

## CONTRIBUTIONS REGARDING ELABORATION OF THE VIRTUAL MODEL TO WOOD PROCESSING OF SCULPTURAL SURFACES

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### Abstract

*This paper presents virtual 3D of the solid capture, to build a virtual model somewhat independent of the required mathematical model with which to continue working in research.*

*Defining of the solid, 3D drawing of the part or surface space to be processed in this study was done with CAD software Catia V5.*

*Catia V5 program was developed geometric model of the "pig's" geometric model "crucifix", but presenting different phases of the simulation model was only used "panda" given its complexity. The wood is used for watermarks, the decorative surface treatment that is normally done by hand or sculpture copying milling machines, in which case it is necessary to make templates. The artistic works, restored wooden objects can be modified with advanced CAD-CAM procedures in cyberspace and beyond will be processed in 5-axis simultaneous CNC. Sculptural surfaces being processed processing concept have pointed to the peculiarities of anatomical structure of wood (annual rings, fiber, etc.), the regimes of processing it.*

**Key words:** sculptural surfaces, scan, virtual model, 3D mesh.

### INTRODUCTION

Scanning parts with complex surfaces.

Scanning is a process based on the taking over virtual three-dimensional model by a laser scanner, which then know the coordinates of the body surface constituent in the form of "cloud of points".

Body scanner software allows location in a coordinate system, identifying surface separating body from the external environment by knowing the coordinates of constituent points (cloud of points), possible corrections that add or delete points, and the union of all points, which is then interpreted as the outer surface of the body (Derecichei L., 2013), (Derecichei L., 2014), ([www.scanare3D.com](http://www.scanare3D.com)).

Information of "point cloud" are as a rule post-processed in a small network that is called mesh polygons (3D mesh). This type of information can be saved in various formats. The most common format is .stl (Surface tessellation Language) ([www.scanare3D.com](http://www.scanare3D.com)).

### MATERIAL AND METHOD

Define solid, 3D drawing of the part or surface space to be processed in the paper was done with CAD software Catia V5 (Catia V5), (Ganea M.,

2001), (Ganea M., 2003), (Ganea M., 2004) , (Morar L., 2006), (Sebe A., 2004),

After obtaining virtual solid it can be processed by the method CAM, machine tools, possessing some CAM software (respectively outside the car or on a separate computer), meaning the machine tool processing technology, the tools in the tool library, from a semi several roughing and finishing crossing, to obtain the finished piece. In fig. 1 to fig. 2 gives an example of laser scanned item aspects of the process, (Catia V5),(SprutCAM), (Ganea M., 2010), (Ganea M., 2009).

