Six Sigma Kaizen

The Practitioner's Guide to

WHY MOST 5-WHY ANALYSES FAIL BEFORE THE SECOND WHY

How to Diagnose, Escape, and Rebuild the Most Misused Tool in Quality

From Problem Statement Discipline to Root Cause Verification — with a Complete Case Study

Quality Engineering Series

The Most Commonly Abused Tool in Quality Engineering

In the history of quality management, few tools have been simultaneously as celebrated and as consistently misapplied as the Five Why analysis. Developed by Sakichi Toyoda and formalized within the Toyota Production System, the method is elegant in its simplicity: when a problem occurs, ask 'Why?' five times in sequence, with each answer forming the basis for the next question, until you reach the root cause — the systemic condition whose correction will prevent recurrence.

On paper, this is one of the most powerful diagnostic disciplines ever developed. In practice, at the vast majority of organizations that claim to use it, what passes for a Five Why analysis is something quite different: a post-incident document-filling exercise where a team restates the problem five different ways, assigns blame at whichever 'why' feels most comfortable, identifies a corrective action that addresses a symptom rather than a cause, and files the form in the CAPA system — where it will be reviewed by an auditor who checks that five questions were answered and three people signed the form.

The result is a quality tool that consumes significant organizational time and energy, generates paperwork that satisfies compliance requirements, and produces almost no reduction in actual problem recurrence. The same failures appear again, often within months. A new Five Why is conducted. The cycle continues.

This guide is about why that happens — and more importantly, how to stop it. The failures in Five Why analysis are neither random nor mysterious. They occur in predictable, cataloguable patterns that begin at the very first question, often in the first thirty seconds of the analysis. Understanding those failure patterns, and understanding what a genuinely effective Five Why analysis requires in terms of discipline, skill, and organizational environment, is the difference between a quality tool that changes how your operation runs and a compliance ritual that changes nothing.

What This Guide Covers

The architecture of a genuine Five Why analysis — what it is actually supposed to do
The eight most common failure modes — where analyses collapse and why
The problem statement: why the first sentence determines everything that follows
Case Study: Cascade Packaging Solutions — a flawed Five Why, its consequences, and a rebuilt analysis
The causal chain test: how to validate that your Whys are logically connected
Branching analysis: when one Why chain is not enough
Corrective action verification: the step that almost no one takes
Quick Reference: problem statement templates, causal chain test, and a complete Five Why worksheet

Section 1: What the Five Why Analysis Is Actually Supposed to Do

The Original Intent — and Where It Gets Lost

Taiichi Ohno described the Five Why method as a way of 'scientifically approaching the true cause' of a problem. The word 'scientifically' is doing a great deal of work in that sentence. Ohno was not proposing a documentation form. He was describing a disciplined intellectual process: starting from an observed phenomenon, following a chain of causation backwards through each contributing condition, and continuing until the investigation reaches a cause that, if corrected, would eliminate the problem permanently.

The number five is itself often misunderstood. Ohno chose it not because five is the magic number of causes in any process — root causes can be reached in three iterations or may require seven or eight — but because in his experience, most investigators stopped too early, settling for a proximate cause (the most immediately visible contributor) when the actual systemic root cause lay several layers deeper. The instruction to ask 'Why?' five times is a heuristic against premature closure: keep going past the obvious answer until you reach something that is both changeable and systemic.

The analysis produces value only if two conditions are met: the causal chain is logically valid (each answer genuinely explains why the previous condition occurred), and the final root cause is truly actionable — meaning that a corrective action applied to the root cause will prevent the original problem from recurring. If either condition fails, the Five Why produces a document, not an improvement.

The Anatomy of a Valid Five Why Chain

A properly constructed Five Why analysis has a specific logical structure that can be tested at each step. The structure looks like this:

Element	What It Contains	Test for Validity
The Problem Statement	A specific, factual description of what happened — the observable, measurable defect or failure. Not a category, not a generalization.	Can a person who was not there read this and understand exactly what occurred? Is it falsifiable? Does it contain the object, the defect, and the deviation?
Why 1	The immediate physical or mechanical cause that directly produced the problem. The most proximate contributing condition.	Does this answer directly cause the problem statement to occur? If this condition were not present, would the problem still happen?
Why 2	The condition that caused Why 1 to exist or occur. One level deeper into the causal chain.	Does this directly cause Why 1? Is this based on evidence, or is it an assumption? Could you demonstrate this causal link?

Element	What It Contains	Test for Validity
Why 3	The condition that caused Why 2. Often where 'human error' tends to be incorrectly placed — pointing to individuals rather than systems.	Is this a system condition or an individual condition? Individual conditions rarely produce durable corrective actions.
Why 4	The condition that caused Why 3. Often where process design, standard work gaps, or management system failures begin to appear.	Does fixing this cause eliminate all the Whys above it, or does it only address one path in a branching causal structure?
Why 5 (Root Cause)	The systemic condition whose correction, if implemented and sustained, would prevent the original problem from recurring.	The 'So Therefore' test: If we fix this, can we say 'Therefore Why 4 will not occur, therefore Why 3 will not occur...' all the way back to the problem statement?

The 'So Therefore' Reverse Test

The most reliable validation of a Five Why chain is to read it in reverse: start at the root cause and work forward using 'So therefore...' instead of 'Why?'

Root Cause → 'So therefore...' → Why 4 → 'So therefore...' → Why 3 → 'So therefore...' → Why 2 → 'So therefore...' → Why 1 → 'So therefore...' → the original problem occurs.

If the reverse chain reads logically at every step, the forward causal chain is valid. If any step in the reverse chain does not follow logically — if you find yourself saying 'well, maybe...' or 'sometimes...' — the causal link at that step is either wrong, incomplete, or an assumption rather than a verified fact.

This test takes ninety seconds. It catches the majority of faulty Five Why analyses before they produce wrong corrective actions.

