

# "How to Reduce Total Maintenance Cost with a Few Simple Steps"

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# Questions? – Text in your answers

1. Do you consider your Maintenance is higher than it should be?
2. What is your number one problem in your organization?
3. Do you have a Maintenance Planner?
4. Do you have an effective CMMS with all maintenance work entered via a Work Order which is charged to an asset
5. Is your company reactive, proactive or do not know

# What is included in “Maintenance Cost”?

1. Maintenance Labor
2. Maintenance Material
3. Contract Maintenance
4. Maintenance Restoration
5. ???

# What impacts Maintenance Cost?

1. Reactive Maintenance
2. No Maintenance Planning and Scheduling
3. Ineffective Planning and Scheduling
4. Performing PM and Equipment continues to fail
5. Lack of Training for Maintenance Technicians
6. Maintenance Techs not performing work with a “Repeatable Procedure”
7. Maintenance Errors
8. No Maintenance Scorecard
9. Contractors not performing work to specifications
10. No one “verifying” or “providing oversight” of Contractor work if it is conducted to specifications

# How is Maintenance Cost Measured?

- Maintenance Cost as a % of Replacement of Asset Value
- Maintenance Material Cost as a % of Replacement of Asset Value
- Maintenance Training Cost as a % of Replacement of Asset Value
- Maintenance Contractor Cost as a % of Replacement of Asset Value

## Estimated Replacement Asset Value (ERV)

Also referred to as Replacement Asset Value (RAV), it is the dollar value that would be required to replace the production capability of the present assets in the plant.

Includes production/process equipment, as well as utilities, facilities and related assets. Does not use the insured value or depreciated value of the assets. Includes the replacement value of buildings

Source: SMRP Best Practices

# Maintenance Cost as a % of Replacement of Asset Value

## “Typical vs World Class Companies”

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

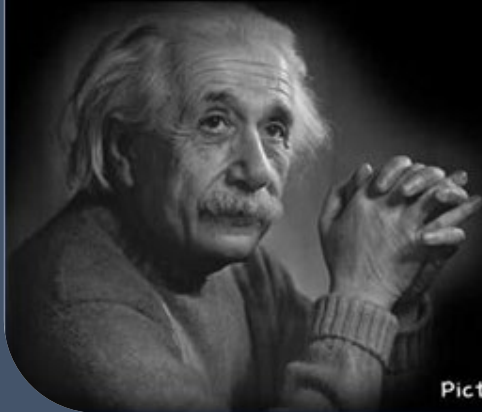
Metric	→ Typical	→ World Class
Maintenance cost/replacement asset value		
Maintenance cost must include labor (including overtime), materials, contract maintenance, and capital replacements, and maintenance (replacing worn-out assets because they were never properly maintained)	3.5–9%	2.0–3.0%
Maintenance materials cost/replacement asset value		
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%



Think about this...

If your current total Maintenance Cost is currently at \$10mm per year at 9% of RAV because maintenance is not in control, and you transition to proactive maintenance and your cost is now 3% of RAV your cost is now \$3,300,000”

**Insanity: doing the  
same thing over and  
over again and  
expecting different  
results.**



**Albert Einstein**

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# What would happen if you were to reduce Maintenance Cost?

1. Your company would be more profitable which results in job security
2. Stress is reduced in production, maintenance, and leadership
3. Stockholders / Owners are more likely to ensure you have job security
4. Employees come to work excited to work in a proactive environment





# WARNINGS

An organization cannot cut cost in order to improve performance,  
cutting cost with a plan results in higher cost

## Warning

*“Maintainable Equipment in this Area Only”*

REACTIVE MAINTENANCE NOT AUTHORIZED IN THIS AREA

# Step 1: Educate Personnel in Known Maintenance and Reliability Best Practices

- Plant Leadership – 2 Hours
- Production Leadership – 4 Hours
- Maintenance Leadership (Maintenance Manager/Maintenance Supervisors) – 3 Days
- Maintenance Technicians – 3 Days

An Investment in Knowledge Pays the Best Interest

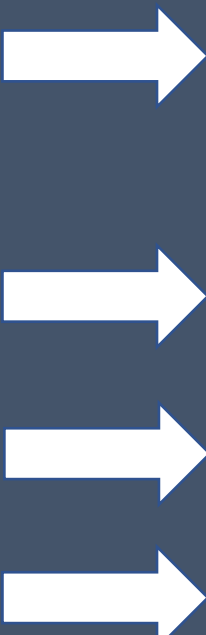
– Benjamin Franklin



## **Step 2 - Baseline Current Measurements against known “Best Practices”**

- **PM Execution – 15% labor hours**
- **PM Results – 15% labor hours**
- **PdM Execution – 15% labor hours**
- **PdM Results – 35% labor hours**
- **Total Work “Planned” – 90%**
- **Reactive Work – Less than 2% labor hours**
- **Stock-outs – less than 2%**
- **Scheduled compliance by day/week – 85 to 90%**
- **Failure Elimination is a key focus of all (FRACAS)**
- **Work orders are closed out with ALL Codes ID**
- **Maintenance Cost as a % of Replacement of Asset Value (Insured Value)**

