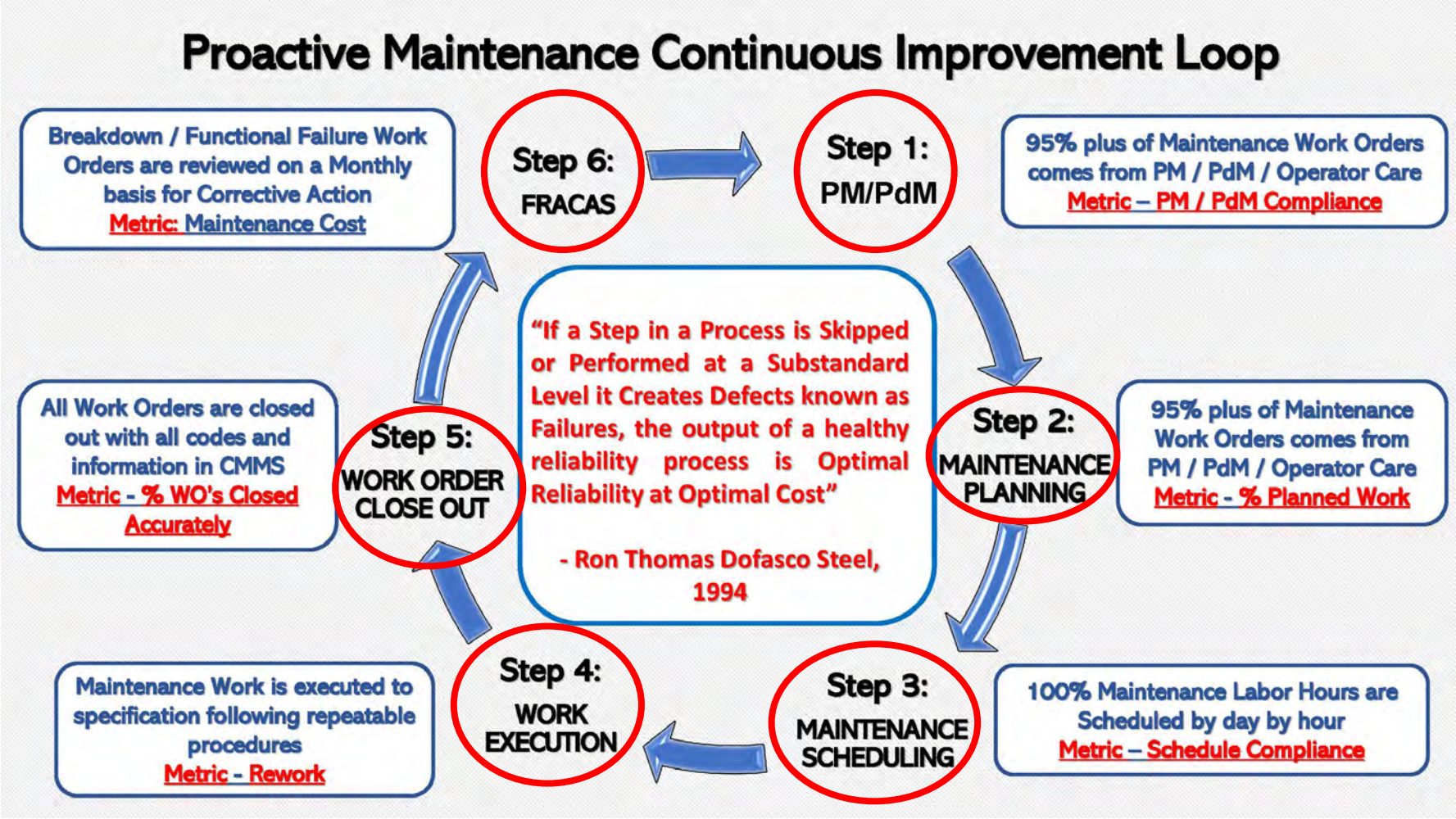
Preventive Maintenance Best Practices

By Ricky Smith CMRP

Proactive Maintenance

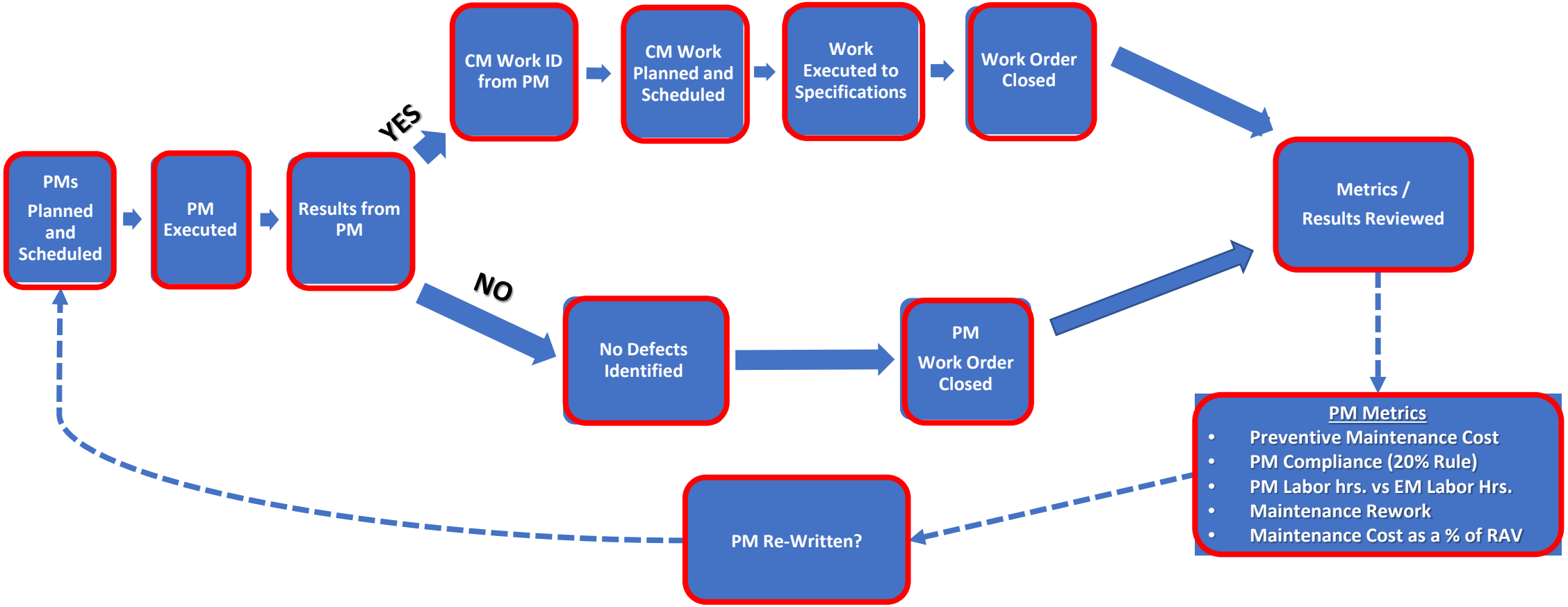


Preventive Maintenance Definition

Preventive Maintenance (PM) Actions performed on a time- or machine-run-based schedule that detect, preclude or mitigate degradation of a component or system with the aim of sustaining or extending its useful life through controlling degradation to an acceptable level.

