Best Practice Strategies Key to Successful Maintenance Effort

Today's "best-of-breed" pulp and paper mills identify and use proven best practice techniques to boost maintenance efficiency and focus on reliability. — By John Yolton

With competition in manufacturing coming from many global regions, the challenge to remain profitable places greater and greater emphasis on those actions within the mill that can positively affect the bottom line. In this regard, the maintenance and reliability effort has finally come under minute scrutiny by upper management, which refuses to accept the time-honored premise that maintenance is a "necessary evil."

Rather, these managers are expecting, rightfully so, that improved management of the reliability effort is an opportunity to add to the profitability of the operation. Many managers view reliability improvement as an investment, and expect that modifications to existing efforts will have "low hanging fruit" potential.

In the past, "inspired" managers allowed some freedom for changing reliability and the existing maintenance function, as long as performance of the operations did not suffer. Many times the measurement of that operating performance was poorly documented, simply because the tools for collecting and analyzing data were not present. However, lack of tools or "enablers" is no longer an excuse.

Today, there is an evaluation technique for maintenance and reliability. Although the principles of this technique have always been present, tools used for the evaluation have required improvement. That process is called *best practices evaluation*.

These strategies require an understanding that certain practices within an operation contribute to performance that exceeds that of its competitors. Research of these improvement practices is performed by a variety of people and organizations, and much has been published relating to best practices.

The list of best practices used by various "best-of-breed" industries has been determined and well documented. This article examines some of these identified maintenance *best practices* being used by industry:

Benchmarking

"If you always do what you always did, you will always get what you always got" is a commonly used phrase to explain the process of doing nothing, especially in regard to improving the process. One tool used effectively today is that of benchmarking.

The process of benchmarking can take many forms. One is to compare a specific mill with other mills within a company, using criteria for indicative data that will highlight differences, e.g., opportunities.

Another method is to use an outside firm to provide comparison data, perhaps across many industries, so that potential opportunities can be identified and cost/benefit analysis can be performed.

Key Performance Indicators

(aka KPI, Dashboard, Balanced Scorecard)

KPI's are the report card for performance of the functions driving processes. The basic premise for KPI's is the adage "you cannot improve what you do not measure."

Determining indicators that are relevant and meaningful is perhaps the biggest challenge. Results of monitoring KPI's and focusing individual and team effort to achieve KPI's are significant. As expected, KPI's should show progress towards achieving the business goals of the corporation.

Work Flow Control

Any action requires some measure of control. To control or manage the action and future similar actions, information concerning each action is required. This usually takes the form of a work order to which additional information is applied throughout the course of whatever action is taken.

Even today, with the availability of software systems that run on anything from desktop browsers to corporate-wide client/server configurations, there are still mill operations that fail to document their maintenance work

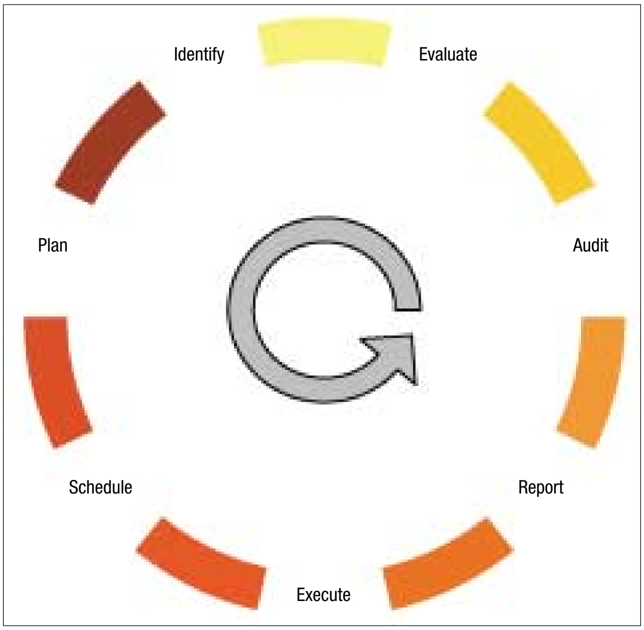

Figure 1. Work flow control is critical to the maintenance/reliability effort.

