

REPRAPWORLD

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Next Beer & Pizza party the 1st June

RepRapWorld's Meet the maker wanted!



Meet the makers wanted! Submit your experiences, latest project, advise and accomplishments for next month's newsletter.

This month we found Jan Donker available to write a piece about his experience in 3D Printing and building his heated chamber. Check out his submission [below](#).

Diede van Abs, one of the regulars, has printed a F1 racing car. A preview is on the left and below is a link to a video on Facebook with the car driving.

And while you are there, gives us a like!

[Click here for the video](#)

If you would like to participate in the Meet the maker section. Please use the button below to contact us. And share your story with thousands of like-minded-makers!

Want to pitch your project for the 'Meet the maker' section. Please click here!

Anet A6 3D printer build course

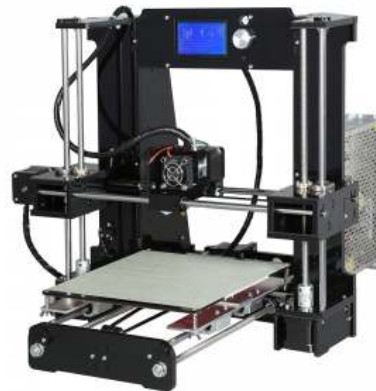
By Jos Richters

23 May 2017 HCC!3D and RepRapWorld organized a workshop 3D Printing at the Oostland Library. The goal was to increase the interest in 3D Printing and start organizing/promoting a DIY 3D Printer build weekend with the members of HCC (Hobby Computer Club) in the Hague region in the Netherlands.

The 3D Printer build would be based on the RepRap principles, and the whole project has been developed so a end-user can construct and assemble the printers by themselves. One of the cornerstones is that most of the parts are going to be 3D Printed. The model will be a Cartesian model, based after the Prusa I3, which will be delivered by RepRapWorld as a kit.

A 3D Printer is a machine which can build up a object layer after layer by depositing material through a nozzle in the printhead. The perpendicular X-Y-Z movements transports the nozzle across the printbed allowing the layers to be deposited atop each other.

RepRapWorld has agreed to support HCC in this project by making the RepRapWorld Lab available for one weekend to allow the 3D Printer to be build with some expert help (where needed).



This cooperation with RepRapWorld is the ideal opportunity for the less experienced 3D Printer user or the starter with the wish to own a 3D Printer. This cooperation is accented by the organization of the Beer&Pizza party every first Thursday of the month. The goal of this meeting is to share information and experience, while enjoying a beer (or soda). Attending these meetings are some very experienced users and of course the employees of RepRapWorld. Why do I mention this, the 3D Printer should not become a machine 'used only once' because of a lack of knowledge and the challenge of starting with 3D Printing.

If there is enough interest, the workshop weekend should be organized in September or October. You can show your interest by emailing to 3dprintdiy@gmail.com or by contacting RepRapWorld.

The cost of the DIY weekend will be € 395. This includes the Printer kit, a can of 3DLAC, a spool of Real Filament and Coffee/Tea/Lunch during the weekend.

