PROCESSING AND EVALUATION OF MEASUREMENT RESULTS A CAMBER GEARS USING KIMOS

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Abstract: *Software to the coordinate measuring machine Klingelnberg P 65 can do the following:*
- Toothing measurement segmented division of the intervals between teeth or missing teeth (the teeth of wheels part of the job) is determined by the characteristics of the input system of gears and are omitted from the control division;
- Topography;
- Determination of the inner circle and outer circle gears including comparing the values of tolerance and the issue of measuring the profile sheet and sidewalls.

Key words: *measurement, Klingelnberg P 65, control system, processing and evaluation system, camber gears.*

1. INTRODUCTION

The whole "measuring machine" include machine components, control system and system for processing and evaluation. The design of the machine is formed by a frame, rigid and compact build, which has elements of the settlement with the attenuation characteristics of the oscillations. Training for the workpiece (C), rigidly connected to the frame, is easily accessible and comfortable, both front and rear loading piece so far on the machine is possible without any difficulty.

The support provides features to achieve optimal workpiece mounting of vertical alignment between the peaks.

The basis for achieving a precision measuring machine stock contact form linear guides, respectively rotary bearings, extremely accurate and free of play, the measurement of axis X, Y, Z and C. [2]

Each axis is equipped, in addition, and lengths measured by a system that angular values measured with high resolution. Training is done in all cases, the actuators are directly coupled through the respective systems.

Optimally adapted to the measurement of toothing is the new measuring system probes in several axes. Measurement axes have a large range of measurement (+ / - 1 mm) and an over-long race. Capturing value is measured by a digital measurement system. Using a rotation system, meaning the measurement plan can be adjusted continuously measuring X / Z. In this way exploration is manageable in the normal section plane, such as gears of the front propeller angle worm sea.

Through software is also adapted such force that the measurement axis of measurement features each part.

Additional measurement axis Y direction allows, for example, direct exploration of the

circle both outside and inside of the front of the teeth of gears. Fully automated control system of measurement (Command PPP) adjusted, the machine checked all functions that are necessary to ensure the conduct of verification operations.

The system consists, in addition to conventional control elements, and a CNC, equipped with a 4-axis controller. [6]

Control algorithms are realized through software. Controller software works, as is the entire CNC software on a high-performance personal computer, which, together with a digital controller and interface card type, located on a bus (VME bus) industrial hardware form The CNC control system. Standard hardware, produced in a very large number of units, boasts high reliability and becomes, thanks to its collaboration with the optimal measurement software specially developed for this purpose, an automatic control system for highly efficient A device for toothing measuring. In combination with direct drive and measuring systems of CNC axes, high measurement speeds are achievable.

In total it is possible to adjust the simultaneous combination of four axes (x, y, z and c), so it is possible to execute any curved paths in space. [3]

Register deviations K3D stylus system, existing on the workpiece in the direction of a certain spatial coordinates. The stylus can be switched on three-dimensional measurement system in a two-dimensional. Processing of measured values by comparing them with the reference geometry of the parts is done on a computer for processing and evaluation, which is a high performance personal computer equipped with a Pentium processor. Computer processing and evaluation shall, in addition, PPP control system necessary information relating to space curves, to be described, corresponding measurement program preselected for the respective workpiece. CNC control system is inside a control cabinet, designed by ergonomic criteria and the

machine is installed in such a way as to ensure maximum space saving. A service unit with an integrated industrial PC, playing the role of a computer for processing and evaluation, equipped with a keyboard and joysticks, are mounted on the machine. The high speed control system allows you to explore PPP a large number of measurement values, even in the measurement of short races. [5]

PPC control system provides for an erroneous maneuvers of service or when a component, details of the functional defect or deficiency occurred, information which, in turn, serve as the basis of a diagnostic system.

This ensures high reliability under all components, reduction of machine downtime due to failures to a minimum. The possibility of remote diagnosis via a modem, the technical level corresponds to current practice. To continue with the development of internet and intranet, remote diagnosis possible, using new techniques is entirely feasible.

The main component of the system, fully automated, processing and evaluation of measurement results, consists of a powerful personal computer equipped with a Pentium processor, combined with a large LCD display and working with Windows 2000.

In combination with integrated hard drive, which offers a large storage capacity, this system meets the following functions: program management, measurement, through KLINGELNBERG Application Manager (KAM). Storing data processed for different parts of measurement programs, generating control instructions to the control system PPC. Calculation of measured values from information received from the measuring feeler, and the measurement axes. Evaluation and representation of measured results on display, including monitoring compliance with prescribed tolerances. [1]

Storing the results of the measurements to other processing and evaluation (for statistical purposes).

