Practical Teaching of UG CAM Based on the Case of Pattern Punch

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Abstract

UG CAM is a very strong course in practical teaching. It is very important to strengthen the teaching of cases in the classroom. This paper takes the simulation processing of flower-type punch as an example, introduces the general process of case teaching in the process of UG CAM teaching, so that the theory connects with the reality, enhances the interest of students, fully reflects the subject status of students, cultivates students' ability that the theory connects with the reality and improves the teaching effect of UG CAM.

Subject Areas

Computer Engineering, Education

Keywords

Pattern Punch, Practice Teaching, UG CAM

1. Introduction

CAM (Computer Aided Manufacturing) is computer-aided manufacturing, which includes computer-aided production planning, computer-aided process design, computer numerical control programming, and computer-controlled processing. CNC machining programming is its main content. CNC machining mainly refers to the control of the machine tool with digital information recorded on the media, so that it automatically performs the specified machining tasks [1] [2] [3].

In the vehicle industry, the processing of various process equipments with complex profiles, for example, main models inside and outside the body, stamping dies for sheet metal parts, bumper, instrument panel and other large injection molds, engine intake, cylinder water set of casting sand core molds, connecting rods, crankshafts, etc., is a field in which CNC machining has a special advantage [4] [5]. It plays a pivotal role in the production of modern mechanical

products and has been widely used.

UG CAM is a processing and manufacturing Momodu which is one of the important modules of UG and plays a pivotal role [6]. Its main function is to undertake the task of interactive graphic NC programming, it is based on the surface geometry information of the existing CAD 3D model, and it automatically calculates the tool path of NC machining, then completes the processing and manufacturing of the product, and realizes the product designer.

2. Features of UG CAM

2.1. General Operation Steps of UG CAM

The specific operations of automatic turning programming, automatic milling programming and automatic cutting of wire cutting in UG CAM are different, but from the part design drawing to the final machining program, can be shown in Figure 1.

2.2. The Concept of CNC Process Tree

The multi-view performance of CNC process planning is fully reflected in the UG CAM process database. The different perspectives of the process planning are the different views of the database. UG/CAM divides the routing into four views, and they are PROGRAM tree, TOOL tree, GEOMETRY tree, and METHOD tree as shown in Figure 2.

UG CAM course is a designated elective course for vehicle engineering. Its teaching goal is to master the principles and methods of computer-aided manufacturing, so that students can master CAM basic knowledge and usage methods, and obtain application theory knowledge to solve practical problems. Not only that, they can also master the setting of UG CAM processing environment, the
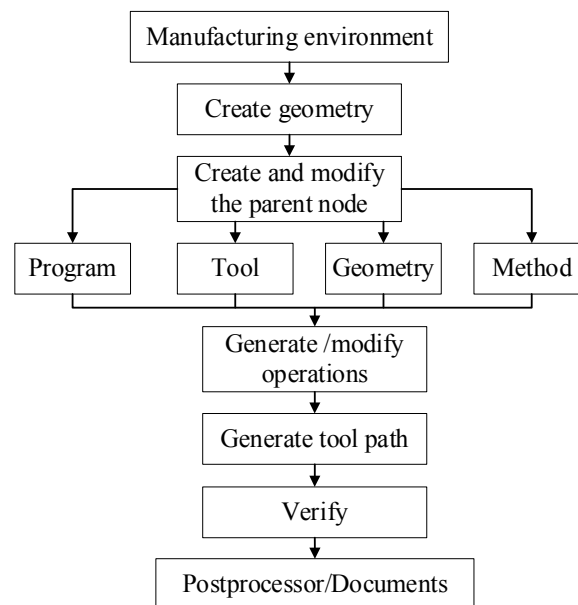

