TECHNICAL UNIVERSITY OF KOŠICE
FACULTY OF MECHANICAL ENGINEERING

Prof. Ing. Peter Demeč, CSc. – Assoc.Prof. Ing. Tomáš Stejskal, PhD.

VIRTUAL PROTOTYPING AND EXPERIMENTAL VERIFICATION OF MACHINE TOOLS ACCURACY

The monograph aims to acquaint the scientific and professional public with the results of numerical and experimental research into the design properties of machine tools in terms of their impact on their working accuracy. The publication draws on the results of the authors' own research activities within the grant project KEGA no. 025TUKE-4/2019: Integrated training laboratory for virtual prototyping and experimental verification of machine tool accuracy and was supported also by the Slovak Research and Development Agency under the Contract no. APVV-18-0413

© Prof. Ing. Peter Demeč, CSc.
Assoc.Prof. Ing. Tomáš Stejskal, PhD.

VIRTUAL PROTOTYPING AND EXPERIMENTAL VERIFICATION OF MACHINE TOOLS ACCURACY

Reviewers:
Prof. h. c. Prof. Ing. Karol Velíšek, CSc.
Prof. Ing. Jozef Pilc, CSc.
Prof. Ing. Slavko Pavlenko, CSc.

ISBN 978-3-96595-013-9

CONTENTS

PREFACE

We have prepared the presented scientific monograph in order to acquaint the general scientific and professional public with some research results with the results of numerical and experimental research of the properties of machine tool construction in terms of their impact on their working accuracy. Identifying the influences of the machining process itself, as well as the influences of the design properties of the machine tool, will make it possible to predict and subsequently optimize its design in terms of its achieved working accuracy. The practical importance of virtual machining and experimental research in this area is primarily in reducing financial costs and speeding up machine design without the need to produce a physical prototype. Using simulation models, it is possible to repeatedly analyze the weak points of the machine design, determine the effects of individual components of the machine on its properties and optimize them, but also take into account ergonomic and other requirements.

The publication draws on the results of the authors' own research activities within the grant project KEGA no. 025TUKE-4/2019: Integrated training laboratory of virtual prototyping and experimental verification of machine tools accuracy and from previous grant research projects, partial results of which have been published in works listed in the bibliography. Developed and verified methodologies of virtual machining, mathematical simulations and experiments are developed by the scientific field of Production Machines and Equipment and can be used in industrial practice in existing, respectively potential machine tool manufacturers.

The authors thank the reviewers, namely Prof. h. c. Prof. Ing. Karol Velíšek, CSc. from the Faculty of Materials Science and Technology in Trnava, Prof. Ing. Jozef Pilc, CSc. from the Faculty of Mechanical Engineering of the University of Žilina and Prof. Ing. Slavko Pavlenko, CSc. from the Faculty of Production Technologies of the Technical University in Košice based in Prešov for careful reading of the manuscript of the monograph and their valuable comments and advice, which contributed to the improvement of the publication and will be an inspiration for us in the future.

At this point, we would also like to thank our families for their quiet support and the immense tolerance they have endowed us with our work on the publication.

Košice, October 31, 2021

Authors