A Framework for the Reverse Engineering of Cutting Tool-path Simulation

E-mail: 9707926@mail.dyu.edu.tw

ABSTRACT

In precision manufacturing industry, how to ensure the numeric code (NC) for machine tool processing is very important. In the traditional method, the pattern and the tool-path designed in the CAD/CAM, directly using straight lines and circular arcs to simulate the profile and generate current NC Codes. Between CAD/CAM systems and machine tools, there is a Pest-processer need to be implemented. This kind of normal technique will not guarantee the numeric code (NC) is the same as original design after manufactured on the machine tool. In this study, the main purpose is to simulate the NC codes produced for a CNC milling machine, so as to determine whether it is correct and complete before the machine tool processing. Base on the processing instructions in NC Code, the system uses wireframe to go through the process of developing a cutting path, which can prevent over-cutting in the real cutting. There are wide ranges of CNC milling machine controllers available, and this system is based on controller to various sorts as the design basis. Assume After reading the NC codes of a milling machine, the system is able to use reverse engineering to recreate and simulate the cutting path. In this study, using the concept of software engineering, a human-machine interface (HMI) system is developed. Through a 3D display to provide rotation, zoom, pan, and other functions, the system gives users full understanding of the cutting path in the milling process. In addition to provide simulation of the cutting path, it is also possible to perform NC-code editing on this system. In the process of examining the cutting path, it can immediately improve or insert NC-code instructions if necessary. Furthermore, the system provides a debug function for detecting the cutting path, which allows users to identify any error position in the cutting path, thus establish a complete simulation of the cutting path.

Keywords : Tool-path ; Software engineering ; Reverse engineering ; Human-machine interface (HMI)

Table of Contents

REFERENCES

[1] Licari, R., Valvo, E. L. and M. Piacentini (2001) Part program automatic check for three axis CNC machines. Journal of Materials Processing Technology, 109, 290-293.

[2] Sommerville, I. (1996) Software Engineering, 5th edition. Reading, MA, Addison-Wesley, 4-19.

[3] Bennett, K. H. (1993) An overview of maintenance and reverse engineering, The REDO Compendium, John Wiley and Sons, Inc., Chichester.

[4] Rine, D. C. (1997) Supporting reuse with object technology. IEEE Computer, 30(10), 43-45.

[5]   (82)   C++

[6]   92

[7] Visual Basic 6.0   (   )(88)

[8]   (85)   Visual Studio 2005

[9] http://www.microsoft.com/taiwan/msdn/elearning/vs2005.htm [10] http://phi.sinica.edu.tw/aspac/reports/94/94019/ [11]   (93)

[12] Yoshimi, T. and W. Takahiro (1992) Generation of 5-axiscontrol collision-free tool path and postprocessing for NC data, CIRP Annals , Vol, 41, No, 1, 539-542.

[13]   (72)   CNC

[14]   (95)   -Software Engineering

[15]   (75)   CNC

[16] Tan, K. K., Huang, S. N. and H. L. Seet (2000) Geometrical Error Compensation of Precision Motion System Using Radial Basis Function, IEEE Transactions on Instrumentation and Measurement, Vol, 49, No, 5.

[17]   (92)   CNC

[18]   3D   /

[19] http://study.tnit.edu.tw/teacher/jchuang/tutor/nc-2.htm.

[20] http://elearning.stut.edu.tw/m_facture/web/ch3.htm [21] Gamma, E., Helm, R., Johnson, R. and J. Vlissides (1995) Design patterns: elements of reusable object-oriented software, Addison-Wesley.

[22]   (96)   Visual Basic 2005   (   )

[23]   (92)   Visual Basic.net

[24]   (94)   CNC