Precision 3D PRINTING

Extrusion Troubleshooting Reference

Diagnosing and Fixing Under-Extrusion and Over-Extrusion

Symptom	Likely Cause	Fix
UNDER-EXTRUSION 4 items		
Gaps between wall lines	Speed exceeds volumetric flow limit	Reduce print speed or raise nozzle temperature.
Grinding / clicking extruder	Speed too high or temp too low	Reduce speed 20%. Increase temp 5°C. Check for clog.
Inconsistent line width	Wet filament or worn nozzle	Dry filament. Inspect nozzle bore — replace if worn.
Weak layer adhesion	Under-extrusion + low temperature	Raise temp 5°C. Verify flow rate with calibration cube.
OVER-EXTRUSION 4 items		
Elephant foot on first layer	Z offset too low or flow rate high	Raise Z offset. Reduce flow multiplier by 2–3%.
Blobs and zits on outer walls	Excess material at seam point	Reduce seam overlap. Enable wipe and coasting.
Top surface bumpy or ridged	Over-extrusion throughout print	Measure filament diameter. Reduce flow rate.
Dimensions larger than model	Flow rate multiplier too high	Print calibration cube. Adjust flow multiplier.
CALIBRATION STEPS (IN ORDER) 4 items		
Step 1: Measure filament	Use callipers at 5 points along spool	Enter actual diameter in slicer filament profile.
Step 2: Calibrate e-steps	Command 100mm; measure actual movement	New e-steps = (current × 100) ÷ actual mm moved.
Step 3: Set flow rate	Print single-wall cube; measure wall thickness	Target: extrusion width ± 0.05mm.

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Step 4: Verify temperature	Print temp tower from 190–230°C	Use lowest temp with no delamination or stringing.