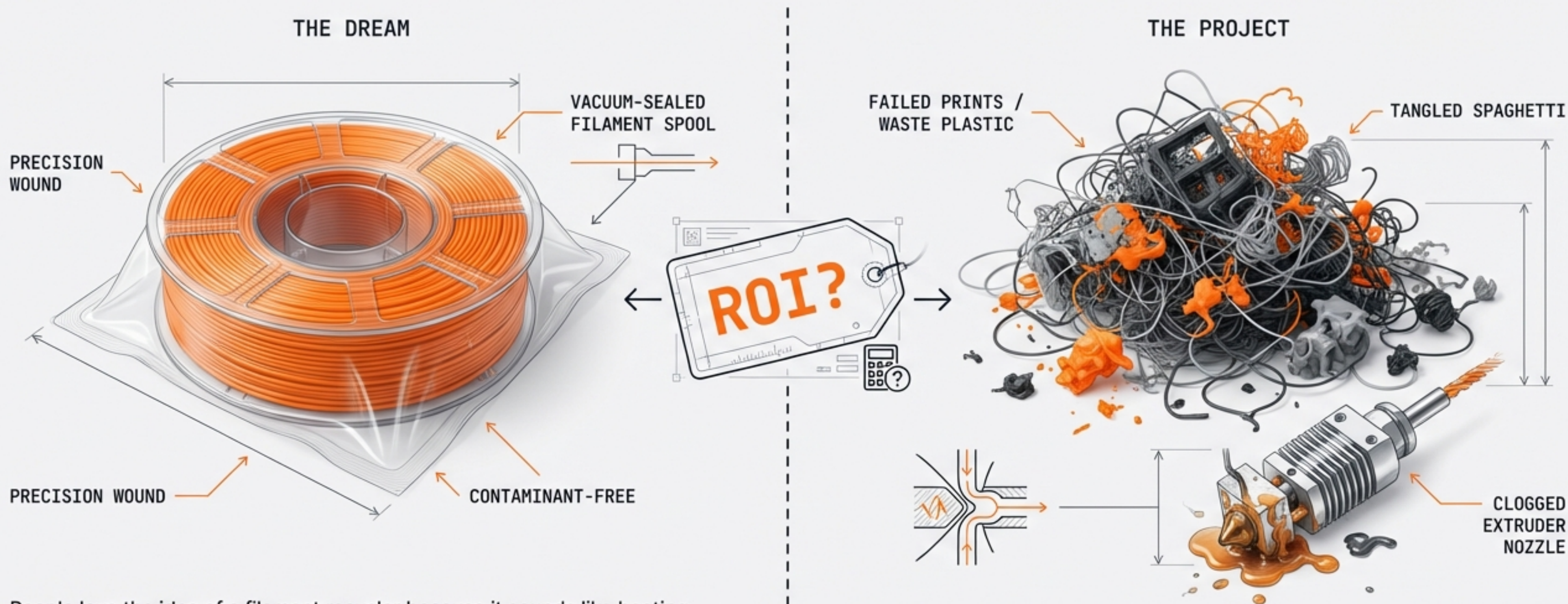


# Filament Recycling: Free Money or Expensive Hobby?

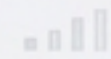
The honest math behind turning scrap into spools.



People love the idea of a filament recycler because it sounds like beating the system. Turn trash into spools. Save the planet. Here's the part nobody wants to hear: most buyers aren't buying savings. They're buying a project. This isn't a "Is it cool?" question. It's a math question.



