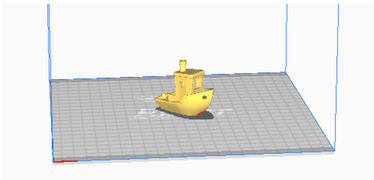
THE FASTEST 3D BENCHY COMPETITION

Steven House, Joseph Ryan

Dr. Lucas Craig, Mr. Cullen Haskins, Mechatronics Technology – Capstone 2024

Introduction

The 3D printing speed boat challenge pushes a 3D printer to its limits while testing its capabilities to print a variety of geometrical features. Modifications can be made to printers to increase printing speed. The Ender 3 is a low-end 3D printer that will be modified to challenge a Bambu Labs PS1 to match printer quality and time.



Competition Criteria

- Must use PLA Filament
- Maximum Nozzle Width Size: 0.5mm
- Maximum Layer Height: 0.25mm
- Must use 3 top and bottom layers
- Must use 2 walls
- Use 10% infill
- Dimensional accurate Print (+- 0.5mm tolerance)
- The printer must be powered by Stepper Motors
- Must Share Print Profile

Capstone Objectives

- Match quality of a Bambu Labs PS1
- Record all Setting Changes in Cura and the Printer Interface
- Maintain the Printer to ensure print efficiency is maintained
- Perform upgrades to accommodate printer adjustments

Bambu Labs PS1

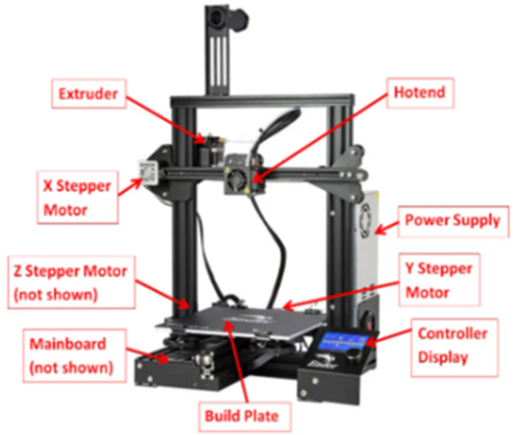
$699, Time: 16 Min

VS

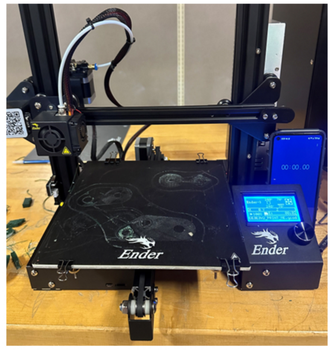
Creality Ender 3

$169, Time: 98 Min

Background



Preliminary Analysis (Faster Print Time Capabilities)



Printer:
- Acceleration
- Jerk
- Velocity

Cura Settings:
- Retraction
- Printing on 45 Degree Angle
- Infill

Results: Modifying Settings

Test #	Acc X	Acc Y	Vel X	Vel Y	Time
2	500	500	500	500	53:47
16	5000	5000	500	500	19:53
28	5000	5000	600	600	12:56

Possible Ender 3 Modifications:

Larger Motors
Magnetic Bed
Replace Marlin Firmware with Klipper Firmware
Installing Linear Rails
Direct Drive Extruder
All – Metal Hot End

Acknowledgements:

Canton College Foundation
Whitney Sharlow
Dr. Lucas Craig
Mr. Cullen Haskins
Mr. Christopher Mayville