PROCESS OPTIMIZATION

Improve yield and total gallons

Jon Ambrose, CSSBB CMRP
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NATIVE WISDOM...

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How do we harvest the greatest dollars for the least cost?

- **Optimization tools:**
  - DMAIC
  - FMEA
  - VISUAL WORKPLACE
  - VISUAL WORK INSTRUCTIONS
  - STATISTICAL TOOLS (CONTROL CHARTS)
  - AUTOMATED PROCESS CONTROL
  - KEY PERFORMANCE INDICATORS (KPI)*
  - KPI COLLECTED AND REPORTED AUTOMATICALLY
  - SUPPORT TEAM OF SPECIALIST
  - KNOWLEDGE MAPS
  - PROCESS MAPS

FMEA

FAILURE MODE and EFFECT ANALYSIS

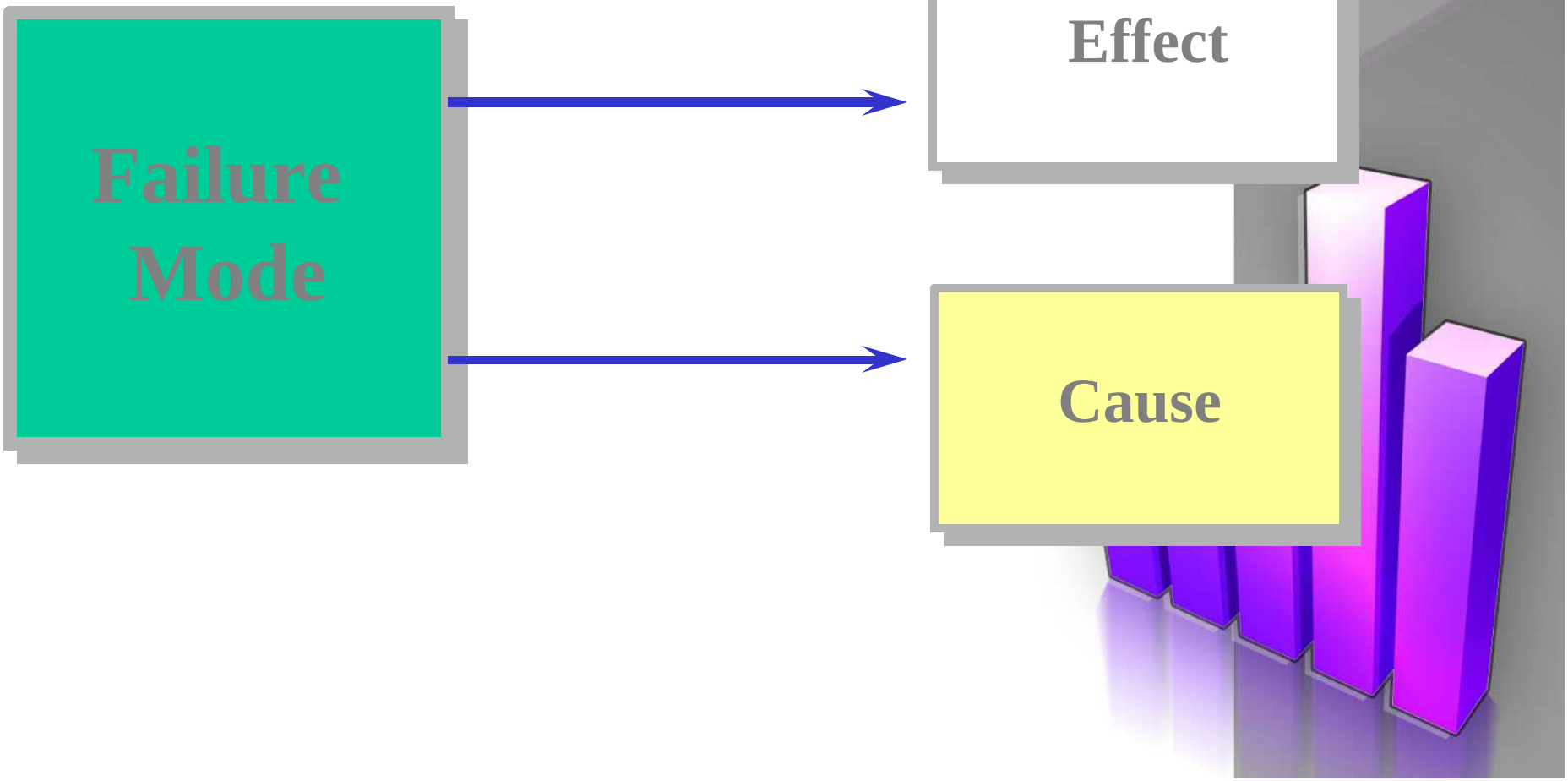
DESCRIBE THE FUNCTION

ASK

WHAT IS THE FUNCTION OF FERMENTATION?

