ARE YOU READY?

Preparing For Reliability Improvement

Improvement initiatives backed by effective practices and policies can enhance profitability. Careful preparation is key, says this industry veteran.

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IT'S A FACT OF LIFE across industry: Many organizations need to upgrade their basic maintenance practices. Even when good ones are in place—such as preventive and predictive programs, effective planning, scheduling and MRO-purchasing/storeroom policies—some plants still need to strengthen elements like equipment availability and cost-reduction efforts. Improving availability and reducing costs (from both maintenance and operational standpoints) can best be approached by implementing an equipment-reliability-improvement program. While these efforts may require significant time and resources to implement, they can generate enormous returns.

Getting the biggest reliability-improvement bang for your buck calls for careful, upfront planning: Success involves more than simply hiring engineers and telling them to go out and "fix reliability."

Start with your data

While the fact that data drives reliability improvement may seem obvious, it's not uncommon for companies to either 1) not have data; or 2) have data that's not easily mined from their CMMS/EAM systems. The following activities are crucial to undertake prior to embarking on a reliability-improvement initiative:

- Ensure you have best-practice work processes that collect data and appropriate policies in place.
- Ensure that you classify work in a way that it can be mined to understand problems.
- Identify key performance indicators (KPIs) that can point to potential opportunities.
- Establish KPIs to gauge how well your preventive (PM) and predictive (PdM) programs perform.

Best-practice work processes

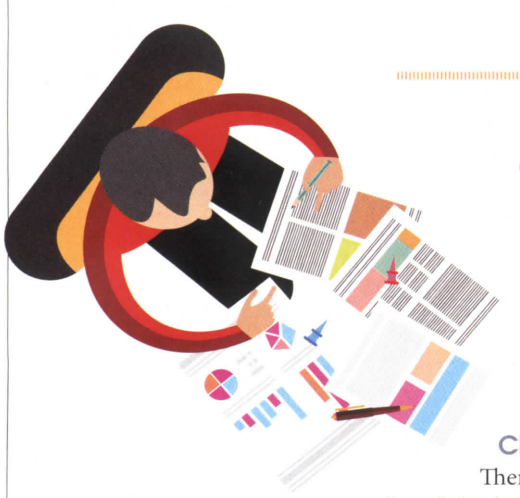
The work-order work process is the most fundamental element of successful maintenance. All work must be captured. This must include labor, materials, contractors and other expenses that go into maintaining plant equipment. This information must be accurate, and the type of work being done must be coded carefully.

A second key area is ensuring that all work goes through a planning and scheduling process so that needed work is agreed to by operations and executed systematically. This means all PM and PdM work will go through this process. (KPIs and effective management-review procedures must be in place to make sure these important processes are accomplished effectively.) While an entire book could be written about these basics, this article focuses on PM and PdM work orders. Companies spend time to write PM instructions and create PM programs, but often don't manage the process effectively.

It is important that PM efforts find and repair things that will prevent operational outages or other emergency situations. A good way to do this is to ensure that when something is found, a work order is created to do that corrective work. Too often, companies allow technicians to repair found defects and charge their time and materials to PM work orders. This is a big mistake, and indicative of an area where a policy must be in place. Although this can seem a pragmatic way to perform work that might involve only a few minutes of a technician's time, it's one that could potentially mask a problem.

A good policy is to establish a timeframe for such work, say 15 minutes. Work that can't be performed within the specified time would require a follow-up work order. It's also important that the follow-up work order be appropriately coded as work identified by a PM activity. An additional recommended policy element is that, regardless of time, if a part is required for the repair, a corrective-action work order must be created

The path to success involves more than simply hiring engineers and telling them to go out and 'fix *reliability*.'



Data drives reliability improvement, yet many companies either don't have any or don't have the type that's easily mined from a CMMS/EAM system.

to capture the labor and materials used.

Classifying work

There are many ways to classify or "type" the forms or reasons behind why any given work is needed. Each company has to determine what makes sense for its particular situation. For starters, consider the following two methods:

1. Work classes/classifications

- Routine Maintenance
- Capital Project
- Process Modification
- Preventive Maintenance
- Predictive Maintenance
- Regulatory/Environmental
- Safety
- Miscellaneous

2. Work type

- Normal Repair
- Replacement
- Inspection
- Troubleshooting
- Adjustment
- From PM
- From PdM
- Miscellaneous

Whatever designations or codes your operation chooses, they must be accompanied by clear definitions on their use, including by whom and under what circumstance. This leads to granularity and standardization of data that eventually provides useful diagnostic information.

KPIs for opportunities

There are several KPIs that can indicate opportunities. An excellent one is a report that shows the mean time between failure (MTBF) for equipment. Again, a policy may be established that if a piece of equipment falls below a selected value, that equipment must receive a formal review. It may be that the equipment will be placed in the capital replacement plan, put into a rebuild schedule, placed on a list of equipment that will undergo an improvement process or simply be lived with as is. This review must be done in coordination with operations.

