**Organizing for Reliability:**

**Maximizing Your Reliability Software Investment**

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**Synopsis**

Aligning your equipment reliability work processes with your reliability software is essential to an effective and sustainable equipment reliability program. You will not be successful by just throwing software at your problems.

Many organizations successfully implement costly and complex reliability software suites only to find that that their expectations for improved reliability and reduced costs fall well short of expectations. The software vendor is blamed, or maybe the in house implementation team. Sometimes performance really does improve but falls off after 3-5 years as the implementers move on to other assignments. Management is puzzled and wary of software vendors and internal visionaries.

Efforts fall short when companies confuse implementing “reliability software” with implementing a “reliability process.” Both must be done because one enables the other. Since reliability is really a business process, software is just a tool for managing the process.

Here we will examine a few proven techniques that will help focus your reliability efforts and take maximum advantage of your reliability software.

**Understanding “Reliability, the Process”**

A successful reliability program is organized around the basic reliability work process. Software should enable and enforce the reliability procedures. Procedures must be updated as part of any software solution so that the staff understands expectations.

Understanding the elements of the basic reliability process allows you to organize around it and then implement:

* + Staffing to operate and maintain both the software and the process
	+ Software solutions
	+ Administrative guidance such and policies, procedures and guidelines

**Essential Reliability Program Elements**

The following suggestions are based on the author’s experience as plant staff and as a consultant. Adopting them will help maintenance and reliability practitioners and plant managers take full advantage of modern reliability software. Good process plus good software will also help get the elusive “reliability culture change” that is often discussed but less often achieved.

1. Organize around the equipment reliability process
2. Establish asset criticality assessment guidance
3. Establish a Plant Health Committee to oversee and focus the reliability program
4. Implement an equipment reliability scorecard
5. Create a “Top Reliability Issues” list
6. Establish a risk informed work order priority system
7. Capture key work history

**Number 1 – Organize Around the Reliability Process**

Who is going to operate and maintain your expensive reliability software “machine?” We may have mentioned that you will not be successful by just throwing software at your reliability problems. You must also organize to properly attack them.

**Generic Equipment Reliability Process Model**

Any successful reliability program executes each of the elements in the simple diagram below. Each process element communicates “on the lines” with the others via data, displays, and recommendations. Each element requires people and administrative structure. Questions to answer:

* Will there be a central reliability organization with reliability analysts and reliability engineers or will each facility have those people? Will there be a combination?
* Will there be a set of corporate “playbooks” setting expectations and providing detailed guidance or will each facility be developing its own?



**Building the Reliability Organization**

Create clear alignment, roles and responsibilities for support of the work processes at the corporate and site levels. The key people should be versed in the reliability process and be SMRP certified or pursuing certification.

Corporate Level

* The overall program is best owned and managed at corporate level to assure consistency
* Experts people with RCM, Weibull Analysis, RAM Modeling, and similar special skills that are in lesser demand at the sites are best managed in a centralized organization
* Functions like maintenance strategy templates, health monitoring policies and KPI driven scorecards could be managed at the corporate level
	+ Typically 2-5 depending on fleet size

Site Level

* Local maintenance strategy is best owned and managed by site subject matter experts who adjust corporate templates based on local operating experience.
* Maintenance Engineers that are in high demand should be located at the sites
* Typically 1-2, depending on site size

The corporate and site organizations must support each other. Reliability goals are rarely achieved in a corporate or site leadership vacuum.

**Number 2 – Establish Asset Criticality Assessment Guidance (Risk Matrix)**

When Maintenance, Operations, & Engineering all work with the same definition of risk the organizational priorities begin to align. Line of sight visibility into risk enables better decision making around prioritization and resource allocation.

**Example Actions After Asset Criticality Has Been Determined**

Queries and graphs can be constructed to:

* Search backlogs and adjust work order priorities
* Cancel PMs on run-to-failure components
* Ensure Asset Strategy and Health Monitoring includes critical components
* Perform bad actor analysis by system and equipment type to determine which critical asset strategies should be reviewed and optimized first

**Number 3 – Establish a Plant/System Health Committee**

Reliability is a plant function, not an engineering or maintenance function. Time and resources must be applied at least monthly – more often as a program starts up – to allow the staff to focus on the reliability process and solving the problems it flushes out. This cannot be left to the working level operators of the software.

The plant/system health committee is the one stop shop for all things reliability. It focuses on the process and coordinates reliability activities. The plant manager chairs a cross functional team of operations, maintenance, engineering, planning, inspection, and other key reliability roles. The essential tasks are:

* Meets frequently, usually monthly
* Agenda driven focus on plant reliability
* Uses metrics to identify equipment issues and reliability threats
* Manages the Top Reliability Issues list and action plans

**Number 4 – Implement Reliability Process Scorecards**

A scorecard or two will help you understand 1) how well the organization is doing to adopt the new processes, software and culture and 2) how well the process is actually working. Fully adopting the process, software and culture leads to a working process and a working process leads to better performance and lower costs. Check the SMRP *Best Practices 5th Edition* for indicators related to the five pillars and how to calculate them. Pick a key few for your first scorecards and expand as you learn.

