# FEELERS USE AND CONTROL METHODS OF SURFACE PROCESSING WOODEN SCULPTURES

**Derecichei Laura,* Ganea Macedon****

*University of Oradea, Faculty of Environmental Protection,
26 Gen. Magheru St., 410048 Oradea, Romania, e-mail: derecichei.laura@gmail.com
**University of Oradea, Faculty of Managerial and Technological Engineering, 1 University St., Oradea, 410087, Romania

***Abstract***

*This paper presents the types of electronic probes coupled to CNC (Renishaw takeover offset pieces Renishaw touch probes for tool offset acquisition, digitization Renishaw probes). Pickup probe offset piece is made in the store and took over the main shaft is temporary phases of work. Control methods. Control part of computer-assisted procedures.*

**Key words:** types of probes, palpable digitizing, methods of control, measuring machines.

## INTRODUCTION

*Types of probes*

CNC coupled electronic feelers are the following types:

- Renishaw probes takeover offset pieces (fig. 1) (reaching the edges of the 3-point play to take over the grid origin of the song); (www.renishaw.com);

- Renishaw touch probes for tool offset acquisition (fig. 2) (prejudice axial and radial tool cutting edge to retrieve the lenght and radius correction tool);

- Digitization Renishaw probes (fig. 3) (exploration program template for registration CNC piece) (www.renishaw.com).

## MATERIAL AND METHOD

Similar probes as accessories CNC, manufacturers and other companies as: HEIDENHAIN, SIEMENS, etc. (Heidenhain, Siemens).

Pickup probe offset piece is made in the store, has con ISO and is taken in the main shaft temporary phases of work. She spherical sapphire tip and ceramic rod. Signal transmission to CNC is done by infrared probe with emiyor on board and one end fixed on the car. 0-1 pulse type signal is for sensing contact with the track and recording the numerical values of the transducer axis, then through the parametric part are processed and valued as well as information on the actual origin of the coordinate system of the workpiece (Abrudan, 1996).

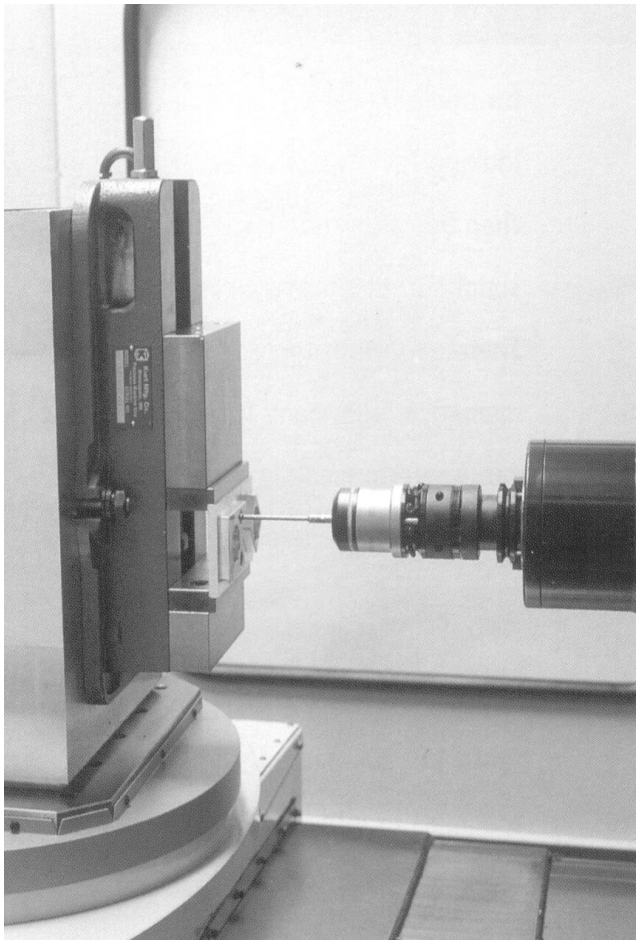

Fig. 1. Offset pickup palpable piece

**RESULTS AND DISSCUSIONS**

2nd probe for tool offsets is coupled to the CNC table was placed on board or sled table top machine and has the cubic form, on whose faces are achieved cutting edges of the tool.

