DENVER PEAK ACADEMY

CONTINUING PEAK EDUCATION

May 16, 2014

CPE AGENDA

2:30-2:45 - Intro by Peak Team

2:45-3:30 - “Failure Mode Analysis” and “Simplified Metrics” by Jerraud/Patrice (Peak Team)

3:30-4:00 - “Lean at Denver Water” by Brian Good(Deputy Manager of Organizational Improvement)

4:00-4:10 - Break

4:10-4:30 - Black Belt lanyards

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FAILURE MODES & EFFECTS ANALYSIS (FMEA)

FAILURE MODES & EFFECTS ANALYSIS (FMEA)

INTRODUCTION

The FMEA form is a tool used to perform both identification and elimination of wastes. The point of the tool is to gather and prioritize the process issues in an effort to eliminate steps that cause a failure/defect in the process. The FMEA table, in addition to identifying the critical problematic elements of a process, serves as a vehicle for generating future improvement actions.

OBJECTIVES

1. **Identify where FMEA fits into the A3 for identifying and eliminating process issues.**
2. **Explain the fields of the FMEA.**
3. **Identify a method for constructing an FMEA.**

BACKGROUND

1. **Failure Modes and Effects Analysis (FMEA)**
    - **First developed in the 1950's.**
    - **Appropriated by NASA in the 1960's for the space program.**
    - **Ford Motor Company was the first North American company to widely implement the use of FMEAs.**

FAILURE MODES & EFFECTS ANALYSIS (FMEA)

PURPOSE

A structured approach to:

- Identify the ways in which a widget, service, or process can fail. (fishbone)
- Estimate risk associated with specific failure causes. (mistake proof)
- Prioritize the actions to reduce risk of failure. (impact/effort)

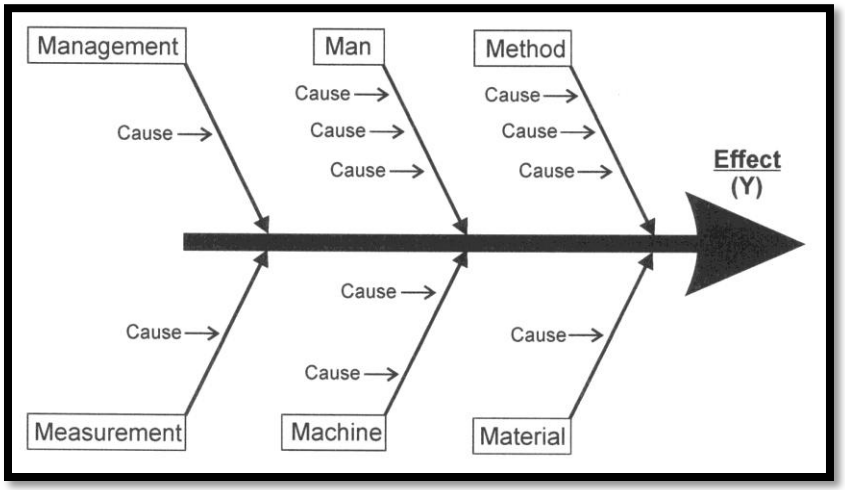
When filling out an A3 you can use the FMEA for:

- Gap analysis – Box #4
- Brainstorming – Box #5
- Experiments – Box #6
- Results Box – Box #8

FAILURE MODES & EFFECTS ANALYSIS (FMEA)

PROCESS MAP

FISHBONE DIAGRAM



Two ways to use FMEA

1. **Perform a process map and use each step on your FMEA chart to determine all the failure modes in your current process.**
2. **Perform a fishbone diagram and use each cause in your FMEA chart to determine the failure.**

FAILURE MODES AND EFFECTS ANALYSIS CHART

				INITIAL ASSESSMENT						ACTIONS & HISTORY						
STEP	PROCESS STEP/INPUT	POTENTIAL FAILURE MODE	POTENTIAL FAILURE EFFECTS	SEVERITY	POTENTIAL CAUSES	OCCURRENCE	CURRENT CONTROLS	DETECTION	RPN	ACTION(S) RECOMMENDED	RESP /DUE DATE	ACTIONS TAKEN	SEVERITY	OCCURRENCE	DETECTION	RPN
1	Fill carafe with water	Wrong amount of water	Coffee too strong or too weak	8	Faded level marks on carafe	4	Visual inspection	4	128	Replace carafe	Bob/ 7-8-14	Carafe replaced	8	1	3	24
				8	Water spilled from carafe	5	None	9	360	Train employees	Sarah/ 7-9-14	Employees trained	8	2	7	112
		Water too warm	Coffee too strong	8	Faucet not allowed to run and cool	8	Finger	4	256	Train employees	Bob/ 7-12-14	Employees trained	8	2	6	96
				8	Employee not aware of new need for cool water	7	None	10	560	Train employees	Tom/ 7-15-14	Employees trained	8	1	8	64
		Carafe not clean	Foreign objects in coffee	10	Carafe not washed	4	Visual inspection	4	160	Appoint inspector before storage	Mike/ 7-15-14	Bob is the new inspector	10	1	4	40
			Bad taste	10	Carafe stored improperly	7	Training	5	350	Create storage bin & train employees	Alice/ 7-20-14	New storage bin & employees trained	10	2	3	60

