

WRITING REPEATABLE/ EFFECTIVE CORRECTIVE MAINTENANCE AND PREVENTIVE MAINTENANCE PROCEDURES

BY: **RICKY SMITH, CMRP,
CMRT, CRL**



PM Procedure Example

Equipment Block ID:
Line 101

Equipment Hierarchy:
E56000 Septet Process Line

Project Description:
Perform PM on Septet Process Line

Job Description:
Perform PM on Hydraulic System

Frequency: Monthly

Estimated Craft Hours: 2 techs x 3.0 hrs | Estimated Elapsed Time: 3.0
Estimated Production Downtime: 3.0

Originator: Dave Stone | Origination Date: 03/12/2012
Owner: Plant Maintenance | Version #: 1.0
Previous Version(s) Modifications:
Approval: DS | Version #: 1.0

Warnings: Failure to follow instructions could lead to death or serious injury
Cautions: Failure to follow procedure could result in early equipment failure

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

Part # (Stores ID)	Part Description	Quantity	Quantity Description
#B3214	Hydraulic Filter	2	Each
#B2543	Zinc Anode	1	Each

Consumables Needed:
Degreaser, lint free towels, thread seal

Special Tools Required:
1/2" Torque Wrench

Mobile/Special Equipment:
None

Required Departmental Coordination:
Production Line shutdown / Hydraulic Cylinder Extended / One Operator to Assist Maintenance
Other Procedures Referenced:
Job Preparation / Lockout Procedure #XXX

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Step#	Description	Craft	# of Crafts	Clock Hours	Craft Hours	Craft Initials
1	Inspect Hydraulic System Running • Does the Pressure Fluctuate more than 5psi? Yes / No • Number of Hydraulic Leaks	Mech	2	.5	1.0	
2	Inspect/Service Hydraulic System	Mech	2	.25	.5	
2	Clean inside Reservoir with Lint Free Rags	Mech	2	1.0	2.0	
3	Replace Hydraulic Filters (2)	Mech	1	0.3	0.3	
4	Torque Fasteners on Filter Fasteners to (
4	Replace Zinc Anode on Water Cooled Heat Exchanger	Mech	1	.5	.5	
5	Inspect 5 Hydraulic Hoses for wear or leaks • Hose 1.1 Yes / No • Hose 1.2 Yes / No • Hose 1.3 Yes / No • Hose 1.4 Yes / No	Mech	2	1	2	
6	Inspect Hydraulic Cylinder for Leaks • Inspect Rod Seal for Leaks (Circle One) - No Leaks - Weeping Oil - Oil Stream • Inspect Rod Yoke for break in thread seal on threads Breaks? Yes / No	Mech	1	0.3	0.3	
7	Inspect all work after production is up to rate "Do not leave equipment until production is up to rate"	Mech	2	.5	1.0	
TOTAL Hours				4.35	7.0	

Condition (As Found):

Condition (As Left):

Page 2 of 3

Comment(s) / Findings:

Craft's Feedback on Procedures:

Craft's Signature(s):

Date:

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Why Companies do not use Preventive Maintenance and Corrective Maintenance Procedures?

1. Organizations have never seen an “Effective Procedure Looks Like” and their value
2. Lack of Knowledge in Preventive / Corrective Maintenance Best Practices
3. The Maintenance Culture is Reactive
4. Organizations feel Repeatable Procedures are not needed – Techs are experienced know what they are doing
5. Techs feel they know how to perform maintenance work correctively without specifications
6. Overnight deliveries sit for weeks, months
7. Everyone works as hard as they can with little if any movement seen toward proactive
8. Storeroom is Chaos (people standing in line at 7:00am waiting on parts)
9. Storeroom has excess inventory “just in case”
10. Maintenance Rework is high however no one can determine the true “Root Cause of Rework”
11. No one knows there is a problem (no scoreboard)



Procedure Based Maintenance

By: Jack R. Nicholas, Jr., P.E., CMRP of MQS LLC

- In the field of maintenance, the traditional approach has been to rely upon the intuitive knowledge and skill of the crafts-persons who conduct it.
- There is a great deal of pride of workmanship and, in all too many organizations, a great deal of psychic income in addition to significant overtime pay for successful emergency repairs to return equipment to operation after unplanned shutdowns.
- There is a mystique that accompanies all of this that many skilled crafts-person would like management to believe firmly.
- That is that there are too many variables in maintenance, making compliance with written procedures impossible and impractical; that the “way we’ve always done it” is the best and only way to conduct maintenance.
- This idea spills over into preventive maintenance, also. Crafts-persons believe that their own intuitive knowledge is preferable to a written procedure and/or a thoroughly defined checklist

