STUDY ON MAKING DECORATIVE ITEMS CARVED WOOD

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Abstract

This paper presents achieving the carved elements by using numerical control machine INFOTEC 2015F. Machine INFOTEC 2015F is designed for 2D and 3D cutting of various materials such as acrylic, polycarbonate, composites, PVC, resins LAB, dibond, korian, aluminum sheets, copper, bronze and wood-like materials (mdf, hdf, chipboard etc).

Key words: solidworks, infocam pro (2015 energy), CNC woodworking machine

INTRODUCTION

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., has led to a new technological level in achieving carved elements (Lustun, 2012, Marciniak, 1991).

The use numerical control machines in achieving carved elements is a technology frequently used in field. Sometimes this machine processing only roughing operation and leaves it the possibility sculptor to complete the work and to leave their artistic mark on it (Ganea, 2010, Derecichei, 2013, Derecichei, 2014, Lucaci, 2015).

At the sculptural surface processing in the concept of this processing are under consideration particularities anatomical structure of the wood (annual rings, the fibers, the medullary rays etc), of the arrangements of processing of the it (Ganea, 2010, Derecichei, 2013, Lucaci, 2014).

In wood processing, numerical control machines, are used for watermark, at the ornamental surface processing which normally is achieved by manually sculpture or by copying milling machine, in which case is necessary to make the templates. The artistic works, restored wooden objects can be changed with the advanced procedures CAD-CAM in the virtual space and subsequently will be processed in 3-axis CNC simultaneous (Derecichei, 2013, Ganea, 2010).

MATERIAL AND METHODS

The applied part of the study was achieved within the company RICIMOC SRL-D in this year (2016), on the numerical control machine INFOTEC 2015F in 3-axis (Fig.1).

Fig. 1. INFOTEC 2015F

For the achievement of sculpted element has been used SolidWorks software. The data of the element projected are taken up by INFOCAM PRO software (Derecichei, 2013, Fetea, 2014, Fetea, 2015) This software performes and optimizes the transfer of the data from SolidWorks software. One program sequence is presented in figure 2.

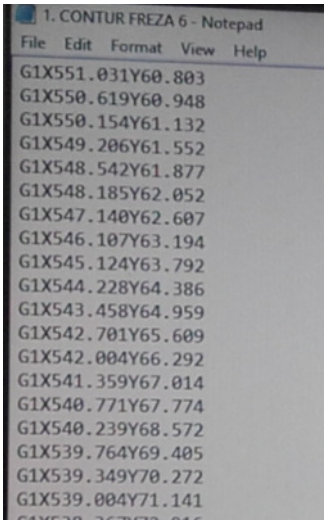

Fig. 2. Program sequence INFOCAM PRO

The carved element was achieved of softwood from the linden species presented in figure 3.

Fig. 3. The element prepared for processing

For the element processing it was adopted an advance of 0.5 mm / pass and a speed of 24,000 rotations / minute (Răcășan, 2011)

The processing of has been conducted in two stages.

The first stage is roughing operation performed by a straight milling head having a diameter φ 6 mm presented in figure 4.

Fig. 4. Straight milling head

The second stage is finishing operation in 2D and 3D performed by a sharp milling head presented in figure 5 (Ganea, 2000, Ganea, 2007).

Fig. 5. Sharp milling head

RESULTS AND DISCUSSION

Processing parameters adopted are:
- the speed of rotation of the tool is 24.000 rotations / minute
- the depth of penetration into the material is 10 mm