Source: SMRP Best Practices Definitions

Preventive Maintenance Process



PM Continuous Improvement Loop

PMs Evaluated and Optimized Based on PM Metrics

Why Best Practices in Preventive Maintenance?

To:

- To ensure Equipment meets capacity, quality, and cost requirements
- Keep equipment in a Maintainable Condition
- To Prevent Equipment Failure when “Run to Failure” is not the maintenance strategy
- To meet Productions Requirement through Optimization of Asset Reliability

Preventive Maintenance Problems / Solutions

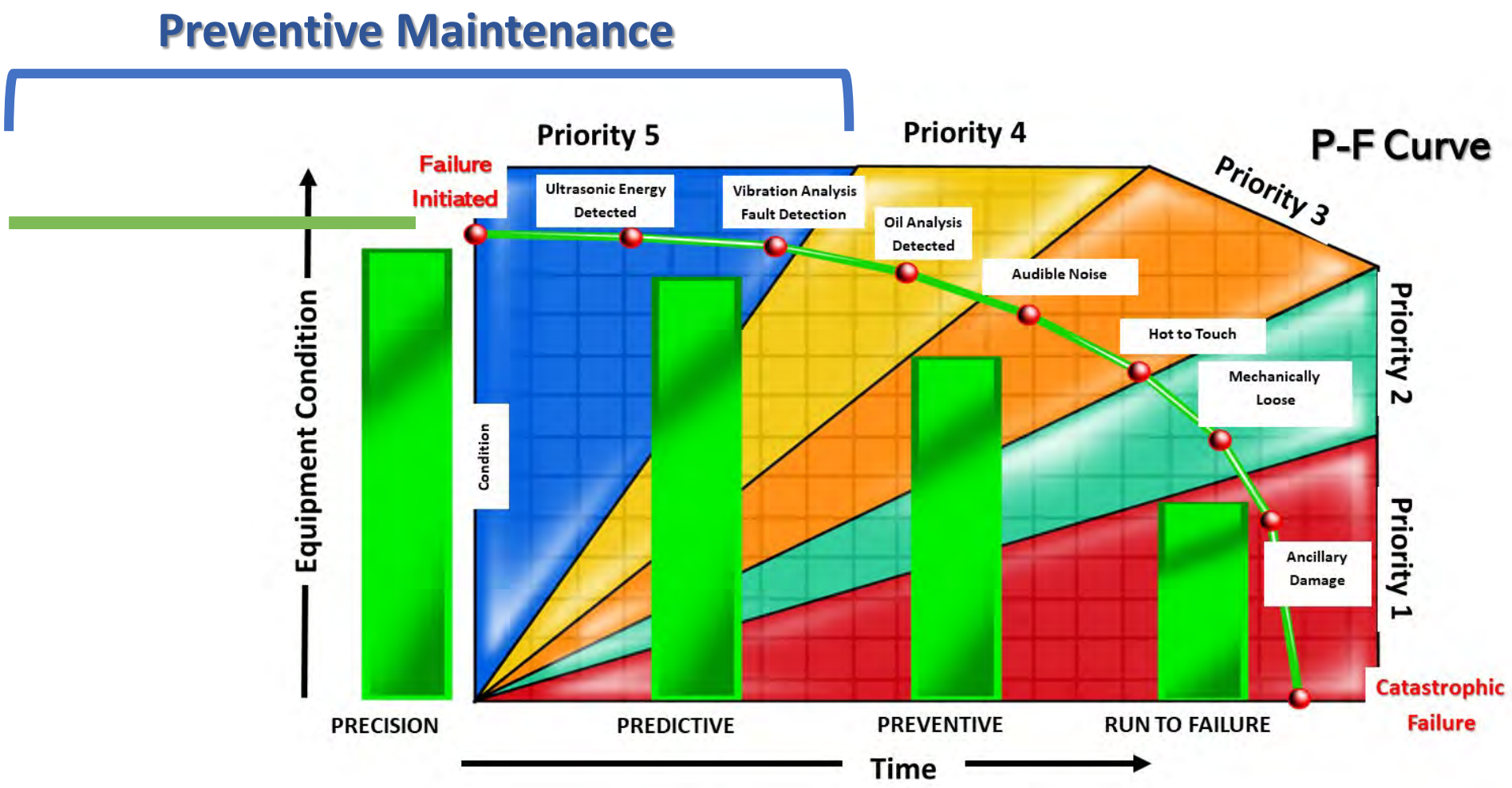
"Insanity: Performing PM on equipment that continues to break down"

PM Activities	PM Metrics	Possible Problem	Possible Solution
Inspection	PM Effectiveness (MTBF)	• PMs Not focused on Failure Modes • Ineffective measurements • No step by step procedure • No verification PM completed to specifications • Personnel not following procedure	• Engage Maintenance Techs in evaluating PMs • Post line graph: PM labor hrs. vs EM/Urgent labor hrs.
Lubrication	PM Compliance (Using the 10% Rule)	• Measurements with high variation • Lack of training in Best Practices • No oversight by Maintenance Leadership	• Determine type and amount of grease required • Inspect lubrication process
Time Based Change Out	Schedule Compliance (by day by hour)	• Asset unavailability • Maintenance Planning and Scheduling not effective	• Planning and Scheduling training for planners and leadership
Operator Care	PM Compliance (by shift) PM Effectiveness	• No specifications on PM • Lack of Reporting for corrective action • Lack of Management support	• Measure effectiveness of PM Compliance of Operator Care

Common Traps of Preventive Maintenance as a Strategy

- Most PM tasks are not based on Failure Modes
- Not enough detail in PM tasks to be value added
- Too many wrong tasks specified resulting in PMs often not performed at all
- Asset unavailability during PMs can outweigh reliability gains
- Lack of management focus and PMs often viewed as low priority
- Widespread dependence on inappropriate vendor suggestions

Preventive Maintenance and the PF Curve



Why Best Practices in Preventive Maintenance?