Procedure Based Maintenance

By:
Jack R. Nicholas, Jr., P.E., CMRP of MQS LLC

Abstract

This paper introduces a compelling argument for development of and adherence to procedure based maintenance when implementing and executing a modern program to ensure maximum capacity of a plant and reliability of its equipment. The argument is based on a new analysis of four (4) statistically significant failure profile distribution studies over the period of the last 40 years, the latest of which was completed in 2001. While all of the studies involve failure profiles in mobile platforms (two for commercial aircraft, and one each for surface warships and nuclear powered attack submarines) the conclusions that can be drawn from them apply equally to fixed facilities, commercial transportation systems and utility infrastructures of all types. It also applies to categories of equipment such as motors. The author will estimate the odds of ensuring a decline in reliability by assuming what we used to think were “truisms” about failure profiles in equipment. Several case studies are included to emphasize how these findings cross over to manufacturing, utility, and government equipment and systems.

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Cost of NOT Using Repeatable Procedures

TABLE 7.2. Maintenance Costs in Typical and World-Class Companies

Metric	Typical	World Class
<u>Maintenance cost/replacement asset value</u> Maintenance cost must include labor (including overtime), materials, contract maintenance, and capital replacements, and maintenance (replacing worn-out assets because they were never properly maintained)	3.5-9%	2.0-3.0%
<u>Maintenance materials cost/replacement asset value</u> Maintenance materials cost must include material in storeroom stock plus material in other locations (maintenance shop, plant floor, etc.)	1.0-3.5%	0.25-0.75%

Rework is corrective work done on previously maintained equipment that has prematurely failed due to maintenance, operations or material problems. The typical causes of rework are maintenance, operational or material quality issues. –Source: SMRP Metrics

Attributes of a Typical organization vs a World Class Maintenance Organization

Typical Maintenance Organization Attributes

- 1 All Maintenance work is not captured by a Work Order
- . Maintenance Work is based on a Techs knowledge
- 2 Maintenance Procedures are not repeatable
 - Example: Check Chain Drive?
- 3 • Example: Lubricate Bearings
4. Maintenance Rework is high

World Class Maintenance Organization Attributes

1. All Planned and Scheduled Maintenance Work using repeatable procedures
2. When repeat failures occur Maintenance Procedures are analyzed to determine Root Cause of the problem
3. Maintenance Rework is minimal and controlled
4. Maintenance Cost is controlled



Human Induced Failures

80% of equipment failures are human-induced, meaning the failure was caused by the actions of people.

Examples of Human Induced Failures:

- Repairs are not made with a repeatable procedure, so everyone does it a little (or a lot) differently, creating uncontrolled deviation to the reliability of the equipment.
 - Mechanic #1 Lubricates an asset and follows a repeatable procedure and does the job the right way; Resulting Mean Time Between Failure (MTBF) far exceeds expectations.
 - Mechanic #2 lubricates the same equipment without a procedure, and just does it like he always has, not knowing the proper contamination control method; MTBF is out of control, but no one knows it because it is not measured.

Table 1: Cut 'em down at the roots

Bearings	
Problem	Root cause
Bearing failure due to contamination of grease with dirt, dust or silica	Failure to wipe grease fitting or the end of the grease gun nozzle clean
Bearing failure due to contamination of grease by dirt, dust or silica	Seal not holding due to over-lubrication
Bearing failure due to lubricant not providing barrier to prevent metal-to-metal contact	Wrong grease/oil or heat-reduced viscosity due to temperature rise beyond range of lubricant
Gear reducers	
Problem	Root cause
Failed bearings and damaged gear teeth due to contamination causing interference between gears, thus overloading bearings	Gear oil added to gearbox through a dirty funnel or dirty container or bucket
Failed bearings due to contamination of lubricant with dirt, dust or silica	Seal leaking due to over-pressurization of gearbox caused by blocked air intake on housing
Electric motors	
Problem	Root cause
Bearing failure due to contamination of the grease with dirt, dust or silica	Failure to wipe grease fitting or the end of the grease gun nozzle clean
Bearing failure due to contamination of the grease with dirt, dust or silica	Seal not holding due to over-lubrication
Windings failed because of grease buildup inside the motor	Relief plug not removed before introducing grease into zerck fitting
Windings failed because of grease buildup inside the motor	Sealed bearings – grease cannot enter the bearing



Question?

