How to Evaluate the 2015 Make: 3DP Test Probes

By **Andreas Bastian** November 7th, 2014 6:00 am

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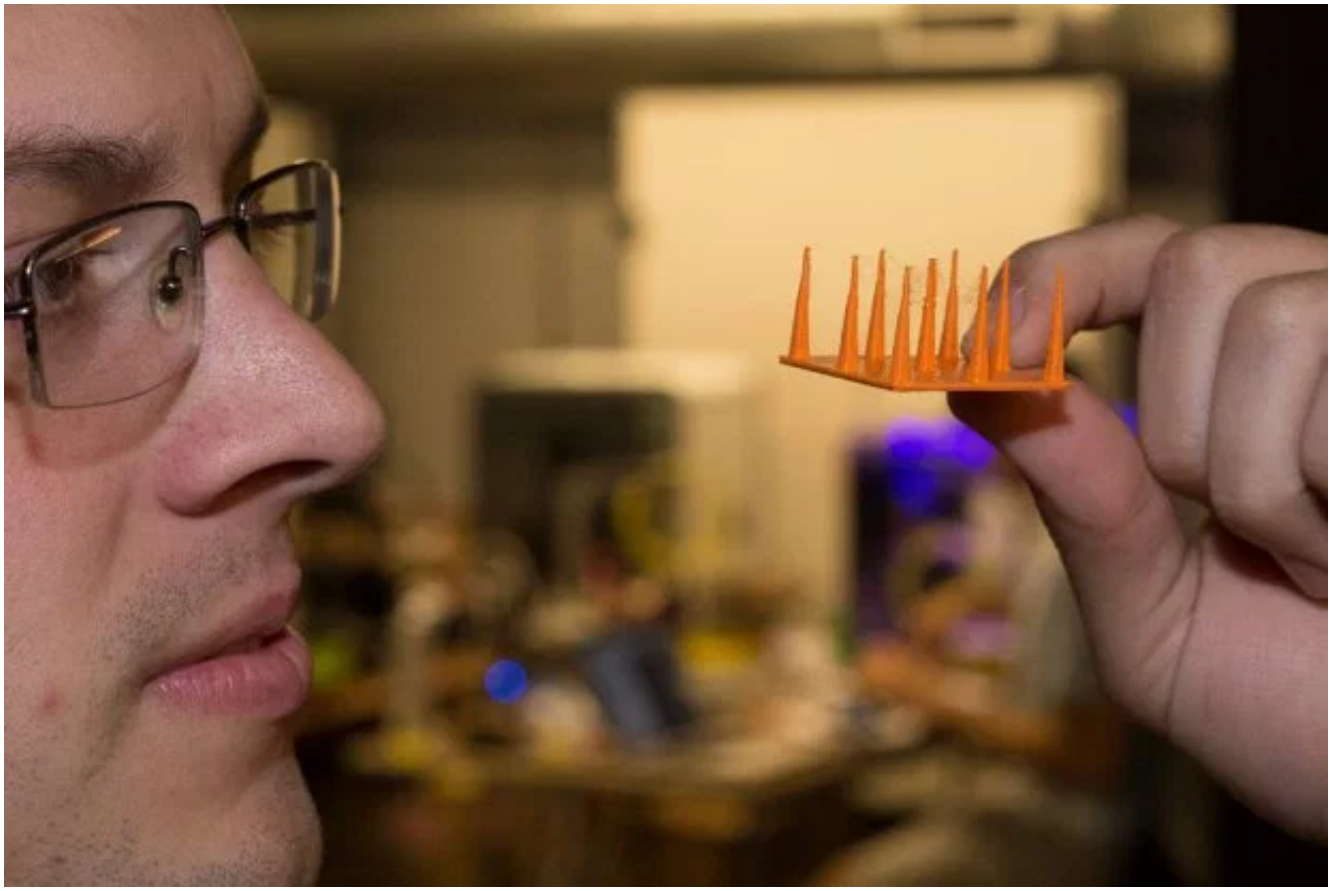


Want to see how your 3D printer stacks up to the competition? Download our test-print files and follow along.

Printing:

For evaluating overall system (machine, software, and materials) performance, print the following at default or “medium” settings. For most machines, this translates to a layer height of 0.2mm and default speeds and temperatures.

If evaluating multiple machines, it is imperative to use the same material, preferably from the same spool (unspooled lengths of filament can be used for individual prints to facilitate this). The *Make:* Magazine 3DP testing team used **Ultimachine orange PLA** for all PLA machines.

*More 3D printing in **Make: Vol. 42**.*

DOWNLOAD AND PARTICIPATE!

The 2015 3DP Test Geometries, created by **Andreas Bastain**, are available from *Make:*'s **YouMagine** and **Thingiverse** accounts. **Print them yourself and report your settings and scores!**

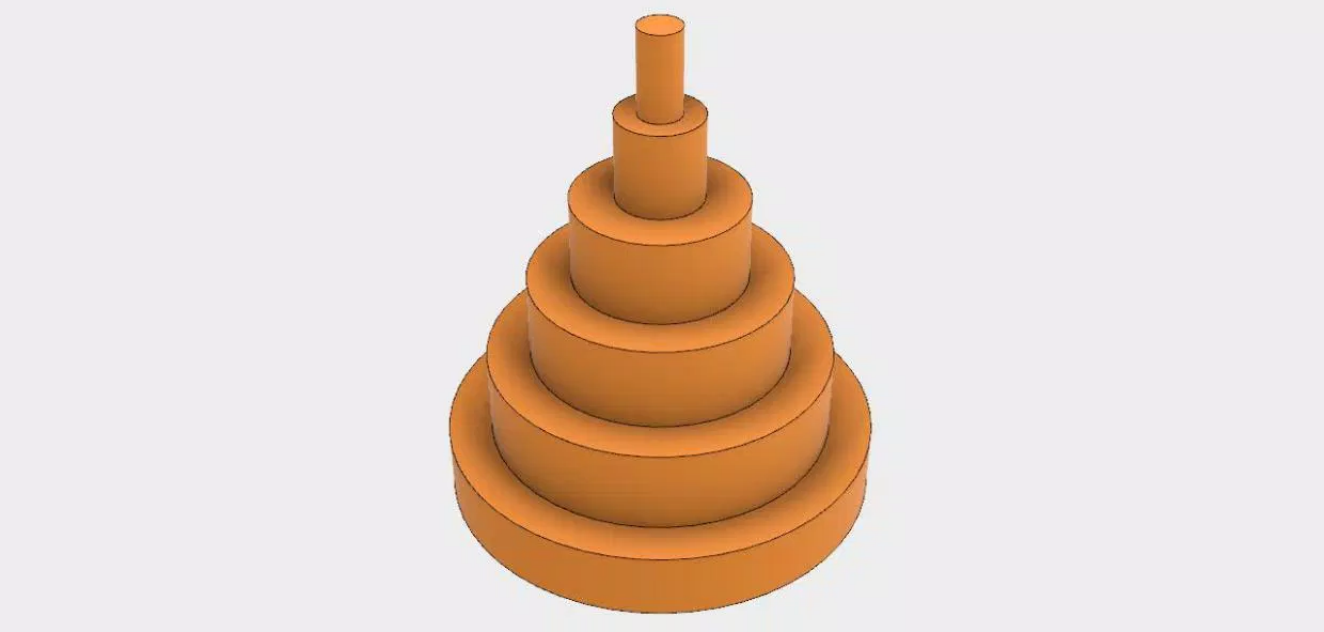
How Much Filament?

