

DECLARATION OF DENIS BAKIN

I, Denis Bakin, being of sound mind, declare the following to be true to the best of my knowledge, information and recollection:

1. I have worked in the area of three-dimensional printing as a hobby since 2011.
2. During the relevant time frame of 2012, I was actively engaged in the design and software development of the multiple extruder support for three-dimensional printing. I was participating in discussions on forums and web sites that allowed (and still allow) persons interested in three-dimensional printing and rapid fabrication to exchange information and ideas to improve three-dimensional printing systems and processes.
3. Attached hereto as Exhibit A is a true and correct copy of the web page for a YouTube video that I published on October 29, 2012, titled “x2 dual color print.”
4. I created this post under the username “dob71yt.”
5. This video has been publicly available in its current form, without the need for a login, at <https://www.youtube.com/watch?v=ZAafPtKjZSc> since October 29, 2012. Both now and at the time that I posted this video, YouTube included search functionality that would have allowed members of the public to search for this video based on the title and the description.
6. Attached hereto as Exhibit B is a true and correct copy of my blog post titled “Dual extruder PLA printing” that I published on October 29, 2012.
7. This blog post has been publicly available in its current form, without the need for a login, at <https://www.okob.net/wp/index.php/2012/10/29/dual-extruder-pla-printing> since October 29, 2012. Okob.net is my personal website where I post thoughts, discussions, and information about my various interests, including 3D printing. The blog portion of okob.net is not password protected and any member of the public can access my blog posts on the website.

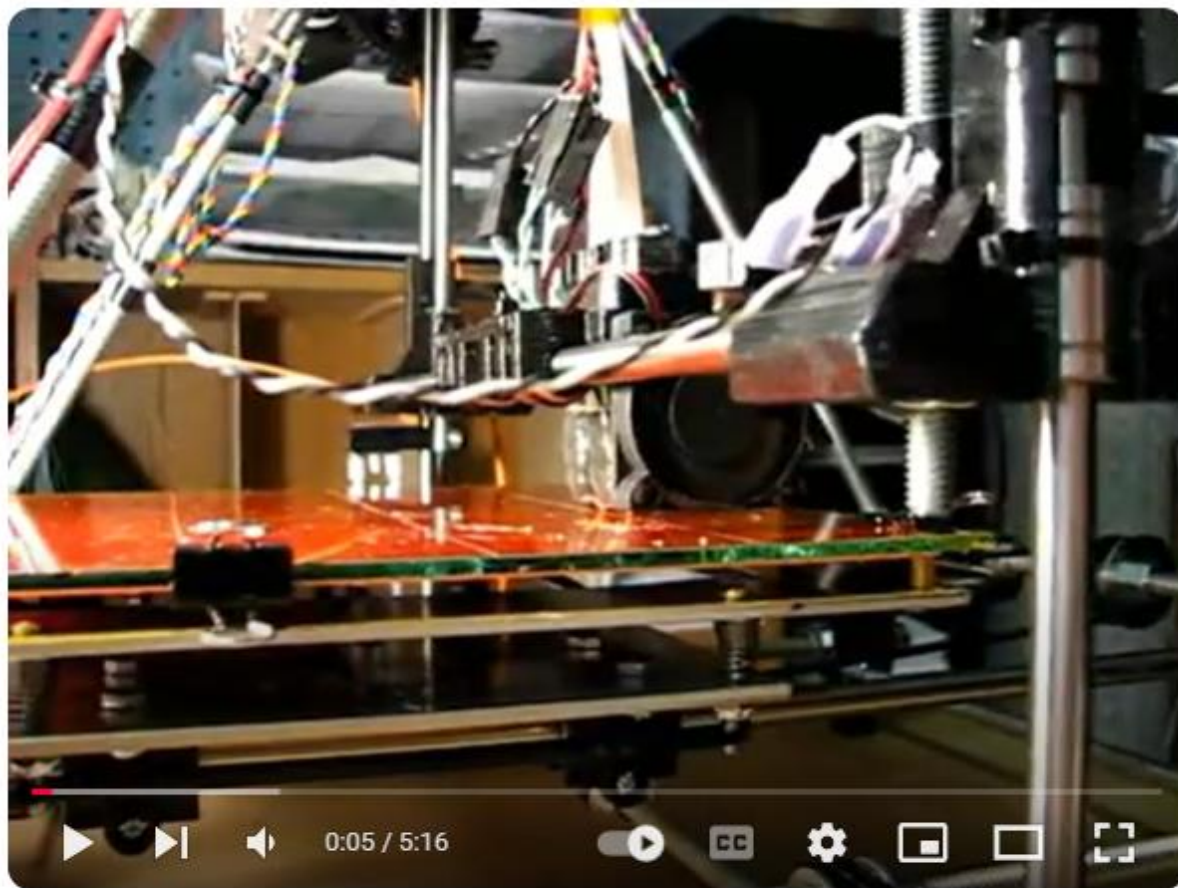
The okob.net website allows visitors to browse blog posts by category (including a 3D printing category) or to search for specific blog posts using keyword searching, as shown in the search bar on the right side of Exhibit B. Additionally, interested members of the public would have been able to locate this blog post via keyword searching using popular search engines available at the time such as Google or Yahoo. Additionally, the archived forum discussions on okob.net, including discussion threads regarding 3D printing, demonstrate that members of the public were able to access and identify subject matter of interest on the website.