Text in “1” Human Induced Failure”
you have seen/experienced



Indicators of Human-Induced Failures

Have you seen any of the following issues? If you have, you are likely to have a serious problem with human induced-failures.

- Lubricating electric motors without removing the relief plug
- Welding on equipment without grounding close to the welded area
- Excessive Equipment failures occur without a known root cause resulting loss capacity
- Operators not operating the equipment to specifications; people are allowed to do their own thing, costing the company millions
- Zinc anodes are not replaced on water cooled heat exchangers, causing tube damage and water intrusion into oil
- Maintenance personnel making quick repairs and not returning to restore later
- No Repeatable Procedures



Over-Torque



Improper Lubrication

"Repeatable Procedure Example"

NO REPEATABLE PROCEDURE

Baseline KPIs/ Metrics Before Creating New or Updating Current Procedures

1. Create a team to assist in creation of a Maintenance Dashboard to measure effectiveness of the new metrics –2 Maintenance Technicians, Maintenance Supervisor, Maintenance Manager, Production Leader, Storeroom Manager
2. ID which *current* metrics will be influenced through creating more effective procedures
3. Identify 4-5 metrics to create a KPI Dashboard to ensure “New Procedures” are effective
4. Post dashboard for all to see, as one enters the plant, in maintenance shop, etc.



What is Required of a Repeatable Procedure? (Page 1)

Preventive Maintenance Procedure Example

Equipment Block ID:			
Line 101			
Equipment Hierarchy:			
ES60XXX Septet Process Line			
Project Description:			
Perform PM on Septet Process Line			
Job Description:			
Perform PM on Hydraulic System			
Frequency: Monthly			
Estimated Craft Hours:	2 techs x 3.0 hrs	Estimated Elapsed Time:	3.0
Estimated Production Downtime:	3.0		
Originator:	Dave Stone	Origination Date:	03/12/2012
Owner:	Plant Maintenance	Version #:	1.0
Previous Version(s) Modifications:			
Approval:	DS	Version #:	1.0
Warnings:	Failure to follow instructions could lead to death or serious injury		
Cautions:	Failure to follow procedure could result in early equipment failure		
Personal Protective Equipment Required: Gloves, face shield, hearing protection			
Part # (Stores ID)	Part Description	Quantity	Quantity Description
#B3214	Hydraulic Filter	2	Each
#B2543	Zinc Anode	1	Each
Consumables Needed:			
Degreaser, lint free towels, thread seal			
Special Tools Required:			
½ "Torque Wrench			
Mobile/Special Equipment:			
None			
Required Departmental Coordination:			
Production Line shutdown / Hydraulic Cylinder Extended / One Operator to Assist Maintenance			
Other Procedures Referenced:			
Job Preparation / Lockout Procedure #XXX			

1. Equipment Block ID
2. Equipment Hierarchy
3. Project Description (PM, CM, Etc.)
4. Job Description
5. Frequency (if a time-based PM Or Time Based Changeout
6. # Craft and Total Hours required
7. Origination Date and Version
8. Warnings / Cautions
9. PPE
10. Parts or Material, quantity and part number
11. Consumables
12. Special Tools
13. Mobile or Special Equipment
14. Shutdown or Coordination required

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What is Required of a Repeatable Procedure? (Page 2)

Preventive Maintenance Procedure Example

Step#	Description	Craft	# of Crafts	Clock Hours	Craft Hours	Craft Initials
1	Inspect Hydraulic System Running • Does the Pressure Fluctuate more than 5psi? Yes / No • Number of Hydraulic Leaks _____	Mech	2	.5	1.0	JR
2	Lockout/Tagout Hydraulic System Caution: Failure to Clean inside reservoir will result in premature valve failure	Mech	2	.25	.5	JR
2	Clean inside Reservoir with Lint Free Rags	Mech	2	1.0	2.0	JR
3	Replace Hydraulic Filters (2)	Mech	1	0.3	0.3	JR
4	Torque Fasteners on Filter Fasteners to (12 Ft Lbs).					
4	Replace Zinc Anode on Water Cooled Heat Exchanger	Mech	1	.5	.5	JR
5	Inspect 5 Hydraulic Hoses for wear or leaks • Hose 1.1 Yes / No • Hose 1.2 Yes / No • Hose 1.3 Yes / No • Hose 1.4 Yes / No	Mech	2	1	2	JR
6	Inspect Hydraulic Cylinder for Leaks • Inspect Rod Seal for Leaks (Circle One) - No Leaks - Weeping Oil - Oil Stream • Inspect Rod Yoke for break in thread seal on threads Breaks? Yes / No	Mech	1	0.3	0.3	JR
7	Inspect all work after production is up to rate <small>"Do not leave equipment until production is up to rate"</small>	Mech	2	.5	1.0	
TOTAL Hours				4.35	7.0	