1. **dimensional_accuracy_test.stl** requires approximately *0.99m of filament*
2. **bridging_test.stl** requires approximately *1.54m of filament*
3. **overhang_test.stl** requires approximately *2.00m of filament*
4. **negative_space_tolerance_test.stl** requires approximately *2.54m of filament*
5. **retraction_performance_test.stl** requires approximately *0.52m of filament*
6. **XY_resonance_test.stl** requires approximately *0.95m of filament* (if your slicer cannot do 0.5mm walls, use XY_resonance_1.0mm_walls.stl)
7. **Z_resonance_test.stl r**equires approximately *2.64m of filament*
8. **The Maker Faire Robot Action Figure** (with supports) requires approximately 3.58m of filament

Here's how to evaluate and score your prints.

1. Dimensional Accuracy

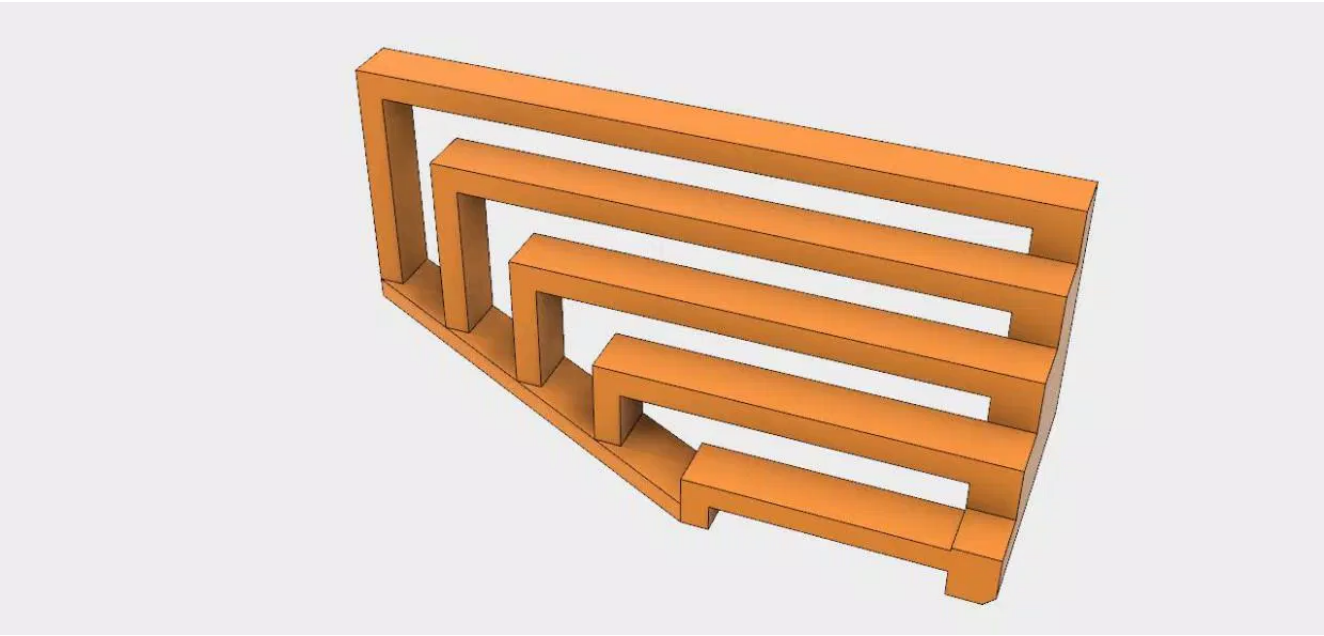
Using digital calipers, measure the second from the bottom tier of the print (with a target diameter of 20mm) across the X and Y directions, following the guide on the bottom of the print. Differences between X and Y measurements indicate the magnitude of backlash present in the system.



- Assign the print a “1” if average deviations in X or Y are greater than 0.4mm.
- Assign the print a “2” if average deviations in X or Y are between 0.4 and 0.3mm.
- Assign the print a “3” if average deviations in X or Y are between 0.2 and 0.3mm.
- Assign the print a “4” if average deviations in X or Y are between 0.1 and 0.2mm.
- Assign the print a “5” if average deviations in X or Y are between 0 and 0.1mm.

2. Bridging Performance

Inspect the five bridges for dropped perimeters and infill.