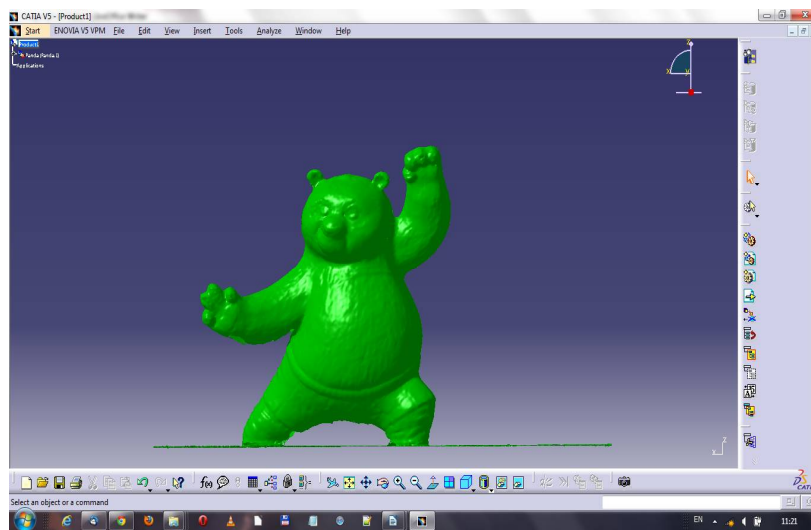


Fig. 1 Scanning the process for virtual solids

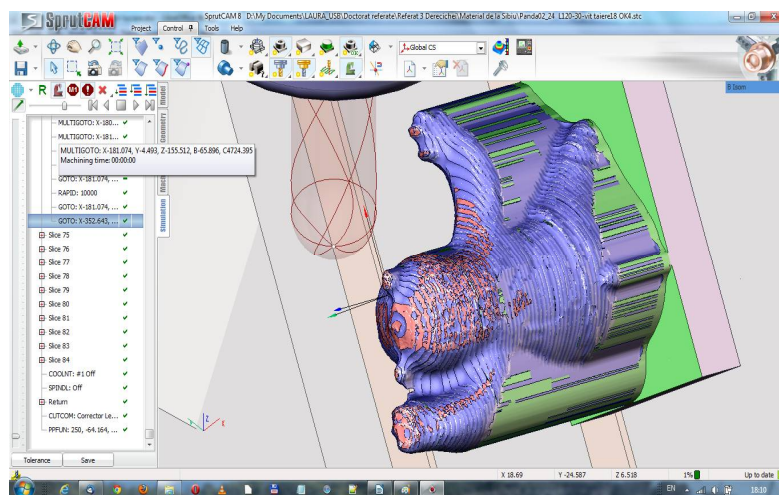


Fig. 2 Virtual processing of your scanned item

## RESULTS AND DISSCUSIONS

Laser scanning was performed at the Technical University of Cluj-Napoca in Engineering and Management Innovation Lab in December 2013.

The work was necessary to capture virtual 3D solid to build a virtual model somewhat independent of the mathematical model required, with which to continue working in research (Derecichei L., 2013), (Derecichei L., 2014), (Derecichei L., 2012). We have scanned more models, depending on the difficulty of further processing in the concept of simultaneous 5-axis CNC. Scan a model called "pig" a model "panda" and a model "crucifix". These examples are shown in the following figures (fig. 3, 4, 5) (Vickers G. et al., 1993).



Fig. 3 - Images from the scan model "pig"



Fig. 4 - Images from the scan model "panda"



Fig. 5- Images from the scan model "crucifix"

Defining of the solid, 3D drawing of the part or surface space to be processed in the paper was realized with CAD software Catia V5 (Ganea M., et al, 2000). The figures below shows the different views of these areas captured by scanning (fig. 6, 7) .Stl format (Dogaru, 2003), (Dogaru, 1985).

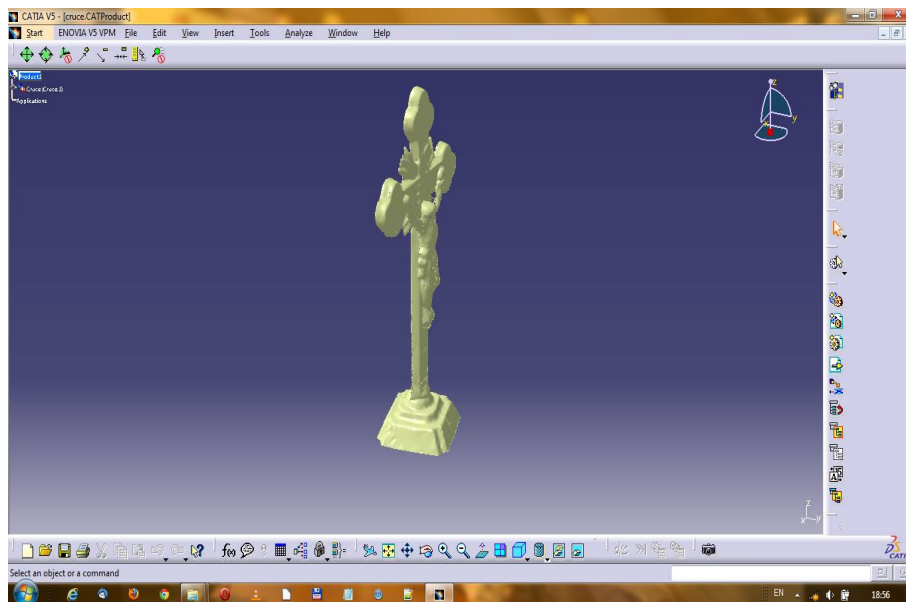


Fig. 6 .Stl which were obtained by 3D scanning and processing Catia- model "crucifix"  
.Stl which were obtained by 3D scanning.