To:

- **To ensure Equipment meets the functional requirements of the assets**
- **Keep equipment in a Maintainable Condition**
- **To Prevent Equipment Failure when “Run to Failure” is not the maintenance strategy**
- **To meet Productions Requirement through Optimization of Asset Reliability**

“Best Practices” are best demonstrated practices found most be of the best companies

Why Preventive Maintenance does not meet Expectations?

1. No one knows what “Known Maintenance Best Practices” looks like
2. The true value of Preventive Maintenance is not seen by management.
3. Preventive Maintenance Inspections are not repeatable.
4. PM Compliance is 100% but equipment problems continue
5. The only metric used to manage PMs is PM Compliance
6. Equipment is not in a “Maintainable Condition”
7. Operators are not involved in Preventive Maintenance

What to do if Preventive Maintenance is not Meeting Expectations?

Step 1: Acknowledge you have a problem with your PM Program not meeting expectations

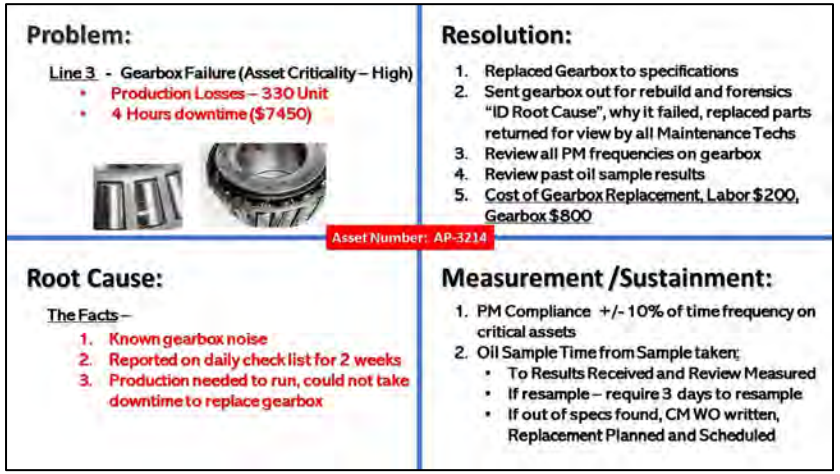
Step 2: Assemble a team of Maintenance Techs, Maintenance Supervisor and operators

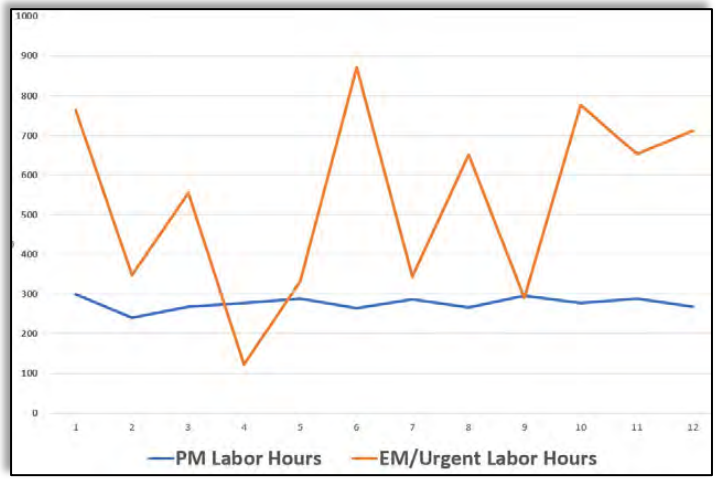
Step 3: The PM Optimization Team establishes their Vision, Mission, and Guiding Principles approved by Maintenance, Production and Plant Leadership and meet weekly for 30 minutes max (FOCUS)

Step 4: Identify the equipment have the most losses, ie. OEE, Production loss, EM/Urgent Labor hrs., etc.

Step 5: Post a Dashboard to measure progress and effectiveness of this Program

Step 6: Create a PM Problem/Solutions Board using the A3 Approach to problem solving

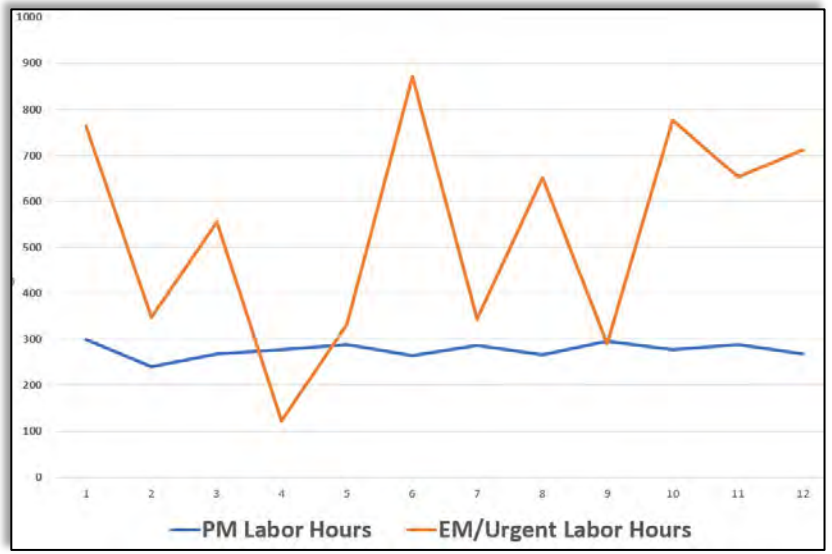




Best Practices in Preventive Maintenance

The Fundamentals of Effective PMs

1. All Equipment PMs are focused on specific “Failure Modes”
2. All PM Procedures should have the following:
    - Step by Step Instructions (initial each step)
    - Specifications
    - Space available for extra information
        - Condition as found
        - Condition as left
        - Recommendation to changes to Procedure
3. When a PM Work Order is given to Maintenance Techs the following should be attached:
    - Equipment Failure history since last PM Executed
4. If equipment fails between PM cycles an RCA should be initiated
5. Post the following metric in Maintenance Shop on a line graph
    - PM Labor Hours vs EM/Urgent Labor Hours



“Measure what you Manage”

An Example of the Hawthorne Effect for Behavior Change in PM using this metric, PM vs EM /Urgent Labor Hrs.

