



FDM vs. SLA 3D Printing for Bulk Orders



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The printers used for this experiment, the ELEGOO Saturn 4 Ultra 16K (Left) and the Prusa i3 MK3S+ (Right)

Materials & Methods

I placed an order to the AFL to FDM print 20 Testudo models commonly ordered in bulk. While they used their standard procedures, I printed 20 of the same model using the SLA printer in the RPL. I then compared the time, resources, and cost of these orders to assess the advantages and disadvantages of each printing type.

Results

After I collected the data, I found that SLA printing can save a large amount of time and greatly increase the quality of prints, but requires a large additional cost and has higher operator difficulty.

Printing Type	Cost	Time (hours)
FDM	\$13.48	66.75
SLA	\$40.696	14.77

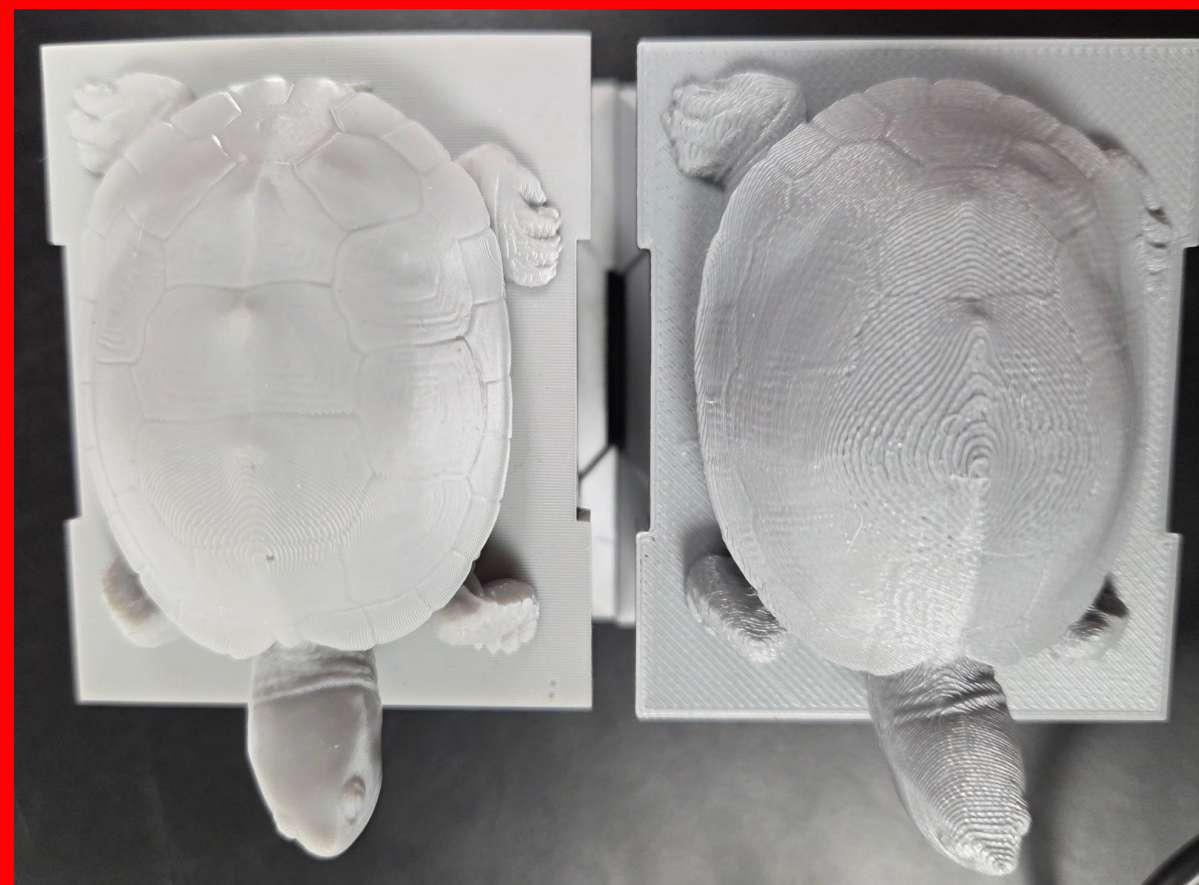
Site Information:

Research Prototyping Lab at Terrapin Works
Glenn L. Martin Hall, College Park, MD 20742
Lab Manager: David Kriesberg
The Research Prototyping Lab (RPL) serves as the center for the most advanced additive manufacturing equipment at Terrapin Works (TW) and a resource for researchers to use on their projects.



Experiment

My experiment is designed to compare the performance of stereolithography (SLA) printing, or resin 3D printing, and fused deposition modeling (FDM) printing for use in bulk orders. The results of my experiment will be used to determine if it is a viable option for another Terrapin Works lab, the Advanced Fabrication Lab (AFL), to transfer its bulk order production to SLA printers from FDM printers.



Resin print (left) and PLA print (right) showing the difference in detail in the shell



PLA print (left) and Resin print (right) showing the difference in detail in the lettering



The Anycubic Wash & Cure 3 Plus (left) is the wash and cure station that I used to post process the resin prints. The Prusa MK4S (right) is an example of a faster FDM printer the AFL has that could be tested.

What I learned From This Experience.

I had to learn a lot of background knowledge before I undertook this project. I learned about SLA 3D printing and design in order to operate the resin printers in the RPL and do my half of the data collection. I also learned about data collection and how to design an experiment which could uncover useful information. My more experienced coworkers were a big help in teaching me both of these things and giving me a supportive working environment where I could ask for advice on how best to run this experiment. I also learned about professional writing in the form of making a report on the whole experiment to share the information I learned as well as providing updates to others about the progress of my work..

Future Work:

More research can be done to compare the rest of the AFL's faster FDM printers and their capabilities to those of SLA printers. This will give a more holistic view of the present capabilities Terrapin Works has for bulk orders and will allow for a more informed decision on the future of bulk order production.

Acknowledgments:

Thank you to lab manager David Kriesberg and the rest of the RPL staff for your work in managing the lab, teaching me how to resin print, and assisting me in performing my research.

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