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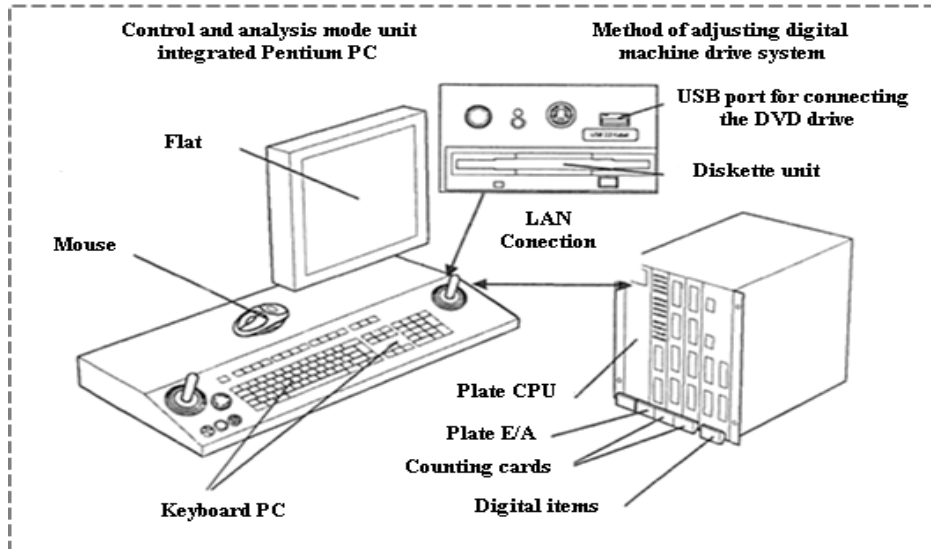AFASES 2011
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Figure 1. The main components of the system, fully automated, processing and evaluation of measurement results

2. APPARATUS AND METHODS USED IN EXPERIMENTAL RESEARCH

To measure the camber gears to coordinate measuring machine used KLINGELNBERG P65. KIMoS method is used (KLINGELNBERG Integration Manager of Spiral bevel gears) to provide reference data for manufacturing flank topography of bevel gears helical data while using the program as reference data for subsequent measurement of those gears.
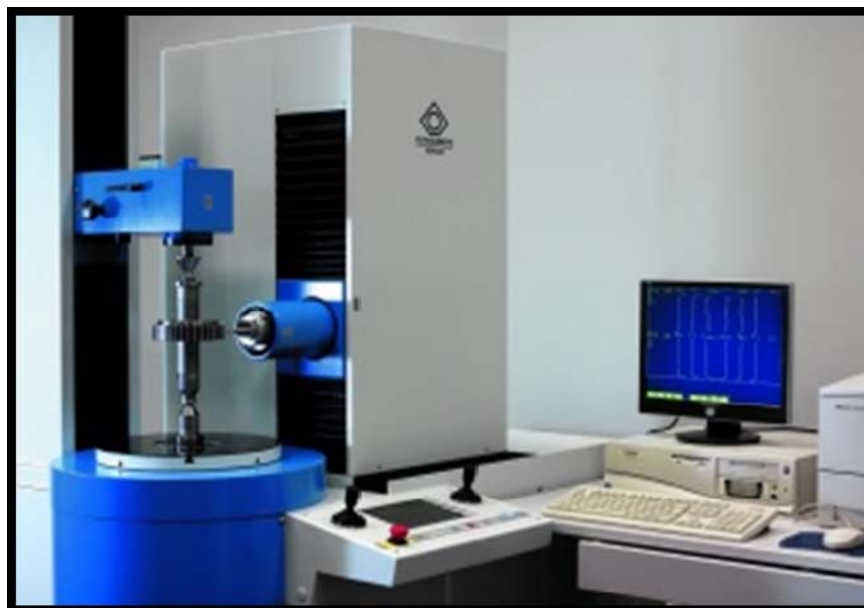