# The Trap: "Vibes" vs. The Math



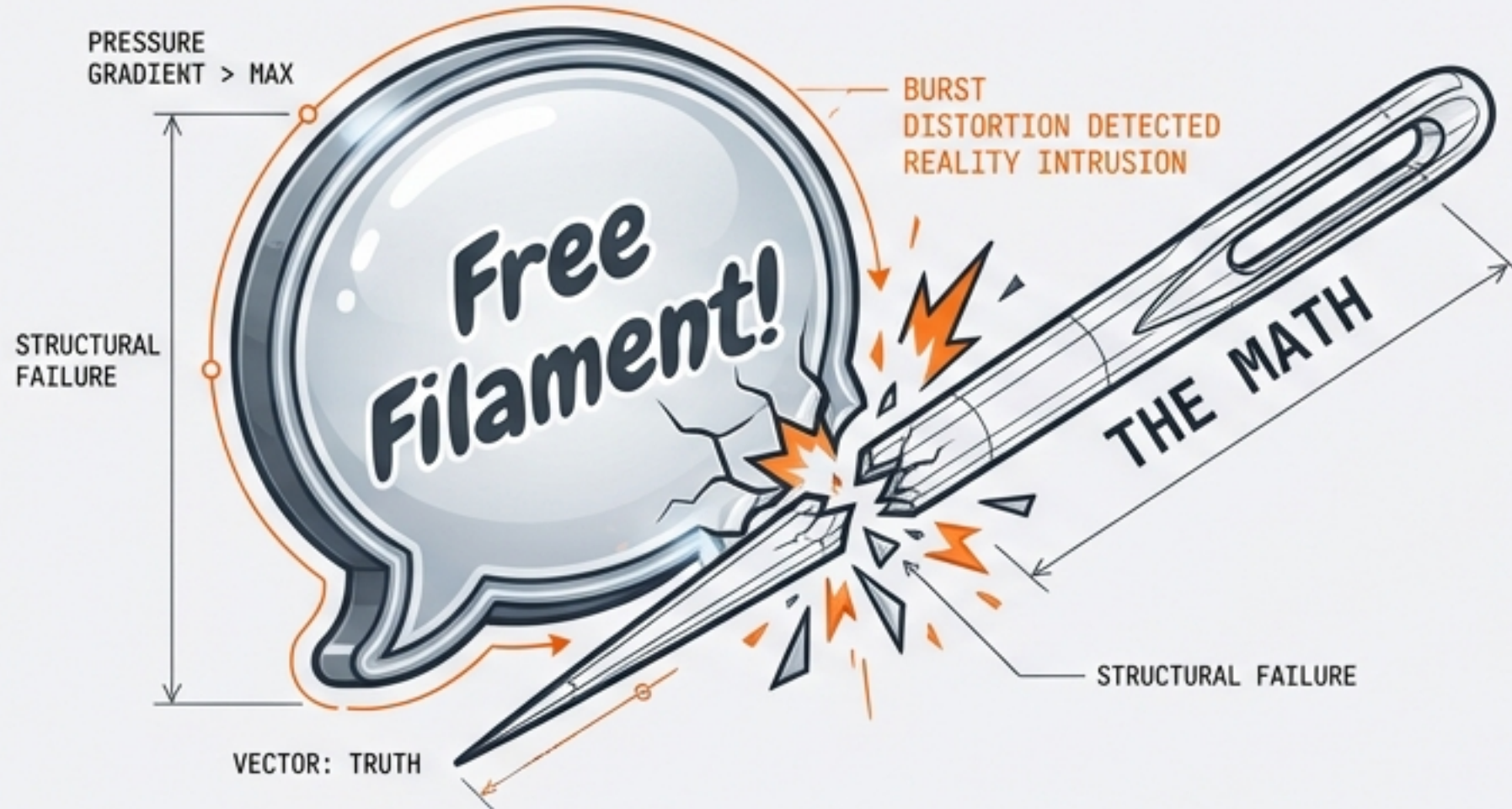
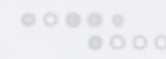
STATUS: CRITICAL ANALYSIS



SYSTEM: ROI\_CALC



DATE: 2024-10-26



The math only cares about three inputs:

</>

1. **SCRAP VOLUME**: How much trash you actually generate.

[DATA POINT: **INPUT\_MASS\_VARIANCE**]

2. **YIELD**: How often the machine produces usable filament.

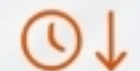
[EFFICIENCY METRIC: **OUTPUT\_INTEGRITY**]

10%

</>

3. **TIME**: How much life you bleed keeping it running.

[RESOURCE DRAIN: **OPERATIONAL\_HOURS\_TOTAL**]



</>

Everyone wants to print for free, but the ROI calculation is ruthless.

If you want the fast answer: Run the numbers.

- > **Payback > 24 months**: You are buying a new hobby you didn't ask for.

[STATUS: **NEGATIVE\_ROI** | WARNING: **TIME\_SINK\_DETECTED**]

- > **Payback < 12 months**: Worth testing... but don't confuse 'payback' with a smooth experience.

[STATUS: **CONDITIONAL\_APPROVAL** | NOTE: **MAINTENANCE\_REQUIRED**]