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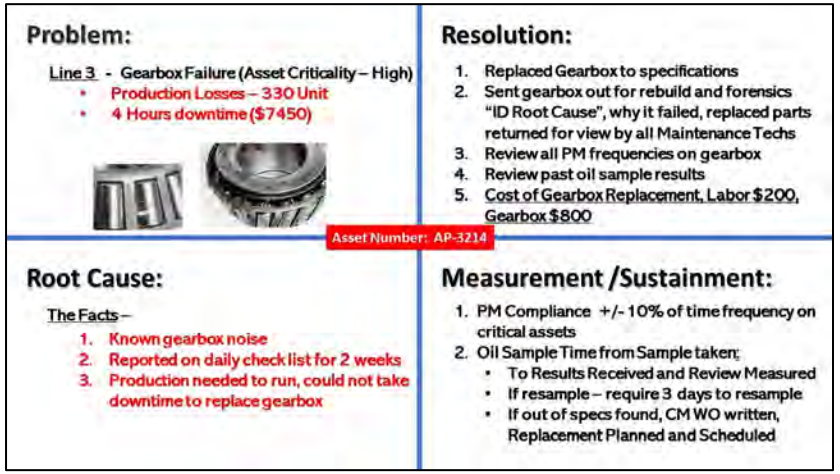
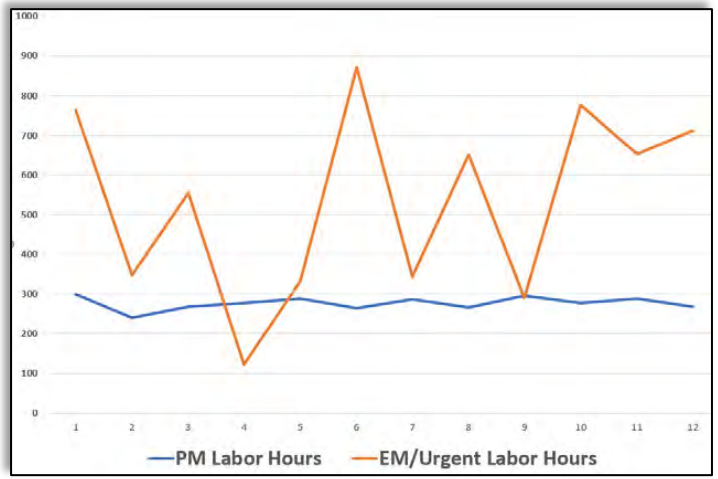
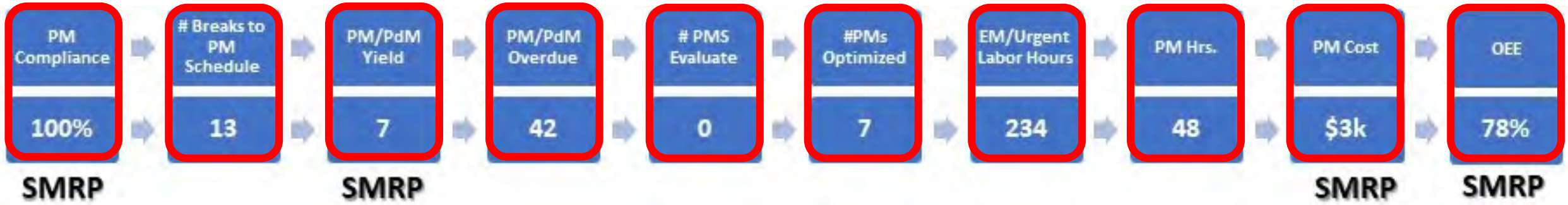




What Metric/Metrics do you use to measure your Preventive Maintenance Function?



"If a step in a process is skipped or performed at a substandard level it creates defects known of failures"

Ron Thomas

Engineering/Maintenance Manager

Dofasco Steel - 2004

Tool-Box Talk 103

“The PM Optimization Process”
PMO

www.worldclassmaintenance.org

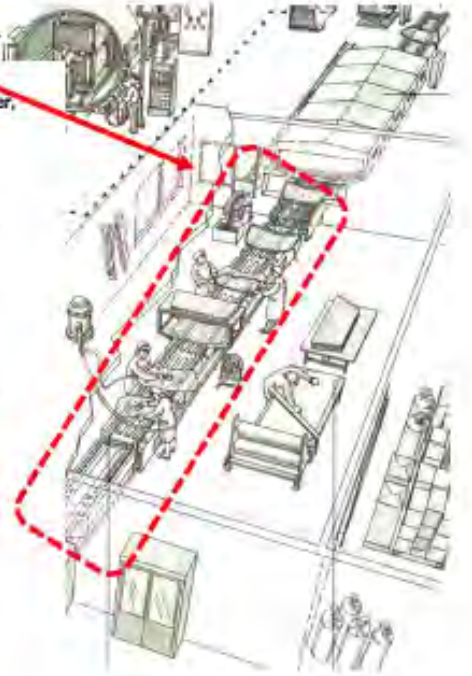
Tool-Box Talk

Preventive Maintenance 103

PM Optimization - “A Process used to optimize preventive maintenance (PM) tasks and frequencies to reduce or mitigate likely failure modes by utilizing tools/techniques such as FMEA, RCM, and Failure Modes Mapping resulting in increase equipment uptime and reduction of cost”

PM Optimization Process

1. Identify which asset or functional area the PM Optimization will be executed
2. Identify a cross functional team (Operator, Maintenance Tech, Reliability Engineer, Maintenance Planner)
3. Establish expectations from everyone engaged in this process
4. Define end goal of this process (ex: Increased PMs Effectiveness, Decrease breakdowns
5. Define how you will measure if the PM Optimization Process is effective or not
6. Present copies of PMs to team, one PM at a time
7. Review equipment history for the past 30, 60, and 180 days
   - # of breakdowns
   - Causes of critical breakdowns based on a formal RCA
   - PM Labor Hours vs EM/Urgent Labor Hours
8. Identify by the following for each task on a PM Procedure/Procedures



PM Evaluation / Optimization Results

PM Live Recommendation	# of Tasks	% of Total Tasks	Labor Hrs Represented
No Value - Delete Task	1,300	16.2%	1,832
Reassign to Lube Route	1,167	10.0%	3,980
Reassign to Operator Care	1,609	18.1%	4,987
Replace with PdM	1,583	17.3%	4,876
Re-Write Task	3,087	20.8%	11,049
Task is Good as Found	2,289	20%	3,923
Total PM Tasks	11,435	100%	30,647

Outcomes of PM Optimization

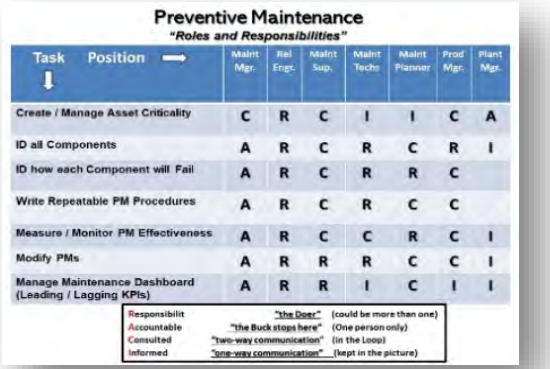
- Increase in Asset Availability
- Increase in Production Throughput
- Increase in OEE
- Maintenance Labor Hours freed up to perform other work which is needed
- Reduction in Total Maintenance Cost
- Reduction is outside Contractors

