How to achieve quality compressor Maintenance – a synopsis

In past columns we discussed various aspects of compressor maintenance. It is now time to offer an overview of compressor maintenance.

As in many human endeavors, the quality of our activities should take precedence over quantity. In compressor maintenance, as in maintenance of any other type of machinery, the quality focus must be accomplished through predictive (PdM) or preventive maintenance (PM). Operations demand uptime and functioning of compression equipment. To achieve these requirements, it has long been recognized that maintenance activities designed to anticipate and avoid failure have been, and continue to be, a sound investment in the overall maintenance strategy. Many companies are investing in software programs to improve maintenance strategy. Yet, no computer system can help a maintenance department, if the basic elements of a preventive and predictive maintenance program are not in place.

Both small and large facilities have identifiable components of a preventive and predictive maintenance program that can be generally described by seven elements:

- facilities management
- inspection routines
- predictive and diagnostic activities
- integration of maintenance within the production activity
- insurance activity
- corrective activity
- continuous improvement

Facilities Management. Each significant piece of equipment and its component hierarchy is uniquely and logically identified, in order that all maintenance activity can be related and an equipment history maintained. Once each piece of equipment has been identified, equipment maintenance procedures manuals should be compiled. Consultation of these documents together with the maintainer's own equipment knowledge will assist in developing quality Preventive and Predictive Maintenance. Machinery maintenance classifications are shown in Figure 1.

Inspection Routines. Establishing effective routines and meaningful frequencies requires thorough study of the compressor operating environment, the manufacturer's documentation, consultation with manufacturers' representatives, and careful study of past experience. Once this has been accomplished, established routines and frequencies must be subjected to ongoing refinement and adjustment. It is important that routines ensure specificity, and where possible, numerical measurements should be utilized. For example, changing product quality, gas composition, pressure ratio, temperature, vibration and noise, are all relevant indicators for the analysis of equipment health. This approach, coupled with visual checks by experienced personnel will contribute towards a quality program.

A philosophy of specificity will help to control excessive frequencies which contribute to significant unnecessary costs. A systematic approach to preventive maintenance activities will help to decrease preventive maintenance costs which can be as much as thirty percent of the overall maintenance labor cost.

