MOOG

September 19, 2019
Rev C

Continuous Improvement Workshop: Permanent Corrective Actions

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Agenda

- **Purpose & Goals of this Workshop**
- **Guidelines on Initiation Criteria**
  - When and Why we issue a Corrective Action
- **Best Practices on How to Write a Corrective Action Response**
  - Section-by-section
- **TIPQA System**

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Moog Quality Team

- **Site Quality Manager – Dawn Salvatore**
- **Assembly Quality Engineers**
- **Quality Assurance Manager**
- **Purchasing Manager and Buyers**
- **Supplier Quality Engineers**
  - Steve Van Raay – Outside Processes
  - Bob Mietzner – Machined Parts & Gears
  - Daniel Hensel – Machined Parts & all other

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Purpose
& Goals of this Workshop

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Guidelines – Corrective Action Initiation Criteria

- **After today you should know:**
  - Why a Corrective Action is issued by Moog
  - Who should respond to a Corrective Action
  - How to perform Containment
  - How to arrive at the Root Cause
  - The purpose of Objective Evidence
  - The difference between Corrective and Preventative Action

- **Our goal is to provide you with the toolbox to perform the best possible RCCA you can.**

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Guidelines:

Why and When We Issue a Corrective Action Request

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Guidelines – Corrective Action Initiation Criteria

What is a “Corrective Action”?

A **Permanent Corrective Action** is immediate and preventative action taken on an assignable cause to **permanently** fix a systemic or process-related issue

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Guidelines – Corrective Action Initiation Criteria

What is a “Corrective Action”?

- Ongoing Improvement initiatives
- *Documents* the work done!
- NOT a reprimand

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Guidelines – Corrective Action Initiation Criteria

A Corrective Action is an Opportunity for *Improvement*

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Guidelines – Corrective Action Initiation Criteria

Moog Customer Request

Audit Finding

Significant Cost/Safety

Recurring Issue

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Guidelines – Corrective Action Initiation Criteria

- Corrective Actions that you submit are not only reviewed by internal parties, but are subject to review by others
  - Including customers, auditors, and regulating bodies from government agencies
- It is critical that all Corrective Actions submitted stand the scrutiny of the aforementioned parties
- It should be understood that what we do is necessary for the safety and well-being of the public

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What is our #1 priority?

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Best Practices:

How To Perform a Good Root Cause Investigation and Permanent Corrective Action

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Best Practices – Administrative Data

Administrative Data

- Part Number, Part Quantity, Rejection #, Date CA issued, Date CA DUE
- BEST PRACTICES: Make sure the data is complete and correct. Be mindful of Bill Of Material (BOM) differences, revision, and affected quantity

It is Moog's responsibility to provide all the Administrative Data,
But it is your responsibility to validate it is complete and correct.

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Best Practices – Description of the Finding

Description of the Finding

- Describe the Non-Conformance. The action will only be as good as the finding!
- BEST PRACTICES: Be as objective and complete as possible. Make sure all references are noted, such as drawing feature sheet/zone, specification paragraph, PO provision, etc.
- Statement should describe “should be” condition and “is” condition.
- Again, the root cause will only be as good as the description of the finding.

It is Moog’s responsibility to provide as much information as clearly as possible, But it is your responsibility to make sure you **understand the problem!**

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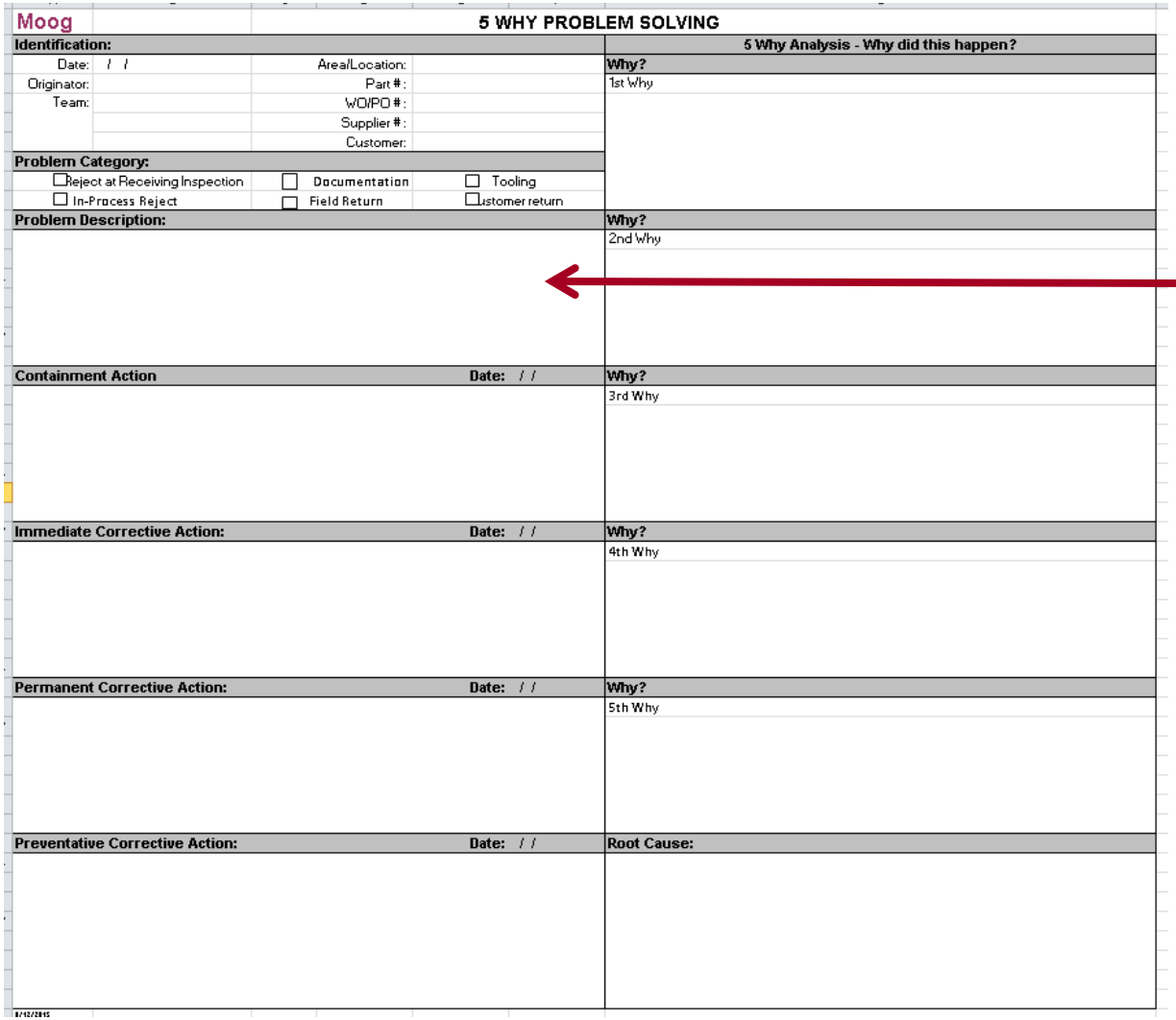
Best Practices – Moog CA Worksheet



Moog

5 WHY PROBLEM SOLVING

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		5th Why
Preventative Corrective Action:	**Date: / /**	**Root Cause:**

Input Problem Description in your own words here

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After Receiving a Corrective Action request the first thing you need to do is…what?

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Best Practices:
Containment

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Best Practices – Containment

- What is your organization going to put in place **IMMEDIATELY** to prevent Moog from receiving any further non-conforming product?
- **All** throughout the supply chain:
  - **YOUR** suppliers and sub-tier suppliers
  - Raw, WIP, and Finished Inventory
  - In-transit to Moog
  - Moog Incoming Stores
- What did **YOU** ship in case **WE** missed it?
- Identify **Inspection GAP** and implement **SHORT TERM detection method** to prevent non-conforming product from reaching Moog
- Ensure **ALL** necessary personnel in your organization/supply chain are **AWARE** of the non-conformity **AND** the Containment Actions

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Best Practices – Containment

- Has to happen in the 1st **24-48 Hours** after a Corrective Action request.
- Must ID **ALL** the product in the Supply Chain – from your suppliers; to your Raw, WIP and finished Inventories; to product in-transit to Moog; to Moog incoming stores
- **Awareness is key**. All necessary personnel must become immediately aware of the defect and the actions taken to contain it.

STOP THE BLEEDING. CONTAIN THE OIL.

Is this a Permanent Corrective Action?

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Best Practices – Containment

- **There are two parts to Containment:**

Contain Defective Material

Close Inspection Gap

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Best Practices – Moog CA Worksheet

Moog — **5 WHY PROBLEM SOLVING**

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Input Containment Action within 24-48 hrs

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Break Out Session:
Containment

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Best Practices:
Root Cause Investigation

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FORM A TEAM

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Best Practices – Form a Team

Who should be on the team?

- Operator
- Manufacturing Engineer
- Design Engineer
- Quality Engineer
- Inspector
- Buyer
- Customer Service
- Management
- Others as applicable!

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Best Practices – Root Cause

- As a **TEAM**, determine the **Root Cause**
- At Moog, we look for evidence that critical thinking has occurred regarding Root Cause identification
  - Use of tools
    - 5 Why's
    - Cause and Effect (C&E)/Fishbone Diagrams
    - Process Maps
  - Include Objective Evidence
- A good root cause is not common
- Corrective Action is only as good as the Root Cause identification!

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Best Practices – Root Cause

What is a Root Cause?

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Best Practices – Root Cause

A Root Cause response must consider **2** aspects:

1) Process Issue or Systemic Issue

What caused the non-conformance in the first place? What allowed it to happen? What act or failure to act allowed the event to occur?

2) Failure to Detect

How did the part leave your building? Why was it certified as conforming?

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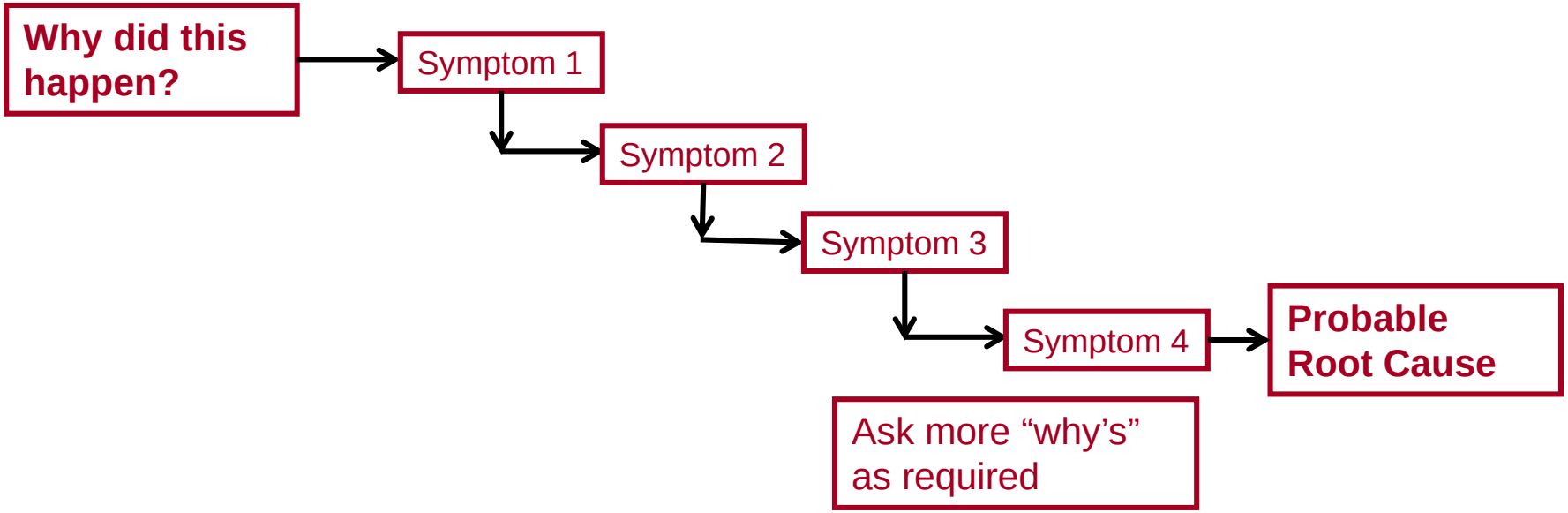
Best Practices – 5 Why

- Begin the questioning process with the “most likely” major cause
- Ask “Why does this defect occur or condition exist?”
  - Rule of Thumb is to ask “why” **5 times**
    - Early questions are usually superficial, obvious. As question continues, it becomes progressively more difficult and a more thought-provoking assignment
    - **Stop** when you reach an impacting yet achievable **action**. (don’t fix the axis of Earth!).
    - May have to perform this exercise for different scenarios/paths.