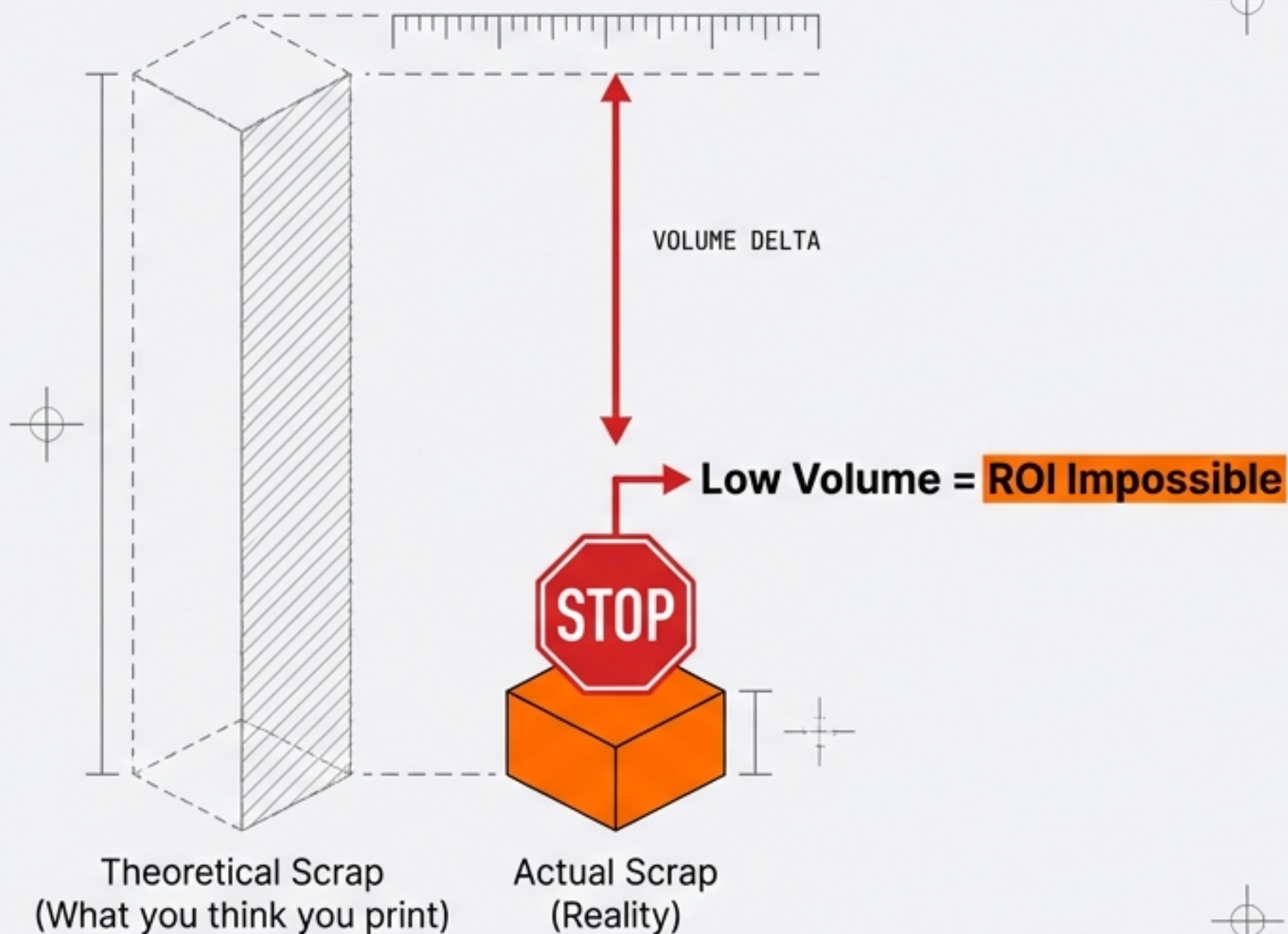
REPORT\_ID: FILARENT\_REALITY\_CHECK\_V1.2 // ENGINEER: A.I. SYSTEM



# The Gatekeeper Metric: Scrap Volume

⚠️ 📄 🔧 STATUS: CRITICAL ANALYSIS // SYSTEM: ROI\_CALC // DATE: 2024-10-27 // ENGINEER: A.I. SYSTEM

## COMPARATIVE ANALYSIS



**Core Message:** If you don't generate enough trash, the ROI is mathematically **impossible**.

- The cost of the machine **never amortizes** if you are only feeding it 1kg a month.
- You can tweak yield. You can pretend your time is free. You can lie about electricity. **Low scrap still kills ROI.**
- **If your scrap volume is low, the rest of the calculator doesn't matter.**



REPORT\_ID: FILAMENT\_REALITY\_CHECK\_V1.2



# Stop Guessing. Measure It.



## The 2-Week Bag Test

Your first guess is usually 2-3x too high because you remember the dramatic spaghetti failures but forget that most prints succeed.