FAILURE MODE and EFFECT ANALYSIS

SENTENCING TECHNIQUE



POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
IN MANUFACTURING AND ASSEMBLY PROCESSES
(PROCESS FMEA)

FMEA Number MM-2000

Item MM-2X | **Process Responsibility** Goodson | **Prepared By** R. Yates/867-5309

Model Year(s)/Program(s) 2001/N/A | **Key Date** 4/24/2001 | **FMEA Date (Orig.)** 2/2/1999 | **(Rev.)** 03/02/2001

Core Team Sam and Janet Eveling

Process Function / Requirements	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occ	Current Process Controls - Prevention - Detection	Det	RPN	Recommended Action(s)	Resp. & Target Compl. Date	Action Results: Actions Taken	Sev	Occ	Det	RPN
010 - Wind wire around index finger																
001 - Coil diameter	Diameter too large	- Coil hits battery during operation - Rotor is short because too much material is used in coils	8	0	Wire wound loosely	3	>Char Control 1: Measure with gage.	4	96	None		None				
	Diameter too small	- Weak motor - Difficult removal from finger	6		Finger too small	4		3	72	None		None				
	Diameter too large	- Coil hits battery during operation - Rotor is short because too much material is used in coils	8		Finger too large	5		3	120	None		None				
	Diameter too small	- Weak motor - Difficult removal from finger	6		Wire wound tight	8		3	144	Provide operator with a tool for grasping the wire that limits the tension.	Tool Engineering 6/6/1999	Tool developed, tested, and implemented at process step 010.	6	3	3	54
002 - # of coils	Too few coils	- Motor too weak	5	0	Operator miscounts	2	>Char Control 1: Operator counts number of coils out loud.	3	30	None		None				
					Not enough wire	3		4	60	None		None				
	Too many coils	- Rotor too short to reach supports - Motor too powerful - Wasted material	8		Operator miscounts	2		3	48	None		None				
110 - Coil starting position	Starting position too incorrect (long or short)	- Opposing wire end too short to reach support - Not enough wire to wind all coils	7		Light dim so ruler hard to read	2	>Char Control 1: Use ruler to locate start position.	3	42	None		None				
					Ruler worn so hard to read	3		3	63	None		None				

FAILURE MODE and EFFECT ANALYSIS

POTENTIAL MITIGATION STEPS

ENGINEERING DESIGN

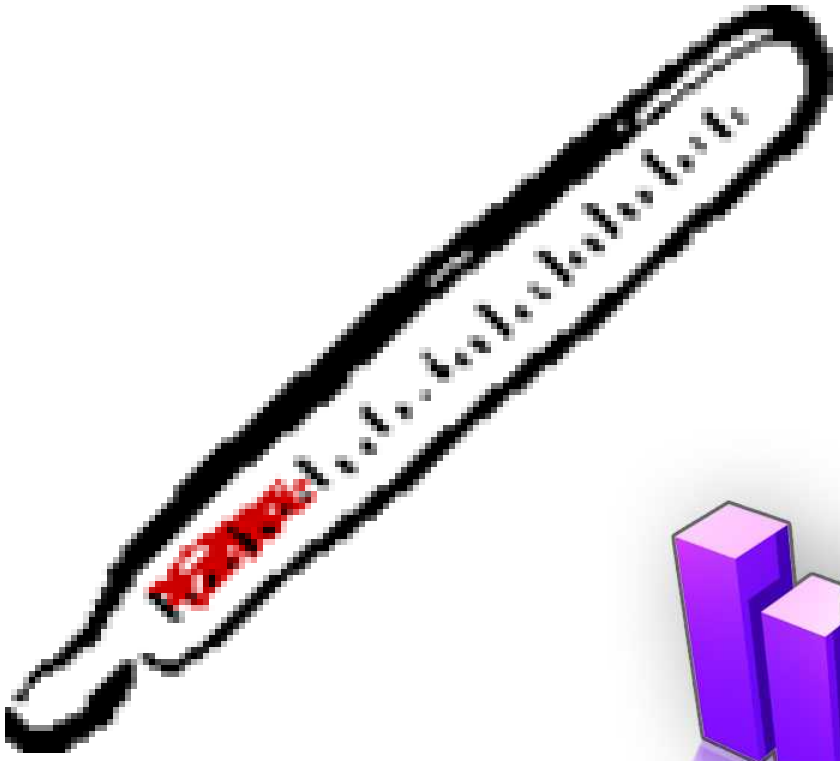
AUTOMATED CONTROL (DCS & PLC)

MAINTENANCE PLAN (PM & CMMS)

PROCESS VISUAL WORK INSTRUCTIONS

KEY PERFORMANCE INDICATORS (KPI)

Key Performance Indicators must match the level of operation where accountability exist.



OPTIMIZATION EXCERSISE

QUESTIONS