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Best Practices – 5 Why Example

- **1. Why is the Jefferson Memorial in Washington D.C. deteriorating?**
  - Because harsh chemicals are frequently used to clean the monument
- **2. Why are harsh chemicals needed?**
  - To clean off the large number of bird droppings on the monument
- **3. Why are there a large number of bird droppings on the monument?**
  - Because the large population of spiders in and around the monument are a food source to the local birds
- **4. Why is there a large population of spiders in and around the monument?**
  - Because vast swarms of insects, on which the spiders feed, are drawn to the monument at dusk
- **5. Why are swarms of insects drawn to the monument at dusk?**
  - Because the lighting of the monument in the evening attracts the local insects

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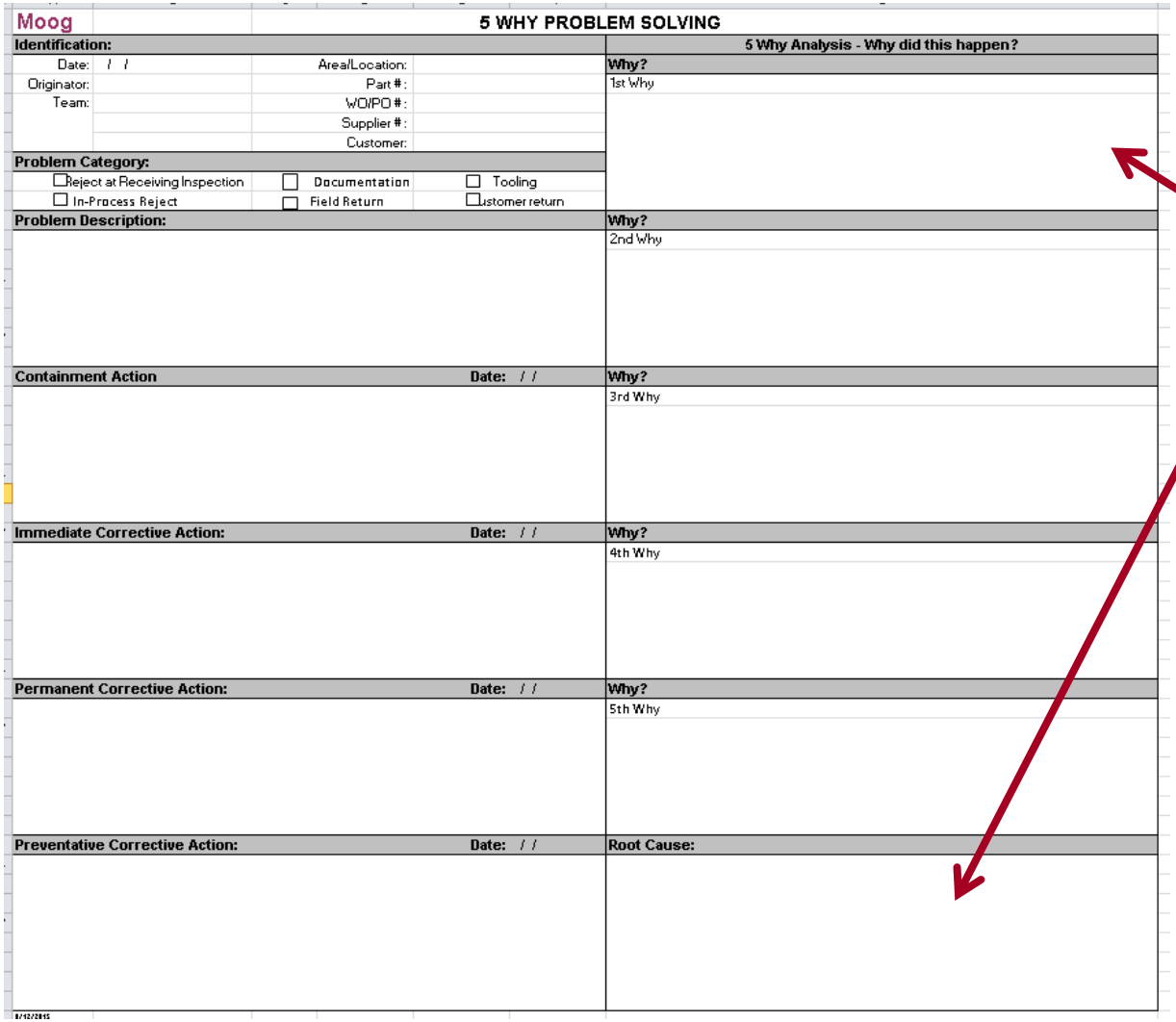
Best Practices – 5 Why Example

- **1. Why is there a high reject rate of widgets?**
  - Because the plastic is stained.
- **2. Why is the plastic stained?**
  - Because there is excess oil in the cutting machine.
- **3. Why is there excess oil in the cutting machine?**
  - Because it is clogging as it has been months since it was cleaned.
- **4. Why is it so long since it was cleaned?**
  - Because we only service machines when they break down, not on a preventative basis.
- **5. Why only service after breakdowns?**
  - Because maintenance says it is cheaper
    - But what about the cost of rejects and rework?

Best Practices – Moog CA Worksheet



Moog

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Ask 5 Why's to arrive at Root Cause

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Best Practices – 5 Why

- Asking **Why** is a way of identifying the underlying root cause of a problem so that this can be tackled, rather than dealing only with superficial symptoms.

- It should be seen as a **simple** and **quick** alternative to Cause and Effect Analysis.

- The **5 Why** strategy is an easy and often effective tool for root cause identification, however for more complex issues C & E Analysis by be required.

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Best Practices – Cause and Effect (C&E)/Fishbone Analysis

- **What is a Fishbone diagram or Fishbone Analysis?**
  - Fishbone diagram is an analysis tool to provide systematic way of understanding effects and the causes that create those effect. The design of the diagram looks like the skeleton of a fish hence, it is referred to as the fishbone diagram.

- **A fishbone diagram can be used when you:**
  - Want to study **all the possible reasons** why a process is having difficulties, problems, or breakdowns in the initial stages of the process.
  - Need to identify areas for data collection

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Best Practices – Cause and Effect (C&E) /Fishbone Analysis

- **Creating a Fishbone Diagram:**
  1. List the problem/issue to be studied in the head of the fish
  2. Label each bone of the fish. The major categories typically used are:
     1. The 6 M's: Methods, Machines, Materials, Manpower, Measurement, Management
     2. The 4 P's: Place, Procedure, People, Policies
  3. Within the categories, brainstorm possible causes for the issue. List them on the fish.
  4. Analyze the results, identify the **most likely causes**.
  5. Evaluate the different most likely causes to identify the Root Cause.

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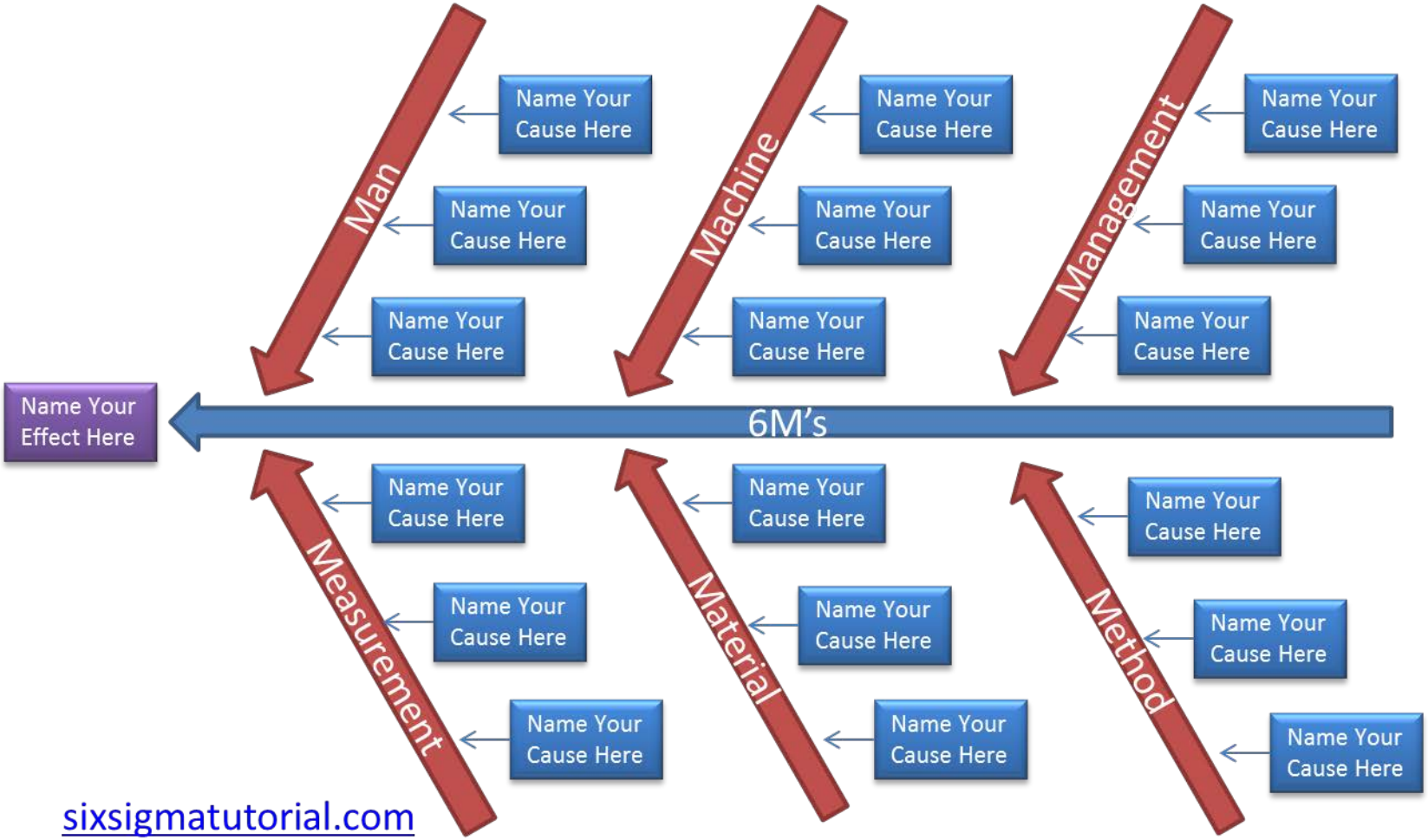
Best Practices – Cause and Effect (C&E) /Fishbone Analysis



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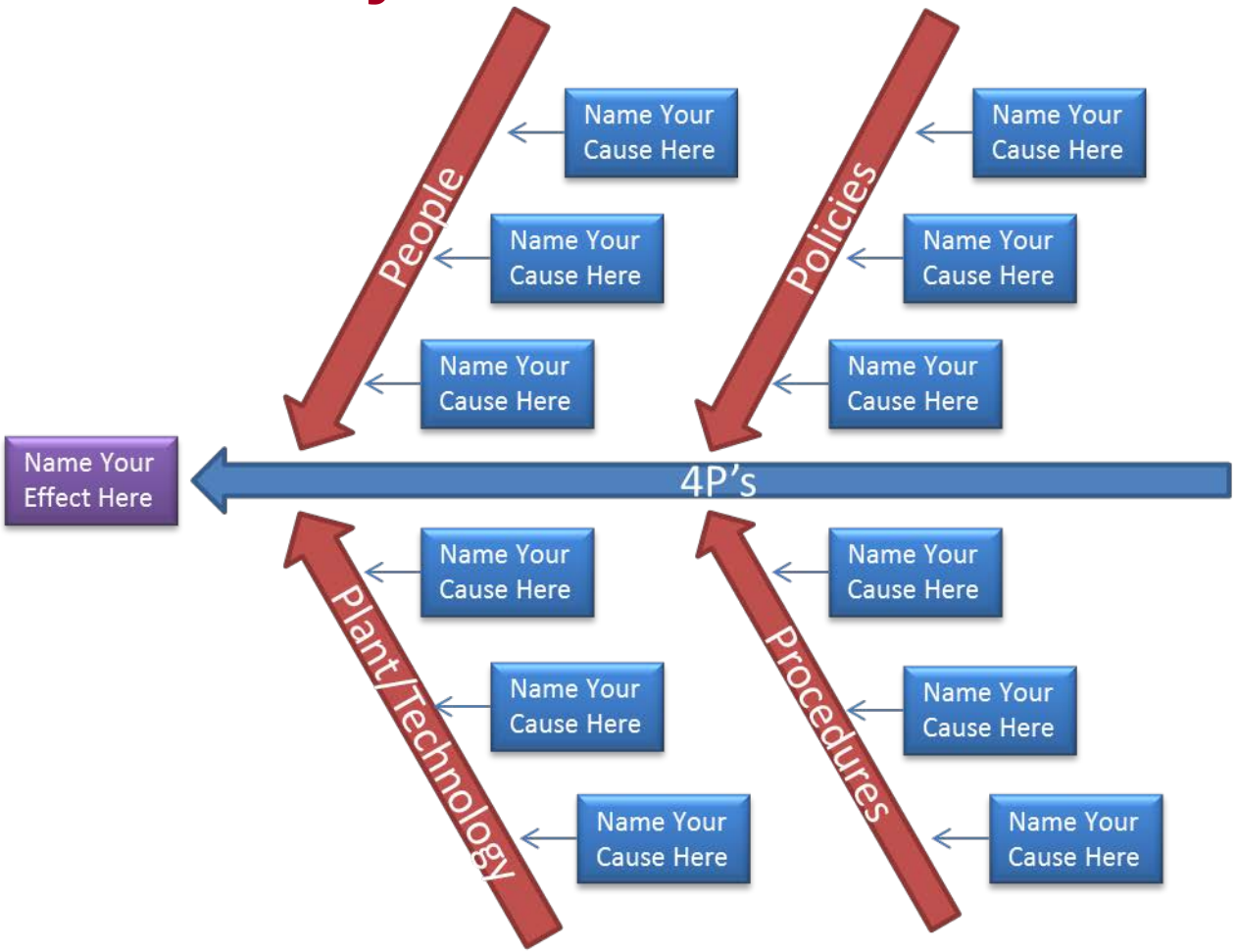
Best Practices – Cause and Effect (C&E) /Fishbone Analysis



sixsigmatutorial.com

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Best Practices – Cause and Effect (C&E) /Fishbone Analysis

"Nicks & Dings" Fishbone Exercise

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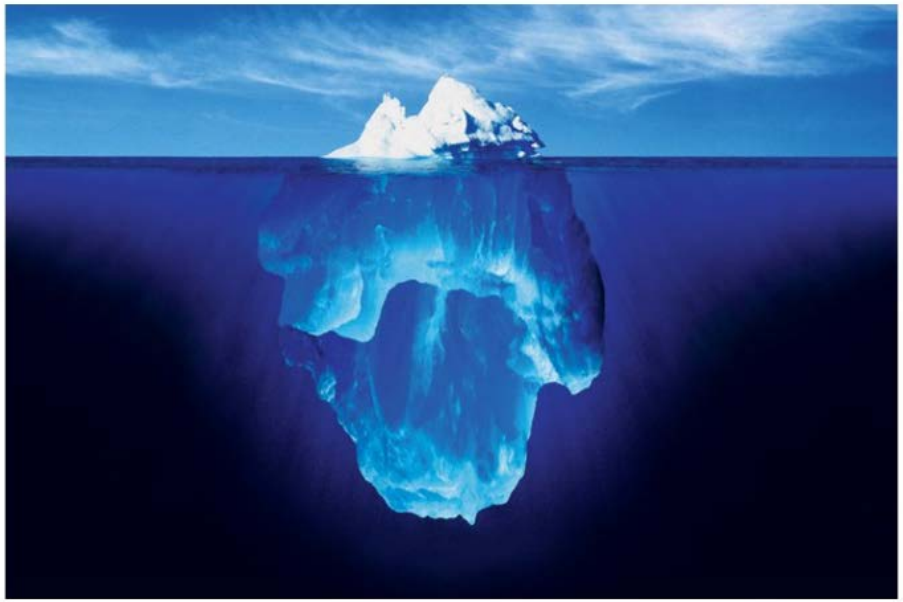
Best Practices – Root Cause



Most problems are below the surface. Get to the ROOT cause.

