

3D PRINTING GUIDE

The Prototyping Cost & Lead-Time Guide

Material choices, tolerances and realistic timelines, so you can budget a prototyping run without guesswork.

01	Material comparison with real per-part costs
02	Design rules that cut print time and failure rates
03	When printing beats machining - and when it does not

Use this guide to assess where you are, identify the evidence you need, and turn the biggest gaps into a practical action plan.

Prepared by Brotherly Technology

Owner-led IT, security, and compliance support.

15-MINUTE ASSESSMENT

Start with the current state

Mark each item Yes, Partial, or No. A written policy only counts as Yes when the process is operating and you can show evidence.

☐ The prototype has a defined question: fit, appearance, ergonomics, assembly, flow, or load.	☐ Yes ☐ Partial ☐ No
☐ The CAD file is a watertight solid at the correct units and scale.	☐ Yes ☐ Partial ☐ No
☐ Critical dimensions, interfaces, loads, temperatures, chemicals, and finish are identified.	☐ Yes ☐ Partial ☐ No
☐ Material choice is based on the test rather than color or familiarity.	☐ Yes ☐ Partial ☐ No
☐ Orientation and support strategy consider strength, finish, tolerance, and removal.	☐ Yes ☐ Partial ☐ No
☐ Wall, hole, pin, text, bridge, overhang, and clearance features suit the process.	☐ Yes ☐ Partial ☐ No
☐ The quote separates setup, material, machine time, labor, finishing, failure allowance, and shipping.	☐ Yes ☐ Partial ☐ No
☐ Quantity and revision likelihood are included in the process decision.	☐ Yes ☐ Partial ☐ No
☐ The lead time includes review, queue, print, cooling/cure, finishing, inspection, and shipping.	☐ Yes ☐ Partial ☐ No
☐ A first article is approved before a larger batch when fit or tolerance matters.	☐ Yes ☐ Partial ☐ No
☐ Critical dimensions have an inspection method and acceptance range.	☐ Yes ☐ Partial ☐ No
☐ The file, revision, material, orientation, settings, and results are recorded for repeatability.	☐ Yes ☐ Partial ☐ No

Quick score: Yes = 2, Partial = 1, No = 0. Start with any No that could stop work, expose sensitive data, or create an avoidable contract cost.

LOADED COST

Calculate the real per-part cost

Use the provider's actual rates and slicer output. Material alone is rarely the largest cost for a complex or short-run part.

Cost component	Input	Per-part calculation
Setup / file review	\$ ____ per job	Setup divided by accepted quantity
Material	____ g x \$ ____ / g	Model + supports + purge / waste
Machine time	____ hr x \$ ____ / hr	Build time divided by parts on plate
Labor	____ hr x \$ ____ / hr	Prep + removal + finishing + inspection
Finishing	\$ ____ per batch	Coating, inserts, sanding, curing, dyeing
Failure allowance	____ %	Apply to material, machine, and labor exposure
Total	\$ ____ job / ____ accepted	\$ _____ per part

Compare materials using the same geometry, orientation, quality target, quantity, and acceptance rate. Ask for the assumptions behind any per-part figure.

Reduce print time and avoid preventable failures

Change geometry deliberately for the process. A small orientation, wall, support, or tolerance decision can dominate cost and lead time.

1	Orient for the priority: strength direction, critical surface finish, tolerance, support access, and stable bed contact.
2	Use consistent walls, generous fillets, printable holes, supported overhangs, and realistic clearances; confirm process-specific minimums.
3	Split large or support-heavy geometry when assembly is cheaper and more reliable than one complex build.
4	Choose printing for complex geometry, rapid revision, low quantity, fixtures, and validated end-use materials; compare machining for tight tolerance, critical surfaces, metals, and repeat volume.
5	Run a first article, inspect critical dimensions, record results, and revise before multiplying the error across the batch.

What to watch for

WATCH: The material is chosen before loads, heat, chemicals, and finish are defined.

WATCH: A nominal CAD hole is expected to print at machining tolerance without allowance.

WATCH: The quote includes print time but omits setup, finishing, inspection, and failed builds.

WATCH: A large batch is released before a first article is assembled.

WATCH: Printing is selected for a part better suited to sheet, stock, molding, or machining.

MAKE IT ACTIONABLE

Turn the worksheet into a 30-day plan

Do not try to solve everything at once. Assign one owner, one next action, and one date for each priority.

NOW	Name the owner and confirm the current state.	_____
NEXT 7 DAYS	Fix the highest-risk gap or gather the missing evidence.	_____
NEXT 30 DAYS	Complete the remaining quick wins and set review dates.	_____
NEXT QUARTER	Test the process, document results, and assign improvements.	_____

Notes / decisions / questions for your provider

Want a second set of eyes? Book a free consultation at brotherlytechnology.com/contact/ or call 404-907-1005.

Costs and lead times depend on geometry, process, machine, material market, finish, quantity, tolerance, acceptance criteria, and provider capacity. Use this worksheet with a current quote and an approved first article.