Often, a piece of equipment that does not appear on the MTBF list may be identified by operations as needing improvement. This may be because of the schedule production load, lengthy repair time when a failure occurs, the lack of a back-up process, support of an important customer or the high cost of replacement processes. Another good KPI to create is a report of high-maintenance-cost equipment. These may offer significant cost-reduction opportunities.

Once a list of opportunities has been identified, some are selected for equipment improvement. A joint, maintenance-and-operations, equipment-improvement process can be effective, and should be considered. Such groups should be facilitated by a reliability engineering expert. This will leverage engineering resources and create greater buy-in when solutions are presented for approval.

Data must then be gathered from the selected equipment to support the problem-solving process. This is where good coding and the creation of corrective-action work orders provides a substantial payback. If corrective labor and materials are charged to PMs when defects are found, data-mining becomes very difficult. That's because with possibly thousands of PMs done in a facility over the course of a year, perhaps only hundreds capture faults. Since those hundreds will be hard to find, the data will need to be sorted and classified manually—a frustrating process for any site.

KPIs for PM effectiveness

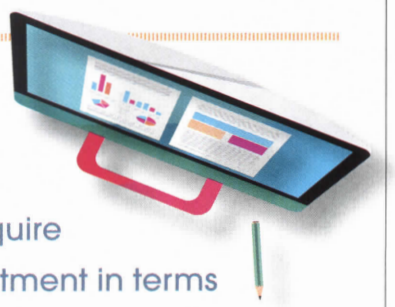
An excellent KPI for monitoring PM effectiveness is to create a report and chart of how many faults are detected per 100 PM activities. An effective

program will likely find between 5 and 20 faults for each 100 PMs performed. The report should show PMs that do not detect any faults, and also highlight those PMs with a large number of findings. Too few may indicate that the PM frequency is too often or that the PM tasks are the wrong ones. Too many may indicate that PM frequency is not often enough or that there is a problem that needs a reliability-engineering review.

It is important to regularly review PMs to keep them current. Annually is a good practice. Not only do technicians become aware of things that need to be checked over time, they see things that do not need to be checked. Changing operational conditions can also induce different failure modes or necessitate a different PM.

Regular reviews can also help determine if a PM can be moved to a PdM, add more objectivity to the work process, and identify the most appropriately skilled person(s) to perform the work. A KPI here might be the average age of PMs since their last review, with special reports on PMs that exceed the company's policy on review frequency.

Of course MTBF and mean time to repair (MTTR) will also indicate how effectively a PM effort is being planned and performed. However, since the absolute value of these measures may not be the best indicator, look carefully at the trend line to verify continuous improvement.



Implementing a reliability-improvement program may require a significant investment in terms of time and resources, but the payoff can be enormous.

The bottom line

Implementing a successful equipment-reliability-improvement program may require a significant investment in terms of time and resources, but payoff can be enormous: Incorporating best practices, good practices and well-defined policies, these initiatives help companies become and remain profitable. Don't let inadequate preparation come back to haunt your organization's efforts. **MT**

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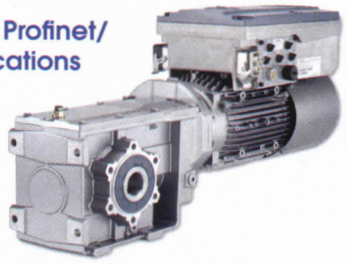
LEADING EDGE

Manufacturing Solutions

A variety of new products and services were rolled out at PROMAT 2015 in Chicago, including:

Gear-Motor Drive with Profinet/EtherNet/IP Communications



According to Siemens, its new SINAMICS G110M motor-mounted drive for SIMOGEAR gear motors meets the demand for faster machine-build, installation and start-up capabilities in a space-saving design that offers increased control flexibility. Equipped with integral USS/Modbus RTU, Profibus, and Profinet/EtherNet/IP communication profiles, it's the newest addition to the Siemens Integrated Drive System (IDS) line-up. The unit's high degree of protection—up to IP66—makes the G110M suited for a variety of applications, including conveyors. For applications that require safety technology, the new drive incorporates functions such as "Safe Torque Off" (STO) that can be activated via a fail-safe input, or Profisafe without additional safety-monitoring components.

Siemens Corp.
industry.usa.siemens.com

Turnkey Retrofit Conveyor Program

A new turnkey retrofit program from Regal Power Transmission Solutions is designed to transform live-roller conveyors for sustainable, high-uptime performance. Combining its System Plast modular plastic belt and chain, high-efficiency Hub City or Grove Gear drives and Sealmaster material-handling bearings, Regal provides single-source or à la carte capabilities for on-site evaluation, consulting, layout design, validation and installation. System Plast heavy-duty plastic belts provide a non-skid, energy-efficient conveyor surface for moving walkways, automotive assembly lines and material handling of heavy loads. Hub City High Efficiency Right Angle reducers are designed to replace industrial worm-gear drives, providing 90% efficiency in all ratios. Grove Gear Bravo gear reducers feature lightweight, single-piece, vent-free aluminum housings protected with high-temperature nitrile output seals. Available in several styles, Sealmaster bearings feature a cast-iron base or housing for improved stability.

Regal
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