MODELING AND SIMULATION OF 3D SURFACE FINISHING WOOD CARVINGS

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Abstract

The paper presents 3D CAD product to be taken up and processed by the procedure CAM (Computer Aided Manufacturing) to reach CNC machining program of the workpiece.

CAM product development can also be assisted by external computer car, or even on the machine tool.

In woodworking, and especially sculptural surfaces typical was the "work of art" sculptor, designer, craftsman, who came to the "artistic" concept and development was manually, or based on offering opportunities şabloane. Program scheduled processing simulation using a simulator built. SprutCAM also offered the possibility of developing post processors for all CNC system.

Key words: woodworking, CAM, sculptural surfaces, scan, virtual model.

INTRODUCTION

The issue of CAD (Computer Aided Design) is solid definition, 3D drawing of the part or surface to be machined space.

The balance relates to the final piece, eg plastic piece that is injected into the mold. The definer of the resulting solid surfaces of mold design and configuration of the injection mold.

Solid definition is geometrically and mathematically so as to know the mathematical laws generation (Ganea M., 2010).

Among the programs 3D CAD design, we can mention: CATIA V5 (CATIA V5), COSMOS EDGE, I-DEAS, Pro Engineer, UNIGRAPHICS and others (Ganea M., 2010).

3D CAD product development can be done separately on a computer outside the car or on the machine CNC CAD through specific procedures. Such equipment can remember CNC: SPRUTCAM, MAZATROL 32M, CENTURION V, FIDIA TNC 426M TNC 530i, FANUC 32M, CIMATRON and others (www.gefanuc.ro). The latter is possible to have direct procedure and finally CAM software piece to the machine on site (Marciniak K., 1991; Yoshimi I., 2008; Jain K., 1989).

3D CAD product to be taken up and processed by the procedure CAM (Computer Aided Manufacturing) to reach CNC machining program of the workpiece.

CAM product development can also be assisted by external computer

car, or even on the machine tool. In the first case, the CAM programs are generally the same which was developed CAD product or etc., but can be devoted to CAM programs like MasterCAM (Ganea M., 2010; Ganea O., 2007).

In the 2nd case, the processing directly CAM CNC machine equipment, equipment listed above have these features specialized types of parts, for example prismatic turning etc., FANUC and more (Ganea M., Ganea C., 2000).

MATERIAL AND METHOD

Modeling and Simulation 3D surface finishing

CAM procedure allows the following main functions:

- Define the blank;
- Defining the manufacturing process;
- Defining the type of tool CAM tool library;
- Define other tool than the existing library of CAM;
- Defining the tool dimensions: diameter, length;
- Definition of cross processing;
- Defining working arrangements;
- Defining the trajectory math tool to generate mathematical laws;
- Defining their parameters and numerical values;
- Drawing tool tip trajectory in real time, or concentrate;
- Tracing the true odds processed zone;
- Generation CAM machining program.

The CAM procedure reach CNC part program by defining the specific parameters of the actual machine tool equipment, procedure called postprocessing (Derecichei L. et al., 2013).

RESULTS AND DISSCUSION

Laser Scanning was performed at the Technical University of Cluj-Napoca in Innovation Management and Engineering Laboratory in 2013.

The wood used in the processing of sculptural surfaces has the following properties: homogeneous without late wood and early wood is soft. Wood species used in this case are: cherry, maple, linden, oak, the latter being used more manual processing. For fragile surfaces to chose the panda fig. 1 (Derecichei L. et al., 2013; Lustun L. et al., 2013; Lucaci C. et al., 2013; Racasan S., 2011).

CAM - roughing, finishing 5-axis

Basically you can schedule the by milling and drilling operations (and the last variant and turning and cutting) track any kind of defined surfaces and / or analytical or-analytical curves (splines).

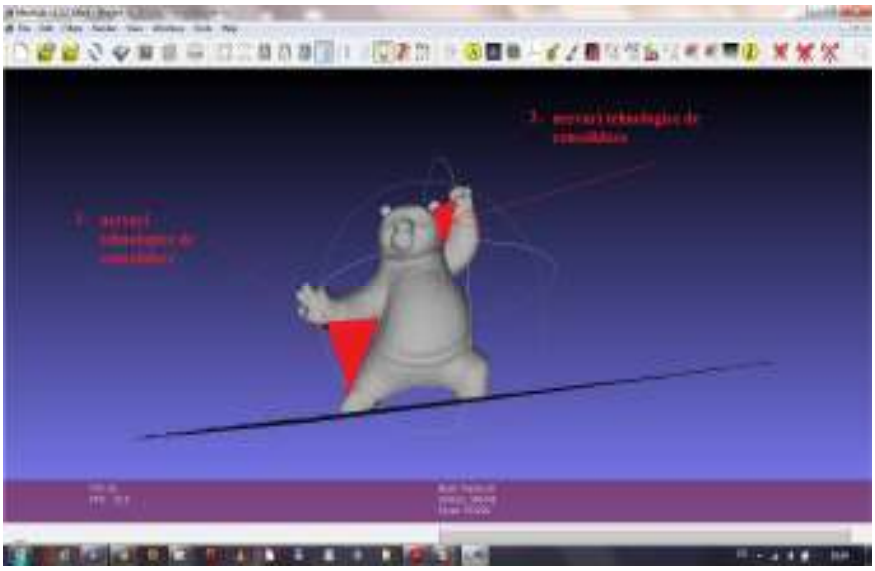

Fig. 1. The 3D model of the part. Fragile piece of wood with 1 and 2 ribs technological consolidation, which is eliminated by a subsequent generation of additional crossing surface

In his chosen processing virtual model "panda", given that it has more "ribs" and must take into account that they do not break the processing 5-axis CNC simultaneously (Derecichei L. et al., 2013; Derecichei L., 2013).