**STEP 1:** • Keep separate bags for failures, supports, and calibration trash.

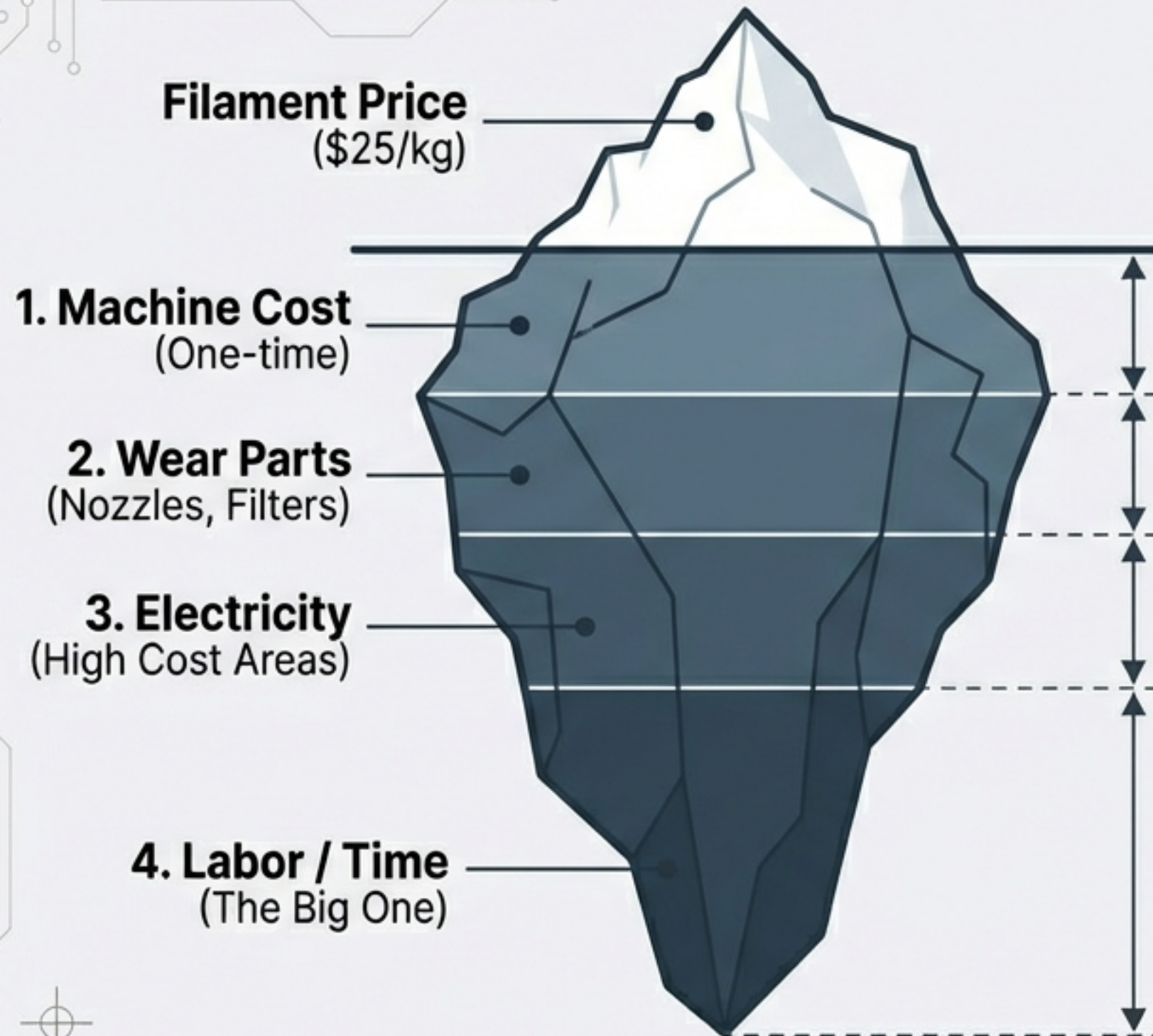
**STEP 2:** • Weigh each bag after 2 weeks on a kitchen scale.

**STEP 3:** • Multiply by ~2 to get your monthly estimate.

*If you can't estimate scrap, your ROI is roleplay. You're just moving sliders until the output looks comforting.*



