



Healthcare for production machinery

Can a Planned Maintenance System Reduce Your Cost To Produce Your Product?

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Can a Planned Maintenance System reduce your cost to produce your product?

As leading companies continue to search for ways to become more competitive, many are turning to maintenance as fertile ground for cost containment. Much of US industry still maintains their equipment the same way it was done 50 or 100 years ago. But technology and the advent of computers have made maintenance methods available that can reduce the cost of maintenance per unit of production. Planned maintenance is one of those methods.

Planned maintenance consists of three major parts: 1) time directed maintenance, called Preventive Maintenance (PM); 2) condition directed maintenance, called Predictive Maintenance (PdM); and 3) Planned Repairs.

PM is the like minor work the car manufacturers recommend you do to your car. Change the oil every 3000 miles, an alignment every year, check the cooling system every spring. All are examples of time directed tasks. They are based on either the calendar, units produced or some other "clock."

Predictive maintenance on the other hand says "test the oil and only replace it if it needs it." By using modern Condition Assessment techniques such as vibration analysis, oil analysis, infrared imaging and others, the maintenance department can test the equipment on a periodic basis and monitor its condition. Lubrication, belt replacement, alignments and overhauls all can be based on condition instead of time. The cost to perform the test is normally much less than the cost of the maintenance. Also avoided is the possibility of introducing problems while performing maintenance. By trending the condition, it is possible to predict failure before it actually occurs. Bearings show characteristic vibration signatures of failure

long before they actually fail. Chipped gear teeth, poor electrical connections, improper lubrication and many other conditions give telltale signals. Appropriate maintenance can then be performed during normal shutdowns or changeovers. The plant avoids lost production, increased repair costs from cascading failure and extra overtime and parts expediting costs.

Planning repairs means determining ahead of time what skills, parts, tools and documentation are needed. When the mechanics get to the machine, they have all the parts and tools needed to do the work. They don't have to lose time waiting or running after something they forgot.

The impact of PM and PdM on reliability and cost can be significant. A study published by ASME of the maintenance cost per horsepower of general industrial rotating machinery found that when no PM or PdM program was in place, the cost of maintenance was \$18 per horsepower per year. By using just PM, that was reduced to \$13/HP-Yr and a combination of PM and PdM reduced it to \$8/HP-Yr. Other studies have shown ROI's in the range of 4 to 30 times. Maintenance costs have been reduced by 7 to 60%, unscheduled downtime reduced by 33 to 45% and production increases have ranged from 2 to 40%. Additional reported savings include reduced spare parts inventories, reduced power consumption and improved quality and safety.

PM is usually implemented with the purchase of a Computerized Maintenance Management System (CMMS). CMMS's can be found for any computer and operating system, from PC's to mainframes. The costs of the software start as low as \$1000 and go upwards from there. Corporations employing their own mainframes can spend millions. A single plant, buying a good, mid-

level PC system can expect to pay \$5000 to \$20,000, depending on functionality. That cost covers the software and training in using the software.

After the software is purchased, a preventive maintenance database must be developed. This database is made up of PM tasks for each machine covered. Several options exist for developing the database. The plant can use it's own people to inventory the machinery and develop tasks from recommendations made by OEM's, industry trade groups, etc. Expect to spend at least one manweek per machine in research and task writing. Another source may be the software vendor. Many of the bigger ones are developing libraries of generic tasks. These provide a starting point for a customized database. Probably the best way is to use an outside firm that specializes in developing databases. A database, customized for your operating profile and environment, will cost in the range of \$20,000 to \$40,000 for an average sized plant.

Other costs you can expect include computer hardware if you don't already have it, labor to research and enter historical data, and the cost to develop administrative procedures for the system. Most importantly, be sure to budget time and money for training the workforce. The maintenance and production workers need to understand the importance of doing the work correctly and documenting it correctly. They also must know how to handle the work orders. Middle and senior management need training on how to interpret the reports, and how to use the system to their best advantage. What questions should they ask, what measures should they watch?

Ongoing costs must also be considered. Someone must print and distribute the work orders everyday. When the work is completed, someone must close the work order out by entering the cost, time and descriptive information reported on them. Someone must backup the database on a regular basis. The database must be kept current as machines are added, removed and modified. You will also have to budget for forms for work orders and paper for reports.

Total start-up costs for a medium sized plant with 100 to 120 machines and 15 maintenance personnel will be about \$80,000 to \$100,000. Operating costs will be another \$30,000 to \$50,000 per year. Those are significant numbers. But when compared with the potential payback, worth it. The median reported ROI is 11 times, which means the payback should be over a \$1,000,000 the first year.

What's your maintenance cost per unit of production? Is it less than your competitors? Preventive and predictive maintenance may be what you need.