

3D Printing

KICKSTARTER'S CHEAPEST 3D PRINTER DELIVERS

For many people, 3D printing is something that they've heard about but which they figure is either too expensive or too complicated to dabble with. Since the arrival of the very first \$350 plug-and-play-style 3D printers late last year, however, that belief might be on its way out. Consider the M3D: a compact, consumer-grade 3D printer that promises "high quality prints made easy." Is it all that we had hoped for? I've spent several months with the M3D, and several dozen prints later, here are my findings.

The Background

The M3D is a project that took off on Kickstarter. The company raised \$3.4M to bring the dream of an inexpensive yet reliable and easy-to-use 3D printer to life. Evidently, many people bought into that dream. The good news is that it works. Everything in the user interface is presented in layman terms, with words like "high" vs. "low" quality, and the software walks you through tasks like loading and removing filament, which is great for beginners. I was printing within 15 minutes of taking it out of the box, and the part that came out at the end was better than the very first prints that I made with a Thing-O-Matic a few years ago.

I can't help but draw parallels with MakerBot's 2010 landmark Thing-O-Matic, the first hobby-kit 3D printer on the market and the printer that started this revolution. Back then, 3D printing was hard: you first had to assemble the machine from parts, then software configuration and tuning could take weeks, with lots of research, trial, and error.

Fast-forward six years and you get a new wave of entry-level consumer 3D printers that are lighter, less expensive, easier to use, and that produce similar-quality prints. What struck me at first is how easy the M3D is to carry. Its plastic cube frame is rigid and easy to grip. It just feels like something you could throw into a backpack (but don't do that). It has something of a toylike appearance, which will make it approachable for newcomers but which serious Makers may find dubious—at least at first.

How It Works

The M3D has a cold printing bed, so it is recommended for PLA plastic only. M3D sells ABS filament, but warping might become an issue. The print bed is covered with a BuildTak sheet, a special rough surface that provides maximum adhesion. It works very well, but after my third print, I was already starting to damage it. M3D sells replacement BuildTak sheets for \$6 each, and I recommend getting a few spares.

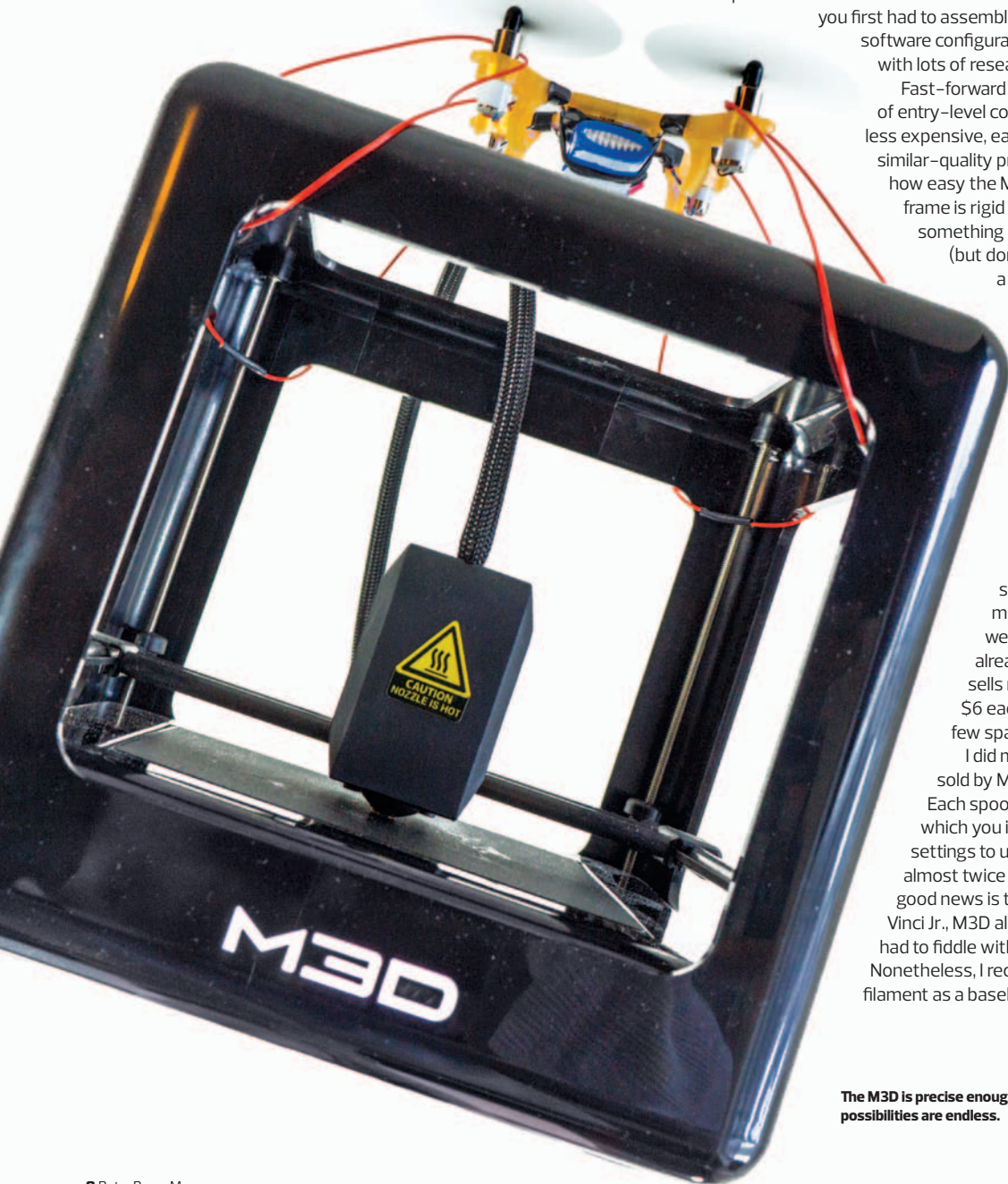
I did most of my tests with PLA filament sold by M3D (the company calls it "3D Ink"). Each spool comes with a code on the side, which you input, and it tells the software what settings to use. At a price of \$14 for 225g, it's almost twice the cost of generic filament. The good news is that, unlike its competitor, XYZ's da Vinci Jr., M3D allows the use of generic filament. I had to fiddle with the settings a bit, but it's doable. Nonetheless, I recommend starting with M3D's filament as a baseline.