# Defining "Net Savings"



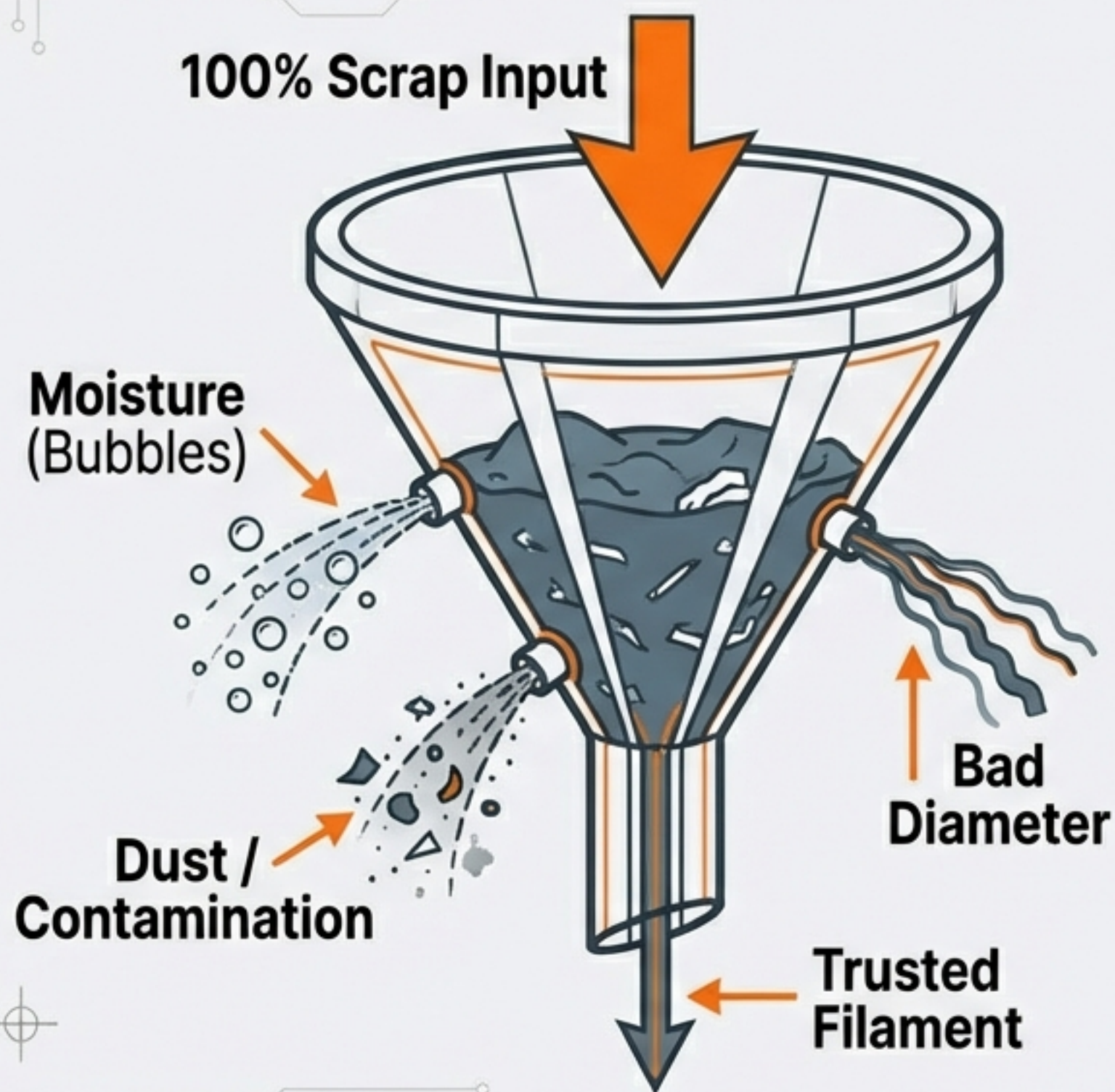
$$\text{Gross Savings} = \text{Usable Output} \times \text{Filament Price}$$

$$\text{Net Savings} = \text{Gross Savings} - (\text{Electricity} + \text{Consumables} + \text{Time} + \text{Machine Cost})$$

- **One-time cost:** Don't put \$0 for shipping/tax just because you don't know it yet.
- **Consumables:** Blades dull. Nozzles clog. Filters get gross. This is not \$0/month.
- **Electricity:** In high-cost areas, this quietly shrinks your savings per kg.



# The "Yield" Lie



**Core Message: 1kg of scrap does NOT equal 1kg of filament.**

- Assuming 90–100% yield is fan fiction.

