



VERIFICATION OF SUITABILITY OF STRATEGY USED FOR MILLING IN THE ENVIRONMENT OF SPREADSHEET SOFTWARE APPLICATION

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ABSTRACT:

Main goal of this paper is to describe possibilities of appraisal of milling strategy in the environment of spreadsheet software application. Paper also describes evaluation principles and criteria determining suitability of selection executed by software application. From the user's view it describe expected functional principles of application while in the scope of software environment it deals with factors affecting program creation and solution realization itself.

KEYWORDS:

CAD/CAM systems, milling strategy, suitability, criterion, Excel.

1. INTRODUCTION

Currently in the field of machine industry there is need of improving the production's efficiency, of production time shortening, simplification of production and saving of energies and materials. These goals can be achieved by better exploitation of production devices and lesser tools consumption. Request of productivity improving concerns all the participants from the field of tool, automobile and aero-industry, producers of moulds and different parts of variable shapes in various usage areas.

The possibility of production's efficiency improvement is innovation attitude in milling. It is technology of miscellaneous exploitation for machining of planar, 3D shaped and rotary surfaces, slots, threads and gearing. One of attributes related to better use of milling is milling strategy, which means the way of tool motion down the machined surface. Wrong strategy selection can negatively affect production time and costs in roughing as well as in finishing strategies. Question of suitable strategy choice is therefore still actual even in new vintage CAM systems.

Optimization of manufacturing strategy selection is important matter mainly for new and inexperienced users of CNC technics, as acquirement of knowledge in this area could present barrier from economical and time aspect. Simple but helpful software application should assist in faster decision about strategy fitness and produce positive impacts of this decision. Paper deals with creation possibility of such solution in the environment of most used spreadsheet application - Microsoft Excel.

2. SOLUTIONS FOR MILLING STRATEGIES IN SYSTEMS OF COMPUTER AIDED MANUFACTURING

Currently there is a lot of software products offering computer aid in different production spheres including manufacturing strategies area. These systems should simplify the work of NC programmers and ensure the correctness of their decisions or even to substitute them by software process and so secure highest manufacturing efficiency.

To most common CAD/CAM systems solving the problems of manufacturing strategies currently belong (newest versions of software are listed in brackets):

EdgeCAM (version 12); ProENGINEER (Wildfire 4); ProTOOLMAKER; CADDs (version 5); CAM-TOOL (V3); Catia (V5R18); FeatureCAM (2008); SurfCAM (Velocity); Unigraphics (NX6); MasterCAM (X²); SolidCAM; PowerMILL (version 9); ESPRIT (SolidMILL); VX CAD/CAM (version 13).

These systems providing CAM concern machining up to 5 axis. They contains sections for roughing as well as for finishing. To main roughing strategies supported in CAD/CAM systems belongs raster milling, contour milling, profiling, raster with profiling.

