TRAINING MODULE

Lean VA / RNVA / NVA Analysis

The waste that looks exactly like work

A working module for engineers with 1–2 years on the floor. By the end you will be able to classify any element correctly into VA, RNVA, or NVA, and calculate a station's real VA% by hand.

Grounded in Taiichi Ohno's Toyota Production System — the founding distinction between value-added work and waste

BEFORE WE START

What You Will Be Able to Do After This Module

1. Define VA, RNVA, and NVA correctly — and place a real element into the right one, not by feel.
2. Explain why a machine's own auto-run time counts as VA, not a motion-economy question.
3. Calculate a station's VA% and compare it honestly against the line average.
4. Explain why this tool's kaizen suggestions are pulled verbatim from the OPL library, never independently reworded.
5. Recognize the two most common mistakes junior IEs make when they first classify VA/RNVA/NVA.

FOUNDATION — THE QUESTION BEHIND EVERY CLASSIFICATION

Does This Element Transform the Product?

One question, asked of every single element on the line:

VA — VALUE-ADDED

Transforms the product in a way the customer would pay for. “Insert bracket,” “weld joint,” a machine's own transformation cycle.

RNVA — REQUIRED NON-VALUE-ADD

Doesn't transform the product, but the process genuinely can't run without it right now. “Reach for part,” “release to bin.”

NVA — NON-VALUE-ADD (WASTE)

Neither transforms the product nor is truly necessary. “Search for the right part,” “wait for the previous station.”

THE CORE IDEA

This Tool Never Disagrees With Itself

A theme you've now seen in several modules — here it applies to BOTH the classification and the suggested fix:

Therblig classification

SAME map_therblig() as MTM RCA, Yamazumi, and SWCS — never a second, disagreeing opinion on what an element IS.

Kaizen suggestion

SAME motion_guidance() text OPL cards already show — never a differently-worded fix for the same element.

Imagine an operator reading “Search for part — fix: pre-kit upstream” on an OPL card, then opening this report and finding the same element classified differently with a DIFFERENT suggested fix. That contradiction would cost trust in both documents — exactly the same lesson from the SOP module's Conflict Filter.

WHERE THIS DISTINCTION COMES FROM

The Most Dangerous Waste Looks Exactly Like Work

Ohno's founding insight for the whole Toyota Production System: an operator searching for a part LOOKS busy — hands moving, clearly engaged — but the product isn't one step closer to done. That's exactly why NVA is dangerous: it doesn't announce itself the way a broken machine does. VA/RNVA/NVA is the discipline of asking the harder question — not “is someone working?” but “is the PRODUCT being transformed, right now?”

Every RNVA element is a candidate for elimination too — just a harder one, because the process genuinely needs it today.

TAIICHI OHNO

Toyota Production System

A RULE THAT SURPRISES JUNIOR IEs

A Machine's Auto-Run Time Is VA, Not a Motion Question

It's tempting to ask “how can the machine be faster?” the same way you'd ask about a human motion. That's the wrong question here:

MACHINE AUTO-CYCLE = VA

The press stamping, the weld cycle, the mold curing — this IS the core transformation, exactly like a manual Use(U) element. Treat it as VA, full stop.

MOTION ECONOMY QUESTIONS

Belong to the OPERATOR's elements around the machine — load, unload, wait — not to the machine's own transformation cycle itself.

Matches MTM RCA's own “Process/Machine” carve-out exactly — the same rule, applied consistently across the whole suite.

THE METHOD, IN ONE PICTURE

Three Steps, Every Element on the Line

1

CLASSIFY

Every element gets a Therblig, then a VA/RNVA/NVA tag — same classifier as MTM RCA.

2

AGGREGATE

Sum by category, per station and for the whole line — VA% is the headline number.

3

SURFACE & SUGGEST

Rank the top NVA elements, attach the matching OPL kaizen fix verbatim.

1

STEP 1

Classify Every Element

The same six elements you'd see on a real station sheet — classified against the Slide 3 question.

Element	Time	Class
Reach for bracket	3s	RNVA
Insert bracket into housing	12s	VA
Machine auto-cycle (rivet stake)	15s	VA
Release part to bin	2s	RNVA
Search bin for correct size	4s	NVA
Wait for previous station	3s	NVA

Notice: the machine element gets VA here even though it's automatic — the Slide 6 rule in action.

2

STEP 2

Calculate VA%

Same six elements, now summed by category against the station's real total cycle time.

This is the headline number — but never the whole story on its own.

Category	Elements	Total
VA	Insert bracket + Machine cycle	12 + 15 = 27s
RNVA	Reach + Release	3 + 2 = 5s
NVA	Search + Wait	4 + 3 = 7s

Station Total = 27 + 5 + 7 = 39s. VA% = 27 ÷ 39 = 69%

This line's average VA% is 74%. This station, at 69%, sits BELOW average — flagged for priority attention, not because 69% is "bad" in isolation, but because it's worse than what the rest of the line already achieves.

STEP 3 — SURFACE THE TOP NVA, ATTACH THE FIX

The Biggest NVA Element Gets the OPL's Own Fix

TOP NVA: “Search bin for correct size” — 4s, the largest single waste element at this station.

