

TRAINING MODULE

SOP Master

A blank hand is a broken time-motion study

A working module for engineers with 1–2 years on the floor. By the end you will be able to split a raw step into left-hand/right-hand actions correctly, and explain why every hand always gets a written role.

Grounded in Frank & Lillian Gilbreth's Principles of Motion Economy — the bilateral, symmetrical use of both hands

What You Will Be Able to Do After This Module

- 1 Explain why a blank LH or RH column silently invalidates a time-motion study, not just looks incomplete.
- 2 Split a raw work step into explicit left-hand and right-hand actions, by hand.
- 3 Apply ECRS Action Command tagging from keyword and context, the way the engine does.
- 4 Explain why an Eliminate/Combine step gets a different Control Remark than a standard step — and why that matters.
- 5 Recognize the two most common mistakes junior IEs make when they first write a bilateral SOP.

A Time Study Assumes Both Hands Are Accounted For

Every MTM, C2C, and Yamazumi number in this whole suite assumes the cycle time actually reflects what BOTH hands were doing. That assumption breaks quietly if this document doesn't hold up:

BLANK RH/LH COLUMN

Looks like “that hand wasn't doing anything important.” Actually means: nobody checked. The recorded cycle time may be silently wrong.

EXPLICIT ROLE, EVERY HAND

Even a genuinely idle hand gets a written role: hold/stabilize, pre-stage the next part. The study now actually represents the real cycle.

This is Kinematic Isolation: every raw step decomposed into what the LEFT hand and RIGHT hand each physically do — no exceptions, no blanks.

One Raw Step → Two Explicit Hand Roles

RAW STEP: "Operator picks up bracket and places it in the fixture."

LEFT HAND

Picks up bracket from bin, positions it in the fixture, holds steady.

RIGHT HAND

Not idle — pre-stages the NEXT bracket from the bin, ready the instant this cycle's fixture step finishes.

The raw text only described what ONE hand does. Isolation didn't just document the right hand — it found a real motion-economy opportunity: overlapping next-cycle prep with this cycle's work, a genuine time saving nobody would have written down otherwise.

WHERE THIS METHOD COMES FROM

Both Hands Should Never Be Idle at the Same Time

The Gilbreths' Principles of Motion Economy include a rule that's a century old and still exactly right: the two hands should begin and complete their motions simultaneously, and neither should ever be idle except during rest. Bricklaying, their most famous study, cut motions per brick from 18 to about 5 largely by finally giving the “idle” hand real, overlapping work.

Kinematic Isolation is that century-old rule, enforced automatically on every single step of your SOP.

MOTION ECONOMY

Frank & Lillian Gilbreth

Four Parts, Every Time a Station's SOP Is Built

1

KINEMATIC ISOLATION

LH/RH split, no blank hand ever.

2

ECRS ACTION ALLOCATION

Eliminate/Combine/Rearrange/Simplify, from keyword + context.

3

CONFLICT FILTER

An Eliminate/Combine step never gets a contradictory 'do not deviate.'

4

OPERATION TYPE MATRIX

MAN/MACHINE/COMBINED routing, refined mid-sequence.

The rest of this module walks all four with worked examples.

1

PART 1

Kinematic Isolation

Applied to every raw step, whether the original text mentioned one hand or two.

The isolation itself is often where a real ECRS opportunity gets discovered — not a separate later step.

THREE MORE RAW STEPS, ISOLATED

Raw Step	Left Hand	Right Hand
Insert two screws, torque to spec	Holds part steady against fixture	Drives screws with powered driver
Inspect weld, log result	Holds part under inspection light	Marks checklist / scans barcode
Load part, press cycle start	Loads part into nest	Presses start, then pre-stages next part

Notice row 3: the raw text only said “press cycle start.” Isolation still gave the right hand a next-part pre-stage role — the same overlap pattern as the title example, applied consistently.

2

PART 2

ECRS Action Allocation

The same four categories you already know from Yamazumi — assigned here from keyword and context, at the step level.

Context matters as much as the keyword: “search” in a fixed, kitted bin reads differently than “search” in a mixed bulk bin.

WORKED EXAMPLE

“Operator searches the mixed bin for the correct-size washer before placing it.”

1

Keyword match: “searches” → candidate Simplify tag.

2

Context check: mixed bin, not pre-sorted — confirms genuine search behavior, not a false positive.

3

Action Command assigned: SIMPLIFY — candidate fix is pre-kitting single-size washers upstream.

This is the SAME tag you'd see on this element's Yamazumi segment — the two tools describe one underlying finding consistently, never disagreeing.

