3 SIMPLE IDEAS TO IMPROVE EQUIPMENT RELIABILITY

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3 Simple Ideas to Improve Equipment Reliability

By Ricky Smith CMRP

Maintenance in a any organization can be improved by executing a few new ideas they can make a major difference in the reliability and uptime of their equipment. I hope this article is found to be easy to understand and will be key to success for your site.

"It isn't what you know that will kill you; it is what you don't know that will"

There is an old saying, "you cannot eat an elephant all in one bite; but you can eat it one bite at a time." Let's begin by looking at some of the known problems that maintenance and reliability managers encounter daily:

1. Breakdowns are frequent – the causes and reasons are many.

2. Not enough maintenance is performed – cutbacks typically hit maintenance staff first.

Do these two problems drive you crazy? These problems, and many others, always drove me crazy when I was in maintenance management. Then I found a few steps that made all the difference between success and failure, which is not as drastic a difference as you may think. In fact, I have learned over the years that the difference between these two outcomes is exactly as shown in Figure 1.

Figure 1: The Distance Between *Success* and *Failure*

Trust me, I have been where you are. As a former Maintenance Supervisor and Maintenance Manager I had to know the truth about where my program stood and develop a plan to overcome our primary obstacles so that my crew could be successful:

1. Performing preventive maintenance on equipment that continues to break down.
2. Planner constantly chasing parts.
3. Not enough staff to complete all of the daily work.
4. Completing a repair just to see it again next week.
5. Production blaming maintenance for equipment problems.

Based on all I have stated, I developed a few key questions to ask myself. This took a while; I am not a fast thinker or a quick learner. However, once I resolved these questions and overcame these problems, the reliability and maintainability of our assets went up, immediately making my life, production's life, and my crew's life easier.

So, what are the three questions that if answered will make a large impact on the maintainability and reliability of your equipment?

Idea #1: The first step required to upgrade the reliability and maintainability of your organization

After thinking about this idea, I knew there was only one thing a maintenance person would focus on: making the equipment maintainable, and thus reliable, to meet the intent of the end user – production.

Listed below is the process I followed to upgrade reliability and maintainability.

1. Identify, with production management, what is the most critical equipment in the worst condition. Remember that it does not matter what we consider to be critical, but rather it is what production management thinks is critical and can deliver immediate results if it were reliable.
2. Develop a plan with your crew and production to upgrade this equipment to a maintainable and reliable level.
3. Identify all of the problems with this equipment using all techniques and technologies available at the time, including production data on the equipment.
4. Order parts and plan and schedule the work.
5. Execute to your plan together with production and your crew, ensuring that all repairs are made using effective, repeatable procedures with specifications and standards. Perform a

QA/QC check to validate that the work was completed to specifications. At this time of need, all egos must be checked at the door.

6. Once all of the work is complete, commission the equipment using as many predictive maintenance technologies as possible, along with production process data. Since a person cannot predict failure, *condition-based monitoring* is a much more accurate representation of what is truly being performed.

7. Post a sign on the equipment that states: "This equipment is maintainable". (See Illustration 2 – Warning Sign) Establish an agreement between your crew and production to maintain this equipment to "like new" conditions no matter what. The results will shock you, so record the production output increase once the equipment is up and running.

Illustration 2 – Warning Sign

8. Since people's memory is very short, post the results you achieve by the equipment and track to make certain they are updated daily by your production partner. One of the best items to display is Mean Time Between Failure (MTBF); put this by the equipment on a weekly basis, as shown in Figure 3.

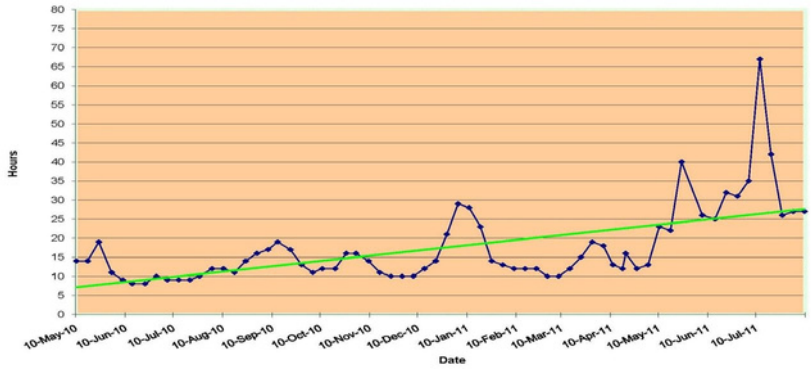


Figure 3: Mean Time Between Failure (MTBF) Example – 900 Electric Motors

Compliments of Kim Hunt - Domtar

9. Develop an effective Failure Modes Driven Strategy for the equipment, identifying failure modes, causes of failures, etc., to build a solid maintenance plan using preventive maintenance and condition-based monitoring.

10. Move to the next piece of equipment based on production management's input and complete the steps the same way you did for the last one.

