

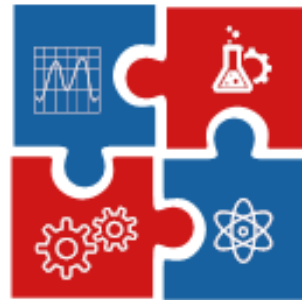
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CNN TECH

**„International Conference of Experimental and
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Programme and The Book of Abstracts

04 – 07 July 2023

Zlatibor, Serbia

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DESIGN OF MULTIPRODESK: MULTIFUNCTIONAL RAPID PROTOTYPING DESKTOP MACHINE

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Abstract

Rapid prototyping technology has emerged as one of the most significant technologies that enable the reduction of the product development and production times. The novel low-cost desktop multifunctional machine tool, able to support additive and subtractive manufacturing of symmetrical and asymmetrical cylindrical parts, is presented. The core of the invention is the new concept of the machine tool with a horizontal rotating device chuck (3-axis rotary CNC) as a multifunctional rapid prototyping machine. The specific concept of the machine's geometry enabled reconfigurability, i.e., the simple change of tools for the unique combination of three production technologies on one desktop machine: milling, laser engraving, and rotary 3D printing. Open-source control infrastructure enables end-user customization and machine upgradeability and achieves cost-effectiveness. Innovative design enables additional technological advantages in the desktop rapid prototyping machine tools domain, such as: 1) the possibility of the production of a single cylindrical part completely in one clamping by using a combination of additive and subtractive manufacturing (which achieves effective use of material, energy, and reduced time consumption, increased productivity, increased accuracy); 2) modularity and the open architecture control structure which allows for upgradeability and further development of the machine according to end-user needs (possibility to add supplementary axes per users' demands; 3) digital twin technology. MultiProDesk is a valuable production tool for SMEs in various production technologies where it allows users to adopt mass customization concepts and to reach mass personalization production (as a step to Industry 4.0).

Keywords

Rapid prototyping, 3-axis rotary CNC, milling, laser engraving, rotary 3D printing.

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