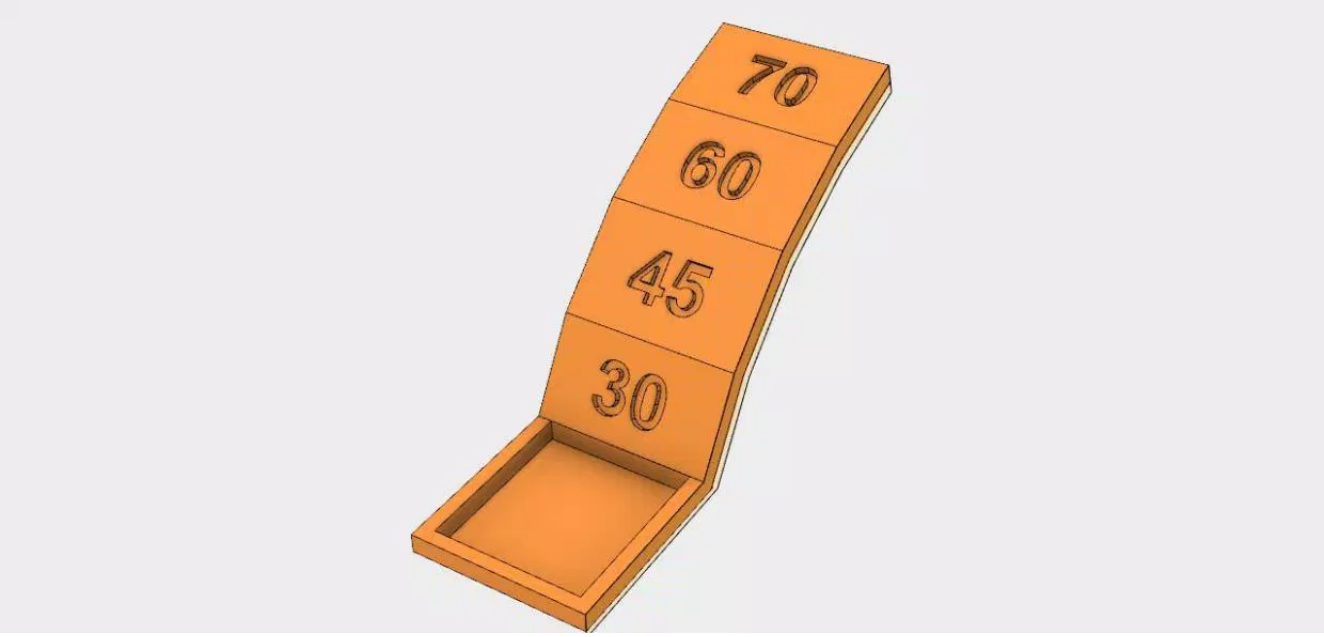


- Assign a “1” if any bridge has dropped infill.
- Assign a “2”if only the longest two bridges have dropped infill.
- Assign a “3” if none of the bridges have dropped infill, but all have dropped perimeters.
- Assign a “4” if the shortest two bridges compiled without any dropped perimeters.

- Assign a “5” if all bridges compiled without any dropped perimeters (drooping of less that 2mm is acceptable).

3. Overhang Performance

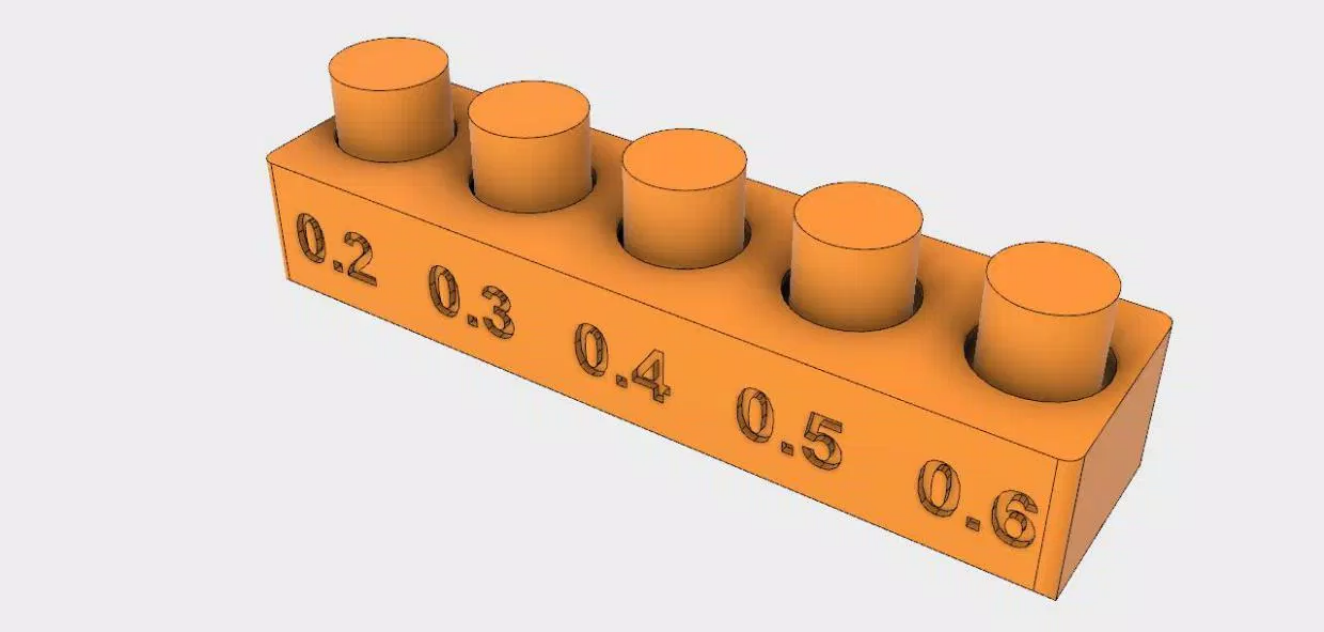
Inspect the 30, 45, 60, and 70 degree overhangs, looking for drooping perimeters, wobbling extrusions, and infill hemorrhaging.



- Assign a “1” if the printer did not compile any of the individual overhangs. Assign a “2” if the printer compiled the geometry but dropped loops and infill on the 60 and 70 degree overhangs.
- Assign a “3” if the printer only dropped loops on the 70 degree overhang.
- Assign a “4” if the printer didn’t drop any perimeters and the surface of the 60 and 70 degree is only slightly different from the surface of the 30 and 45 degree overhangs.
- Assign a “5” if there is little distinguishable difference in surface structure between the four overhang angles.

4. Negative Space Tolerances

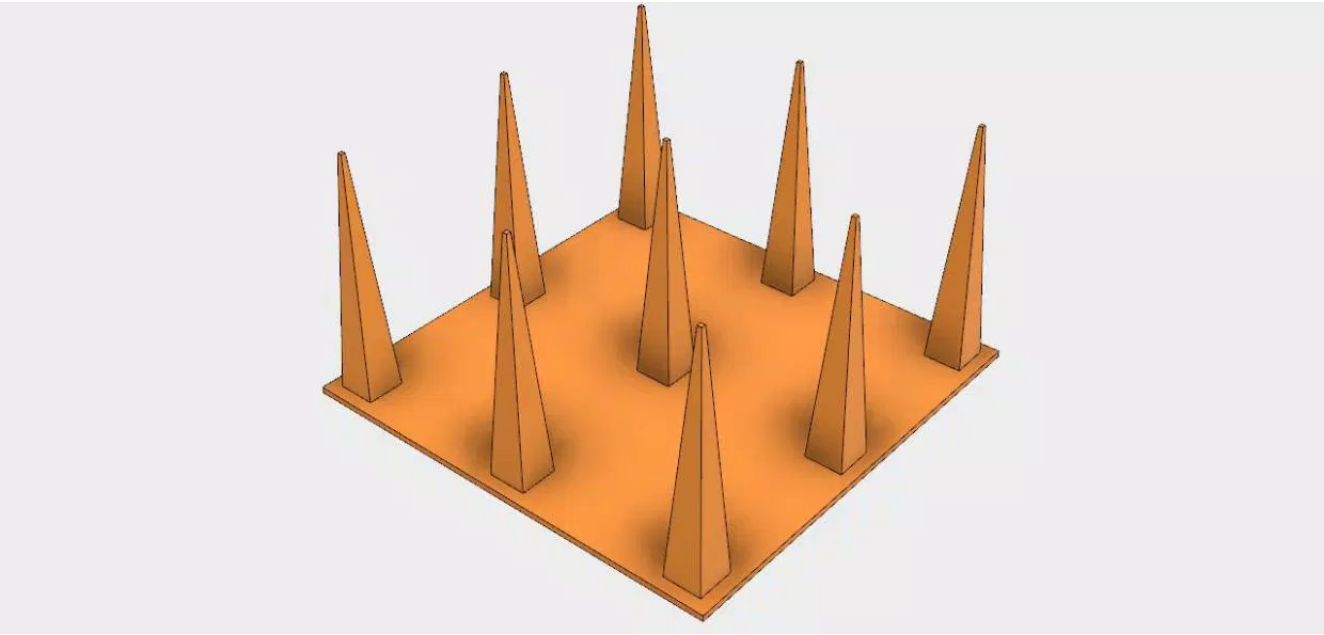
Remove the captive pins by hand without using tools.