Condition (As Found):
3 leaking hoses

Condition (As Left):

Clean reservoir and area, , tightened hose fittings

1. Procedure Steps
2. Description for each step, to include:
 - “RED” Warnings and “YELLOW” Cautions
 - Steps to follow along with action items
 - Quantitative Values (Ft Lbs.)
 - Subjective Values (Yes/No)
 - Subjective Values (No Leaks, Weeping Oil, Oil Stream)
 - “Inspect all work after production is up to Rate”
3. Craft Type, # of Craft, Craft Hours / Clock Hours, Initials
4. Sum of Total Hours

What is Required of a Repeatable Procedure? “Page 3”

Preventive Maintenance Procedure Example

Comment(s) / Findings:
3 leaking hoses, need to replace all 3 hoses and fittings, Rod Seal "Weeping Oil"?

Craft's Feedback on Procedures:
Need to add "clean outside reservoir"

Craft's Signature(s):
Jimmy Rogers
B. Dudley

Date: *December 21, 2020*

1. Comments / Findings for Planner and Supervisor for Possible Future Work
2. Craft Feedback on Procedures
3. Craft Signatures

A copy of a similar Procedure Template can be found at:
www.worldclassmaintenance.org



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Requirements for Writing a Procedure To Ensure Repeatability

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 rog	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

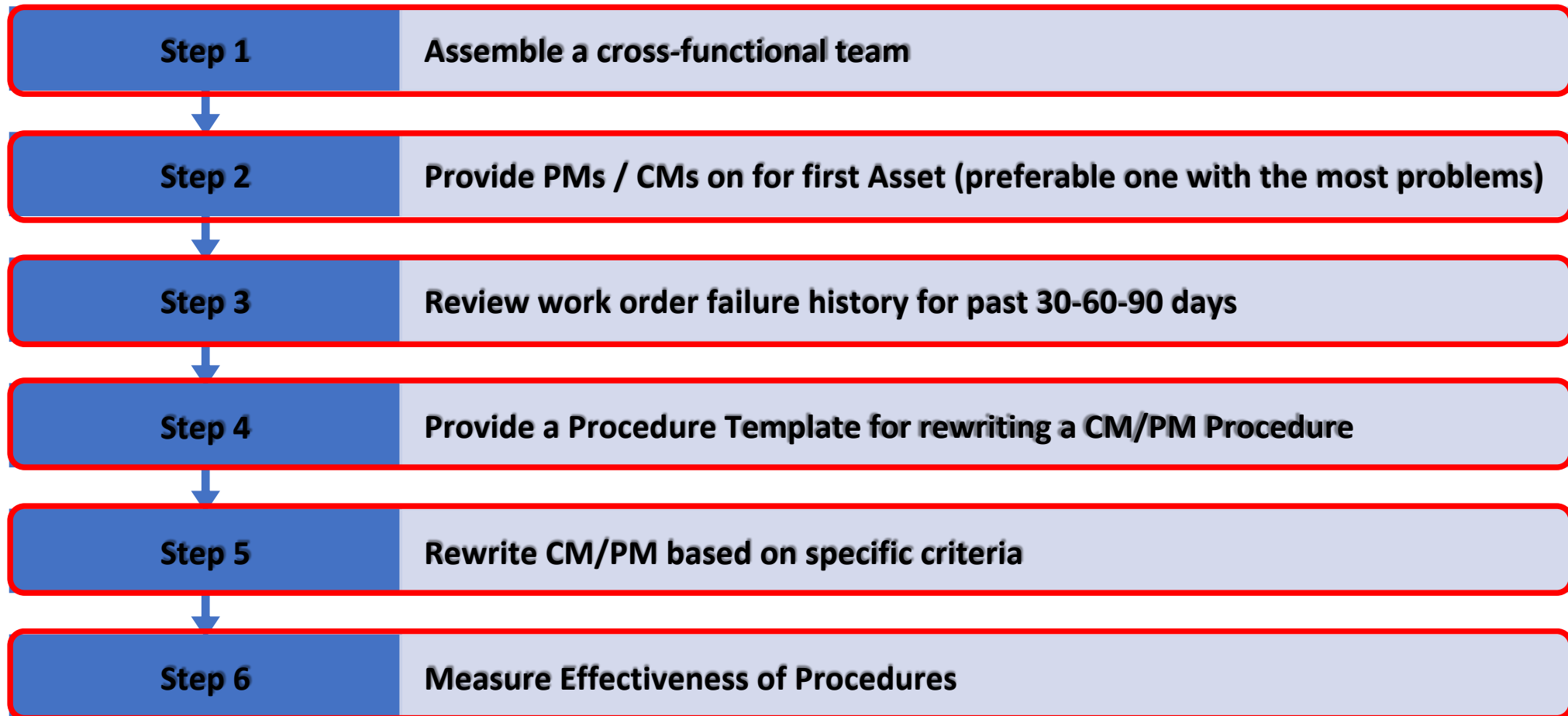
Craft's Feedback on Procedures: (Optional)
All Good

