Why should maintenance be kept simple?

Original Message ----- From: "Steve Turner" <steve@omcs.bz

To: <plantmaint@plant-maintenance.com Sent: Wednesday, May 08, 2002 9:53 PM
Subject: Re: [plantmaint] I Vote for Simple Analysis Methods List

Obviously Manou would like an explanation of this statement that I wrote in the paper in discussion at http://www.pmoptimisation.com.au/downloads/comparison_rcm_pmo.pdf

My statement was as follows: **"Empirical methods can be easily applied without using computers whereas most statistical methods require software packages to run them**".

My main contention here is that for some reason, we engineers seem to take great delight in turning something which is fundamentally simple into something that is very complex. By doing this:

A. We introduce numbers of assumptions of which many, may be (and often are) flawed,
B. We purchase expensive software which:

1. Takes the focus off the task of analysis, RCM/PMO training and implementation and into software implementation and software training,

2. Takes the onus of analysis away from the very people who understand the plant (the operators and tradesmen) as these people are often not sufficiently computer literate to run the complex software and almost always not statistically competent. Hence we loose buy-in and therefore the enthusiasm to create a living program that is simple to understand and simple to make logical changes. The PM program ends up being owned by the engineer in the back room with the computer rather than the folk who do the work and know what works and what does not.

3. Takes far more time to do the analysis that it should.

4. We end up with a program that is easily discredited on the basis of the assumptions and the “dodgy” data.

I am certainly not against computers and modern technology, however I believe in "horses for courses". For example, some of the best planning systems I have seen are done on a series of white boards, some of the best reporting systems and log book systems are paper based: carbonated books with three tear out strips which flash out to the right people and are filed where they can be easily searched..... books kept on line so that anyone passing by can flick through the log and get a great picture of how things are running, how they have run for the past day or week for that matter..... No logging on to a computer... just simple systems working effectively (BTW the data gets entered into a database for obvious reasons).

Now you may be wondering how I come to the conclusion that the analysis issues are not complex... By empirical methods I mean asking the right people the right question primarily to determine the appropriate PM task and interval. In the majority of cases, condition monitoring is chosen as the means of managing the failure. It is widely accepted that the intervals of inspection for condition monitoring are primarily driven by the rates of decay of assets. The point is that the rates of decay of an asset at failure mode level are rarely measured or collected with any degree of rigor (if at all) hence there is rarely data available to support anything else, other than an empirical approach.

So point one is that if I ask the right questions of the right people, I will get the best assessment of the rates of decay very quickly, whereas if I were to rely on statistical methods, I may never get the information in sufficient quantity to make reasonably confident predictions.

The second approach to preventive maintenance is what we may call "Hard Time" or Scheduled discard / refurbishment tasks. The intervals of these tasks rely on some information regarding the failure patterns and the consequence of failure. Again, in most industrial applications, there are two “in a sense contradictory" situations.

If the component has a dominant failure mode which is age related and has a high frequency, then the maintainers will usually know what that is because they change the component regularly. They do not need a sophisticated database for this.

On the other hand, if the failure is age related and low frequency, then it will take a long time to get any statistically significant data unless there are lots of these components in the same service. However, in collecting the data, one could easily suggest that maintenance has failed, as its primary task is to remove the failures before they occur.

So, in order to get the information, that is so desperately needed to succeed, we must first setout to fail. This makes no sense. So once again, in an industrial application, we are forced either:

1) To make sweeping assumptions about means and distributions and stuff the numbers into simulation algorithms (I personally have a lot of difficulty accepting the validity of these programs as you may have gathered by now), or

2) We can take the empirical approach which relies on intuition, engineering training and valued judgment of experienced people who have probably dealt with similar failure modes many times before.

No doubt Manou, there are instances where statistical applications can work wonderfully well and where computer simulation packages stand out head and shoulders above the rest. However in my patch, we are almost always short of the data we want. We therefore need to provide simple thought processes that help people to make good educated assessments. If I were to rely on three or four guesses jammed into a software tool (that perhaps only people of your statistical background really understand) then I would be most uncomfortable about turning in a decent result for a client. "Trouble is, a bad result rarely surfaces immediately, but that's another subject."

Regardless of anything else though, the bottom line is implementation. The more ownership the program has at the "shop floor" then the more successful it will be (in my experience). Doing a bunch of elegant statistical analysis or any analysis for that matter is a cost to the business. It is a cost until the time that it is implemented. Since implementation is often the tough bit, we most often focus heavily on implementation rather than trying to clean up data and support assumptions which may result in a solution which is no better than the initial assessment. I love statistics, but I also understand its limitations.

Anyone wanting to read more on this subject can download a paper called "understanding the downsides of statistical maintenance analysis methods" from our website at www.pmoptimisation.com.au. Readers should be aware that this paper discusses only a certain type of approach that is a "cost minimisation" approach. Readers may see similarities in some of the points raised in packages that use different algorithms.

Hope this helps to at least present my opinions. If you agree then great if you don't well I hope I have at least challenged your thinking.

Regards to all

Steve Turner

Director
OMCS International
steve@omcs.bz
ph 61 419397035
www.reliabilityassurance.com