What a Root Cause Actually Is — and Is Not

The term 'root cause' is used loosely in most quality organizations to mean 'the answer at the bottom of our Five Why form.' This conflation produces most of the failures in corrective action systems. A genuine root cause has specific characteristics that distinguish it from a contributing factor, a proximate cause, or a symptom:

Characteristic	What It Means	How to Test It
Systemic, not individual	The root cause is a condition in the system — a process, a design, a standard, a training program, a measurement system — not a specific person's action or decision.	'If a different operator had been working that day, would this problem have occurred anyway?' If yes, the cause is systemic. If no, you may have an individual cause, which requires different analysis.
Actionable	The root cause points to something that can be changed. It is not a force	'Can we design, implement, and control a change that eliminates this

Characteristic	What It Means	How to Test It
	of nature, a customer behavior, or a market condition.	condition?' If no, this is a constraint, not a root cause — keep asking Why.
Preventive — not just corrective	Correcting the root cause eliminates the problem permanently under normal operating conditions, not just for this specific incident.	'If the same conditions occur again in six months, will the corrective action still prevent this problem?' If not, you have addressed a specific incident, not the root cause.
Singular (or properly branched)	The root cause is the single condition (or set of conditions in a branching analysis) whose elimination prevents recurrence. It is not a list of five contributing factors all labeled 'root cause.'	'If we corrected this one condition, would the problem be prevented even if all the other identified causes remained unchanged?' If no, you may have multiple contributing roots requiring a branching analysis.

Section 2: The Eight Failure Modes — How Five Why Analyses Collapse

The failures in Five Why analysis are not random. Across thousands of organizational quality systems, the same patterns appear with such consistency that they can be named, described, and designed against. Each failure mode tends to enter the analysis at a specific point and produce a specific type of wrong outcome:

Failure Mode 1: The Vague Problem Statement (Kills the Analysis Before Why 1)

The problem statement is the foundation of the entire analysis. Every Why that follows is a direct consequence of how precisely and accurately the problem statement defines what actually happened. A vague problem statement makes a valid causal chain logically impossible, because you cannot trace the cause of something that has not been precisely defined.

	Vague (Invalid)	Specific (Valid)
Example 1	'Quality problem with product'	'Unit SN-4471 failed electrical continuity test at Station 8 on 14-March at 06:42 — open circuit measured at J3 connector'
Example 2	'Customer complaint received'	'Customer received 240 units of Part #7823 with thread depth 0.8mm — specification minimum is 1.2mm. Complaint received 18-March, covering Lot #2241'

	Vague (Invalid)	Specific (Valid)
Example 3	'Machine downtime issue'	'Injection mold press #2 experienced 3 unplanned stops between 07:00 and 10:30 on 21-March, totaling 94 minutes of lost production. Cause code entered as E-04 (hydraulic)'

A useful memory aid for problem statement construction is the 'Object + Defect + Deviation' structure: identify the specific object affected, the specific defect observed, and the specific deviation from the expected standard. All three elements must be present before a valid Five Why analysis can begin.

Failure Mode 2: The Blame Why (Stalls the Analysis at Why 2 or 3)

This is the single most common failure mode across quality organizations, and it is the one most deeply embedded in organizational culture. The Blame Why occurs when the causal chain reaches a human action and stops there — treating individual behavior as a root cause rather than as a symptom of a systemic condition that made that behavior likely.

'The operator did not perform the inspection step' is not a root cause. It is a data point. The root cause question is: why did that operator, in that process, at that time, fail to perform that step? The answer almost always points to something systemic: no enforcement mechanism existed; the step was ambiguous in the work instruction; cycle time pressure made the step feel optional; the inspection tool was inconvenient to use; training did not include the consequence of skipping the step; the team leader modeled skipping the step during high-volume periods. Each of these is an actionable system condition. 'Operator error' is not.

> ⚠ **The Human Error Trap**
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> *When a Five Why analysis reaches 'human error,' 'operator error,' 'employee did not follow procedure,' or any variant of individual behavioral failure as the final root cause — and stops there — the corrective action almost always consists of retraining the individual, revising the SOP to add the word 'must,' or issuing a memo reminding people of the requirement.*
>
> *These actions almost never prevent recurrence. The next operator, in the same systemic conditions, will make the same error. The corrective action addressed compliance, not causation.*
>
> *The test: if your corrective action would produce no improvement if that specific employee had been absent that day, your root cause is not the root cause.*
>
> *The correct response to 'Why did the operator skip the inspection step?' is always another Why: 'Why was it possible for the operator to skip the inspection step and have the product continue through the process?'*

Failure Mode 3: The Jump Why (Skips Logical Steps in the Causal Chain)

The Jump Why occurs when the analysis leaps from a condition to a cause that is not a direct causal antecedent of the previous condition. The two items in the chain may both be true, and may both be related to the problem, but there is a logical gap between them that the analysis has filled with assumption rather than evidence. The resulting causal chain appears valid on paper but fails the 'So Therefore' reverse test.

Step	Jump Why (Invalid — Gap Present)	Correct Chain (No Gap)
Problem	'Component failed in field after 8 months'	'Component failed in field after 8 months'
Why 1	'Component was installed incorrectly'	'Bearing seat was machined 0.04mm undersize — interference fit exceeded specification'
Why 2	**'Operator was not trained'**	'CNC program offset was set to +0.04 rather than -0.04 at last tool change'
Why 3	'Training program does not cover this component'	'Tool change offset adjustment is performed manually with no second check'
Why 4	← *JUMP: Why does missing training produce THIS specific installation error?*	'No offset verification step in the CNC changeover procedure'
Why 5		'Changeover procedure was last revised in 2019 and does not reflect current CNC controller interface'

The left column illustrates a jump from 'installed incorrectly' to 'operator not trained' — skipping the specific mechanism by which the incorrect installation occurred. Even if training was deficient, training deficiency alone does not explain why THIS specific error (a 0.04mm undersize) occurred on THIS component. The jump Why produces a corrective action (training) that will not prevent the offset error from recurring.

Failure Mode 4: The Opinion Why (Substitutes Assumption for Evidence)

Each step in a Five Why chain must be grounded in evidence, not assumption. The Opinion Why occurs when a team member's belief about why something happened is accepted and written into the analysis without verification — often because the assumption sounds plausible, is offered by someone senior, or because the team is under time pressure to complete the form.

Opinion Whys are particularly dangerous because they are not obviously wrong. A statement like 'the gasket failed because the material was substandard' may be true, or it may be an assumption made by someone who prefers supplier-blame explanations. Without actually testing the gasket material — measuring its properties against specification, reviewing the material certification, comparing to retained samples from conforming lots — this Why is conjecture. Corrective actions built on conjecture address the imagined cause, not the actual one.