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Best Practices – Root Cause

- Verify that you have identified both 1) the Process or Systemic Issue, and 2) the failure to detect.

- Once you have found the Root Cause, you must reassess the immediate Containment activity you took before, to ensure you have **FULL containment**.

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Break Out Session:

Root Cause Investigation

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Best Practices:
Permanent Corrective Action

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Guidelines – Permanent Corrective Action

What is a “Corrective Action”?

A **Permanent Corrective Action** is immediate and preventative action taken on an assignable cause to **permanently** fix a systemic or process-related issue

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Best Practices – Permanent Corrective Action

Actions must be credible – Objective Evidence (OE) must back up completed actions

Open Actions need **Owners** and **Due Dates**

Again, Permanent Corrective Actions will only be as good as the root causes defined!

(notice the repeated use of the word “permanent”)

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Guidelines – Permanent Corrective Action

Examples include:

- Updating Work Instructions/Procedures
- Drawing Changes
- Process Changes
- Tooling
- Visual Guides
- Poke-a-yoke assembly set ups
- Training *to the corrected action*

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Best Practices – Objective Evidence

Objective Evidence:

- Provides **tangible evidence of change**
- Provides **verification documentation**
- Can be audited and reviewed by **anyone** (such as independent **Corrective Action Board,** or **CAB**)
- Provides closure and feedback to **Moog** (and sometimes **Moog's Customer**)
- Stands on its own (what happens if you and your team win the **lottery** and leave work tomorrow? Will the Corrective Action still be in place?)
- **Always** provide Objective Evidence. We will ask for it!

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Let's look at some Examples

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Best Practices – Permanent Corrective Action

- **Root Cause: “Inspection error (we missed it!).”**
- **C/A: “We will apply 100% Inspection from now on.”**

Is this a good response?

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Best Practices – Permanent Corrective Action

- **Root Cause: "Inspection error (we missed it!)."**
- **C/A: "We will apply 100% Inspection from now on."**
- **Quality cannot be inspected into a product.**
- **Did inspection create the feature?**
  - If not, it can NOT be the Root Cause!
- 100% Inspection by a person is *never* 100% effective.
- How does Inspection prevent the problem from happening again?
- "Why was it missed and what will prevent them from missing it again?" are just two of the questions to ask.
- Was the right tool (calibrated & capable) used to Inspect at the point of manufacture? (Gauge Reproducibility & Reliability, R&R)
- Inspection can be used as a **validation** of the Corrective Action.
- **Quality cannot be inspected into a product!**

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Best Practices – Permanent Corrective Action

- **Root Cause: "Wrong gage, tool, machine or material used."**
- **C/A: "We will use right gage, tool, machine or material from now on."**

Is this a good response?

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Best Practices – Permanent Corrective Action

- **Root Cause: "Wrong gage, tool, machine or material used."**
- **C/A: "We will use right gage, tool, machine or material from now on."**

Remember to keep asking Why!

- Are the correct, gages/tools/machine/material called out and correctly identified on the instruction/router/job order?
- What will prevent this from happening again?
- Where is the **objective evidence**?

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Best Practices – Permanent Corrective Action

- **Root Cause: “Operator screwed up. People make mistakes.”**
- **C/A: “We have reprimanded and trained the operator.”**

Is this a good response?

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Best Practices – Permanent Corrective Action

- **Root Cause: "Operator screwed up. People make mistakes."**
- **C/A: "We have reprimanded and trained the operator."**

Focus on the Process placed in the hands of the operator

- What allowed the operator to do this?
- Has the process been mistake-proofed?
  - Is the program correct?
  - Are Work Instructions correct and do they have the right amount of detail?
- Never blame the operator
- Remember the Objective Evidence!

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Best Practices – Permanent Corrective Action

- **Root Cause: "It wasn't us, it was the Moog-directed sub-tier."**
- **C/A: "We have requested an alternate sub-tier from Moog."**

Is this a good response?

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Best Practices – Permanent Corrective Action

- **Root Cause: "It wasn't us, it was the Moog-directed sub-tier."**
- **C/A: "We have requested an alternate sub-tier from Moog."**

- Who is getting the Purchase Order contract from Moog?
- Who is signing the CofC?

YOU ARE

- You are responsible for the product you ship to Moog. If action must be taken against the sub-tier, you must take it.
- You may use sub-tier response in addition your own CA response. But be mindful of the due dates!

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Best Practices – Moog CA Worksheet

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Input Permanent Corrective Action

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Break Out Session:

Permanent Corrective Action

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Best Practices:

Verification / Follow Up

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Best Practices – Verification / Follow Up

- **What is Verification?**
  - You, someone on the Corrective Action **Team**, or an assigned Verifier, **verifies** – or Checks – that the Corrective Action was implemented **successfully and completely**, and that it is **working**
- The Verification **Plan** is submitted with the Permanent Corrective Action
  - Actual Verification can be performed at a later date, usually about a month

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Best Practices – Verification / Follow Up

- **What do you look for in Verification?**

Two-step process:

1) Verify Corrective Action was implemented **successfully** and **completely**
2) Verify Corrective Action is **working**

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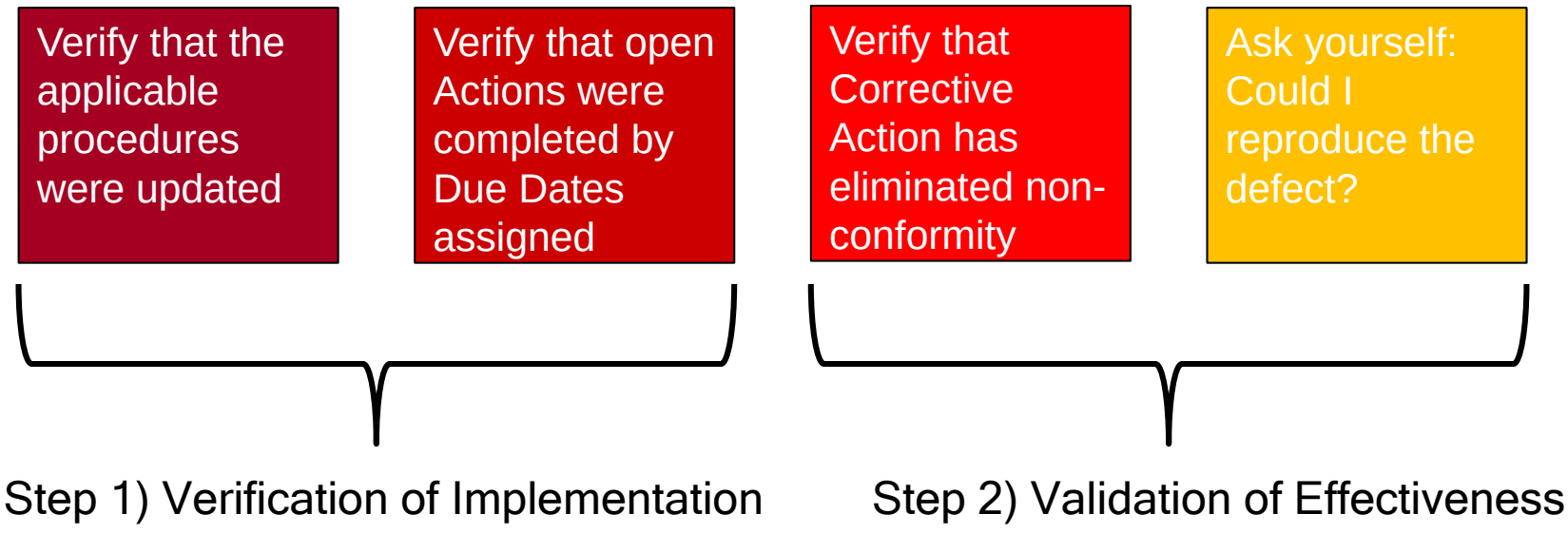
Best Practices – Verification / Follow Up

- **What do you look for in Verification?**



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Best Practices – Verification / Follow Up

- **Document** the Corrective Action results and provide informational **feedback**.
- Let everyone know what has been done, include it in the job folder, post it, make it visual!

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Best Practices – Verification / Follow Up

- Post measurement charts where everyone can see them
- Let everyone know what the charts mean to your business
  - By the way, this is a new AS9100 Rev D requirement, titled **Awareness**
- Keep the charts as simple as possible; always note which direction is good!

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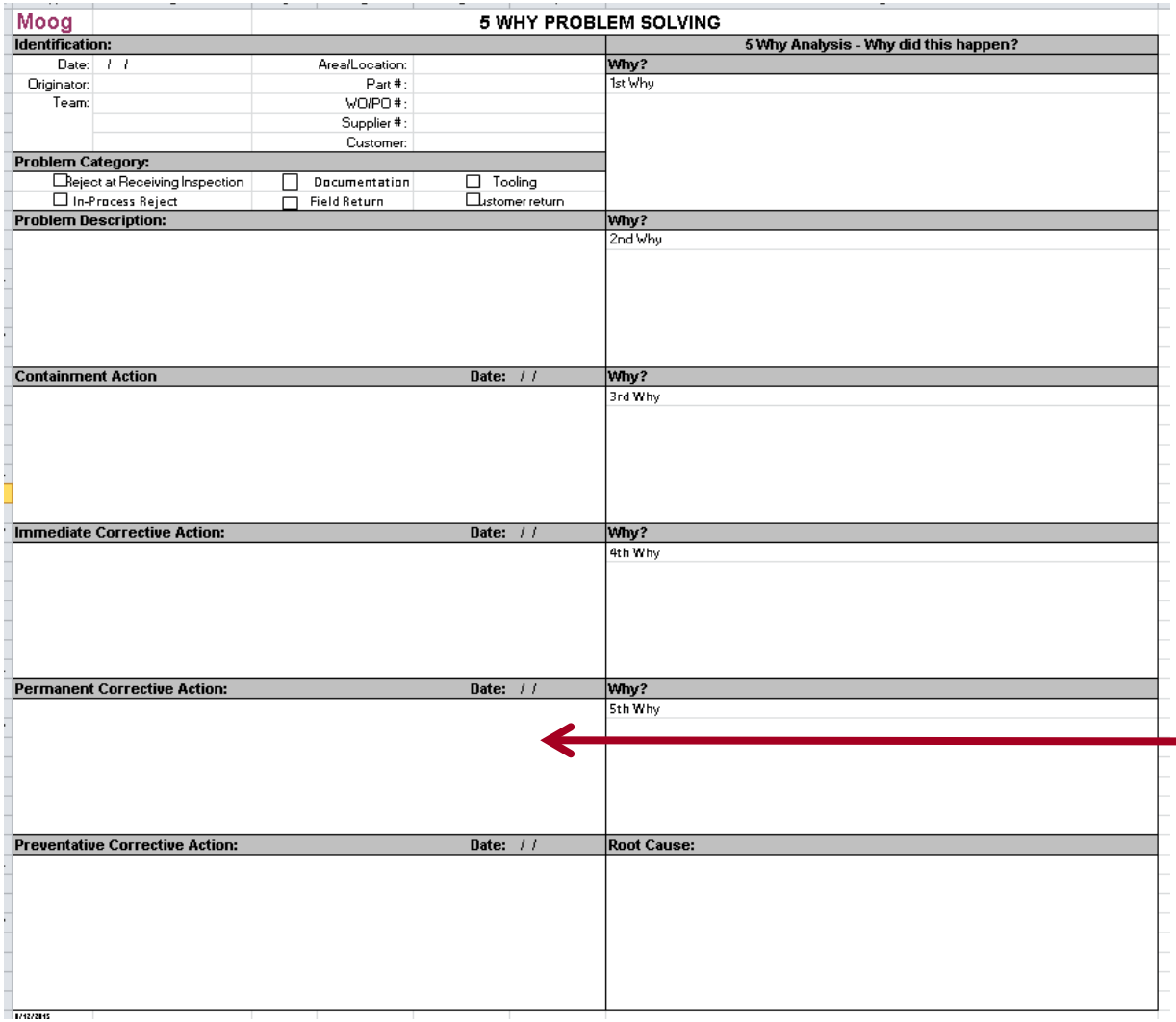
Best Practices – Verification / Follow Up

- Train all affected employees **to the Corrected Action**
- Document the training on a training record
- Provide this record as **Objective Evidence** in your Corrective Action response

Best Practices – Moog CA Worksheet



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Verification *Plan* should be included in Permanent Corrective Action Response

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Congratulations!

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Congratulations!

You have completed and submitted a Root Cause and Corrective Action. You have also submitted Objective Evidence, and either Verified it is working, or provided a Verification plan.

Are you done?

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NO

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Best Practices:

Preventative Action

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Best Practices – Preventative Action

- Look across ALL Moog parts – could they see the same failure?
- Look across ALL your customers – having a “special process” for only one customer such as Moog is a **FAILURE MODE**.
- Why wait for a Corrective Action request? Take steps **now** to minimize risks later!

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Best Practices – Preventative Action

- If you produce a shaft of multiple lengths for Moog and you completed a Corrective Action on one part number, does it apply to all the other parts also?
  - Could they see the same failure mode?
  - Do those routers/processes need to be reviewed and updated as well?

- If you perform an Outside Process for Moog and you resolve a processing issue for one part number, does it apply to all other parts?
  - Be wary of any “special processes”!