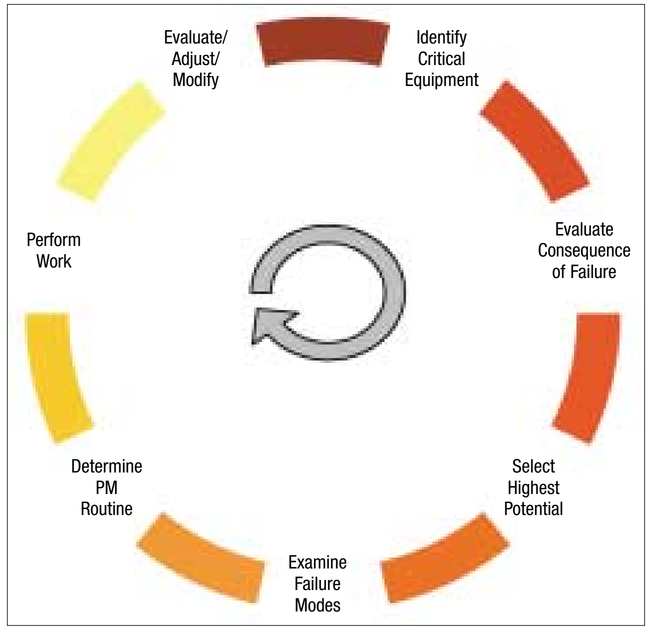

Figure 2. Simplified Flow for an RCM Process.

in any form and are expecting to successfully compete with those that do.

Controlling the flow of the identified work is tantamount to managing your overall maintenance/reliability effort. Your typical "reactive" response to maintenance needs in a mill is indicative of a lack of work flow control. No one is managing the process.

Preventive Maintenance *(aka PM)*

Everyone has a PM program, or so we are told. Unfortunately not everyone fully utilizes the existing program to its ultimate capabilities, or else they severely abuse the intent of the program by overburdening it with "wants"' versus "needs."

Some common PM problems include:

- The PM program may not currently be applied to the right equipment
- The technology may have changed but the strategies for its care have not
- Staffing requirements for PM routines are not met because of other "more critical," higher-priority needs
- Scheduled downtime associated with preventive maintenance is viewed as potential operating time to be used as makeup for the lost time occurring from other, unexpected outages.

Operations Driven Reliability

(aka Basic Care,® ODR)

Maintenance of operating equipment is an operating responsibility. The degree to which equipment or a facility is maintained is determined and approved by operations. The expertise and capabilities of the maintenance force and its management determine the quality and quantity of work performed.

In many cases, in today's highly competitive market, the operators themselves are now performing many of the former "maintenance" tasks, where skill is not a factor. This use of operators to perform basic maintenance tasks is called Operator Involvement, or is part of a Total Productive Maintenance initiative. The most successful mills in the world have recognized this basic assignment of responsibility sharing.

Reliability Centered Maintenance

(aka RCM, RCM II, SRCM®)

Analysis of lost production opportunities as a result of equipment failure, or a lack of specific management processes or policy, is a sure-fire way of deciding on corrective actions to prevent similar future occurrences. Many mills practice this "feed-back" methodology for reducing their equipment downtimes and personnel related safety problems.

The best mills have set up an RCM process within their facilities and follow the procedures with discipline. There are many published techniques explaining this process, but in simplistic terms it follows the flow in Figure 2.

It is not atypical for an RCM analysis to resolve a significant problem with a simple inspection or PM routine.

Materials Management

(aka MRO—Maintenance, Repair, Operations)

The most efficient mills in the world today recognize that management of the materials used in the performance of maintenance is a definite best practice. Contributing factors include locating maintenance inventory relative to the work areas, spare parts delivery schemes, improved parts identification through the availability of bills of materials for an asset, vendor managed inventories, and use of bar coding, among many others.

Enough research on this one subject has shown that relatively simple changes to current practices in this category can contribute as much as 10% to the overall efficiency of a reliability and maintenance effort.

Diagnostics *(aka CBM—Condition Based Maintenance; PdM—Predictive Maintenance)*

These predictive maintenance technologies are firmly in place at most paper mills. This wide-spread best practice now centers on the application and functional use of the technologies available. These application and technology discussions continue today.