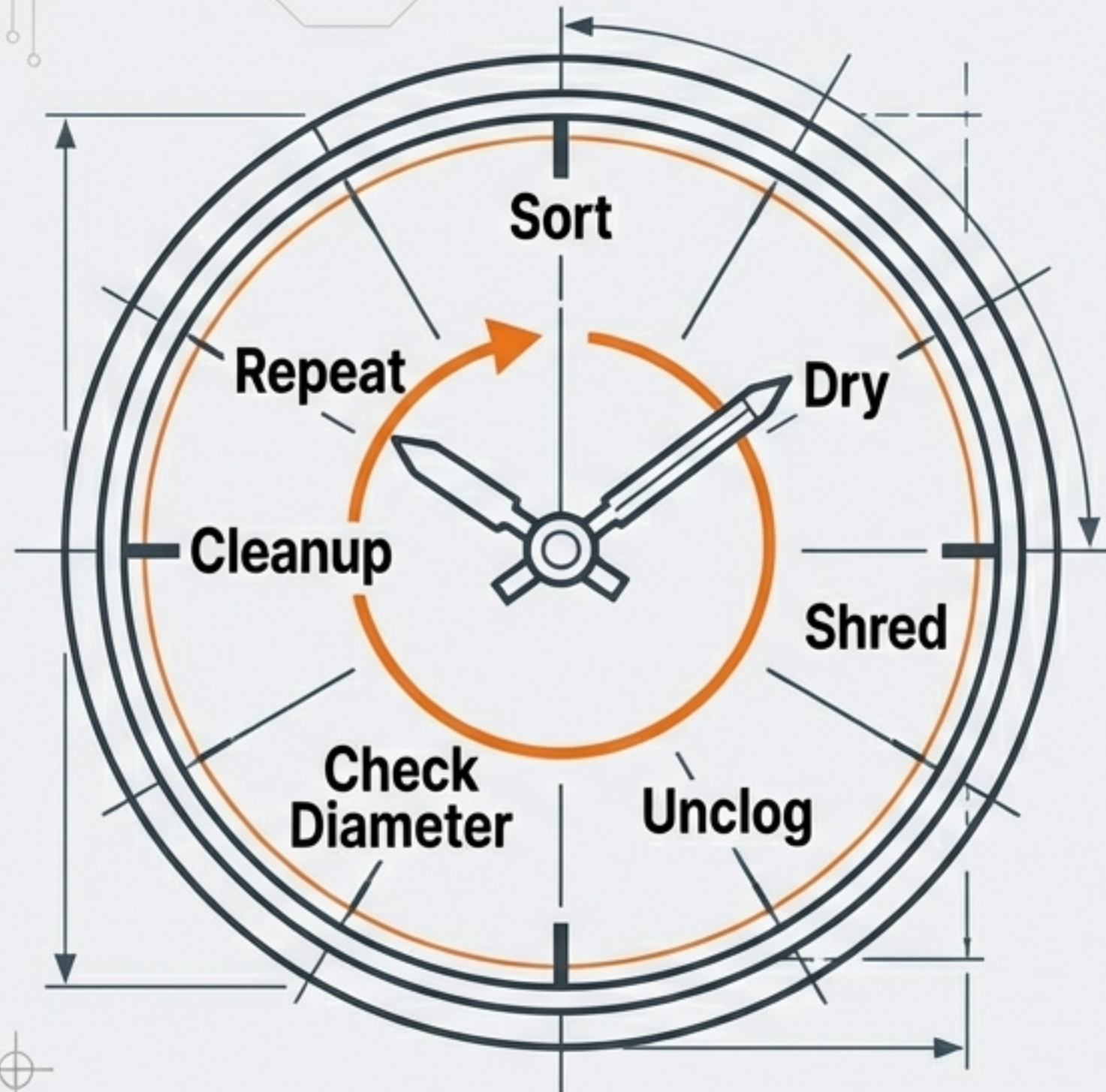
## Real Yield Killers:

- **Contamination:** Mixed plastics, labels, unknown additives.
- **Moisture:** Wet material bubbles and extrudes unevenly.
- **Diameter Inconsistency:** Filament that technically exists but causes print failures.

**You don't get "Scrap Amount" of usable filament. You get "Scrap × Yield".**



# The Hidden Cost of Time (The Spicy One)



**This is not a microwave. It requires sorting, drying, shredding, and babysitting.**

**The Binary Choice:**

**OPTION A: The Hobbyist**

- If you do it for fun, time cost is \$0.

**OPTION B: The Saver**

- If you do it for savings, your time has a dollar value.