# Step 3 - Conduct a Maintenance Assessment to assess “current state” against “known best practices”



## Score totals:

### 0 - 500 = Total Reactive / Reliability principles are not understood or applied

- Need to educate all management and engineering in reliability and develop a reliability strategy for serious change. Need to develop a business case to define the opportunity immediately. (attend training in Maintenance and Reliability Best Practices)

### 501 – 700 = Emerging (long way to go)

- Need to develop a business case and reliability strategy with timeline, targets, and objectives.

### 701 – 850 = Proactive (continue the journey, you are headed in the right direction)

- Need to ensure continuous improvement process is built into your asset reliability process. Identify gaps in the assessment and fill the gaps.

### 851 – 1000 = World Class

- Hire an outside reliability consulting firm to assess your current stated and make recommendations for any change required. Great job.

# Step 4 - Create a Master Plan to Move from Current State to Future State with...

1. Quick Wins
2. Use Crawl, Walk, Run Methodology
3. Identify Roles and Responsibilities
4. Create a Dashboard to Measure Effectiveness
5. Perform a Gemba Walk weekly w/key players



Maintenance "Roles and Responsibilities"									
Task	Position →	Plant Mgr.	Prod Mgr.	Maint Mgr.	Stores Mgr.	Maint Tech	Maint Super	Maint Planner	CMMS Admin
CMMS Management		I	I	C	C	I	C	R	A
Lean Leading and Lagging KPI Management		I	I	A	C	I	C	R	R
Preventive Maintenance		I	I	A	I	R	C	C	C
PM Evaluation/Optimization		I	C	A	C	R	R	R	R
Maint. Planning/Scheduling		I	R	A	I	I	R	R	I
Work Execution		I	I	A	I	R	C		I
Maintenance Rework		I	I	A	C	R	C	C	C
Production Rework		I	A	I					
Failure Reporting, Analysis, Corrective Action Process		A	R	R	C	I	C	C	C

Responsibility	"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)



# Step 5 – Ensure all assets are in a Maintainable Condition

Begin with worst performing asset or assets (production line)

- Assess and Restore what is inhibiting the assets from meeting expectations
- Once restored “Maintained” with the effective PMs, Repeatable Procedures, and Planning and Scheduling

## Warning

***“Maintainable Equipment in this Area Only”***

**REACTIVE MAINTENANCE NOT AUTHORIZED IN THIS AREA**

# Step 6 – Create and Implement Repeatable Procedures for “ALL” Repeatable Work

## Why Repeatable Procedures?

1. To reduce Human Induced Failure
2. To ensure work is complete to specifications
3. To ensure everyone is aware of the possible risk involved in this work

### PM Line 3

Equipment Block ID:			
Plant 102 - Line 3			
Equipment Hierarchy:			
E560XXX			
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: b5	Version #: 1.0		
<b>Warnings:</b> Failure to Lockout/Tagout could result in Death or Serious Injury			
<b>Cautions:</b> 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			
3/4" 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 <b>Warning: use face shield when blowing with compressed air</b> <b>Warning: Ensure hydraulic pump drive motor is racked out. Tag test before proceeding.</b>	Mech	1	0.2	0.2
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 <b>Torque bolts to 80 ft. lbs.</b>				