Measure the Outcome of the PM Optimization Process with PM KPIs

Preventive Maintenance Leading and Lagging KPIs

Steps of the PM Optimization Process

1. Identify a cross functional team (Operator, 2 Maintenance Tech, Reliability Engineer, Maintenance Planner, etc.)
2. Establish expectations from everyone engaged in this process
3. Define end goal of this process
4. Examples:
    - Reduction is Equipment Problems by “X” percent
    - Less stress of reactivity
    - Make PM #1 Priority
5. Define Roles and Responsibilities for all members of the PMO Team
6. Define the criteria for how to evaluate the PMs
7. Present copies of PMs to all parties

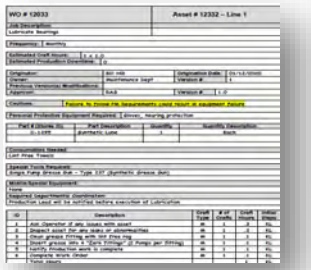


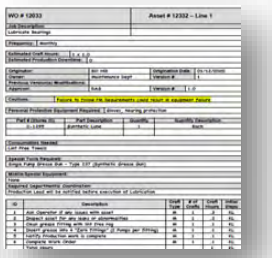
Preventive Maintenance

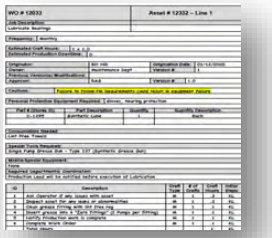
“Roles and Responsibilities”

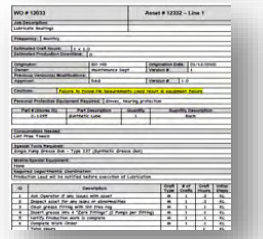
Task ⬇ Position ➡	Maint Mgr.	Rel Engr.	Maint Sup.	Maint Techs	Maint Planner	Prod Mgr.	Plant Mgr.
Create / Manage Asset Criticality	C	R	C	I	I	C	A
ID all Components	A	R	C	R	C	R	I
ID how each Component will Fail	A	R	C	R	R	C	
Write Repeatable PM Procedures	A	R	C	R	C	C	
Measure / Monitor PM Effectiveness	A	R	C	C	R	C	I
Modify PMs	A	R	R	R	C	C	I
Manage Maintenance Dashboard (Leading / Lagging KPIs)	A	R	R	I	C	I	I

Responsibilit	“the Doer”	(could be more than one)
Accountable	“the Buck stops here”	(One person only)
Consulted	“two-way communication”	(in the Loop)
Informed	“one-way communication”	(kept in the picture)









Steps of the PM Optimization Process, cont.

Step 8: Define the criteria for how you will measure if the PM Optimization Process effective or not

- **Define what the categories for the PMO (see the example below)**
- **Evaluate each task based on criteria below**

Example of a PM Evaluation

Line 104 - Current PM Tasks

1. Inspect Motor Coupling (2 hrs.)
2. Check motor for loose base (30minutes)
3. Electrician - Check electrical fittings for looseness (1 hour)
4. Mechanic - Lubricate 5 Bearings on Septet (2 hr.)
   - Wipe Zert Fitting off
   - Insert 3 grams of grease
   - Inspect area for any additional problems
5. Mechanic - Inspect V-Belt (2hrs)
6. Mechanic – Check for leaks on Hydraulic system (2 hours)
7. Operators – Line Running PM (4 hrs.)
8. 2 Mechanics - PM Conveyor System (6 hrs)

PM Task Action Recommendation	# of Tasks	% of Tasks	Man-Hours Represented
Non-Value Added (Delete)	★ 1	9%	12
Reassign to Operator Care	★ 2	18%	14
Replace with PdM	★ 3	27%	10
Re-Engineer	★ 2	18%	12
No Modifications Required	★ 3	28%	2
Totals	11	100%	19

Steps of the PM Optimization Process, cont.

Step 9: Rewrite PMs or write new PMs

- Identify your Best Maintenance Technician to lead this process
- Maintenance Supervisor and I – 2 technicians
- Identify the Asset or Line with the largest equipment problems (unsure? ask production)
- Have MODEL of what a "Good PM Looks Like"

PM Line 3

Equipment Block ID:	Plant 102 – Line 3
Equipment Hierarchy:	ES60XXX
Project Description:	Preventive Maintenance – Inspect Line 3 Shear Pins
Job Description:	PM Line 3
Frequency:	Monthly
Estimated Craft Hours:	1 x 1.0
Estimated Elapsed Time:	1.0
Estimated Production Downtime:	
Originator:	Dave Smith
Origination Date:	01/12/2020
Owner:	Maintenance Dept
Version #:	1
Previous Version(s) Modifications:	
Approval:	DS
Version #:	1.0
Warnings:	Failure to Lockout/Tagout could result in Death or Serious Injury
Cautions:	Failure to follow PM Requirements can result in equipment failure
Personal Protective Equipment Required:	Gloves, face shield, hearing protection

Part # (Stores ID)	Part Description	Quantity	Quantity Description
ES – 31256	1/2" x 2" Gr. 5 socket head bolts	6	each

Consumables Needed:
Degreaser, paper towels
Special Tools Required:
2' pry bar ½" torque wrench
Mobile/Special Equipment:

PM Line 3

Required Departmental Coordination:
Production shutdown / position / blow off equipment
Other Procedures Referenced:
None

ID	Description	Craft	# of Crafts	Clock Hours	Craft Hours
1	Clean area to be inspected using compressed air or degreaser as required	Mech	1	0.2	0.2
	Warning: use face shield when blowing with compressed air				
	Warning: Ensure hydraulic pump drive motor is racked out: Jog test before proceeding				
2	Inspect shear pin plates	Mech	1	0.3	0.3
2-1	Visually check for cracks on shear pin plates Are any cracks evident Yes _____ No _____				
2-2	Insert 2' pry bar between plates to check for movement. Is any movement present? Yes _____ No _____				
3	Inspect sprocket	Mech	1	0.3	0.3
3-1	Visually inspect for: Cracks Yes _____ No _____ Broken Teeth Yes _____ No _____ Visible Signs of Wear? If indicated, report findings below and to immediate supervisor for appropriate actions				
4	Inspect retainer cap	Mech	1	0.2	0.2
4-1	Visually inspect for broken bolts Are there any broken bolts? Yes _____ No _____				
4-2	If broken bolts are found, replace as required Torque bolts to 80 ft. lbs				

PM Line 3

Condition (As Found):
Condition (As Left):
Comment(s):
Craft's Feedback on Procedures:
Craft's Signature(s):
Date:

Steps of the PM Optimization Process, cont.

