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MEASUREMENT OF WHITENESS OF MATERIALS BY OPTICAL ELECTRONIC METHOD

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ABSTRACT

One of the laser measurement systems is the Monarc system. This measurement system is designed to measure the rotational position, linear dimensions and shape of the object being inspected using a laser. The Monarc system includes a specially programmed automatic product quality control system.

Keywords: Monarc, Laser, Scanner, VRZ, histogram, constructive, functional, system, optic, Porog.

INTRODUCTION

The growing demands for products in modern engineering production require accurate measurement of the mechanical and geometric parameters of the product. Until recently, the above characteristics were mainly measured with contact (inductive) measuring devices.

Until now, the technical characteristics of such devices have reached their limits in practice, and from now on, the application of new technical solutions and methods, suitable measuring devices is required in this field. In addition, such measuring systems are distinguished by their high cost and the fact that they require a lot of time to measure the necessary parameters.

One of the options for solving such problems is the use of LASER measurement systems, i.e. LASER Scanners. The principle of operation of such systems is as follows: it fixes the characteristic points or edges of the examined object depending on the change in contrast of the image and analyzes the shade of the image.

This method guarantees a sufficiently accurate measurement in a wide range (from 0.25 mm to 50 mm). Also, measurement works are carried out without leveling (non-contact) the extinguishing system of the inspected object.

In LASER measurement systems, as a result of the use of optical elements of additional modification (for 1500 series), the measurement aperture can be expanded up to 203.2 mm.

METHODS

The MONARC laser measurement system, which measures saturation or whiteness, is a standard measurement complex. It includes:

-Laser copier,

- A device that mechanically locks the inspected product and controls its movement,

-Management and analysis of results in EXM.

In the LASER measurement system, depending on the situation, it is also possible to measure the object while it is moving along the horizontal and vertical planes. This measuring system is a constructive and functional system, built on the basis of a modular structure. It is possible to determine the inspected object in the required mode, with the required accuracy, range, and all parameters. As the system works on a module basis, the workflow is universal.

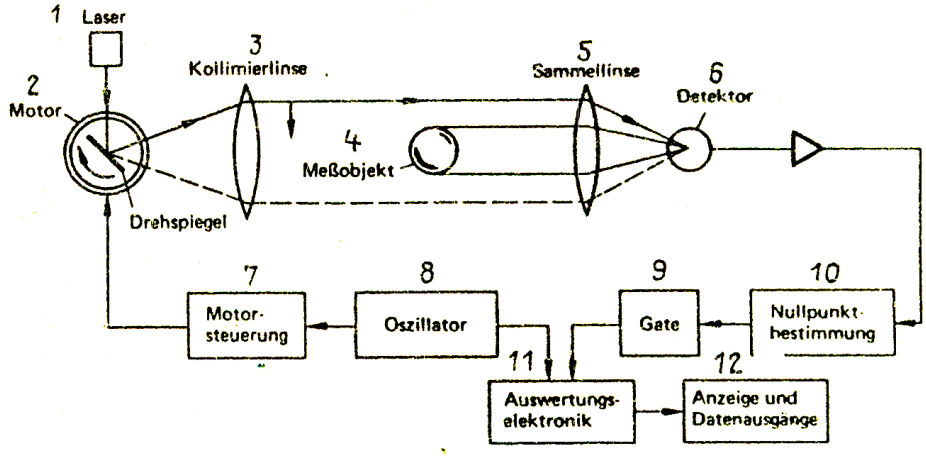

Figure 1. Scheme of the MONARC laser device for quenching.

Here is the 1st laser; 2nd engine; 3-collimator; 4-checkable object; 5-focusing lens; 6-optoelectronic detector; 7-control engine; 8- generator; 9- adjustment scheme; 10- evaluation and correction blog; 11- image processor blog; 12- results and indication blog. In this method, moisture and whiteness of cotton materials can be detected in a large diopson, without contact with the material, with high accuracy, using optical light. With the help of a rotating mirror and an optical system, a set of parallel reference beams is created, which moves at a frequency of 150 Hz in the beam measurement zone. The stream of rays falling on the object turns into a corresponding electrical signal in the detector, and an image shadow appears in the plane of the detector. The boundaries of the shadow of the object image are scanned with the help of laser beams.