The M3D is precise enough to print this micro-quad airframe. The possibilities are endless.

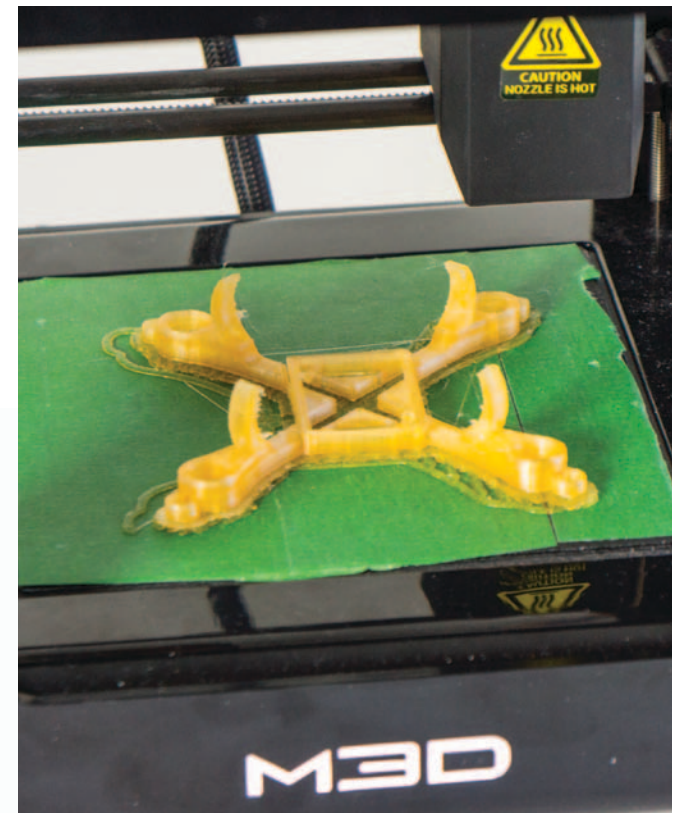
The quality of the prints, using the settings out of the box, was fairly good. On its website, M3D claims that its printer can reach a layer resolution of 50 microns (lower is better), but at the highest quality setting, I found that the machine had trouble extruding and the print failed. The "medium" setting worked best.

I also had some issues with the software, which is still in beta. I had the M3D working, but it started misbehaving when I updated to the latest version of the app. When I downgraded, the problem went away. The program also gets easily confused when fed 3D files (STL) that have some flaw in the geometry, more so than other common programs like Cura or Slic3r. I'm hopeful that those issues will be resolved as M3D keeps improving its software.

I also have to mention the noise. My M3D had a very noisy little fan built into the print head. You won't hear it if you're in another room, but if you sit next to it while it prints, the sound can be annoying. M3D must have figured out it was an issue because the company offers a free replacement fan for machines still under warranty. Replacing it,



One of the first objects that I made was this custom spool holder that I downloaded from Thingiverse. The filament spool can be loaded in a special compartment under the print bed, but although that sounds very cool in theory, it's a pain in practice. Inserting and pushing the end of the filament into the small opening requires extreme finesse and a technique that I could not quite master. Then, when I tried to remove the spool to change colors, the filament broke inside the feeder tube and I could not use it anymore.



The M3D offers a print volume of approximately 113 x 109 x 116mm (4.4 x 4.3 x 4.6 inches). You can print directly on the BuildTak sheet, but I protected mine by covering it with painter's tape (sometimes called blue or green tape) and my prints came out just as good. M3D also recommends selecting the "use raft" option when printing (visible on the picture), but I later discovered that I could manage without it.



These two test parts were made with the M3D. The one on the left should be a perfectly round cylinder. The printer had trouble with a few things, like making consistently round shapes and extruding a top layer all the way to the edge, as is somewhat visible on the steps of this pyramid. There are a few things that you can do to help with that, such as adjusting something called the "backlash." I followed the tutorial on the M3D website and saw some improvement, but as you can see from this picture, I couldn't get it as perfect as it should be. It's not a deal breaker, but experienced Makers will notice it.

however, means taking apart the print head. It's not difficult, but not everybody is going to enjoy doing that.

The standard edition M3D sells for \$350, but the company says that it will discontinue this offer soon. The retail edition that comes with a spool of filament is sold for \$450. The M3D feels very much like a product still in beta. It's a good machine for newcomers, but its slight shortcomings might disappoint veteran Makers. The portable nature of the M3D is just begging for Wi-Fi support, for instance. Right now, it must remain connected to a PC for the duration of each print. With the previously mentioned da Vinci Jr. breathing down its neck with precisely this kind of feature, M3D will have to step up its game if it hopes to remain relevant.