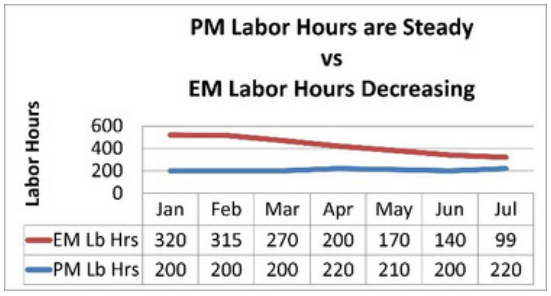
If you follow this same process, you will be successful in improving your assets' reliability and maintainability while meeting the requirements of production.

Idea # 2: Identify where you are and where you are going by using simple metrics which measure effectiveness

Having the right effectiveness metrics in place and focused on continuous improvement is the answer. A great example would be to measure PM Compliance and it is above 98% however the equipment continues to fail. It does not make sense. Have you ever thought about using a line graph which shows the correlation between PM Labor Hours and Emergency Labor Hours in order to measure PM Effectiveness? You must know where you are before you can begin a journey.

See Illustration 4 and if the results are not acceptable you may want to review Idea #1 again.

PM Compliance is a metric which only measures if PMs are completed on time and is a joke in most organizations.



	Jan	Feb	Mar	Apr	May	Jun	Jul
EM Lb Hrs	320	315	270	200	170	140	99
PM Lb Hrs	200	200	200	220	210	200	220

Illustration #4 – PM vs EM Labor Hours

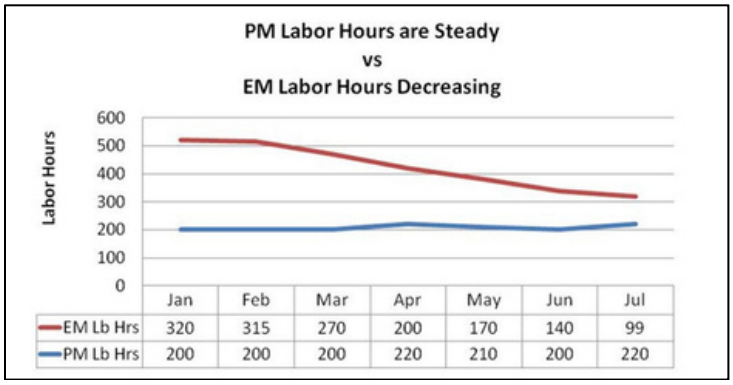
With this one metric you will know where you are with your current PM Program. Try it out and let me know what you find. Once you know where you are you can begin to develop a plan to head in the right direction.

Idea #3 – Using Balance Scorecards to manage Maintenance

The next idea is to develop a maintenance dashboard which has a live comparison of specific KPIs which validate each other. This is like driving down the road in your car and looking at all the gauges, if one is flashing red you may need to stop and solve the problem. The KPI Dashboard Concept is the same. This specific one can be fed by an Excel program which is populated by your CMMS/EAM or other data source.

To build the dashboard, begin by identifying three questions you would like to know the answer to on a weekly or monthly basis which would confirm or deny all KPIs are accurate.

Question 1: PM Compliance is 100% however is your PMs truly effective?



Question 2: Is Planned Work meeting expectations?

Question 3: Is Scheduled Compliance Data accurate?

Question 4: Are Work Orders Closed Out Accurately?

Question 5: Is Maintenance Rework at an acceptable level?

Question 6: Is Maintenance Cost at an acceptable Level?

Question 7: Is Maintenance Wrench Time at an Acceptable Level?

Wrench time, the time your people are actually "turning wrenches" or performing proactive work, is one indicator of whether your maintenance planning and scheduling functions are meeting requirements.

If your wrench time is 25% and you improve it to 50%, you just increased the amount of proactive work being conducted by 100%. A workforce of ten maintenance people is now performing twice the amount of work with less stress and more capacity for the plant.

See the example in **Figure 4**, which shows the delays or distracters that could be caused by lack of effective planning (Planning Function: Identifying the parts, tools, procedures, and standards/specifications required for effective maintenance work, increasing wrench time) and scheduling (Scheduling Function: Scheduling of maintenance, operations, contractors, engineering , and safety personnel to be at the right place at the right time performing the right work synchronized together which is intended to minimize interruption to operations and production.

