

# Groundwork for Creating a Successful CBM Program

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## Abstract

The success of a Condition Based Maintenance (CBM) program relies on more than just having the condition monitoring tools. Instead of asking which condition monitoring technology is better, the facility should start with a thorough understanding of the failure modes associated with their most critical assets. In addition, aligning to more of a culture of reliability as opposed to a culture of firefighting can be the biggest obstacle of all. This presentation will deliver information for the attendees to think about when starting a condition monitoring program, suggested culture change management, creating awareness of the condition monitoring program, and ways to help create program buy-in from leadership.

When deciding to implement a Condition Based Maintenance (CBM) tool, there are always many questions asked and decisions to be made. Ultrasound or vibration? Infrared or oil analysis? Motor current testing or precision alignment? Which CBM technology to choose? Over the years, I have had countless conversations with maintenance and reliability professionals on which CBM technology is better, or which CBM technology they should use?

Instead of asking which technology is better, the question should be which technology can be used to find the failure modes that I'm looking for, and how early will we be able to find them? A good CBM program will first start with a detailed asset criticality assessment. Once it has been determined which assets are the most critical to the processes, the maintenance organization should then understand the failure modes of their most critical equipment. Based on the failure modes on the most critical equipment, there should then be research and understanding on the CBM technology that will find the failure mode early enough in order to plan and make repair or replacement decisions before the failure becomes so severe that safety and shutdowns are the result.

Once the CBM technology has been chosen, questions should be asked regarding both the current need and the foreseeable future. An example might be with airborne ultrasound, the current need may be only for compressed air leak detection, but the foreseeable future need might be for a bearing condition monitoring program. So, obtaining an ultrasound instrument that will easily allow for the transition from a compressed air leak program to a bearing condition monitoring program should be selected. Another question that should be asked, but is commonly overlooked is the amount of support that is offered by the CBM technology solution provider. Usually, the solution provider is willing to do a lunch and learn to discuss inspection techniques for certain applications. Software and instrument specific webinars are usually easy to set up and can be an easy and effective training method. With the onset of the industrial internet of things movement, a very common question asked centers around the data collected from the CBM tool. Questions such as how will the data be utilized? Where will the data be stored? How can my CBM technology data integrate with my CMMS or other monitoring systems?

Speaking of data, in my many visits to plants and facilities each year, if there is one thing that I can see that maintenance and reliability professionals can do better, is reporting and documentation. If maintenance is to be perceived as value rather than cost, reporting and documenting the findings from the CBM tool are critical. When documenting problems found from the CBM tool, ROI information should be included. For example, instead of reporting that a certain number of compressed air leaks were found during the last compressed air leak survey, the report should include the dollar amount reflected and the wasted energy loss from those compressed air leaks. If the problems found are mechanical problems, then the reporting should also include the costs associated from the potential downtime that was averted due to finding the problem early before there was any unnecessary equipment downtime. Any of these reports should be well documented and shared throughout the facility including upper management, and at the World Class level, this information should be shared with other similar facilities within the organization.

### **Why do CBM Programs Fail?**

CBM programs usually fail due to a lack of clear goals and expectations. The people involved in the CBM program need to be educated on why there is a need for doing things differently. They also need to be supported and allowed the proper amount of time to use the CBM tool. Once the tool is in use, there needs to be clear expectations on how the data and reporting will be used. This is important so that they understand how the data that they are collecting will be used to make better decisions on the work that is to be done. A CBM program will also need to have root cause analysis done on any failures detected on critical assets. All of these actions together, that are done on a regular basis, will help to sustain the CBM program.

Moving from reactive maintenance to a more proactive maintenance approach is a big change, and as with any change, there are always challenges. Many times, a decision to not do anything, either consciously or unconsciously is a decision. Another common excuse for choosing to do nothing is time. Time is an excuse that many use to simply dodge the obvious. Two things must be in place before any CBM initiative begins: a team of individuals who aren't afraid to step up to the challenge and a clear set of goals and expectations for those individuals.

The origination of some of the eventually sustained and successful CBM programs that I have seen, was started by someone who wasn't afraid to step up and take a stand against continued reactive problems. The person or team willing to do things differently have already recognized that the organization can no longer continue to operate in a reactive environment. These people will be the champions that will help to lead the change.