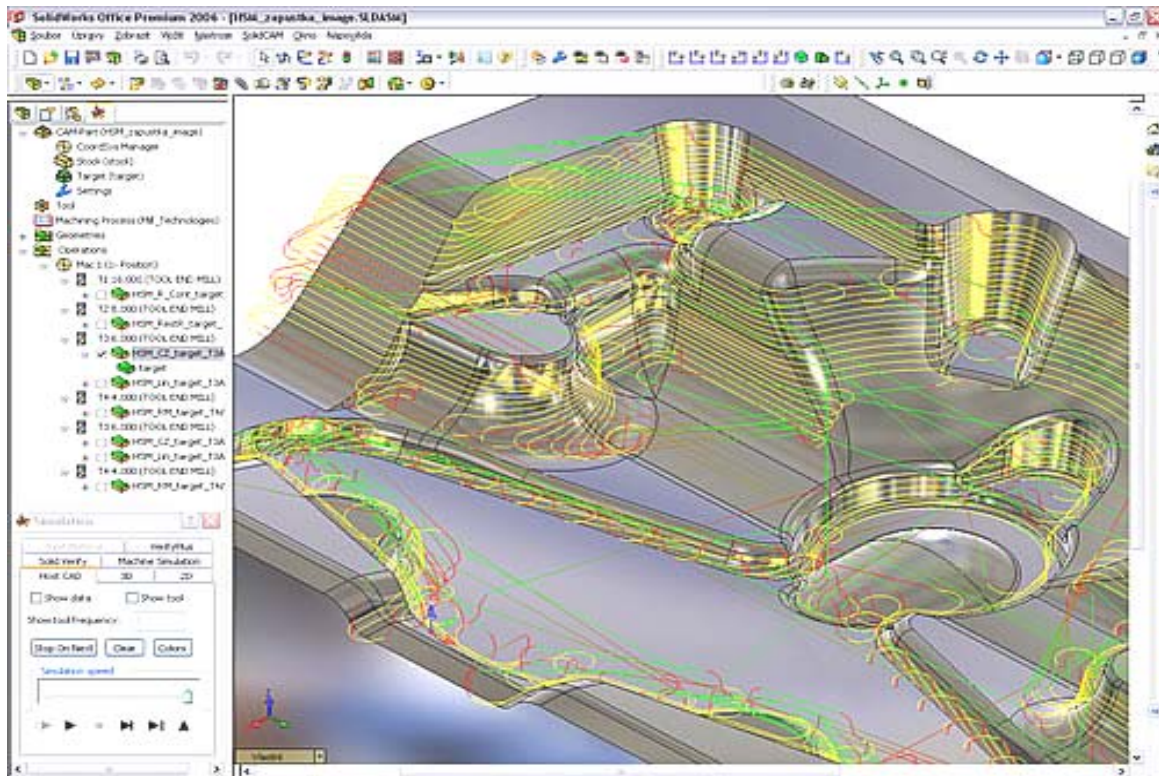


Figure 1.: Complex strategy design performed in Solidcam Software

To most used finishing strategies offered in CAD/CAM systems belong projection milling, constant Z-height milling, corner milling, nib milling, rotary milling.

In most software concerning manufacturing strategies NC programmer has an option to choose suitable strategy, which would allow surface machining in shortest possible time while preserving requested quality. However only few programs select optimal strategy without choice process of its user.

3. LENGTH VERIFICATION OF SUITABILITY OF MILLING STRATEGY IN THE SPREADSHEET SOFTWARE ENVIRONMENT.

REQUIREMENTS ON SOFTWARE APPLICATION

Software application should simplify the selection of suitable milling strategy. Among more offered strategies it select the one that meets the suitability criteria the most. At the same time it is necessary to provide the user with possibility of decision whether to consider existing criterion or not. These criteria should include the quality level of machined surface (figured for example by reached roughness level), level of residual under-surface stresses, time necessary for machining, level of tool wear etc. Requirements on application will be given from two points of view:

- ✚ Program options from the view of its possibilities of use and exploitation – acceptance of important suitability criteria, selection of suitable strategy for complex 3D surfaces, offering import option from other software applications, offering the possibility of surface definition by some kind of model creation, provide user with integrated help section;
- ✚ Program possibilities from the view of user's environment – compatibility with different operational systems, user friendly environment, resistance to users mistakes, adequate hardware requirements, affordable price;

MICROSOFT EXCEL ENVIRONMENT AND ITS POSSIBILITIES RELATED TO CREATED SOFTWARE APPLICATION

Microsoft Excel (full name Microsoft Office Excel) is a proprietary spreadsheet application written and distributed by Microsoft for Microsoft Windows and Mac OS X. It features calculation, graphing tools, pivot tables and a macro programming language called VBA (Visual Basic for Applications). It is overwhelmingly the dominant spreadsheet application available for these platforms and is bundled as part of Microsoft Office package.

From the view of creation of software solving the selection of suitable milling strategy Excel offers very limited options for successful realization of some complex application. On the other hand, possible output in the form of simple application would have one great advantage – worldwide

availability and realization possibilities thanks to wide-spread using of MS Office products. Without use of Visual Basic, the application options will be rather reduced, but it can still be useful. Utilization justification of such simple and slack software need to be verified by NC programmers and users from praxis.

PRELIMINARY TEST VERSION OF NEW SOFTWARE APPLICATION

The solution for quick and simple selection of basic milling strategies has been created using only typical modest Excel operations and calculation of data entries between the cells. This preliminary version contemplates two basic strategies RASTER and BOX applied in square and round mode. This comes out as four ways of moving the tool over the machined surface, what is graphically viewed in figure 2.

