

## TECHNOLOGICAL ASPECTS OF SCULPTURAL SURFACE TREATMENT OF WOOD MILLING CUTTER OR THOR

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### **Abstract**

*This paper presents technological aspects of the sculptural surface treatment of wood milling cutter or thor, contour generation spatial surfaces using spherical tipped cutter, milling principle to generate thor or spherical tipped cutter, CNC generated contours, thor milling generating principle and finger tip ball, with axes normal to the surface and contour description for 4 and 5 axis CNC.*

**Key words:** sculptural surface, CNC generated contours.

### **INTRODUCTION**

Processes generating spatial areas have evolved in recent decades, from the copy after reaching pattern and the current methods of computer-assisted generation.

They are still used in new forms evolved so that there is a range of processes that currently generate suitable surfaces (Ganea, 2003).

On the stand generation machining through different processes such as turning, milling, grinding, electrical erosion, laser machining superfinish, etc. (Ganea, 2010).

### **MATERIAL AND METHOD**

Digitization. This method is basically a newer 3D scanning 3D model using a feeler usually analog, but can also be incremental as CNC option (Ganea, 1995; Ganea et al., 1995).

If digitizing analog probe of the company Fidia, similar to that of copy, exploring separate template contour machining operation, putting in place probe in spindle tool support arm missing here probe the case of copying, the role of feedback overall system copy (FIDIA, General catalog, 1998; [www.fidia.it](http://www.fidia.it)).

As a result of scanning / exploration pattern with probe occurs storing discrete sequence coordinates of points of the contour components described palpable (Ganea et al., 2000). These values are obtained by storing discrete data rates axis transducers, at times reaching the nominal deflection transducers values of tangible and this strategy due to the curve contouring level by type iterations around - away from the curve with steps of size increment of exploration of about 0.02 to 0.03 mm (Ganea et al., 2000; Ganea et al., 2001).

## RESULTS AND DISCUSSION

By exploiting generation CNC milling cutter thor or spherical head.

Generation CNC based on mathematical equations describing the surface, which decompose in contour, or families of curves representing successive tool paths whose wrapper is on the surface (Ganea C., 2003; Marciniak, 1991).

Specific problems and mathematical description of the generation, the generation technological aspect and its implications on various constructive modifications of car tools and special equipment occurring in any given order are listed below (CENTURION V. Milltronix, 1995).

Examples of curved surface generation level features are given in fig.1, fig. 2, fig. 3, fig. 4 (MAZAK, Collected prospectively, 1992).