3

PART 3

Conflict & Contradiction Filter

A step tagged for removal or merging cannot honestly also say 'standard method, do not deviate.' That contradiction gets caught automatically.

This is the same honesty discipline from the Judgement Review and Control Plan modules — applied to the SOP's own wording this time.

THE CONTRADICTION THIS PREVENTS

WITHOUT THE FILTER

Step tagged ELIMINATE ("wait for glue to set", non-value-add) still gets the generic Control Remark: "Standard method — do not deviate." A step marked for removal, telling operators never to change it.

WITH THE FILTER

Same step gets a TRANSITIONAL engineering-control note instead: "Continue current method until Eliminate action is implemented; do not treat as permanent standard." Honest about the step's actual status.

Why it matters: an operator reading "do not deviate" on a step everyone already agrees is waste learns to distrust the whole document — including the parts that genuinely matter.

4

PART 4

Operation Type Matrix

Seeded from the station's overall classification, then refined per-step when machine-trigger language shows up mid-sequence.

A Man-Machine STATION doesn't mean every step is COMBINED — individual steps can still be pure MAN or pure MACHINE.

ONE STATION, THREE STEPS, THREE DIFFERENT ROUTINGS

Step	Text (excerpt)	Routing
1	Operator loads part into press nest	MAN
2	Press cycle START — auto-stamps, 8s	MACHINE
3	Operator inspects while press retracts	COMBINED

Step 3's routing to COMBINED came from detecting “while press retracts” mid-sentence — a genuine man-machine handoff the station's overall classification alone would never have caught.

Authored Text Wins — Never Silently Re-Derived

If Operator_SOP_Bilateral.xlsx already has authored LH/RH text matching a step, that text is used VERBATIM — not regenerated.

AUTHORED TEXT ALREADY EXISTS FOR THIS STEP:

“RH: grip torque wrench WITH BOTH THUMBS FORWARD — reversed grip has caused wrist strain reports.”

USED EXACTLY AS WRITTEN — the safety caution about grip direction survives, word for word, instead of being paraphrased away by an automated re-derivation that never knew about the wrist strain history.

Only when no authored match exists does the engine fall back to deriving LH/RH text itself from the raw JM step — and even then, cross-matches PFMEA and ECRS data the same way generate_ocp_master.py does, so nothing is invented from nothing.

Five Mistakes That Give Junior IEs Away

X Leaving a hand's column blank because “it's obviously not doing much” — that judgment call belongs in a written role, not a blank cell.

X Re-deriving LH/RH text for a step that already has authored, verbatim guidance — losing safety notes or tribal knowledge in the process.

X Leaving a generic “do not deviate” remark on a step already tagged Eliminate or Combine — exactly the contradiction Part 3 exists to catch.

X Assuming every step at a Man-Machine station is COMBINED — check each step's actual routing, don't inherit the station label blindly.

X Treating ECRS tags on the SOP and on the Yamazumi chart as two separate findings instead of one consistent tag, cross-checked.

What generate_sop_master.py Does For You

One complete bilateral SOP per station, plus a coverage summary — all four engine parts applied automatically.

- 1

SOP_<Station>_<Process>.xlsx

Every step, every hand, ECRS-tagged, contradiction-filtered, and operation-type routed — one file per station.
- 2

SOP_Source_Coverage_Summary.xlsx

Shows which steps used authored verbatim text vs. derived text, across the whole line — so you know exactly where tribal knowledge is captured and where it isn't yet.
- 3

Cross-dataset matching

Same proc_match() logic as generate_ocp_master.py — PFMEA failure modes feed the Risk Gate column, ECRS feeds waste flags, consistently.

KEY TAKEAWAYS

Recap — Say This Back In Your Own Words

- A blank LH or RH column doesn't mean “nothing important” — it means the time study may be silently wrong.
- Isolating both hands often surfaces a real motion-economy opportunity, not just a documentation formality.
- A step tagged for removal or merging should never carry a ‘do not deviate’ remark — that's a contradiction, not a standard.
- Authored, verbatim SOP text always wins over automated re-derivation — tribal knowledge and safety notes shouldn't get paraphrased away.

TALK IT THROUGH — 3 QUESTIONS FOR YOUR NEXT LINE WALK

1. Pull up one of your own bilateral SOPs — find a blank hand column. What role should it actually have?
2. Find a step tagged Eliminate or Combine on your line — does its Control Remark still say “do not deviate”?
3. Is there authored safety or tribal knowledge on your floor that's never made it into the SOP text verbatim?