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Best Practices – Moog CA Worksheet

Moog

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Input Preventative Corrective Action here

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PFMEA

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PFMEA

PREVENTATION IS BETTER THAN CORRECTION

- **P**rocess **F**ailure **M**ode **E**ffects **A**nalysis
  - What does DFMEA stand for? How is it different?
- Prevention is more difficult, but far more powerful
- Why do we wait for something to fail before we do anything about it?
  - We already have a lot of knowledge of things that go wrong in our industry!
- PFMEA is not just a document, it is a *process*
  - This process contains a *living document*

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PFMEA

Equipment:	FMEA TYPE	Team Members :		Initialization Date:	Revision :
P/N Sub-assembly:	Process	Facilitator/Lead :		Follow-Up Date:	Page :
P/N:	Design (Product)	Stakeholders :			
Nomenclature:	Other				

FUNCTIONS OR PROCESS STEPS		PURPOSE OF FUNCTION/PROCESS STEP	POTENTIAL FAILURE MODE(S)	POTENTIAL FAILURE EFFECT(S)	SEV	POTENTIAL CAUSE(S) MECHANISMS OF FAILURE	OCC	CURRENT CONTROLS		DET	RPN	ACTION PLAN							
								PREVENTION	DETECTION			FAILURE PREVENTION ACTIONS	OCC	FAILURE DETECTION ACTIONS	DET	ACTIONS TAKEN			RPN
N°	Descriptions	Descriptions	In what ways might the process potentially fail to meet the process requirements and/or design intent?	What is the effect of each failure mode on the outputs and/or customer requirements? The customer could be the next operation, subsequent operations, another division or the end user.	How Severe is the effect?	How can the failure occur? Describe in terms of something that can be corrected or controlled. Be specific. Try to identify the causes that directly impact the failure mode, i.e., root causes. Think about man, machine, measurement, material,	How often does the cause / failure mode occur?	What are the existing controls and procedures that prevent the failure cause from occurring?	What are the existing controls and procedures that detect the failure?	How well can you detect the cause / failure mode?	SEV x OCC x DET	What actions will be taken to better prevent the failure cause from occurring?	How often does the cause / failure mode occur?	What actions will be taken to improve detection of the failure?	How well can you detect the cause / failure mode?	Action owner	Action target date	Action complete?	SEV x OCC x DET (REVISED)
											0								0
											0								
											0								
											0								
											0								
											0								
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MOOG

PFMEA

1. Begin by outlining the **process steps**
2. Identify all **potential failure modes** (within the realm of reason)
3. List the **effects** of the failure mode. There may be more than one!
4. Write down the **causes** of each potential failure
5. List the existing controls to **prevent** the failure from occurring
6. Also list the existing controls to **detect** the failure if it occurs

MOOG

PFMEA

Equipment:	FMEA TYPE	Team Members :
P/N Sub-assembly:	Process	Facilitator/Lead :
P/N:	Design (Product)	Stakeholders :
Nomenclature:	Other	

FUNCTIONS OR PROCESS STEPS		PURPOSE OF FUNCTION/PROCESS STEP	POTENTIAL FAILURE MODE(S)	POTENTIAL FAILURE EFFECT(S)	S E V	POTENTIAL CAUSE(S) MECHANISMS OF FAILURE	O C C	CURRENT CONTROLS		D E T	R P N
								PREVENTION	DETECTION		
N°	Descriptions	Descriptions	In what ways might the process potentially fail to meet the process requirements and/or design intent?	What is the effect of each failure mode on the outputs and/or customer requirements? The customer could be the next operation, subsequent operations, another division or the end user	How Severe is the effect?	How can the failure occur? Describe in terms of something that can be corrected or controlled. Be specific. Try to identify the causes that directly impact the failure	How often does the cause / failure mode occur?	What are the existing controls and procedures that prevent the failure cause from occurring?	What are the existing controls and procedures that detect the failure?	How well can you detect the cause / failure mode?	SEV x OCC x DET
	1		2	3		4		5	6		0
											0
											0
											0
											0
											0
											0
											0

1. Begin by outlining the process steps
2. Identify all potential failure modes (within the realm of reason)
3. List the effects of the failure mode. There may be more than one!
4. Write down the causes of each potential failure
5. List the existing controls to prevent the failure from occurring
6. Also list the existing controls to detect the failure if it occurs

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PFMEA

7. Now assign values between 1 and 10 for Severity, Likelihood, and Detection.
   - Ask yourself, **how severe** is the potential failure? 10 is Most Severe.
   - What is the **Likelihood** this failure will occur? 10 is Very Likely.
   - How well can we **detect** the failure if it happens? 10 is Almost Impossible to Detect.
8. Multiply Severity x Likelihood x Detection to get your **Risk Priority Number (RPN)**
9. Ta-da! You've identified your HIGHEST RISKS! Now, you must assign actions and create **Control Plans** to reduce these risks!
   - This is a HUGE part of AS9100 rev D!

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PFMEA

Equipment:			FMEA TYPE		Team Members :					
P/N Sub-assembly:			Process		Facilitator/Lead :					
P/N:			Design (Product)		Stakeholders :					
Nomenclature:			Other							

FUNCTIONS OR PROCESS STEPS		PURPOSE OF FUNCTION/PROCESS STEP	POTENTIAL FAILURE MODE(S)	POTENTIAL FAILURE EFFECT(S)	SEV	POTENTIAL CAUSE(S) MECHANISMS OF FAILURE	OCC	CURRENT CONTROLS		DET	RPN
								PREVENTION	DETECTION		
N°	Descriptions	Descriptions	In what ways might the process potentially fail to meet the process requirements and/or design intent?	What is the effect of each failure mode on the outputs and/or customer requirements? The customer could be the next operation, subsequent operations, another division or the end user	How Severe is the effect?	How can the failure occur? Describe in terms of something that can be corrected or controlled. Be specific. Try to identify the causes that directly impact the failure	How often does the cause / failure mode occur?	What are the existing controls and procedures that prevent the failure cause from occurring?	What are the existing controls and procedures that detect the failure?	How well can you detect the cause / failure mode?	SEV x OCC x DET
					7		7			7	8
											0
											0
											0
											0

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PFMEA EXAMPLE

MOOG	POWER CONTROL UNIT - MOTOR BRAKE SUB-ASSEMBLY		FMEA TYPE	Team Members :	Euphrathe Abramian, Raul Leos, Erwin Liang, John Parducho
	-		Assembly Process	Facilitator/Lead :	John Parducho
P/N:	CA87014-006		-	Stakeholders :	David Zimmon, Joerg Schlafke, Phuong Vu
Nomenclature:	MOTOR BRAKE ASSEMBLY		-		

FUNCTIONS OR PROCESS STEPS		PURPOSE OF FUNCTION/PROCESS STEP	POTENTIAL FAILURE MODE(S)	POTENTIAL FAILURE EFFECT(S)	SEV	POTENTIAL CAUSE(S) MECHANISMS OF FAILURE	OCC	CURRENT CONTROLS		DET	RPN
								PREVENTION	DETECTION		
	Operation 30 / Step 13	INSTALL -2- SPRING WASHERS (17) AND SPACER (32) ONTO TOOL T134843 (-401 AND -402)	Belleville springs installed in the wrong orientation	Damage springs; sideloaded during compression; brake out of tolerance	5	Operator incorrectly installed springs in series; work instructions does not define orientation; spacer (32) should be used	6	Spacer (32) should be used to ensure correct orientation	Spacer (32) should be used to help visually indicate correct orientation	6	180

1. Begin by outlining the process steps
2. Identify all potential failure modes (within the realm of reason)
3. List the effects of the failure mode. There may be more than one!
4. Write down the causes of each potential failure
5. List the existing controls to prevent the failure from occurring
6. Also list the existing controls to detect the failure if it occurs
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   - What is the **Likelihood** this failure will occur? 10 is Very Likely.
   - How well can we **detect** the failure if it happens? 10 is Almost Impossible to Detect.
8. Multiply Severity x Likelihood x Detection to get your Risk Priority Number (RPN)

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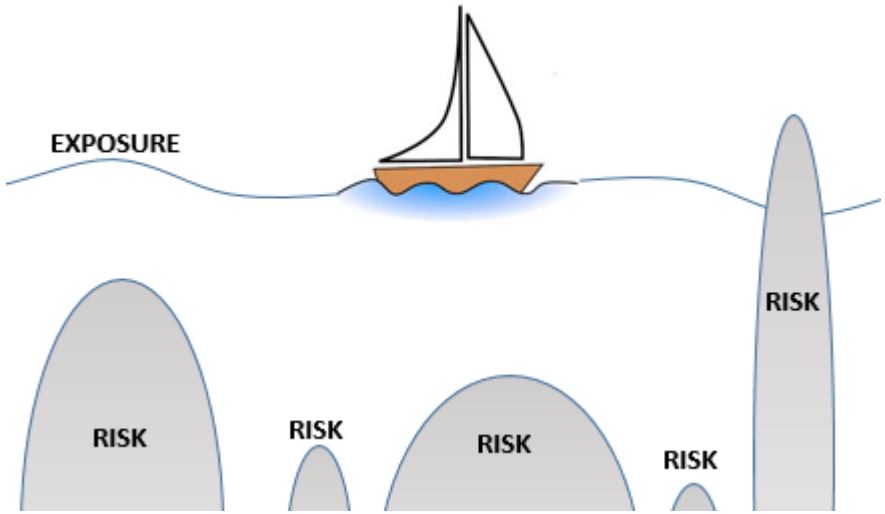
PFMEA

- Now that you have identified the highest risks, go forth and create Preventative Actions and/or **Control Plans** to *reduce* the risks, starting with the highest RPN.
- Then, input the Actions in the Actions Taken column of the PFMEA, and reassess the Severity, Likelihood, and Detection.
  - Did the RPN drop?
  - Now what?



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PFMEA

Initialization Date:		Revision :	
Follow-Up Date:		Page :	

ACTION PLAN							
FAILURE PREVENTION ACTIONS	OCC	FAILURE DETECTION ACTIONS	DET	ACTIONS TAKEN			RPN
What actions will be taken to better prevent the failure cause from occurring?	How often does the cause / failure mode occur?	What actions will be taken to improve detection of the failure?	How well can you detect the cause / failure mode?	Action owner	Action target date	Action complete?	SEV x OCC x DET (REVISED)
							0

- Now that you have identified the highest risks, go forth and create Preventative Actions and/or Control Plans to *reduce* the risks, starting with the highest RPN.
- Then, input the Actions in the Actions Taken column of the PFMEA, and reassess the Severity, Likelihood, and Detection.
  - Did the RPN drop?
  - Now what?

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PFMEA

- What is your organization doing to assess **Risk**?
- Again, this is a **HUGE** part of AS9100 rev D
- Requires a **TEAM**, is a lengthy but *invaluable* process
- Can be used on **anything**
  - Individual production steps (bearing installation, deburr, wiring, test)
  - Production relocation or acquisitions
  - Administrative Processes (such as Contract Review, Purchasing)
  - Design changes
  - Any process you can think of!

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Best Practices – Preventative Action

- Anyway, back to CAPA…
- Look across ALL Moog parts – could they see the same failure?
- Look across ALL your customers – having a “special process” for only one customer such as Moog is a **FAILURE MODE**.
- Why wait for a Corrective Action request? Take steps **now** to minimize risks later!

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Break Out Session:

Preventative Action

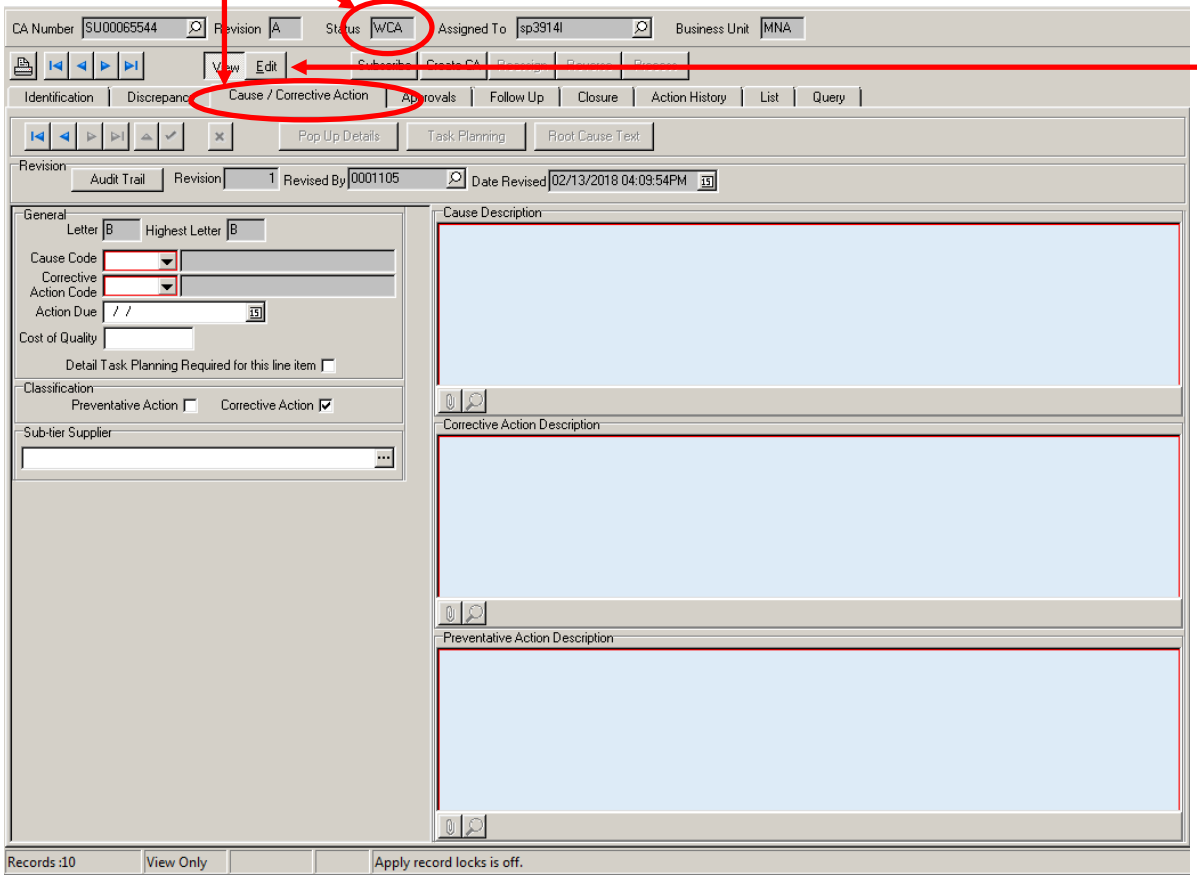
MOOG

Best Practices:
Using TipQA

MOOG

Corrective Action Tab

Before we can start, we have to make sure that the Corrective Action Status and Tab match.



Begin by pressing the Edit button.

Once the edit button is pressed, the tab is ready to be activated and edited.