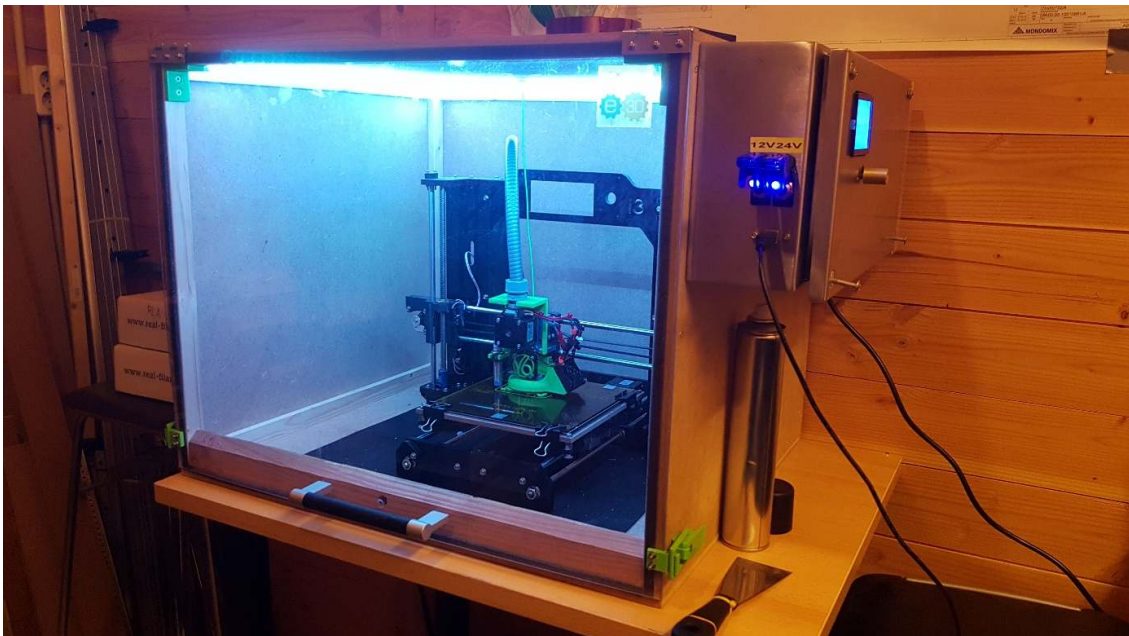
Meet the maker: Jan Donker



My name is Jan Donker, I'm a 26 year old Technician from Huizen, N-H. I first encountered a 3D printer three years ago, when a co-worker of mine took his MendelMax to the workshop. I was amazed to see what he had going on, and it was building up structures in front of my eyes. Later I bought myself a Chinese Prusa I3, with the intension to buy a tool like a hammer. I didn't know I was so off..

After receiving the Prusa, I tried to make it work. But it was a frustrating job because I didn't even know I had to plug my computer in, so I operated it only by hand. After one question led to another, I met Bart from RepRap, who invited me over to have a chat and a look at what I was dealing with. After that, things went on fast. I modified the control system so the printer would be plugged with a few connectors.

Build a Heated Box for it to sit in (my own little workshop is used to angle grinders, drilling and other ways of making a terrible mess) and be protected. Then the control board and all got rewired, made into an stainless box with a graphical screen, a few fancy missile-switches (FIY, as soon as I get the chance to build LED's into a project, I will) and an RGB-LED strip to lighten up the interior of the box. At a moment, the only thing still original on that thing was the black, acrylic frame.



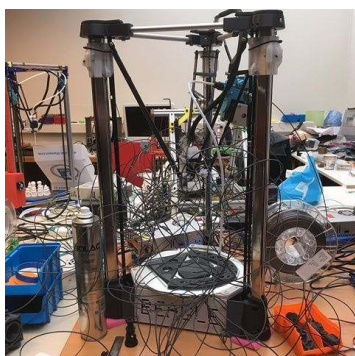
But by this time I am running out of my learning-curve, relying on stuff as beginners-luck and weird late night YouTube videos in a try to get some understanding of how 3D-printing actually works. Because on paper, it is simple.. But many people at RepRap have shown me that it is very hard to make a good, clean print. Not even talking about overhangs or supports. Just a 40mm x 40mm sample box can show anyone

how hard it is to make a clean print. Next to that, I'd like to be printing with ABS (just to make it that little notch harder than it already seems to be).

Now, I am set out to design myself a new printer. More stable frame, capable of cleaner prints, bigger building platform. Recycling parts from the Prusa-build, I will try to use my experience as an engineer to make a new system, capable of doing what my Prusa wasn't able to. I am leaning towards a Delta-build as delta's are known for their smooth perimeters.

