

3D Print Failure Detective

Difficulty Beginner	Time 45-60 minutes	Type Practice & Review
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Background

A print farm has produced several failed parts. Before changing settings, the team needs evidence-based diagnoses.

Engineering Problem

Inspect failed prints, identify likely causes, and recommend a controlled correction for each failure.

Learning Objectives

- Recognize common print defects
- Use physical evidence to diagnose causes
- Separate printer, material, model, and setup issues
- Plan controlled troubleshooting tests

Materials

- Set of failed prints or failure photographs
- Magnifier
- Ruler or calipers
- Failure inspection sheet
- Slicer access

Procedure

1. Number each failed sample and photograph it from two angles.
2. Describe only visible evidence before naming a cause.
3. Classify the failure as adhesion, extrusion, temperature, support, geometry, layer shift, stringing, or another category.
4. Identify the most likely cause and one alternative cause.
5. Locate the slicer or printer setting connected to the likely cause.
6. Recommend one controlled change; do not change multiple variables at once.
7. Rank the samples from easiest to hardest to correct.
8. Choose one sample and outline a three-print troubleshooting sequence.

Engineering Requirements

- Analyze at least four samples
- Include visible evidence for every diagnosis
- Provide one likely and one alternative cause
- Recommend only one primary change per test
- Use correct printing vocabulary

Constraints & Safety

- Do not operate or service a printer unless authorized

- Do not touch hot components
- Do not claim certainty when evidence is incomplete

Deliverables

- Failure inspection sheets
- Annotated photographs or sketches
- Cause/evidence/correction table
- Ranked correction list
- Three-print troubleshooting plan

Reflection Questions

1. Which failure had the clearest evidence?
2. Which diagnosis was most uncertain?
3. Why should only one variable change at a time?
4. What information from the original print job would improve your diagnosis?

Engineering Tip

Describe the defect before diagnosing it. “The first layer detached at one corner” is stronger evidence than “bad adhesion.”

Common Mistake

Changing temperature, speed, bed level, and material at once may fix the print but prevents you from learning the cause.

Stretch Goal

Slice a small test coupon that isolates the suspected problem and predict the result.

Career Connection

Additive manufacturing technicians and quality engineers diagnose defects using visual evidence, process data, and controlled testing.