A little secret

Joel Levitt teaching in Kuala Lumpur Oct 2009

Raise your hand if you would like to go from reactive to proactive maintenance. Going from reactive to proactive is like yearning for the shiny red bike in the toy store window before Christmas. All the kids going by want one, but only a few of those kids' parents will spring for one. Proactive maintenance is similar — all the smart maintenance professionals want it but few companies' management will actually step up to the plate and pay. After all, the usual way to proactive maintenance is an arduous multi-year journey needing money (sometimes a good deal) and top management support.

There has got to be a better way. If you believe what you read, all it takes is a good solid preventive and predictive maintenance system (PM/PdM). But there is a logical problem with merely installing a system unless you get extra and specific resources for the duration of the effort. Let's look at that. PM will get you to proactive maintenance, but without extra resources to support it especially in the beginning, you'll need a very thick skin, a great deal of patience and a decades-long attention span.

To see why this is so, let's take a closer look at reactive maintenance. What does it mean to run a reactive maintenance effort? If we look at the condition of equipment in a typical reactive organization, we would find that most have suffered deterioration. In fact, most equipment is in various states of impending catastrophic failure. There is also no effective effort to identify deterioration that will lead to failure, and prioritize and deal with it before the machine breaks down.

If that is the state of a reactive shop, why not use a PM system to turn the ship around? What is the logical problem mentioned earlier? Let's assume reasonably level resources for maintenance. Your people are already working on breakdowns most of the time. Who is available to do the additional PM work load? Well, usually the PM is done during down times when there is nothing else to do. This is called "bootstrapping" the PM system.

Bootstrapping might have worked in the days when your personnel weren't already stretched so thin. It actually never worked that well because of the logic of PM. Half the effectiveness of PM comes from basic maintenance tasks such as cleaning, lubricating and tightening bolts. These lengthen the life of equipment **already in good shape** (no critical deterioration to cause breakdown). The other key to PM's effectiveness in reducing breakdowns is that when deterioration is found by inspectors, it is fixed **before** it turns into a breakdown (called corrective maintenance).

Visualize that your shop is stretched thin from cutbacks when you decide to add PM activity. On top of that, add additional corrective activity. What do you think will happen? Will you have the discipline to do corrective maintenance work on the equipment that might fail instead of working on equipment that has already failed? Remember there are no extra resources.

This is the contradiction of trying to install PM systems without adding more resources. Since PM has demonstrated it takes a year or more to start to take effect (when done fully and correctly), many more installations are abandoned during their first year than succeed. This is the reason why most PM attempts to move from reactive to proactive maintenance fail (usually not with a bang but with a whimper).

What else can be done? Another strategy is to spend some time (say a year) doing two activities at once. The first activity is getting better at reactive maintenance. Have the crew figure out what should be done to reduce the time it takes to react and repair a breakdown. Use people in teams and create a structured technique to capture ideas and propose experiments. More on the specific technique later but consider Root Cause Analysis (RCA) to reduce the time it takes to be reactive.

The second activity is to look at all your repetitive failures plus any repetitive requests for maintenance help. Using established RCA techniques, try to fix them forever. Not all repetitive failures will be solvable with your teams and within your limited budget. But if you pick well, these will free up some time to start more RCA projects.

This dual strategy requires some bootstrapping of the labor for the first few months and some limited additional materials. As a year goes on maybe 20-30% of the repetitive failures can be resolved through RCA. As these problems get fixed forever, their labor is freed up. Use that time to start a PM program.

Start the program small. Be sure you install PM in a rigorous manner. Start with the most critical machines. Go over any machine destined for PM and fix everything your inspection turns up before letting it become an asset in the PM system. One by one, add assets to the PM list. Now that is the way to bootstrap a PM system.

What about RCA, what is that? Simply speaking, RCA is a structured process to solve problems. It can be applied to everything from accidents (such as the space shuttle disasters), plant fires and explosions to small localized problems. Even small interruptions to production can be analyzed with RCA. Basic RCA techniques can be learned in two days.

RCA is best done by small teams of people (3-6) with different backgrounds. At minimum, someone from operations, an expert in the process and someone from maintenance should be present. Also smart people from other parts of the company are useful to ask the “dumb” questions that the professionals would never think to ask.

The first step is to figure out what the problem is. This is tougher than it sounds. Some problems are concealed; some problems are the result of misunderstanding, misdirection (both intentional and unintentional) or mishandling.

Once the problem is defined, the consequences are spelled out and, most important, ways to measure results are chosen, the second big step is to gather data and brainstorm causes. You may develop a handful of potential causes. Some are primary and others are secondary. Causes themselves have causes. These causes and causes of causes form trees (called “cause trees”). These cause trees should be

checked both practically and logically to determine actual causation. The completed set of cause trees for an event should model the event closely.

The last step is looking for an intervention to stop that chain of events that caused the failure or accident. You are trying to interrupt the cause tree. Once you have a likely intervention you can test it to see if it indeed interrupts the problem in the real world. Then look closely to see if there are any unintended consequences of the intervention. As part of the last step we have to make the change stick by rewriting SOPs, changing parts procured, communicating the changes to everyone, adding the change to drawings, CMMS tasks or wherever will make it happen and keep it happening, etc.

That is the little secret of going from reactive to proactive by your bootstraps!

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