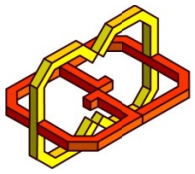


Technion-Israel Institute of Technology

Computer Science Department

Center for Graphics and Geometric Computing

CGGC Seminar

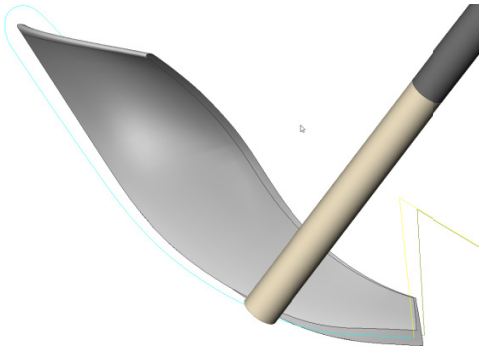
Christine Pranzas & Bastian Pranzas

ModuleWorks GmbH, Germany

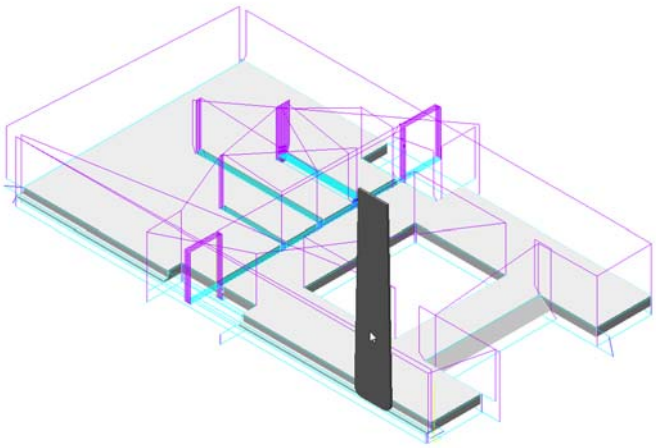
5-axis and 6-axis tool path generation for CNC- Machines

It is getting more and more popular to use 5-axis CNC-Milling machines to create parts out of metal or wood. 5-axis machines are necessary to place revolving tools at any position in space. During the presentation we want to give you a short overview about creating automated, efficient and smooth tool path algorithms for roughing and finishing (SWARF). The first presentation will give you an overview about 5-axis SWARF and 6-axis chain saw machining. Within the second talk you will get an overview about roughing tool path generation.

The main idea of SWARF machining is to move a millining cutter (cylindrical and conical cutters) along two 3d boundary curves of a triangle mesh (which describes the shape of the part) in space. To get good results a surface structure analysis in a preprocessing step is necessary. This helps to find discontinuity areas like inner or outer corners and to machine those in a correct way.



In the industry not only revolving tools are used. Some tools like grind stones or chain saws need additional information to describe a tool position in space. Therefore a 6th axis in unavoidable. Showing the differences between 5- and 6-axis machines by comparing the SWARF and the chain saw tool paths will give you a good overview about the current use of different machines in the industry.



4- and 5-axis tool paths often are produced in two steps: First, a traditional 3-axis tool path, that removes the desired areas using the tip of the tool is being calculated. This tool path might have collisions between the shaft of the tool and the part (so called undercut-areas), or it might require a long tool to avoid collisions between the tool holder and the part during machining (for example steep areas). Second, this tool path is modified by changing the tool orientation while preserving the cutter location. Usually this means preserving the contact point between the tool and the target surface. Depending on the shape of the tool and the target surface as well as the desired tool orientation, this can't always be achieved without violating the target surface. To solve this problem, the tool location as well as the contact point on the target surface must be changed. This presentation shows an efficient way to do this when working with revolved surfaces.

The lecture will be held on Sunday, 24.11.2013, at 12:30, Taub 401

Snacks and Beverages at 12:15

הזמנה זו מהווה אישור כניסה עם רכב לטכניון