

STOCKING STRATEGY × LEAD TIME REDUCTION

Cutting Lead Times Through *Math*, Not Negotiation

How I built a min/max stocking framework for 2,387 parts and uncovered that the single largest lead-time reduction lever wasn't on the supplier side at all — it was hiding inside our own purchase order process.

2,387PARTS MODELED
END-TO-END**42%**OF PARTS AT TARGET
WITHOUT VENDOR ACTION**5**PRIORITY TIERS
P1 THROUGH P5**12mo**STOCKOUT RISK
SIMULATION

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Portfolio Case Study

No stocking policy means *every part* is a fire drill.

The inventory system was effectively running make-to-order on parts that were consumed every month. Most items had no safety stock configured, no maximum, and reorder points set so low they triggered POs already inside the vendor's lead-time window. Every late delivery felt like a vendor problem — but the root cause was buried in our own planning parameters.

THE CORE PROBLEM

The vast majority of past-due lines weren't supplier failures — they were the predictable consequence of **asking vendors to deliver in less time than they had quoted**. Without a stocking buffer, every demand signal became an emergency. Without a max ceiling, every PO was a one-off negotiation instead of a programmatic refill. The supply chain was carrying the cost of chaos and getting none of the benefits of discipline.

What was actually broken

- 01 No safety stock on long-LT parts.** Parts with 90, 120, even 175-day lead times were configured with zero buffer. When demand hit, MRP fired a PO and the vendor was immediately behind.
- 02 No ABC discipline.** A-class parts (top 80% of spend) and C-class parts (bottom 5%) were managed the same way. High-value, frequently-consumed items got no special treatment. Low-movers got over-ordered.
- 03 No simulation, no confidence.** When parameters were changed, nobody could predict the result. Would the change cause stockouts? Drive excess? Free up cash? Without forward-looking math, every adjustment was a guess.
- 04 Hidden internal lead time.** 94% of parts carried an identical 21-day gap between vendor lead time and our internal purchase lead time — a buffer for our own PO processing, receiving, and inspection that nobody had measured or challenged in years.

Two problems, *one framework*: math you can simulate.

Rather than tackle stocking strategy and lead-time reduction as separate initiatives, I built a single Excel-based model that solved both. Stocking parameters and lead times are mathematically linked — change one and the other shifts. The model exposes those relationships so a buyer or planner can see the downstream impact of any decision before committing to it.

— THE GOVERNING FORMULAS —

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| Daily Demand | $(\text{Build Rate} \times \text{Qty per Unit}) \div \text{Working Days}$ |
| LT Demand | $\text{Daily Demand} \times \text{Lead Time (days)}$ |
| Safety Stock | $\text{Tier Factor} \times \text{LT Demand}$ |
| MIN | $\text{LT Demand} + \text{Safety Stock} \leftarrow \text{reorder trigger}$ |
| Order Qty | $\text{Coverage Months} \times \text{Monthly Demand (ABC-tuned)}$ |
| MAX | $\text{MIN} + \text{Order Qty} \leftarrow \text{ceiling after receipt}$ |

ABC SEGMENTATION

A-items (top 80% of annual spend) get tightest control and highest service level. C-items (bottom 5%) carry more stock cheaply and order less often. The math adjusts coverage months automatically by class.

LEAD-TIME TIERS

Short-LT parts need little buffer. Long-LT parts (>60 days) need meaningful buffer because a missed signal is expensive to recover from. The safety-stock factor scales with lead-time tier automatically.

"If you can't simulate the policy forward, you don't have a policy — you have a guess with a number attached."

— PROJECT DESIGN BRIEF

The biggest win was *internal*, not external.

Once every part was tagged with its vendor lead time, internal purchase lead time, and the gap between them, a pattern emerged that no one had ever quantified: **94% of parts carried an identical 21-day internal processing buffer**. That buffer alone — independent of any vendor — was pushing thousands of parts over the target lead time. Cutting it became the fastest, lowest-risk win in the entire program.

