

CAD/CAM SYSTEM FOR AUTOMATIC MANUFACTURING TECHNOLOGY DESIGN OF FREE FORM SURFACE PARTS

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Abstract

Apart from having strong application in mechanical engineering, parts with free form surfaces are also present in electrical industry, medicine, appliance and consumer goods industry etc. Following this increasing interest, the research team of the Production Engineering Department of the Faculty of Mechanical Engineering Belgrade in Serbia, initiated series of studies in order to develop CAD/CAM system that will provide automatic manufacturing technology design for milling operations. The designed system is intended for automatic tool path generation based on loaded inputs (part/workpiece CAD model, workpiece material and surface roughness) and a database containing sets of values for available cutting tools and cutting coefficients for tool/workpiece material while considering geometry as well. Manufacturing of the workpiece according to the generated tool path fulfills the requirements for minimizing machining time and production costs accordingly. The system generates machining parameters based on available data stored in the database, which is an integral part of the designed system. MATLAB[®] software package was used for developing this system, therefore no expert knowledge about CAD/CAM systems is necessary for its use. The machining of parts based on the developed optimization methods was carried out at the Faculty of Mechanical Engineering in Belgrade. Precise dimensional inspection of manufactured parts was performed at Department of Physics - University of Liverpool, UK using OGP Smartscope CNC 624 multisensor metrology system. Deviation maps were created based on measurement data which demonstrate that the machining was performed in defined specifications, verifying the applicability and pertinence of the developed system.

Keywords

CAD/CAM systems, Computer graphics, Free form surfaces, Tool path optimization

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