Elements of a Good Preventive Maintenance Program

White Paper Sponsored by:

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Elements of a Good Preventive Maintenance Program

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1. Right content.

If your program does not have the right content, it will never generate the desired and possible results. If your program has not been thoroughly updated in the last five years, it probably contains not only too much PM, but also the wrong activities. A good PM program has +90% of all PM activities done as inspections while equipment is running.

Classical examples of wrong and excessive PM are PM activities on V-Belt drives, couplings and many other components with safety guards. Many PM programs suggest that these components are inspected weekly by maintenance crafts people and every shift by operators. On top of that a shutdown PM is also done every six months. The fact is that most of the guards are designed in such a way that the components cannot be inspected while equipment is operating, and it does not make sense to inspect something that cannot be seen.

Many guards are big and heavy, so it can take two crafts people several hours to take off guards, do the inspections and replace the guards during a shutdown. Even worse, if they find a problem on the component during this inspection, and it has to be corrected before start up, this could lead to a prolonged shutdown and production losses.

If guards are designed in the right way, the only PM needed should be inspections on the run. In a route based inspection program, each of these inspections takes an average of about three minutes including walking time. If a problem is found during these inspections, a planned and scheduled corrective maintenance action will be done when the next opportunity presents itself.

To decide on the right content, you must understand three things.

1. The consequence of a breakdown of the component.
2. How a failure can be detected.
3. How long before a breakdown of the component a failure can be detected.

Consequence of a breakdown.

A break down is defined as the point in time when a component's function ceases. The consequence of a break down can be prioritized in following groups.

1. Personal or environmental damage.
2. High costs for production losses or maintenance to correct break down.
3. Preserve value.

As a first step, it is good advice not to go into any elaborate and time consuming evaluation to find the criticality of equipment. That can be done later. We use the following fast approach to evaluate criticality:

A . Ask yourself what will happen if this equipment breaks down.

For 90% of equipment the answer is given by reading the name plate of equipment and understanding the process. If there is spare equipment, you can find out how fast this spare equipment can be started.

B. Ask Operators.

If you do not know the answer to the first question, you should ask an operator.

That will take care of about another 50% of the remaining questions.

C. Consult process and Instrumentation drawings.

It is bad if the operator does not know the answer, but it is also identifies a need for training.

Together, we will look at a process and instrumentation drawing to learn what will happen if the equipment breaks down. This will answer most of the remaining of unanswered questions.

With this screening process you only need to analyze what is important to analyze and you save more than 90% of time as compared to processes suggested in Reliability Centered Maintenance and similar programs.

Using the same approach as above, the next step will be to set up the right PM for each component (Coupling, valve, cooler, etc.) of the equipment (e.g. Hydraulic system).

2. Documentation and training.

When you have selected the right PM procedure, you need to document this procedure. It is important that you decide on the format for this document, because it should be used to train people and to improve the chosen procedure in the future. Remember that in this case, we talk about basic inspection methods, not predictive maintenance methods such as vibration analysis and wear particle analysis.

In our program, we have chosen to call these procedures Condition Monitoring Standards (CMS). We use a lot of pictures to describe these procedures, and I would recommend you to do the same. It is easier and safer to describe a method with a picture than in words. The document also stands a better chance to be read and understood if it includes pictures. IDCON has 100 of the most common components already documented. To purchase these or to view and download examples you can go to www.idcon.com and click on "Bookstore".

As a minimum, you need to include what, how and especially why an inspection should be done.

It takes time to develop these documents, but remember if you have done one, for example for a coupling, this document will be reused for all other couplings of this type.

Frequencies and other values unique to the individual component will be described in the route list or in a hand held computer.

Do not make the mistake of assuming that crafts people or operators know how to inspect components.

My experience is that crafts people have been trained to do repairs and troubles shooting of problems that already exist. Very few have been trained in inspections to find problems before they are actually problems. Much of this training is a thought process; you need to teach people to think about inspections and anticipating latent problems.

The CMS documents together with professionally available training material, form very unique useful and effective “Know-How and Know-Why” training material for operators and crafts people.

As a minimum, the training should include inspection methods for most common components and systems and a review of useful basic instruments and tools such as high intensity lights, strobes, and hand held IR instruments, mirrors and other optical tools and leak detectors. Contact IDCON at info@idcon.com if you would like a proposal for this type of training.

3. Assign resources.

It seldom works well to just say, 'PM is priority 1, and we will assign different people to do it as we see the need." Or even worse: "Our team decides among themselves who will do the inspections today." To try to do it this way, is almost a guarantee that your PM effort will fail.

