

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

# **Performance Monitoring Guidelines for Power Plants**

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**Performance Test Codes**



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(Revision of PTC PM-1993)

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**Performance Test Codes**



**The American Society of  
Mechanical Engineers**

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Date of Issuance: April 30, 2010

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# CONTENTS

Foreword.....	vii
Committee Roster .....	viii
Correspondence With the PTC PM Committee.....	x
Introduction.....	xi
<b>Section 1 Fundamental Concepts.....</b>	<b>1</b>
1-1 Object and Scope .....	1
1-2 Overview.....	1
1-3 Definitions and Description of Terms.....	17
<b>Section 2 Program Implementation.....</b>	<b>22</b>
2-1 Program Planning.....	22
2-2 Instrumentation .....	33
2-3 Performance Monitoring Implementation and Diagnostics .....	58
2-4 Incremental Heat Rate.....	131
2-5 Performance Optimization .....	145
<b>Section 3 Case Studies/Diagnostic Examples.....</b>	<b>177</b>
3-1 Air Heater Plugging Due to Failed Sootblower .....	177
3-2 Boiler Example .....	179
3-3 Temperature Calibrations.....	180
3-4 Capacity Loss Investigation Due to Fouling of Feedwater Flow Nozzle (Nuclear Plant) .....	184
3-5 Unit Capacity and ID Fan Capacity Due to Air Heater Leakage .....	189
3-6 Loss of Extraction Flow.....	191
3-7 Question and Answer Session: A Nuclear Plant Diagnostic Problem .....	193
3-8 Application of Turbine Test Data for Problem Identification.....	195
3-9 Condenser Tube Fouling Problem .....	196
3-10 Feedwater Partition-Plate Bypass Problem.....	199
3-11 Air-Heater Pluggage Problem.....	200
3-12 Deposits in High-Pressure Turbine .....	201
3-13 Pulverizer Coal-Mill Fineness Problem.....	202

## Figures

1-2.6-1	Typical Plant Losses.....	5
1-2.6-2	Typical Losses for a Gas-Turbine-Based Combined Cycle Plant .....	6
1-2.6-3	Heat Balance for Turbine Cycle of Typical Pressurized Water Reactor Nuclear Plant .....	7
1-2.6-4	Mass Flows Through Steam and Feedwater System for Typical Pressurized Water Reactor Plant.....	8
1-2.6-5	Energy Distribution for a Typical Pressurized Water Reactor Nuclear Plant.....	8
1-2.6-6	Typical Boiler Losses .....	9
1-2.6-7	Typical Cycle Losses.....	10
1-2.6-8	Typical Turbine/Generator Losses .....	11
1-2.6-9	Computed Variation of Unburned Carbon With Excess Air .....	12
1-2.6-10	Effect of O <sub>2</sub> and Coal Fineness on Unit Heat Rate .....	13
1-2.6-11	Effect of Stack Gas Temperature on Unit Heat Rate .....	13
1-2.6-12	Boiler Loss Optimization.....	14
2-2.3.1-1	Primary Flow Section for Welded Assembly.....	37
2-2.3.1-2	Inspection Port .....	37
2-2.4-1	Basic Pressure Terms From ASME PTC 19.2 .....	40
2-2.4-2	General Uncertainties of Pressure-Measuring Devices From PTC 6 Report .....	40
2-2.4.5-1	Effect of Pressure and Bias Errors on HP Turbine Efficiency .....	42
2-2.4.5-2	Effect of Pressure and Bias Errors on IP Turbine Efficiency .....	43
2-2.5.1-1	TC Drift Study of Six Thermocouples Cycled 210 days to 300 days .....	44
2-2.5.2-1	Drift of Ice Point Resistance of 102 RTDs Cycled 810 days.....	45
2-2.5.3-1	Effect of Temperature Bias and Error on HP Turbine Efficiency.....	46
2-2.5.3-2	Effect of Temperature Bias and Error on IP Turbine Efficiency .....	46
2-3.6.2.1-1	Performance Curves to Characterize Boiler Losses — Example for a Coal-Fired Unit .....	63
2-3.6.2.3-1	Heat Rate Logic Tree — Main Diagram.....	64
2-3.6.2.3-2	Illustration of Decision Tree Concept for Investigating Performance Parameter Deviations .....	65
2-3.8.4.1-1	Pulverizer Capacity Curve .....	81
2-3.8.4.1-2	Arrangement for Sampling Pulverized Coal.....	82
2-3.8.4.1-3	Graphical Form for Representing Distribution of Sizes of Broken Coal.....	83

