ABOUT USING THE SOLIDWORKS IN THE WOODWORKING ENGINEERING

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Abstract

This paper presents the design of a Phoenix showcases comfortable using SolidWorks program it allows to elaborate 3D PDF files and programming CNC 5 or 6 axis.

The modeling has as point beginning based design on constructive and technological characteristics of the pieces, continuing with the realization assemblies, dimensioning and semi-automatic generation for drawings of execution.

The modeling based on characteristics eases creation and modification a piece. This type modeling helps geometric modeling process to the technological process.

Key words: SOLIDWORKS, CNC woodworking machine.

INTRODUCTION

The progress made in the electronics industry have led to the appearance of more efficient computers, with more elaborate software that allows modeling and processing of parts with complex geometry, on the numerical control machines in 3, 4 and 5 axis interpolated numerical simultaneously.

Thereby tackles a new technological level in the field of computer-assisted CNC machine tools, namely the one entitled "Five Axis Machining", from the perspective of the woodworking, with reference to the technological perspective in the case the wood to extend current technology for generating concept in 5-axis simultaneous (Ganea M., 2010).

This idea aligns all that does this mean led by CNC machines, with or without hierarchical leadership through the external computer, pieces generation by CAD CAM procedures that are increasingly better performing, the modeling and simulation generation virtual of the workpiece by machine tool future and using expected future technological equipment, software wherewith are equipped the machine tools to lead the 5-axis simultaneous processing process machines, the methods for control (CAQ) - also assisted by computer etc. (Derecichei L., 2014).

MATERIAL AND METHODS

SolidWorks uses the method developments of solid bodies, being one of the used 3D modeling techniques bodies. Starting from a 2D drawing appointed graphical corps of construction.

SOLIDWORKS has a geometric module own, it is equipped with drawing properties (Tutorial – TypeEdit 3D).

The modeling has as point beginning based design on constructive and technological characteristics of the pieces, continuing with the realization assemblies, dimensioning and semi-automatic generation for drawings of execution. The main characteristics of the software are:

- The power to identify, modify and communicate the action of design. This is possible due to structural modeling module which registers the process of construction accessible, enabling in any time changing the size, of relations and the workpiece geometry;
- The possibility of assemblies modeling, allow the establishment of reference surfaces with the help of module „Assembley Configurations";
- The execution of directly from the three-dimensional model, of the 2D documentation.

The program can generate complex forms, realization importation - exportation of type files IGES, STEP, DXF, VRML, STL. etc.

The object of study is a Phoenix showcases comfortable produced by IMAR S.A. Arad of figure 1.

Fig. 1. Phoenix showcases comfortable

In continuation will be undertaken the program algorithm SOLIDWORKS starting from the 2D drawing of figure 2. With the command REVOLVE and MATERAL is finished the program.