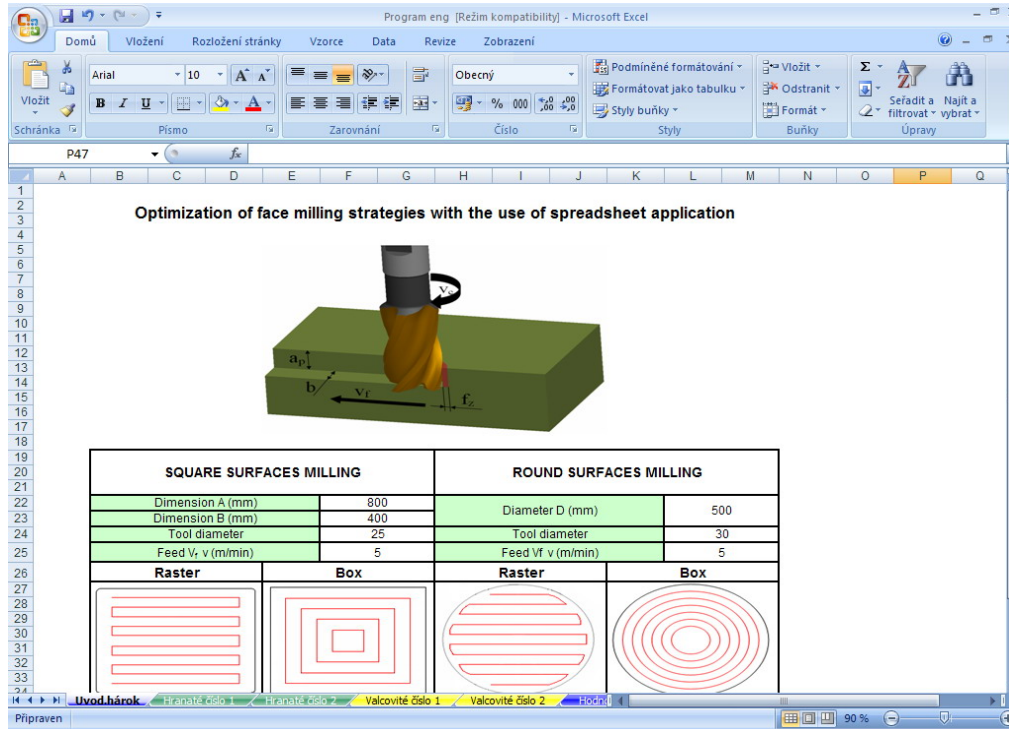


Figure 2.: Preliminary test version of application created in .xls format

Figure 3 shows brief view on principles of calculation procedure and way, how program communicates with user in order to get the input data.

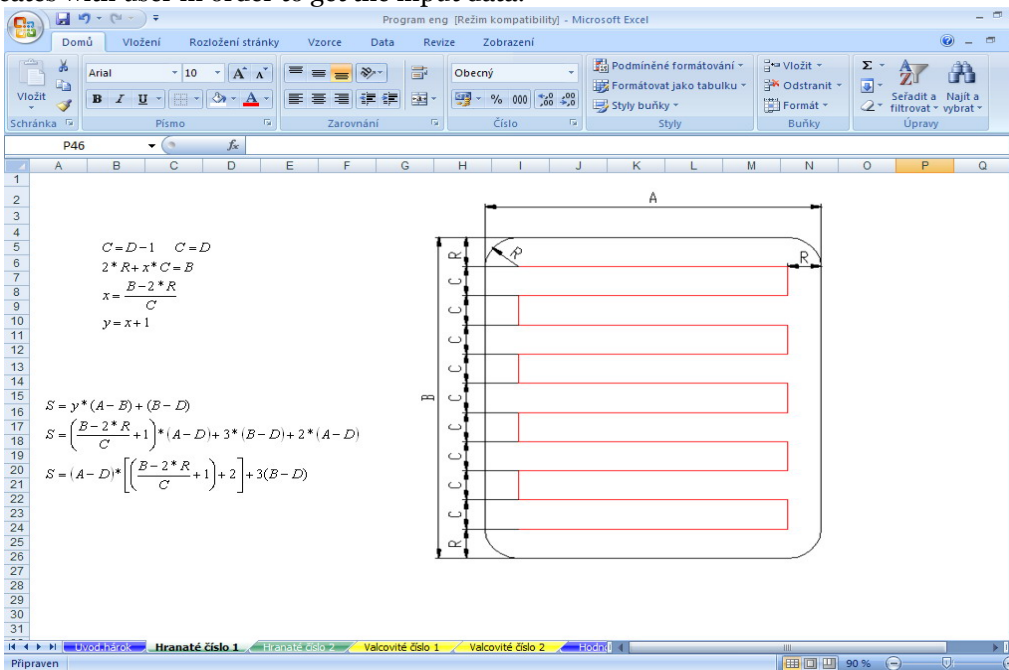


Figure 3.: Mathematical and graphical communication with user

4. CONCLUSION

The role of computer aid of optimal manufacturing strategy selection and proposition is significant from the view of production efficiency and productivity. This fact is confirmed by experiences of many companies operating in different industrial spheres.

Systems of computer aid of manufacturing currently dispose with great tools in the field of suitable strategy selection. Simple application that would not be fixed to any expensive software would be helpful especially for smaller users as method of preliminary strategy design.

This paper describes the possibilities of such program creation in the environment of most known spreadsheet software from Microsoft company. The chance to create fully working complex application while using basic Excel options is limited as achieved program outputs would be rather preliminary. Although the application presents certain addition in the field of improving and simplifying the selection of manufacturing strategies mainly for inexperienced user.

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