



Q: How can the bead thickness being extruded be double checked?

A: Measure the width of a single extruded bead with a caliper to verify extrusion width.

## PRINT QUALITY

1. Walls of the print are not adhering to the solid layers of the printed part.
2. Outlines will have slight gaps between each of the outer wall layers printed.

## PROBLEM

Extrusion multiplier set too low. Under-extrusion occurs when the extruder does not supply enough material as fast as it is needed to complete the print. In this case, the amount of material was limited by the extrusion multiplier to 85% (see reverse).

## CORRECTIVE ACTION

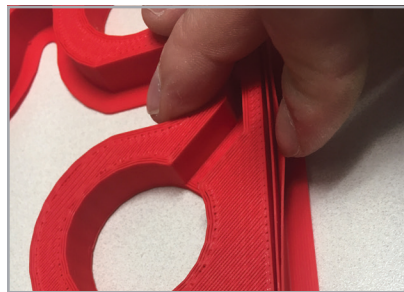
Increasing the extrusion multiplier corrects the problem. Raising the print temperature results in better material flow to prevent under-extrusion.

- Extrusion multiplier
- Temperature setting



Zoomed View

**Failed Print:** Gaps between outer walls. Top layer passes do not adhere to one another.



**Failed Print**



**Fixed Print**

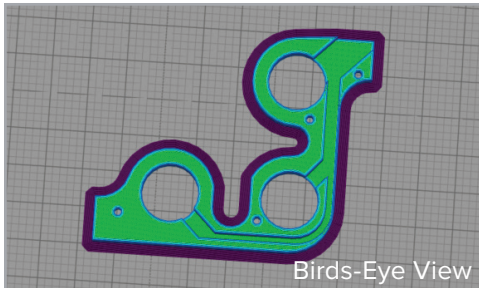


Zoomed View

**Fixed Print:** Solid top layers. Outer walls adhere tightly to the solid layers.

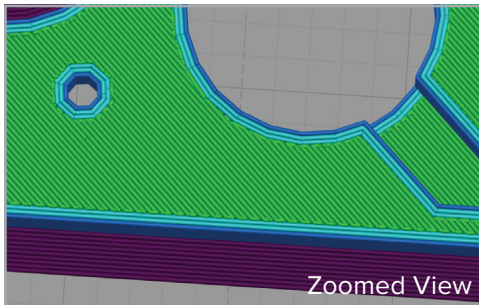


**Rule of Thumb:** Only make one adjustment at a time, so you can see the result of the change.



Birds-Eye View

**Model, Sliced:**

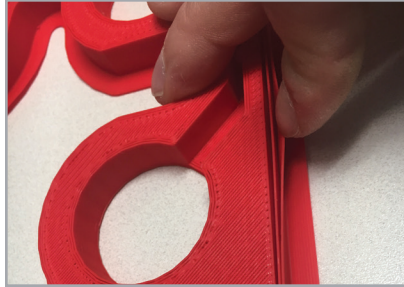


Zoomed View

**Model, Sliced:**

## KEY POINTS

Increasing the material flow allows the small gaps between each pass to fill in nicely.



**Failed Print:** Gaps between outer walls. Thin top solid layer extrusion.



**Fixed Print:** Solid top layers. Outer walls adhere tightly to the solid layers.

PRINT PROCESS SETTINGS	BEFORE FIX BAD PRINT	AFTER FIX GOOD PRINT
Material Type	PLA	PLA
Bed Temperature	80C	80C
Nozzle Size	.6mm	.6mm
Nozzle Temperature	190C	200C
Flow Rate (Extrusion Multiplier)	0.85	1.00
Extrusion Width	.68mm	.68mm
Print Speed	100mm/s	100mm/s
Layer Height	.3mm	.3mm
Number of Perimeters	3	3
Top Layers	10	10
Bottom Layers	10	10
Infill Percentage	15%	15%
Support Structures	none	none
Extrusion Multiplier	0.85	1.00

## OTHER NOTES

Underextrusion can be prevented by printing the 40mm calibration boxes. A thin wall box that is properly printed, will measure equal to the extrusion width.