Opinion Why (Assumption)	Evidence Required to Validate It	What Happens if Evidence Contradicts It
'The material was out of specification'	Material certification review; physical testing of retained sample from the affected lot; comparison to specification limits	The Why is invalid. The actual Why 1 is different. The analysis must restart with the correct causal chain — potentially eliminating multiple downstream Whys.

Opinion Why (Assumption)	Evidence Required to Validate It	What Happens if Evidence Contradicts It
'The operator skipped the step because they were in a hurry'	Time study of the operation; cycle time data for that shift; operator interview; review of production targets vs. actual output that day	If time pressure was not a factor, the actual Why is different — possibly inadequate training, ambiguous instructions, or tool unavailability.
'The vendor sent bad parts'	Incoming inspection data for that lot; dimension/attribute measurement of retained samples; review of vendor certification and test data; comparison to previous lots	If incoming parts were within specification, the problem originated inside the facility — often in handling, storage, or a downstream process — and the corrective action targets the wrong organization.
'This has always been a problem with that machine'	Historical downtime and quality data for that machine; comparison to similar machines; maintenance records; capability studies	'It has always been a problem' is not a cause. It is a description of chronic acceptance of a condition. The Why is still unanswered.

Failure Mode 5: The Single-Path Why (Ignores Contributing Branches)

Many problems have multiple contributing causes — two or three independent conditions that together produced the problem, where the elimination of any one of them alone might have prevented it. A single-path Five Why analysis follows one causal strand and produces a corrective action for that strand, leaving the other contributing causes unaddressed. The next incident occurs via one of the unaddressed paths.

Recognizing when a branching analysis is needed requires the team to ask, at each Why: 'Is this the only reason Why N occurred, or could it have occurred for other reasons?' If multiple independent causes could produce the same Why, each deserves its own branch. The analysis is then a tree rather than a chain, with a separate root cause (and corresponding corrective action) at the end of each branch.

When to Branch the Analysis

Branch when: a Why has more than one independent cause, each of which alone is sufficient to produce the Why.

Do not branch when: multiple causes all trace back to the same systemic root (they will converge further down the chain).

A common situation requiring branching: 'Why did the defect reach the customer?' has two independent causes: (1) the defect was created, AND (2) the detection system failed to catch it. These require separate causal chains — one chain addresses defect prevention; the other addresses detection reliability.

A rule of thumb: if your Five Why worksheet has five items labeled 'Root Cause,' you almost certainly have either multiple contributing branches that needed separate analysis, or you have mislabeled contributing factors as root causes.

Failure Mode 6: The Circular Why (Restates the Problem at a Different Level)

The Circular Why occurs when a team re-describes the problem rather than explaining it — using different words to say the same thing while appearing to move the analysis forward. This

is most common in the first two or three Whys, when the team is still close to the surface of the problem and has not yet begun genuine causal investigation.

Step	Circular Why (Invalid — Restates Problem)	Genuine Why (Explains Mechanism)
Problem	'Painted surface shows orange-peel texture on 37 units from Batch 4412'	Same
Why 1	*'The paint did not apply smoothly'*	'Spray gun atomization pressure dropped from 45 PSI to 31 PSI during the batch'
Why 2	*'The coating process was not working correctly'*	'Air supply regulator on Gun #3 was drifting — pressure drop of 14 PSI measured over 40 minutes'
Note	*Why 1 and Why 2 in the left column are circular — they describe the same condition ('paint applied with defect texture') with different words. No causal mechanism has been identified.*	Why 1 in the right column identifies the actual physical mechanism: pressure drop. This can be investigated, verified with equipment data, and leads to a traceable root cause.

Failure Mode 7: The Countermeasure Why (Works Backward from the Desired Solution)

This failure mode is perhaps the most insidious because it is often executed by experienced, well-intentioned quality professionals. The Countermeasure Why occurs when the team begins the analysis with a predetermined corrective action in mind — often the 'obvious' fix or a standard organizational response — and then constructs the Five Why chain to justify that predetermined action, rather than following the evidence to wherever it actually leads.

The result is a Five Why analysis that is logically consistent and internally coherent but is backwards: it was written from the bottom up (from preferred solution to problem statement) rather than from the top down (from problem statement to actual root cause). The corrective action is implemented, closes the CAPA, and the problem recurs — because the actual root cause was never identified.

How to Detect a Countermeasure Why

The analysis was completed unusually quickly — under 30 minutes for a complex problem.
The root cause happens to point to an improvement project that was already planned or budgeted.
Every team member agreed immediately on every Why with no substantive discussion.
The corrective action is something the organization has done before for different problems.
When team members are individually asked 'Why do you believe Why 3 caused Why 2?' they cannot explain the causal mechanism — they can only describe the Why chain as it was written.
Prevention: Require evidence documentation at each Why step before the analysis can proceed. If the team cannot identify what evidence would be needed to verify a Why, the Why is an assumption.

Failure Mode 8: The Unverified Correction (Closes the Loop Without Confirming It Worked)

The eighth and final failure mode occurs after a technically valid analysis produces a genuine root cause and a well-designed corrective action — and then the organization implements the action and closes the CAPA without ever confirming that the corrective action actually eliminated the problem. The assumption is that implementing the action is equivalent to solving the problem. It is not.

Corrective actions fail for many reasons: implementation was incomplete; the action addressed the identified root cause but a contributing branch was not analyzed; the root cause was correctly identified but the corrective action did not eliminate it as thoroughly as planned; the problem has a second contributing cause that was not apparent in the initial analysis. Without effectiveness verification — a structured review, at a defined interval after implementation, of whether the problem has actually recurred — the organization has no way of knowing whether its investment in analysis and action actually worked.

Verification Element	What It Requires
Verification metric	A specific, measurable indicator that will confirm the problem has not recurred. Must be defined at the time the corrective action is assigned — not chosen afterward in a way that makes success easy to claim.
Verification timeframe	A defined period after implementation during which the process will be monitored. Long enough for the problem to have been likely to recur under pre-correction conditions (typically 60–90 days for manufacturing process failures, or 3–5 occurrences of the triggering condition).
Verification owner	A named individual responsible for monitoring and documenting effectiveness — not the same person who implemented the corrective action, to avoid confirmation bias.
Recurrence trigger	A defined threshold that, if exceeded, automatically reopens the CAPA and requires a re-analysis. The trigger prevents a small recurrence from being rationalized as 'within normal variation.'
Post-verification documentation	A formal record that the verification period elapsed, the metric was monitored, and either (a) the problem did not recur — CAPA closed effectively, or (b) the problem recurred at or above the trigger threshold — CAPA reopened for deeper analysis.