Figure 2. General appearance KLINGELNBERG P65 machine [1]
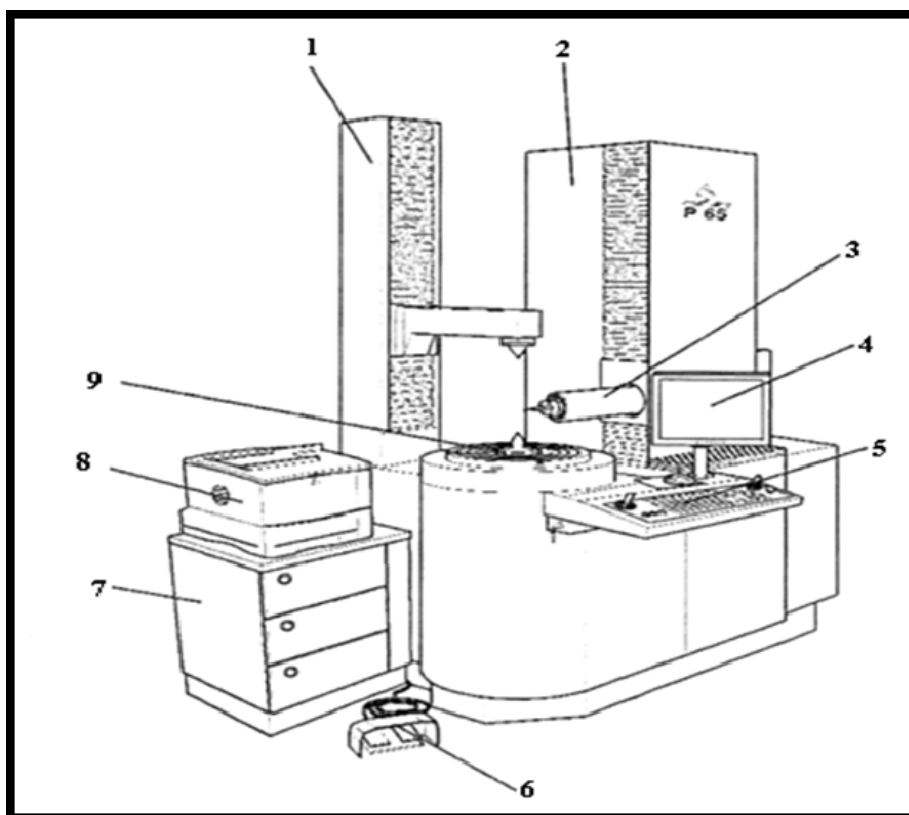
2.1. Spare parts

Figure 3. Spare parts [1]

Explanation of figure:
1) The peak centering clamping;
2) Perpendicular guide;
3) Measuring feeler with replaceable lining;
4) Monitor;
5) Control console;
6) Switch, foot operated, for motor movement catcher console to peak centering;
7) Container;
8) Printer;
9) Rotating table centering tip.

3. EXPERIMENTAL RESEARCH

3.1. Object of research

An objective of this paper is to examine the principles of processing and evaluation of measurement results using gears with camber KIMoS (KLINGELNBERG Integration Manager of Spiral bevel gears).

3.2. Results

Of modern production systems running in an increasingly more important, the exchange of data between different components of the production equipment through a network. Pentium computer, which is equipped with equipment to verify gear produced by the company KLINGELNBERG working with the operating system allows the interconnection comfortable Windows 2000 and LAN (Local Area Network) Ethernet protocol. It is necessary for that purpose, to draw a distinction of principle between the content network interconnection (programs) and network interconnection objects (computers).

The interconnect network can, for example, online, between them, measuring programs, which are run on computers with a similar equipment. The interconnection network uses this first exchange of data related to input data for parts to be measured, to be controlled for the first time on the system. On the other hand, can and store the results of measurements performed on a centralized

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basis, for further processing (for statistical purposes).

Input data to complete the verification process of objects, which controls for the first time the facility, constitute the main part of the working of service staff. By placing their centralized data simultaneously for several measurement systems, so you can get for a wide range of machined parts, a substantial reduction in training time measurements. Beyond this, however, is possible and interconnection of different programs, such a measurement program with a program for calculating the adjustment of a machine data processing. As a significant example of this process can be called, led by computer, the manufacture of gears. The adjustment to derive KIMoS (KLINGELNBERG Integration Manager of Spiral bevel gears) provide particulars of the topography of the flank to manufacture spiral bevel gears, while using data as reference data for subsequent measurement program for those gears.