Russell's Printing Tips

By Russell Gulman



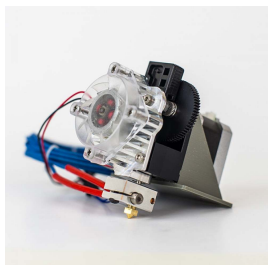
In my first Tips column, I discussed the constraints involved in faster printing speeds. I'd like to continue the high level discussion again this month, but in the months ahead, I will start diving into greater technical details of the components of successful printing, such as extruders, hotends, print surfaces, electronics and so forth.

Cost Vs Value

For those of us who feel part of the open source RepRap community, reducing cost is an intrinsic driver. As a principle design choice, some of our local customers have even built functional machines almost entirely from scraps of MDF board and old computer parts. These are impressive achievements, but when the goal is to achieve repeatable high quality prints, we need to also account for the ongoing lifetime costs of our machine rather than the one-time purchase price. (Troubleshooting) time is money, and not all components are equally important or equally diverse in levels of quality. Below are a list of the most important components that I've found over the years are generally more important to the smooth and reliable running of a printer, and thus worthy of a bit more investment:

Hot End

A well made all-metal hotend not only allows for a greater range of printed materials, but is less prone to risky thermal runaway conditions or meltdown. I happen to be partial to the e3D v6 (standard and volcano) because of their applied lessons learned in the nozzle drilling process, along with the rapid thermal transition zone in the heatbreak due to the shrouded cooling fan. Their latest iterations lock in the temperature sensor with screws for added safety, and include a high-temperature resistant silicone sleeve around the heater block for better temperature isolation and burn protection.



Extruder

While a direct drive extruder has the advantage of being inexpensive and having a small form factor, a geared extruder can provide real power and thus reliability (it is possible to compensate the lower torque on a direct drive extruder though increased step stick power, but this comes with additional wear and tear and possible overheating). A good 1.75mm extruder should ensure that the entire filament path is contained from the drive shaft to the nozzle, which minimizes the chance of filament escape for flexible filaments (or due to period of high back pressure). Lastly, a

good extruder should be capable of handling dozens of retractions over the same small area of filament, which occasionally happens in unexpected places in a print.

Bearings / Sliders

A good bearing can make a big difference in wear, noise and linear play. It seems obvious to say that bad bearings will impact the quality of a print, yet this is one area where folks will often look to save a few cents, and then (sometimes literally) pay the price later on trying to troubleshoot their motion systems. Whether to minimize play or avoid binding, good sliders and good bearings are worth their price (and not just with fidget spinners)!

Electronics Board

The quality of the components make a big difference over time in the functioning of an electronics board, which can be exposed to a high-heat and sometimes dusty environment. Some other desirable features are:

- multi-extruder support
- external motor pins (for connection to external step sticks)
- thermocouple support
- USB and Ethernet support
- ferrite core or other grounding circuitry



Standard cartesian machines usually don't require significant processing power, but delta machines need to convert each gcode instruction into the delta reference frame through a series of trigonometric calculations, which is quite intensive.

Step Sticks

A good quality stepper driver should have thermal protection capability (shutting itself off to prevent overheating) and more thermal resilience overall. The higher its maximum steps / mm, the smoother the transition from one step to the next.

Pulleys & Belts

Similar to bearings, a good pulley should have good balance, little to no rotational play, and good belt meshing to minimize backlash. Many tooth and belt systems are designed to only move in one direction, and thus may have more backlash than desired during direction reversal. I've found GT2 pulley and belts to be quite good in minimizing backlash. Additionally, belts should have as little stretch as possible, and fit snugly into the pulley. Otherwise, there is an increased chance during rapid speed changes of belt slippage.



Leadscrews

(Cartesian-style printers only): Most newer Prusa-style printer kits now include z-axis leadscrews rather than the older threaded rod designs. This upgrade makes a huge difference in print quality, z-axis speed, noise and z motion smoothness. Lower tolerance threaded rods can have subtle variations in thread pitch between the two z rods, causing an imperceptible rocking motion that appears as alternating "banding" layers in the final print.

