

Multi-axis machining of bio-medical parts

Background

Bio-medical parts are designed to conform to the complex shape of bones and joints for example. Multi-axis machine tools have been widely used for machining these bio-medical parts due to the excellent accuracy and efficiency it provides. One of the challenges to the multi-axis machining are to develop a uniform tool path generation system to fully realize the capability of existing machining resources. Therefore, it is necessary to conduct research on tool path planning of multi-axis machine tools.

Industrial demands

Tool path generation for multi-axis machining includes many features and multiple criteria, such as the accuracy, length of tool path, machining time and the size of the remaining scallops. Due to the rapid development of computer graphics technology, triangular mesh has been widely used for representation of complex surface, which has been developed in MNMT.

New method

A universal system is proposed for tool path generation on triangular mesh surface to improve the processing precision and efficiency in the multi-axis machining of bio-medical parts. This system produces a series of closed paths without any self-intersection inherently and the generated tool path could cover the surface with a remarkable balance of smoothness and uniformity.

Progress and results

The tool path planning system has been developed. The results demonstrate that the proposed system is applicable for any complex surfaces represented by triangular mesh. When the surface contains some local features, the tool path would be split and gathered into some clusters automatically.

