

Day in the Life of a Proactive Maintenance Technician

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VP – World Class Maintenance

A proactive maintenance technician is a highly trained professional who is an expert in his or her skills area, has knowledge of other skills areas, including safety and production, and has a desire to learn more. This professional knows and can implement a failure-modes driven maintenance strategy for any piece of equipment.

A proactive maintenance technician uses knowledge and experience to ensure the maintenance process is optimized by making constructive recommendations to management concerning improvement areas.

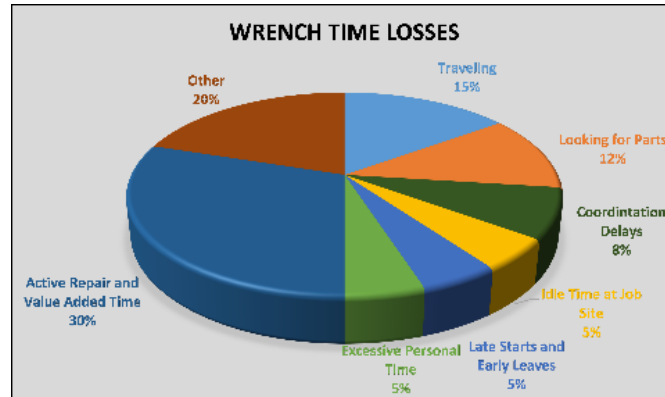
To ensure success, a proactive maintenance technician is proactive in everything he or she does. This person constantly reviews information to ensure procedures are accurate and issues are resolved quickly, and does what is required to ensure the work is repeatable. Such a professional leads by example and takes responsibility for training new employees on how to be proactive and effective maintenance technicians.



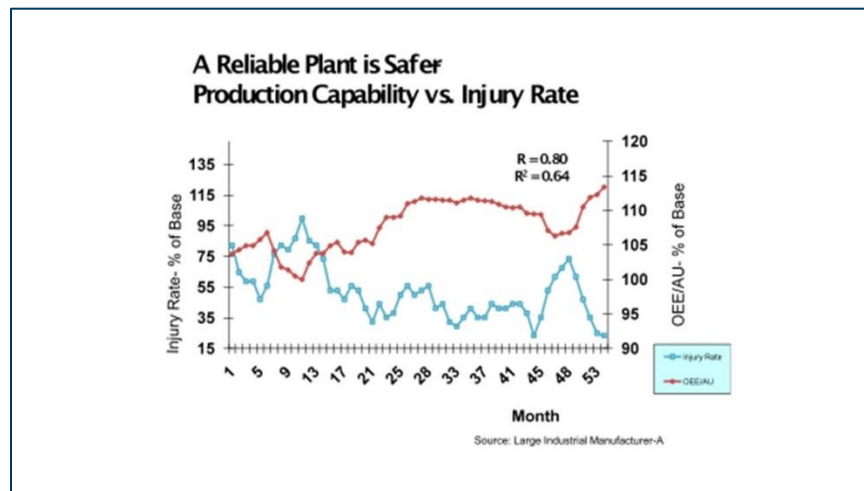
A successful proactive maintenance technician follows known best repair practices in all tasks and has a suitable reference book as part of his or her tool set, such as Industrial Machinery Repair: Best Maintenance Practices Pocket Guide from Elsevier Publishing. A proactive maintenance technician may be a Certified Maintenance Reliability Technician (CMRT).

On a daily basis, a proactive maintenance technician begins work on time, ends work on time, takes the allotted break(s) without taking additional time and always makes the best use of time. He or she knows the applicable planned and scheduled work for the week and inspects the next day's tools and parts for the scheduled work.

Wrench time is high (55% and greater), as shown in the following diagram, because the maintenance technician identifies scheduling delays and makes recommendations for improvement.



Additionally, a proactive maintenance technician makes sure the work site is clean and safe when completing work. Work safety is always the #1 priority. We hear this all the time, but the facts show a proactive organization's safety and incident rate is extremely low. Think about the different in a proactive maintenance organization vs. a reactive one, a proactive maintenance organization incident/safety rate is low.



Think about our normal lives. If you are late for appointments or work often, what are the chances you may get in an accident or have an incident (speeding ticket)? It is much higher and so the same goes for maintenance teams.

A reactive organization in maintenance may hear these statements often:

- How much longer is it going to take to get the equipment up because of a breakdown? (I have heard this many times as a tech, supervisor, and as a maintenance manager.)

- How much longer before you finish the PM, etc.?
- Where are the parts? Why did this breakdown occur?
- Where are the parts?
- Why did this breakdown occur?

Perhaps most importantly, a proactive maintenance technician is always proud of the work he or she conducts or influences. No pat on the back is required, just the personal satisfaction in knowing that the job was completed successfully.

What does a Typical Day in the Life of a Proactive Maintenance Technician Look Like?