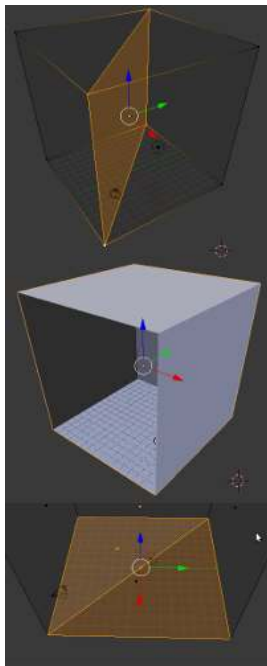
Other important, but somewhat manageable lower priority components (heater beds, filament quality, etc..) will be discussed in their own dedicated future columns.

**Did you print something for one of our products?
Let us know and we will put it in our next
newsletter**

Blender workshop: Fixing non-manifold models

by Bart Meijer

So you have exported an STL file from your favorite 3D modeling software, you load it up in Slic3r. Everything looks fine, but when you start printing it, you notice weird imperfections and toolpath. Or worse. Changes are your 3D model is non-manifold and you need to do some fixing.

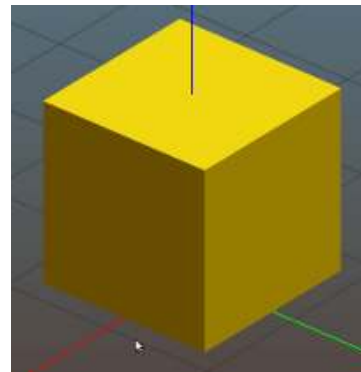


What does non-manifold mean?

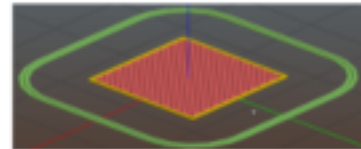
Essentially it's a 3D object that can't exist in real life. That is a problem, as this is exactly what we are trying to accomplish by 3D printing it. In the picture on the left are three examples of non-manifold objects. The one at the top presents a cube with an inner face, so it has 7 faces instead of 6. I have seen this happen when software exports 2 objects and accidentally glues them together, when exporting to STL. The second example shows a cube with a face missing. So 5 faces instead of 6, effectively making it no cube, but a container with infinitively small walls. Finally the example at the bottom is a bit harder to understand maybe. In this case there are also 7 faces, but instead of a face within the object, it has two bottom faces. One face covering all of the bottom, one only half, intersecting with the other. This results in an outside face of two faces, making it impossible to determine the correct one.

How bad is non-manifold?

In a lot of cases you won't see a problem. Slicing software has detection and fixing built in. In fact, with all examples, Slic3r will happily draw a cube and report that it fixed X errors when you load the STL.

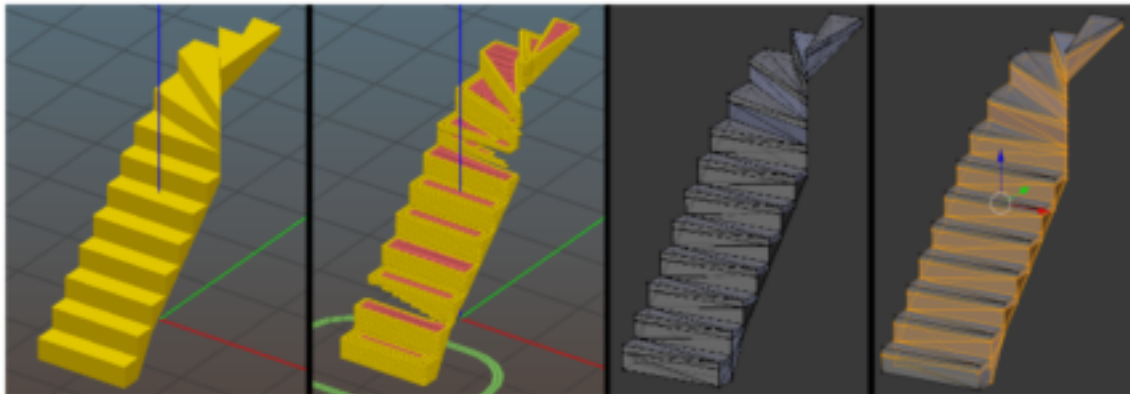


Also looking at the toolpath in the preview tab of Slic3r, it will show Slic3r did a good job at fixing the non-manifold file. So, as always, you should look at the toolpath first to check for non-manifold problems.