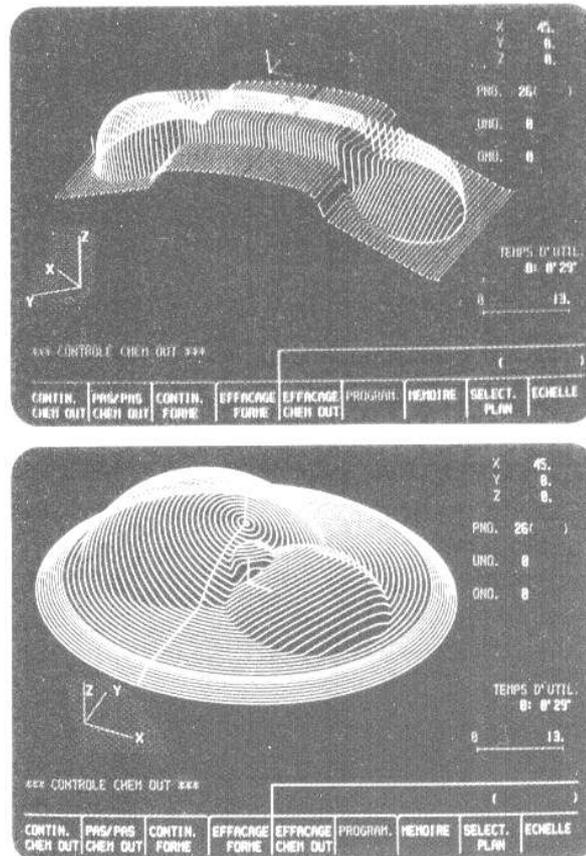


Fig. 1. Contours generated CNC

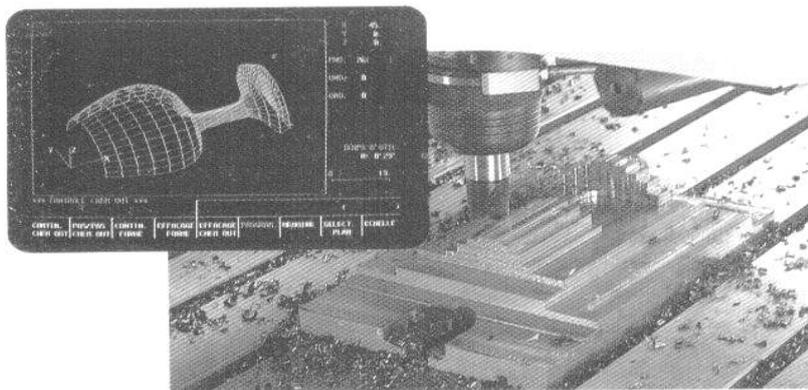
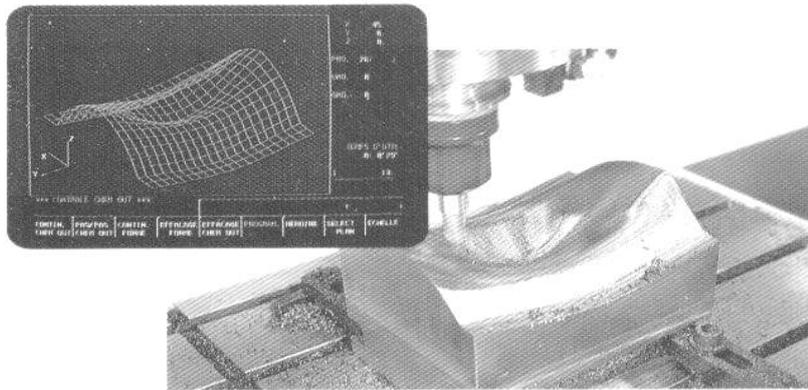
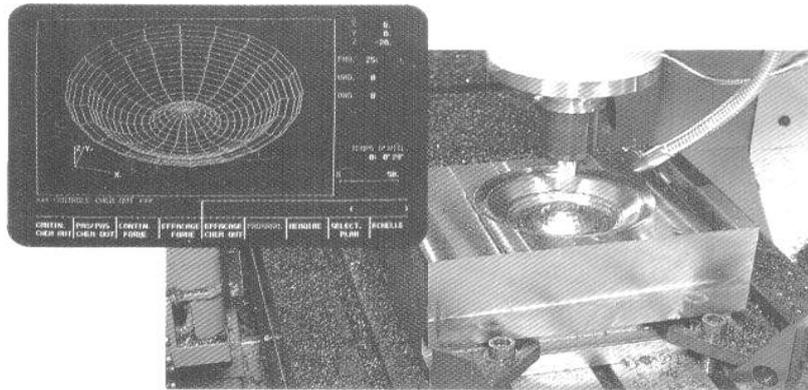


Fig. 2. Examples of milling contours parallel orthogonal planes using spherical tipped cutter

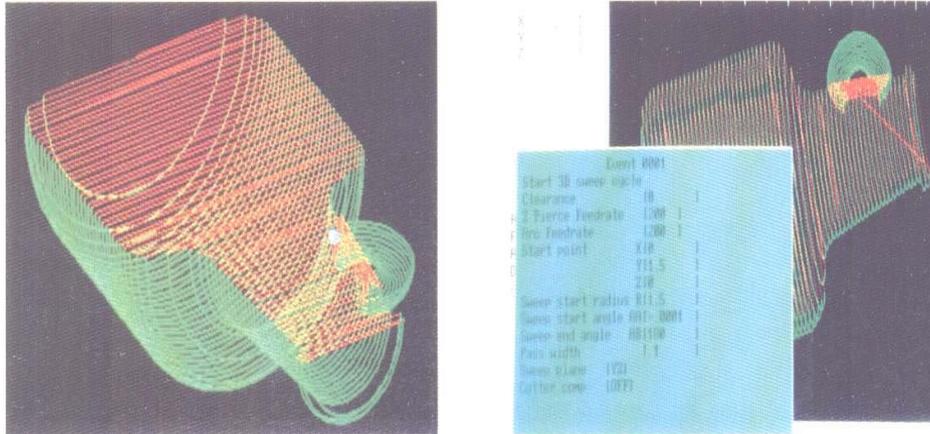


Fig. 3. Examples of contours in planes XZ and YZ (CENTURION V)