The ribs are temporary technological components to reinforce breakables piece during processing and after finishing processing is eliminated either by machine or manually.

CAD - CAM technology easily enables this consolidation type of rib (Derecichei L. et al., 2013).

5-axis simultaneous milling Mouldings

In fig. 2 is shown the preform sequences during roughing simulation.

Simulation allows the identification of possible collisions and enables modification command file generated CLDATA to eliminate them. Dozens of simulations were conducted in SprutCam program, and collisions have occurred are removed manually.

Below shows the sequence of post-processing program obtained Sprutcam for operation processing simultaneous 5-axis CNC (www.sprutcam.ro, 2014):

PANDA02_17

(GENERATED BY SprutCAM)

.....

(5 AXIS MULTI SURFACE)

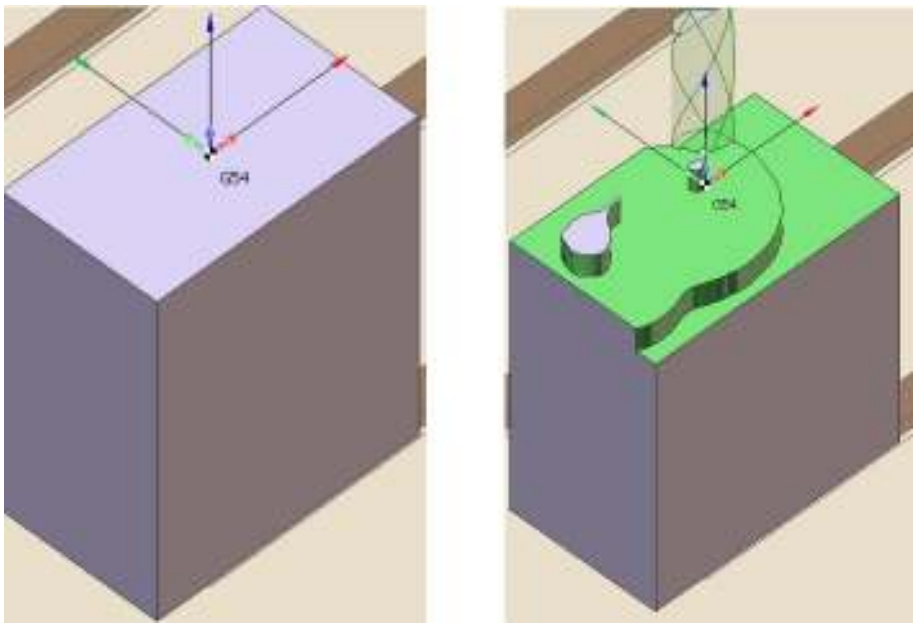

Fig. 2. The preform and the sequences during roughing simulation

G53.1
S106M3
G00G43H3X-121.993Y47.335Z131.041B-18.989C-75.952
X-79.279Z6.912
Z-3.088
M8
G01Z-13.088F200
X98.932Y29.711Z-82.438B23.937C4714.907
X98.998Y29.696Z-82.456B23.948C4714.852
X99.643Y29.566Z-82.407B24.04C4714.395
X99.821Y29.53Z-82.395B24.066C4714.269
X100.513Y29.389Z-82.352B24.167C4713.784
X102.742Y28.929Z-82.283B24.502C4712.242
X102.999Y28.875B24.542C4712.066
X105.147Y28.421Z-82.334B24.884C4710.614
X105.425Y28.361Z-82.347B24.929C4710.428
X107.608Y27.89Z-82.514B25.295C4708.987
X108.069Y27.79Z-82.561B25.374C4708.687
X110.014Y27.365Z-82.792B25.714C4707.441
X110.32Y27.298Z-82.835B25.769C4707.248
X112.448Y26.828Z-83.182B26.157C4705.917
X113.042Y26.697Z-83.294B26.268C4705.551

X114.768Y26.314Z-83.641B26.595C4704.504
.....
X165.7Y16.878Z-100.655B37.965C4683.212
X165.837Y16.855Z-100.746B38.002C4683.168
Z-90.746
G00Z-80.746
X267.134Z48.898
M9
M5
G28G91X0.Y0.Z0.B0.
G90
G69
G49

CONCLUSIONS

It should be noted that only machines can simulate SprutCam library to which it is connected, respestiv in this case, the DMU 70 (DMG). For TMA-AL-550 machine can not simulate in SprutCam until completion of the library with the virtual model.

SprutCam postprocessor and therefore does not have to be executed in parallel simulation and programming of EMSIL the program were executed and experimental processing.

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