- Assign the print a “0” if no pins can be removed.
- Assign the print a “1” if the 0.6mm radial tolerance pin can be removed.
- Assign the print a “2” if the 0.6mm and 0.5mm radial tolerance pins can be removed.
- Assign the print a “3” if the 0.6, 0.5, and 0.4mm radial tolerance pins can be removed.
- Assign the print a “4” if the 0.6, 0.5, 0.4 and 0.3mm pins can be removed.
- Assign the print a “5” if all pins can be removed.

5. Fine Positive Space Features Performance

Evaluate based on the quality of deposition composing the spires:



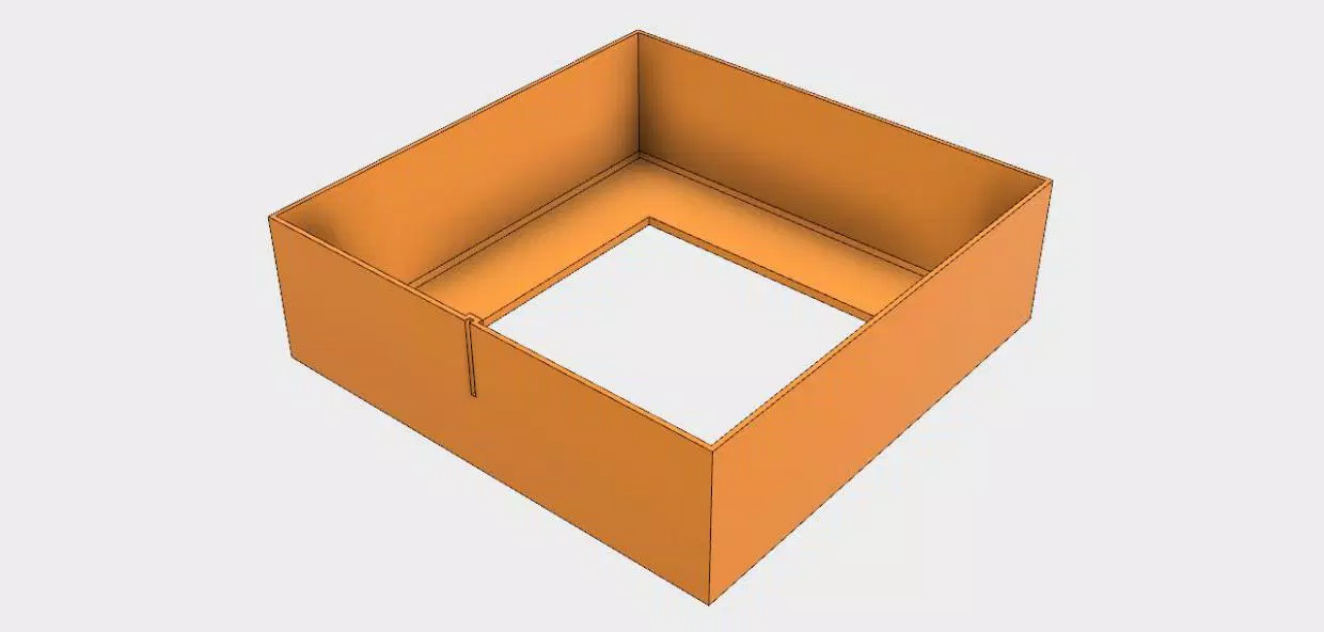
- Assign the print a “1” if the spires did not compile due to extruder jam/lack of material flow.
- Assign the print a “2” if the spires compiled but are densely connected by strands of

material.

- Assign the print a “3” if the spires compiled and there are some connecting strands but the main deviation from target geometry is due to volume flow issues (under- or over-extrusion).
- Assign the print a “4” if the spires compiled, there are no connecting strands, but there are volume flow issues.
- Assign the print a “5” if the spires compiled and there are no connecting strands and no stepping or ridging due to volume flow issues.

6. Mechanical Resonance in XY

This test evaluates both resonance in the XY gantry, deposition control during linear extrusions, and deposition control at layer changes. As resonance is difficult to measure quantitatively, this is a binary test.

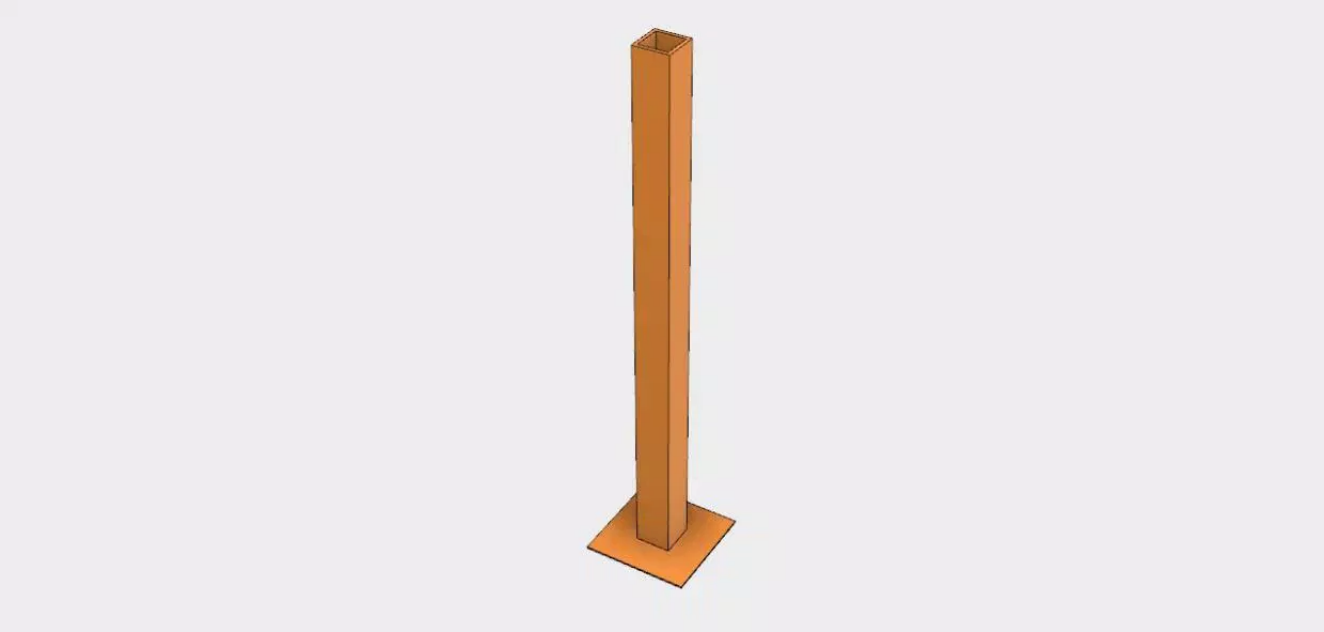


- If there is any rippling at the corners or at the midpoint of the print wall with the inset, assign the print a “fail” value of “0”.
- If there is no rippling, assign the print a “pass” value of “2”.