Signal to CNC cable is impulse step and is used similarly but in combination with the current tool and loading registers correction of the tool length and radius (Ganea, 2010).

3rd probe for digitization is used for continued exploration of the play area through a program CNC contour exploration, transmitting it periodically (with a given step) share information on the play, all by taking them from the axis transducers.

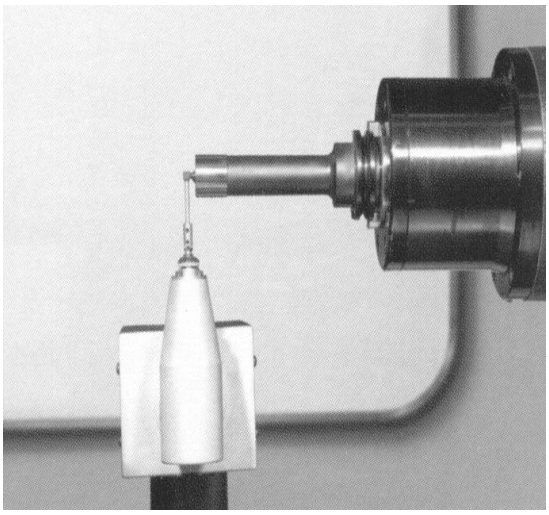

Fig. 2. Palpable pickup tool offset

Here the signal from the transducer is differentiated separate X, Y, Z, and having 2 minimum and maximum values defining each a window on each axis (Bojan, 1999). Maintaining contact with the surface of the part is done by the window edges and points values increment components of the step trajectory is programmed (it stores the coordinates of the curve located on given step) (Ganea, 2010).

Information processing is done with additional software called SUSA (HEIDENHAIN), which can be placed in a separate computer connected to the CNC program aimed at developing remake of future as a result of digitization (HEIDENHAIN – Germany, 2010).

*Methods of control*

Control part of computer-assisted procedures CAQ (Computer Aided Quality) or CAV (Computer Aided Verification). These procedures relate to measurement and automation of processing that information, computer assisted (Ganea, 2009).

There is a difference as a way of processing curved surfaces so when compared to similar procedures in cell and flexible systems for prismatic parts common, but fundamentally they are similar (Apro, 2008).

Do not confuse these control procedures AQ procedures, which refers to something else on providing quality industrial units.

We distinguish these computer-aided control procedures:

Retrieving offsets the machine tool manufacturing.

This is done with Renishaw touch probes and refers to the following

types of control operations:

- To offset the automatic play, namely the center coordinates of the measuring system of the piece and its axis directions;
- Automatic acquisition tool offsets, ie the length and radius corrections thereof;
- Automatic acquisition of intermediate values of quotas centers and diameters of holes, position the reference surfaces, etc. However as the basis for subsequent finishing operations and a part of the test measurement with span (Ganea, 2010).

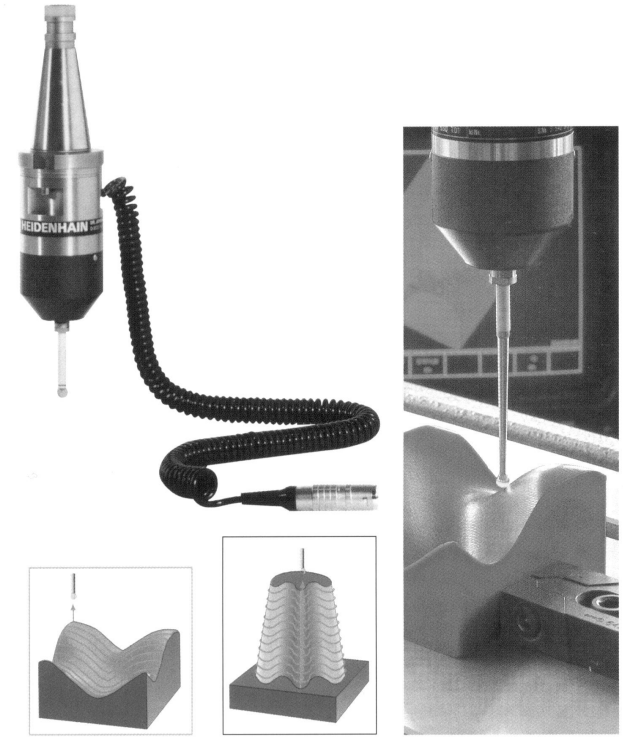


Fig. 3. Palpable digitizing

Since these procedures can also detach functions that can be exploited automatically by machine tool, such as:

- Automatic compensation of thermal deformation of the machine;
- Compensate for deformation of workpiece or machine;
- Cross track error compensation table or device;
- Compensation of geometric errors of the machine.

