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Editorial

Editorial for Special Issue "Advances in Computer-Aided Technology"

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The determination of this Special Issue topic, in the field of Advances in Computer-Aided Technology belonging to the section "Mechatronic and Intelligent Machines", was well received by the community of scientists and researchers. Computer-aided technologies (CAx) encompass the use of computer technology to aid in the design, analysis, and manufacturing of products. Significant progress has also been made in this area, due to the rapid expansion of science and technology. Advanced CAx tools combine many different aspects of product lifecycle management (PLM), including design, finite element analysis (FEA), manufacturing, production planning, and product. In terms of the transition to the Industry 4.0 concept, the idea of the digital twin comes to the fore, and existing CAx systems must adapt to this trend. This book presents 13 selected papers that are related to industrial applications in several major topics of the scientific main areas such as New trends in CAx systems, Digital manufacturing, Internet of Things in manufacturing, Simulation of production systems and processes, Systems for advanced finite element analysis, Material engineering, Digitization, and 3D scanning.

A multi-case load spectrum-compiling method is proposed in the study of authors Wang et al., for the dynamic modeling of a hydraulic excavator stick to simplify and accelerate the fatigue bench test. Fatigue tests were performed using a program load spectrum and using a random spectrum [1]. The main goal of the paper of authors Skrivanek et al. is to present the effect of a change in the drive structure of a small-diameter knitting machine. The novelty of the work was a comprehensive comparison of the existing and modified drive structure with a description of the possible benefits in terms of dynamic behavior, overall simplification of the machine concept and expected savings in terms of electricity consumption [2]. The article by Mitalova et al. describes the initial study and development in the field of machining one kind of composite material with natural reinforcement WPC with AWJ. The influence of selected technological factors on the topography of resulting surfaces has been studied in particular [3]. The article of the authors Lishchenko et al. describes research on how to develop information signals in time and frequency domains containing the surface quality diagnostic features to monitor the 3D-printing technological system state. The article shows how it is possible to increase the efficiency of the online monitoring of the quality of the 3D printing technological process using an optical contactless high-performance measuring instrument. The research results are applicable to 3D-printing machines [4]. The study of the authors Ivanov et al. describes the production of flexible fixtures with modern machining technologies capable of machining similar shapes and sizes of parts with complex geometries [5]. The paper from the authors Slapak et al. describes a new measurement approach to obtain the necessary transmission parameters together with its mathematical model. A mathematical model was created to calculate the nonlinear friction of the gearbox in all four quadrants with a detailed description of the simulation of the servo drive with the modeled gearbox. The results are compared with the real measurement of the system [6]. The paper from the authors Komarek et al. deals with the modification of the existing mechanical system of the needle bar. The purpose of the

Citation: Pollák, M.; Kočiško, M. Editorial for Special Issue "Advances in Computer-Aided Technology". *Machines* **2023**, *11*, 227. https://doi.org/10.3390/machines11020227

Received: 1 February 2023
Accepted: 2 February 2023
Published: 3 February 2023

published research was to design a completely new principle for controlling the grip and release of the needle by means of an electromagnet located in the body of the needle bar. This innovative solution will eliminate the noise generated by the release of the needle on the original system [7]. The usage area of digital impressions, which is the primary stage of digital dentistry, is increasing worldwide; there is a lack of performance data on intraoral scanners, especially in the field of implantology, which is dealt with in more detail in the study by the authors Albayrak et al. [8]. The aim of the research by the authors Pollák et al. was to determine the deep-drilling process input conditions. The focus of the analysis was on how the monitored technological and physical impacts translate into achieving the required gun-drill life and the quality and dimensional accuracy of deep holes, as well as their overall impact on tool life [9]. The study by the authors Ryumin et al. describes the development in the field of design of ship structures, focusing on the detailed description of an integrated system capable of performing both the design and modeling of the structure of merchant ships [10]. The paper by the authors Grozav et al. proposes a study on the feasibility of implementing Deep Neural Networks for predicting the dimensional accuracy and the mechanical characteristics of components obtained through the FDM method using empirical data acquired by high-precision metrology [11]. The paper by the authors Solfronk et al. presents an investigation of the computational strategy used in FEA on the springback prediction of a thin sandwich material made of micro-alloyed steel. The Vegter yield criterion combined both with isotropic and kinematic hardening law was used for their own calculation [12]. The article by the authors Stejskal et al. presents a direct analytical expression covering the rank of two tensors in a plane. The method was applied to the simplest type of tensor, which represented an advantage for the analytical approach of the method. Numerical methods for tensor rendering can be replaced with an accurate analytical method [13].

The editorial team thanks all authors of the published articles as well as authors of articles who were interested in publishing in the Special Issue. We especially thank the reviewers, who examined all the submitted articles in detail and, through their scientific experience, expressed their opinion on the solved issue and helped with valuable advice in improving the presented results of the authors' studies.

Conflicts of Interest: The authors declare no conflict of interest.

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