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Looking for gold in your organization? Doing the right maintenance at the right time for the right reasons on the right equipment is a good way to find it.

In 1979, an MIT report estimated that $200 billion U.S. dollars were spent on the direct costs associated with reliability and maintenance (R&M). It also was estimated that over 14% of the 1979 Gross Domestic Product (GDP) was lost opportunity due to improper R&M practices. This level has continued to increase as a result of aging infrastructure and other reliability-based reasons, to over 20% of the U.S. GDP—or $2.5 trillion in lost business opportunity. This is greater than all but the top three economies of the world! Today, it is estimated that the R&M industry is approximately $1.2 trillion in size, with up to $750 billion being the direct cost of breakdown maintenance (reactive) or generally poor, incorrect or excessive practices.

The primary cause of the loss is that over 60% of maintenance programs are reactive, which includes those programs that were initiated and later failed due to ‘maintenance entropy,' or collapsing successful programs where the significant paybacks are no longer seen. These days, over 90% of maintenance initiatives fail, 57% of CMMS applications fail and over 93% of motor management programs fail. The primary reason for this dismal state of affairs seems to be the result of the current business mindset, which calls for immediate improvements. The cold hard fact is that it normally takes 12 to 24 months for a supported program to take hold and begin to show results.

Proper R&M best practice processes have a direct impact on equipment availability, throughput capacity and spare inventories. In addition, the U.S. Department of Energy's Industrial Technologies organization has stated that proper R&M can improve energy costs an average of 10 to 15%. For example, if we were to just maintain electric motors, alone, it would yield annual energy savings of up to 122 billion kWh and greenhouse gas emission reductions of over 74 Megatons. When expanded to all maintenance opportunities, the impact is significantly larger.

So, how to we do it? How do we get our arms around this monster known as R&M? It's actually simpler than you might think. It just requires a little focus, an investment in time and support from the executive on down in the form of a corporate R&M strategy and local tactics.

Concept of a manageable maintenance program

In any sustainable program (refer to the program map in Fig. 1), you must start with knowing what you own. A program cannot be managed if no one knows what there is to manage. Everything must be surveyed and evaluated for its impact. The initial program must start out with a "pilot" area and the expansion of the program must be done in small chunks, as a

majority of false starts occur when programs are initiated that take on too much. This process is referred to as the Facility Asset Census (FAC).

Once a census is completed, a Critical Equipment List (CEL) can be developed through selecting equipment based upon specific criteria that must include, at a minimum:

1. *Personnel Safety*: If a system were to fail and involve personnel safety, it must be considered a critical system.
2. *Regulatory:* If the impact involves regulatory issues such as the environmental systems, it must be considered a critical system.
3. *Production:* Systems that impact production must be included. Some analysts will select production equipment based upon its impact on the overall production within a facility. The greater the impact, the higher the ranking. Most companies employ a three-level ranking system, but ranking systems as high as 10 levels are known to be used. Each level indicates the amount of attention the equipment receives.
4. *Cost Impact:* If a system surpasses a repair or replacement value cost threshold, it should be considered. The average industrial value for consideration is $25,000.
5. *Other Impacts:* Such things as working environment, marketing/sales considerations or other systems deemed important by the organization must be considered. This concept often is at odds with many RCM (Reliability-Centered Maintenance) and similar programs to the detriment of the program.

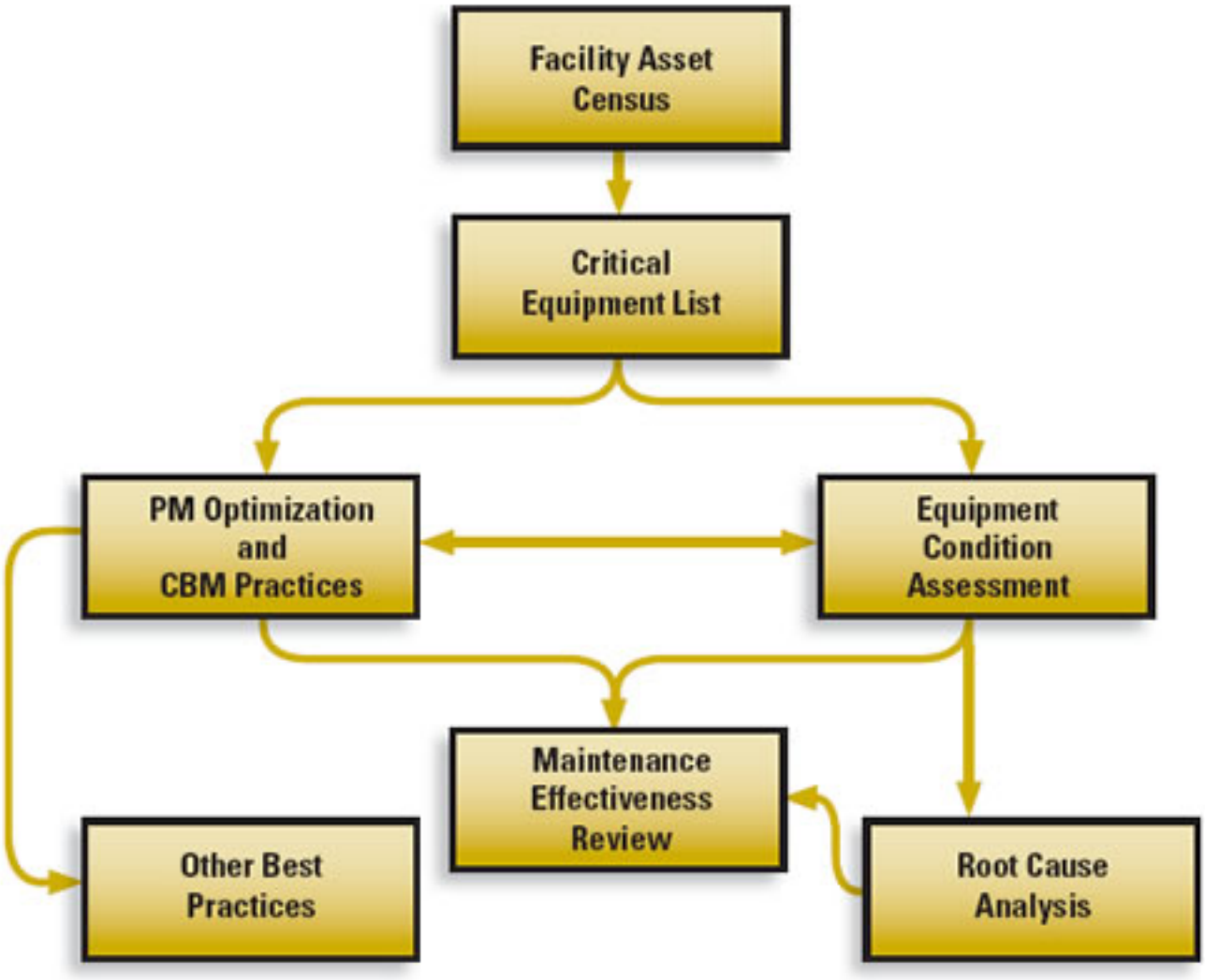

Figure 1. Program Map

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