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LOW COST INDUSTRIAL MEANS AND METHODS FOR AIDED BY PC INDUSTRIAL PROCESS

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Abstract (TNR 9 pt Bold): *Due to the fact that the revolution probes had have always key-roles for the component parts of different products with application in different fields, precision manufacturing and machining of such of revolution probes required and always will require special attention. An important issue in this regard relates to the dimensional inspection to provide proper and safe functioning. For this reason, the aim of the research was to develop a gauge for revolution probes inspection, in terms of dimensional deviations and functioning, with lower costs, but to approach the performance of specific equipment dedicated for such operations. The system could be successfully used for both for research and educational activities in terms of technological processes optimization with application especially in automotive field.*
Keywords (TNR 9 pt Bold): *revolution, form deviation, shafts, gauge*

1. IMPORTANCE OF THE MACHINING PRECISION OF THE REVOLUTION COMPONENTS

Due to the fact that the revolution components have a very large range of application, ensuring reliable operation of there is crucial for a safe and proper functioning of the final product in which they take part (bearings, shafts, pulleys, flywheels etc). For this purpose, both manufacturing quality control and operation of the revolution components represents a crucial aspect.
A basic aspect of the quality inspection is the form and dimensional deviation testing. It focuses mainly on measuring form and functioning deviations (centering, coaxial, cylindricity deviations etc.) of the revolution components. The goal is to reduce some unwanted effects during their operation (runout, axial, misalignment etc.) [1].
For this reason, the paper addresses the problem of optimizing the stands used for different types of form deviation of the revolution probes.

2. REVOLUTION PROBES QUALITY INSPECTION - STATE OF ART / RESEARCH PURPOSE

Nowadays, for the quality inspection of the revolution components functioning there are used different kind of dedicated equipments, like type CNC, for certain types and dimensional classes of revolution pieces. Vast majority of these include their own software environment, thus ensuring a very practical and efficient quality inspection process.
The paper addresses the issue of implementation of a research in order to obtain an efficient, low – cost gauge, easy to be used, for deviation form inspection of revolution probes, type shaft or flywheel [2].

3. OPTIMIZATION AND OPTIMIZATION OF DIMENSIONAL INSPECTION GAUGE AIDED BY PC

The starting point of the research was an older practical realization, in a Diploma Project (Transilvania University of Brasov) on the manual balancing shafts (figure 1). A first step in optimizing the gauge was to

equip it with a drive system so that the shafts form deviation inspection to be in semi-automatic mode. Specifically, as the drive system it has been provided a recycled motor gear windshield wipers, in the first stage, it's ordering being ensured by direct supplying to a voltage source (figure 2). At this stage of stand development, it was possible to vary the shafts driving speed, for different modes of their dimensional inspection and functioning testing.

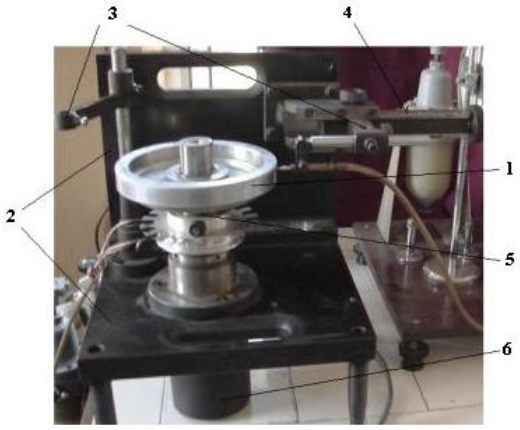

Figure 1: The manual shafts testing gauge, initial stage: 1- tested shaft/flywheel; 2 – base support plates; 3 – disposing systems for measuring devices; 4 – guidance for measuring devices disposing systems; 5 – fastening and fixing systems for tested shafts; 6 – housing for shaft's bearings

This could be possible by rotating of a component knob of the power supply, some studies being made on the correlation between the voltage source and shafts rotation entraining speeds [3].