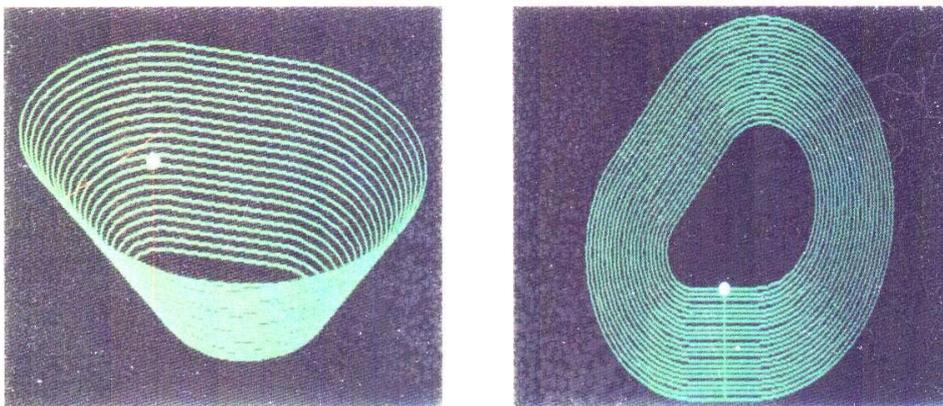


Fig. 4. Contours and their projection in the XY plane to the reference plane

The principle of generating the milling cutter thor or tipped ball in the tool axis is normal to the surface contact point curve (Vickers G.W. et al., 1993) is illustrated in fig. 5 ([www.heidenhain.com](http://www.heidenhain.com)), fig. 6 (HEIDENHAIN, General catalog, 1999), fig. 7, fig. 8, fig. 9, fig. 10, fig. 11, ([www.mazakitalia.it](http://www.mazakitalia.it)) and the milling is in the fig. 12 example.