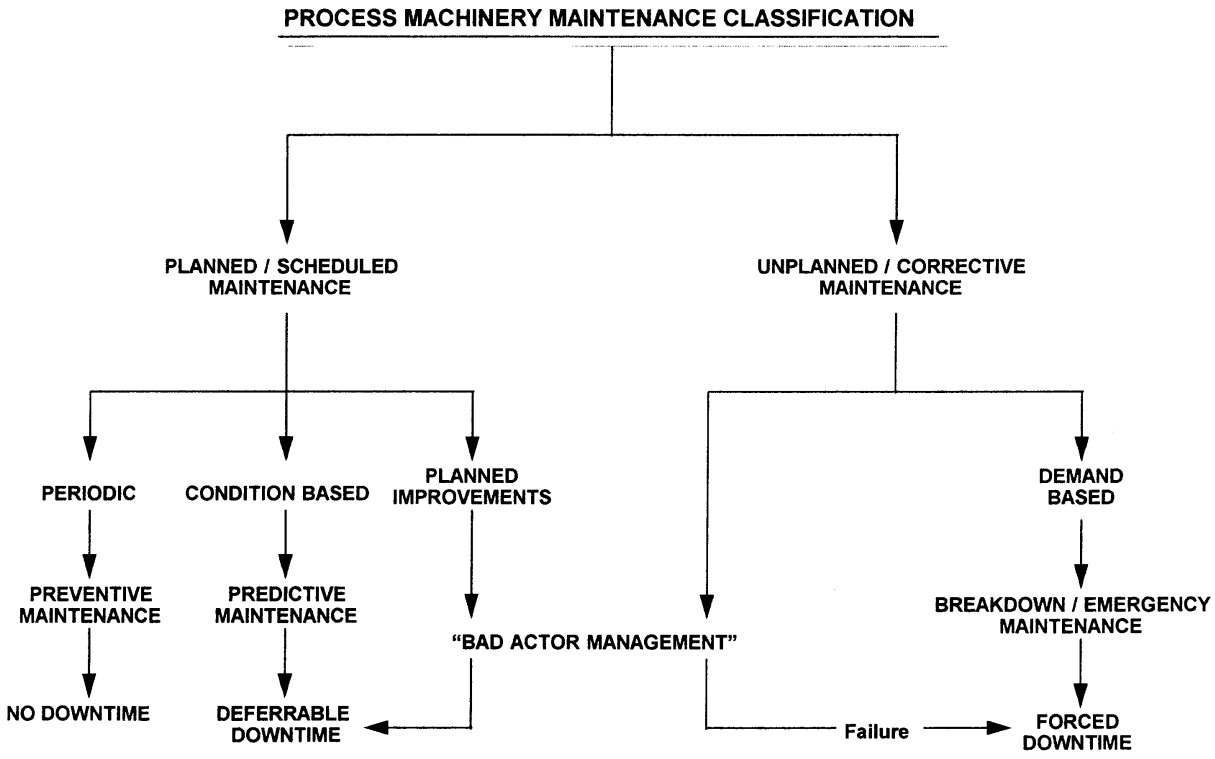

Figure 1. Process machinery maintenance classification[1].

Predictive & Diagnostic Activities. Significant results have been achieved through quantifiable preventive maintenance. Recognition of these results has created a demand for technologies to meet preventive maintenance needs. A quality program should include one or more of the following diagnostic techniques:

- ♦ vibration analysis
- ♦ thermographic techniques
- ♦ oil analyses
- ♦ aerodynamic and compression path performance monitoring and trending

If these techniques are not in use, a re-evaluation of progress in the preventive or predictive maintenance activity may be in order.

Integration with the Production Strategy. Most process or pipeline operations have recognized the need for an integration of the maintenance activity within the overall production strategy. Scheduled periodic shutdowns, based on maintenance needs that have been identified through preventive maintenance, are mandatory. It is essential that scheduled equipment downtime be made available in order to achieve the benefits from

[1] Practical Machinery Management for Process Plants: Volume 5; F.K. Geitner & H.P. Bloch, *Maximizing Machinery Uptime*, 2006, Elsevier, ISBN-13: 978-0-7506-7725-7, P. 356.

the corrective activity of preventive and predictive maintenance.

Insurance. Spare parts, such as spare rotors, their storage and repair facilities play a significant role in a preventive maintenance strategy. A clear understanding of wear parts as opposed to insurance parts is essential. Understanding of what needs to be done, and scheduling the shutdown to get it done, are only half the activity. A balanced capability must be in place to ensure corrective repairs. Existing repair facilities and spare parts must therefore, be evaluated to ensure reasonable success. Statistical analysis of failures and preventive maintenance findings can, and do, play a significant role in determining the right mix of inventory levels and repair facilities.

The Corrective Activity. Are your reliability professionals working on fully quantifiable cost-benefit projects? An excellent base for prioritizing the maintenance engineering activity, for example, are history records containing information on the facilities management activity, quantifiable cost data from preventive maintenance and other maintenance activities. Sound, corrective designs - while requiring significant investment - can achieve enormous cost benefits in parts and labor.

Continuous Improvement. Effective corrective maintenance leads to continuous improvement. There are many examples that demonstrate how the maintenance environment has contributed to continuous improvement and increased reliability of compression equipment, and for that matter, of other machinery, over the equipment life span. Best-of-Class companies have long subscribed to the idea of '***considering every maintenance occasion an opportunity for continuous improvement*'.**

Everyone should evaluate their present programs within the framework discussed here. You may very likely have a quality program. If not, it is time to formulate a plan for change. The results will be rewarding and cost effective.

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Reference:
Practical Machinery Management for Process Plants: Volume4*; Major Process Equipment Maintenance and Repair,* Second Edition by H.P. Bloch and F.K. Geitner, ISBN 0-8841-5663-X, 1997, www.gulfppp.com

Author

Fred K. Geitner (fredgeitner@gmail.com) resides in Brights Grove ON, Canada. He advises process plants worldwide on machinery maintenance cost reduction and reliability improvement.