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

Steps to Write / Re-Write PM or CM Procedures



Maintenance Procedures Optimization

“Roles and Responsibilities”

Tasks Positions → Decisions ↓	Maintenance Manager	Maintenance Supervisor	Maintenance Planner	Maintenance Tech	Production Leadership
Assemble Cross Functional Team	A	R	R	R	C
Provide PMs / CMs on for first Asset (preferable one with problems and highest criticality)	A	C	R		I
Review work order failure history for past 30-60-90 days	A	R	R	R	C
Rewrite CM/PM based on specific criteria	A	R	C	R	I
Measure Effectiveness of New Procedures	A	R	R	R	I
Move to Next Asset	A	R	R	C	C

Responsibility
Accountable
Consulted
Informed

“the Doer” (Could be more than 1 person) “the Buck stops here” (One person only)
“in the Loop” (Two-way communication) “kept in the picture” (One-way communication)

Knowledge of Best Practices is a Requirement

Step 1: Education in Best Practices

• Best Maintenance Technician Practices

• PM Best Practices

• Single Point Lessons

Step 2: Write General Procedures

• Ex: Replace Electric Motor

• Ex: Replace Chain Drive

• PM Hydraulic System

• PM Conveyors

• Etc.

Step 3: Measure Effectiveness



Bearing Handling "TOOL BOX TRAINING"

Reference: SKF Bearing Installation and Maintenance Guide

General Rules which must be followed:
"If any of these rules are not followed they will result in reduced life of a bearing resulting in self-induced failure!"

- Always leave bearings wrapped in paper and sealed in their boxes until ready to use.
- Always use clean, lint free gloves to handle bearings
- Store bearings in their original sealed packages in a clean, dry area that is free of vibration
- Never use a bearing to check fit of a shaft or housing
- If the bearing is to be used in high or low temperature application or if the grease is not compatible with the bearing preservative then cleaning is required
- Always dry a bearing after cleaning
- Never allow a bearing to spin while drying it with clean, dry compressed air.
- Bearings must also be cleaned if they have been contaminated or you are changing to a different type of grease.
- Large bearings with thick preservative should be cleaned - outside diameter of 440 Millimeters or more
- Use clean solvent when cleaning a bearing
- Never rotate a bearing that is dry
- Bearings that have been previously greased and are sealed or shielded should not be cleaned

- #### Mounting Bearings
- If possible mount the bearings in a clean, dust free environment (even small contamination will cause premature failure)
 - Keep the bearing in a clean environment until sealed, cover with clean clothes
 - Use gloves. These are highly recommended and should only be used for installing bearing otherwise they would be kept in their sealed plastic bag

- Use the proper Handling and Installation Tool - if possible (these will help you reduce the chance of inducing a failure to a bearing during installation)

- When moving or lifting large bearings use lifting tackle they should not be suspended at a single point but use a steel band or fabric belt to wrap around the bearing. A spring between the hook and lifting shackle or sling. You can now install the bearing in a vertical position without damaging the bearing.
- When lifting a large bearing for installation in a horizontal manner threaded rods can be installed by SKF to facilitate installation of lifting eyes and should be lifted at three points.

