

TRAINING MODULE

Process FMEA

Action Priority, not a multiplied-out number

A working module for engineers with 1–2 years on the floor. By the end you will be able to calibrate Severity from real data, translate a floor observation into a physical defect, and calculate AIAG-VDA Action Priority by hand.

What You Will Be Able to Do After This Module

1

Explain why AIAG-VDA replaced the old RPN (Severity × Occurrence × Detection) with Action Priority.

2

Calibrate a Severity score from real MTM Priority data, instead of a guessed 1–10.

3

Translate a plain-language floor observation into a physical product defect, the way the tool does.

4

Calculate Action Priority (HIGH/MEDIUM/LOW) by hand, using the real AIAG-VDA logic — not simple multiplication.

5

Recognize the two most common mistakes junior IEs make when they first fill out a PFMEA.

Severity, Occurrence, Detection

Every row in a PFMEA answers the same three questions about one specific way the process can fail:

SEVERITY (S)

If this failure reaches the customer, how bad is it? 1 = no effect, 10 = safety or regulatory.

OCCURRENCE (O)

How often does the cause behind this failure actually happen? 1 = almost never, 10 = near-certain.

DETECTION (D)

How likely is the current control to CATCH it before it ships? 1 = certain to catch, 10 = almost never caught.

Note the trap already built into Detection: a HIGH Detection number means the control is BAD, not good — it's scored as “likelihood of NOT catching it.”
Read every D score backwards from what feels intuitive.

Multiplying Three Numbers Can Bury a Safety Risk

Same two failure modes, scored honestly. Watch what the old RPN math does to their priority order:

CASE A — SAFETY RISK

S=9 O=2 D=2

Old RPN = $9 \times 2 \times 2 = 36$

New AP = HIGH

CASE B — NUISANCE DEFECT

S=4 O=5 D=5

Old RPN = $4 \times 5 \times 5 = 100$

New AP = LOW

Old RPN ranked the nuisance defect (100) ABOVE the safety risk (36) — backwards. AIAG-VDA's Action Priority fixes this with one hard rule: Severity ≥ 9 is ALWAYS HIGH, no matter what Occurrence or Detection say.

WHERE THIS METHOD COMES FROM

One Global Standard, After Decades of Two

For years, American automakers used AIAG's RPN-based FMEA while German automakers used VDA's own scoring system — a supplier shipping to both had to run two different analyses on the same process. In 2019, AIAG and VDA published a joint handbook: one format, one logic, and — the change that matters most on the floor — Action Priority replacing RPN entirely.

If a customer or auditor still asks for “the RPN,” that's the older standard talking — this tool reports AP, as the current standard requires.

AIAG-VDA FMEA HANDBOOK

1st Edition, 2019

Action Priority Is a Rule Table, Not Multiplication

Severity ≥ 9 $\rightarrow$ ALWAYS HIGH, regardless of Occurrence or Detection

Severity ≥ 7 and Occurrence ≥ 4 and Detection ≥ 5 $\rightarrow$ HIGH

Severity ≥ 7 and Occurrence ≥ 4 and Detection ≤ 4 $\rightarrow$ MEDIUM

Severity ≥ 7 and Occurrence ≤ 3 $\rightarrow$ MEDIUM

Severity ≥ 5 and Occurrence ≥ 4 and Detection ≥ 7 $\rightarrow$ HIGH

Severity ≥ 5 and Occurrence ≥ 4 and Detection ≤ 6 $\rightarrow$ MEDIUM

Severity ≥ 5 and Occurrence ≤ 3 and Detection ≤ 4 $\rightarrow$ LOW

Severity ≤ 4 and Occurrence ≤ 5 $\rightarrow$ LOW

Four Sources, Feeding In Automatically



None of these are re-collected — this tool reads what the rest of the suite already produced.

1

STEP 1 Calibrate Severity from Real Data

No more picking a number 1–10 from memory. Severity is read off the MTM Priority you already assigned in the MTM module.

This is exactly the same station you diagnosed in MTM Golden Zone — the tools connect.

THE CALIBRATION TABLE

MTM Priority	Severity	Meaning
CRITICAL	8	Line stoppage / high disruption downstream. Potential safety impact.
HIGH	7	Major rework at downstream op or customer. Significant CT impact.
MEDIUM	5	Minor rework, correctable on-station. No outgoing quality risk if caught.
LOW	3	Minor operator inconvenience. Contained within station.

Our worked element (“grasp part from bulk bin”) carries MTM Priority = CRITICAL → Severity = 8, locked in — not a guess.

