



Rapido hot-end Maximum Practical Flow Rate Test

Test conditions

Printer Voron 2.4 with Afterburner Volcano mod
[Voron 2.4 - Afterburner Volcano by ivjunior - Thingiverse](#)
Hotend Rapido hotend
Extruder Voron 2.4 Afterburner
Slicer PrusaSlicer 2.3.0
Filament Generic PETG ϕ 1.75mm Density: 1.27 g/cm³

Test procedure

Installing the Rapido hot-end on a printer. Slice and print a cylindrical part (Diameter=250mm) in single wall vase mode. Try to maintain an even printing (extrusion) speed that no retraction and layer change stop.

Gradually increasing speed and temperature try to find the fastest printing speed that no extruder skipping and no big impact to the printing result too. Using that speed to print and weigh the part to calculate maximum volumetric flow rate.

Volumetric flow rate= (Weight÷1.27)/printing time

Due to the extremely flow rate and the single wall vase mode the stock part cooling fan is no longer enough so an external cooling fan was introduced to achieve a better result. The fan was handled by an experimenter with his hand following the printing path to cool the part during printing.

Figure 1 Rapido hot-end Installation

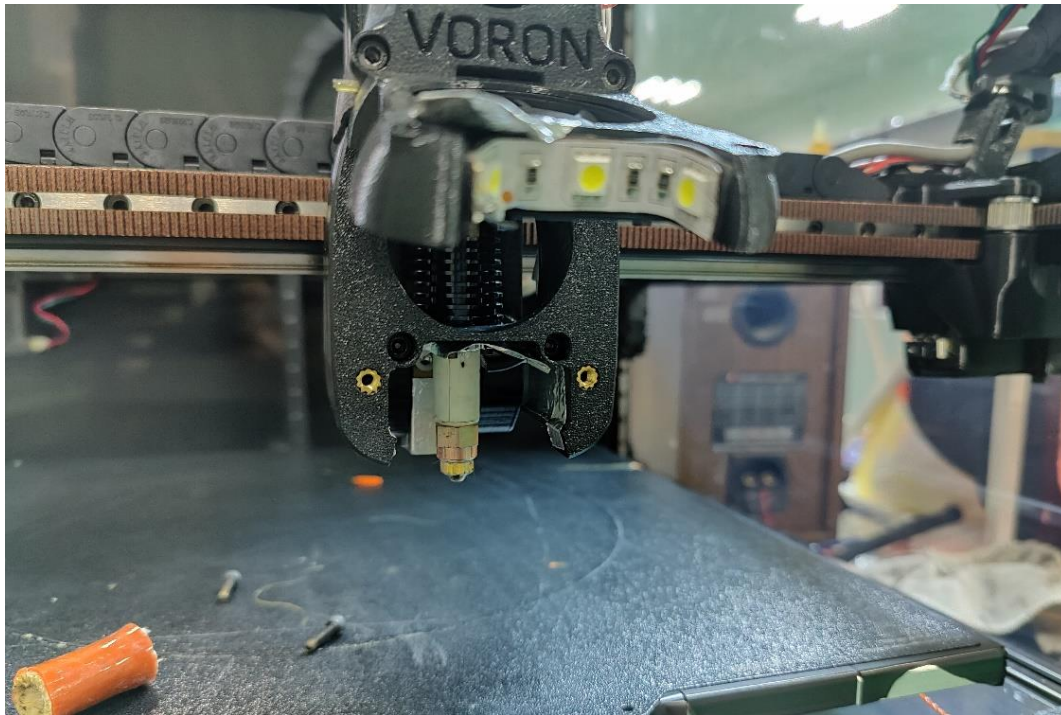
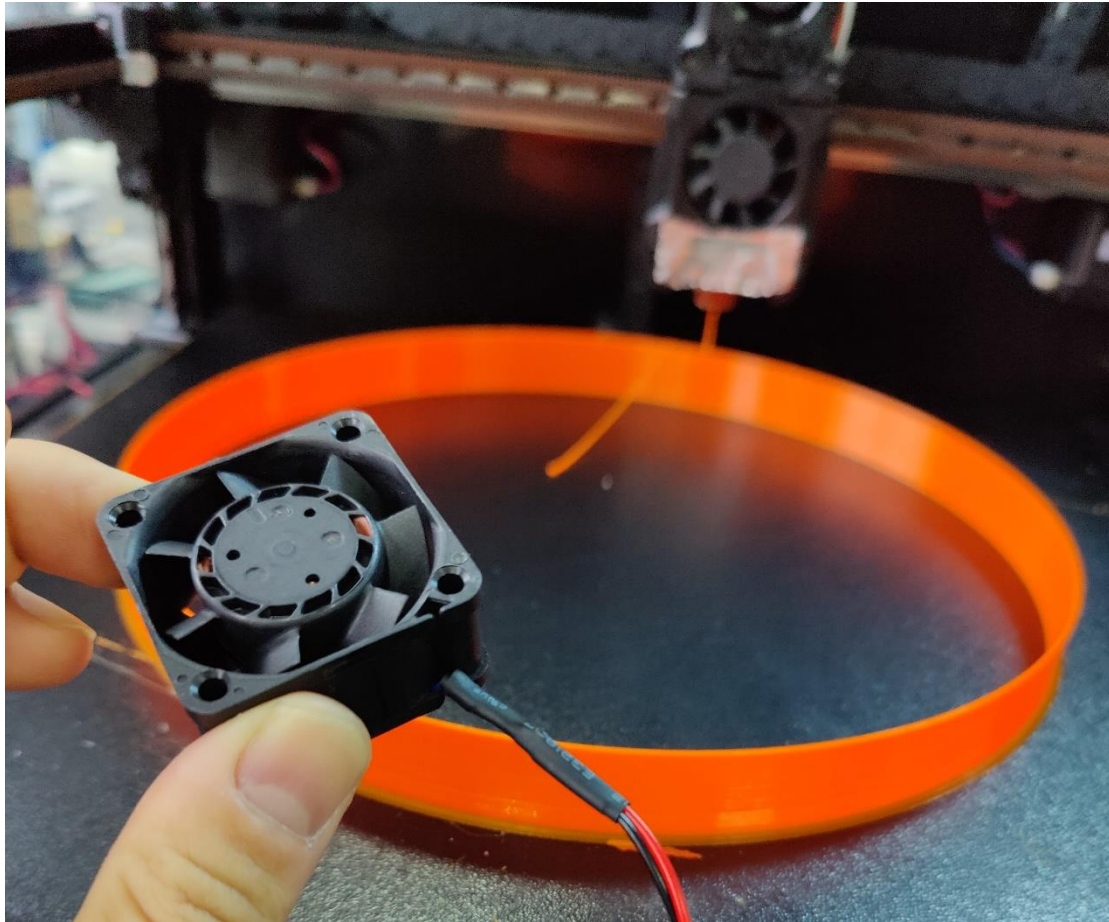