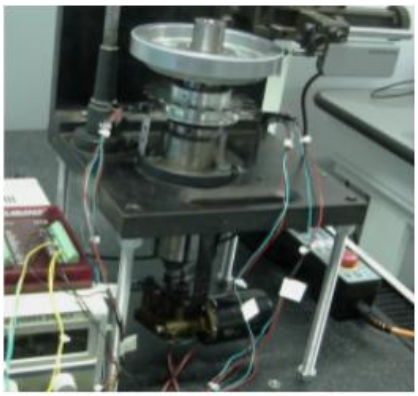

Figure 2: The testing gauge equipped with gear motor for shafts driving

In terms of speed rotation of the shaft, the study focused on establishing appropriate drive speeds so that the shafts dimensional and functioning inspection is efficient and also accurate. In the table below there are presented the values of the driving speeds applied for the established dimensional measuring cycles:

Table 1: Driving speed values corresponding to the appropriate gauges dimensional inspection modes

1st speed [rot/min]	4
2nd speed [rot/min]	6
3rd speed [rot/min]	8
4th speed [rot/min]	10
5th speed [rot/min]	12
6th speed [rot/min]	14
7th speed [rot/min]	16
8th speed [rot/min]	18
9th speed [rot/min]	20
10th speed [rot/min]	22
11th speed [rot/min]	24

For a better shafts inspection process improvement, it was took the problem to locate more accurately any form deviations of the tested shafts (circularity, cylindricity deviations etc.). For this, some researches were focused on how, during the testing process, the shafts could be entrained in rotation with well defined angular steps. This involved following the way in which the command of the shafts rotation driving process could be strictly controlled. For this reason, the gauge was equipped with a proximity sensor, to measure the shafts angular position [4]. For the process monitoring, a hardware interface was implemented. It consists in a board equipped with a programmable Arduino, a display for the process monitoring and four bush buttons to establish the shafts rotation angular steps for the testing process (figure 3). [5], [6].

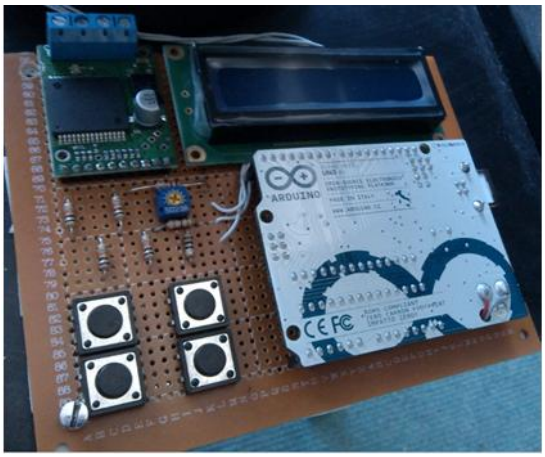

Figure 4: The hardware device for the command process

In the current research stage to optimize the testing gauge, it looks like in figure below:

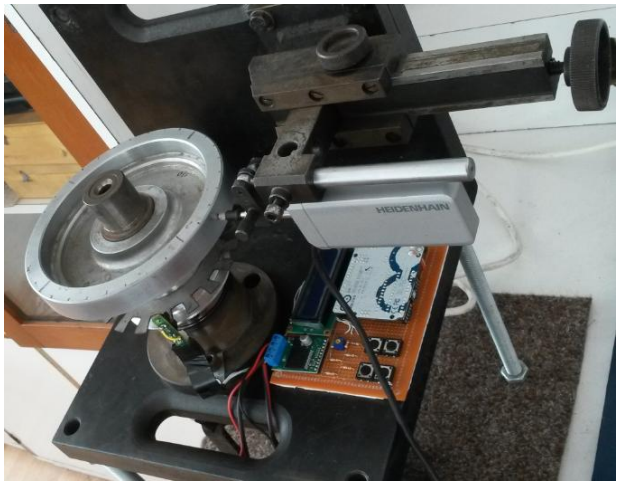

Figure 5: Actual stage of the shafts testing gauge improvement

The testing gauge improvement invoked also equipping it with a measuring device, which consists in an incremental displacement transducer and a fixing system of its, with the possibility to change it's position.

4. CONCLUSION

The obtained gauge can be successfully used both in research and for teaching purposes, allowing full monitoring of the dimensional inspection processes. Currently research is focused on studying the possibilities of programming the Arduino microcontroller to enable accurate monitoring of the shafts testing process. By programming the microcontroller, another aspect aims to obtain a flexible mean so that the operator could quickly and easily to establish the control process parameters.
The developed gauge may be very useful for the dimensional inspection and functioning of different parts, driven in rotation, especially in automotive applications.

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