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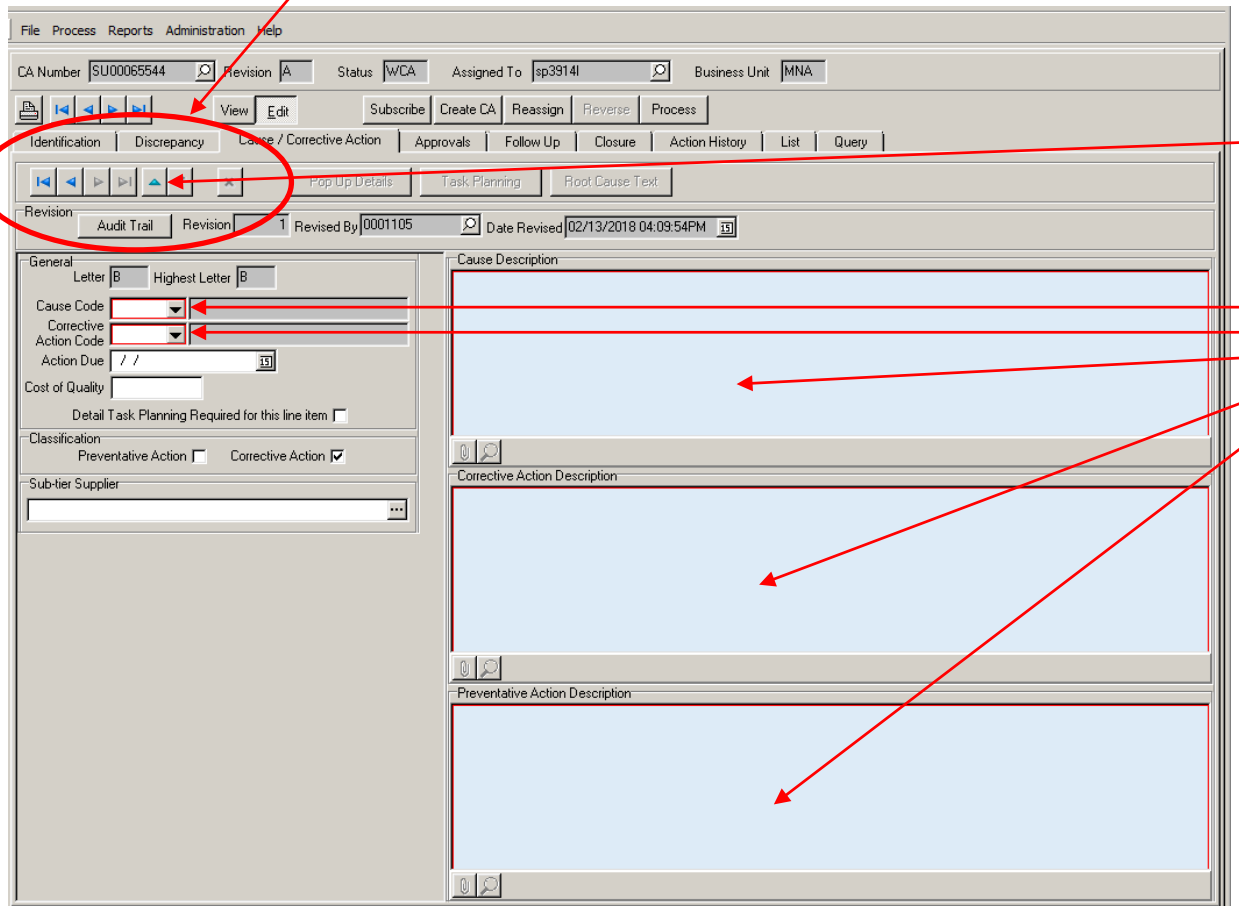
Corrective Action Tab (cont.)

Once Activated, the VCR style buttons will activate and turn blue/green



By pressing the Green Triangle, we will open up the document to being revised/updated.

All boxes or fields that are highlighted in RED are required fields.

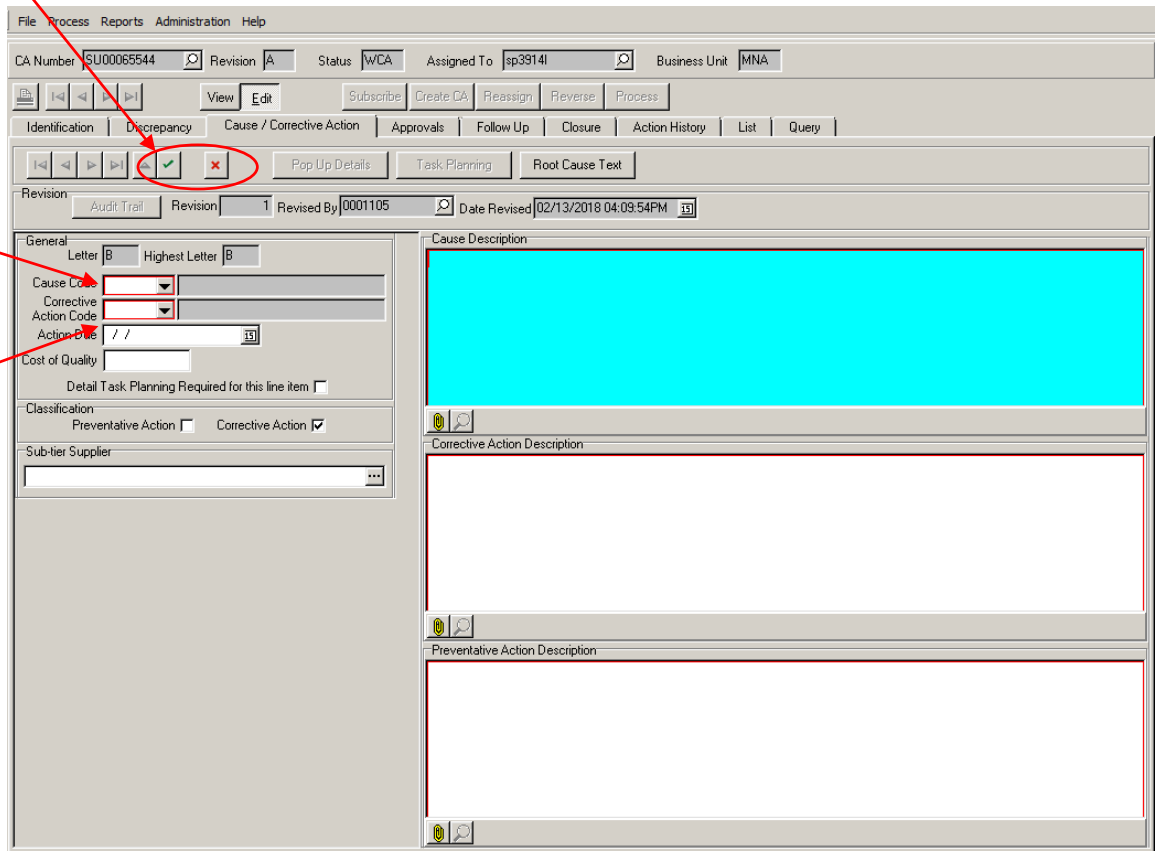
Corrective Action Tab (Cont.)… Cause Description

Now that the Triangle has been pressed, the fields will turn white letting you know they are ready for revision. One field will turn blue. This will be the currently active field.

Green Checkmark/Red X: The GREEN Checkmark is used to save any changes you have made… the RED X will delete all edits made since the Triangle has been depressed.

Cause Code: In this pull down menu, identify as closely as possible the cause of the issue based on the options available. Click on the down arrow to pull down the menu.

Corrective Action Code: In this pull down menu, identify as closely as possible the Corrective Action implemented based on the options available. Click on the down arrow to pull down the menu.



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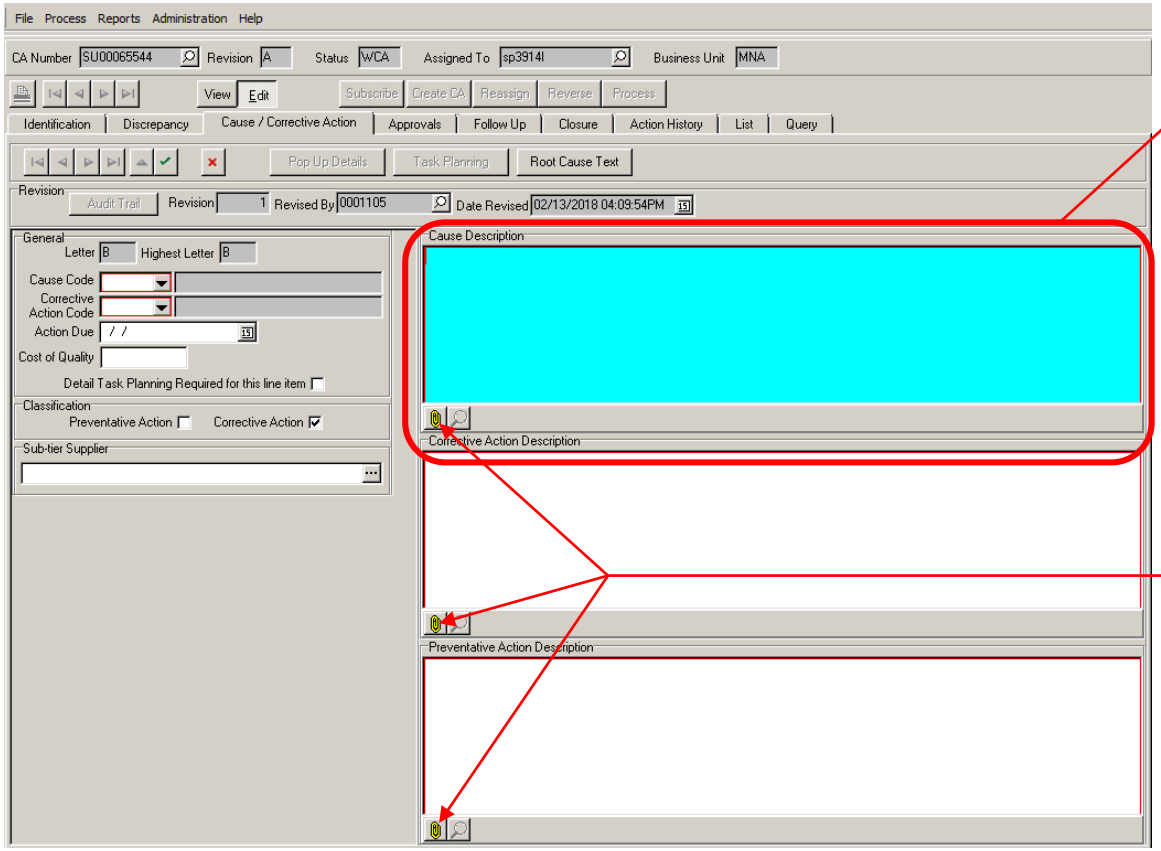
Corrective Action Tab (Cont.)… Cause Description



Cause Description: In this field we expect to see the root cause of the nonconformance detailed. A 5Y or other root cause investigative tool should be used and attached to show how the root cause was determined.

Attachments: By pressing the paperclip at the bottom of the field, you can attach documents which support your statements. This is true for every paperclip you see for the various fields.

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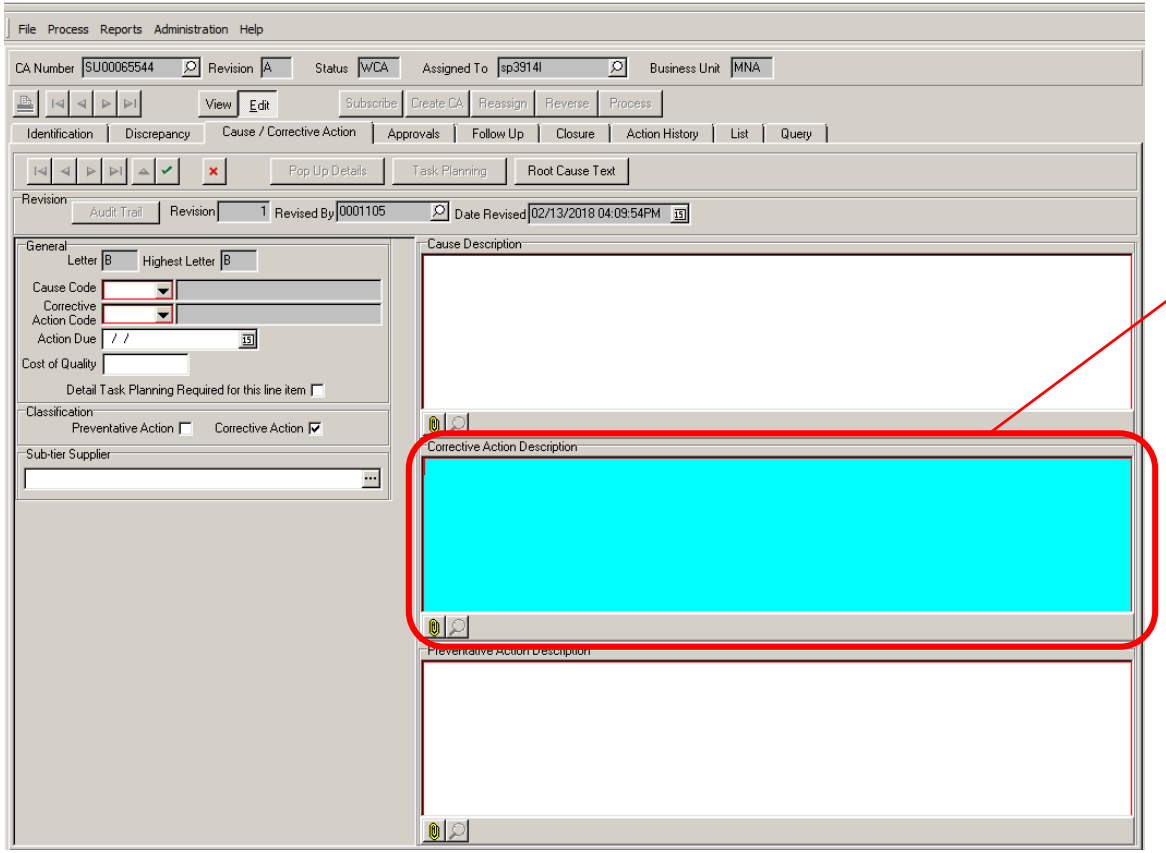
Corrective Action Tab (Cont.)… Corrective Action Description