FAILURE MODES AND EFFECTS ANALYSIS (FMEA)

Rating	Severity of Effect	Likelihood of Occurrence	Detectability
10	Hazardous without warning	Very High: failure is almost inevitable	Cannot detect
9	Hazardous with warning		Very remote chance of detection
8	Loss of primary function	High: Repeated Failures	Remote chance of detection
7	Reduced primary function performance		Remote chance of detection
6	Loss of secondary function performance	Moderate: occasional Failures	Low chance of detection
5	Reduced secondary function performance		Moderate chance of detection
4	Minor defect noticed by some customers		Moderately high chance of detection
3	Minor defect noticed by some customers	Low: relatively few failures	High chance of detection
2	Minor defect noticed by some observant customers		Very high chance of detection
1	No effect	Remote: failure is unlikely	Almost certain detection

FAILURE MODES AND EFFECTS ANALYSIS (FMEA)

POTENTIAL DIFFICULTY UNDERSTANDING OF THE Risk Priority Number (RPN)

- The Risk Priority Number is only a guideline and must be combined with common sense and logic:
  - Consider: Two RPNs rated 160 and 200.

FAILURE MODE	SEVERITY (S)	OCCURRENCE (O)	DETECTION (D)	RPN
A	**10**	4	4	160
B	4	10	5	200

•Though both failure modes require action, Mode A requires immediate action to prevent a problem, even though it has a lower RPN (Note High Severity: 10).

•The ease of implementation should also be considered when deciding the order of action.
•While the rating scales attempt to balance the **S O** and **D** ratings, potential safety issues should be addressed immediately. RPN values can be misleading when **high severity** is combined with **low occurrence** and **detection ratings**.

FAILURE MODES AND EFFECTS ANALYSIS (FMEA)

DOES THIS GO INTO AN A3?

1. Why change is needed	4. Gap Analysis/Assumptions	7. Action Plan
2. Current State	5. Brainstorming	8. Results
3. Future State	6. Experiments	9. Lessons learned

Once a project team is completely done filling out the FMEA form, it is placed inside of box 4 of the A3 as a Gap Analysis. HOWEVER, if you finish all the boxes you can use it throughout your innovation.

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FAILURE MODES & EFFECTS ANALYSIS (FMEA)

ADVANTAGES

•Improve the quality, reliability and safety of a product/process

•Improve company image and competitiveness

•Increase user satisfaction

•Collect information to reduce future failures, capture process-knowledge

FAILURE MODES & EFFECTS ANALYSIS (FMEA)

SUMMARY

- The FMEA is a powerful tool for any project team, and it's best used when it's completed proactively before any problems starts.
- When implementing actions from a FMEA, actions should be prioritized.
- The FMEA is a great tool that can be used throughout the process. It is a more comprehensive gap analysis but also a follow up tool to help you with results.

Follow the links below for more information and tutorials on how to use the FMEA tool:

- http://www.bmgi.org/node/1648
- http://www.bmgi.org/course/failure-modes-and-effects-analysis-fmea
- http://clickandlearn.bmgi.org/ **(Click on "Search for BMGI Modules" and then type in "Building an FMEA" in the field labeled "module title")**

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Metrics-Keeping it simple!

METRICS…LET'S GO BACK TO THE BASICS!

How Many?

*How many widgets do you make or process

*How many clients do you serve

*How many licenses are issued

*Customer Demand

*Volume

How Long?

*Staff Time

*Customer Intake

*Time waiting

*Backlog

*Soft $ Costs

How many are Right?

*How much rework

*How many additional touches

*Quality

*Standard Work

*Consistency

METRICS…SIMPLE AND VISUAL!

Use them in your A3, RIE, JDI, Charters

Type of Metric	Metric Description	Baseline	Target
How Many?	•How many do you receive? •How many people walk through your door?	X per day	Y per day
How Long does it take?	•How long does your entire process take beginning to end	X min per widget	Y min per widget
How many are Right?	•How many make it through the process without rework or being sent back the first time.	5 out of 10 widgets C&A =50%	9 out of 10 widgets C&A =90%

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"Lean at Denver Water"

Brian Good-Deputy Manager of Organizational Improvement