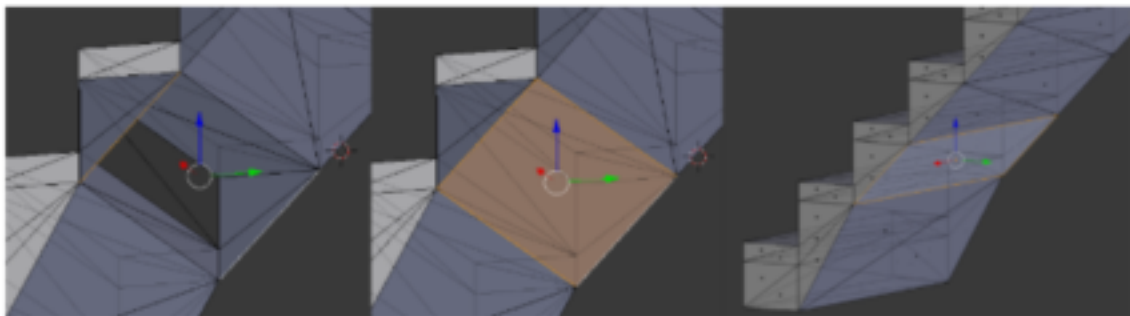


Fixing non-manifold objects

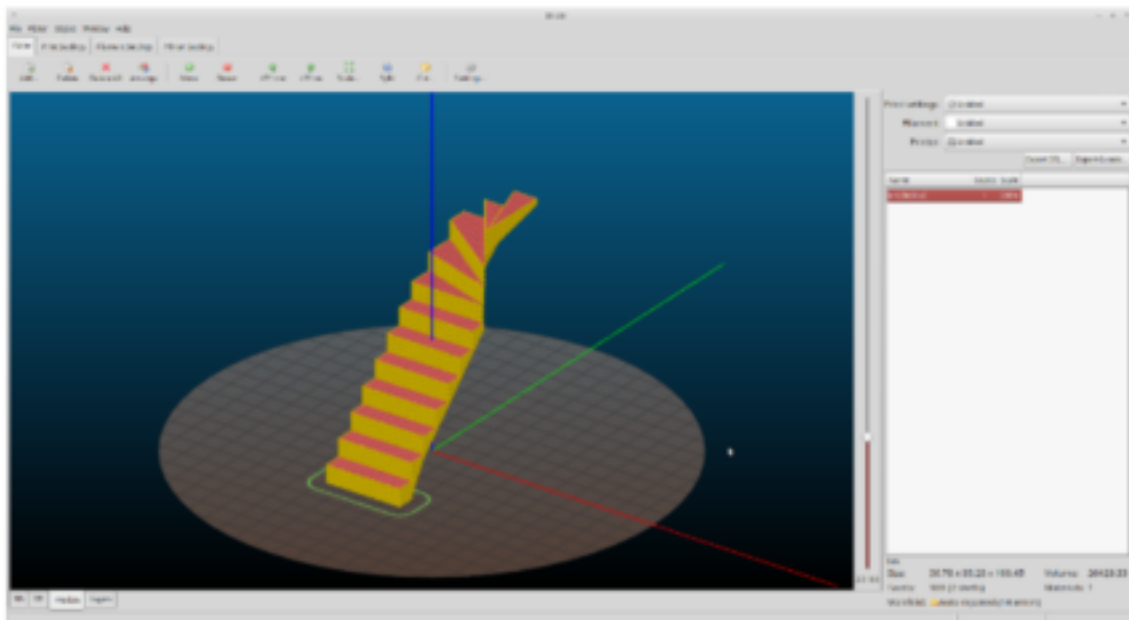
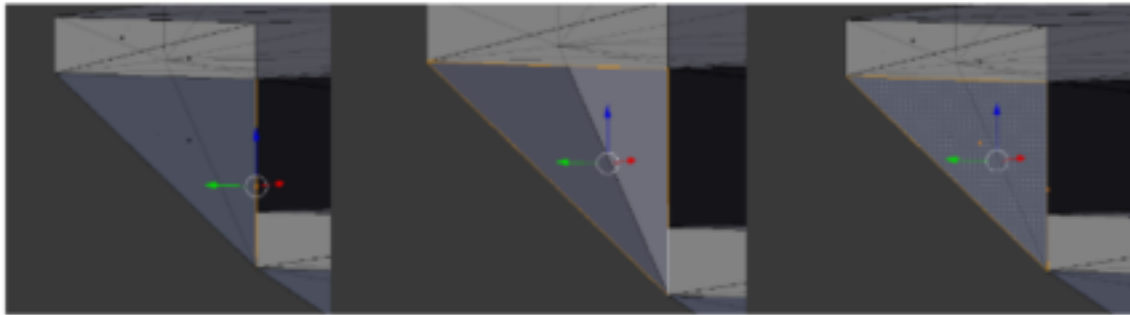
The following example is a more complex model of a stairs. At the left there is not much weird to see at first sight. If we look at the preview tab, you see a lot of problems. Slic3r is apparently not able to slice the model. If we open up the model in Blender and go to edit mode while selecting the object, there still doesn't seem to be much wrong. Although the different shades at the right of the model do give away that something is wrong. Blender is not able to determine the correct shade of those faces.