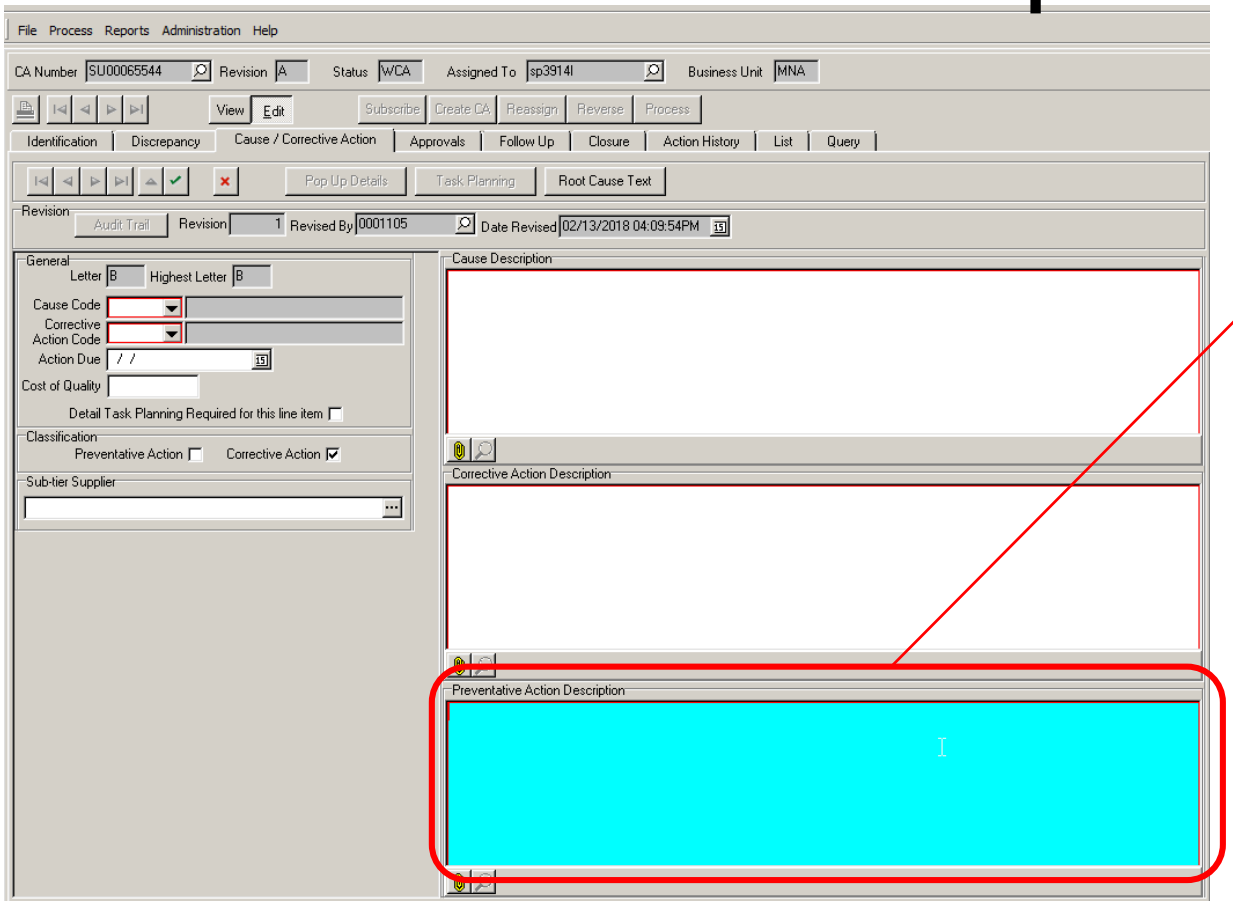


Corrective Action Description: In this field we expect to see the root cause addressed in such a manner as to eliminate or prohibit the nonconforming characteristic from recurring. 100% inspection is generally not accepted as a corrective action.

Any changes to procedures or process documentation should be attached as objective evidence of the corrective action. This includes any records of training as well.

Attachments: By pressing the paperclip at the bottom of the various fields, you can attach documents which support your statements.

Corrective Action Tab (Cont.)…
Preventative Action Description

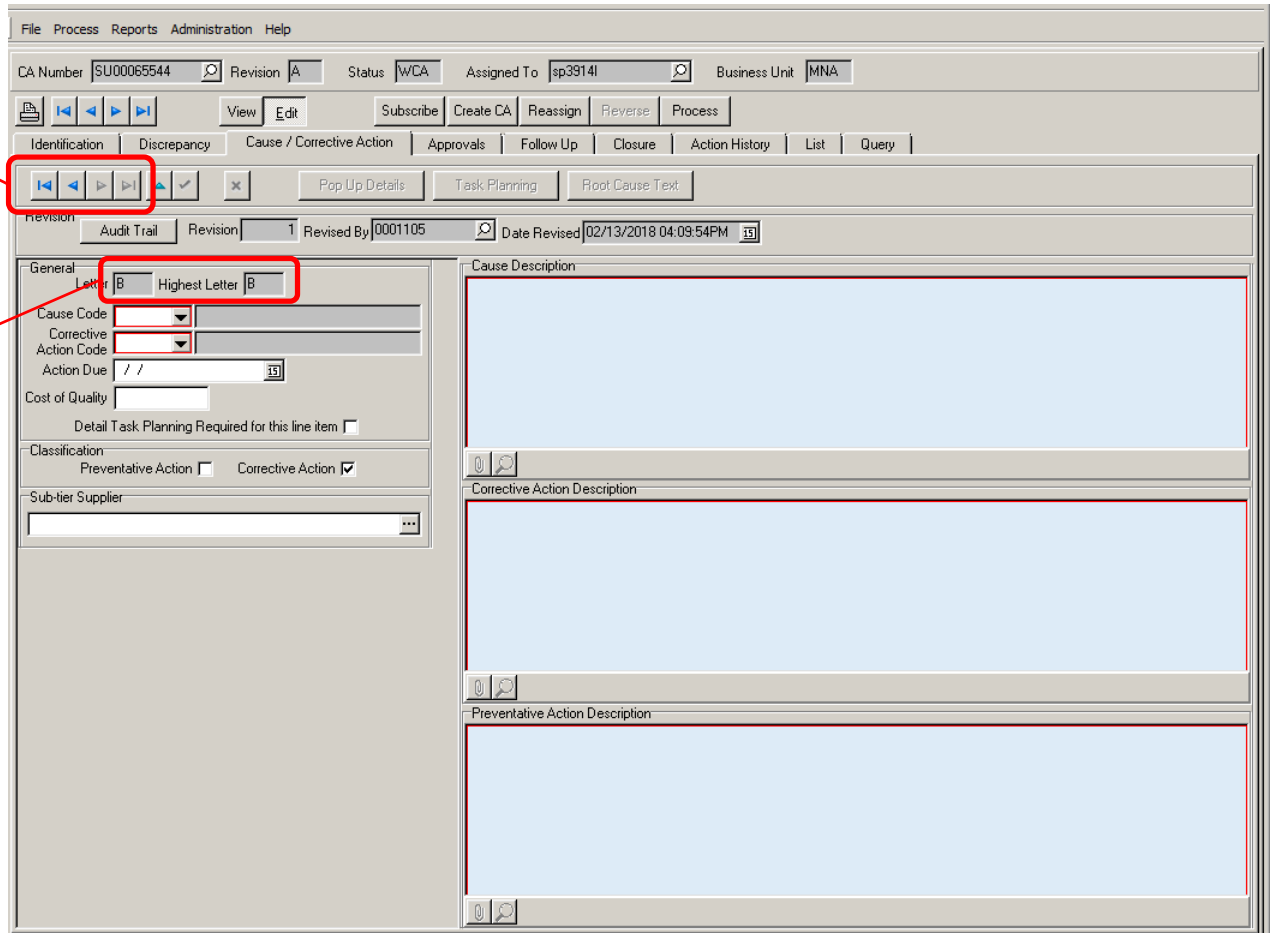


Preventative Action Description: In this field we expect to see suppliers perform a "Look Across" to determine if the nonconformance identified could affect other Moog parts processed by the supplier. This field should contain a statement similar to "*Look across has been performed and this corrective action is also being implemented to Part numbers ###, ###, and ###.*"

For the look across, changes to other documents or procedures is not required.

Corrective Action Tab (Cont.)… Multiple Nonconformances

In some instances, there may be more than one nonconformance related to received product. These can be toggled between using the VCR style Back and Forth buttons…



Note: On the sample shown, we are currently looking at item B. To see item A we can press the Back Arrow with the line which will take us all the way back, or the back arrow without the line which will take us back only one item.

Each item MUST be responded to prior to submitting Corrective Actions for review.

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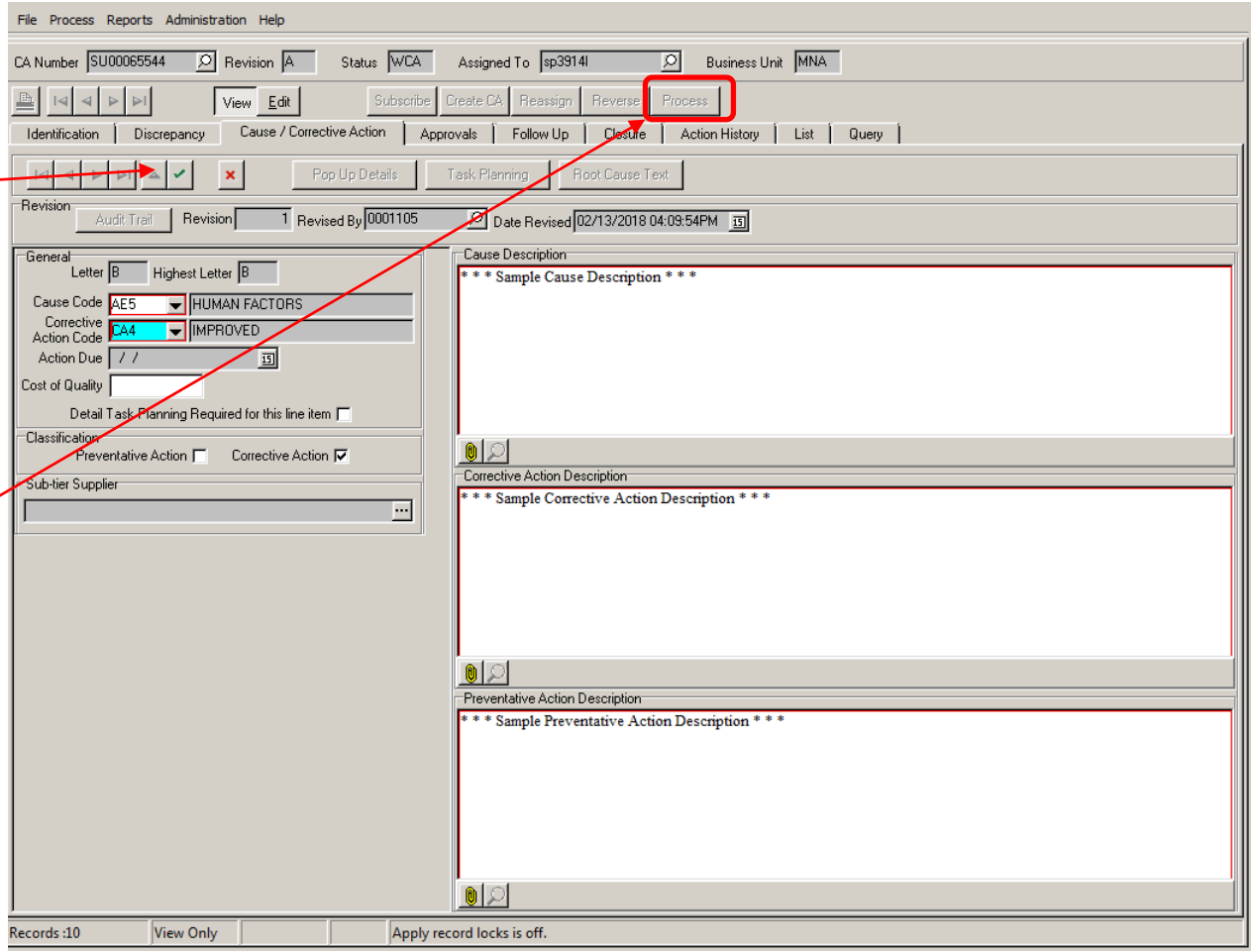
Corrective Action Tab (Cont.)… Corrective Action Completion

Once all the fields have been completed and all the objective evidence has been attached, press the GREEN checkmark to ACCEPT the changes.

Once the GREEN checkmark has been checked, the PROCESS button at the top of the page should highlight. When it does, press PROCESS and the Corrective Acton will automatically be reassigned to the individual who generated or authored the Corrective Action.



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Summary

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Guidelines – Corrective Action Initiation Criteria

What is a “Corrective Action”?

A **Corrective Action** is immediate and preventative action taken on an assignable cause to permanently fix a systemic or process-related issue

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Summary

What is a “Corrective Action”?

- Ongoing Improvement initiatives
- *Documents* the work done!
- NOT a reprimand

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Summary

- **FORM A TEAM**
- **CONTAIN** the non-conformance – Supply Chain, Detection, and Awareness
- A Corrective Action is only as good as it's **Root Cause**
- Get to the REAL **Root Cause** – there can be more than one!
- IMPLEMENT solid **Corrective Actions**
- SHOW **Objective Evidence**
- **VERIFY** the Corrective Action
  - Ask yourself if the defect could be reproduced by others
- **PREVENT** the defect from occurring on other parts

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Best Practices – Containment

- **There are two parts to Containment:**

Contain Defective Material

Close Inspection Gap

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Best Practices – Root Cause

A Root Cause response must consider **2** aspects:

1) Process Issue or Systemic Issue

What caused the non-conformance in the first place? What allowed it to happen? What act or failure to act allowed the event to occur?

2) Failure to Detect

How did the part leave your building? Why was it certified as conforming?

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Summary

Actions need **Owners** and **Due Dates**

Actions must be credible – Objective Evidence (OE) must back up completed actions

Again, Permanent Corrective Actions will only be as good as the root causes defined!