While expressly designed for evaluating resonance, the print can also be used to evaluate deposition control in a more qualitative manner (inconsistent extrusion width, standing wave effects).

7. Mechanical Resonance in Z

This test exposes resonance in the Z axis if present and is subject to a binary evaluation.



When illuminated from above, if there is a noticeable loss of layer registration in the top half of the print, manifesting as horizontal ridging, assign the print a “fail” value of “0”.

If there is no loss of layer registration with increasing Z height, assign the print a “pass” value of “2”. In addition to evaluating Z resonance and layer registration, this print can expose misalignment in the Z-axis if there are consistent ridges of the same pitch as the leadscrew.

To get the total mechanical resonance score, add the XY and Z scores.

Documentation and Sharing:

Please use the “I Made One” button on your file sharing site of choice to share your results! Make sure to include the following information with your photo(s) of your completed test prints:

- Machine make and model
- Slicer and slicing settings (layer height, number of shells, print temperature, extrusion multipliers, speeds)
- Print time – Start with a room temperature extruder and platform. Begin timing when you start the print, and include the preheat sequence. Keep timing through any post-print sequence, like the extruder or platform returning to a homing position.
- Filament source

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ANDREAS BASTIAN

Andreas Bastian researches, designs, and builds new types of 3D printers. He has worked with FDM, SLS, DMLS, and SLA technologies and aims to make all more accessible. Currently a 3D printing research scientist at Autodesk, he is also active in the e-NABLE 3D printing prosthetics community.

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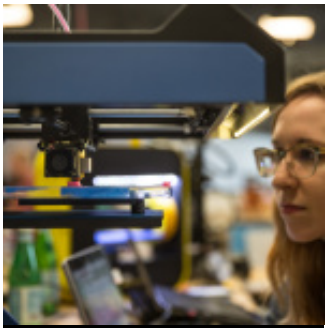

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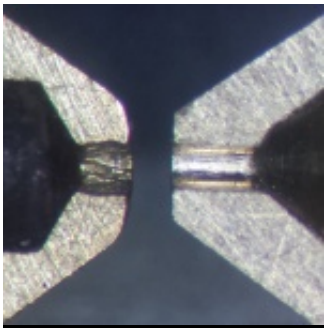

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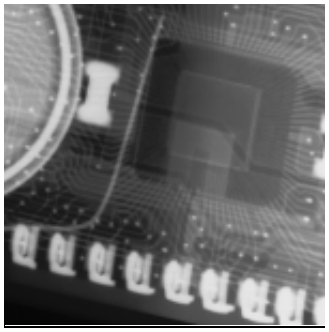

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ianlee74 · a year ago

Andreas, I love this. Thanks for releasing it. The perfect complement would be a post on what to do to your printer to improve your scores on each test. Thanks!

9 · Reply · Share ›

Anna Kaziunas France ianlee74 · a year ago

Agreed! Great idea! We've been discussing how to work that into a upcoming publication.

4 · Reply · Share ›

ChrisWilsonCA · 9 months ago

Here is a Google spreadsheet of the test results and printer features:

https://docs.google.com/spread...

This spreadsheet makes it easy to sort the printers by whatever tests and features are most important to you. The negative space tolerance (minimum gap), accuracy and backlash scores were converted to their corresponding measurements to make them easier to interpret (".2 - .3" means between .2 and .3mm). The initial view of the spreadsheet is sorted by the 2nd to 5th columns. To sort by different columns:

1. Highlight all columns in rows 4 to 27 with the left mouse.
Be sure to include the bottom row of labels (row 4) in the highlighted data.

2. Click Data>Filter views>Create new temporary filter view.

3. Click the boxed triangle in the column you want to sort and select Sort A->Z for increasing numbers or Sort Z->A for decreasing numbers.

4. To sort by multiple columns, repeat step 3 doing the least important column first and the most important column last.

see more

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ChrisWilsonCA ChrisWilsonCA · 9 months ago

Here are some observations derived from the spreadsheet in my previous post:

1. DeltaMaker, Ultimaker 2 and Replicator 5th Generation were the only printers that printed a removable pin in a hole with a .2mm radial gap. Despite this excellent performance on gaps, DeltaMaker and Replicator 5th Generation did poorly on the fine features test (the spires did not print or were densely connected by strands of material).

2. DeltaMaker, Printrbot Simple Metal, TAZ 4 and Type A 2014 Series 1 were the only printers that had both accuracy and backlash under .1mm. Of these 4 printers, DeltaMaker was the only one that did well on both the surface curved and surface general tests.

3. Ultimaker 2, Zortrax M200, TAZ 4 and Felix 3.0 were the only printers that got perfect scores on the fine features test. Of these 4 printers, Ultimaker 2 and TAZ 4 were the only ones that did well on the bridging test.

4. Ultimaker 2 and Zortrax M200 were the only printers that got perfect scores on both the surface curved and surface general tests.

see more

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Ben Gruber · a year ago

In the description of the bridging test, what is the meaning of "dropped infill" versus "dropped perimeters"? Does it mean "there is a gap in the bridge" versus "the bridge is drooping"? Does the phrase "bridges compiled" refer to something the software did or something the hardware did? Is the description suppose to say "drooped perimeters" (the perimeters are sagging) instead of "dropped perimeters" (the perimeters are missing)? How is it possible to have dropped or drooped perimeters without also having dropped or drooped infill? Please post a few pictures to clarify these situations.

The description of the bridging test says:

Assign a 1 if any bridge has dropped infill.
Assign a 2 if only the longest two bridges have dropped infill.

Based on this description, it appears that the score would be 1 if only the longest bridge has

Based on this description, it appears that the score would be 4 if only the longest bridge has dropped infill. Since higher scores are better, I guess what is meant is:

Assign a 1 if more than two bridges have dropped infill.
Assign a 2 if one or two bridges have dropped infill.

Thank you for making these great test models and for sharing them.

2 · Reply · Share ›

David H. · a year ago

I have a few questions about the meaning of the print scores.

