Laser Material Processing

Springer-Verlag London Ltd.

William M. Steen

Laser Material Processing

Second Edition

With 234 Figures

Springer

Professor William M. Steen
James Bibby Professor of Engineering Manufacture
Mechanical Engineering Department
University of Liverpool
Liverpool L69 3BX
UK

ISBN 978-3-540-76174-7

British Library Cataloguing in Publication Data
Steen, W. M.
Laser material processing. - 2nd ed.
1.Lasers - Industrial applications
I.Title
621.3'66
ISBN 978-3-540-76174-7 ISBN 978-1-4471-3609-5 (eBook)
DOI 10.1007/978-1-4471-3609-5

Library of Congress Cataloging-in-Publication Data
Steen, W. M.
Laser material processing / William M. Steen. - - 2nd ed.
p. cm.
Includes bibliographical references.
ISBN 978-3-540-76174-7
1. Manufacturing processes. 2. Lasers- -Industrial applications.
3. Prototypes, Engineering. I. Title.
TS183.S73 1998 97-46601
670.42- -dc21 CIP

1st edition published in 1991

Typesetting: Camera ready by author

69/3830-543210 Printed on acid-free paper

To Margaret, Pip, Mim, Donald and Jane

The stimuli for this emission

Acknowledgements

The author would like to acknowledge the support he has gained from the enthusiasm of the many students who have passed through the research schools he has led at Imperial College and now Liverpool. Many of these now run their own laser businesses, teach the subject or have found other ways of making money from laser material processing. This is one of the greatest pleasures an academic can have.

In help with this book he is particularly grateful to Dr. W. O'Neill for his help in editing and correcting chapters 1 & 2; to Prof D.Hall for guidance on brightness; Prof J.D.C.Jones for help with focussing; to Dr. R. Akhter for his help in editing and assembling the illustrations for chapter 4; to Miss F. Fellowes for her help in assembling and editing chapter 6 and the cover picture, which is of silica powder blowing into a laser beam during the FOCAL process which she helped to invent; to Dr. L. Li for his help in editing and illustrating chapter 7 and last, but not least, to his wife, Margaret, who created an ambience in which to live and complete this work.

Contents