

Springer Series in Reliability Engineering

Series Editor

Hoang Pham

For further volumes:

<http://www.springer.com/series/6917>

Gilberto Francisco Martha de Souza
Editor

Thermal Power Plant Performance Analysis

 Springer

Gilberto Francisco Martha de Souza
Department of Mechatronics and Mechanical Systems
Polytechnic School
University of São Paulo
05508-900 São Paulo
Brazil
e-mail: gfmsouza@usp.br

ISSN 1614-7839

ISBN 978-1-4471-2308-8

DOI 10.1007/978-1-4471-2309-5

Springer London Dordrecht Heidelberg New York

e-ISSN 2191-5377

e-ISBN 978-1-4471-2309-5

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Library of Congress Control Number: 2011943798

© Springer-Verlag London Limited 2012

Apart from any fair dealing for the purposes of research or private study, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms of licenses issued by the Copyright Licensing Agency. Enquiries concerning reproduction outside those terms should be sent to the publishers.

The use of registered names, trademarks, etc., in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant laws and regulations and therefore free for general use.

The publisher makes no representation, express or implied, with regard to the accuracy of the information contained in this book and cannot accept any legal responsibility or liability for any errors or omissions that may be made.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

*To Leonardo, Livia, Cleusa and Maria da
Conceição*

Contents

Introduction	1
Gilberto Francisco Martha de Souza	
Fundamentals of Thermodynamics Applied to Thermal Power Plants	7
José R. Simões-Moreira	
Analysis of Thermal Plants Configuration	41
Nisio de Carvalho L. Brum	
Fuels: Analysis of Plant Performance and Environmental Impact	61
Marilyn Mariano dos Santos, Patricia Helena Lara dos Santos Matai and Laiete Soto Messias	
Fundamentals of Reliability	91
A. P. Teixeira and C. Guedes Soares	
Fundamentals of Maintenance	123
Gilberto Francisco Martha de Souza and Fernando Jesus Guevara Carazas	
Fundamentals of Risk Analysis	147
Bilal M. Ayyub	
Reliability Analysis of Gas Turbine	189
Fernando Jesus Guevara Carazas and Gilberto Francisco Martha de Souza	

Combined-Cycle Gas and Steam Turbine Power Plant Reliability Analysis 221
Gilberto Francisco Martha de Souza, Fernando Jesus Guevara Carazas,
Leonan dos Santos Guimarães and Carmen Elena Patino Rodriguez

Risk-Based Inspection and Maintenance (RBIM) of Power Plants. 249
Faisal Khan, Mahmoud Haddara and Mohamed Khalifa

Index 281