Section 3: Case Study — Cascade Packaging Solutions

Company Background

Cascade Packaging Solutions (CPS) is a fictional manufacturer of industrial corrugated packaging — custom-printed, die-cut, and assembled corrugated containers for the food and pharmaceutical distribution industries. CPS operates a 220,000 square foot facility with four production lines, employing 310 people across two shifts. The company is ISO 9001:2015

certified and operates a CAPA (Corrective and Preventive Action) system that requires a Five Why root cause analysis for any quality escape that reaches a customer.

CPS had been experiencing a persistent problem: its CAPA system was generating large volumes of activity — typically 18–25 open CAPAs at any given time — but its external customer complaint rate had not meaningfully declined in three years of CAPA activity. The quality manager, Hector Ramos, had begun to suspect that the analyses were not reaching genuine root causes. He identified a specific customer complaint as a vehicle for testing this hypothesis: a complaint from a pharmaceutical distributor, Northlight Distribution, that had received 4,200 units of a critical packaging insert with an incorrect die-cut dimension.

The Incident: What Actually Happened

On a Tuesday in March, Northlight Distribution received a shipment of 4,200 pharmaceutical packaging inserts from CPS — Part #PI-7742, a folded paperboard insert designed to secure pharmaceutical vials within a corrugated outer carton. Upon receipt inspection, Northlight's incoming quality team identified that the central die-cut aperture in the insert — the precisely sized opening through which a vial neck passes to be secured — measured 28.4mm in diameter rather than the specified 26.0mm. At 28.4mm, the aperture was too large to hold the vials securely; the inserts were non-functional and the entire shipment was rejected.

The 4,200 rejected units represented $18,700 in direct material cost to CPS. More significantly, Northlight had relied on this shipment to fulfill a pharmaceutical client's order. The delay in receiving replacement product caused Northlight to miss a contractual delivery window, and they submitted a formal vendor performance incident that placed CPS on a 90-day probationary period — risking $340,000 in annual business.

Hector convened a Five Why team the morning after receiving the formal complaint. The team included the shift supervisor, the die-cut operator from the affected run, the quality inspector who had released the shipment, and the production planner.

The First Five Why — What the Team Produced (and What Was Wrong With It)

The team completed its analysis in approximately 45 minutes. The following is the Five Why as submitted to the CAPA system:

Step	First Analysis — As Submitted
Problem Statement	'Quality problem with die-cut inserts — customer complaint received from Northlight Distribution'
Why 1	'The inserts were the wrong size'
Why 2	'The die-cut tooling was set incorrectly'
Why 3	'The operator did not verify the setup before running the job'
Why 4	'The operator was not following the setup verification procedure'

Step	First Analysis — As Submitted
Why 5 / Root Cause	'Training gap — operator was not adequately trained on the setup verification procedure'
Corrective Action	'Retrain operator on setup verification procedure. Review procedure with all die-cut operators. Supervisor to sign off on operator certification before return to independent operation.'

Why This Analysis Failed — Annotated Critique

Hector reviewed the submitted analysis and identified five distinct failure modes within it. He documented his critique before reconvening the team:

Failure Mode	Specific Problem in This Analysis
Vague Problem Statement	'Quality problem with die-cut inserts — customer complaint received' tells us nothing about the specific defect. What dimension was wrong? By how much? Affecting which specific units? From which lot? Which die-cut line produced them? The analysis cannot be traced to a specific causal event because the problem statement does not describe a specific event.
Circular Why	Why 1 ('the inserts were the wrong size') is a restatement of the problem. The problem IS that the inserts were the wrong size. The first Why should explain the physical mechanism by which the wrong size was produced — not describe the result again in different words.
Opinion Why / Assumption	Why 2 ('the die-cut tooling was set incorrectly') is an assumption, not an evidence-based finding. The team had not measured the die tooling, reviewed the setup documentation, or established that tooling was the causal mechanism. The 28.4mm output could have been produced by a worn die, an incorrect job ticket, a material thickness variation, or a press pressure deviation — none of which were investigated.
Blame Why (×2)	Whys 3 and 4 both point to the operator — Why 3 (did not verify setup) and Why 4 (not following the procedure). This is not a deeper causal chain — it is the same individual attribution restated. Neither Why investigates why the system permitted the operator to proceed without verification, or whether the verification procedure was actually adequate for catching this type of error.
No Escape Cause Analysis	The analysis never addresses why 4,200 non-conforming units were shipped to the customer. Even if the root cause of the incorrect die-cut was correctly identified, there is a separate and equally important question: why did CPS's quality inspection process fail to detect the dimension error before shipment? This required a second analytical branch that was never constructed.

📌 The Consequence of the Flawed Analysis

CPS implemented the corrective action: the operator was retrained, a supervisor sign-off was added to the certification record, and the procedure was reviewed with the team. The CAPA was closed in 19 days.

Eleven weeks later, CPS received a second complaint from a different customer — a food distributor — for non-conforming die-cut dimensions on a different part number, produced on a different die-cut line by a different operator who had been through the standard setup verification training.

The recurrence confirmed what Hector had suspected: the first analysis had not reached the actual root cause. The retraining addressed a person who may not have been the source of the problem, while the actual systemic cause remained active in the process.

The Rebuilt Analysis — What the Investigation Actually Found

Hector reconvened the team with new ground rules: no Why could be recorded until the evidence for it was identified. The team spent three days on the rebuilt analysis — conducting physical measurements, reviewing production records, interviewing operators on both shifts, and examining the die-cut tooling and setup documentation.

The investigation revealed something the first analysis had not considered: the 28.4mm aperture was not produced by a setup error. The die tooling was physically correct — when measured, the die produced a 26.0mm aperture with acceptable precision. The oversize aperture was caused by a different mechanism entirely.