We can easily check for non-manifold problems by, still in edit mode, select vertex select mode. Then from the 'select' menu find 'Non Manifold'. This will select all vertices with a problem. Not everything selected is wrong, but it indicates that there is a problem nearby. If we look at the back of the model we find a face missing. By selecting two edges and pressing F, Blender will create a face. By clicking Mesh → Normals → recalculate Outside, Blender will try to reevaluate the object. And the shades are much better now.



That was an easy fix. At the top of the stairs there is a bigger problem. There is a face infinitively small at the corner. Also it's not connected to a vertex in the middle, making it problematic to render correctly. Select both the small face and the face covering the side and delete them. Go to edge mode, select the surrounding edges and press F to fill-up the hole with a new face. Once all non-manifold problems are fixed the model looks much better in the Slic3r toolpath preview.



In conclusion, it takes a lot of time to fix a non-manifold object. It can be quite tedious work to get an object to be sliced as desired, although the software can handle a few problems. So preferably, the software exporting the STL file should do a better job by adjusting parameters for exporting. But if nothing helps, at least you can detect and fix common problems now.

Thingiverse updates

Thingiverse

On Thingiverse you can find a lot of cool stuff to print. From guitar picks to Pokemon. You can also find handy stuff to cover up electronics.

Maker Henk Diepeveen

How to store your quality Filament from exposure of moisture? Print a Reelbox for Realwheels (diameter 200 x 70mm)

Find the Real box [here](#).



Find your quality Real Filament here!

TCT Announcement



26 - 28 September 2017
NEC, Birmingham, UK

Stand G56

RepRapWorld will be attending the TCT show 2017. And we would like to invite all of you to come visit us at the booth.

During the TCT 2016, Bart Meijer our Technical Manager was given the chance to respond to some questions from Jenny Shang.

She was exploring the new and exciting world of 3D Printing (something we already know by hearth).

The whole article gives a great feeling on what to



expect at the TCT show. 3D Printers, 3D Printer parts, Filament and much more. See the [link](#) below for the full article.

Jenny Chang's view on the TCT show 2016

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