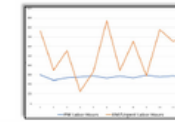
- Inspect the shaft clearances are within acceptable tolerances before installation a bearing. You can find this information online.

Single Point Lesson Preventive Maintenance Fundamentals

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

- All Equipment PMs are focused on specific "Failure Modes"
- 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
- When a PM Work Order is given to Maintenance Techs the following should be attached:
 - Equipment Failure history since last PM Executed
- If a piece of critical equipment fails between PM cycles an RCA should be initiated
- Post the following metric in Maintenance Shop on a line graph:
 - PM Labor Hours vs EM/Urgent Labor Hours



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: Create a PM Optimization Team - Assemble a team of Maintenance Techs, Maintenance Supervisor and operators for the team.

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)

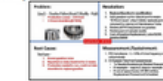
Step 4: Identify the equipment experiencing the most losses, i.e. OEE, Production loss, EM/Urgent Labor hrs., etc.

Step 5: Implement PM Optimization Process on the first asset or area. (review Tool Box Talk - 103 PM Optimization)

Step 6: Post a Dashboard to measure progress and effectiveness of the Program



Step 7: Create a PM Problem/Solutions Board using the A3 Approach to problem solving



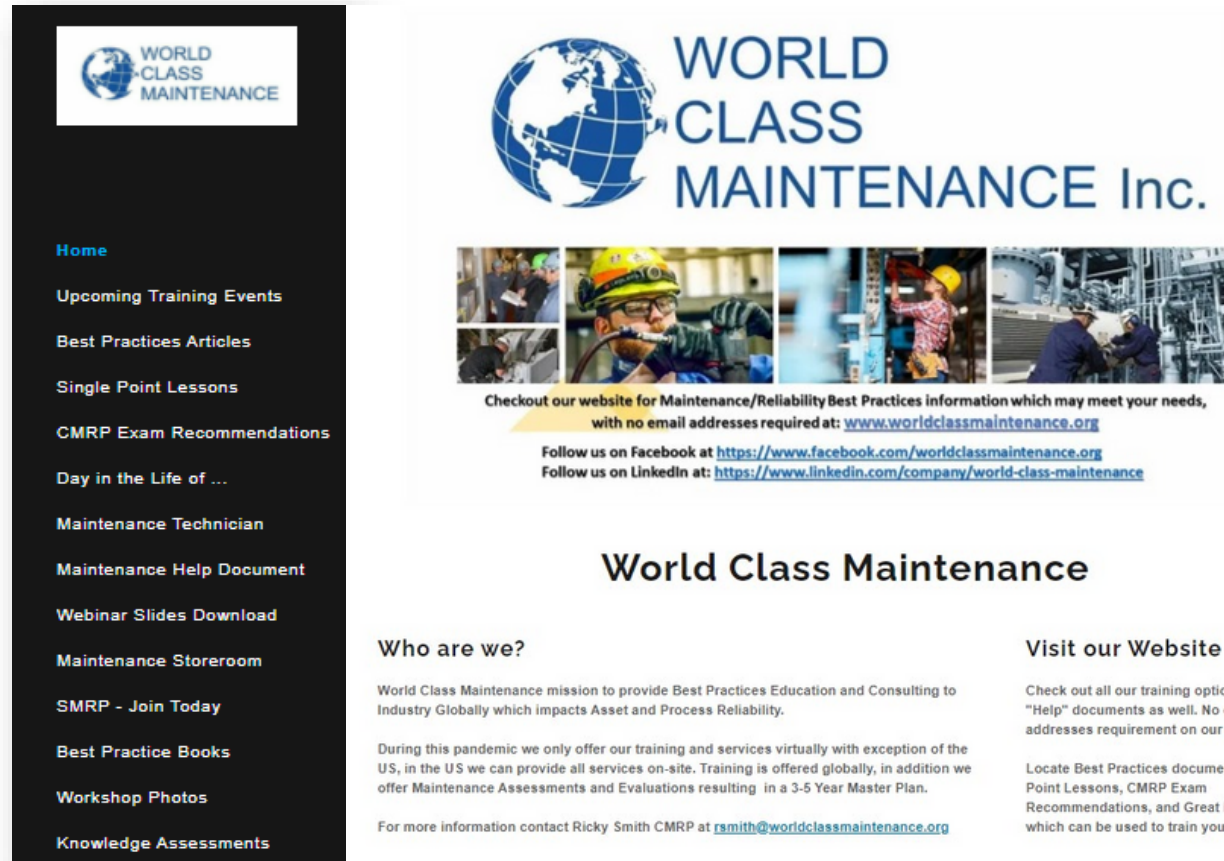
PM Procedure Example

Step	Description	Cost	# of Cops	COG	COG	COG	COG
				Cost	Time	Hours	Minutes
1	Inspect Hydraulic System Running • Use the Pressure Procedure • Number of Hydraulic Leaks	None	2	3.0	3.0	3.0	3.0
2	Check Filters to Cleanable reservoir will result in pressure with filter	None	2	20	3	3	3
3	Check Inlets Reservoir with Last First Steps	None	2	1.0	2.0	2.0	2.0
4	Replace Hydraulic Filter (2) • Filter Pressure on Filter Assembly to 1.5 • Replace O-Ring on Filter Control Valve Assembly	None	1	0.5	0.5	0.5	0.5
5	Inspect & Adjust Pressure For each valve • Head 1.0 • Head 2.0 • Head 3.0 • Head 4.0	None	1	1	1	1	1
6	Inspect Hydraulic Cylinder for Leaks • Inspect Rod Seal for Leaks (Check One) • Oil Leaks • Wiping Oil • Oil Leaks	None	1	0.5	0.5	0.5	0.5
7	Inspect Rod Seal for Leak in Thread seal on Thread Seal • Oil Leaks	None	2	3	3.0	3.0	3.0
				4.05	7.0	7.0	7.0

Questions?

Checkout my website for free Proactive Maintenance Information to include
“Procedure Templates”

www.worldclassmaintenance.org