Figure 2 Printing



Figure 3 hand hold part cooling fan

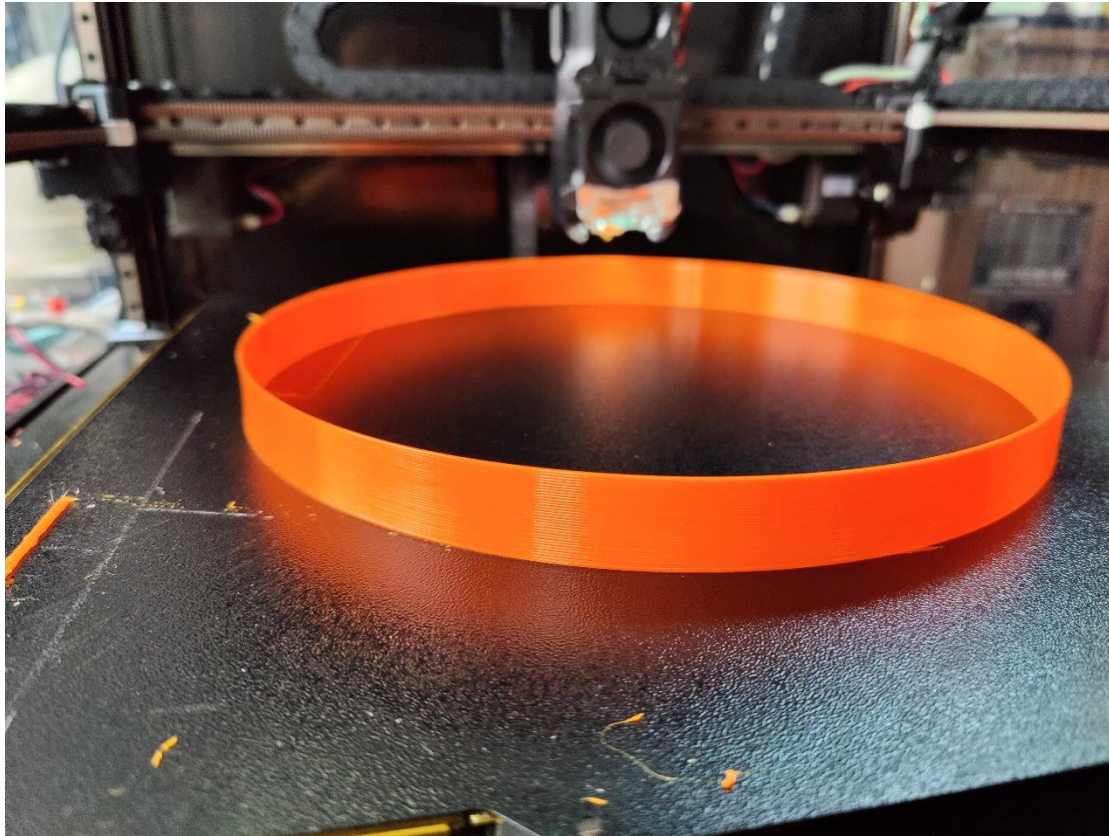


Test result

1. 0.8mm nozzle (Continuous extrusion)