Investigation Finding	Evidence
The correct die was installed	Die tooling for Part #PI-7742 was measured using a calibrated optical comparator. Aperture of installed die measured 25.98mm — within tolerance of 26.0mm ±0.25mm specification. The die was correct.
Material thickness was significantly above specification	Retained material samples from the affected production run were measured. Paperboard caliper measured 0.38mm versus specified 0.28mm ±0.02mm. The paperboard was 0.08mm above the maximum specification — a 28.6% thickness excess. Supplier certification for that lot showed the material as conforming.
Thickness affects aperture size in this die-cut process	Engineering analysis confirmed: the die-cut process uses a steel rule die in a flat-bed press. At higher material caliper, the effective cut geometry changes — the material springs back differently from the cutting rule, producing an effectively larger aperture. At 0.38mm caliper, the expected aperture output is 28.3–28.6mm — consistent with the 28.4mm measured in the customer complaint.
Incoming inspection did not measure caliper	CPS's incoming inspection procedure for paperboard stock required visual inspection for damage and verification of count only. Caliper measurement was not a required incoming inspection step. The supplier certification was accepted as verification of material conformance without physical verification.
The first escape (non-detection before shipment) had a separate cause	Final inspection for die-cut inserts required dimensional sampling at a rate of 5 units per 1,000. However, the aperture dimension measured in final inspection was a go/no-go gauge check using a gauge pin sized for 26.0mm nominal. The gauge pin fit a 28.4mm aperture easily — it was undersized relative to the aperture. The gauge check, as designed, could not detect an oversized aperture. It could only detect an undersized aperture.

The Rebuilt Five Why — Branch 1: Defect Creation

Step	Rebuilt Analysis — Branch 1 (Defect Creation)
Problem Statement	'Part #PI-7742 die-cut inserts from Production Run #R-2244 (Lot 4412, Qty 4,200) produced aperture diameter of 28.4mm — specification 26.0mm ±0.25mm (min 25.75mm, max 26.25mm). Deviation of +2.15mm above maximum — non-functional for intended vial-retention application.'
Why 1	'The paperboard stock used in Run #R-2244 had a caliper of 0.38mm — 35% above the specification maximum of 0.30mm. At this caliper, the steel rule die produces an aperture 2.3–2.6mm larger than nominal due to material springback geometry.' [Evidence: caliper measurements of retained samples; engineering analysis of die-cut geometry vs. caliper]
Why 2	'Out-of-specification paperboard (caliper 0.38mm) entered production without detection. Lot was released from incoming inspection on supplier certificate of conformance alone — no physical caliper measurement was performed at incoming.' [Evidence: incoming inspection records for Lot 4412; procedure review showing no caliper measurement requirement]
Why 3	'CPS's incoming inspection procedure for paperboard stock does not include caliper measurement. The procedure was designed when CPS purchased from a single approved supplier with highly consistent material. The procedure was not updated when the approved supplier list was expanded to include two additional suppliers in 2021.' [Evidence: procedure revision history; approved supplier list additions in 2021]
Why 4	'The incoming inspection procedure update process does not require re-evaluation of inspection requirements when new suppliers are added to the approved supplier list. No formal risk assessment was performed when the two new paperboard suppliers were approved.' [Evidence: supplier approval records; CAPA 2021-14 approving new suppliers — no incoming inspection update noted]
Why 5 / Root Cause	'The supplier approval process does not include a step requiring review and update of the incoming inspection procedure to reflect the risk profile of the new supplier. The approved supplier list and incoming inspection procedures are managed independently, with no linkage between changes to one and review of the other.'
Corrective Action 1	'Revise the supplier approval procedure to require a mandatory review of all relevant incoming inspection procedures as part of supplier approval. Add caliper measurement to the incoming inspection procedure for all paperboard stock with a new tolerance gate of 0.28mm ±0.02mm. Implement immediate 100% caliper incoming inspection for all paperboard lots until supplier capability is established.'

The Rebuilt Five Why — Branch 2: Escape Cause (Failure to Detect Before Shipment)

Step	Rebuilt Analysis — Branch 2 (Escape Cause)
Problem Statement	'Same as Branch 1 — 4,200 non-conforming units shipped to customer without detection during final inspection.'
Why 1	'Final inspection dimensional check used a 26.0mm go/no-go gauge pin for aperture verification. A 28.4mm aperture (2.4mm oversize) passes this gauge without detection — the gauge pin fits easily into the aperture. The inspection method is incapable of detecting

Step	Rebuilt Analysis — Branch 2 (Escape Cause)
	oversized apertures.' [Evidence: gauge specification; physical verification — 26.0mm pin passes freely through 28.4mm aperture]
Why 2	'The final inspection gauge specification was written to detect the most common historical failure mode for this part: undersized apertures caused by die-cut depth variation. Oversized apertures were not considered a failure mode when the inspection method was designed in 2019.' [Evidence: inspection method development records from 2019; historical defect data showing 100% of prior aperture defects were undersized]
Why 3	'The inspection method was not reviewed when material suppliers were changed in 2021, even though different supplier materials have different springback characteristics that could produce different failure mode directions (oversized rather than undersized).' [Evidence: 2021 supplier approval records — no inspection method review documented]
Why 4 / Root Cause	'Same systemic root cause as Branch 1: the supplier approval process does not require review of inspection methods when new suppliers are added. The two branches share a common root.' [This is a convergent branch — both branches reach the same systemic process gap, confirming the root cause identification.]'
Corrective Action 2	'Redesign the final inspection gauge for Part #PI-7742 to use a ring gauge or optical measurement system capable of detecting both undersized and oversized apertures. Revise the inspection procedure to require maximum aperture measurement in addition to minimum. Extend the gauge review to all die-cut parts using go/no-go pin gauges — assess bidirectional detection capability for each.'

What the Rebuilt Analysis Changed — and What It Took

The rebuilt analysis produced three substantive changes from the original: (1) the problem was traced to a material specification issue, not an operator behavior issue — so the corrective action targeted material control, not personnel retraining; (2) a second branch was analyzed and found to share the same root cause, confirming the root cause identification; and (3) the systemic gap — a supplier approval process disconnected from incoming inspection and inspection method management — was identified and targeted.