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1. Diffraction of laser beams refracted from the boundary of the inspected object does not affect the measurement results;

2. External atmospheric pressure and air temperature do not affect the measurement results. Only they can cause a slight linear expansion of the geometric size of the object, but this error is corrected during the processing of the results;

3. The measurement process, the turbulent flow of air passing between the inspected object and the optoelectronic receiver, does not significantly affect the fall and direction of the beam;

4. Use of image processing in the "Porog" method, the vibration of the laser light when measuring the object does not cause contamination of the optical system. As a result, there is no need to constantly clean the optical measurement system;

5. The level of cleanliness of the surface of the inspected object has little effect on the measurement results. The features mentioned above show the advantages and guarantee of the LASER measurement system;
6. Calibration (adjustment) of the LASER measuring system is carried out according to NBS requirements and there will not be many adjustment intervals;
7. When checking the scanner head, all the data in the memory is saved;
8. Changing the geometrical parameters of the details in different dimensions does not require readjustment during the measurement of the mechanical elements of the scanner system;
9. The high-speed scanning of objects by the LASER measurement system allows for a large number of measurements to be carried out in a short time;
10. The LASER measurement system has an indication of deviation of possible parameters, so that all the information is saved even in case of any accident.

EXPERIMENTS AND RESULTS

Currently, two different modifications of the above-described system are being developed in series. Their absolute errors are from 0.3 to 5 and 0.15 to 2.5 μm, and they are designed to measure linear dimensions in the range of 0.25 to 50 mm and 0.08 to 25 mm. The user can change the measurement time from 40 ms to 10 s.

Measuring systems are installed on a granite ground base panel on a standard 19-inch frame, with an electronic control unit and a control motor. If necessary, an IR54 standard housing exposure control system can be added to them. The object under inspection is placed in movable and immovable fasteners. Such a design ensures the simultaneous reliable operation of the laser scanner system and the mechanical movement of the object.

The transmission system is equipped with an additional linear measuring VRZ type indicator device. The transmission system is equipped with an additional linear measuring VRZ type indicator device.

In the process of dynamic measurement, continuous or step-by-step rotation of the inspected object in the measurement plane is ensured.

The transmission mechanism of the structure is 250, 450 or 750 mm. In the standard case, a belt-type transmission mechanism is used. The transmission step of the mechanism is 2 or 5 μm.

The above values limit the accuracy of measuring the linear dimensions of the object.

A high-precision transmission mechanism with a working step of 100 mm and an absolute error of 0.6 μm is used to measure the position and shape of the object.

The built-in automatic control system, which ensures product quality, performs all functions typical for the process:

-Planning of testing and control;
- Collection of data necessary for measurement;
- Automatic control of the required parameters of the product according to the algorithm;
- Processing the results without moving away from the controlled process;
-Continuous control of the process according to the selected static criteria;
- Analysis of product quality and data processing even when not dependent on the instructions and solutions developed for the quality management system in non-real time;

The universality and compactness of this system, from the point of view of programming, allows to adapt to specific issues.

In this master's thesis, the main properties and characteristics of the above system are considered, showing specific examples and its main functions.

This system is a modular software package. In the user, in the dialogue mode: the skills of sequential control, processing of results and decision-making functions are formed.

A package of special modular programs: performs sequential control operations, equivalent to copying the necessary files at the same time, and allows to change them if necessary.

In addition, a separate module provides for carrying out any measurements using the described System. Limitations may be beyond the functional capabilities of the system itself.

Here are the prerequisites for programming:

- Measurement sequence;
- The conditions for measuring the configuration of the object in the measuring tract;
- Analytical expressions for processing the obtained results;

It should be noted that it is also possible to create programs using up to 48 different relationships to process the results.

In addition to these, the package module also includes the control module of control, with the help of which the selection size can be assigned, the necessary control cycle and gradation (adjustment), the type and number of the product under control, the statistical characteristics of the processing of the selected results, the obtained quantities if necessary. remember and archive it;

System programming support remembers a large number of configurations and allows you to recall them when solving the necessary problems.