The "pig" .stl the scanned before processing in Catia.

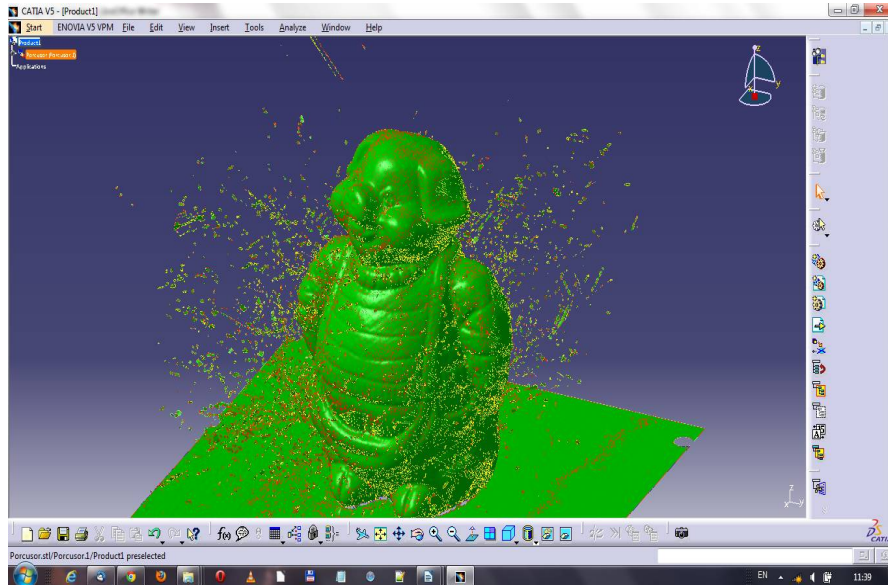


Fig. 7 .Stl which were obtained by scanning 3D before processing Catia- model "pig" and a cloud of points corresponding

The next phase is creating mesh-sized networks FEM (Finite Element Method) over virtual product the scanned (fig. 8, 9) in CATIA format scanned models.

The "panda .igs" in Catia meshes 1

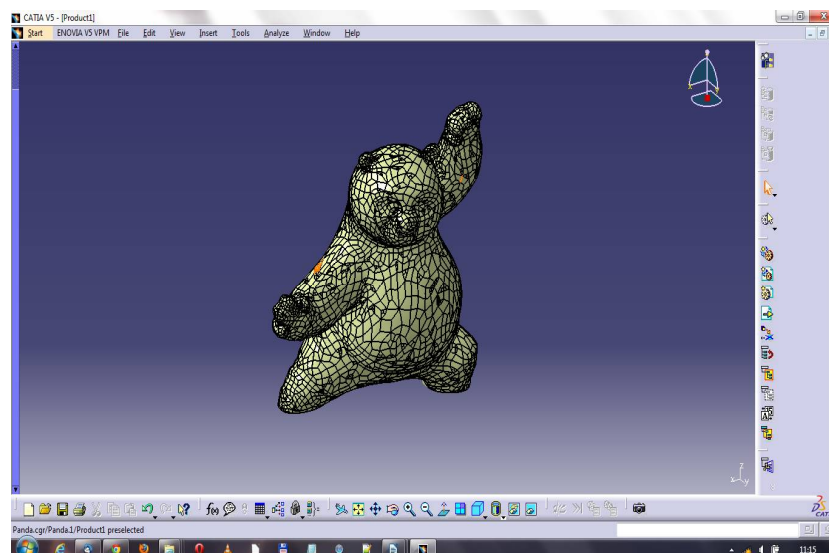


Fig. 8 .Stl which were obtained by scanning 3D mesh model to obtain "panda"