Dimension	First Analysis	Rebuilt Analysis
Time to complete	45 minutes	3 days (including 2 days of physical investigation)
Evidence gathered	None — all Whys based on team discussion and assumption	Caliper measurements, engineering analysis, procedure review, supplier records, gauge specification review
Root cause identified	Operator training gap (incorrect)	Supplier approval process disconnected from incoming inspection and gauge management (verified)
Corrective action target	Individual operator — retrain	System — supplier approval procedure; incoming inspection; gauge design

Dimension	First Analysis	Rebuilt Analysis
Branches analyzed	One (defect creation only — escape cause not analyzed)	Two (defect creation + escape cause — converged to same root)
Recurrence (11 weeks later)	Yes — different operator, different line, same systemic condition	N/A — root cause and systemic fix identified before second event occurred
Estimated recurrence prevention value	Near zero (same systemic conditions remained)	Prevented second supplier complaint + probationary period risk on second account ($290,000 estimated exposure)

What Made the Rebuilt Analysis Different

Evidence before assertion: no Why was recorded until the team identified the evidence that would confirm or deny it. When Why 2 was proposed as 'tooling setup error,' someone asked 'have we measured the die?' They measured it and found it was correct. The analysis changed completely at that point.

Investigation time: the rebuilt analysis required 3 days because the investigation required physical work — measuring retained samples, reviewing records, interviewing people from multiple shifts, consulting engineering. Fast analyses of complex problems are almost always wrong.

The second branch: asking 'Why did 4,200 non-conforming units ship?' as a separate question from 'Why were they produced incorrectly?' is what revealed the gauge design flaw — and the finding that both branches shared the same systemic root cause is exactly the type of confirmation that validates a root cause identification.

Section 4: Building Organizational Capability for Effective Five Why

The Three Conditions That Enable Good Analysis

The individual techniques of Five Why — precise problem statements, evidence-based Whys, causal chain validation — are learnable skills. But even teams that have learned these skills will produce poor analyses if the organizational conditions do not support the practice. Three conditions are foundational:

Condition	What It Means and Why It Matters
Time to investigate properly	Genuine root cause analysis of non-trivial problems cannot be completed in 45-minute meetings. It requires time to gather evidence, measure conditions, review records, and speak with people across shifts and functions. Organizations that require CAPA completion within 24 hours or 5 days will consistently produce poor analyses — not because their people lack skill, but because the timeline forecloses the investigation that skill requires. Complex

Condition	What It Means and Why It Matters
	problems deserve investigation time proportional to their cost and recurrence risk.
Psychological safety to challenge assumptions	When a Five Why team includes a senior leader whose preferred explanation is adopted by the group without challenge, the analysis fails. When the team's most junior member has information that contradicts the group's direction but does not feel safe offering it, the analysis fails. Effective root cause analysis requires a team environment where any Why can be questioned, where 'I don't think that's the mechanism' is a welcome contribution, and where evidence overrides seniority. Leaders who participate in Five Why analyses should ask questions, not provide answers.
Accountability for effectiveness, not just completion	If the quality management system measures CAPA performance by time-to-close and number of open CAPAs, teams are incentivized to close quickly rather than correctly. When effectiveness verification results are tracked — specifically, recurrence rates within 90 days of CAPA closure — organizations shift from completion metrics to outcome metrics. The test of a Five Why analysis is not whether the form was filled out. It is whether the problem recurred.

Training Approach: How Organizations Build Five Why Skill

Reading about Five Why failure modes and then continuing to conduct analyses the same way is the most common outcome of quality training. Building genuine analytical skill requires a different approach:

Training Element	What Effective Training Looks Like
Case-based critique before new methods	Before introducing what a good analysis looks like, present examples of poor analyses — ideally from the organization's own historical CAPA system — and ask participants to identify the failure modes. This builds diagnostic skill that transfers immediately to reviewing current work.
Live analysis practice with coaching	Classroom exercises using printed case studies build theoretical understanding. Practice on actual current problems, with an experienced facilitator coaching the team in real time, builds the application skill that classroom exercises cannot develop.
Peer review of analyses before CAPA submission	Require that every Five Why analysis be reviewed by a second qualified analyst before CAPA submission. The reviewer checks problem statement precision, causal chain logic, evidence documentation, and escape cause analysis. This catches the majority of failure modes before they become closed CAPAs with wrong corrective actions.
Recurrence tracking as a training feedback loop	Every time a problem recurs within 90 days of CAPA closure, the original analysis and corrective action should be reviewed in a structured retrospective. This creates a direct feedback loop between analysis quality and outcome — the most powerful learning mechanism available.

When Five Why Is and Is Not the Right Tool

Five Why analysis is powerful for a specific type of problem. Recognizing when a different tool is more appropriate is itself a quality skill:

Situation	Five Why: Right Tool?	Alternative or Supplement
Single, specific failure event with a traceable causal chain	Yes — ideal application. The specific event provides the problem statement anchor for causal chain tracing.	N/A
Chronic, high-frequency defect with multiple contributing causes	Partial — Five Why can explore individual causal branches, but the chronic nature suggests systemic complexity.	Ishikawa (fishbone) diagram for structured cause enumeration; Design of Experiments for quantifying factor contributions; SPC to characterize the variation pattern.
Complex, multi-variable process failure where the causal mechanism is unclear	Partial — Five Why is a good starting framework but is limited when the problem has no clear single causal path.	Fault tree analysis for complex system failure; PFMEA review; 8D structured problem solving for complex cross-functional issues.
Safety incident with potential regulatory reporting implications	Supplement only — Five Why is insufficient for regulatory-grade root cause analysis in safety-critical events.	Formal incident investigation with qualified investigator; MORT (Management Oversight and Risk Tree); Bow-tie analysis; regulatory-required methodologies.
Supplier-caused failure where the supplier must conduct the analysis	Yes — but require the supplier to submit evidence documentation for each Why, not just the chain. An unsupported supplier Five Why is nearly worthless.	Require 8D report format which includes containment, root cause evidence, and corrective action verification — provides more accountability than a bare Five Why form.