1. For the accuracy score, the article says "measure the second from the bottom tier of the print (with a target diameter of 20mm) across the X and Y directions." The article also says "Assign the print a 5 if average deviations in X or Y are between 0 and 0.1mm." Does "average deviations in X or Y" mean

a) the average of the deviation in X and the deviation in Y
b) the maximum of the deviation in X and the deviation in Y
c) the average of the deviations in X and the deviations in Y for each of the different tiers in the model
d) the maximum of the deviations in X and the deviations in Y for each of the different tiers in the model
e) none of the above

In my opinion, it does not make sense to average deviations. A printer with a deviation in X of .4mm and a deviation in Y of 0mm is clearly worse than a printer with a deviation of .2mm in both X and Y. The average deviation is the same in these two cases. I think the accuracy score should be based on the maximum deviation across all tiers in the model with the

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2 · Reply · Share ›

GlenSims · 9 months ago

In the next 3D printer shootout, I suggest replacing the bridging score with these two numbers:

1. Length of longest bridge without dropped infill where all shorter bridges also don't have dropped infill (possible name: Completed Bridge)

2. Length of longest bridge with less than 2mm of droop where all shorter bridges also have less than 2mm of droop (possible name: Straight Bridge)

These scores are useful when designing objects and they are easier to interpret than an integer from 1 to 5. With the current bridging test print, the possible values for each score would be: <2cm, 2cm, 3cm, 4cm, 5cm, >6cm.

In the table below,
P = bridge passed (minimal droop or no dropped infill)

F = bridge failed (excessive droop or dropped infill)
X = don't care

_____Bridge Length (cm)

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see more

1 ^ | v • Reply • Share ›

GlenSims • 9 months ago

For the XY resonance and Z resonance tests in the next 3D printer shootout, I suggest printing the test prints at up to 5 different speeds and derive the score from the shortest print time that passes the resonance test and has all longer print times also pass the test. In the table below, the print times are labeled A(longest) to
E(shortest) and

P = Pass
F = Fail
X = Don't Care

_____Print Times
Score__A B C D E
0_____F X X X X
1/A____P F X X X
1/B____P P F X X
1/C____P P P F X
1/D____P P P P F
1/E____P P P P P

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see more

1 ^ | v • Reply • Share ›

RalphNYC • 9 months ago

The manufacturers of closed-source printers (MakerBot, Zortrax,...) should reconsider the benefits of open-source for both the customer and the manufacturer. I will only buy open-source printers because open-source gives me the flexibility to fix my own problems instead of being dependent on the manufacturer.

There are plenty of good open-source printers. Six out of ten of the top performing printers in Make's annual guide (what Make called "The Standouts") use open-source software. Four out of ten have open-source hardware. If MakerBot Replicator 5th Generation and Zortrax M200 were open-source, maybe a customer could figure out how to improve their test results.

1 ^ | v • Reply • Share ›

Greg • 10 months ago

Make Magazine measured greater than .4mm of backlash for the da Vinci 1.0 while Chuck Hellebuyck measured 19.95 - 19.89 = .06mm of backlash for this printer. Can anyone make a

guess about why Make and Chuck got such different backlash measurements on the same model of printer? The only explanation I can think of is maybe the printer Make tested got damaged in shipping. Make's review said "Our package clearly had some serious international miles on it, but everything was well packed and in good order."

I would not expect differences in software settings to change the amount of backlash. Backlash is related to the amount a stepper motor has to be told to move before the nozzle actually moves at all when the direction of motion changes. When the direction of motion changes, the printer software can tell the stepper motor to move a little extra in the new direction to make up for gaps between pairs of gears. What the printer software can't compensate for is the variability in these gaps between different printers.

It will be interesting to see the test results from other da Vinci owners. On the accuracy/backlash test, I suggest that people report the measured values of the diameters in the X direction and the Y direction so that there will be a clearer picture of where the results are different.

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Daniel Hegner · a year ago

Thanks for this benchmark! It has been useful for me to benchmark my Robo3D printer! What I'm missing is some pictures of the most common failure modes and I'd also appreciate a clarification to the question posted by David H below.

Thanks again, Daniel

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Bill Walker ➚ Daniel Hegner · 10 months ago

Would you mind sharing your test results? I just got a Robo3D R1 for my birthday and am debating returning it for a Printrbot Simple Metal. I would love to have some quantitative data to guide my choice.

Thanks.

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Guest · a year ago

have some: http://www.thingiverse.com/thi...

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3DZPrinting · 6 months ago

Curious... It says you used the same material for all Pla machines. What about the ABS machines?

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Simon Cook · 9 months ago

I see one flaw with this evaluation set and that is that it does not score the ability to print easily removed support. Some real word designs that we want to print cannot be printed

without some kind of support. No printer can print cantilevers without support. Printers like the Zortrax and Up/Afinia with snap away support or those offering a second disolvable filament are invaluble for printing anything complex and I think should be rewarded in the scoring for such. I have a collection of repraps for my use and one Up Plus for the prints that present as too gravity defying to print unsupported. I really wish the open Slicers would get this worked out!

Chuck Hellebuyck • a year ago

I just ran the tests on my davinci 1.0. I have corrected the loose glass and repaired a broken bearing mount in the past (as seen in my YouTube videos:

Greg ↗ Chuck Hellebuyck • 10 months ago

On the accuracy test, what did you get for the length of the diameter in the X direction and the Y direction? Why do you think you scored better than Make on the accuracy and Z resonance tests?

Chuck Hellebuyck ↗ Greg • 10 months ago

19.95 Y, 19.89 X. Less that 0.1mm average variance to nominal 20mm. Didn't have any offset in Z or light leaks per the directions.

Luis E. Rodriguez ↗ Chuck Hellebuyck • a year ago

Sounds great, care to share your settings and/or photos? This would benefit other users of the machine or those thinking about purchasing it.

Chuck Hellebuyck ↗ Luis E. Rodriguez • a year ago

Settings were in my post. Excellent Mode in Davinci XYZware (0.2 layer height, 10% fill). You can see more of my results at my YouTube Channel.

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Jon MacDonald • a year ago

Great idea, going to run these tests on our Makergear M2 tonight. Thanks for the hard work!

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Tiziano Berti • a year ago

hi, amazing work and test method!
we have a 3D printing lab in Milan (Italy) and we're working on some test method for materials instead of printers. Some tests can be overlaid and be a good test method both for printers and materials.
Since we think that in many cases parameters drive print quality more than the printer itself can you please share the settings you used for each print/printer?
in this way we can check the full method and have a better understanding of the review.
For our material tests we are running a matrix test of temperature-speed combination to evaluate surface finish, cooling time, layer adhesion, and they could also be run on yours models to check for example the bridging ability of a filament.
Thanks and keep it up!

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Luis E. Rodriguez ↗ Tiziano Berti • a year ago

We used the parameters that each manufacturer listed on their websites. In many cases they provided profiles for the slicer recommended.

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Greg ↗ Luis E. Rodriguez • 10 months ago

When the individual printer reviews are published on Makezine.com, how about providing a link to the web page that contains the parameters used? I haven't

been able to find any default parameters for the da Vinci on us.xyzprinting.com. As can be seen in the post by Chuck Hellebuyck, without knowing the parameters, it is impossible to know why two people got different results on the same test. Enough parameters need to be specified so that two people can get the same results on the same test.