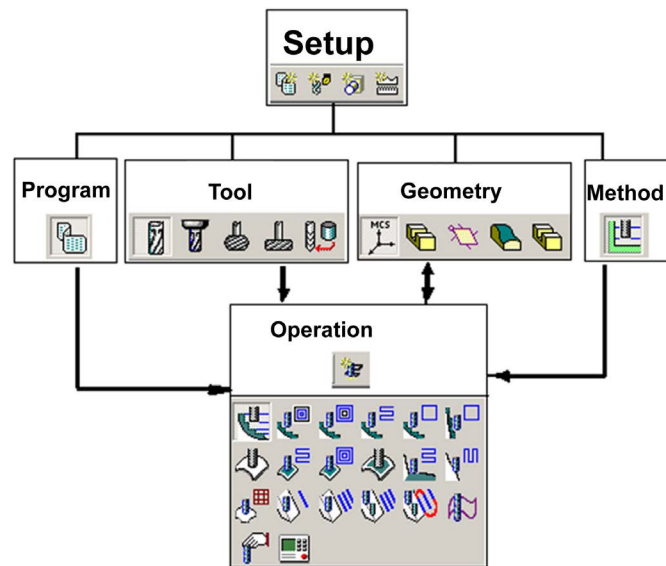**Figure 1.** General operational flow of UG CAM programming.

Figure 2. UG CAM CNC process tree.

creation of cutting tools, methods and geometric parent node group, the setting of common options, then master the programming methods of plane milling, cavity milling, fixed axis surface contour milling, etc.

3. Pattern Punch Processing Case

Because UG CAM is very practical, it requires close contact with production practices in the teaching process. In the classroom teaching, the teaching of actual cases must be strengthened. At present, although the actual practice can meet the teaching requirements, it has less contact with the actual production case. Therefore, this paper introduces the system flow of UG CAM in the case teaching process through the body simulation processing.

3.1. Establishment of Rough Parts

Firstly, in the UG modeling module, the three-dimensional model is used to establish the three-dimensional model of the pattern punch, and the blank model is added to the original model as shown in Figure 3.

3.2. Tool Path Generation

In the simulation process, two tool path operations are required that are one roughing and one finishing.

Firstly, setting the roughing simulation path. For the model material, a flat knife is selected as the roughing tool; the upper surface of the blank is offset by a certain distance to establish a safety plane; the part and the blank geometry are defined.

Then, creating a plane milling operation. The cutting method and driving method of the plane cavity milling are selected. The design of the machining path parameter: the percentage of the tool diameter is selected as 60.0, that is, the
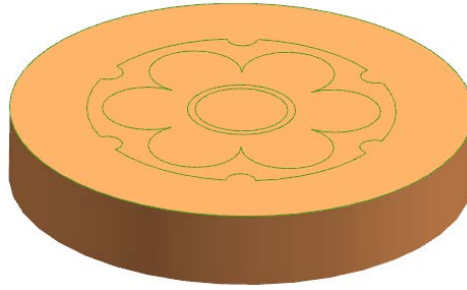
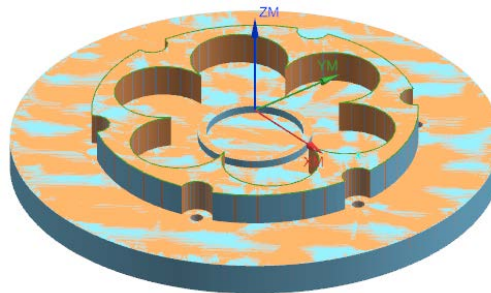Figure 3. Parts and blank models of the flower punch.

Figure 4. The finished model.

stepping amount is set to 60% of the tool diameter; the input Depth Per Cut (Range) is 2.0, and in the cutting layer option, complete the processing after the relevant setting is made. Then, it can create a point machining operation and process six small holes. The entire roughing of the pattern punch can be completed.

The finishing tool path setting is similar to the above steps. The design of parameter: the tool will use a smaller size tool.

After the rough machining tool path is set, the tool path is generated and the tool path is simulated. Through simulation processing, the final model is shown in Figure 4.

3.3. CNC Programming Pre-Processing and Post-Progressing

The two paths of the roughing and finishing obtained by the simulation are output as a numerical control program, and are prepared for the subsequent transmission to the computer of the numerical control machining milling machine through the network. If the processing device has a memory limit, the machining program can be divided into small sections.

4. Summary

UG CAM is very practical and should be closely linked to production practices during the teaching process. In the classroom teaching, it is necessary to strengthen the aspects of curriculum internship and curriculum design practice. In the course of teaching, this course increases the case analysis of computer simulation processing of typical parts of automobiles, and enhances the students' interest in

learning through the explanation of the above-mentioned processing simulation processing cases, so that students can summarize the methods of knowledge application in practice and improve students' ability to solve problems.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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