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PHYSICAL
METALLURGY
PRINCIPLES

Third Edition

Second Edition
Dynamics,

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PWS-KENT PUBLISHING COMPANY
Boston



PWS-KENT
Publishing Company

20 Park Plaza
Boston, Massachusetts 02116

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PWS-KENT Publishing Company is a division of Wadsworth, Inc.

Library of Congress Cataloging-in-Publication Data

Reed-Hill, Robert E.

Physical metallurgy principles / Robert E. Reed-Hill.—3rd ed.

p. cm.

Includes index.

ISBN 0-534-92173-6

1. Physical metallurgy. I. Abbaschian, R. II. Title.

TN690.R43 1991

91-30237

699'9—dc20

CIP

International Student Edition ISBN 0-534-98236-0



This book is printed on recycled, acid-free paper.

Sponsoring Editor: *Jonathan Plant*
Assistant Editor: *Mary Thomas*
Production Coordinator: *Helen Walden*
Text and Cover Designer: *Helen Walden*
Manufacturing Coordinator: *Peter D. Leatherwood*
Typesetter: *Asco Trade Typesetting Ltd., Hong Kong.*
Printer and Binder: *Arcata/Halliday*

Printed in the United States of America
92 93 94 95 96—10 9 8 7 6 5 4 3 2 1

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and directly behind, the notch. The effect of this mode of stressing is to place the metal at the base of the notch in a state of triaxial tension. The rate of loading in the impact test is much faster than in a normal tensile test, being of the order of 10 million times faster. This rate of straining results from the fact that the knife edge is mounted at the center of percussion of a heavy pendulum hammer, which is dropped from a fixed height. Because the hammer always falls the same distance, it contains a fixed amount of energy when it strikes the specimen, usually of the order of 200 ft-lb (271 J). Fracturing the specimen removes energy from the hammer, which is measured on the testing machine by the height to which the hammer rises after it has broken the specimen. The energy expended in fracturing the Charpy impact specimen is the quantity measured in the test. If the fracture is completely ductile, the energy expended will be high; when it is completely brittle, the energy expended will be low.

The impact test furnishes us with a simple method of following the change in

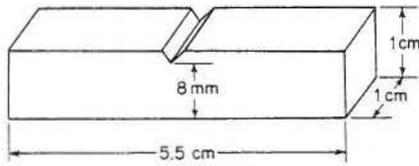
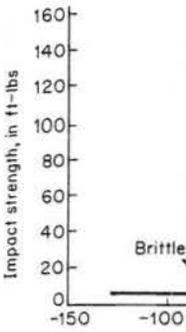


Fig. 22.50 V-notch Charpy impact test specimen.

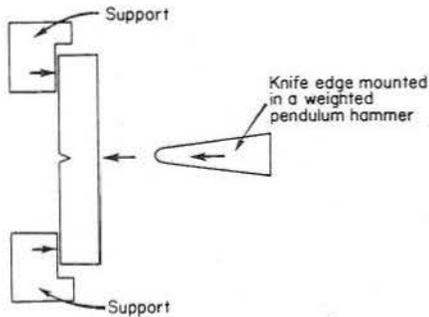


Fig. 22.51 Method of applying the impact load to a Charpy specimen.

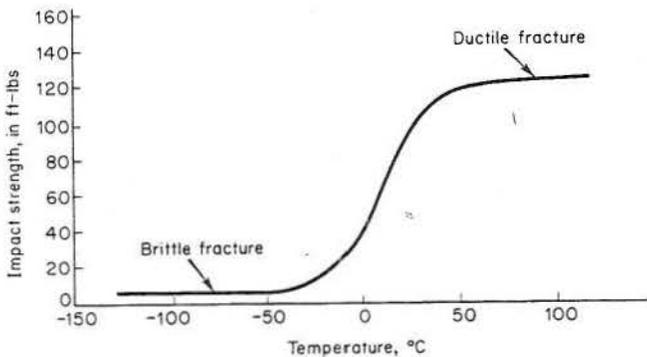


Fig. 22.52 Representative Charpy impact ductile to brittle fracture transition curve.

22.38 The Impact Test

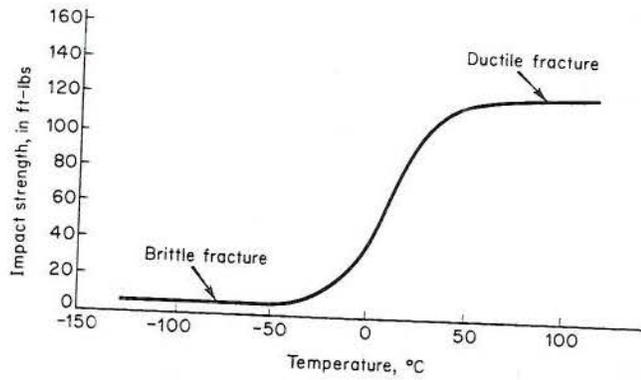


Fig. 22.53 Representative Charpy impact ductile to brittle fracture transition curve.

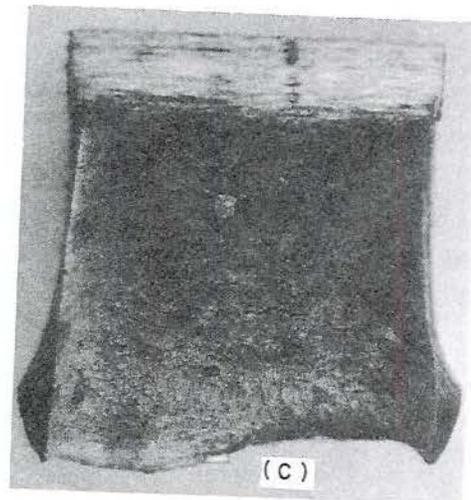
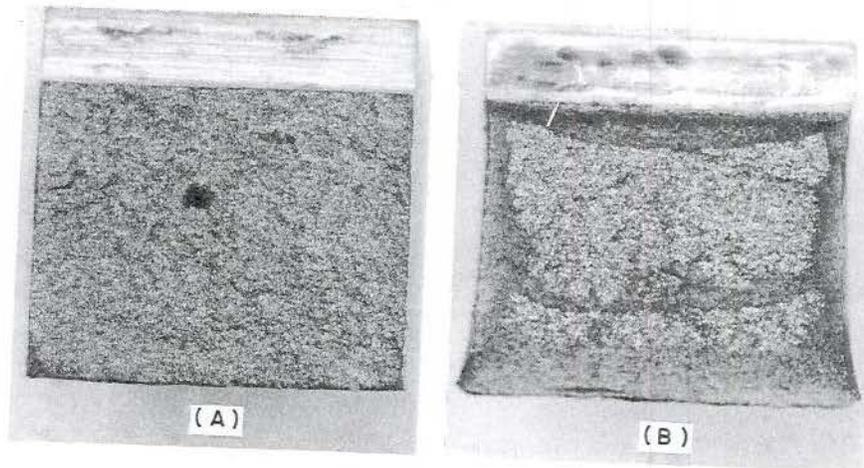


Fig. 22.54 Typical Charpy v-notch fracture surfaces: (A) completely brittle fracture; (B) part ductile, part brittle; (C) completely ductile.

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