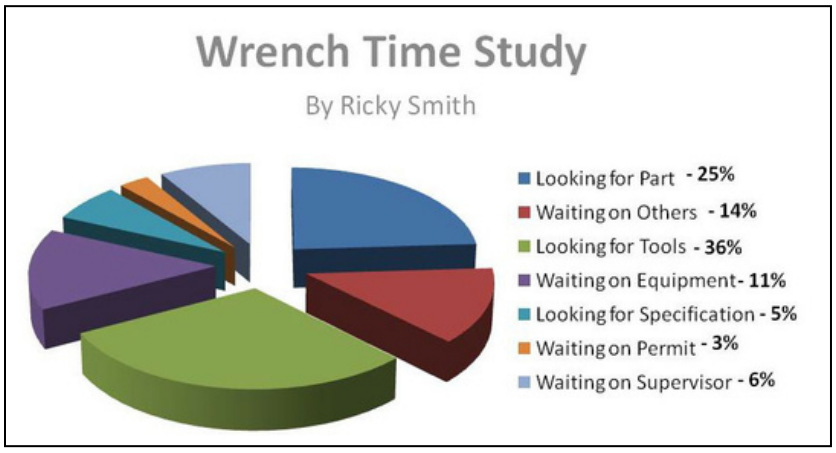


Figure 4: Results of Wrench Time Study (Conducted by Ricky Smith)

Planned Work % is the percent of work orders which have all the defined fills filled in. A planned job at the minimum should have:

- Repeatable, Effective Work Procedures
- Equipment Specifications and Standards
- Required Parts and Potential Parts
- Coordination Required and with whom and when
- Warning and Cautions

- Craft and Estimated Labor Hours
- Actual Prep and Execution Time
- Etc.

Planned Work is work that has gone through a formal planning process to identify labor, materials, tools, and safety requirements. This information is assembled into a job plan package and communicated to craft workers prior to the start of the work.

Scheduled Compliance: The scheduling of maintenance labor in coordination with operations, contractors, engineering, safety personnel to minimize interruption to operations and production and to ensure the work is completed on time and effectively.

Scheduled Compliance is measured by dividing the total labor hours available (all maintenance labor hours with exception of people who are on vacation or sick leave only) into the total labor hours completed by day and by week. I know people like to move the work because of issue from day to day. That is acceptable however you do not receive compliance for it. The items which are taken away from scheduled compliance will be identified in a Wrench Time Study.

If you want to succeed, take things one step at a time as I stated in my article and stay FOCUSED. People love to be successful, and these ideas allow a maintenance crew to be successful. I am telling you these things having been in Maintenance Management myself. I have seen many companies succeed around the world following these recommendations. I would like to add you to the list. Do not strive to be "World Class", strive to be the best you can be through following Managing Maintenance Effectively.

Final Note: Use the World Class Maintenance Attributes to guide you to success.

World Class Maintenance vs Typical Attributes

Category	Typical Maintenance	World Class Maintenance
Maintenance Cost as a % RAV	5.6 – 11%	2.0-2.5%
Budget Compliance	Less than 60%	100%
Planners per Craftsperson	No Planner or No Proactive Planning Process	1 - 20
Absenteeism	10% plus	+/- 5.0 %
Ready Backlog in Weeks	Unknown	2-4 weeks
% Planned Work	15% or less	90%
Schedule Compliance	50%	90-100%
PM Compliance	60%	95-100%
Inventory Accuracy	Unknown	95% plus
Maintenance Training Cost	No Budget	6% of Budget
Maintenance Rework	High	Low
Accurate Maintenance Dashboard	Not Available	100%

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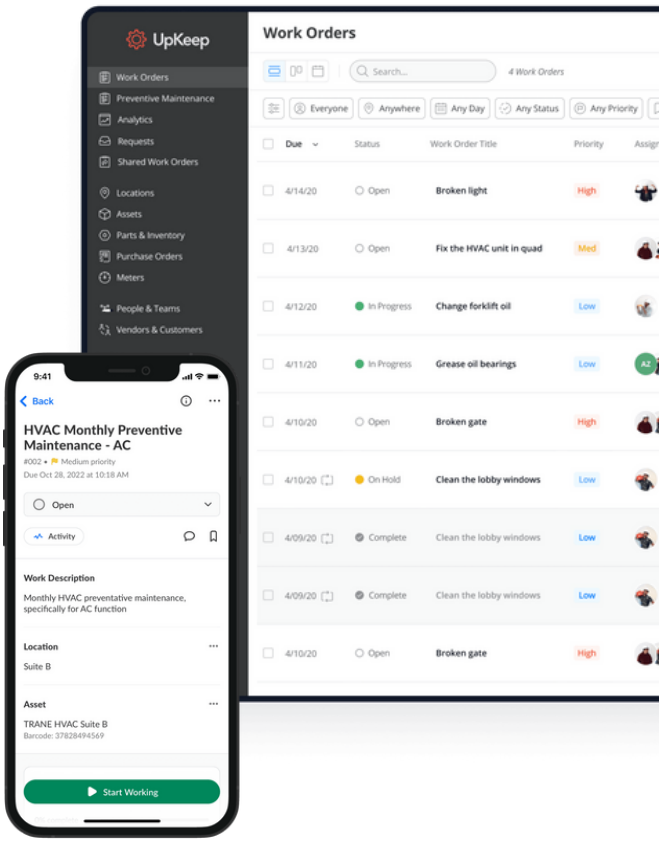

Our Products

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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**

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