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Belgrade, 12.-14. September 2024.

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TECHNOLOGICAL FORMS OF PRISMATIC WORKPIECES AND THE SELECTION OF NECESSARY AXES FOR MACHINE TOOLS

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ABSTRACT

The development of numerous devices, technologies, and industries has resulted in a large number of various metal parts being produced. Each metal part, workpiece, used either independently or as part of an assembly, has characteristic surfaces that are processed using some metal cutting method. For easier and quicker identification of surfaces that need to be processed on a workpiece with complex geometry, it is necessary to form certain classes of typical technological forms that are most commonly encountered in workpieces. Each technological form has corresponding characteristics related to cutting diameter, cutting depth, appropriate radius, and a range of other parameters. The paper analyzes a total of 27 different classes of technological forms, and for each of these forms, 1000 different 3D CAD models are generated. The obtained 3D CAD models serve as input for training and testing 3D Convolutional Neural Networks (3D-CNNs) in recognizing various technological forms. Excellent results were achieved through testing the 3D Convolutional Neural Network.

Based on the data regarding workpieces, or the classes of technological forms that the workpiece possesses, it becomes possible to define the necessary axes for machining on machine tools, namely two, three, and five-axis machine tools. Based on the number of required machining axes, an appropriate configuration of machine tools is proposed and formed from the database of machine tool module models.

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