Step 10: Monitor and measure to ensure New PMs are effective and adjust as needed

PM Compliance	# Breaks to PM Schedule	PM/PdM Yield	PM/PdM Overdue	# PMS Evaluate	#PMs Optimized	EM/Urgent Labor Hours	PM Hrs.	PM Cost	OEE
100%	13	7	42	0	7	234	48	$3k	78%
SMRP		SMRP						SMRP	SMRP

Step 11: Post results for all to see

Examples of Results

- **Reduction in equipment failures by 50%**
- **Reduction in Storeroom Stockouts by 40%**
- **Reduction in Stress for Everyone**
- **Stabilized production**
- **Etc.**

Step 12: Once concept has been proven move to the next asset/area

How to Improve your Current PM Program

Step 1: Educate Your Staff

"Knowledge is the foundation of any and all skills"

Tool-Box Talk

Preventive Maintenance 101

Preventive Maintenance - Actions performed on a time- or machine-run-based schedule that detect, preclude, or mitigate degradation of a component or system with the aim of sustaining or extending its useful life through controlling degradation to an acceptable level. (Definition Source: SMRP Best Practices)

Fundamentals of PM

1. All Equipment PMs are focused on specific "Failure Modes"
2. All PM Procedures should have the following:
   - Step by Step Instructions (initial each step)
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3. When a PM Work Order is given to Maintenance Techs the following should be attached:
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5. Post the following metric in Maintenance Shop on a line graph
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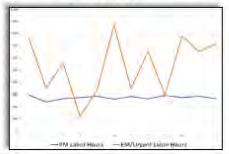

Steps to take if PMs are not Effective or meeting expectations

Step 1: Acknowledge you have a problem with your PM Program not meeting expectations

"you cannot solve a problem without admitting you have a problem"

Step 2: Assemble a team of Maintenance Techs, Maintenance Supervisor and operators

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Step 4: Identify the equipment experiencing the most losses, ie. OEE, Production loss, EM/Urgent Labor hrs., etc.

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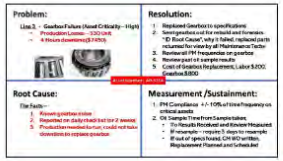


It is critical to manage Preventive Maintenance as a continuous improvement process which results in optimal equipment reliability if managed effectively.

Tool-Box Talk

Preventive Maintenance 102

Preventive Maintenance (PM) / Operator Care (OpCare) is conducted by both trained and task qualified Maintenance Technicians and Production Operators with step by step instructions.

Preventive Maintenance Vision Statement

A Holistic Integrated Approach that Identifies and Mitigates Defects That reduces Unscheduled Downtime and Reduces Total Cost of Ownership

Preventive Maintenance Mission Statement

Preventive Maintenance is a controlled experiment with execution to specifications resulted in a desired outcome.

"Optimal Reliability at Optimal Cost"

Preventive Maintenance Guiding Principles

1. Preventive Maintenance is the most important routine function that maintenance personnel must accomplish to specifications
2. Preventive Maintenance must meet expectations of Production consistently (*Optimal Process Reliability*)
3. Everyone (operators and maintainers) are trained in Maintenance Best Practices

4. PM is executed to specifications
   a. Ex: Tension? Deflection? good/bad? etc.
5. PM inspections are conducted by trained individuals
6. Defects found on a PM results in a Corrective Work Order to be planned and scheduled to correct/eliminate defect
7. The inspector's initials are posted after each step in a PM Inspection
8. If any equipment does not meet the functional requirements set by management a Root Cause Analysis is conducted by stakeholders.

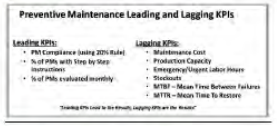
"You cannot perform PM on Equipment that is not in a Maintainable condition"

Preventive Maintenance Ishikawa (Fishbone)

Preventive Maintenance Dashboard

"You cannot Manage what you do not Measure"

Using the right metrics in an organized manner will allow management to control the equipment without the equipment controlling management



In order to ensure an organization to ensure their data is accurate the Maintenance Planner should close the work order into the CMMS/EAM.

Tool-Box Talk

Preventive Maintenance 103

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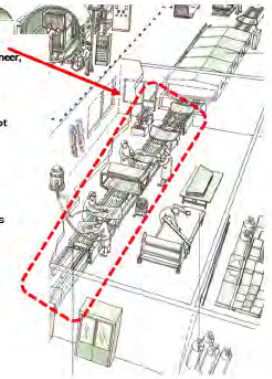

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Measure the Outcome of the PM Optimization Process with PM KPIs

Preventive Maintenance Leading and Lagging KPIs

www.worldclassmaintenance.org

How to Improve your Current PM Program, Cont.

Step 2: QA/QC PM Execution

- Visit the job site
- Ask questions
  - Does the PM look effective to them?
  - Any ideas how we may improve it?
  - What is your biggest issue with PMs?
- Post PM Effectiveness (PM hrs. vs EM Labor hrs.)

How to Improve your Current PM Program, cont.

Step 3: Perform a PM Evaluation

PM Task Action Recommendation	# of Tasks	% of Tasks	Man-Hours Represented
Non-Value Added (Delete)	1,640	8.2%	6,661
Reassign to Operator Care	1,380	6.9%	5,605
Reassign to Lube Route	2,856	14.3%	11,600
Replace with PdM	6,437	32.2%	28,222
Re-Engineer	5,200	26.0%	26,221
No Modifications Required	2,487	10.4%	8,987
Totals	20,000	100.0%	87,297

How to Improve your Current PM Program, cont.

Step 4: Re-write your PMs focused on Failure Modes

Table B.5- Rotating equipment - Failure modes

Equipment class (see Table A.4) [a]								Failure modes			
Combustion engine	Compressor	Electric generator	Electric motor	Gas turbine	Pump	Steam turbine	Turbo expander	Description	Examples	Code [b]	Type [c]
X	X	X	X	X	X	X	X	Fail to start on demand	Doesn't start on demand	FTS	1
X	X	X	X					Fail to stop on demand	Doesn't stop on demand	STP	1
X	X	X	X	X	X	X	X	Spurious stop	Unexpected shutdown	UST	2
X	X	X	X	X	X	X	X	Breakdown	Serious damage (seizure, breakage)	BRD	3
X	X		X	X	X	X	X	High output	Overspeed/output above acceptance	HIO	2
X	X	X	X	X	X	X	X	Low output	Delivery/output below acceptance	LOO	2
X	X		X	X	X	X	X	Erratic output	Oscillating, hunting, instability	ERO	2
X				X		X		External leakage - fuel	External leakage of supplied fuel/gas	ELF	3
	X			X	X	X	X	External leakage process medium	Oil, gas, condensate, water	ELP	3
X	X	X	X	X	X	X	X	External leakage utility medium	Lubricant, cooling water	ELU	3

How to Improve your Current PM Program, cont.

