

# Preface

The market for cutting tools worldwide is estimated to be worth \$200 billion, of which, 3 % of the market is dominated by abrasive cutting tools. The development of high-performance grinding wheels has allowed significant increases in the advancement in surface grinding processes such as creep-feed, VIPER, and high-speed stroke grinding. This brief describes the advances made in vitrified grinding wheels and abrasive grains that have enabled high-performance grinding to take place.

The first chapter describes the characteristics of abrasive grains in terms of shape and classification of those parameters for measuring particle shape and how they are related to sharpness, wear, toughness, and cutting ability. The different types of grains, their chemistry, and manufacture are explained together with how they are selected for various grinding applications. The second chapter of the brief is focused on the minerals formed during the firing of ceramic bonding systems, the reactions between alumina and the bond, and the provision of two case studies that detail how interfacial compounds and quartz-containing bonding systems affect wear of grinding tools.

The brief is written for students of materials science and manufacturing technology as well as practicing scientists and engineers involved in the manufacturing industries. The brief is meant to be used as an aid to understanding how abrasive grains and bonding system chemistry affect grinding wheel wear and performance in vitrified products. The brief also provides an understanding of how grinding wheels are formulated and manufactured.

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High Performance Grinding and Advanced Cutting Tools

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2013, VIII, 100 p. 83 illus., 16 illus. in color., Softcover

ISBN: 978-1-4614-3115-2