ASME PTC PM-2010
(Revision of PTC PM-1993)

Performance Monitoring Guidelines for Power Plants

Performance Test Codes

The American Society of Mechanical Engineers

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ASME
SETTING THE STANDARD

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FOREWORD

Since the original publication of these Guidelines in 1993, then limited to steam power plants, the field of performance monitoring (PM) has undergone considerable expansion. PM has gained in importance as the lifetime of equipment and power plants have been lengthened and greater demands on extending it by careful monitoring — rather than its replacement by new equipment — has become the tendency in the power industry. The techniques themselves have also been transformed, largely by the emergence of electronic data acquisition as the dominant, though not exclusive, method of obtaining the necessary information. Manual methods remain but as specialized applications. Based on the realization of the changes that have taken place it was deemed necessary to update the document itself.

The new realities of engineers and other plant personnel concerned with PM are reflected in the revised organization of the new Guide. This consists of three parts which are considered to have equal importance as regards the reader. Part 1 "Fundamental Considerations" stresses, not only by its contents but also by its separate editorial status, the importance of considering the essentials of PM prior to the specifics of the actual application. All too often lack of experience or need for rapid delivery of results has led to implementation without due thought being given to the basic needs, potential benefits and likelihood of tradeoffs of the PM program. The distinction here is in the emphasis given to the underlying importance of basic considerations.

Part 2 "Program Implementation" is a thoroughly revised and updated text of the main body of the 1993 Guide. Readers familiar with the original edition will find some of the material familiar but much that is new. The concepts of PM implementation and diagnostics have been brought into closer conjunction as is the case in contemporary practice rather than as two wholly separate aspects of monitoring activity. Similarly, the importance of cycle interrelationships have now been thoroughly recognized and so the distinction given to it in 1993 was no longer necessary; it has become an accepted part of PM implementation, in practice and in the structure of this revised Guide.

Part 3 "Case Studies/Diagnostic Examples" is wholly new. Since 1993 a large amount of experience and historical data has been accumulated and a selection is here presented. The importance of Part 3 goes beyond the illustrative although the various actual situations briefly described were chosen for their applied significance. In a larger sense, Part 3 illustrates the immense scope and variety of PM and, it is hoped, thereby makes clear the need to carefully consider the specifics of each monitoring situation. There are few general rules and many aspects particular to the plant, equipment and process to be considered. Plant's technical staffs are encouraged to learn from the experience of their predecessors in the field of monitoring and carefully scrutinize these recommendations and details as guidance to establish an optimal PM program.

This edition was approved by the Performance Test Codes Standards Committee on December 8, 2008.

ACKNOWLEDGMENTS

This revision of PTC PM Performance Monitoring Guidelines for Power Plants is dedicated to the memory of Fred H. Kindl, who passed away while this revision was in progress. Mr. Kindl was an outstanding engineer who significantly promoted the importance of power plant performance activities, a faithful member of the Committee, and a major contributor to the content of these Guidelines.

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Proposing Revisions. Revisions are made periodically to the Guide to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Guide. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Guide. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal including any pertinent documentation.

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INTRODUCTION

This document contains guidelines for performance monitoring and optimization. These guidelines establish procedures for monitoring power plant performance parameters in a routine, ongoing, and practical manner.

These guidelines do not constitute or supersede any of the Performance Test Codes. They constitute a set of nonmandatory guidelines to promote performance monitoring activities.

The guidelines provide methods and procedures to monitor power plant and equipment performance and to validate, process, and analyze the data in order to improve or optimize unit or plant thermal efficiency, capacity, economic dispatch, operator awareness, and cycle component diagnostics, as well as to provide information for engineering studies, preventive or predictive maintenance, and planning purposes concerning equipment maintenance, replacements, or upgrades.

It is not the intent of this document that the instructions it contains be used for acceptance or official testing of new or existing power plants, systems, and components.

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PERFORMANCE MONITORING GUIDELINES FOR POWER PLANTS

Section 1 Fundamental Concepts

1-1 OBJECT AND SCOPE

1-1.1 Object

The object of these guidelines is to provide information to implement and utilize a performance monitoring and optimization program effectively. These guidelines are not intended to become mandatory for power plant performance monitoring, nor do they include all or override any safety considerations.

In performance monitoring of diverse items of power plant equipment, the uncertainty level of results may range from very small to quite large, depending on the given situation. It is important for the engineer to evaluate uncertainty and take appropriate action for meeting goals. Useful references include PTC 19.1 Test Uncertainty and the related Performance Test Codes.

1-1.2 Scope

The scope of these guidelines includes fossil-fueled power plants, gas-turbine power plants operating in combined cycle, and the balance-of-plant portion including interface with the nuclear steam supply system of nuclear power plants. The guidelines include performance monitoring concepts, a description of various methods available, and means for evaluating particular applications.

The guidelines provide procedures for validation and interpretation of data, determination of performance characteristics and trends, determination of sources of performance problems, analysis of the performance in relation to the process, determination of losses due to degradation, possible corrective actions, and performance optimization.

The guidelines provide the necessary information for implementing a performance monitoring program, using either an automated or a manual data acquisition system, or both.

1-2 OVERVIEW

1-2.1 Definition of Performance Monitoring

Performance monitoring is an overall, long-term effort to measure, sustain, and improve the plant and/or unit thermal efficiency, capacity, dispatch cost, emissions control, and maintenance planning. The program can be implemented for multiple reasons such as cost reduction, capacity improvement, and/or reliability improvements. The decision to implement a performance-monitoring program should be based on plant and fleet requirements and available resources. This includes personnel knowledgeable of the process, the instrumentation, the data collection medium, and the required analysis and interpretation techniques.

For the purpose of this document, the term “monitoring” refers to an overall, long-term, continuing program. It can range from periodic testing of individual components to on-line monitoring of all cycle components. The term “testing” refers to a specific part of the performance monitoring program.

These guidelines cover a broad range of performance monitoring techniques oriented toward power plants. They seek to advise plant personnel on how to effectively monitor the efficiency and condition of the equipment throughout its lifetime. They also extend beyond monitoring itself into the areas of information evaluation and application toward corrective action.