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Garret Hoffman • a year ago

I've been printing with shape-ways for a while now, and now I'm curious how their printing in various materials stacks up against these metrics... >_>

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Luis E. Rodriguez ➚ Garret Hoffman • a year ago

Only their FDM prints would be applicable to these tests. Not SLS or other technologies that they use. They weren't designed for those methods.

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Anthony • a year ago

Not sure how the ultimaker 2 beat the zortrax m200? Also not sure why makerbot is listed in any category other than terrible. Guess it boils down to which company pays the most money or the crew that review the printers don't know what they are doing. Andreas Bastian however knows his stuff can't speak for the rest of the nobodys

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Edward Carr ➚ Anthony • 10 months ago

Anthony,

The Zortrax M200 is a good printer but it has 3 serious limitations that I hope Zortrax will fix on their next model:

1. The printer can not print PLA.
2. The warranty is void if third-party filament is used.
3. The printer does not have open source hardware and software.

Zortrax's next model needs the ability to control the temperature of the nozzle so it can print PLA and other materials. Ideally, Zortrax should offer this as an upgrade to their current customers. If there are third-party filaments that are known to damage the printer, they should be listed on Zortrax's web site. Third-party filaments that have been tested and found to work fine should also be listed on Zortrax's web site.

Makers need and want the freedom to modify the hardware and software of our printers. It is much more difficult for us to make improvements and modifications with a closed source printer like the Zortrax M200. I suggest that Zortrax use a non-commercial open source license for their hardware and software like Ultimaker.

Make's resonance tests are really an indication of the printer's default print speed. Zortrax could slow down the default print speed if they want to pass Make's

Zortrax could slow down the default print speed if they want to pass Make's resonance tests. I personally don't care about the bridging score either. If Zortrax fixes the 3 serious limitations above and improves their results on the negative space tolerance test, Zortrax will have a good chance of having the best printer in next year's shootout.

1 ▲ | ▼ • Reply • Share ›

Anthony ➚ Edward Carr • 10 months ago

Not quite sure if you have used a 3D printer before but open sourced printers are garbage. I've owned the Mendal, Solidoodle 3, Afinia H480, Pegasus SLA 3d printer and the Zortrax. All except the Afinia H480 and the Zortrax have amazing print quality and reliability both packaged together, Both printers are closed sourced and both printers have extruders that run hot. When I had the open sourced printers I had nothing but issues with printing. You couldn't just drag, drop and print. Parameters had to be adjusted based on each print such as the speed, flow, retraction and feed rate. Marlin has never been solid and all the slicers except for simplify 3d had slow import times on importing STL and/or Slicing the STL to gcode. I couldn't print lets say a bolt, gear and bust all at once because each required different settings to print correctly with any decent quality. With closed sourced printers you can drag and drop any type of STL whether it'd be a bolt, gear, bust, mount you name it and it would print it beautifully and successfully 98 percent of the time. I'm not sure what everyone's fascination with PLA is but for any engineer or designer you want a material that will not warp in the sun or doesn't brake while you apply any tension. PLA is extremely brittle and although it has little warp there are techniques that can be applied such as a heated enclosure that reduce warp

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Anthony ➚ Anthony • 10 months ago

Ahh and if you don't believe me check out my instagram Techbuilder for some of the prints I've done

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Nick Parks ➚ Anthony • a year ago

Hi Anthony, I wrote the review on the Zortrax M200. Let me start by saying after printing through at least 20lbs of filament, I am throughly impressed with the machine. I expressed the quality of this machine in the review, it prints extremely reliably, and accurately. Support comes off well and prints are very durable. That being said, it can only print in ABS and as beautiful as the prints were, we did see significant resonance in the x y and z axes and found that the printer requires support material when bringing most gaps. I ran the test prints in both Ultimachine and Zortrax filament and the results were the same.

After printing each print, we placed a coded indicator on the bottom and put them into

piles of prints with those from other machine sorted by print model. We then conducted a blind study based purely on print quality and sorted the prints from one to five without knowing which machine they came from.

The Zortrax rated very well, but was held back by it's bridging ability and and resonance. I know that by tuning the settings in this machine, the prints would have come out better, but to keep things equal we printed every print on every printer with the default settings. We then tallied the points to rank the printers.

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Anthony ➚ Nick Parks • a year ago

Nick,
I'm glad you love the printer but take in mind a couple of things. ABS is a much harder to print well filament vs PLA that sticks to anything and virtually has no warp and does not need a heated enclosure. ABS is like painting with oil based (no pun intended) professional paint and PLA is the cheap water color paint that is simple and easy to use but at the end of the day it's a paint for kids. Most machines now a days print with PLA but that's a cop out and any print that degrades in your car when it's hot outside shouldn't be used as a filament. Stratasys industrial machines don't offer PLA why do you think that is? Next lets talk about bridging, bridging is an excuse for a printer that can't print with support or "easy to remove support shall I say" so most printers rely on bridging because they can't do supports well even people who moderate at ultimaker forum recommend not to (http://umforum.ultimaker.com/i.... You don't see stratasys providing bridging examples because that's a limitation as supports provide better surface quality so bridging shouldn't be a test to begin with and did you increase the fan to 100% when you tried to bridge? The resonance in the x, y, and z axis was do to the fact that you didn't pay attention to nozzle diameter and requirements from the print manufacture.

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see more

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Nick Parks ➚ Anthony • a year ago

I appreciate you responding so quickly. The test prints that we used were meant to test the machines to their limits. In the case of z-resonance, that meant thin and tall, non of the results were faked and Make is not paid by any 3D Printer manufactures or anyone else for that matter to produce the reviews. All of the printers had the same models and most printers even have the same .4mm nozzle size (including the Ultimaker). In most cases, you're right, bridging is not required, but some things that are nice about bridging besides users not having to remove support material are that they yield shorter print times, and also consume less filament and energy.

One thing we did do is layout the results so people could see what categories the printers did well in. Those who don't need bridging will probably disregard the it's bridging capability.

For most engineer's, ABS would be preferable, but for those who keep printers inside their homes, they may be bothered by the smell of ABS. Also, PLA is nice because it is bio degradable. I did the bridging test a few times once with the additional fan speed at 100%, it did help a little bit but was mostly consistent.

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Anna Kaziunas France Anthony · a year ago

Ouch! No money exchanges hands. Printer manufacturers send their machines and we review them. On models tested, when machines were run at the default settings, the Ultimaker 2 scored higher than the Zortrax.

From your comments, it sounds like you've read the issue. If so, then you know that the Zortrax scored in the top 5 machines tested and received a very favorable review.

If you have a Zortrax and have very dialed-in settings or tips you'd like to share - we'd love to hear them!

