PRINTMASON FIELD EDUCATION

First Print Evidence Kit

A free, no-gate field packet for planning, recording, inspecting, and learning from one desktop material-extrusion print.

FREE EDITION / VERSION 1.0
10-page printable kit | Published August 2026 | No email or account required

Practical records for turning a print into an explainable, repeatable result. This material does not certify a part, approve an engineering design, or replace current equipment, material, workplace, or regulatory instructions.

01 / START WITH THE JOB

Project requirements card

A print begins with a purpose, not a file. Record what the object must do, where it will live, and what failure would mean before choosing a process or material.

SCOPE BOUNDARY

Use this kit for learning, prototypes, visual models, fixtures, and other noncritical work. Do not treat it as an approval route for medical, protective, pressure, lifting, weapon, food-contact, child-safety, mains-electrical, or building-structural parts.

PROJECT / PART NAME

OWNER / REQUESTER

DATE / NEEDED-BY DATE

INTENDED USE AND ENVIRONMENT

REFERENCE FILE NAME AND VERSION

SUCCESS STATEMENT

Write one observable sentence: This print is successful when...

FAILURE CONSEQUENCES

What could happen if the part deforms, cracks, loosens, melts, or is used incorrectly?

02 / CHOOSE DELIBERATELY

Process and material selection

Use requirements to compare options. A familiar printer is not automatically the right process, and a popular filament is not automatically the right material.

Requirement	Target or limit	How you will check
Fit / dimensions		Calipers, gauge, mating part
Loads / handling		Defined bench test or observation
Heat / sun / moisture		Known environment and duration
Appearance		Viewing distance, color, finish
Time / budget		Machine time and material estimate

Candidate score: 1 means poor fit; 5 means strong fit. Explain any unknown instead of scoring it optimistically.

Geometry can be produced	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Material fits the environment	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Post-processing is manageable	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Risks and emissions are controlled	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Result can be inspected	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Cost and lead time are acceptable	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

DECISION AND REASON

Selected process, machine, and material - plus the strongest rejected alternative and why it lost.

Evidence anchors: process terminology [S1]; material extrusion fundamentals [S2].

03 / CONTROL EXPOSURE

Workspace and safety check

Desktop printing can produce particles and gases; heated surfaces, moving components, sharp tools, and post-processing add other hazards. Apply the hierarchy of controls and current manufacturer guidance. [S3-S6]

1 / Eliminate or substitute Avoid an unnecessary print or choose a lower-emission material/process when it still meets the job.	**2 / Engineering controls** Use effective source capture or ventilation appropriate to the machine, material, room, and occupancy.
3 / Administrative controls Restrict access, label hot or moving equipment, document cleanup, and plan unattended-operation rules.	**4 / Personal protection** Use PPE selected for the actual task and safety data. PPE is the last line, not the whole plan.

PRE-PRINT CHECK

- ☐ Current machine manual reviewed
- ☐ Material label and SDS available
- ☐ Ventilation or source control operating
- ☐ Airflow path does not expose others
- ☐ Hot and moving zones are guarded
- ☐ Stable, noncombustible setup checked
- ☐ Correct tools and PPE available
- ☐ Spill, fire, and shutdown plan known
- ☐ Children, pets, and bystanders excluded
- ☐ Post-processing and waste route planned

UNCONTROLLED HAZARD / STOP CONDITION

Name the condition that means do not start or stop the print immediately.

NO UNIVERSAL SAFE SETTING

An enclosure is not automatically a control: without appropriate capture, filtration, or exhaust, it may only delay release when opened. Verify controls for the specific equipment, feedstock, room, and users.

04 / FREEZE THE BASELINE

Machine, material, and slicer record

A result cannot be repeated if the inputs are vague. Record versions, not just brand names, and preserve the generated machine file with the source model.

Record	Value
Printer / firmware	
Nozzle / build surface	
Material maker / product	
Color / lot / spool ID	
Drying / storage state	
Slicer / version	
Machine / filament profile	
Model file / revision	
Machine file / checksum or timestamp	

Key setting	Baseline	Changed for this run?
Layer height / line width		
Nozzle / bed temperature		
Walls / top / bottom		
Infill pattern / percent		
Speed / cooling		
Orientation / supports		

WHY THIS BASELINE

State which current manufacturer profile or previous successful record you started from. Record uncertainty.

05 / RUN ONE EXPERIMENT

Print and observation log

Change one main factor at a time. Observe the same checkpoints on every run so memory and hindsight do not rewrite what happened.

RUN ID / DATE / OPERATOR

HYPOTHESIS - IF I CHANGE X, I EXPECT Y BECAUSE

SINGLE PRIMARY CHANGE

CONTROL OR PRIOR RUN USED FOR COMPARISON

Checkpoint	Observed evidence	Action
Start / purge / homing		
First layer		
Early walls and corners		
Bridges / overhangs / supports		
Mid-print stability		
Final layer / removal		

Start time _____	**End time** _____
Estimated material _____	**Actual mass if measured** _____

UNEXPECTED EVENT

Pause, collision, power loss, intervention, odor change, visible emission, noise, loose part, or other deviation.