The three-tier reduction strategy

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| <p>TIER 1 / 42%</p> <h3>Internal Only</h3> <p>1,010 parts</p> <p>Vendor LT already ≤ 70 days. Reducing internal processing buffer from 21 days to 7 days hits target with zero vendor action.</p> | <p>TIER 2 / 34%</p> <h3>Vendor Partnership</h3> <p>812 parts</p> <p>Vendor LT 71-100 days. Combine internal buffer reduction with blanket POs and lead-time negotiation on top-10 vendors.</p> | <p>TIER 3 / 24%</p> <h3>Strategic Sourcing</h3> <p>565 parts</p> <p>Vendor LT > 100 days. Requires dual-sourcing with domestic shops, VMI/consignment, or qualifying alternate suppliers.</p> |
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This tiered structure transformed an overwhelming 2,387-part problem into three distinct workstreams with different owners, different tactics, and different timelines. Tier 1 became an internal process improvement project. Tier 2 became commodity-manager partnership work. Tier 3 became strategic sourcing — the only tier that actually required vendor negotiation as the primary lever.

THE COUNTERINTUITIVE FINDING

Every prior conversation about lead times had focused on getting vendors to commit to shorter quotes. The data showed that **nearly half the problem could be solved without talking to a single supplier** — by attacking our own 21-day internal buffer. The fastest path to "shorter lead times" was a process improvement project, not a procurement initiative.

A prioritized action list, grounded in *simulation*.

Setting Min/Max/SS values across thousands of parts is one decision. Knowing where to start is another. The model classifies every part into one of five priority bands based on its current state versus where it should be — so buyers know what to expedite this week, what to order this month, and what's already healthy.

The five-band priority framework

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| P1 | A-class below safety stock — Expedite immediately. Highest-usage parts with zero buffer. | 57 parts |
| P2 | A-class between SS and Min — Order this week. Buffer intact but replenishment overdue. | 10 parts |
| P3 | B-class below Min — Standard POs batched by vendor over weeks 1-2. | 218 parts |
| P4 | C-class below Min — Mostly 1-3 unit orders. Batch by vendor to minimize PO volume. | 992 parts |
| P5 | At or above Min — Load parameters into ERP; system maintains coverage automatically. | 1,110 parts |

The 12-month simulation

The model doesn't just spit out parameters — it pressure-tests them. The simulation tab walks the 15 highest-risk parts forward 12 months: demand burn, PO receipts (timed by actual lead time), ending on-hand position. Any month ending below zero turns red. This is where the policy gets validated before a single PO is placed.

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| <h3>5 tabs</h3> <p>ASSUMPTIONS, PARTS MASTER, ABC, CRITICAL, SIMULATION</p> | <h3>Yellow Cells</h3> <p>ALL POLICY LEVERS EDITABLE — EVERYTHING RECALCULATES LIVE</p> | <h3>Heat Maps</h3> <p>LEAD TIMES, STOCKOUT RISK, CRITICAL-TIER FLAGS</p> |
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| Advanced Excel | Power Query | Python in Excel | Claude AI | Gemini | Infor XA (ERP) |
| Min/Max Modeling | ABC Analysis | Monte Carlo Concepts | | | |

The best supply chain decisions look like *math problems*.

The fastest win is often inside your own walls

Every prior conversation about lead times had been a procurement conversation: which vendor, what terms, what relationship? The data made clear that the largest single lever — by a wide margin — was an internal process inefficiency that had calcified over years. The lesson: before negotiating with anyone outside the company, audit how much of "their" lead time is actually yours.

Discipline beats reaction

A reorder-point system with no safety stock means every replenishment becomes a fire drill. A Min/Max/SS system with ABC-tuned coverage means most parts replenish themselves automatically, freeing buyers to focus on the genuine exceptions. The cost is a slightly higher steady-state inventory level. The benefit is a calmer organization that can think strategically instead of constantly responding.

Simulate before you commit

The single most valuable feature of the model isn't any individual formula — it's the simulation tab. Being able to show finance leadership exactly what 12 months of carrying cost looks like under a new policy, before a single parameter changes in the ERP, turned what would have been a contentious approval process into a collaborative one.

LOOKING FORWARD

Stocking and lead-time decisions don't have to be art — they can be engineering.

Every parameter in a planning system is a hypothesis about the future. The supply chain teams that win the next decade will be the ones who can express those hypotheses as math, simulate them forward, and make adjustments with the same discipline as a control system. This model was one step in that direction. The roadmap is bringing the same simulation-first mindset to demand planning, capacity planning, and supplier capacity commitments.