The fact is well established that the use of diagnostics, with follow-up corrective actions associated with prior notification of failure, leads to improved reliability and bottom line performance. Doing the right work has as much or more effect as doing the work right. The assumption of course is that action will be taken based on analysis of the data.

Examples of diagnostics technologies include:

- Vibration (both batch and real-time continuous monitoring)
- Thermography (moving more and more into the mechanical side of maintenance)
- Thickness measurement (particularly in the pulp mill and power generation areas)
- Oil Analysis (most mills have been practicing analysis; however, the analysis of oil samples has progressed with technology, providing much more data for failure mode analysis)
- Inspections (visual inspection by qualified personnel is still a diagnostic best practice).

Asset Care Management Systems

(aka CMMS/EAM)

Having a computerized information and transaction system and realizing the potential from that application is a controversial matter today. The fact remains, however, that accurate, timely, widely available information is key to making effective decisions regarding the care of assets.

Having and using an asset care management information system is a best practice. An analysis of the "as-is" situation will immediately identify the presence of a number of "stand-alone" systems. Generally these take both manual and electronic (usually spreadsheet) forms.

Various people within an organization use the stand-alone systems to archive information and track mill processes such as motor changes, roll records, safety data, RCM, PMs, etc. Too often, because a single user has usually developed the application, the valuable information captured is not widely available to other users who would benefit from the information.

Knowledge Based Maintenance

(aka DSS—Decision Support System)

The evolution of information support systems has led to a new breed of enablers generally referred to as decision support systems. Fundamentally these applications access other databases for information and data relating to specified assets and their performance characteristics, so that current performance can be evaluated and actions taken depending on the analysis.

Rules are typically developed (the knowledge) for each critical asset being monitored. These rules establish acceptable base performance criteria. Deviation from this base level triggers an alert/alarm, which in turn can trigger a recommended action by the appropriate response resource, e.g., operations, maintenance, outside contractor.

Example: A large integrated mill installs a DSS to monitor and evaluate process performance. Embedded in the DSS is the capability to analyze online and hand collected vibration spectrum which, when processed through the rules engine, indicates a developing problem with a drive motor. An alert is transmitted to operations with a recommendation for further, immediate analysis of the motor's integrity. This evaluation leads to a shutdown and a near catastrophic failure is averted.

Training

(aka precision maintenance, automation maintenance)

Overlooking the basic elements of maintenance has also become a problem with today's modern mill. Alignment, balance, proper mounting of bearings, and lubrication techniques all contribute to good maintenance practices (or, if not applied correctly, poor practices).

Often, this training is expected to be passed along from one generation to the next while performing on-the-job training. This expectation is not being met generally. Recognition and correction of this deficiency can lead to significant improvements in equipment reliability.

Continuous Improvement

(aka CI and Adaptive Management)

"If it ain't broke, don't fix it" is not a best practice concept. That strategy, referred to as the "caretaker" syndrome, follows the belief that improvement is not required, that everything will be just fine without disruptive change.

The more effective maintenance efforts within the industry today have all adopted another common belief: "where we are today only makes us better than the competition, it does not make us the *best*." Constantly striving to improve the current status, whether in skills competency, equipment utilization, productivity, etc., is an indication of a facility's desire to achieve competitive superiority.

It is human nature to desire improvement of current circumstances, but it is also human nature to resist change. The key to successful continuous improvement is to replace the existing with something better. The process for success is "selling" that change on the basis that it will improve the life of those involved. Continuous Improvement is a process, not a product, or a final state.

Conclusion

The examples above are just some of the best practices being used today by maintenance and reliability functions in the "best-of-breed" mills in the paper industry. These companies have taken the time to identify what they and other operations are using to improve their maintenance efforts and focus on reliability.

The constant vigil for "best practices" is not restricted to looking at other operations within the paper industry. In fact, the RCM process originated in the airline industry and is applied with many hybrid variations throughout all industries. What is your mill's maintenance and reliability strategies? Will they give your operation a competitive advantage? ■

About the Author:
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