(notice the repeated use of the word “permanent”)

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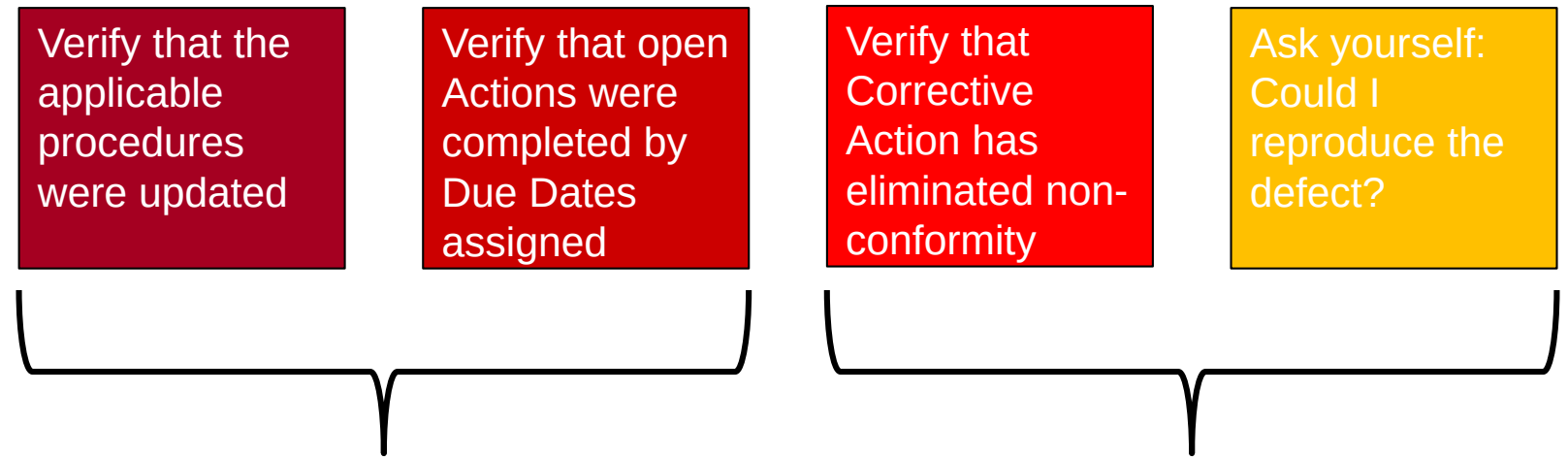
Best Practices – Verification / Follow Up

- **What do you look for in Verification?**



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Best Practices – Preventative Action

- Look across ALL Moog parts – could they see the same failure?
- Look across ALL your customers – having a “special process” for only one customer such as Moog is a **FAILURE MODE**.
- Why wait for a Corrective Action request? Take steps **now** to minimize risks later!

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Summary

A Corrective Action is an Opportunity for *Improvement*

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What is our #1 priority?

MOOG

Congratulations!

MOOG

Congratulations!

You have completed a Continuous Improvement activity for the benefit of your organization, Moog, and all your other customers.

Do you keep going?

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YES

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Thank you!

End.

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Supplemental Material

MOOG

Summary

Continuous Improvement is *continuous*

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Best Practices – Cause and Effect (C&E)/Fishbone Analysis

- **Creating a Fishbone Diagram:**
  - List the problem/issue to be studied in the head of the fish
  - Label each bone of the fish. The major categories typically used are:
    - The 6 M's: Methods, Machines, Materials, Manpower, Measurement, Management
    - The 4 P's: Place, Procedure, People, Policies
  - Repeat this procedure with each factor under the category to produce sub-factors. Continue asking, "Why is this happening?" and put additional segments each factor and subsequently under each sub-factor.
  - Analyze the results, identify the 'most likely causes".
  - Evaluate the most likely causes to identify the true Root Cause.

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Best Practices – Permanent Corrective Action

"We talked to the operator, he/she will be trained"

Is training alone sufficient?

- Never blame the operator
- Focus on the process placed in the hands of the operator
- What allowed the operator to do this?
- Can the process be mistake-proofed?

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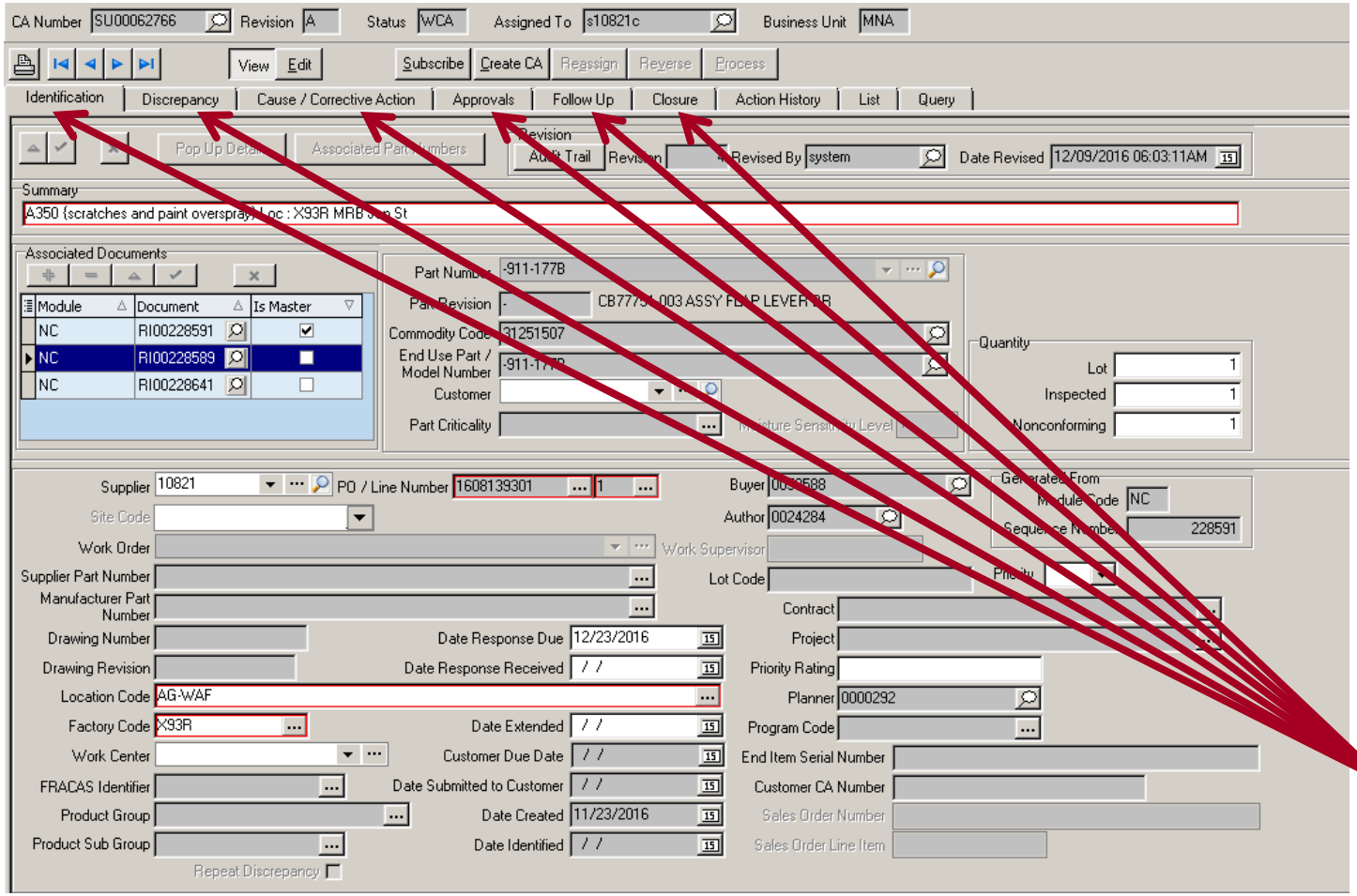
Best Practices – Using TipQA

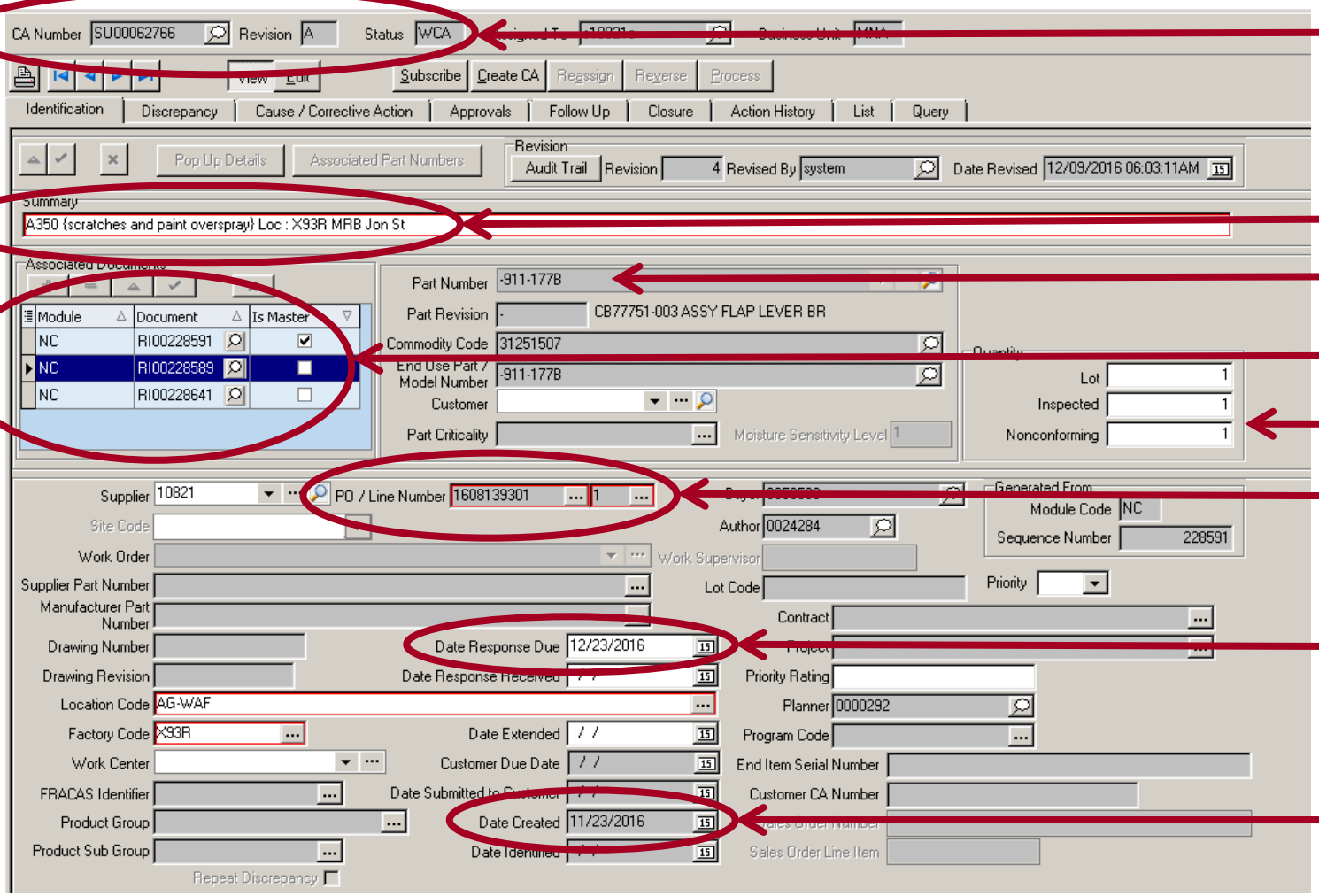


Use tabs to navigate. Left-to-right workflow

MNA - North America

MOOG

Best Practices – Using TipQA; Administrative Data



CA# & Status

Brief Summary

Part Number

Associated NCs

Qty

PO # & Line

Date Response Due

Date Created

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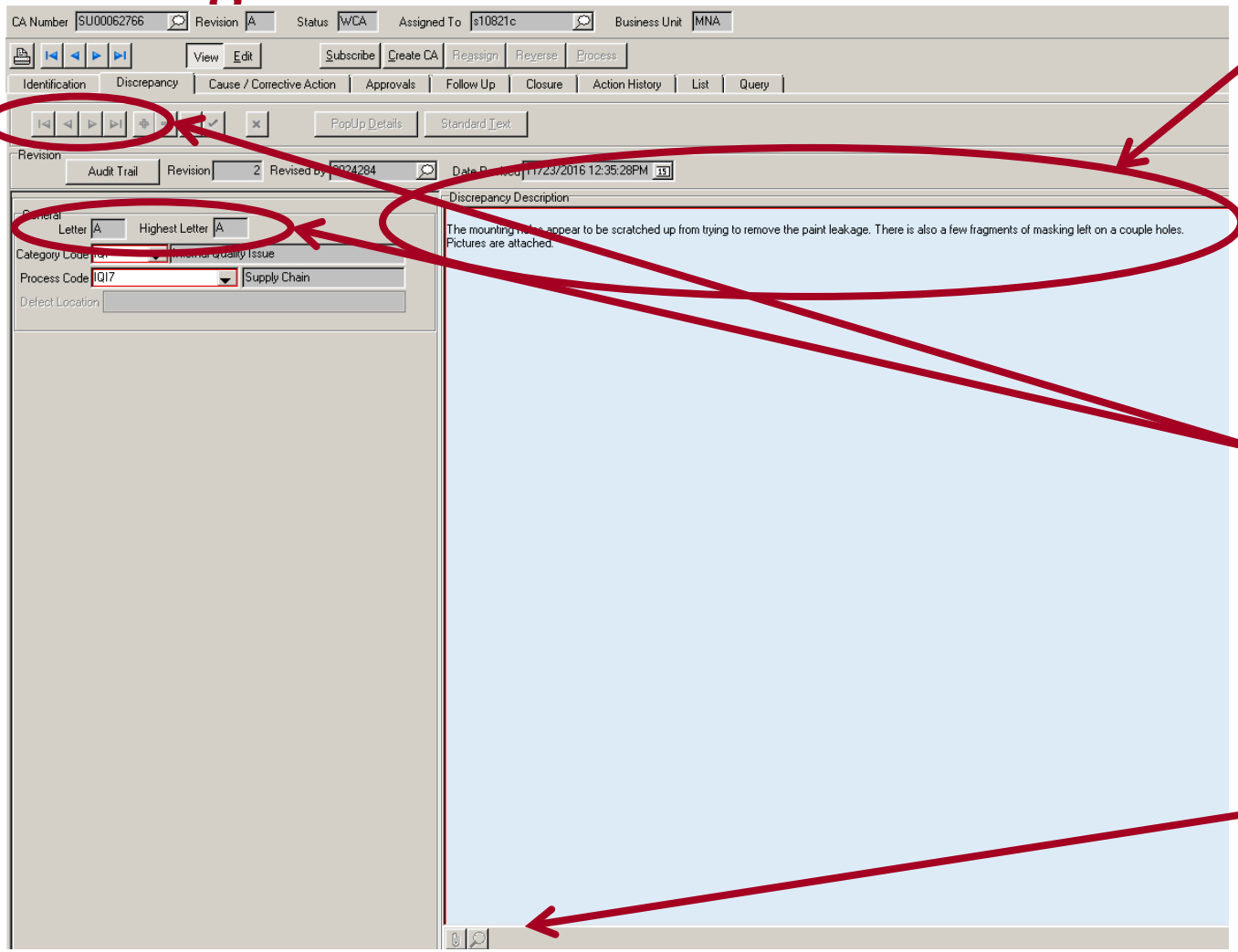
Best Practices – Using TipQA; Description of the Finding



Detailed description of the finding

Each non-conformance for which the CA was issued will have it's own "Letter" (e.g. NC line). Click to advance. Pay attention to – and respond to – each one!