**Reality Check:** It's not a magic box that turns random scrap into perfect spools while you sleep.



# The Hidden Cost of Quality



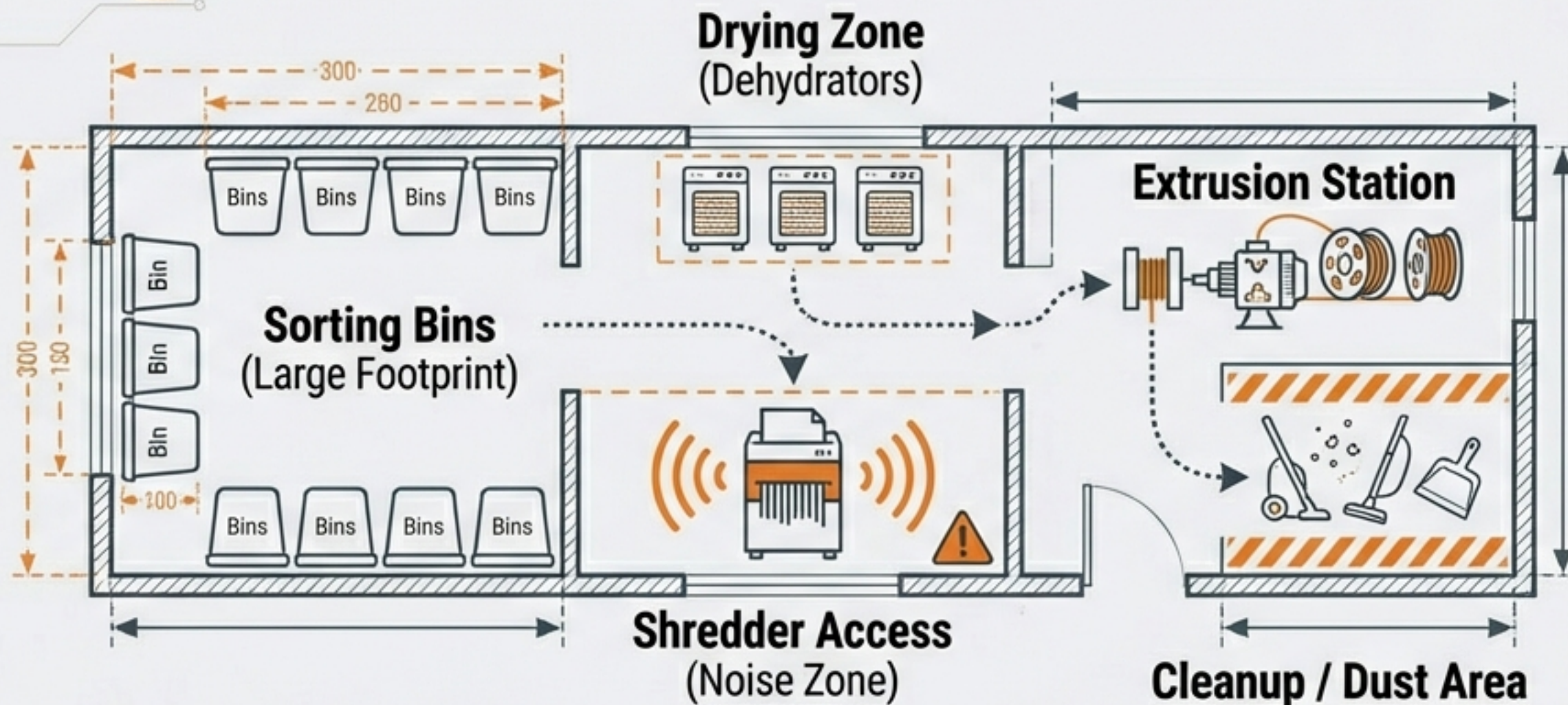
**Yield isn't just what extrudes; it's what you trust to print.**

## Key Insight:

- Diameter tolerance is the silent killer. You save \$20 on a spool but lose \$30 on a failed large-scale print.
- If you feed the machine "mystery plastic," you get mystery filament.
- The more disciplined you are upstream (sorting), the less pain you suffer downstream (printing).



# Workflow Friction & Footprint



**The fastest way to hate a machine is to have no home for it.**

- This generates **noise, dust, and mess**. Shredding isn't silent or cute.
- If you don't have a dedicated space for the workflow, the 'set up and tear down' **friction** will make you quit.
- **Plastic dust** gets everywhere. If you live in a shared space, this matters.



# Diagnostic Profile A: The Casual / Hobbyist



## THE PROFILE:

- **Scrap:** < 2kg / month
- **Material:** Mixed (PLA, PETG, ABS)
- **Habit:** Scrap pile is basically vibes

## THE VERDICT: **DON'T BUY FOR SAVINGS**

- You are buying a new hobby. The machine will sit idle most of the time.
- Payback is essentially 'never'.
- Net savings is small because usable output is small.



# Diagnostic Profile B: The Heavy User



## THE PROFILE:

- **Scrap:** 2–6kg / month
- **Habit:** Prints weekly, tunes profiles, willing to sort

## THE VERDICT: **PROCEED WITH CAUTION**

- ROI is possible (12–18 months) \*if\* you are disciplined about sorting and drying.
- A small improvement in yield changes 'Never' to 'Okay'.
- **The Trap:** Downstream print failures. If you aren't strict on quality, you burn your savings on failed prints.



# Diagnostic Profile C: The Print Farm



## THE PROFILE:

- **Scrap:** 6+ kg / month
- **Stream:** Steady stream, usually single material type

## THE VERDICT: **VIABLE**

- High volume amortizes the machine cost. ROI starts looking less like comedy.
- The challenge here is workflow management, not math.
- You either systemize the sorting/shredding/drying, or the process eats your schedule alive.



# How to Cheat the Calculator (And Why You Shouldn't)

Don't shop for validation by moving sliders until the number looks good.


