PRINT QUALITY TROUBLESHOOTING GUIDE

Not Extruding At Start:

Printer does not extrude plastic at the beginning of the print.

1. **Extruder was not primed before beginning the print.**
2. **Nozzle starts too close to the bed.**
3. **The filament has stripped against the filament gear.**
4. **The extruder is clogged.**

Print Not Sticking To The Bed:

The first layer does not stick to the bad and the print quickly fails.

1. **Hot Bed is not level.**
2. **Nozzle starts too far away from the bed.**
3. **First layer is printing too fast.**
4. **Temperature or cooling settings.**
5. **The Hot Bed surface (tapes, glues, sprays, material)**
6. **When all options fail: Use brims and rafts.**

Under-Extrusion:

Printer does not extrude enough plastic, gaps form between perimeters and infill.

1. **Incorrect filament diameter.**
2. **Increase flow multiplier.**

Over-Extrusion:

Printer extrudes too much plastic, prints look very messy.

1. **Decrease flow multiplier.**

Gaps in Top Layer:

Holes or gaps appear in the top layer of the print.

1. **Not enough top solid layers**
2. **Infill percentage is too low.**
3. **Under-Extrusion.**

Stringing or Oozing

Lots of strings and hairs left behind when moving between different sections of the print.

1. **Retraction distance.**
2. **Retraction speed.**
3. **Temperature is too high**
4. **Long movements over open spaces.**
5. **Movement speed.**

Overheating

Small features become overheated and deformed.

1. **Insufficient cooling.**
2. **Printing at too high a temperature.**
3. **Printing too fast.**
4. **When all else fails: Try printing multiple parts at once.**

Layer Shifting or Misalignment

Layers are misaligned and shift relative to each other.

1. **Main Block is moving too fast.**
2. **Mechanical or Electrical issues.**

Layer Separation and Splitting

Layers are separating and splitting apart while printing.

1. **Layer height is too large.**
2. **Print temperature is too low.**

Grinding Filament

Plastic is being ground away until the filament no longer moves, otherwise known as 'stripped' filament.

1. **Aggressive retraction settings**
2. **Increase the extruder temperature.**
3. **Printing too fast.**
4. **Check for a clogged nozzle.**

Clogged Extruder

Extruder is clogged or jammed and will no longer extrude plastic from the nozzle.

1. **manually push the filament through the extruder.**
2. **Reload the filament.**
3. **Clean out the nozzle.**

Stops Extruding Mid Print

Printer stops extruding plastic randomly in the middle of a print.

1. **Out of filament.**
2. **The filament has stripped against the filament gear.**
3. **Thick piece of filament unable to pass through extruder.**
4. **The extruder is clogged.**
5. **Over heated extruder motor driver.**

Weak infill

Very thin, stringy infill that creates a weak interior and does not bond together well.

1. **Try alternate infill patterns.**
2. **Lower the print speed.**
3. **Increase the infill extrusion width.????**

Blobs and Zits

Small blobs appear on the surface of prints also know as zits.

1. **Avoid unnecessary retractions**

Gaps Between Infill and Outline

Gaps between the outline of the part and the outer solid infill layers.

1. **Not enough infill overlap.**
2. **Printing too fast.**

Curling or Rough Corners

Corners of the print tend to curl and deform after they are printed, typically due to overheating.

1. **See Overheating.**
2. **See Print not sticking to bed (If occurring on the early layers).**

Scars on Top Surface

The nozzle scrapes across the top of the print and creates a scar on the surface.

1. **Extruding too much plastic.**
2. **Try Vertical lift (Z-Hop).**

Gaps in Floor Corners

Gaps in the corners of the print, where the top layer does not join to the perimeter of the next layer.

1. **Not enough perimeters**
2. **Not enough top solid layers.**
3. **Infill percentage is too low.**

Lines on the Side of Print

Side walls are not smooth, lines are visible on the side of the print.

1. **Inconstant extrusion due to poor quality filament.**
2. **Temperature variation**
3. **Mechanical issues (Vibration)**

Vibrations and Ringing

Vibrations that cause oscillations on the surface of the print, otherwise known as 'ringing'

1. **Printing too fast.**
2. **Firmware acceleration.**
3. **Mechanical issues**

Gaps in Thin Walls

Gaps between thin walls of the print where the perimeters do not touch.

1. **Change nozzle diameter to fit better.**

Small Features Not Printed

Very small features are not printed or are missing from the software preview.

1. **Change nozzle diameter to fit better.**
2. **Redesign the part to have thicker features.**

Inconsistent Extrusion

Extrusion amount tends to vary and is not consistent enough to produce an accurate shape.

1. **Filament is stuck or tangled.**
2. **Clogged extruder.**
3. **Too low layer height.**
4. **Incorrect extrusion width.**
5. **Poor quality filament.**
6. **Mechanical extruder issues.**

Warping

Warping of large parts, particularly with high temperature materials such as ABS.

1. **Increase Hot Bed temperature.**
2. **Disable fan cooling.**
3. **Use a heated enclosure.**
4. **Add a brim or raft.**

Poor Surface Above Supports

Poor surface quality on the underside of the part where it touches the support structure.

1. **Reduce the layer height.**
2. **Increase support infill percentage.**
3. **Adjust Distance Z from print.**
4. **Adjust Distance XY from print.**

Dimensional Accuracy

Dimensional issues where the measured dimensions do not match the original design intent.

1. **Impact of first layer dimensional accuracy.**
2. **Under or Over Extrusion.**
3. **Adjust original part size.**

Poor Bridging

Sagging, drooping, or gaps between the extruded segments of your bridging regions.

1. **Check Filament printing temperature is comparable with material being printed**