Attachments, such as photos or test reports, will be attached here. If not, check the NC.

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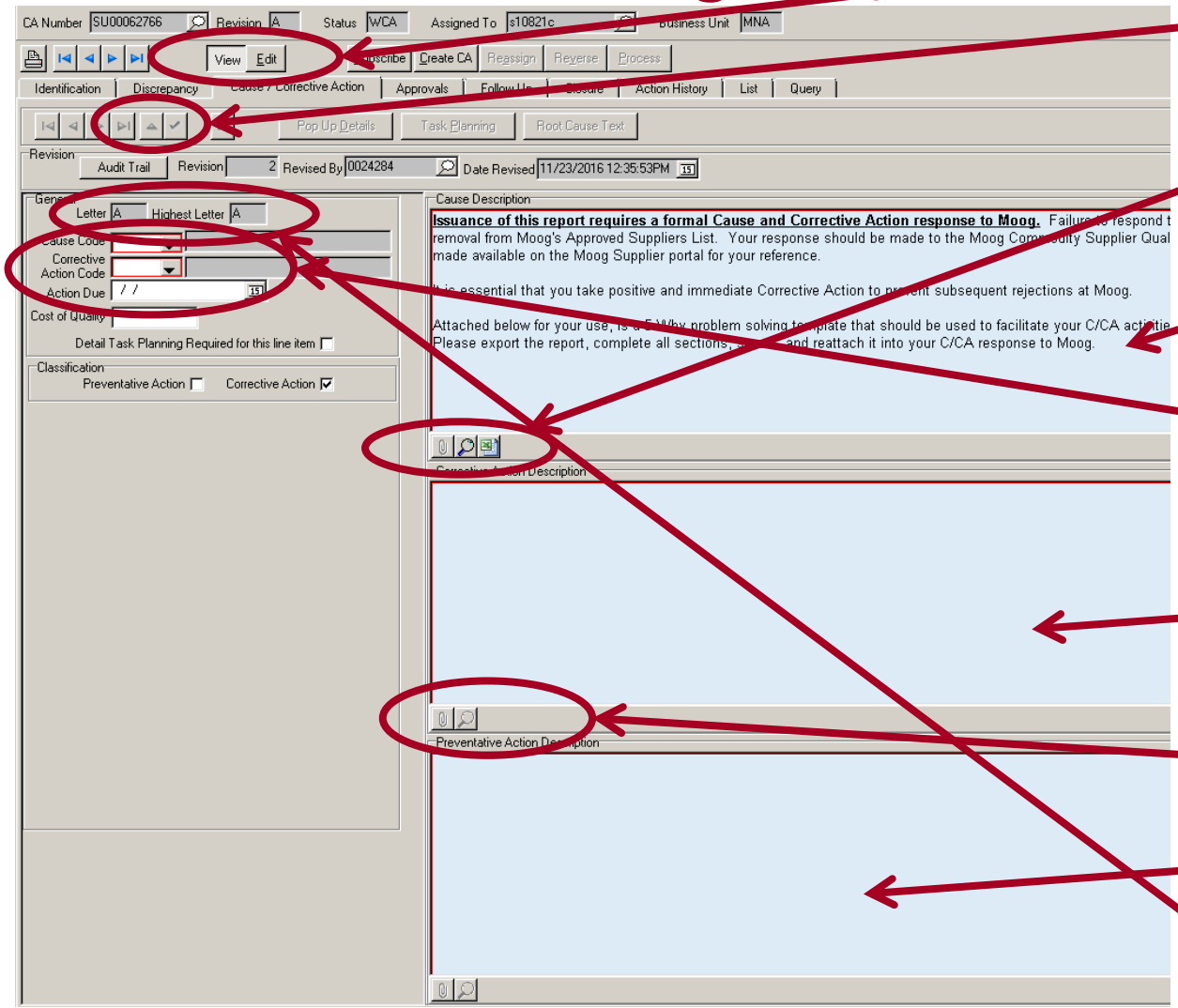
Best Practices – Using TipQA: RCCA



Must be in Edit mode

Click blue triangle

Use the 5-Why spreadsheet to complete your Root Cause investigation

Re-state your Root Cause here

Remember to select the Cause Code and CA Code from the drop-down

Input Permanent Corrective Action here. Be as detailed as possible. Should include Verification plan!

Attach Objective Evidence

Input Preventative Action here. Be as detailed as possible.

Again, watch the letters

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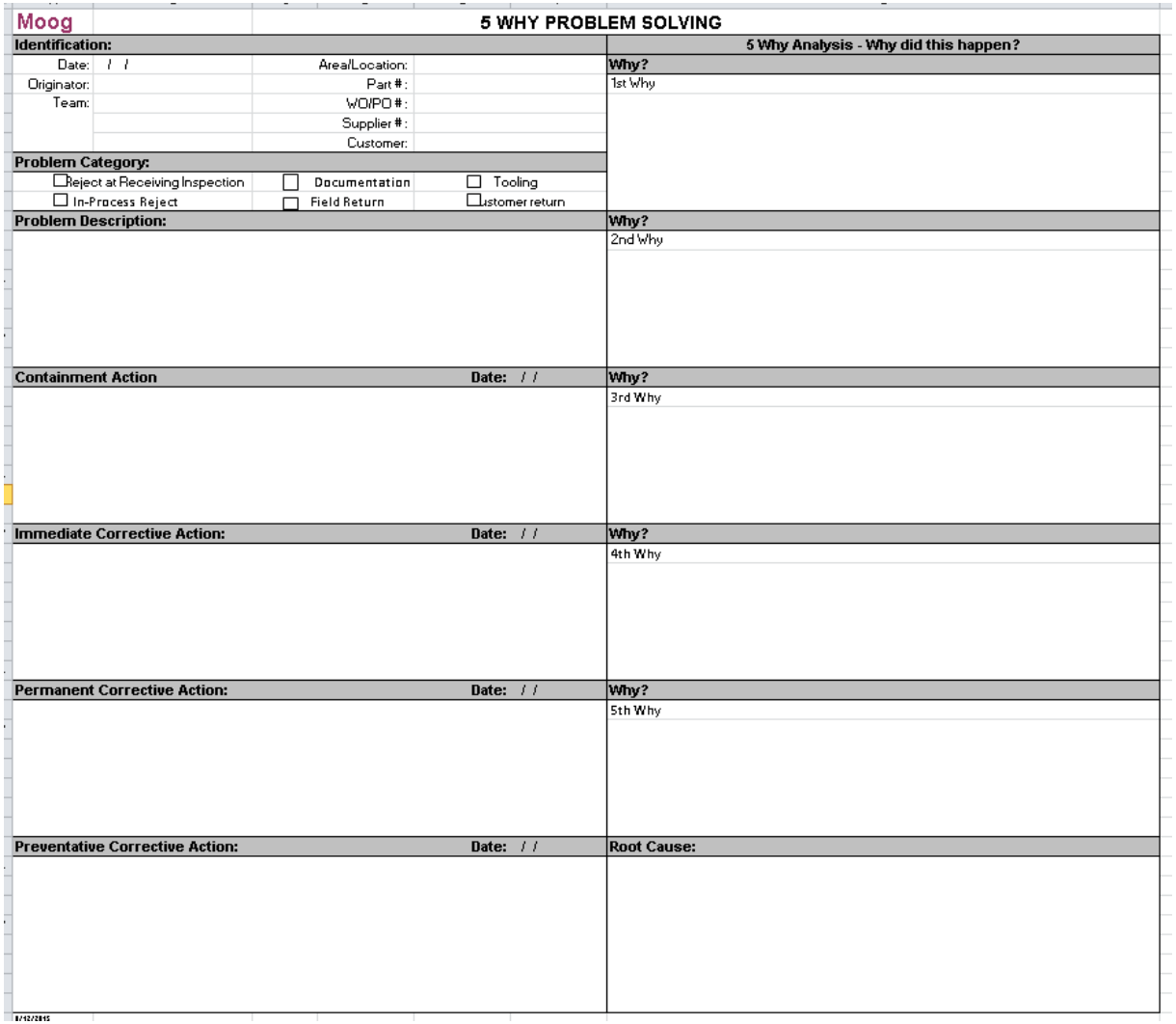
Best Practices – Moog CA Worksheet



Moog

5 WHY PROBLEM SOLVING

Identification:		**5 Why Analysis - Why did this happen?**
Date: / /	Area/Location:	**Why?**
Originator:	Part # :	1st Why
Team:	WO/PO # :	
	Supplier # :	
	Customer:	
Problem Category:		
☐ Reject at Receiving Inspection ☐ Documentation ☐ Tooling		
☐ In-Process Reject ☐ Field Return ☐ Customer return		
Problem Description:		**Why?**
		2nd Why
Containment Action	**Date: / /**	**Why?**
		3rd Why
Immediate Corrective Action:	**Date: / /**	**Why?**
		4th Why
Permanent Corrective Action:	**Date: / /**	**Why?**
		5th Why
Preventative Corrective Action:	**Date: / /**	**Root Cause:**

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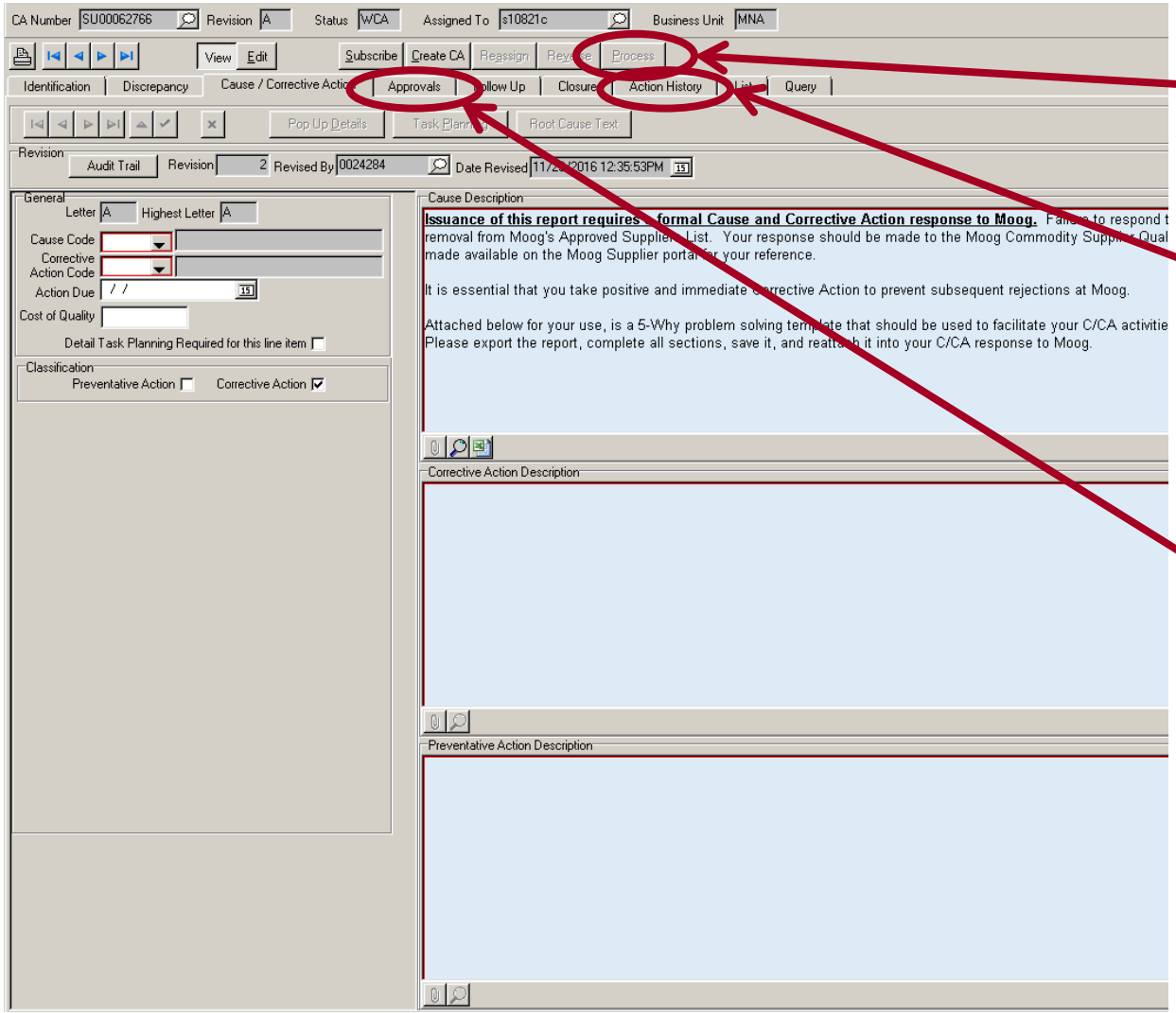
Best Practices – Using TipQA; RCCA



When complete, you must select “Process”. Status will change from WCA to WA

To confirm that you have submitted, observe the “Action History” tab

Once a Moog representative reviews and approves, it goes to the Corrective Action Board for review. After CAB acceptance, CA will enter Follow-Up (Verification) stage. You may observe the Approvals in the “Approvals” tab

If at any time the CA is not approved, it will be sent back to you for updates

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Best Practices:

Good CA Example

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Best Practices – Good CA Example

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Revision Control

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Revision Control

Revision	Reason for Change	Release Date	Author
NC	Initial Release	2/1/2017	D. Hensel
A	Added Permanent CA examples, moved Containment ahead of Form a Team, added Containment slide	5/5/17	D. Hensel
B	Replaced TipQA slides, added PFMEA material, added Fishbone “nicks & dings” exercise	2/15/2019	D. Hensel
C	Changed root cause “facets” to “aspects”	8/15/19	D. Hensel