

---

# **Roark's Formulas for Stress and Strain**

WARREN C. YOUNG  
RICHARD G. BUDYNAS

**Seventh Edition**

**McGraw-Hill**

New York Chicago San Francisco Lisbon London  
Madrid Mexico City Milan New Delhi San Juan Seoul  
Singapore Sydney Toronto

Cataloging-in-Publication Data is on file with the Library of Congress.

**McGraw-Hill**



A Division of The McGraw-Hill Companies

Copyright © 2002, 1989 by the McGraw-Hill Companies, Inc. All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the publisher.

1 2 3 4 5 6 7 8 9 DOC/DOC 0 7 6 5 4 3 2 1

ISBN 0-07-072542-X

*The sponsoring editor for this book was Larry Hager and the production supervisor was Pamela A. Pelton. It was set in Century Schoolbook by Techset Composition Limited.*

*Printed and bound by R. R. Donnelley & Sons Company.*

McGraw-Hill books are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. For more information, please write to the Director of Special Sales, Professional Publishing, McGraw-Hill, Two Penn Plaza, New York, NY 10121-2298. Or contact your local bookstore.



This book is printed on recycled, acid-free paper containing a minimum of 50% recycled, de-inked fiber.

Information contained in this work has been obtained by The McGraw-Hill Companies, Inc. ("McGraw-Hill") from sources believed to be reliable. However, neither McGraw-Hill nor its authors guarantee the accuracy or completeness of any information published herein and neither McGraw-Hill nor its authors shall be responsible for any errors, omissions, or damages arising out of use of this information. This work is published with the understanding that McGraw-Hill and its authors are supplying information but are not attempting to render engineering or other professional services. If such services are required, the assistance of an appropriate professional should be sought.

---

## About the Authors

**Warren C. Young** is Professor Emeritus in the Department of Mechanical Engineering at the University of Wisconsin, Madison, where he was on the faculty for over 40 years. Dr. Young has also taught as a visiting professor at Bengal Engineering College in Calcutta, India, and served as chief of the Energy, Manpower, and Training Project sponsored by US Air in Bandung, Indonesia.

**Richard G. Budynas** is Professor of Mechanical Engineering at Rochester Institute of Technology. He is author of a newly revised McGraw-Hill textbook, *Applied Strength and Applied Stress Analysis*, 2nd Edition.