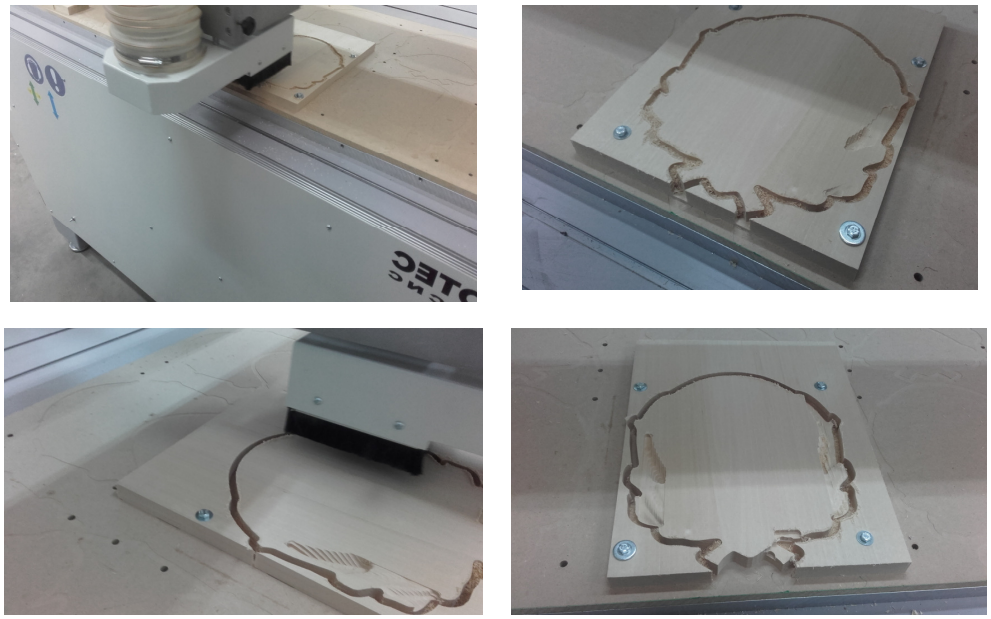

Fig. 6. The roughing operation

These parameters had been chosen because it substantially reduces processing time and the number of passes. This choice has been adopted because of the fact has been used an element of softwood (Fetea, 2015)

The result after processing by roughing is one satisfactory because the element presents small rough and fiber breakages that can be corrected by applying the finishing stage (Fig. 6).

Following the completion of the finishing process has resulted in a smooth surface which has required manual retouching minor (Fig. 7).

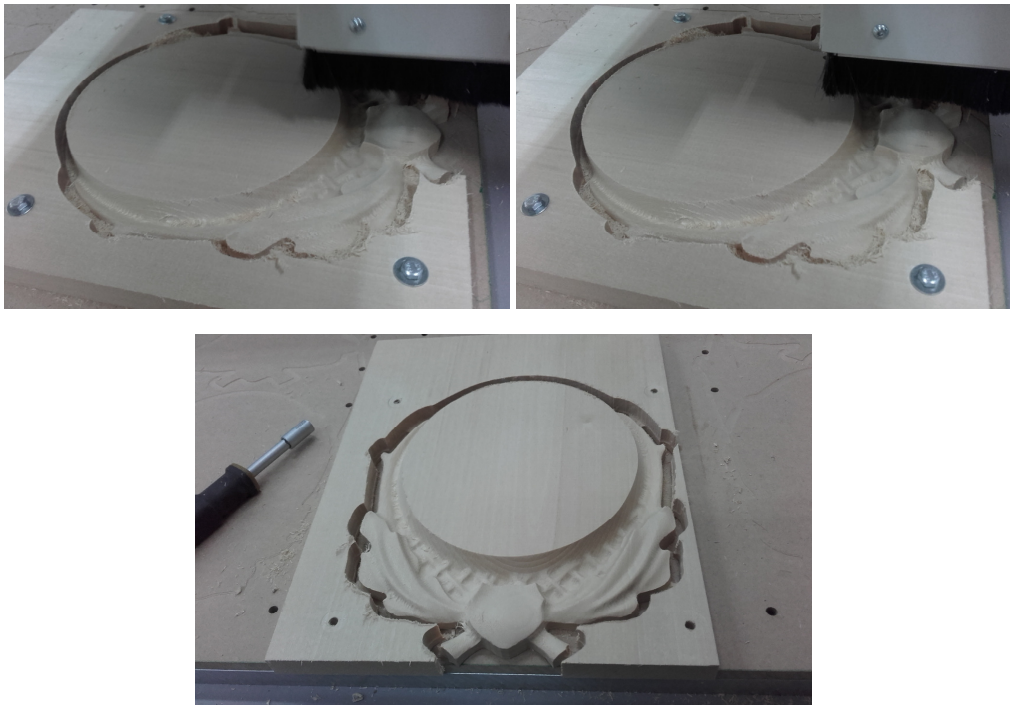

Fig. 7. The finishing operation

In figure 8 is presented in the element final.

The quality machined wood parts are characterized by precision dimensional geometric shape and degree of smoothness, that the machined surface roughness. By cutting the machined surfaces resulting irregularity due both processed timber structure, but especially the manufacturing process of various factors.

During the cutting process does not produce large defects, such as: pulling fiber, fiber breakage, high roughness, burns and not worn cutting tool sharpening angle (Dogaru, 2003).

3-axis CNC sites are used primarily for surface machining with complex shapes, but also can be used in decorative surface processing what normally

is achieved by carving or by copying milling machine in which case it is necessary to make the templates (Derecichei, 2013).

Fig. 8. Carved element in the final

CONCLUSIONS

The advantages of this method in achieving carved elements are: considerably reducing the time of their realization, high productivity because can be achieved more elements in a processing cycle according to the capacity numerical control machines.