Well-defined goals and expectations are also critical. The goals set should not only reflect the goals of the maintenance & reliability department but should also be in line with the company's core business strategy and core principles, along with any industry specific corporate and regulatory compliance. The goals should also take into account safety improvements that coincide with improvements to the reliability of the equipment, customer or supplier satisfaction when production is improved due to more reliable manufacturing processes, environmental awareness of improved energy and waste reductions due to a more efficient and reliable facility, and increased shareholder value through more reliable and efficient processes. So, we know that there will be challenges, therefore we should have a solid plan in place to overcome those challenges.

## **Planning for Success**

Regardless of the CBM technology chosen, having a good plan in place before the technology implementation will be critical for success. In many cases, the culture of the organization can be the biggest hurdle. There are many models to help with a change management initiative. One in particular, is *Kotter's 8 Step Model*. First, one must prepare for the change. In this phase of the change management, there must be a sense of emergency established that links the change to the organization's long-term goals and enlists leaders who support the change. Second, a guiding coalition is created with leaders onboard who will let the team know what is expected and how others can be coached to lead the change. Third, a change vision is developed in order to engage those who will be impacted by the change and one that resonates with those who are impacted.

In phase two, the change is managed. In step four, change is managed by communicating the vision for buy-in which helps to ensure the change is stabilized. At this point, the team should begin to look for resistance to the change, and coach and reinforce as needed. Step five requires empowered broad-based action which makes it

possible for people to adopt the change and removes organizational obstacles such as structure, KPI's and reporting processes that are inconsistent with the change. Step six is a momentum building phase where short-term wins are both generated and celebrated. This increases the probability that others will adopt the change. The final two steps of *Kotter's 8 Step Model* help to reinforce the change. It's important to keep your message alive and monitor the progress of the change and have discussions to keep people from reverting back to old habits. Step eight is to incorporate the change into the culture. In this final step, leaders and managers have the change embedded within and policies, procedures, audit processes, and communication are all in alignment with the new change and culture.

Planning for success may include a benchmarking visit to a sister site who already has a CBM program in place, or any facility that has a mature CBM program in place. Especially one with a program centered around the CBM technology that is of interest. Writing a detailed procedure for how the CBM technology will be used is also critical for success. It's also important to select the right personnel who will use the CBM technology. Selecting someone who understands the need for the initiative, how the tool will be deployed, what assets will be monitored, and an understanding of what failure modes the tool will detect. In addition, the personnel chosen should be properly trained. When considering an investment in a CBM tool, the training cost is usually minimal compared to the overall cost of the tool. So, when budgeting for costs, formal training should be included if the user is to get the most out of the tool and have the right understanding of how to use the device.

Additional best practice information for CBM programs can also be found in industry resources like the Society for Maintenance & Reliability (SMRP) Best Practices Metrics. This reference is available to members of SMRP at no additional cost. It is compiled using a wealth of knowledge from industry practitioners. Some of the metrics referenced that are directly related to CBM programs are Maintenance Training Return on Investment which is an objective used to determine the ROI of training maintenance employees. Tracking this metric will help to gain information to make improvements to the facility's maintenance and reliability program. Another metric of importance when tracking the progress of a CBM program is the percent corrective work from the CBM findings. The SMRP Best Practice Metrics suggests that at the World Class level, the percent corrective work from CBM findings should be greater than 35%.

## **Sustaining the Effort**

Making a move from reactive maintenance to a more proactive maintenance strategy is a big change. In order to do that, the organization must change what is valued. In a reactive environment, "firefighting" maintenance is valued, but in a more proactive environment, the strategy should be to prevent the fires from ever being lit. In a more proactive environment, the "firefighters" are no longer the "heroes." When the focus is placed on how the organization can prevent failures from happening, that's when the culture begins to shift from reactive to proactive. Sure, there will always be some

reactive problems, but being able to minimize the reactive work allows for more time for more productive PM's, better planning and scheduling of work, increased equipment uptime, and an increase in overall equipment effectiveness (OEE).

## **Conclusion**

In order for all of this to take place, the people involved must be engaged, informed, trained, and supported. They should have clearly communicated goals and expectations. Also, the ones involved in the new CBM strategy, should have a sense of ownership in the program and understand why their role is important. An effective use of condition monitoring tools can help to be forewarned about potential problems before they become reactive problems, but there must be processes in place that allow for the successful use of those condition monitoring tools. With some initial planning and thought, managing the change correctly, and getting some guidance from industry resources like the SMRP Best Practice Metrics, the CBM program will have a better chance of being a successful and sustainable program.