Dimensional and Shape Quality Control. Modern Equipment
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**ABSTRACT**

Nowadays, the product quality in furniture industry is more and more required for the competitiveness of the products on the market. The quality is defined through a high processing accuracy, high quality of the raw materials, good design and high quality of the finished surfaces and of the mounted product. That means a controlled production process, a controlled supply chain, good equipment and high quality tools. The accuracy of the finished product is the result of the accuracy of the technological process and it is defined by the machine parameters used for the process operation and also by the tool type and quality. In the present paper, the authors present new methods and modern equipment used to measure the processing accuracy.

**INTRODUCTION**

The European Union common regulations have as a result the introduction of a DISCIPLINE IN THE MANUFACTURING PROCESS of the producers, in order for them to guarantee the quality of the products sold in the European Union. That means, among the other things, to assure the accuracy level of their production. This guarantee can not be granted unless periodical analyses of the “production activity results”, one of the analyzed parameters being of course, the **quality of the product**.

To define if the company has good activity results it is needed, for example, to test the quality of the product, which is also the result of its dimensional and shape precision. The dimensional and shape precision are also the result of the fabrication process, due to the machines and equipments used for the process. The dimensions measurement gives indication about the processing accuracy of the machines used into the process. The measurements can be done with classical instruments with the condition of being very accurate ones (gauged and certified by specialized bodies).

In wood industry field, the dimensions can vary from 2 mm to 2 200 mm. In this case it is difficult to measure with the same instrument the small and the big dimension, that instrument being also very accurate one. So, in the last years, when the knock – down furniture became more and more requested by the market, the dimensional accuracy of the parts was compulsory for the interchangeability purpose. So, the needed for the equipment able to measure small and high dimensions in an easier way went to the concept of **measuring equipment for wood industry** purpose.

Thus, in the frame of the Wood Industry Faculty from Braşov, has been set up on the 23-rd of April 2004 the most modern laboratory of testing the processing accuracy of the wooden and wooden based components resulted from the furniture and finished wooden products sector, unique in Romania. The laboratory was set up with the help of the German in cooperation with SAN Software Company from Romania and the German Company HECHT ELECTRONIC AG.

SAN Software has offered the support necessary for the endowment of the laboratory with a modern computer network which transfers the drawings obtained with CAD program to the measuring equipment. The German Company HECHT ELECTRONIC AG is the producer of the measurement equipment and the investment has been done through a project initiated by SEQUA Foundation from Germany.

**OBJECTIVES OF USING MODERN MEASURING EQUIPMENT**

Fabrication of the wooden products as engineering processes means the presence and uses of a system between machines, tools, devices, installations, etc. In an industrial process, the fabrication process introduces different concepts than in prototype or craft industry and they are:

- batch processing, the dimension of the batch being established as function of the production capacity of the plant, the order size and delivery schedule, aiming to optimize their size in order to use the rational engineering site and inventory space, the optimum changeover and processing times, etc;
to assure the total interchangeability of the parts in a batch, condition achieved only through assuring the same processing quality for all the batch components (dimensional processing accuracy, shape and position accuracy) and through assuring a permanent processing control (using dimensional, shape and position checking devices – for all important operations or between groups of operations – for parts, complex parts and sub-assemblies);

- to assure a permanent maintenance activity to keep the work parameters of the system of machines, tools, devices, checking devices, etc.

Performances of an engineering process impose in fact a high level of processing accuracy at each workstation, including also a high level of processing accuracy of the production sector or of the plant.

Because of the topics mentioned before, the paper intends to present new equipments of measuring the processing accuracy and the specific measuring methods.

**EQUIPMENT AND MEASURING METHOD**

**CADesQ Equipment**

CADesQ equipment, presented in figure 1 is composed of a measuring table of 2500 x 1250, mm, a PC Touch-screen and a measuring device placed on a moveable bridge, which has a translation movement on X axis. The measuring device is composed of six measuring heads, each one being positioned for a separate measurement type (length or width, depth, hole diameter, hole depth, etc.). The equipment has a measurement accuracy of 0.01 mm.

![Figure 1. CADesQ measuring equipment](image-url)

The drawing of the part which is intended to be measured is a .dxf files (developed by AutoCAD). Based on the software developed by the manufacturer, all the measurements to be done are introduced in the measuring program. They may be as follows: linear sizes (on the three coordinate axis X, Y and Z), holes diameters and distances between them, hole depth, together with the accepted tolerances according to the technical specifications or to the customer requirements. The interface of the program with the operator is shown in figure 2. Through the command: ”New meas. point”, the type of measurement (distance on X or Y axis, depth on Z axis, diameter of the hole, depth of the hole, etc) and the accepted tolerances for those dimensions are introduced into the measuring program. “Read measure from .dxf” will be selected than and the cursor will choose from the drawing imported as .dxf file the start point and the end point that define the line or the point that define the hole position.

After defining the measurement points and the imposed tolerances, the file will be transferred through network on the measuring table PC, where the operator will measure the dimensions according to the program.

The measured values are transferred to a .txt file, in which it is specified if the measured dimension is included in the tolerances field or not. Then, statistical parameters and measurement uncertainty can be calculated in order to describe the process.
OptoDesQ Equipment

OptoDesQ equipment presented in figure 3 is composed of a granite table, a video CCD camera fixed on a mobile bridge and a computer. The measurements are contact less performed, with a precision of 0.01 mm, using an interface program (OptoDesq Interface) shown in figure 4, defined by the operator, based on the drawing or client requirements. First the overall dimensions (length, width and thickness) are introduced in the program.

For example, when testing the panel flatness, „Vertical hole” is introduced as an option and the coordinates of the points in which we measure the dimension on “z” axis together with their tolerances are introduced.

The data will be automatically processed by the software and than generated by it in an interface as shown in figure 5 and in the drawing of the measured part when critical points appear in red color. After the measuring action is completed, the data will be transferred in a .txt file. This will allow statistics of some parameters and also the measurement uncertainty. OptoDesQ allows to measure the
following parameters: straightness, linear measurements (length, width, thickness), the angular deviations of the edges, flatness, the hole centre position and the hole diameter, distances between holes and the edges linear deviations.

Figure 5. Results generated by OptoDesQ program

**LaminatDesQ Equipment**

LaminatDesQ equipment is characterized through high precision measurements and it is recommended to be used for measuring the laminated products: parquet and floor panels, veneered or laminated panels having a thickness of maximum 18 mm. LaminatDesQ allows the measurement with a precision of 0.02 mm of the following characteristics: linear sizes (length, width, thickness), parallelism, flatness, rectangularity, tongue and mortise sizes according to DIN EN 13329. The obtained results can be seen on the display. The results can be printed.

Figure 6. LaminatDesQ equipment

**CONCLUSIONS**

In order to allow the transfer of the wooden and wooden based products on the European market, as mentioned before, it is necessary for the manufacturer to get certificates of conformity for the products they are producing. According to standards 17050-1:2005 and 17050-2:2005, the declaration of conformity issued by a certified body/laboratory (according to the requirements of SR EN ISO/CEI 17025:2005), proofs the conformity of an object with the specified requirements, no matter of the sector of production. Thus the object of any declaration of conformity can be a product, a process, a management system, a person or a specific body. The equipment we have presented offers the advantage of a high measurement precision and modern measurement methods, not standard yet, but which can be validated, in order to assure the producers about the accuracy of the results, certifying them the precision of their manufacturing process.

**REFERENCES**