Model:	Cylindrical	Diameter=250mm	Height=20mm
Slicer setting:	Singel wall vase mode with 0 bottom layer		
Nozzle:	V6 0.8mm (copper)		
Filament	Generic PETG 1.75 @265C		
Printing speed	72MM/S		
Extrudtion width	1.2 mm		
Layer height	0.6mm		
Part weight	21.2g	16692.91mm ³	
Print duration	394S		
Volumetric throughput	42.37 mm ³ /S		

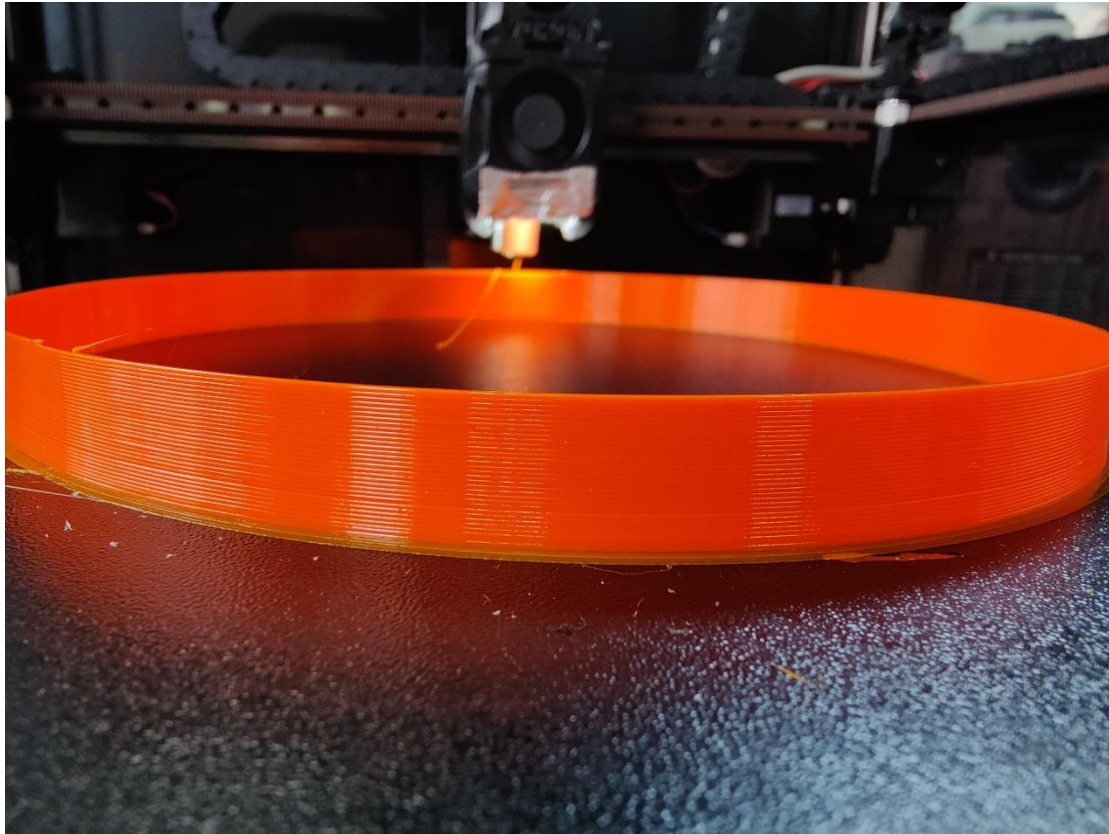
Figure 4 0.8mm V6 nozzle test result



2. 0.8mm Volcano nozzle (Continuous extrusion)

Model:	Cylindrical	Diameter=250mm	Height=20mm
Slicer setting:	Singel wall vase mode with 0 bottom layer		
Nozzle:	Volcano 0.8mm(brass) + Melting Zone Extender		
Filament	Generic PETG 1.75 @265C		
Printing speed	80MM/S		
Extrudtion width	1.2 mm		
Layer height	0.6mm		
Part weight	21.1g	16614.17mm ³	
Print duration	281S		
Volumetric throughput	59.13 mm ³ /S		

Figure 5 0.8mm Volcano nozzle test result



3. 1.2mm Volcano nozzle (Continuous extrusion)

Model:	Cylindrical	Diameter=250mm	Height=20mm
Slicer setting:	Singel wall vase mode with 0 bottom layer		
Nozzle:	Volcano 1.2mm(brass) + Melting Zone Extender		
Filament	Generic PETG 1.75 @265C		
Printing speed	70MM/S		
Extrudtion width	1.7 mm		
Layer height	0.6mm		
Part weight	30.2g	23779.528mm ³	
Print duration	372 seconds		
Volumetric throughput	63.92 mm ³ /S		

Figure 6 1.2mm nozzle test result