2-3.8.6.1-1	Sampling Direct-Fired Pulverized Coal-Sampling Stations (Dimensions Are “Percent of Pipe Diameter”) .....	89
2-3.9.4.3-1	Typical DCA and TTD Versus Internal Liquid Level.....	105
2-4.2-1	Input/Output Curves for the Two Typical Thermal Units .....	131
2-4.2-2	Input/Output Relationships for a 2 × 1 Combined Cycle Facility .....	132
2-4.2-3	Incremental Heat Rate for Steam Turbine With Sequential Valve Operation .....	132
2-4.3.1-1	Optimum Load Division by Equal Incremental Heat Rate.....	135
2-4.4-1	Example of Heat Rate Not Monotonically Increasing in a 2 × 1 Configuration .....	137
2-4.4-2	Incremental Curve Shape .....	138
2-4.4-3	Illustration of Development of Incremental Heat Rate Information From Basic Plant Measurements.....	139
2-4.4-4	Heat Rate and Incremental Heat Rate Versus Load Fossil Unit.....	141
2-4.4-5	Heat Rate and Incremental Heat Rate Versus Load Bias Error.....	141
2-4.4-6	Heat Rate and Incremental Heat Rate Versus Load Combined Bias and Random Error .....	142
2-4.6.1-1	Combined Cycle Heat Rates Versus Ambient Temperature .....	144
2-4.6.2-1	Combined Cycle Input/Output Relationships.....	144
2-4.6.2-2	Combined Cycle Incremental Heat Rates Versus Ambient Temperature .....	145
3-1.1-1	Air Heater Exit Gas Temperature 2-Week Trend.....	177
3-1.3-1	Air Heater Differential Pressure 2-Week Trends .....	178
3-3.2-1	Three RTDs: Readings Collected at Five Temperatures .....	181
3-3.2-2	Fit of RTD Data.....	182
3-3.2-3	Histogram of RTD A.....	182
3-3.2-4	Distribution of Errors for the Three RTDs .....	182
3-3.2-5	Fits of RTDs A, B, and C in Open Circuit .....	183
3-3.2-6	Fits of RTDs A, B, and C Using the Calendar–Van Dusen Eq. (3-3.2) for Calibration.....	183
3-3.3-1	Fits With and Without Replicate Data.....	184
3-4.1.1-1	Logic Tree for Case Study: Capacity Loss Investigation .....	186
3-4.1.2-1	Decision Tree for Capacity Loss Due to Suspected Fouling of the Feedwater Flow Nozzle .....	187
3-4.1.3-1	Power Design Heat Balance for Case Study .....	188

3-5.2-1	Flue Gas Analyzer Measurements at Locations Along the Gas Path.....	190
3-6.3-1	Generator-Output and Heat Rate Deviation.....	191
3-6.3-2	Change in Performance Profile Over Significant Cycle Positions.....	192
3-7-1	Variations of Fourth-Stage Pressure .....	193
3-7-2	Similarities Between Predicted and Measured Pressure Changes .....	194
3-8.3-1	Turbine Pressure Profiles.....	196
3-13.3-1	Adjusted Inverted Cone .....	203

## Tables

1-2.6-1	Off-Design Conditions' Approximate Effect on Actual Heat Rate .....	11
1-2.6-2	Value of Turbine Section Efficiency Level Improvement on a Unit Heat Rate of 10,000 Btu/kWh .....	12
1-2.6-3	Sensitivity of Heat Rate to Various Parameters for a Typical Pressurized Water Reactor Nuclear Power Plant .....	14
2-3.6.2.2-1	Diagnostic Chart of Turbine Loss Characteristics .....	62
2-3.6.2.2-2	Steam Surface Condenser Diagnostics .....	63
2-3.16-1	Matrix of Cycle Interrelations.....	124
2-4.3-1	Incremental Rates for the Two Generating Units in Fig. 2-4.2-1 .....	133
2-4.3-2	Relative Incremental Costs Associated With a Combined Cycle Facility.....	134
2-4.3.1-1	Impact of Load Division on Plant Economy.....	135
3-5.2-1	Air Heater Leakage .....	189
3-10.1-1	Test Results of Four High-Pressure Heaters .....	199
3-12.2-1	Reconciliation of Load Change Based on Change in Performance Parameters .....	202
3-13.3-1	Measurements Taken at the Outage .....	203
3-13.3-2	Calculated Cone and Feedpipe Areas .....	204
3-13.3-3	Resulting Gap Clearances and Areas .....	204

## Nonmandatory Appendix

A	Thermodynamics Fundamentals.....	205
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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.

**Attending Committee Meetings.** The PTC Standards Committee holds meetings or telephone conferences, which are open to the public. Persons wishing to attend any meeting or telephone conference should contact the Secretary of the PTC Standards Committee or check our Web site <http://www.asme.org/codes/>.

## 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.