It is possible to check the current measurement results on the EXM display screen and change the displayed values using the keyboard.

The system has options for displaying data in the following mode:

1. Give the results in the form of a diagram, indicating all the conditions of the shutdown in the standardized permissible area. On the part of the user, it is possible to enter the given area in the "off and on" mode. If necessary: giving individual values by channel symbol or number in alphanumeric form; given and actual values; deviation from given values; giving threshold values in the (fixed) field.
2. Histogram representation of 10 different classes of analyzed quantities that appear within the normalized permissible area. It also shows the numerical and percentage parameters of the checked selections, as well as some current statistical characteristics.
3. During the control process, it also shows the conditional control "card" of process or product quality. Also, the statistical characteristics of the examined samples are ranked on the basis of up to 25 samples.

If necessary, by programming in the system, based on complex algorithms, it automatically evaluates up to 100 measured values in condensed state, performs statistical processing (average value of samples, mean square deviation, etc.). On the basis of a specially programmed module, it is possible to classify precise details, functional finished installations and their elements, if we remember the condensed sizes.

This, in turn, ensured the operation of the machine based on sufficient statistical selection and reliable diagnostics. The hardware of the system works according to a decentralized structure. The central EXM function is controlled by a modern 16-bit collector hard disk "Winchester" and the measured quantities are processed and stored at high speed. If necessary, expand the standard control system in the system; Quality Assurance in Series 1010; it is possible to combine them into a single complex using a local communication network.

CONCLUSIONS

1. With the help of the above-mentioned system, moisture and whiteness of cotton materials can be determined by sending high-precision optical light to the material in a large diopson without contact.
2. Measurement of quantities is carried out in full automatic mode, in the sequence specified by the user. In this case, it is possible to call pre-prepared measurement programs by pressing the appropriate functional key or clicking on the appropriate symbol.
3. One of the main advantages of the described system is that it can perform operations at a high speed. In particular, the time of measuring up to 20 parameters of textile materials in a complex configuration does not exceed 1 minute.
4. This system provides the possibility of working in the mode of several users. For example, multiple test results can be processed.
5. The high universality of this system, in which the tested material can be easily replaced by another, and it takes 30 seconds.
6. Another one of the possibilities of the system: display of received information in various forms; processing of results according to standard or user-defined algorithms; Based on the diagnostic status of the tested materials, it is possible to process the obtained values.
7. General management using the system is carried out in communication mode. There is no great demand for service personnel in the field of accounting. Because the process is done automatically by Sistema.
8. The modular system structure and programming support ensure that its parameters match the conditions of the problem being measured.
9. Built-in standard interfaces and network adapters in the system allow the use of complex measuring units in the system. It also ensures product quality control in industrial production conditions.
10. The construction of the system allows it to be used in relatively complex production conditions.
11. One of the possibilities of the system is that it is possible to carry out measurements in the "hand" mode. That is, in small series production, laboratory and product sample testing.

REFERENCES

1. Modern problems and features of the development of the light and textile industry of the Republic of Uzbekistan. Report of the Department of the Republic of Uzbekistan for 2016-2017.
2. Mukhitdinov M., Musaev E. S., “Optical methods and humidity control devices – M.: Energoatomizdat, 1996.-96p.

3. Takahashi F. "Measurement and automatic control of humidity in production processes." Per. Japanese Kaiso., 2014 v.17 No. 2 s10-77.
4. Hoffman K “Feuehtemessung durch infarororeflexin” – Chemie Ingeneur – Technik, 2017г. №1 p. 55-62.
5. Shevchuk A.I. On the question of experimental evaluation of the distribution of random errors in the circuits of IR analyzers of the composition of substances. – Automation of the textile industry. 2008 No. 3. With. 27-32.
6. Karimov Abdusamat Ismonovich, Ismanov Muhammadziyo. Mathematical Modeling of Heat Flux Distribution in Raw Cotton Stored in Bunt. Engineering Vol.12. No. 8, August.20,2020, 591-99.DOI: 10.4236/eng. 2020.128041.
7. Ismanov M., Karimov A. (2020) Mathematical Modeling of the Technological Processes Original Processing of Cotton. International J. of Innovation and Applied Studies, 1, 28-39