Modeling and Simulated Processing of Heart Cam Based on CAXA

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Abstract. This article mainly uses the "CAXA manufacturing engineer" to model and simulate the heart-shaped cam parts. The cam is one of the typical mechanical parts. Because of its complicated contour, it is difficult to ensure machining accuracy on ordinary machine tools. Machining centers can guarantee accuracy and increase efficiency. CAXA manufacturing engineer is an excellent CAD/CAM software, through this software, the 3D modeling of the parts is completed, and the machining trajectory is generated, and the NC machining is simulated. It is more accurate and more efficient. It saves a lot of cost for the enterprise.

Introduction of CAXA Manufacturing Engineer Software

CAXA manufacturing engineer is not only a high efficient and easy to learn, with very good technological programming software, but also a set of Windows original style, all Chinese three-dimensional modeling and surface entity perfect combination of CAD/CAM system[1].

Modeling of Heart Cam Parts

Open the CAXA manufacturing engineer software[2], first create a sketch on the X, Y plane, and draw a circle with a radius of 15mm at the center, make a 60mm vertical auxiliary line at the center point, and draw a circle of 20mm at the end point of the auxiliary line, as shown in Figure 1.

At the top of the circle, a 10mm - length auxiliary line is made horizontally, and two radius 30mm circles are drawn, and the redundant lines are cut off, and the auxiliary line of the outer outline of 20mm is drawn at the center point, and the circle of 20mm is drawn. The top part of the part needs to have a transition curve with a radius of 10mm. And delete the superfluous lines, as shown in Figure 2. Exit the sketch and make a 15mm stretch. And create a new sketch at the top level, draw a circle with a radius of 15mm, exit the sketch, and stretch 20mm, as shown in Figure 3.

Create a new sketch at the top of the circle, draw a circle with a radius of 10, and exit the sketch. Stretch to remove material through, and in the middle of the part into the sketch, from the center to make a 30 auxiliary line, and draw a radius of 5 circle, out of the sketch, stretch removal through, as shown in Figure 4.
Machining Simulation

For machining simulation, tool path is first generated and machining simulation is completed according to tool path[3].

Tool Path Generation

First generate the blank, open the "definition blank" dialog box, select the "reference model", and set the reference point, click "determine" to complete the blank setting, as shown in Figure 5.

Then the processing method is selected, and the software has a variety of alternative processing methods, Taking into account the shape of cam parts, selected tools, machining accuracy, surface quality requirements, etc, The contour processing method is used here[4].

Finally, the machining trajectory is generated, the contour line processing dialog is opened, the processing parameters are set, and the parts to be machined are selected, and the tool path is automatically generated by the system[5], as shown in Figure 6.
Figure 6. Generate machining trajectory.

Simulation and Simulation of Parts Machining

Select the generated processing trajectory, click the right mouse button, pop up the shortcut menu, select the "simulation processing", enter the simulation processing interface, and select the "start" button, then the dynamic simulation is carried out according to the generated tool path, and the parts after processing are shown as shown in Figure 7.

Figure 7. Machining simulation of a heart cam.

Conclusion

CAXA software can accurately and quickly design the machining model, and generate NC milling program through parts processing parameter setting. Through machining simulation, the tool path is edited and optimized to avoid lack of cutting, cutting extra and collision in the machining process, so as to ensure the correctness of the program. Especially complex parts, using the CAXA can avoid cumbersome numerical calculation, short the programming time greatly, realize the calibration of non actual processing parameters, improve the surface processing quality and machining precision of the parts.

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Reference


