Development of an Object-Oriented 2D Parametric CAD and Integrated NC Machining Application System

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ABSTRACT

With the rapid development of machining technology in the last few years, computer numerical control (CNC) machine has already become an indispensable machinery for a machining workshop. For example, many new types of CNC machines have been introduced such as lathe machine, milling machine, drilling machine, WEDM … etc. to facilitate various demands.

In fact, a designer often needs to draw the part with off-the-shelf software. CNC machine operator writes and/or transmits the NC code generated by a CAM engineer to the controller for machining process. A typical controller can be used to edit and verify the NC code through toolpath simulation, but intelligent CAD system is not normally provided. This research adopted the Microsoft Visual C# and Direct3D to develop such a value-added CAD System. With a parametric CAD system as the drawing core, a designer could construct and revise the focused geometry more efficiently. The NC codes could then be output accordingly.

To realize the developed parametric 2D CAD system, integration with a human-machine interface for a turret drilling center, WEDM, CNC milling machine and laser manufacturing machine has been successfully accomplished. The developed system has been used to draw a pattern and output the machining data of the pattern. NC codes were used to link with the virtual turret drilling center, Virtual CNC and the virtual wire electrical discharge machine while DXF and BMP files were used to link with the laser manufacturing machine.

The developed parametric 2D CAD system is expected to serve as an assistant system for a CNC operator through its integration to a CNC controller towards a value-added component.

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