Step 4 Cont.

NOTE: Re-Write Your PMs so they are Repeatable

Written Procedures

NORA STANDARD PROCEDURES

Sampling Procedure NSP-S-002.01

Drain Port Location

General Considerations

Sampling Procedure Drain-Port Location

Material Requirements for Obtaining a Sample

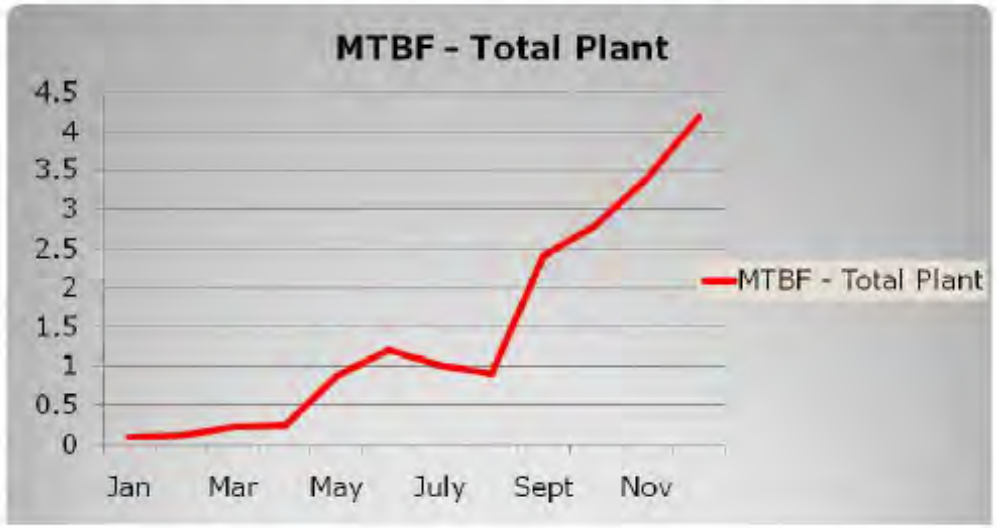
Sampling Procedure

- Clearly Define Best Practice
- Consistency and Continuity
- Reinforce Best Practice
- Define Training and Certification
- Enable Quality, Safety and Environmental Compliance

How to Improve your Current PM Program, cont.

Step 5: Begin measuring PM Effectiveness and Efficiency

- **Effectiveness: Mean Time Between Failure**



- **Efficiency: PM Compliance using the "10% Rule of PM"**

Minimum Requirements for an Effective PM Procedure

1. Repeatable Process
2. Equipment Status, “Running or Shutdown”
3. Procedure steps minimum…
   - Noun, adjective, and verb
4. Step by Step Instructions (initials of inspector for each step)

   “If a step in a Process is skipped it creates defects known as failures”
4. Specifications
5. Pictures preferred --- “Good” or “Bad”, “Yes” or “No”, etc.

PM Procedure Example

PM Line 3

Equipment Block ID:
Plant 102 – Line 3

Equipment Hierarchy:
ES60XXX

Project Description:
Preventive Maintenance – Inspect Line 3 Shear Pins

Job Description:
PM Line 3

Frequency:	Monthly

Estimated Craft Hours:	1 x 1.0	Estimated Elapsed Time:	1.0
Estimated Production Downtime:			

Originator:	Dave Smith	Origination Date:	01/12/2020
Owner:	Maintenance Dept	Version #:	1
Previous Version(s) Modifications:			
Approval:	DS	Version #:	1.0

Warnings:	Failure to Lockout/Tagout could result in Death or Serious Injury
Cautions:	Failure to follow PM Requirements can result in equipment failure

Personal Protective Equipment Required:	Gloves, face shield, hearing protection

Part # (Stores ID)	Part Description	Quantity	Quantity Description
ES - 31256	1/2" x 2" Gr. 5 socket head bolts	6	each

Consumables Needed:
Degreaser, paper towels

Special Tools Required:
2' pry bar ½" torque wrench

Mobile/Special Equipment:

PM Line 3

Required Departmental Coordination:
Production shutdown / position / blow off equipment

Other Procedures Referenced:
None

ID	Description	Craft	# of Crafts	Clock Hours	Craft Hours
1	Clean area to be inspected using compressed air or degreaser as required	Mech	1	0.2	0.2
	Warning: use face shield when blowing with compressed air				
	Warning: Ensure hydraulic pump drive motor is racked out; Jog test before proceeding				
2	Inspect shear pin plates	Mech	1	0.3	0.3
2-1	Visually check for cracks on shear pin plates Are any cracks evident Yes _____ No _____				
2-2	Insert 2' pry bar between plates to check for movement. Is any movement present? Yes _____ No _____				
3	Inspect sprocket	Mech	1	0.3	0.3
3-1	Visually inspect for: Cracks Yes _____ No _____ Broken Teeth Yes _____ No _____ Visible Signs of Wear? If indicated, report findings below and to immediate supervisor for appropriate actions				
4	Inspect retainer cap	Mech	1	0.2	0.2
4-1	Visually inspect for broken bolts Are there any broken bolts? Yes _____ No _____				
4-2	If broken bolts are found, replace as required Torque bolts to 80 ft. lbs				

PM Line 3

Condition (As Found):

Condition (As Left):

Comment(s):

Craft's Feedback on Procedures:

Craft's Signature(s):

Date:

Preventive Maintenance Problems / Solutions

"Insanity: Performing PM on equipment that continues to break down"

PM Activities	PM Metrics	Possible Problem	Possible Solution
Inspection	PM Effectiveness (MTBF)	• PMs Not focused on Failure Modes • Ineffective measurements • No step by step procedure • No verification PM completed to specifications • Personnel not following procedure	• Engage Maintenance Techs in evaluating PMs • Post line graph: PM labor hrs. vs EM/Urgent labor hrs.
Lubrication	PM Compliance (Using the 10% Rule)	• Measurements with high variation • Lack of training in Best Practices • No oversight by Maintenance Leadership	• Determine type and amount of grease required • Inspect lubrication process
Time Based Change Out	Schedule Compliance (by day by hour)	• Asset unavailability • Maintenance Planning and Scheduling not effective	• Planning and Scheduling training for planners and leadership
Operator Care	PM Compliance (by shift) PM Effectiveness	• No specifications on PM • Lack of Reporting for corrective action • Lack of Management support	• Measure effectiveness of PM Compliance of Operator Care