8. I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

By: 
Denis Bakin

Date: 12/1/2024

Exhibit A



x2 dual color print



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Demonstrating the dual color printing technique utilizing temperature changes and "parking space" object for fighting the plastic leaking from idle extruders (details:

<http://www.okob.net/wp/index.php/2012...>)



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Exhibit B

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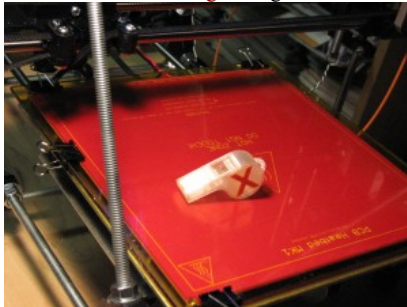
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Notes, ideas and general comments on anything related to high-tech.

October 29, 2012

Dual extruder PLA printing

Filed under: [3D Printing](#) — Tags: [Dual extrusion](#)



Dual color object

One of the most annoying problems with the dual extruder printing is the plastic leaking from the idle extruder. It is especially noticeable with PLA that flows easier than ABS. Lowering the temperature of the idle extruder while it is not needed and restore it when it is time to start printing with that extruder again helps to deal with leaking. It is tricky though since leaking has to be prevented during the temperature changes.

The technique being used with the current generation of the RepRap X2 printers (S/N: 020*) is to print a “parking space” besides the actual object. That “parking space” serves two purposes, one is to plug the nozzles while the temperature changes and the other is to “prime” the extruders (i.e. establish the consistent flow of plastic) before printing the actual object after the temperature change.

You can see the full size video on YouTube: <http://youtu.be/ZAafPtKjZSc>

The video demonstrates the RepRap X2 S/N 0203 ([find it on eBay](#)) printing a dual color whistle (pictured above) using the described technique during the tune-up procedure. The STL files used for the print with the parking space object are here:

1. The whistle body (“BASE”, for printing with the extruder 0): [Whistle X2 body](#).
2. The text (“INSERT”, for printing with the extruder 1): [Whistle X2 text](#)

The special Skeinforge profiles for the X2 printer are needed to generate the G-code. They can be deployed using [x2Profile](#) app from the from the [X2SW software bundle](#).

The ...0.5C-BASE profile has to be used for slicing the body and ...0.5C-INSERT for slicing the text STL of the model. The penultimate G-code generated has to be then merged using the “x2Merge” application (a part of the X2SW software bundle).

The “x2Merge” application merges together the G-code generated for the body and the text STLs. It is merged layer-by-layer. The content from the chosen alteration files for extruder switching is inserted in the places where there is a need to change the extruder. The inserted G-code positions the nozzles above the “parking space” object and changes the active extruder while lowering the temperature of the idle and restoring it for the active hotend before letting the printing continue.

The technique works the best for printing a few layers of color, for example a colored text on the top and bottom of the object. It essentially eliminates the discoloration due to the plastic leaking, but because of the time needed to adjust the temperatures it slows down the print substantially when there are a lot of layers requiring extruder switching.

Note: in order to use the technique X2SW software bundle of at least v1.1.0.4 and [X2 firmware](#) of at least v1.0.0b2 are required.

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October 2012

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