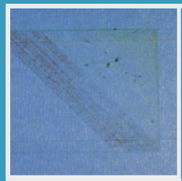
DESIGN & MANUFACTURING FUTURES LAB

Common printed part problems and solutions

University of BRISTOL

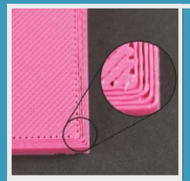


Not extruding at start of print

- Extruder was not primed before beginning the print
- Nozzle starts too close to the bed
- The filament has stripped against the drive gear
- The extruder is clogged

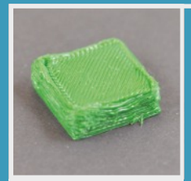
Print not sticking to the bed

- Build platform is not level
- Nozzle starts too far away from the bed
- First layer is printing too fast
- Temperature or cooling settings
- The build platform surface (tape, glues, and materials)
- If all else fails, use brims and rafts



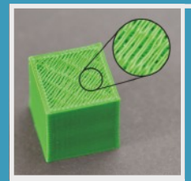
Not extruding enough plastic

- Incorrect filament diameter
- Increase the extrusion multiplier (flow rate)



Extruding too much plastic

- Incorrect filament diameter
- Decrease the extrusion multiplier (flow rate)

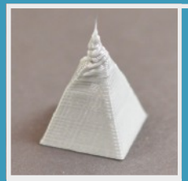


Holes and gaps in the top layers

- Not enough top solid layers
- Infill percentage is too low
- Under-extrusion

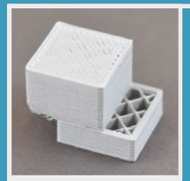
Stringing or oozing

- Retraction distance
- Retraction speed
- Temperature is too high
- Long movements over open spaces
- Movement speed too slow



Overheating

- Insufficient cooling
- Printing at too high of a temperature
- Printing too fast
- When all else fails, try printing multiple parts at once

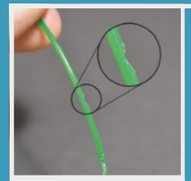


Layer shifting or misalignment

- Tool head is moving too fast
- Tool head knocked during printing
- Mechanical or electrical issues (faulty motor or motor cable)
- Part has become unstuck from print bed

Layer separation and splitting

- Layer height is too large
- Print temperature is too low
- Print material shrinks (e.g. ABS)
- Print in heated enclosure

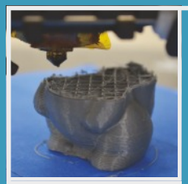


Grinding filament

- Aggressive retraction settings
- Increase the extruder temperature
- Printing too fast
- Extruder blockage

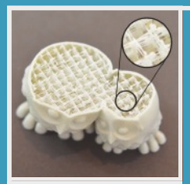
Dimensional accuracy

- Poor quality first layer
- Under or over-extrusion
- Constant dimensional error (compensate by scaling model)
- Increasing dimensional error (likely caused by material thermal contraction - compensate by scaling model)



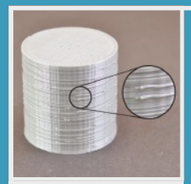
Stops extruding in the middle of the print

- Run out of filament
- The filament has stripped against the drive gear
- Extruder blockage
- Overheated extruder motor driver



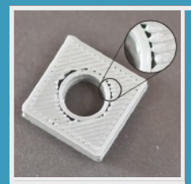
Weak infill

- Try alternative infill patterns
- Lower the print speed
- Increase the infill extrusion width



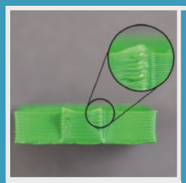
Blobs and surface artefacts

- Retraction and coasting settings
- Avoid unnecessary retractions
- Non-stationary retractions
- Choose the location of your start points



Gaps between infill and outline

- Not enough outline overlap
- Printing too fast



Curling or rough corners

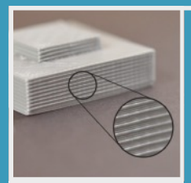
- Curling later on in a print indicates overheating (see "*Overheating*" section)
- Curling at the start of a print indicates poor bed adhesion (see "*Print not sticking to the bed* "section)

Scars on top surface

- Extruding too much plastic
- Adjust vertical lift (Z-hop) setting

Holes and gaps in floor corners

- Not enough perimeters
- Not enough top solid layers
- Infill percentage is too low



Lines on the side of the print

- Inconsistent extrusion
- Temperature variation
- Mechanical issues (vibration, Z-axis lead screw dirty/damaged)

Vibrations and ringing

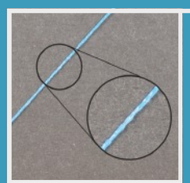
- Printing too fast
- Firmware acceleration
- Mechanical issues (uneven surface, loose screws etc.)

Gaps in thin walls

- Adjust printer settings for thin wall behaviour
- Change the extruder nozzle gauge to fit better

Very small features not being printed

- Redesign the part to have thicker features
- Install a nozzle with a smaller extrusion diameter



Inconsistent extrusion

- Filament is getting stuck or tangled
- Extruder blockage
- Very low layer height
- Incorrect filament extrusion diameter
- Poor quality filament
- Mechanical extruder issues (drive gear clogged)

Warping

- Very common with ABS filament due to high heat-shrinkage
- Use a heated bed
- Disable fan cooling
- Use a heated enclosure
- Use brims and rafts

Poor surface above supports

- Use a lower layer height
- Increase support infill percentage
- Change number of vertical separation layers setting
- Change horizontal part offset setting
- Use a dual extruder printer with dissolvable supports

By Duncan Boa & David Mathias

Source: Simplify3D.com (http://bit.ly/2rjKBjj)