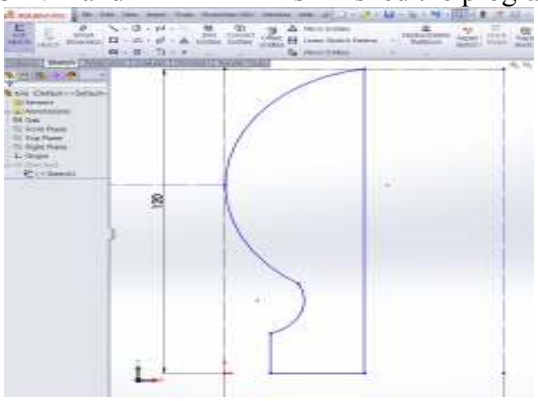

Fig. 2. 2D Drawing representing one end of the baluster

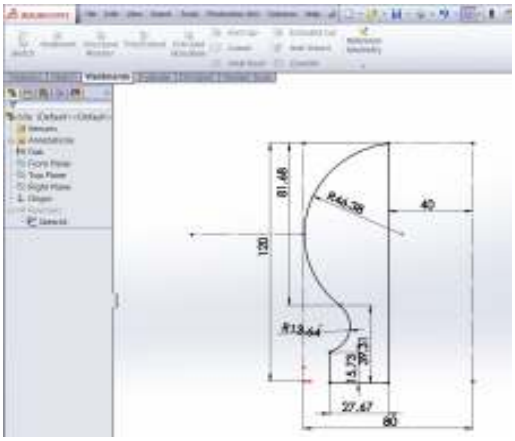

Fig. 3. 2D Drawing size

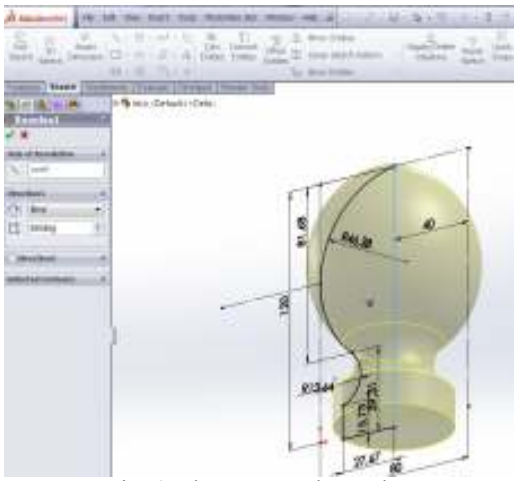

Fig. 4. The command Revolve

Fig. 5. Material selection - oak

RESULTS AND DISCUSSION

The graphs corps of construction with explicit geometry defines the basic form of the piece, which is obtained always by the addition of material. One such block is created by extruding or rotating the about an axis from a section. One can also create oriented sections which is used to generate surfaces or solid corps. After the realization of the base form of the piece, follows creating other graphs blocks of construction, which may be of adding or removing material. These binds of the form base, after a tree structure, and then add the other elements of construction needed to finalize model.

The principal operations that realize the base element are: extruding (for prismatic corps) and the rotation of a contour about an axis (for corps of revolution).

The modeling based on characteristics eases creation and modification a piece. This type modeling helps geometric modeling process to the technological process.

In this case, the modeling is parameterized, and the designer can define, in addition to the existing caracteristics, new elements that are stored in the database .

For the example presented we get the following database:

- the volume, the surface, the edges, the quotas and vertex;
- the shaft of construction of the piece and the relationships between them;
- about piece: the code, the version, date of creation, modification date;
- the piece characteristics: the color, the material, the light, mass properties, comments.

CONCLUSIONS

By using SolidWorks software is allowed the elaboration the 3D PDF files and CNC programming with 5 or 6 axes.

Using the Autocad software to elaboration drawings in the first phase as well as continuing with SOLIDWORKS programm reduces the design time and obtaining the high precision.

REFERENCES

1. Bucătaru M., 1991, Stiluri şi ornamente la mobilier
2. Budău G., Ispas M., 1993, Centre de prelucrare cu comandă numerică. Îndrumar pentru lucrări practice, Repografia Universităţii Transilvania Braşov
3. Budău G., Ispas M., 1996, Comanda numerică a maşinilor unelte pentru prelucrarea lemnului, Editura Lux Libris
4. Cismaru I., Cismaru M., 1991, Îndrumar de fabricare a mobilei de artă
5. Cismaru I., Cismaru M., 2002, Proiectarea şi fabricarea mobilei de artă
6. Cismaru M., 2003, Structuri din lemn pentru mobilă şi produse finite
7. Cotta N., 1983, Proiectarea şi tehnologia fabricării produselor industriale din lemn
8. Derecichei Laura, 2014, Contribuții la prelucrarea în lemn a suprafețelor sculpturale în conceptul de prelucrare în 5 axe simultane, Teza de doctorat, Oradea
9. Derecichei Laura, Lucaci Codruta, 2014, Issues Concerning the Simulation of Finishing Wooden Sculptural Surfaces in the Concept of 5 Simultaneous CNC axes, International Sympozium "Risk Factors for Environment and Food Safety & Natural Resources and Sustainable Development", Analele Universităţii din Oradea, Fascicula Protecţia Mediului, vol XX, anul 19, Editura Universităţii din Oradea, ISSN: 1224 – 6255

10. Fritz A.H., Schulze G., editors 2006, Fertigungstechnik. VDI. Springer, Berlin, Germany, 7 edition
11. Ganea M., 2009, Maşini unelte flexibile şi echipamente tehnologice pentru prelucrarea pieselor prismatice, Vol. 1 - Modulul de Bază şi Organologie Specifică, Editura Universităţii din Oradea, ISBN: 978-973-759-884-4
12. Ganea M., 2010, Maşini şi echipamente tehnologice pentru prelucrarea suprafeţelor în 4 şi 5 axe CNC, Editura Universităţii din Oradea, ISBN: 973-613-598-5
13. Gittel H.J., 2007, High performance Cutting Process in Woodworking. Lenco Ledernnam GmBH, Horb, Germany
14. Lică D., Boieriu C., 2003, Proiectarea, fabricarea şi fiabilitatea mobilei
15. Lucaci Codruţa, Derecichei Laura, Cheregi Gabriel, 2014, Aspects Concerning the Simulation of Roughing Sculptural Wooden Surfaces in the Concept of 5-CNC axes, International Sympozium "Risk Factors for Environment and Food Safety & Natural Resources and Sustainable Development", Analele Universităţii din Oradea, Fascicula Protecţia Mediului, vol XX, anul 19, Editura Universităţii din Oradea, ISSN: 1224 - 6255
16. Lustun Liana, 2008, Tehnologii moderne de fabricarea mobilei şi a produselor finite din lemn, Editura Universităţii din Oradea
17. Marchal Remy, Colet Robert, Bleron Laurent, Pal B., 2007, Improvement of Wood primary processing efficiency, Milan, September 2007
18. ***, 2008, Controlled Machining Centers, ASME B5.69 – 2008, pp. 111-123
19. ***, AN – American National Standard - Methods for Performance Evaluation of Computer Numerically
20. ***, Tutorial – TypeEdit 3D