Another common mistake is to assign people on the night shifts to do PM when they have nothing else to do. The reason for having maintenance people on shift is so that they can respond to possible emergencies. If there are no emergencies, they are not needed on the shift and they can be moved to day time work.

The best results are always achieved when special people are assigned to do inspections on a full time basis.

If you assign dedicated resources to do basic inspections of equipment you will get:

- The right people to do the inspections, including minor adjustments and repairs.
- The right people trained in this unique work.
- The ownership and interest for PM that is necessary for continuously updating and improving the PM work.
- An easier situation to manage. It can be very tempting to pull the people who are supposed to do PM to do emergency work.

Wherever the assigned resources (PM inspectors) report to in your organizational structure, I advise that they work very closely with the supervisor in the area where they do the inspections. Make sure that the PM inspector reports his/her findings and what

he/she has inspected to the supervisor once or twice a day. When he/she has completed his/her route, they should do some of the repairs and adjustments that are the results of the inspections. This will cut back on administration and ease up the friction that otherwise can develop between PM inspectors and the crafts people who have to do all of the repairs.

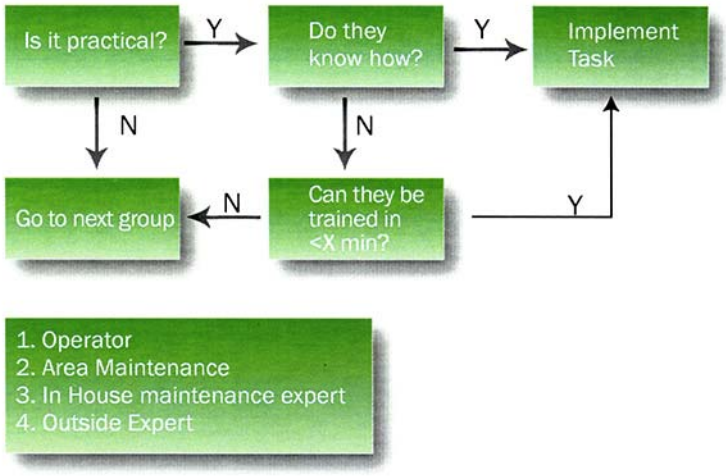
More good advice is that PM inspectors should start all routes with an interview with the operators in the area to be inspected; this will improve communication and on-the-job training of operators. Your goal should be to have the operators do the majority of PM inspections.

4. First decide what, and then decide who.

After you have decided what PM activity needs to be done and with what frequency you decide who shall do it. First choice should be:

1. Operator.
2. Area Maintenance. Mechanical, Electrical, Instrumentation crafts person.
3. In House Maintenance Expert. For example Vibration Analysis or Wear Particle Analysis.
4. Outside expert. For example, X Ray, Acoustic Emission.

The chart below describes the decision cycle.



Equipment Care - Who

For example:

Is it practical for an Operator to do the chosen task? If the answer is yes, because the component to be inspected is close to operator's working area, then you need to ask if the operators in that area have the skills to do the inspection. If the answer is no, you need to decide how much training time you shall spend to teach operators how to do the inspection. You might decide to spend up to 20 minutes as a maximum training time per

task and in most cases you can train an operator in less than 20 minutes how to do an inspection. If this is the case, the next step is to document the operator inspection in your chosen system. If the answer is that you need more time than 20 minutes to train an operator to safely and reliably do the inspection, then you go to the next choice which is Area Maintenance and repeat same questions etc.

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IDCON, INC is a highly specialized consulting company. With our experienced consultants, we specialize in Reliability and Maintenance training and implementation in industry.

Christer Idhammar *is a world renowned expert within Reliability and Maintenance. He started his career in the Swedish merchant marine where he started developing fundamentals of his Results Oriented Reliability and Maintenance Management concept. During the last 40 years this concept has evolved during his time as mechanic crafts person, engineer, manager, consult, educator and philosopher, reliability guru and company leader. As a consultant he started the Idhammar group of companies in 1972 and his own company in USA 1985 -IDCON, INC in Raleigh North Carolina, USA.*

Awards:

He received the coveted EUROMAINTENANCE Incentive 2002 award during the biannual EUROMAINTENANCE 2002 conference in Helsinki in June 2002. Among 19 member European countries he was nominated and received the award from EFNMS - European Federation of National Maintenance Societies - for outstanding achievement and world wide accomplishments in the field of reliability and maintenance.

In 2008 he received the Salvetti Foundation Best Speaker award among 154 speakers at Euromaintenance 2008 in Brussels, Belgium

Several hundred successful companies around the world have engaged Mr. Idhammar in their reliability improvement initiatives.

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