

Industrial Applications of Infrared
Thermography subtitle: Enhanced
Edition: Illustrated Guide with
Case Studies, Checklists, and
Practical Insights for Predictive
Maintenance

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INDUSTRIAL APPLICATIONS OF INFRARED
THERMOGRAPHY SUBTITLE: ENHANCED
EDITION: ILLUSTRATED GUIDE WITH CASE
STUDIES, CHECKLISTS, AND PRACTICAL
INSIGHTS FOR PREDICTIVE MAINTENANCE

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Industrial Applications of Infrared Thermography

**Enhanced Edition:
Illustrated Guide with Case
Studies, Checklists, and
Practical Insights for
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Preface

In today's fast-evolving industrial landscape, the role of condition monitoring and predictive maintenance has never been more critical. This book represents an enhanced edition of my work on infrared thermography, thoughtfully structured to provide not just technical knowledge, but a complete learning experience for engineers, technicians, and industry professionals.

The motivation behind this edition is simple: to share my years of experience and insights in a format that is accessible, clear, and adaptable to modern reading habits. Unlike traditional technical books that rely heavily on visuals, this edition is designed for narration. Each concept, diagram, and thermogram is described with precision so that readers—or listeners—can fully understand the content without needing to see the illustrations. Images are included

purely for illustration purposes and to reinforce comprehension, but the explanations are self-sufficient.

This book has been crafted with multiple formats in mind: audio, electronic, and paperback. Whether you prefer listening during commutes, reading on a tablet, or consulting a physical copy in the field, the content remains coherent, engaging, and educational. My goal is for this book to serve as a practical companion, a reference, and a guide to mastering infrared thermography and its integration into modern maintenance practices.

I hope that through this edition, readers gain not only knowledge but also the confidence to apply these techniques in real-world industrial environments. By making complex concepts understandable without reliance on visuals, this book opens the door to learning in ways that fit

the busy, multi-tasking professional of
today.

—Mohammed Hamed Ahmed
Soliman



Chapter 1 – Overview on Condition Monitoring

1.1 Introduction

In modern industries, machinery and equipment play a central role in sustaining productivity, safety, and quality. Any unexpected failure can result in costly downtime, safety hazards, or environmental consequences. For this reason, organizations have gradually shifted from traditional corrective maintenance—fixing a machine only after it fails—toward more intelligent and proactive strategies. Among these, **Condition Monitoring (CM)** has emerged as a cornerstone of

predictive maintenance and reliability engineering.

Condition monitoring refers to the **continuous or periodic measurement and analysis of machine parameters**—such as vibration, temperature, acoustic emission, or lubricant properties—to detect early signs of deterioration. The goal is to recognize faults at their incipient stage, enabling timely interventions that prevent catastrophic failure while maximizing equipment availability.

1.2 Definition of Condition Monitoring

Condition Monitoring can be defined as:

“The systematic collection, measurement, and analysis of operating parameters of machinery and equipment to detect deviations from normal behavior that may