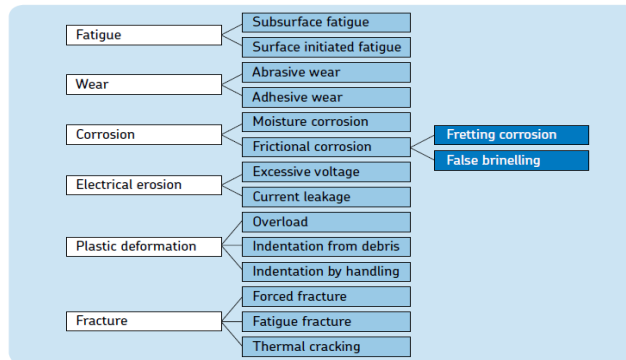
A proactive maintenance technician begins the day by pulling a job package from the scheduled work order, goes to where the parts are kitted, pulls the required parts and tools, and leaves for the job site. Because the planner has made sure that all special tools, parts and procedures are at the job location, the maintenance technician can begin on time since all the equipment, parts, tools and procedures are ready to execute.

Equipment Block ID: SeaRock Mine, 2-ROTOR MARIETTA MINERS		Required Departmental Coordination: Production shutdown / position / blow off equipment																																																													
Equipment Hierarchy: ES60XX Miner		Other Procedures Referenced: Job Preparation / Lockout Procedure #XXXX																																																													
Project Description: 2-Rotor Miner Front End Inspection		<table border="1"> <thead> <tr> <th>ID</th> <th>Description</th> <th>Craft</th> <th># of Crafts</th> <th>Clock Hours</th> <th>Craft Hours</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Clean area to be inspected using compressed air or degreaser as required <i>Warning: use face shield when blowing with compressed air</i> <i>Warning: Ensure hydraulic pump drive motor is locked out.</i> <i>Tag test before proceeding</i></td> <td>Mech</td> <td>1</td> <td>0.2</td> <td>0.2</td> </tr> <tr> <td>2</td> <td>Inspect shear pin plates</td> <td>Mech</td> <td>1</td> <td>0.3</td> <td>0.3</td> </tr> <tr> <td>2-1</td> <td>Visually check for cracks on shear pin plates Are any cracks evident? Yes ___ No ___</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2-2</td> <td>Insert 2" pry bar between plates to check for movement. Is any movement present? Yes ___ No ___</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Inspect sprocket</td> <td>Mech</td> <td>1</td> <td>0.3</td> <td>0.3</td> </tr> <tr> <td>3-1</td> <td>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</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>Inspect retainer cap</td> <td>Mech</td> <td>1</td> <td>0.2</td> <td>0.2</td> </tr> <tr> <td>4-1</td> <td>Visually inspect for broken bolts Are there any broken bolts? Yes ___ No ___</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4-2</td> <td>If broken bolts are found, replace as required <i>Torque bolts to 20 Ft. Lbs.</i></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		ID	Description	Craft	# of Crafts	Clock Hours	Craft Hours	1	Clean area to be inspected using compressed air or degreaser as required <i>Warning: use face shield when blowing with compressed air</i> <i>Warning: Ensure hydraulic pump drive motor is locked out.</i> <i>Tag test before proceeding</i>	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 <i>Torque bolts to 20 Ft. Lbs.</i>				
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Estimated Craft Hours: 1 x 1.0 Estimated Elapsed Time: 1.0 Estimated Production Downtime:																																																															
Originator: Dave Stone Origination Date: 03/12/2012 Owner: Mine Maintenance Version #: 1 Previous Version(s) Modifications: Approval: DS Version #: 1.0																																																															
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Personal Protective Equipment Required: Gloves, face shield, hearing protection																																																															
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The maintenance technician arrives at the job site and is greeted by a production worker, who has cleaned and cooled down the equipment per the maintenance schedule so the maintenance technician has the optimum amount of time to perform preventive maintenance, corrective maintenance, etc.

With a focus on safety, the proactive maintenance technician ensures all workplaces are free of hazards and is skilled at using the tools required to reduce potential hazards to include premature equipment failure.

In-depth training in the identification of failure modes and their causes for all equipment in the maintenance technician's area and vast knowledge on how to prevent or identify failures early are key components for preventing a failure.



SKF Bearing Failure Modes and Causes

Furthermore, the proactive maintenance technician is trained and can execute specific advanced maintenance tools, such as ultrasound, infrared, and laser alignment tools, with precision when needed, thus reducing the need for additional personnel.

The proactive maintenance technician performs all maintenance work to specifications. Following all procedures, the maintenance technician cleans the area and releases the equipment back to production in a “fully functional” status according to the definition of maintenance.

Once production has the equipment back to operating standards, the maintenance technician returns to the shop and ensures all required closed out information is on the work order with the proper failure codes, failure causes, time taken to complete the job and any other information required in the synopsis to includes any recommendation to changes to the work order.