REFERENCES

1. Derecichei L., Lucaci C., 2013, CAD-CAM software problem when drawing three-dimensional sculptures surfaces - International Sympozium "Risk Factors for Environment and Food Safety", Annals of University of Oradea, Fascicle Environmental Protection vol.XXI year 18, University of Oradea 2013;
2. Derecichei L., Lucaci C., Galiş I., 2013, Technological aspects of sculptural surface treatment of wood milling cutter or THOR - International Sympozium "Risk Factors for Environment and Food Safety", Annals of University of Oradea, Fascicle Environmental Protection vol. XXI year 18, University of Oradea 2013;
3. Derecichei L., Galiş I., 2013, LASER scanning sculptural surfaces - International Sympozium "Risk Factors for Environment and Food Safety", Annals of University of Oradea, Fascicle Environmental Protection vol.XXI year 18, University of Oradea 2013;
4. Derecichei L., 2013, Research Report no. 1 - Current state of research and achievements in the field of wood processing complex surfaces, Univ. Oradea, Fac. IMT, February 2013;
5. Derecichei L., 2014, Research Report no. 3 - Achievements experimental sculptural wooden surfaces in concept 5-axis simultaneous CNC, Univ. Oradea, Fac. IMT, February 2014;

6. Derecichei L., Lucaci C., Cheregi G., Lustun L., 2015, Modeling and simulation of 3D surface finishing wood carvings- International Sympozium “Risk Factors for Environment and Food Safety”, Annals of University of Oradea, Fascicle Environmental Protection, vol.XXV, Year 20, University of Oradea 2015, ISSN 1224 – 6255:
7. Dogaru V., 2003, Wood cutting – Transylvania Unioversity Publishing House, Braşov, ISBN-973-635-191-2;
8. Fetea M., 2014, Application of the Galerkin-Vlasov variational method in the study of free vibrations of the square plate C-C-SF-F. Transilvania University Publishing House. CIBv 2014 Brasov. Proceedings of the International Scientific Conference. pp. 255.
9. Fetea M., 2015, Studies and Comparative Analyzes Regarding usual Beams Under Static and Dynamic Loadings By Shock using Analytical and Numerical Methods. Transilvania University Publishing House. CIBv 2015 Brasov. Proceedings of the International Scientific Conference 2015. Bulletin of the Transilvania University of Braşov • Vol. x (xx) , Series I: Engineering Sciences.
10. Fetea M., 2015, Studies Regarding Modal Displacements and Axial Sectional Eforts at Wood Processing CNC Spindle Machine Tools. International Symposia “Risk Factors for Environment and Food Safety” & “Natural Resources and Sustainable Development”. Annals of University of Oradea, Fascicle Environmental Protection, ISSN 1224-6255, pp 345.
11. Ganea M., Ganea C., 2000, Curved surfaces Spatial Processing Technology, University of Oradea, ISBN 973-8083-95-8;
12. Ganea O., 2007, Exam no. 3 in the doctoral training - Material Summary :Vehicles and Equip. Technology for 5-axis CNC processing. Elem. of artificial intelligence. in Robotics, Univ. Oradea, Fac. IMT, June 2007;
13. Ganea M., 2010, Flexible Machine Tools and Systems, ISBN 978-606-10-0020-3, University of Oradea Publishing House;
14. Ganea M., 2010, Machinery and Technology for Processing Surface Echipamenre 4 and 5 Axis CNC, ISBN 978-606-10-0041-8, University of Oradea Publishing House;
15. Ganea M., 2010, Flexible machine tools and technological equipment for machining prismatic parts”,Vol. 2: Cells and modules production equipment and flexible systems. Quality and reception CNC machine tools, University of Oradea Publishing House, ISBN 978-606-10-0339-6;
16. Ganea M. and others., 2010, Constructive and technological objectives of the resources flow (working parts, tools, programs) at the flexible manufacturing cell; TMA AL 550, Scientific Session University of Oradea;
17. Lucaci C., Derecichei L., Cheregi G., 2014, Aspects Concerning the Simulation of Roughing Sculptural Wooden Surfaces in the Concept of 5- CNC axes - International Sympozium “Natural Resources and Sustainable Development”, Annals of University of Oradea, Fascicle Environmental Protection, vol XX, Year 19, University of Oradea, ISSN 1224 – 6255.
18. Lucaci C., Lustun L., Cheregi G., Derecichei L., 2015, About Using the Solidworks in the Woodworking Engineering - International Sympozium “Risk Factors for Environment and Food Safety”, Annals of University of Oradea, Fascicle Environmental Protection vol.XXV, Year 20, University of Oradea 2015, ISSN 1224 – 6255;

19. Lustun L., Galiş I., Lucaci C., Derecichei L., Nistor A., 2012, Peculiarities of Computer Programs CNC Multi Spindle Machining - International Sympozium "Risk Factors for Environment and Food Safety", Annals of University of Oradea, Fascicle Environmental Protection, vol XIX, Year 17, University of Oradea;
20. Marciniak K., 1991, Geometric modeling for numerically controlled machinig, Oxford University Press;
21. Răcășan S., 2011, Contributions to optimize machining wood milled on CNC machining centers [CPCN] - Thesis, Transilvania University of Braşov, Braşov.