↓ motion_guidance() lookup — the exact function OPL cards call

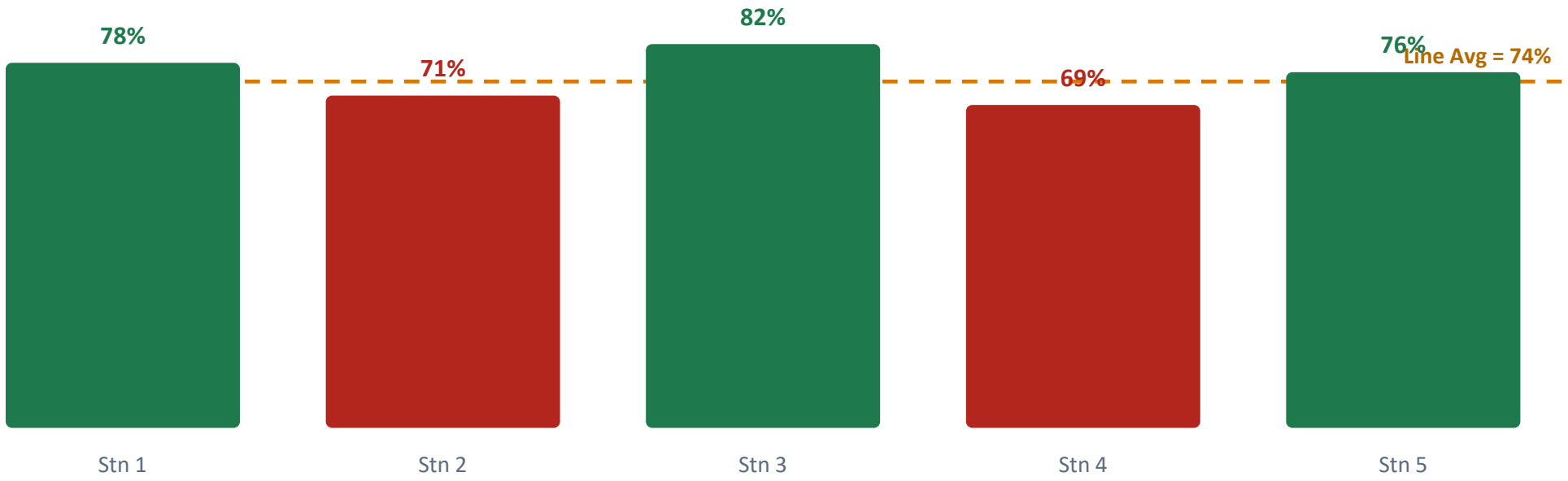
KAIZEN FIX (verbatim from the OPL library)

“Pre-kit fasteners by size upstream, in single-size, single-cycle pouches — eliminates visual search entirely.”

If you flip to this element's OPL card, it will show the EXACT same wording — not a paraphrase. That's the point: one source of truth for “why” and “how to fix,” reused everywhere it's needed.

PUTTING IT TOGETHER

One Station Against the Line's Own Bar



Station 4 (69%) and Station 2 (71%) both sit below the line average — the summary sheet ranks these first, with their top NVA elements and verbatim kaizen fixes already attached.

BEFORE YOU GO TO THE FLOOR

Five Mistakes That Give Junior IEs Away

✗ Classifying a machine's auto-run time as a motion-economy question instead of VA — it's the core transformation, not idle time.

✗ Treating every RNVA element as untouchable — “required for now” is still a candidate for future elimination.

✗ Judging a station's VA% in isolation instead of against the line's own average — 69% can be a real problem or a non-issue depending on context.

✗ Rewriting a kaizen suggestion in your own words instead of citing the OPL library's verbatim fix — creates the exact contradiction this tool is built to avoid.

✗ Assuming higher VA% always means a better station — a station can hit 100% VA and still be a bottleneck if its VA work itself is simply too slow.

FROM PENCIL-AND-PAPER TO THE SOFTWARE

What generate_lean_va_analysis.py Does For You

Every element, every station, classified and aggregated automatically — consistent with every other tool in the suite.

1	**Summary sheet**	Per-station VA%, line totals, and the top NVA waste elements with kaizen fixes — the Slide 11 comparison, generated automatically.
2	**One VA_<Stn> detail sheet per station**	Every element's classification traceable, for anyone who wants to check the reasoning behind a station's VA%.
3	**Same Therblig classifier as MTM RCA, Yamazumi, SWCS**	Never a second opinion on what an element IS.
4	**Same kaizen text as OPL**	Never a second opinion on what to DO about it.

KEY TAKEAWAYS

Recap — Say This Back In Your Own Words

- The core question is always the same: does this element transform the product, right now?
- A machine's own auto-run time is VA — the same rule as MTM RCA's Process/Machine carve-out, applied consistently.
- VA% only means something compared against the line's own average — never judge it in isolation.
- Classification and kaizen suggestions both reuse the SAME source everywhere — never a second, disagreeing opinion.

TALK IT THROUGH — 3 QUESTIONS FOR YOUR NEXT LINE WALK

1. Pick a station on your own line — classify its top 5 elements by hand before checking the report. Did you agree with yourself?
2. Find an RNVA element you've always assumed was untouchable — is it actually still required, or has the process changed since?
3. Compare your own line's lowest-VA% station against the line average — is it actually the priority, or does another station's absolute waste time matter more?