Before the Shift Ends

Prior to leaving for the day, the maintenance technician reviews the work scheduled for the next day from the job plan package left by the planner/scheduler. This ensures that the proactive maintenance technician knows the job and validates that the parts are in the kitted area.

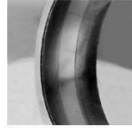
Additional Comments

The maintenance technician may also participate in a Tool-Box training session concerning safety, new work instructions, or technical training ideas to increase his or her knowledge base and help teammates by sharing this knowledge. See the example Tool-Box Talks in the following examples.

Tool Box Talk – Lubrication of Bearings Best Practices




Best Maintenance Lubrication Practices are essential to optimize the life and rating of bearings. The photographs included here are from the *Bearing Failure and Root Cause* (B30) book, Publication #140-01. If you do not own this text, it is recommended that you buy it: www.ansi.com



Cause of Failure: Abrasive particles

NOTE: It may be possible someone did not wipe off the end of the grease gun after pumping grease out or did not clean the grease fitting before lubricating.



Cause of Failure: Dirt ingress during the lubricating process, seal damage, or bad installation practices

WARNING: Best Maintenance Lubrication Practices must be conducted as a "Controlled Experiment". You install the equipment to specification, operate it to specification, and introduce lubrication to specification.

Definitions from Merriam-Webster Dictionary

Specifications: a detailed precise presentation of something or of a plan or proposal for something

Equipment: an operation or procedure carried out under controlled conditions in order to discover an unknown effect or law, to test or establish a hypothesis, or to illustrate a known law

NOTE: There are four factors that are important when lubricating bearings:

1. What type of lubrication?
2. How much lubrication?
3. How frequently should lubrication be applied?
4. How should the lubrication be applied to ensure contamination control?

Tool-Box Talk Preventive Maintenance 104

Defining and Assigning Roles and Responsibilities is critical to success of any process along with how one's action add value to the process. Preventive Maintenance is no exception requiring everyone on a team works together toward a desired result.

Roles – Roles are the positions team members assume or the parts that they play in a specific process. (i.e. Preventive Maintenance)


Responsibilities - Responsibilities are the specific tasks or duties that members are expected to complete as a function of their roles.

Why should you define Roles and Responsibilities?

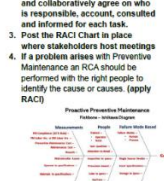
- To ensure everyone is aligned to ensure success of Preventive Maintenance
- To train and educate people in specific positions focused on their one goal, "Optimal Asset Reliability at Optimal Cost"
- Provides clarity, alignment, and expectations to those executing PM resulting in keeping a plant running 24/7
- Enables effective communications between maintenance and production facilitating focus on PM Effectiveness
- To ensure Operator and Care and Preventive Maintenance is aligned toward a common goal
- To reduce Production Losses due to unexpected breakdowns
- Bottom line, the RACI Chart reduces uncertainty and minimizes stress and downtime

Steps to Define Roles and Responsibilities

1. Identify stakeholders, i.e. Technicians, Maintenance, Production Supervisors, etc.
2. ID each task in the PM Process and collaboratively agree on who is responsible, account, consulted and informed for each task.
3. Post the RACI Chart in place where stakeholders host meetings
4. If a problem arises with Preventive Maintenance an RCA should be performed with the right people to identify the cause or causes (apply RACI)

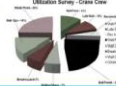


Proactive Preventive Maintenance



Tool Box Talk – Wrench Time Study "Utilization Survey"

"Work Sampling: Why Is It Needed?"



What is Wrench Time?

Wrench Time is defined as the actual amount of time a crafts person spends doing value added work. A Wrench Time Study, or Work Sampling Study, is aimed at identifying and time-wasting or wasting the time spent on non-value added tasks.

World Class Wrench Time is 95-98%, most companies Wrench Time is between 10-20%.

"Your system is perfectly designed to deliver precisely the results you're getting."

– W. Edwards Deming, PhD

Guiding Principles of Wrench Time Studies

Identify the percent of time maintenance personnel are delayed due to one of these specific reasons:

- a. Traveling to and from the workplace; issues not in the plan
- b. Breakdown Planning; emergencies or urgent work; waiting for parts, people, etc.
- c. Training; technical safety, etc.
- d. Meetings; training safety, etc.
- e. Work Execution; waiting on parts, waiting on someone, etc.
- f. Breaks; lunch, heat breaks, etc.
- g. Waiting; waiting on supervisor, another maintenance person, production, etc.
- h. Administrative; Union issues, personnel issues; discussion with supervisor about reactions, work orders, etc.

WARNING: "Drive out fear, so that everyone may work effectively for the company."