"Chaos will rule until we align everyone with the same vision"

Preventive Maintenance Roles and Responsibilities

Task / Position	Maintenance Planner	Maintenance Supervisor	Maintenance Manager	Reliability Engineer	Maintenance Technician	Plant Mgr.
PM Program Design	I	C	A	R	C	I
PM Procedure Effectiveness	C	R	A	R	R	
PM Execution	I	R	A	C	R	
PM Leading and Lagging KPIs	R	C	A	C	I	I
PM Optimization	C	C	A	R	R	I
PM Procedure Creation	I	C	A	C	R	

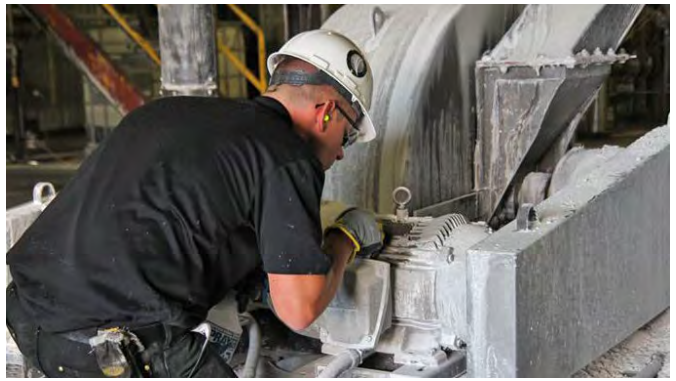
Responsibility	"the Doer"
Accountable	"the Buck stops here
Consulted	"in the Loop"
Informed	"kept in the picture"

Preventive Maintenance Scorecard

100% PM Compliance	16 Breaks to Schedule	↑ Maintenance Cost	↑ Emer/Urgent Labor Hrs	0 PMs Evaluated

QA Inspection of PM Execution by Supervisor

- Execute an unannounced visit to a job site where PM is currently being performed
- Ask question “Does the PM look accurate and is it effective or does it need changes”
  - Issues they may see could be:
    - PM Steps are too long (require on Noun, Adjective, Verb)
    - PM does not match the asset
    - Nothing ever found on the PM
  - Listen, listen, and do not reply immediately to any statement, think about what the techs are telling you



Requirements for Rewriting/Writing a PM so it is Repeatable

WO # 12033	Asset # 12332 – Line 1
Job Description:	
Lubricate Bearings	

Frequency:	Monthly

Estimated Craft Hours:	1 x 1.0
Estimated Production Downtime:	0

Originator:	Bill Hill	Origination Date:	01/12/2020
Owner:	Maintenance Dept	Version #:	1
Previous Version(s) Modifications:			
Approval:	RAS	Version #:	1.0

Cautions:	Failure to follow PM Requirements could result in equipment failure

Personal Protective Equipment Required:	Gloves, hearing protection

Part # (Stores ID)	Part Description	Quantity	Quantity Description
C-1395	Synthetic Lube	1	Each

Consumables Needed:
Lint Free Towels

Special Tools Required:
Single Pump Grease Gun - Type 237 (Synthetic Grease Gun)

Mobile/Special Equipment:
None
Required Departmental Coordination:
Production Lead will be notified before execution of Lubrication

ID	Description	Craft Type	# of Crafts	Craft Hours	Initial Steps
1	Ask Operator if any issues with asset	M	1	.3	KL
2	Inspect asset for any leaks or abnormalities	M	1	.3	KL
3	Clean grease fitting with lint free rag	M	1	.1	KL
4	Insert grease into 4 "Zerk fittings" (2 Pumps per fitting)	M	1	.1	KL
5	Notify Production work is complete	M	1	.1	KL
6	Complete Work Order	M	1	.1	KL
	Total Hours			1	KL

Condition (As Found): (Required)

Leaks coming from #1 Gearbox

Condition (As Left): (Required)

Clean up oil, notified production leader to keep area clean of oil

Comment(s): (Optional)

None

Craft's Feedback on Procedures: (Optional)

All Good

Craft's Signature(s): (Required)

Jim Jimbo

Date:

10/11/2019

- Clearly Define Best Practice
- Consistency and Continuity
- Reinforce Best Practice
- Define Training and Certification
- Enable Quality, Safety and Environmental Compliance

Re-Writing PMs

Step 1	Assemble a cross-functional team
Step 2	Provide PMs on for first Asset (preferable one with problems)
Step 3	Review work order failure history for past 30-60-90 days
Step 4	Provide a Template for rewriting a PM
Step 5	Rewrite PM based on specific criteria

Measuring Effectiveness of PMs

Step 1: Measure PM Effectiveness based on specific KPIs

Step 2: Establish a baseline for each metric

Step 3: Ensure the PM Scorecard is visible for all technicians and maintenance leadership to see

Step 4: For the next 6 months review with Maintenance Leadership and Production once a month

PM Procedure Example

Without a Repeatable Procedure you have everyone doing what they think it right.

PM Line 3

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Mobile/Special Equipment:

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PM Line 3

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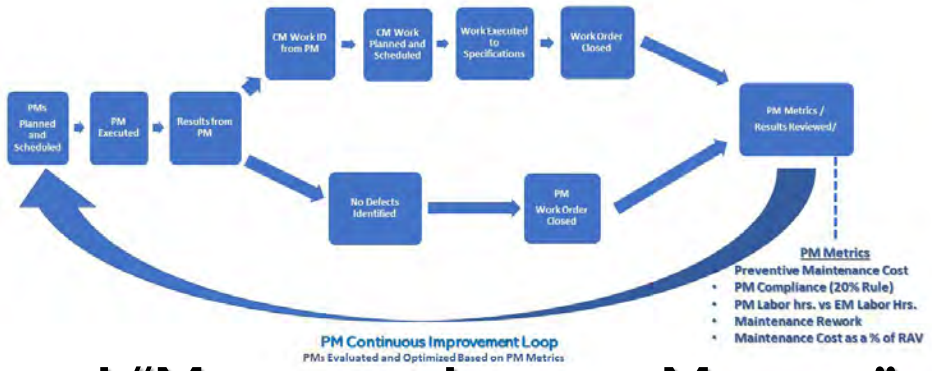
Condition (As Left):
Comment(s):
Craft's Feedback on Procedures:
Craft's Signature(s):
Date:

Steps to Change your PM Program

1. Use one of the Tool-Box Talks to educate leadership and techs
2. Create a plan using the crawl, walk, run methodology

3. Create a Simple PM Process if you do not have one



4. Create PM Dashboard "Measure what you Manage"

QUESTIONS?

Join December 8-10 for “Best Maintenance Technician Repair Practices”

Interested? Email me at rsmith@worldclassmaintenance.org