After measurement, the actual data measured topography of the flank are sent to turn the program for calculating data adjustment for it to calculate the correction to adjust these data processing machine. Exchanging data between programs mentioned leads in this case, the optimization of production process.
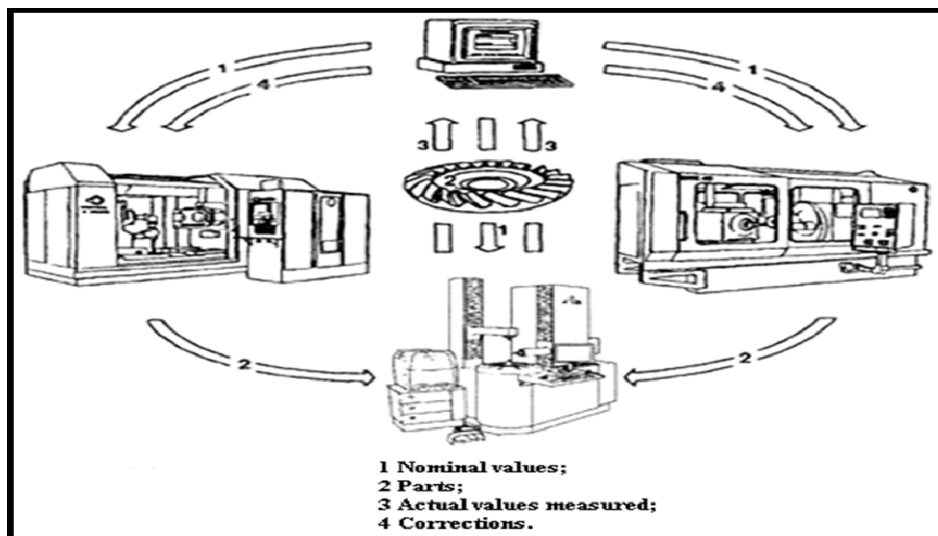

Figure 4. Process for manufacturing gear

It can interconnect in a network, each car checked, and checked the machines Gear cutting machines, in the latter case, however, all machines must be ensured a common database. It can be done and networking with a dedicated computer. Computers equipped with the same operating system can interconnect smoothly with each other in a network. Networking of computers, working with another operating system, it is also possible, as far as is possible to transmit data from one element to another network through a LAN, the internet protocol and there are also to provide an interface for data exchange program.

In principle, LAN equipment is open and it's interconnection with the host computer or customer of the latter. The service is set for a modem, which will use the general location of the causes of defects or functional deficiencies in the execution site update software on the system retrofit or amendment.

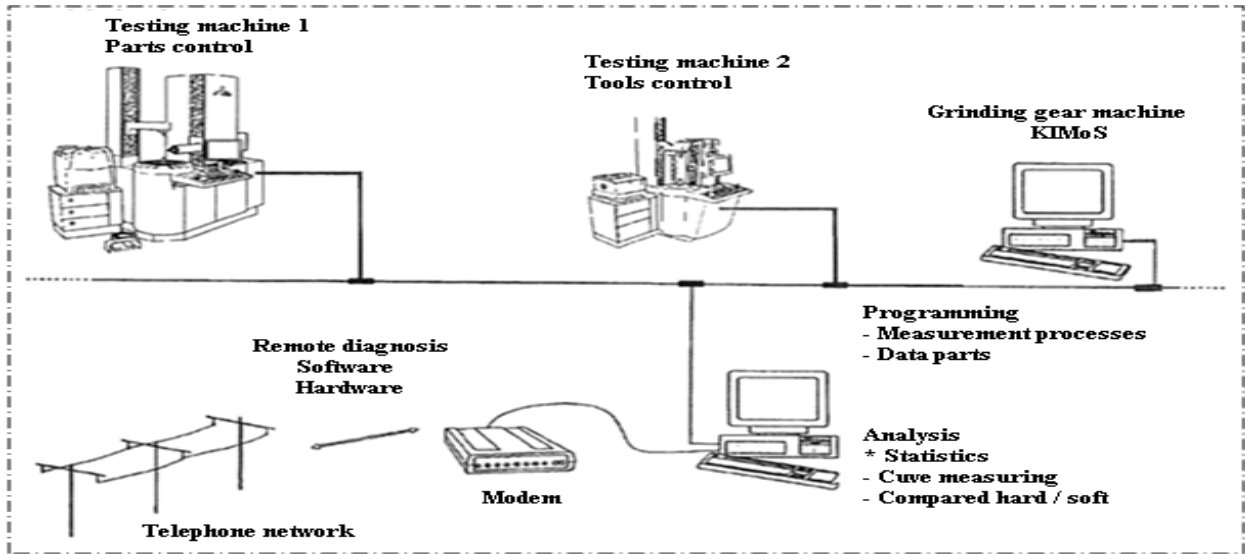Thus are the foundations of a computer system management through the production process.

Figure 5. Computer system management through the production process

4. CONCLUSIONS

The data for calculating the adjustment KIMoS (KLINGELNBERG Integration Manager of Spiral bevel gears) provide particulars of the topography of the flank to manufacture spiral bevel gears, while using data as reference data for subsequent measurement program for those gears.

After measurement, the actual data measured topography of the flank are sent to turn the program for calculating data adjustment for it to calculate the correction to adjust these data processing machine. Exchanging data between programs mentioned leads in this case, the optimization of production process.

5. ACKNOWLEDGEMENTS

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