## The "panda stl" in Catia

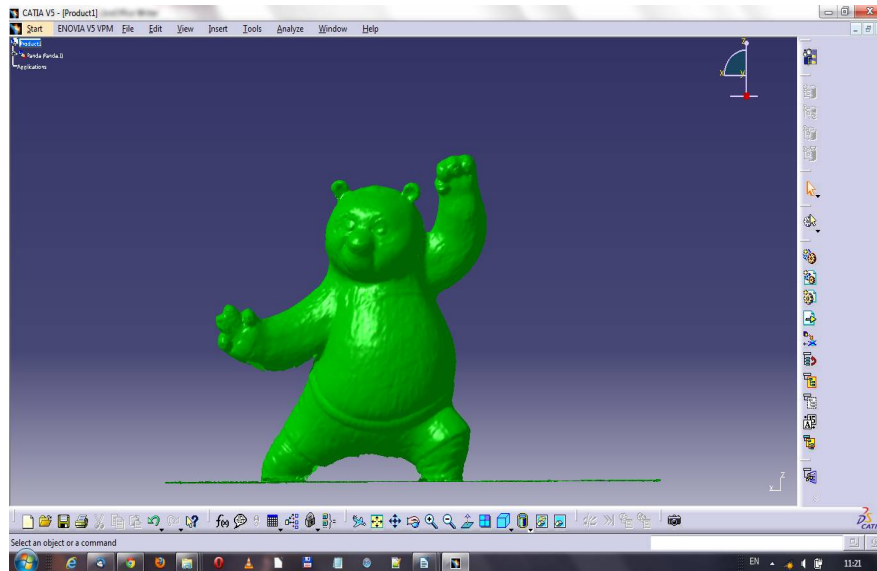


Fig. 9 .Stl which were obtained by 3D scanning and processing Catia- model "panda"

Surface watermark to chose the "crucifix" in figure 10. Carvings and filigree work is often found within the monasteries ([www.lemnucs.com](http://www.lemnucs.com)).

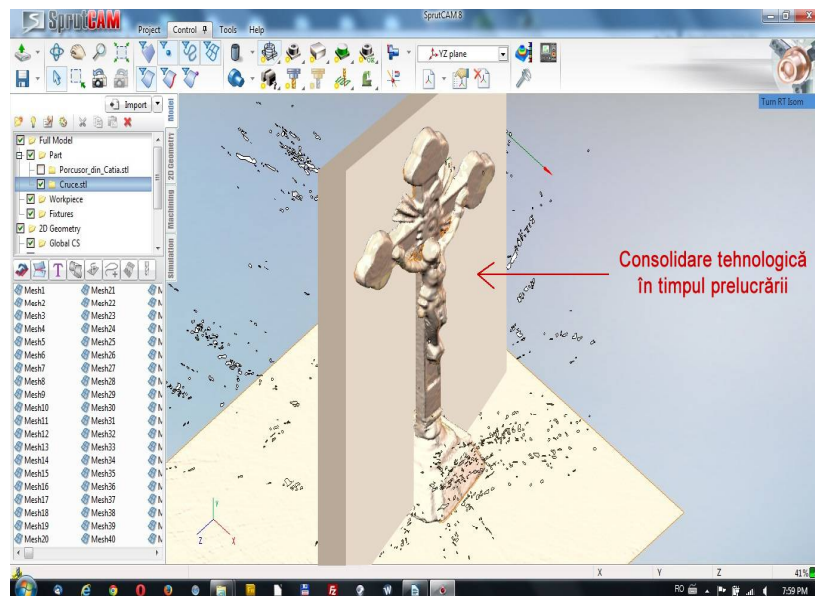


Fig. 10 The geometric surfaces Sprutcam- imported into the watermark; the addition 1 extra soft wood (linden) technology consolidation during surface processing

## CONCLUSIONS

This paper was selected virtual processing model "panda", given that it has several "of ribs" and should be considered as they do not break the 5-axis CNC processing simultaneously.

The ribs are temporary technological components designed to strengthen fragile parts of the song during processing and after finishing processing is eliminated either by machine or by hand.

Cad- CAM technology with ease allows consolidation of these the rib.

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