### PM Line 3

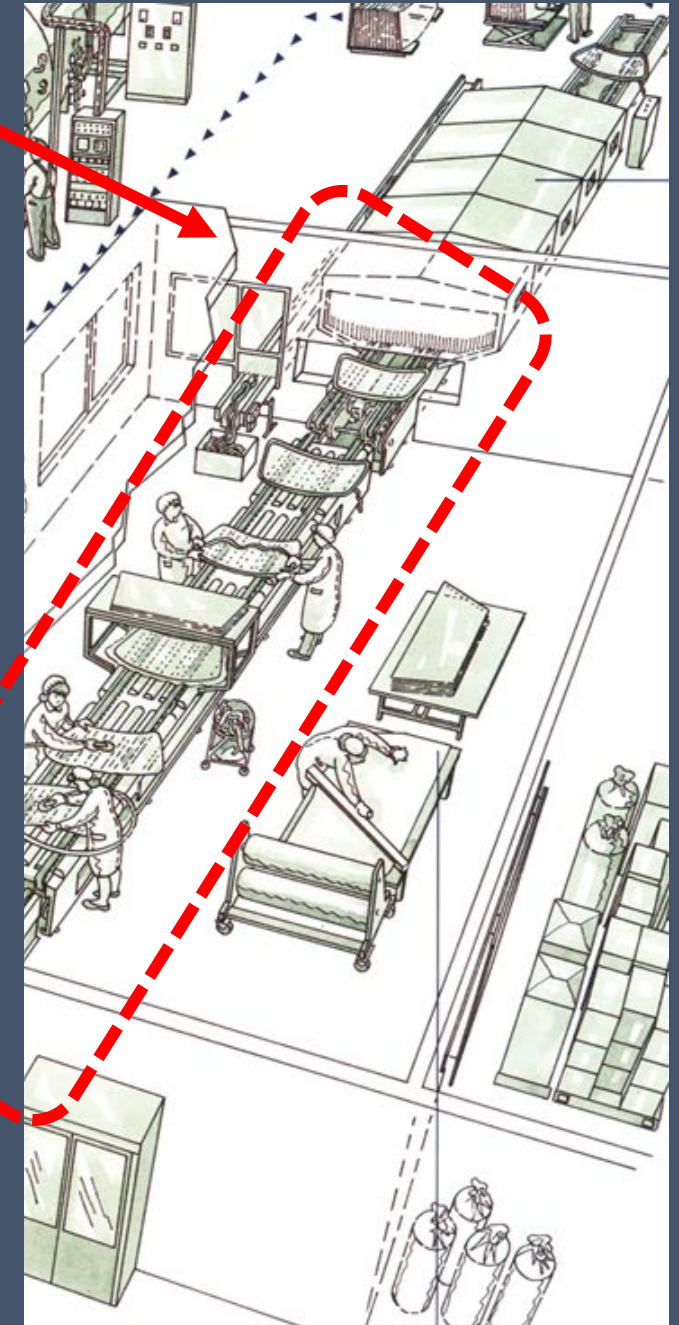
Condition (As Found):	
Condition (As Left):	
Comment(s):	
Craft's Feedback on Procedures:	
Craft's Signature(s):	
Date:	

# Step 7 – Conduct a PM Optimization

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
5. Define how you will measure if the PM Optimization Process is effective or not
6. Present copies of PMs to all parties
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. Go step by step for EACH PM Procedure and identify the following of each task
9. Review the results and adjust as needed

**PM Evaluation / Optimization Results**

PM Eval Recommendation	# of Tasks	% of Total Tasks	Labor Hrs. Represented
No Value – Delete Task	1,740	15.2%	1,832
Reassign to Lube Route	1,167	10.0%	3,980
Reassign to Operator Care	1,889	16.1%	4,987
Replace with PdM	1,983	17.3%	4,876
Re-Write Task	2,387	20.8%	11,043
Task is Good as Found	2,289	20%	3,923
<b>Total PM Tasks</b>	<b>11,455</b>	<b>100%</b>	<b>30,641</b>





# Focus on Maintenance Planning/Scheduling Expectations PF Curve



Maintenance Planning and Scheduling PF Curve is a graphical representation of how Maintenance Planning and Scheduling will fail.

How do we know if Planning and Scheduling Fails? “Wrench-Time will be low”

- World Class Wrench-time: 55-65%
- Typical Wrench-Time: 6-35%

# Step 8 – Focus on Optimizing Planning and Scheduling

1. Attend formal Planning and Scheduling Training (3 days)
2. Arrange for the Instructor to come to your site and assist with the implementing proactive Planning and Scheduling to:
  - Educate Management and the Maintenance Team
  - Create Planning and Scheduling Process Maps
  - Assist in Planning and Scheduling for one week
  - Create a Maintenance Dashboard



Text in one thing you learned today?



# Questions

## MAINTENANCE AND RELIABILITY BEST PRACTICES WORKSHOPS

May – November 2021



Maintenance and Reliability Best Practices ---- May 18-20

Maintenance Planning and Scheduling ---- June 22-24

Preventive Maintenance plus PM Optimization ---- July 20-22

Maintenance Technician Best Practices --- August 24-26

Maintenance and Reliability Best Practices ---- Sept 21-23

Maintenance Planning and Scheduling ---- October 19-21

Maintenance Storeroom Best Practices ---- November 9-11



For more information or request a private session send your request to:  
[rsmith@worldclassmaintenance.org](mailto:rsmith@worldclassmaintenance.org) or visit [www.worldclassmaintenance.org](http://www.worldclassmaintenance.org)