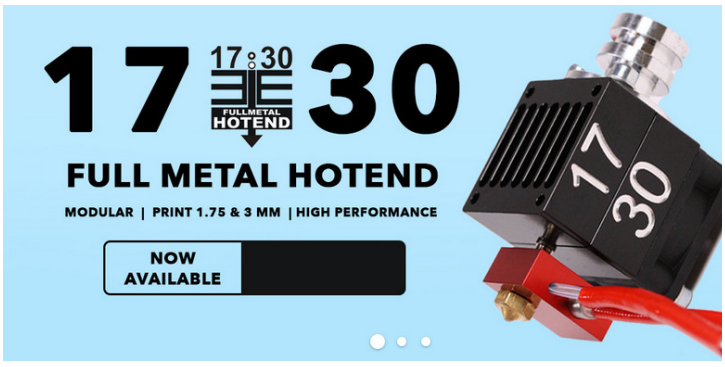
- the printers software can find out what filament you are using,
- can calculate best printing properties without blockages, f.e.
- flow rate, head-speed,
- retract parameters, acceleration-rates and some more
- sophisticated values, also to prevent
- stringy objects,
- you may print smooth, rough or cratered surfaces
- being able to print future filaments !

You don´t need to be an expert for sucsessful 3d-printing.
The machine helps you!

http://www.3ders.org/articles/20150624-commentary-smart-hotends-and-the-need-to-truly-innovate-in-3d-printing.html

HOT END

1730hotend / a cooperation with ReprapUniverse / Netherlands / patent pending



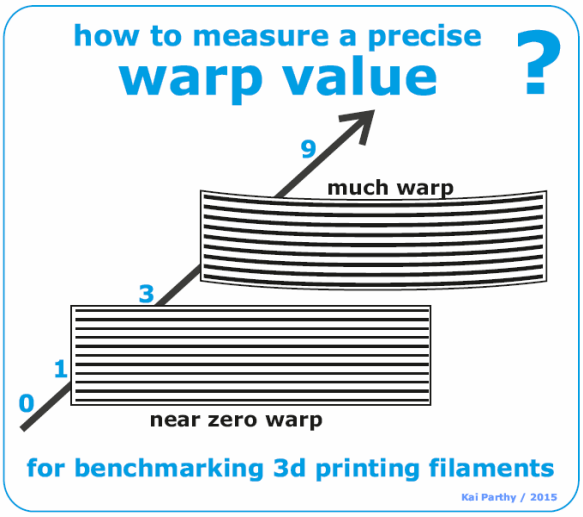
The 1730 Full Metal Hotend enables switching Nozzles between 1.75 mm and 3 mm in less than 5 minutes. Experience total 3D-Printing freedom and enjoy the best of both worlds.

http://www.1730hotend.com/

http://www.3ders.org/articles/20160126-kai-parthy-reprapuniverse-launch-modular-175-3mm-3d-printer-hotend-on-kickstarter.html
https://3druck.com/tags/1730-fullmetal-hotend/80

WARP – INDEX

MEASURING PRINCIPLE



The biggest obstacle for exact printing needs a measurement standard / Warp-Index found
The control of the warp is the everlasting problem of the 3D print scene - but at least we now can measure and classify the warp.

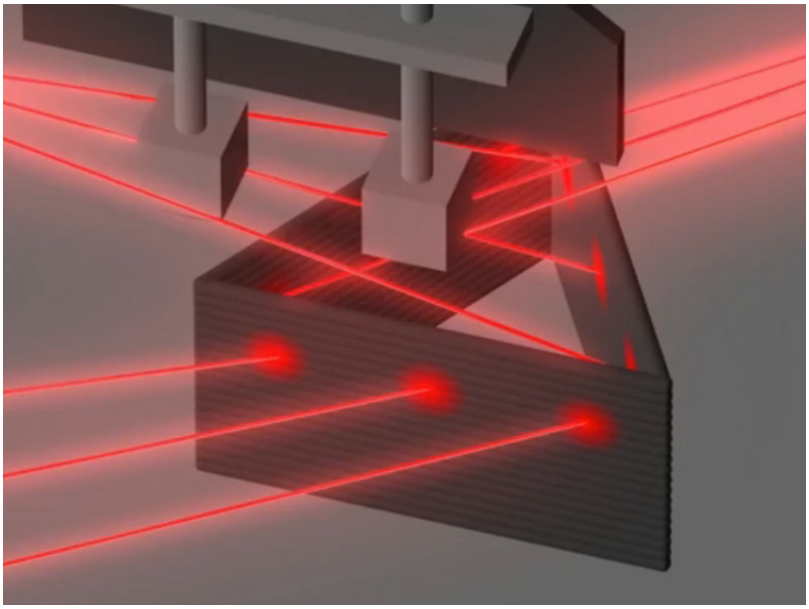
https://all3dp.com/warp-finally-theres-way-measure/

http://www.3ders.org/articles/20151130-kai-parthy-develops-low-bondage-warp-index-for-3d-printing-filaments.html

https://3druck.com/3d-druckmaterialien/kai-parthy-veroeffentlicht-white-paper-zum-thema-warping-5239934/

WARP-fighting CONCEPT

REDUCE DEFORMATIONS



animation:

https://youtu.be/xgWQPULuI-U

BIONIC MESH STEEL FIBRE / patent pending

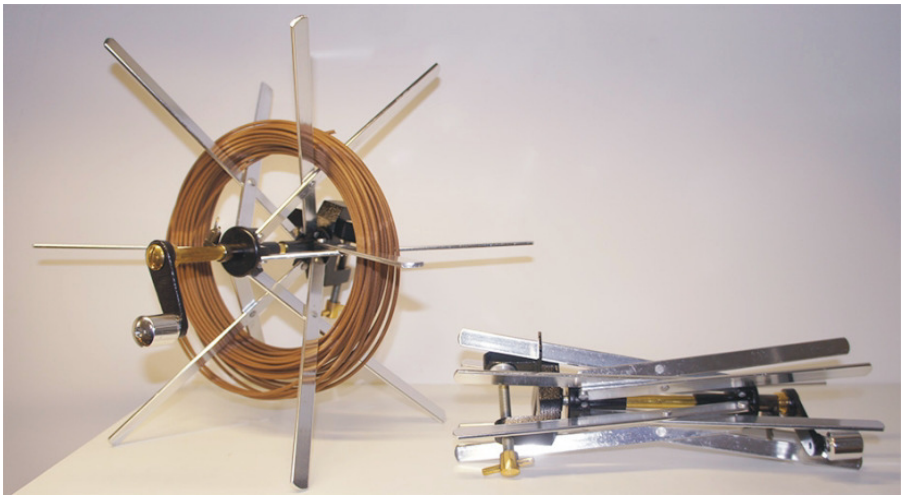
PROOF OF CONCEPT

http://www.3ders.org/articles/20161110-kai-parthy-makes-construction-3d-printing-viable-with-scalable-bmsf-steel-reinforcement-inserts.html

https://3druck.com/3d-druckmaterialien/bionic-mesh-steel-fibre-von-kai-parthy-macht-3d-druck-von-freiformstrukturen-aus-beton-moeglich-1451080/

FILAMENT EQUIPMENT

HELPFUL



universal filament holder with extra long arms

EDU-KITS

FOR SCHOOLS

low priced pack of 2 coils combined = 0.250 Kg

Kai Parthy . CC-Products . Koeln . Germany
Productdevelopment & Innovations
kp@cc-products.de

LAY FILAMENTS