The screenshot shows the homepage of World Class Maintenance Inc. On the left is a dark sidebar with a white header containing the logo. The sidebar lists navigation options: Home, Upcoming Training Events, Best Practices Articles, Single Point Lessons, CMRP Exam Recommendations, Day in the Life of ..., Maintenance Technician, Maintenance Help Document, Webinar Slides Download, Maintenance Storeroom, SMRP - Join Today, Best Practice Books, Workshop Photos, and Knowledge Assessments. The main content area features the logo, a row of four photos showing maintenance workers, and a call to action: 'Checkout our website for Maintenance/Reliability Best Practices information which may meet your needs, with no email addresses required at: www.worldclassmaintenance.org'. Below this are social media links for Facebook and LinkedIn. The page title is 'World Class Maintenance'. There are two columns of text: 'Who are we?' describing the mission and services, and 'Visit our Website' listing available resources.

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World Class Maintenance

Who are we?

World Class Maintenance mission to provide Best Practices Education and Consulting to Industry Globally which impacts Asset and Process Reliability.

During this pandemic we only offer our training and services virtually with exception of the US, in the US we can provide all services on-site. Training is offered globally, in addition we offer Maintenance Assessments and Evaluations resulting in a 3-5 Year Master Plan.

For more information contact Ricky Smith CMRP at rsmith@worldclassmaintenance.org

Visit our Website

Check out all our training options and “Help” documents as well. No email addresses requirement on our website.

Locate Best Practices documents, Single Point Lessons, CMRP Exam Recommendations, and Great information which can be used to train your team.



#1 Software for Maintenance & Reliability Teams

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Mobile-first maintenance management and collaboration across all location, assets, and teams

"With nearly 340 different machines in our work environment, it's an impossible task to manually assign and track PM's. *With UpKeep we can schedule regular maintenance without overlapping tasks with other critical jobs.*"

★★★★★ Paul D, Health and Safety Coordinator



An end-to-end solution for remote condition-based monitoring

Connected and secure IoT sensors for real-time remote condition asset monitoring



DATAHUB
UpKeep

Integrated & Centralized Data Ecosystem for World Class Asset Operations

The only purpose built Asset Data Platform. Asset Focused ELT Solution for advanced analytics and integrated, real-time asset data.



The Maintenance Community Coalition was founded on the belief that working together will benefit everyone within our community

Committed to helping each other thrive in our individual professional journeys by sharing resources and expertise, granting scholarships, hosting events, and unlocking knowledge – always at no cost.

