Part 1

Establishing **Ultrasound Testing** as a **CBM Pillar**

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Looking beyond the acronyms and buzz words may be our best and only chance at discovering the true meaning of our Condition-Based Maintenance journey.

This may seem too philosophical a beginning for an article on Condition-Based Maintenance (CBM), but read on. For what is the goal of any journey, but to arrive at a destination? The goal of starting down the path of CBM should be well defined before taking the first step.

Is it to save money? Increase reliability? Increase productivity? Reduce stress? Improve quality? How about all of the above? Certainly they are all important to us. So where do we rank each one? What is the priority? Is it to improve reliability, productivity, and quality in order to reduce stress and make money? Surely the last one, "make more money," is the key. It is very easy to get too engaged in the process, such that we completely lose sight of the goal.

Condition-Based Maintenance represents a change in the way maintenance tasks are driven. No longer do work orders get pushed out just because an approved amount of time has lapsed since the last maintenance task. By the very definition of the acronym, call to action in a CBM environment dictates that we manage maintenance in response to changes observed from condition-based indicators. If this is indeed fact, then in order to observe a change in condition we must have a reference to measure condition against, and technologies that compare similar machines to each other in order to identify their differences. This is the point along our CBM journey where we meet the Condition Monitoring (CM) of CBM.

Implementing CM into your CBM strategy is not a task to be taken without careful and thoughtful planning. Like your CBM journey, that first perilous step must not be reckless. **Here is a quick list of things NOT to do first:**

1. Buy stuff because there is budget available
2. Take it all out of the box
3. Don't worry about training – the salesman said it was simple
4. Install the software
5. Create some database
6. Take readings
7. Wonder what they mean

This scattergun approach is commonly taken and more often than not winds up being a death sentence for the program. It lacks focus, direction, planning, and education. Success requires a plan, it requires focus, it requires clarity, and most important of all, it requires managerial support – and support is more than just money.

A better starting place is to draw a list of the small day-to-day problems that continually erode productivity and profitability. There are things that bite you hard every hour of every day and cost you more money in the long run. The problem is that most of those problems are now almost invisible to the business – they are just considered the cost of living.

Some examples:

- Compressed air leaks
- Steam leaks
- Defective steam traps
- Over-lubricated bearings

This list represents four huge daily drains on resources. Targeting each of these will yield almost immediate justification for an investment in CM. Are they difficult to do? No, not really. Do they need a long history and a lot of technology? No again. Do they require a huge investment in labor and technology? Once again, "No."

We anticipate hearing some readers shouting, "But this is not what CBM is about!"

Really? These four attacks save a fortune, reduce maintenance cost, and improve plant efficiency, which is a pillar of any productivity calculation. So, yes, this really is what CBM should be about.

Expand the list of four examples above to include monitoring all your rotating machinery and electrical systems. Then add the one technology that can provide effective surveillance of all six: ultrasound detection. Jumping on the ultrasound testing bandwagon is not the point of this article. It's not enough to simply say "You need ultrasound." You need to understand WHY you need ultrasound, and more importantly, HOW you are going to implement it as a supporting pillar of your CBM.

Consider the following simple logic tree:

"Is it okay?" must be at the heart of your CBM program. Answering this question is what your first-line data collection should be about. There are many cases in a plant, both in terms of rotating and non-rotating assets, where ultrasound does answer this question better than most other tools.

Using the quick and simple ultrasound test tool in either troubleshooting or structured (survey-based) modes will allow you to quickly answer this question. **Here are some examples:**

- Bearing condition
- Slow speed bearings
- Belts
- Couplings
- Chains
- Gearboxes
- LV and HV electrical systems
- Hydraulic systems

Ultrasound, faster and simpler than other technologies, is capable of providing the simple answer to the simple question "Is it okay?" There are other technologies that allow you to dig deeper into the problem and maybe allow you to look at the problem in a different way. But if the answer is "YES," why make it more complicated?

Establishing the need for CM and understanding why ultrasound is a pillar technology for CBM takes us to the next stage of our journey: Ultrasound Program Implementation. The "why to do" and the "what to do" are important first steps, but getting past the "how to do" will either make or break the effort. The space allocated to this article does not allow us to cover the next step in depth. Don't dismay, there will be a Part Two follow up in a future issue of *Uptime Magazine*, as well as a complete short course covering Part One and Part Two at CBM2011, on May 2-6, in Fort Myers, FL. Here is what we will tackle in Part Two.

With so much to do you need to be able to define your resources and your assets. Resources refers to your CBM team members, and assets refers to all of your problem areas. Split up your assets into non-trendable and trendable defects. Already you may see conflicts develop. With so many inspection tasks, they must be split into small manageable "bite-size" chunks. Making the tasks too onerous guarantees they won't get done. Keeping surveys to one-hour and two-hour tours ensures successful data collection. Plan for tasks to be performed two, three, or four times each year. Each inspection will generate work. After each survey, track how much repair work is generated. This will serve as a useful KPI as work orders per survey should decrease over time.

By non-trendable, we mean tasks that need to be done but don't require database set-up or trending. Compressed air leak management is a prime example. Steam system surveys are another, as are electrical inspections. General trouble shooting on couplings, hydraulic cylinders, belts, and tightness testing are other non-trendable applications. Applications that are trendable and require database setup include valves, some steam traps and electrical inspection, machine lubrication, and bearing condition monitoring.

In Part Two of this paper we will turn our focus to proper database setup, data collection, processing, and analysis of ultrasonic data. A considerable amount of thought must go into the structure of your database, and time spent at the beginning considering what sort of information you will want to mine from your database in the future will help decide the structure now. How you structure the reporting process to get the results your CBM program needs will prove a fundamental step. Communicating outcomes to your team will lead to timely intervention to attack identified problems in an incisive manner, resulting in massive cost reduction.

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