All these are aimed at improving processing accuracy by forcing the programmable parameters of the program and introducing temporary piece of corrections processing in critical moments (Bearing catalog, 2004). All rely on the facilities offered by the technological program, which allows

availability during the process parameters calling program as a result of exploration results with Renishaw probe between machining operations. These probes are presented in the previous chapter (Ganea et al., 2008).

*Control part of computer-assisted procedures*

This involves exploring the surface curves digitizing probe for digitizing the surface and its comparison with the theoretical model. This operation is not misused, that would block machined machine of measurement, but the measurement precision equal to that of processing, which is incorrect in terms of technology (Ganea et al., 2010).

*Measuring the CNC measuring machine*

It uses Renishaw probes and exploration programs generate identical CNC surface, but measurement accuracy is 1μm, so with an order of magnitude better than the precision machining (Lagun, Spania, general catalogue, 1998).

This is possible because the main pieces measuring machine is built of granite, works in room thermostat, yielding minimal deformations. At the same time, do not block manufacturing machine for measuring operations.

Measuring machines are known as CMM (Meassuring Machine Control or Control Coordinate Meassuring Machine), and are part of procedures known as CAQ (Computer Aided Quality) because the information is processed by computer in order to determine statistical error of workpiece processing.

**CONCLUSIONS**

CNC, CMM machines are driven, with shareholders advances on the 3 orthogonal axes, which is worn. The actuator measurement and exploration of the play on the exposed control.

The actuator, probe measurement is similar to that of the control procedure on car manufacturing, but with different patterns of probes, depending on the track configuration.

**REFERENCES**


1. Abrudan I., 1996, Flexible manufacturing systems. Design concepts and management. Dacia Publishing House, Cluj-Napoca.
2. Apro K., 2008, Secrets of 5-Axis Machining, SUA.
3. Bica A., Curilă M., Curilă S., 2010, Approximating the Solution of Second Order Differential Equation with Retarded Argument, Journal of Computational Analysis and Applications, Volume: 12, Page(s):37 – 47, ISSN 1521-1398.
4. Bojan I., 1999, Flexible manufacturing systems. Optimal design and process management. Dacia Publishing House, Cluj-Napoca.

5. Curilă M., Curilă S., 2008, Geometry Compression of 3D Mesh utilizing Robust Second Order Blind Identification Algorithm, Studies in Informatics and Control with Emphasis on Useful Applications of Advanced Technology, volume 17, number 4, Edited by National Institute for R&D in Informatics ICI Bucharest, Page(s): 421 – 434, ISSN 1220-1766.
6. Curilă S., Gordan C. G., Curilă M., 2008, Tracking of polyhedral objects in image sequences, 2008 IEEE 4th International Conference on Intelligent Computer Communication and Processing (ICCP 2008), Cluj-Napoca, Page(s): 61 – 66, ISBN: 978-1-4244-2673-7.
7. Ganea M., 2009, Flexible machine tools and technological equipment for machining prismatic parts, Vol. 1: Specifies the base module and organological**,** University of Oradea Publishing House, ISBN 978–973-759-884-4.
8. Ganea M., 2010, Flexible Machine Tools and Systems, ISBN 978-606-10-0020-3, University of Oradea Publishing House.
9. 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.
10. 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.
11. Ganea M., et al., 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.
12. Ganea O., et al., 2008, The cinematic chain of two continuous axes rotary-tilting table MRI 500-2CNC at the machine CPFPH 1000-5 axes, Scientific Session University of Oradea.
13. * * *, 1998, Lagun, Spania, general catalogue.
14. * * *, 2004, TIMKEN, Bearing catalog, USA.
15. * * *, 2010, HEIDENHAIN – General Catalog, Germany.
16. www.heidenhain.com
17. www.renishaw.com
18. www.siemens.com