**Leading Indicators** – Activities and processes that will get you where you want to go. Examples:

* PM compliance and timeliness
* Schedule adherence
* Asset Strategies in place for critical components

**Lagging Indicators** – Shows the results of your leading indicators. Examples:

* Forced production loss rate
* CM to PM ratios
* MTBF
* Corrective maintenance costs

**Number 5 – Create a Top Reliability Issues List**

An important purpose of the process is to flush out threats to reliability, determine their causes, and then manage them to closure. These are designated “reliability threats,” not just the Bad Actors charts generated by the software.

A “reliability threat” is defined as a non-broke/fix issue or vulnerability that requires:

* Cause determination
* Development of solution options
* Implementation plan for the selected solution

Reliability threats include repetitive and long-term issues as well as obsolescence and aging issues. They do not include day-to-day broke/fix issues. In general, if you can solve the problem with a work order it’s not a reliability threat.

**Number 6 – Establish a Risk Informed Work Order Priority System**

When setting work priorities, one should consider asset criticality **AND** equipment condition – good, degraded, or failed – **AND** condition of the installed spare, if one exists. Enhance the work priority matrix to ensure the right work is being done on the right equipment at the right time. An example is shown below.



**Number 7 – Capture Key Work History**

Failure Coding

This concept has bedeviled the industry for decades. We want useful failure data but we drown the people trying to close work orders in possible causes and codes. Frustrated workers just pick “other” or something that is close on the first of several menus. We suppress free text descriptions in favor of codes and often don’t get the best of either.

Often free text “work performed” fields pretty accurately describe what failed and what the craft thinks happened. With the advent of cognitive analytic software that can extract useful data from free text, it may be time for this approach to be fully exploited and eliminate excessive menus and codes. Instead of suppressing free text, we should encourage descriptive entries that software could mine and codify.

Use the Equipment Hierarchy

Write work orders to the lowest reasonable level of the equipment hierarchy, such as motor, pump, or valve. Do not permit work orders to be written against just the plant, unit, system or miscellaneous or you will mask where the work and costs are really located.

Know What Initiated Your Corrective Work

Establish and enforce guidance for use of breakdown indicators or work order type and priority to identify which problems “you found” (proactive maintenance) and which problems “found you” (reactive maintenance).

Collect “As Found” Data for PMs
This practice enables powerful metrics for assessing maintenance effectiveness. For example, an excessive amount of additional work needed on compressors discovered during PMs suggests wrong PM scope or PM interval too long. Similarly, an excessive number of as found conditions of “excellent” when performing chiller filter changes suggests we are performing the PM too often. Create indicators that trigger reviews based on as found PM codes.

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| **Simple PM As-Found Condition Codes** |
| **AF-1** Superior. PM performed but component was still in excellent condition |
| **AF-2** As expected. PM performed without need for additional corrective work |
| **AF-3** - (Applies typically to instruments) Measured parameter within tolerance but adjustment performed  |
| **AF-4** - (Applies typically to instruments) Measured parameter outside specified tolerance and adjusted |
| **AF-5** - Degraded beyond PM scope. Performed additional corrective work.  |
| **AF-6** Failed or Unanticipated Failure. Component found in failed condition.  |
| **NA** - Not Applicable. Non-plant equipment. Turnaround / outage prep.  |
| **Comments:** PM Scope OK? PM Frequency OK? Other comments on this task? |

**Where do we start once the software is in and training complete?**

This question often emerges in the latter part of software implementations as the eventual owners of the software and management begin to understand that they also have a process to execute. Depending on the experience and maturity of the organization, any of the following are good places to start. If a plant health committee is being implemented, it should guide and focus the selected approach.

* Determine who is going to do the bulk of the analysis work once the software is ready. Will it be plant staff, contractors, or some combination?
* Determine criticality on assets. Since asset criticality drives everything, give some thought to what assets to do and in what order. There are techniques for making this task more manageable. One method is to start by assessing criticality on all assets that have ever been worked on. Then classify the remaining assets next.
	+ There are many actions you can take with asset criticality to gain immediate value. Review the example actions under item 2 above to get some quick wins.
* Take the population of existing PMs and validate their underlying strategy, including criticality of the assets they address.
* Select a known problem system or asset from experience or bad actor dashboards and apply the processes and software tools to improve performance.
* Select a pilot system and apply the basic tools to learn how to do the entire process from beginning to end.

**Conclusion**

We are sometimes asked what are the most difficult parts of reliability projects. Projects often do not include adequate internal resources because reliability improvement is approached as a software implementation project that ignores the need to also organize around the equipment reliability process. Dedicated reliability staff is required to implement the program AND sustain your success.

To ensure your transformation is successful, management and reliability practitioners must:

* Be patient with yourselves and the staff as you learn both the new software and reliability process
* Understand that sustained reliability improvement requires culture change in the organization. Leadership and training are required
* Staff must understand the connection between asset performance and business performance

Management discipline and focus is required to improve each year. This is a multiple year effort!

Remember – you will not be successful by just throwing software at your problems!