06 / DIAGNOSE WITHOUT GUESSING

Failure and corrective-action log

Name the symptom before naming the cause. Preserve evidence, list competing explanations, and choose a test that can separate them.

RUN ID / FAILED FEATURE LOCATION

SYMPTOM STATED WITHOUT A CAUSE

WHEN THE SYMPTOM FIRST APPEARED

SEVERITY AND CONSEQUENCE

Possible cause	Evidence for / against	Discriminating test
1		
2		
3		
4		

FAULT FAMILIES

Start with geometry and toolpath, material condition, thermal behavior, extrusion path, first layer, motion, environment, or human intervention. A visible symptom can have several causes.

NEXT CONTROLLED ACTION

What will change, what will stay fixed, and what result would support or reject the leading cause?

07 / PRESERVE VISIBLE EVIDENCE

Inspection and photo set

Decide what acceptance means before looking at the finished part. A photo is evidence only when its subject, scale, angle, lighting, and file identity are clear.

Check	Method / tool	Target	Result
Overall dimensions			
Critical fit			
Warp / flatness			
Layer or surface defects			
Mass			
Defined function test			

MINIMUM PHOTO SET

- ☐ Whole part on neutral background
- ☐ Front, back, left, and right
- ☐ Top and build-plate face
- ☐ Critical feature with scale
- ☐ Any defect in context and close-up
- ☐ Fit or use test without private data
- ☐ Label card with run ID
- ☐ Screenshot of orientation / supports

ACCEPTANCE DECISION

Accept, accept with limitation, rework, reprint, or reject. State the evidence and who made the decision.

Evidence anchor: qualification is a defined chain from requirements to measurement, not a visual impression alone [S7].

08 / KEEP THE DIGITAL THREAD

Version and release checklist

A release package should let a future you identify exactly what was printed, what happened, and whether a later change invalidated the earlier evidence.

01 / Intent Requirements card and risk boundary	**02 / Geometry** Source CAD and exported mesh with revision
03 / Process Slicer project, profile, and generated machine file	**04 / Material** Maker, product, color, lot, condition, and spool ID
05 / Run Print log, interventions, failure notes, and timestamps	**06 / Result** Inspection record, photos, decision, and limitations

- [ ] Folder name includes part and revision
- [ ] Source and export file names differ clearly
- [ ] Units and intended scale are recorded
- [ ] Slicer version and profiles are preserved
- [ ] Generated machine file is not confused with source
- [ ] Run ID appears in logs and photo label
- [ ] Acceptance limits are written
- [ ] Known deviations are retained
- [ ] License and source rights are recorded
- [ ] Private or client data is removed before sharing

RELEASE NOTE

What this package supports, what it does not support, and which change would require a new run.

RELEASE IS NOT CERTIFICATION

This record can make a learning print more traceable. It does not establish regulatory compliance, professional approval, or fitness for an untested use.

09 / CONTINUE LEARNING

Sources and PrintMason reading path

Use the current machine manual, material documentation, safety data, and local rules first. These public sources and free guides explain the evidence model behind this kit.

S1. ISO/ASTM 52900:2021 - Additive manufacturing fundamentals and vocabulary
International Organization for Standardization - https://www.iso.org/standard/74514.html

S2. Material Extrusion
National Institute of Standards and Technology - https://www.nist.gov/additive-manufacturing/research-areas/technologies/material-extrusion

S3. Approaches to Safe 3D Printing: A Guide for Makerspace Users, Schools, Libraries, and Small Businesses
National Institute for Occupational Safety and Health - https://www.cdc.gov/niosh/docs/2024-103/

S4. Safe 3D Printing
National Institute for Occupational Safety and Health - https://www.cdc.gov/niosh/bulletin/2024/safe-3d-printing.html

S5. 3D Printing Research at EPA
U.S. Environmental Protection Agency - https://www.epa.gov/chemical-research/3d-printing-research-epa

S6. Additive Manufacturing and 3D Printing Voluntary Standards
U.S. Consumer Product Safety Commission - https://www.cpsc.gov/Regulations-Laws--Standards/Voluntary-Standards/Additive-Manufacturing-3D-Printing

S7. Additive Manufacturing Part Qualification
National Institute of Standards and Technology - https://www.nist.gov/programs-projects/additive-manufacturing-part-qualification

FREE PRINTMASON GUIDES

Choosing a 3D-printing process
Requirements-first process selection and explicit no-print options.

Material extrusion and FFF
Process fundamentals, bonding, toolpaths, machine systems, and evidence.

Desktop filament field guide
Tradeoffs among common filament families without a one-material-fits-all claim.

Desktop printer emissions and ventilation
Control-oriented treatment of particles, gases, occupancy, and evidence.

Diagnosing print failures without guessing
A symptom-to-test method for corrective action.

Measurement and qualification
How requirements, inspection, and traceability support confidence.

VERSION NOTE

First Print Evidence Kit v1.0 - published August 2026. Check printmason.org for the current edition and errata. PrintMason is an independent educational project.