2

STEP 2

Translate to a Physical Defect

An IE's floor observation and a physical product defect are two different languages. This step is the dictionary.

Industry-neutral by design — the same keyword logic works whether the joint is solder, adhesive, or a mechanical fastener.

IE OBSERVATION (keywords: “grasp, bulk bin, singulate”)

“Operator picks one connector at a time from a mixed bulk bin.”

↓ keyword match: grasp / bulk bin / singulat

FAILURE MODE

Component missing or double-loaded at the station

QUALITY EFFECT: Missing component or double-load undetected; functional failure at test or downstream station.

Notice what didn't happen: nobody typed “missing component” by hand. The translation came from the same keyword table for every industry — electronics, mechanical, textile — phrased generically enough to fit all of them.

Running Our Element Through the Real Logic

S = 8 (CRITICAL) O = 4 (moderate historical rate) D = 5 (inline visual check)

- 1

Check: $S \geq 9$? — No ($S=8$), keep checking.
- 2

Check: $S \geq 7$ and $O \geq 4$ and $D \geq 5$? — $8 \geq 7 \checkmark$, $4 \geq 4 \checkmark$, $5 \geq 5 \checkmark$ — ALL TRUE.
- 3

Result: HIGH

TWO MORE SCENARIOS — SAME ELEMENT, DIFFERENT CONTROL

If Detection improved to D=2 (poka-yoke sensor)	$S \geq 7 \checkmark$, $O \geq 4 \checkmark$, $D \leq 4 \rightarrow$	MEDIUM
If this failure were instead S=5, O=3, D=3	$S \geq 5 \checkmark$, $O \leq 3 \checkmark$, $D \leq 4 \checkmark \rightarrow$	LOW

A Completed Kaizen Updates the PFMEA Automatically

A PFMEA that never gets revisited after a fix is just a snapshot. This is what keeps it honest:

1

A Kaizen closes on this station — finish date filled in Kaizen_Output.xlsx, status moves to Complete.

2

generate_pfmea.py scans the Kaizen directory and matches it to this row by station and theme.

3

Action Taken auto-fills with the Kaizen's countermeasure text — no re-typing.

4

Revised Occurrence drops to reflect the fix — and AP is recalculated with the new O.

Our worked element: Kaizen adds a poka-yoke sensor, Occurrence drops from 4 to 2. Re-run: $S=8$, $O=2$, $D=5 \rightarrow S \geq 7\checkmark$, $O \leq 3 \rightarrow$ MEDIUM. Real, traceable improvement — not a manual overwrite.

Five Mistakes That Give Junior IEs Away



Still asking for or reporting “RPN” — the current AIAG-VDA standard doesn't use it; report Action Priority.



Guessing a Severity number instead of calibrating it from real MTM Priority data.



Scoring Detection like a normal scale — remember, a HIGH Detection score means the control is BAD.



Treating MEDIUM and LOW as “ignore” — AIAG-VDA expects a documented rationale even for LOW, not silence.



Leaving a completed Kaizen unlinked — the PFMEA stays stale, and Action Priority never reflects the real fix.

What generate_pfmea.py Does For You

Three sheets, built automatically from data you already have — in the current AIAG-VDA format.

1

PFMEA_Table

Full AIAG-VDA columns — Process Step from SOP, Failure Mode translated automatically, Severity calibrated from MTM, Action Priority calculated — no RPN column at all.

2

AP_Action_Tracker

Every row sorted by AP then Severity — the review meeting's actual priority order, done for you.

3

Station_Summary

Worst AP per station — the one-page version for a plant manager who needs the headline, not all the rows.

KEY TAKEAWAYS

Recap — Say This Back In Your Own Words

- AIAG-VDA replaced RPN with Action Priority because multiplication can bury a rare safety risk under a common nuisance.
- Severity ≥ 9 is ALWAYS HIGH — no Occurrence or Detection number overrides a genuine safety concern.
- Severity comes from calibrated MTM Priority data. Failure Mode comes from a keyword translation table. Neither is a guess.
- A completed Kaizen should always close the loop back to the PFMEA — Action Taken and Revised Occurrence both update.

TALK IT THROUGH — 3 QUESTIONS FOR YOUR NEXT LINE WALK

1. Find one row in your own PFMEA still showing an RPN number — what would its Action Priority actually be under the real logic?
2. Pick a Detection score you assigned recently — did you score it as “likelihood of catching it” or “likelihood of missing it”? They're opposites.
3. Name one closed Kaizen that never made it back into your PFMEA — what's its Action Priority really sitting at right now?