## The 4-Step Honest Method:

1. **FILL BASIC FIELDS ONLY:** Machine cost, filament price, measured scrap.
2. **RUN 'CONSERVATIVE' SCENARIO:** Set 60% Yield, High Time Cost. This is your truth baseline.
3. **CHANGE ONE VARIABLE AT A TIME:** Don't tweak everything at once to write a story.
4. **CHECK THE BADGE:**
  - [✓] = Plausible.
  - [ ] = Better be fun.
  - [ ] = You're buying a project.

**ROI ESTIMATOR v2.1 - INPUTS**


SCRAP VOLUME

4.5 kg/mo




YIELD %

100%




TIME COST

\$0/hr



ESTIMATED PAYBACK PERIOD

1.2 MONTHS 



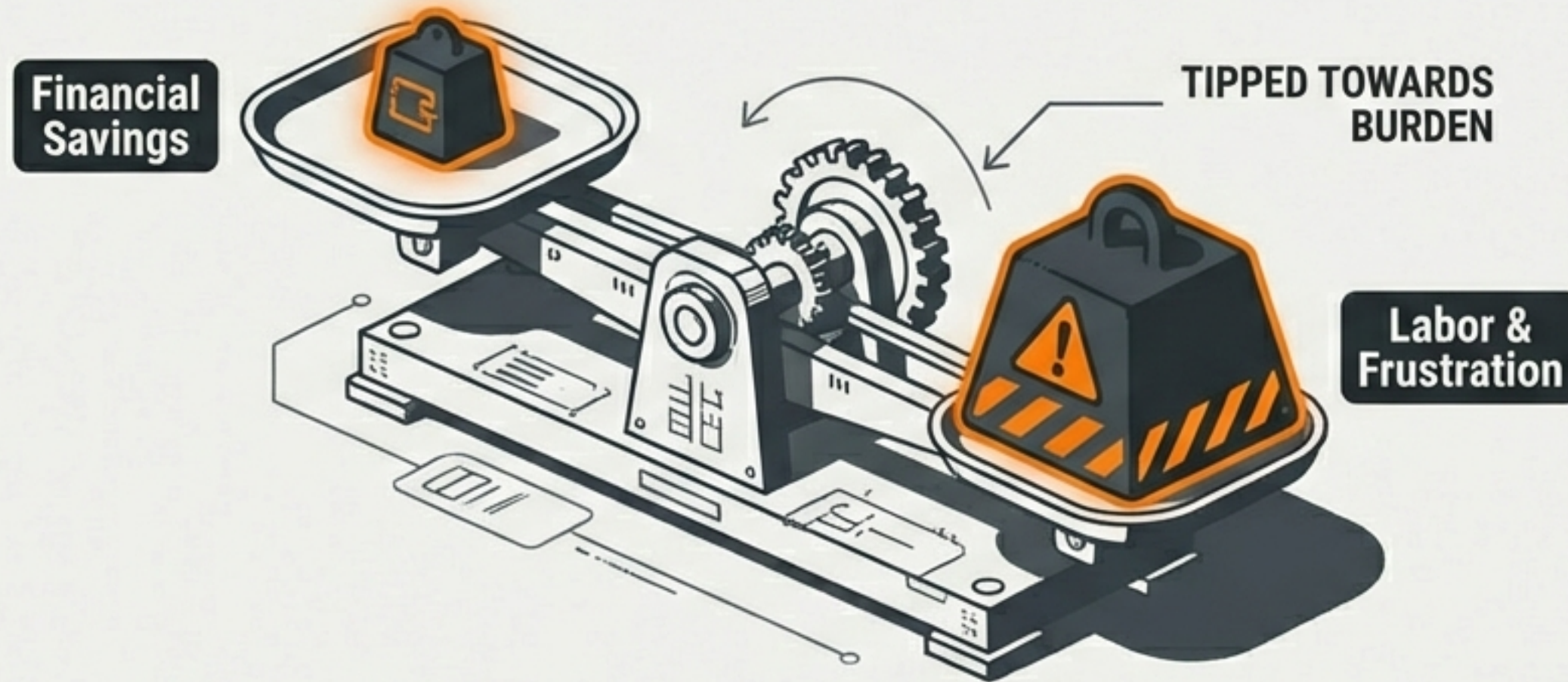
# The 'I Still Want It' Checklist



Pass this test before opening your wallet.  
If you can answer these cleanly, you're ahead of most buyers. If not, stop scrolling.



# The Verdict: Payback $\neq$ Worth It



Short payback just means the math works. It doesn't mean the work is fun.  
If the process sounds annoying, no amount of savings is worth it.  
Run the calculator on 'Conservative.' If it scares you, walk away.

**Don't buy savings. Buy the workload you can actually live with.**