– W. Edwards Deming, PhD

We never want our employees to fear any actions we take as managers. If a wrench time study is to be conducted, it is necessary to discuss the reasons for the study and its value.

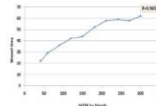
Do not follow the "just do it" approach. You want your maintenance personnel to buy in to the process.

"The only reason for conducting a Wrench Time Study is to identify the delays causing maintenance to be less efficient"

Pay Attention to This Message:

A Wrench Time Study is not about finding personnel who are inefficient, making mistakes, or performing poorly. It is about the quality of the planning process and how the organization uses the planning process.

Planning / Scheduling Impact on MTBF



How is a Work Sampling Study Conducted?

Over the years, Work Sampling Studies have taken many forms. The most common is the Industrial Engineer following someone around all day with a clipboard and stop watch. This technique rarely achieves accurate results.

I prefer a different method. Personnel conduct the study on themselves by means of carrying around a PDA or

What Value Does a Proactive Maintenance Technician Provide to a Proactive Organization?

In addition to all of this, a proactive maintenance technician adds value by working with production and operations as a team to resolve equipment problems, whether maintenance or production related, to optimize asset reliability and increase capacity.

A proactive maintenance technician is always on time, performs work to standard, makes recommendations to improve work for the next time it is executed, ensures tools are operational, verifies production has started up the equipment to standard and on time, and performs all work in a safe environment.

A proactive maintenance technician's conducts preventive maintenance as a "controlled experiment." Because the proactive maintenance technician always takes the time to make repairs accurately, they are more often than not sustainable with no rework required.


A proactive maintenance technician is also capable of correcting defects and making repairs using repeatable, effective procedures that reduce rework. A maintenance technician also has the ability to write effective, repeatable procedures following company guidelines to ensure other technicians have the tools to perform quality work.

With a focus on safety, the proactive maintenance technician ensures all workplaces are free of hazards and is skilled at using the tools required to reduce potential hazards. In-depth training in the identification of failure modes and their causes for all equipment in the maintenance technician's area and vast knowledge on how to prevent or identify failures early are key components for preventing a failure.

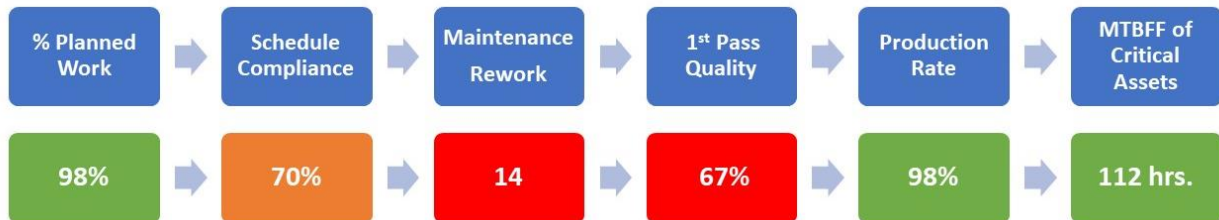
Furthermore, the proactive maintenance technician is trained and can execute specific advanced maintenance tools, such as ultrasound, infrared and laser alignment tools, with precision when needed, thus reducing the need for additional personnel.

A proactive maintenance technician is confident in providing management with metrics that show asset reliability is improving. Further, he or she has the ability to make recommendations for equipment improvement based on failure reports and metrics as shown below.

A3 - Failure Report

<p>Problem:</p> <ul style="list-style-type: none"> Asset #4001 bearing failure 7 times in past 24 months PM Deferred 22 times due to Production Requirements Lost 2300 units of production Lost \$220,000 in production PM Compliance 90% Maintenance Labor Cost: \$2,400 Maintenance Material Cost: \$4,534 Found similar assets were having the same failure 	<p>Resolution:</p> <ul style="list-style-type: none"> Perform PM Evaluation on Asset Conduct RCA of Failure w/Techs and supervisor Education with all Techs on Lubrication Best Practices Compare PM Compliance to # of Failures Measure MTBF of Asset #4001 for next 18 months Trend Maintenance Parts expense by type by month
<p>Asset Number: 4001</p>	
<p>Cause:</p> <ul style="list-style-type: none"> Cause: Over lubrication resulting in seal failure and then bearing seal failure Contributing Factors: <ul style="list-style-type: none"> Lack of effective PM Procedure No PM frequency established Insufficient Training/Lack of Knowledge by Techs 	<p>Measurement /Sustainment:</p> <ul style="list-style-type: none"> PM Compliance needs to be structured Correlate Maintenance Cost PM Compliance Measure MTBF of asset #4001 for 12 months, re-assess

Maintenance Tech Dashboard



Ricky Smith wrote this article based on his experience as a former Maintenance Technician at the US Army, Exxon, and Alumax Mt Holly (Alcoa Mt Holly).