

© 1994 by Blackwell Scientific Publications

First edition © 1975 by the Constructional Steel Research and Development Organisation

Blackwell Scientific Publications
Editorial Offices:
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Librairie Arnette SA
1, rue de Lille
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Blackwell Wissenschafts-Verlag GmbH
Düsseldorfer Str. 38
D-10707 Berlin
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Blackwell MZV
Feldgasse 13
A-1238 Wien
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First published by Crosby Lockwood
Staples 1975
Paperback edition published by Granada
Publishing 1982
Reprinted 1984
Second Edition published by Blackwell
Scientific Publications 1994

Typeset by Florencetype Ltd, Kewstoke,
Avon
Printed and bound in Great Britain at the
Alden Press Limited, Oxford and
Northampton



DISTRIBUTORS

Marston Book Services Ltd
PO Box 87
Oxford OX2 0DT
(Orders: Tel: 0865 791155
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Blackwell Scientific Publications, Inc.
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Oxford University Press
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(Orders: Tel: 416 441-2941)

Australia

Blackwell Scientific Publications Pty Ltd
54 University Street
Carlton, Victoria 3053
(Orders: Tel: 03 347-5552)

British Library
Cataloguing in Publication Data

A catalogue record for this book is
available from the British Library
ISBN 0-632-02507-7

Library of Congress
Cataloging in Publication Data

Johnson, R. P. (Roger Paul)
Composite structures of steel and
concrete / R.P. Johnson. —2nd ed.
p. cm.
Includes bibliographical references and
index. Contents: v. 1. Beams, slabs,
columns, and frames for building
ISBN 0-632-02507-7 (v. 1)
1. Composite construction. I. Title.
TA664.J63 1994
624.1'821—dc20 94-4646
CIP

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Preface

This volume provides an introduction to the theory and design of composite structures of steel and concrete. Readers are assumed to be familiar with the elastic and plastic theories for the analysis for bending and shear of cross-sections of beams and columns of a single material, such as structural steel, and to have some knowledge of reinforced concrete. No previous knowledge is assumed of the concept of shear connection within a member composed of concrete and structural steel, nor of the use of profiled steel sheeting in composite slabs. Shear connection is covered in depth in Chapter 2 and Appendix A, and the principal types of composite member in Chapters 3, 4 and 5.

All material of a fundamental nature that is applicable to both buildings and bridges is included, plus more detailed information and a worked example relating to buildings. Subjects mainly relevant to bridges are covered in Volume 2. These include composite plate and box girders and design for repeated loading.

The design methods are illustrated by sample calculations. For this purpose a simple problem, or variations of it, has been used throughout the volume. The reader will find that the strengths of materials, loadings, and dimensions for this structure soon remain in the memory. The design should not be assumed to be an optimum solution to the problem, because one object here has been to encounter a wide range of design problems, whereas in practice one seeks to avoid them.

This volume is intended for undergraduate and graduate students, for university teachers, and for engineers in professional practice who seek familiarity with composite structures. Most readers will wish to develop the skills needed both to design new structures and to predict the behaviour of existing ones. This is now always done using guidance from a code of practice. The most comprehensive and broadly-based code available is Eurocode 4, which is introduced in Chapter 1. It makes use of recent research and of current practice, particularly that of western Europe and Australasia. It has much in common with the latest national codes in these regions, but its scope is wider. It is fully consistent with the latest codes for the design of concrete and steel structures, Eurocodes 2 and 3 respectively.

All the design methods explained in this volume are those of the