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Mark82 Anna Kaziunas France · a year ago

"Favorable review" - Happy Medium is an insult for Zortrax especially placing it together with ditto. When just another reprap got Rookie of the year "Bee" sorry what is special there or just because it is Open Source. Ultimaker 2 as number one, maybe if is about just printing dumb figurines but also there Zortrax can win without any tuning. All tests prepared for RepRap'ish printers now is 2014 not 2008 Support generation and ability to survive 48h print with failsafe extruder is important not bridging and tinkering, makerbot 5th anywhere in the top is a next joke. (I do own - Zortrax, Ultimaker 1/2 and Makerbot 5th gen) you guys can foolish peoples which never used this 3D printers but not professional users.

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Nick Parks Mark82 · a year ago

Hi Mark, as I discussed with Anthony, the printers were ranked via a blind test based based on their print quality alone. In the review I spoke very highly of the Zortrax's abilities, it is truly an amazing printer. As new software is released, I'm sure this machine will only print better and better. 6th of 26 isn't anywhere close to the a "Happy Medium", this machine was a top performer, and I think those who read the review's of the top printers will realize how good this machine is.

Thanks

-Nick

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Anthony ➚ Anna Kaziunas France · a year ago

I do own a Zortrax M200 and the ultimaker 2 has no where near the reliability, easy support releasing or quality for every print and requires no adjustment of retraction, flow rate and feed rate. I'm assuming that you did testing in the past before the 0.0.9 update from Zortrax however with the new software patch the print quality is night and day view here http://forum.zortrax.com/index...
You can also see here the comparison on previous pages how the zortrax has much better surface quality than the ultimaker 2.

I understand that they make you use their filament which is ABS but their filament is cheap and consistent and more reliable than PLA.You also used a filament which was not Z-ABS which voids the warranty and goes against testing the Zortrax on fair terms. The extruder on Zortrax runs hot similar to Afinia at about 268c most ABS filament likes to run with 210 to 240 tops.

I'm just saying that when you create tests you should consult with experts on the forums in regards to testing the printers as you may not be utilizing the machine appropriately, in this case it was the filament and I can understand that you wrote the article most likely before the software update but it does increase surface detail tremendously

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Julia Truchsess ➚ Anthony · a year ago

Actually, with models sliced by Z-Suite 0.0.8 or 0.0.9, the extrusion temperature of the Zortrax M200 is 280C (0.0.7 used 270C). Generic ABS will definitely not perform optimally at this temperature.

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Anna Kaziunas France ➚ Anthony · a year ago

We'd love to see the test prints run with the 0.0.9 update. Can you run them and post photos of your makes? After all, that's why we published the models -so makers like you could share their knowledge!
http://www.thingiverse.com/thi... or https://www.youmagine.com/desi...

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Anthony ➚ Anna Kaziunas France · a year ago

Of course I'll upload them by this week

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Anna Kaziunas France ➚ Anthony · a year ago

If you read the summary section of the PDF, you will see some more details about how we tested regarding filament exceptions.

For machines that did not claim to be able to handle PLA or used chipped, proprietary or special high temp filament - or were unable to print in Ultimachine PLA without jamming - we used the OEM filament. It is noted in the comparison chart and reviews summary. We also note the good quality and inexpensive price of the Zortrax filament in the review.

Zortrax does not claim PLA amongst its materials and the software does not allow for temperature control, so Ultimachine ABS to run the test prints.

Most of our testers have been printing since the very early desktop days. Several have been testing printers for three consecutive Shootout events. During our Shootouts, we are doing out-of-the-box testing, with out-of-the-box-settings - but we always contact support and use the forums if we run into trouble.

see more

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Anthony ➚ Anna Kaziunas France • a year ago

The filament stated in the article that was used for testing was Ultimachine ABS.

• Reply • Share ›

Anna Kaziunas France ➚ Anthony • a year ago

Ah - yes! I was just making edits to my response, you beat me to it. You are correct, it was Ultimachine ABS, which printed very well, according to our reviewer who has also used the Z-Filaments. I'd love to see the prints run in Zortrax's Z-Filaments, can you run them and post the pictures? Materials are a big part of how a printer preforms, I'm sure we'd all love to see the results!

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Anthony ➚ Anna Kaziunas France • a year ago

Anna you are very kind but you contradict yourself. Using a third party filament violates the warranty which you stated you did not violate the warranty. Additionally you stated care was taken when selecting print temps for filaments however you used ultimachine abs which prints at 240c which is a much lower temp than what the extruder runs on the zortrax remember 268c is its temp for Z-ABS with the Zortrax which is 28c off that's quite a bit, when you exceed temp you diminish quality. PLA is a cop out let's be honest the only difficulty with PLA is retraction but that can be dialed in easily and PLA does not require a heated platform or enclosure and prints on virtually anything. Ultimaker 2 does terrible with abs read their forums. If the Zortrax can print as easily with

terrible with abs read their forums. If the Zortrax can print so easily with abs with all the variables required can you imagine PLA? At the end of the day you guys labeled this article as ultimate printing guide but did not take into account simple variables. Doing this for 3 years does not make anyone an expert. I've been around 3d printing since the makerbot cupcake and the original reprap darwin but that doesn't make me an expert just means I know all the little quirks of 3d printing. Everyone who purchases this guide will now believe that the zortrax is a happy medium when it is at the top. I'll print those pieces by the end of the week and attach them here.

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Anna Kaziunas France Anthony · a year ago

Thanks! I look forward to seeing the prints!

Reply · Share ›

Anthony Anthony · a year ago

Reply · Share ›

Nick Parks Anthony · a year ago

Hi Anthony, before using Ultimachine ABS, I ran each print with Zortrax Z-Ultrat Primium filament. With the exception of the prints being stronger and support being easier to remove (when applicable), the quality was identical. We did not use firmware version 0.0.9, since the newest firmware available at the time of the shootout was 0.0.8. As Zortrax is a young company developing an incredible product, I imagine that their prints will continue to become significantly better with every firmware update. I'd love to see your prints with firmware version 0.0.9!

Thanks,
-Nick

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Brian Lucas · a year ago

Once again very basic tests, what about a comparison of support removal. These tests are greatgreat if you print iPhone cases or vases that don't require support.

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Michael Overstreet Brian Lucas · a year ago

I agree Brian. I think there should be tests on how well a printer does support material. I use it all of the time and I am sure that I am not the only one who does.

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andreasbastian Michael Overstreet · a year ago

Support is tricky and proper execution lies far more in the domain of the slicing engine than the hardware. Given that some of the machine/slicer combinations could barely handle the bridging and overhang tests and that so few slicers have executed single-material support well, we did not look closely into the matter. It is worth a chapter in longer term investigations of slicing engines though.

I've used the overhang probe for testing basic support algorithms, but I'll go ahead and design a proper probe that covers, concave (most difficult), and convex (easier than planar) overhangs in addition to planar ones.

Next year we'll do a more in depth benchmarking of slicing engines and test support algorithms.

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