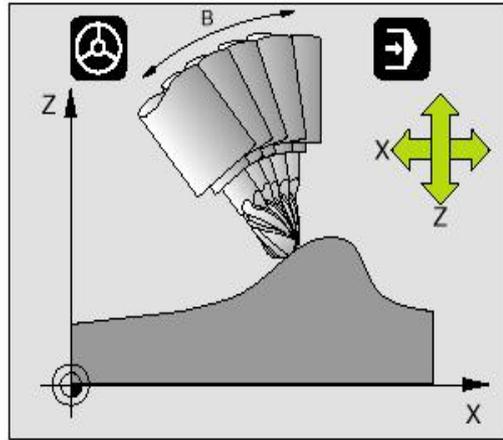


Fig. 5. Maintaining the tool from the part

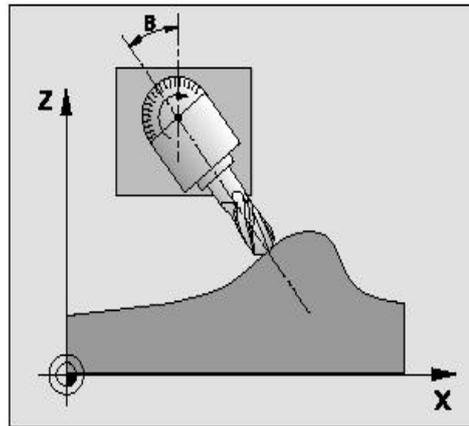


Fig. 6. G80 spin cycle work plan

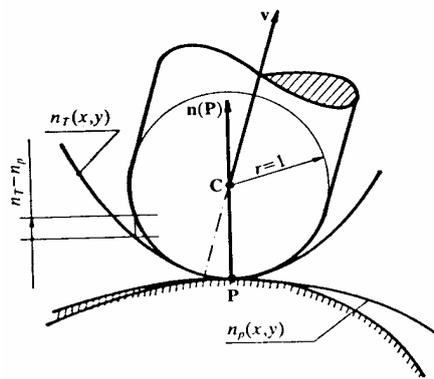


Fig. 7. Spherical tool

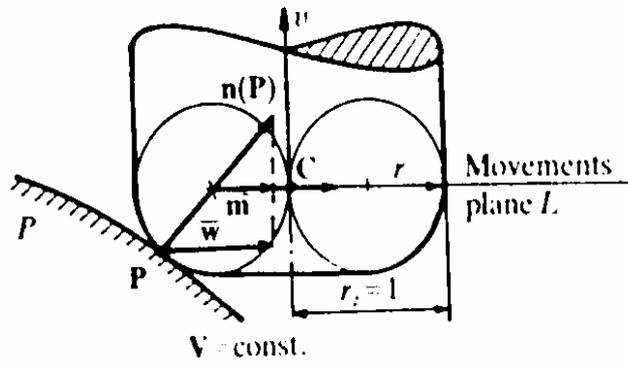


Fig. 8. Position tool

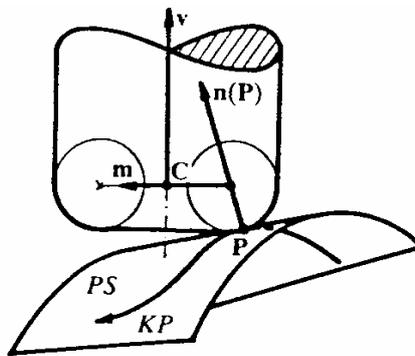


Fig. 9. The movement of a tool along a curved surface

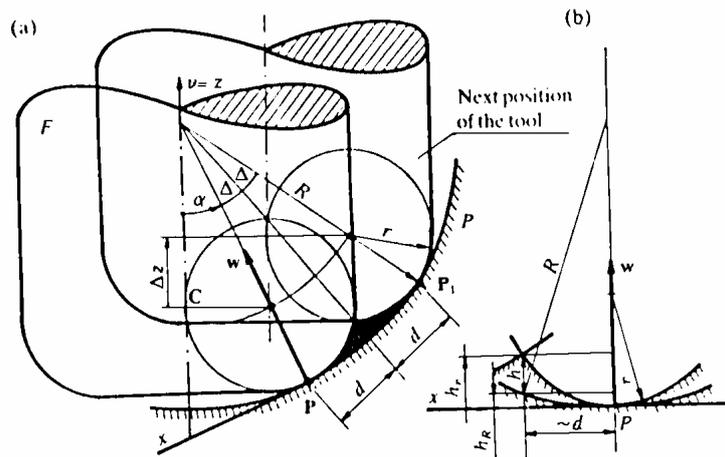


Fig. 10. Calculating the distance between two adjacent planes

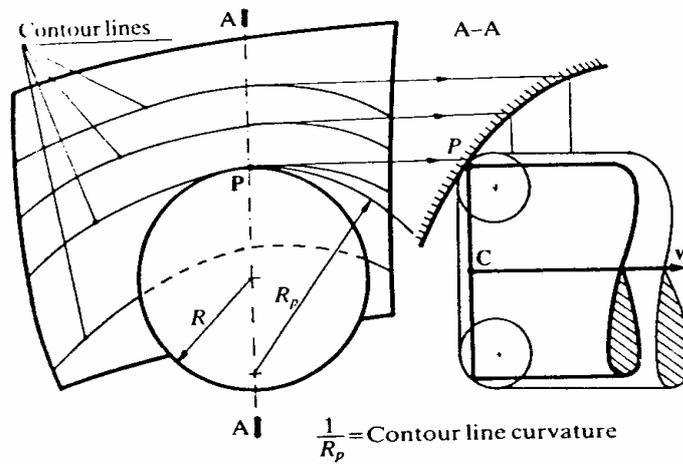


Fig. 11. Thor milling generating principle and finger tip ball, with axes normal to the surface and contour description via 4 and 5 axis CNC

Fig. 12 illustrates the example for milling contours and tilt tool axis direction of the surface normal curve after the point of contact (PARPAS, Collected prospectively, 1999).



Fig. 12. Example contour processing

## CONCLUSIONS

It is worth noting that the process is milling, contour generation is performed at CNC or CAM procedure, the machine uses 3, 4, or 5 axis CNC (three orthogonal linear axes of the machine and two rotational axis

inclination the tool or workpiece, rotation axes CNC milling belonging head or rotary table and tilt). From this it follows that the purpose milling machine is properly equipped for ground space, so the features of the vehicle, and equip with suitable tools.

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