Development of the Numerical Control Program for Turn/Mill Machine Tools

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ABSTRACT

A mill-turn machine combining a lathe and machining center can perform turning and milling operations on the same machine. It can machine a workpiece in one setup and eliminate errors that can be produced by moving the workpiece between turning and milling machines. Since the mill-turn machine has a complex configuration in which linear and rotary movements are nonorthogonal, generating the part program manually is almost impossible. This thesis develops an interface called a postprocessor that converts cutter location data generated by a general commercial CAD/CAM system into the Numerical Control (NC) data dedicated for the mill-turn machine. The form-shaping function matrix of the mill-turn machine, which describes the motion trajectory of tool points relative to the workpiece, is derived by the homogeneous coordinate transformation matrix. The complete analytical equations for NC data are obtained through form-shaping function matrix and inverse kinematics. A window-based postprocessor system written in Borland C++ Builder and OpenGL was developed according to the proposed algorithm. Solid cutting simulation software is utilized to verify the effectiveness of the proposed algorithm.

Keywords : Multi-axis ; Mill-turn ; Postprocessor ; Numerical control

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