Section 5: The Corrective Action — Making the Fix Stick

Corrective Action Design Principles

A correctly identified root cause does not automatically produce an effective corrective action. The action must be designed to address the root cause — not the symptoms, not the proximate cause, and not the organizational preferences of whoever approves the corrective action. Several principles govern effective corrective action design:

Principle	What It Requires
Target the root cause, not the symptom	The corrective action must directly address the systemic condition identified as the root cause. If the root cause is 'supplier approval process does not require incoming inspection review,' the corrective action must change the supplier approval process — not simply add a step to the current inspection procedure without addressing how future supplier additions will be handled.
Prefer permanent systemic changes over procedural additions	Procedural additions (add a step, add a signature, add a reminder) are the weakest form of corrective action. They rely on ongoing human compliance with a newly required behavior in a system that just demonstrated it cannot enforce existing required behaviors. Design changes, engineering controls, and system interlocks are more durable. Ask: 'What would make it impossible or very difficult for this failure to occur again?' before settling for 'remind people to do it correctly.'
Address both cause and escape	The corrective action should include actions from both the defect-creation branch and the escape-cause branch. Preventing the defect and preventing its escape to the customer are two separate problems requiring two separate corrective actions. Addressing only one of the two leaves the customer exposure only partially closed.
Define effectiveness verification before implementation	At the time the corrective action is approved, document exactly how effectiveness will be measured, what the success criterion is, how long the verification period will last, and who is responsible for monitoring. If these decisions are deferred until after implementation, they will be made in a way that favors declaring success.
Consider unintended consequences	Corrective actions create changes in a system of interconnected processes. A change that eliminates one failure mode may create conditions for a different failure. Before implementing, ask: 'What could go wrong as a result of this change?' Conduct a brief risk review of the proposed corrective action — a mini-PFMEA if the change is significant.

Corrective Action Effectiveness Verification

The effectiveness verification period is not a formality — it is the scientific test of the hypothesis that the corrective action will prevent recurrence. Designing the verification properly requires thinking about it as a controlled observation: what conditions must hold, for how long, at what measurement rate, before you can conclude the problem has been eliminated?

Verification Design Element	Guidance
Metric selection	Choose a metric that would reliably indicate recurrence. For a defect-prevention corrective action, this is typically defect rate (at the same station, for the same part or part family, over the verification period). For an escape-prevention action, it is escape rate or incoming customer complaints. The metric must be capable of detecting a recurrence at the relevant frequency — if the corrective action was for a defect that occurred every 60 days, a 30-day verification period is insufficient.

Verification Design Element	Guidance
Verification period duration	Rule of thumb: at least 3 occurrences of the triggering condition, or 90 days — whichever is longer. A corrective action for a problem that occurs quarterly should be verified over at least one quarter after full implementation. A corrective action for a problem that occurs daily can often be verified in 30 days.
Baseline comparison	Define the pre-corrective-action baseline clearly so the post-implementation comparison is valid. 'Defect rate during verification period compared to defect rate over the prior 6 months at that operation' is a measurable comparison. 'Things seem better' is not.
Recurrence trigger	Define the threshold that triggers reopening the CAPA. Typically: if the defect occurs even once during the verification period (for rare, high-severity events) or if the defect rate during verification exceeds 50% of the pre-correction baseline rate. The trigger must be specified before verification begins.
Verification sign-off	Require a named person — not the corrective action implementer — to review the verification data and formally attest that the corrective action was effective before the CAPA is closed. Build in an explicit data review step: 'Here is the defect rate before. Here is the defect rate after. Here is the comparison to the success criterion. I attest this corrective action was effective.'

Quick Reference: Five Why Analysis at a Glance

The Problem Statement Formula

Every Five Why analysis begins here. The problem statement must contain all four elements before the analysis can validly proceed:

Element	Question It Answers
Object	What specific item, part, process, or system failed? (Not a category — the specific part number, machine ID, process step, or lot number)
Defect	What specifically went wrong with it? What was the observed failure mode — what was present that should not have been, or absent that should have been?
Deviation	By how much did it deviate from the expected standard? The specific measurement, count, or observable difference from specification.
Context	When did this occur? Under what operating conditions? From which lot, shift, or production run? What is the scope (how many units, over what period)?

Problem Statement Template

[Object] [produced / exhibited / failed to produce] [Defect] of [Specific Measurement] — specification requires [Standard]. Event occurred [Date/Time/Lot] under [Operating Conditions]. [Quantity] units affected.
Example: 'Die-cut insert Part #PI-7742 from Production Run #R-2244 (Lot 4412, Qty 4,200) produced aperture diameter of 28.4mm. Specification: 26.0mm ±0.25mm (max 26.25mm). Deviation: +2.15mm above maximum. Run date: 14-March, Shift 1, Die-Cut Line 3.'

The Eight Failure Mode Checklist — Review Before Submission

	Failure Mode	Check Question
☐	**Vague Problem Statement**	Does the problem statement contain a specific object, defect, deviation, and context? Could a person who was not there read it and understand exactly what occurred?
☐	**Circular Why**	Does each Why explain WHY the previous condition occurred — or does it just restate the previous condition in different words? Read each consecutive pair of Whys aloud: 'X occurred because Y.' Does Y genuinely explain X?
☐	**Blame Why**	Does any Why name a person's behavior or decision as the final root cause? If yes: why was it possible for that behavior to occur in this system? Ask one more Why.

	Failure Mode	Check Question
☐	**Jump Why**	Run the 'So Therefore' reverse test: starting at the root cause, does each 'So therefore...' lead logically to the next Why and ultimately to the problem statement? Any gap in the reverse chain indicates a jump in the forward chain.
☐	**Opinion Why**	For each Why, can you identify the specific evidence that confirms it? Is that evidence documented in the analysis? If a Why is based on discussion and assumption rather than measurement or record review, it is an opinion Why.
☐	**Single-Path Why**	At each Why, ask: 'Is this the only reason this condition occurred?' If there are other independent causes, each requires its own branch. Have both the defect-creation path and the escape-cause path been analyzed?
☐	**Countermeasure Why**	Does the analysis happen to confirm a solution that was preferred before the analysis began? Could you describe the evidence that led to each Why, in the order it was discovered? If not, the analysis may have been built backward.
☐	**Unverified Correction**	Has an effectiveness verification plan been defined — including the metric, the success criterion, the verification period, the recurrence trigger, and the named verifier — before the CAPA is closed?

