

Preface

Taiyuan University of Technology (TYUT) has been researching and spreading the application of surface finishing technology for about 30 years and is one of the early domestic research institutes carrying out the free abrasive finishing technology. TYUT has obtained a number of achievements and patents. One of the projects was listed in the national key project of scientific and technological achievements. TYUT was awarded one prize for Science and Technology Progress of China and two prizes for Science and Technology Progress of Shanxi province. Based on the former research results, Professor Shichun Yang published a monograph “surface quality and finishing technology” supported by high-standard writing publication fund of China Machine Press in 2000. This monograph won extensive recognition from all sectors of society such as colleges, research institutes, and enterprises. Some colleges are using this book as the textbook for postgraduate or undergraduate students. Some manufacturers have used the new processes and equipment introduced in this monograph. It is certain that the editor’s original intention has been realized.

In the past decade, the Finishing Technology Research Institute of TYUT has been committed to the technical challenge in production. There are four doctoral theses, respectively, discussing many new theories, technologies, and processes related to the barrel finishing for shaft parts with large sizes, magnetic abrasive finishing, fluid magnetic abrasive finishing, and two-phase flow finishing. These theses are supported by National Natural Science Foundation of China, Innovation Funds for Small and Medium Corporation from Nation’s Technology Ministry, Shanxi Natural Science Foundation, Shanxi Scientific and Technological Project, Shanxi Science and Technology Research and Development Program, and Shanxi Foundation for Returned Scholars. Our institute has been cooperating with Langfang branch of China North Industries Group Corporation (Langfang Beifang Tianyu Mechanical and Electrical Technology Co., Ltd.) on developing many new finishing equipments adapting to market demand. The research achievements have been successfully used in military-industrial enterprises, civil enterprises, and foreign-funded enterprises. These enterprises achieved better economic benefits and social benefits. Based on the necessity in practice of teaching, scientific research,

and manufacturing, the monograph “surface finishing theory and new technology” was published in 2011, which was supported by publishing fund of National Defense Science and Technology Books. The principle of this monograph is that the monograph focuses on the research results and achievements of authors. It also emphasizes the systematicness and integrity of theory, experiment, simulation, and application and summarizes the practical finishing methods at home and abroad. This monograph is intended for the practicing engineers who engaged in machinery manufacturing and related engineering field, as well as for scientific personnel and university teachers and students.

In this revision, authors have made some modifications and improvements for every chapter. Chapter 1 supplemented some concepts and explanation. Chapter 2 added simulation and analysis of centrifugal barrel finishing process; types of vibratory barrel finishing process are improved, preparation process of the media are added, and some application cases are updated. Chapter 3 increased one preparation method of magnetic abrasive using the high-energy ball milling. Chapter 4 increased Sect. 6, and the surface modification of FMA is put forward to change the surface chemical properties of the particles in this section. Chapter 5 increased Sect. 6, and this section explored the finishing principle, fluent field simulation, and finishing effects of the two-phase compulsive circulation flows finishing.

This monograph is comprised of 5 chapters. Chapter 1 introduces the concept of surface quality and surface finishing technology, and the development of finishing technology. Chapters 2–5 explore the finishing mechanism, equipment, influence factors, finishing effects and applications of barrel finishing, magnetic abrasive finishing, fluid magnetic abrasive finishing, and two-phase flow finishing, respectively.

This monograph is written by Sheng-qiang Yang, Wen-hui Li, et al. This book is written in the form of brainstorm and division writing. The breakdown of this monograph is Chap. 1 is written by Sheng-qiang Yang, Wen-hui Li, Feng-feng Wu; Chap. 2 is written by Wen-hui Li; Chap. 3 is written by Hong-ling Chen, Yong-gang Li, Zhi-yan Hou; Chap. 4 is written by Wei-dong Li and Huan-wu Sun; Chap. 5 is written by Xiu-hong Li. The book is compiled by Wen-hui Li and Sheng-qiang Yang. English proofreading is done by Jian-yan Tian, and Yan-qing Wang, Xiu-zhi Wang, Li-ping Liu in our institution took part in the translation. The authors express great appreciation to their supports. The authors are grateful to the National Defense Science and Technology Publishing Press for the support.

The authors are limited, and this monograph may have some mistakes. We welcome readers to correct and make valuable comments!

Taiyuan, China
March 2017

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<http://www.springer.com/978-3-662-54131-9>

Surface Finishing Theory and New Technology

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2018, X, 497 p. 443 illus., Hardcover

ISBN: 978-3-662-54131-9