The Complete Five Why Worksheet

CAPA / Problem Reference	_____
Date of Analysis	_____ Analysis Team: _____
Problem Statement (Object + Defect + Deviation + Context)	_____ _____ _____
Evidence confirming problem statement is specific and factual:	_____
Why 1 — Immediate cause that directly produced the problem:	_____
Evidence for Why 1 (measurement / record / observation):	_____
Why 2 — What caused Why 1 to occur?	_____

Evidence for Why 2:	_____
Why 3 — What caused Why 2 to occur?	_____
Evidence for Why 3:	_____
Why 4 — What caused Why 3 to occur?	_____
Evidence for Why 4:	_____
Why 5 / Root Cause — What caused Why 4? (Systemic, actionable, preventive)	_____
Evidence for Root Cause:	_____
'So Therefore' Reverse Test Passed?	☐ Yes — reverse chain reads logically at every step ☐ No — gap identified at Why ____
Branch 2 Needed? (Escape Cause)	☐ Yes (attach Branch 2 worksheet) ☐ No — escape cause same as defect-creation root cause ☐ No — escape cause not applicable
Corrective Action(s) — Root Cause Branch 1	Action: _____ Owner: _____ Due Date: _____
Corrective Action(s) — Escape Cause Branch 2	Action: _____ Owner: _____ Due Date: _____
Effectiveness Verification Plan	Metric: _____ Success Criterion: _____ Period: _____ Verifier: _____ Recurrence Trigger: _____
Verification Outcome	☐ Effective — problem did not recur during verification period. CAPA closed: _____ ☐ Not effective — problem recurred. CAPA reopened for re-analysis.

Five Why Key Terms — Glossary

Term	Definition
Five Why Analysis	A structured root cause analysis technique in which 'Why?' is asked iteratively, with each answer forming the basis for the next question, until the underlying systemic root cause of a problem is identified.
Problem Statement	The specific, factual description of the observed failure that anchors the Five Why analysis. Must contain the object affected, the specific defect, the measured deviation from standard, and the context (when, where, how many).

Term	Definition
Proximate Cause	The most immediately visible or obvious contributing condition — the answer to the first Why. Not the root cause. The analysis must continue past the proximate cause.
Root Cause	The systemic condition whose correction, if implemented and sustained, prevents the problem from recurring. Characteristics: systemic (not individual), actionable, preventive, and singular (or properly branched).
Causal Chain	The sequence of Why-Answer pairs that traces causation from the problem statement to the root cause. Each link in the chain must be logically valid — the answer must directly explain why the previous condition occurred.
'So Therefore' Test	A validation method for the Five Why causal chain: read the chain in reverse, replacing 'Why?' with 'So therefore...' If the reverse chain reads logically at every step, the forward chain is valid.
Blame Why	A failure mode in which an individual's behavior or decision is identified as the root cause, rather than the systemic conditions that made that behavior possible or likely.
Jump Why	A failure mode in which the causal chain skips a logical step — the answer to Why N does not directly cause Why N-1. The reverse test fails at the gap.
Opinion Why	A failure mode in which a Why is based on team assumption rather than physical evidence, records, or measurement. Opinion Whys are unverified hypotheses — not findings.
Escape Cause	The causal chain explaining why the defect was not detected before reaching the customer or next process. A complete analysis requires both a defect-creation branch and an escape-cause branch.
Branching Analysis	A Five Why structure in which multiple independent causes at a given Why each receive their own causal chain, producing a tree structure rather than a single chain. Required when a Why has more than one independent contributing cause.
Effectiveness Verification	A structured post-implementation review of whether the corrective action actually prevented recurrence. Requires a pre-defined metric, success criterion, verification period, recurrence trigger, and named verifier.
CAPA	Corrective and Preventive Action — the formal quality management system process that governs problem identification, root cause analysis, corrective action, and effectiveness verification.
8D (Eight Disciplines)	A structured problem-solving methodology that includes containment, root cause analysis (often via Five Why), corrective action, and effectiveness verification. More comprehensive than a standalone Five Why; often used for complex or customer-facing problems.

Final Thoughts — The Analysis Worth the Time It Takes

The first Five Why analysis conducted at Cascade Packaging Solutions took forty-five minutes and closed a CAPA. The rebuilt analysis took three days and prevented an estimated $290,000 in customer exposure by eliminating a systemic flaw that was actively generating defects across multiple products and production lines. The ratio of investment to return was not even close.

This is the essential argument for doing Five Why analysis correctly: it is not about the technique, the form, or the compliance requirement. It is about the difference between spending two hours on an analysis that changes nothing and spending three days on an analysis that changes a system. The first approach generates paperwork. The second generates durable improvement. The first feels efficient. The second is efficient, because the problem does not recur.

The failure modes described in this guide are not exotic or unusual. They are the default output of Five Why analysis conducted under time pressure, without evidence discipline, in organizations where closing a CAPA quickly is rewarded more than closing it correctly. Changing those defaults requires explicit organizational decisions: to protect investigation time, to require evidence for every Why, to track recurrence as the primary quality metric, and to build cultures where identifying the true cause of a problem — even when it points to a systemic management failure — is more valued than producing a fast, comfortable answer.

The test of every Five Why analysis is simple and unforgiving: does the problem recur? If it does, the analysis was incomplete regardless of how many signatures are on the form. If it does not, the analysis worked. Everything else — the format, the number of Whys, the specific methodology used — is secondary to that single outcome criterion.

The Four Commitments of Effective Five Why Analysis

1. Precision first — write the problem statement to the level of specificity where a causal chain can be logically constructed. If the statement is vague, do not proceed.

2. Evidence for every Why — no Why is recorded without identifying the specific evidence that confirms it. Assumption is investigation debt that will be paid with recurrence.

3. Both branches — always ask separately why the defect was created AND why it was not caught. The escape cause analysis is not optional.

4. Verify before closing — define the effectiveness verification plan before implementing the corrective action. The CAPA is not closed until the verification period has elapsed and the data shows the problem has not recurred.

Sources & Further Reading

Taiichi Ohno — Toyota Production System: Beyond Large-Scale Production • Masaaki Imai — Gemba Kaizen • ASQ — The Quality Toolbox (Nancy Tague) • AIAG — Effective Problem Solving Reference Manual • ISO 9001:2015 — Clause 10.2 (Nonconformity and Corrective Action) • IATF 16949:2016 — Customer-Specific Requirements for CAPA • Mark Graban — Measures of Success • ASQ Quality Progress