

GUIDING THE EXPERIMENTAL RESEARCHES OF ELECTROTECHNICAL MATERIALS WITH APPLYING OF DIGITAL VIDEO TECHNIQUE

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Shown basic advantages of the use of digital video camera for determination of properties of electrical engineering materials on concrete examples: fixing of shows of devices, which do not have an electric output of signal, exception of influence of subjective errors of researcher on the process of measuring, fixing of long duration processes.

Keywords: electrical engineering materials, dilatometer, CLTE, phase transitions, diagram of the state.

Defining the issue, topicality

During the performance of researches in practice it is necessary to take into account the material's properties. Reference books provide an information on basic properties which could scientifically differ from the concrete materials. Material's composites could also differ from the one's mentioned in certificates.

Our practice witnesses that in some cases it is more reliable and simple to perform the measurement of separated material's properties and to apply those results in following work than to use data from reference books (input control).

Objectives of researches

Apply video technique for measurement of properties and composition of materials within a goal to achieve the lower prime cost, to simplify the researches, reliability of derived results and minimized participation of an operator in researches routine.

Exposition of core material

Digital video camera (DVC) allows to:

- exclude the influence of an operator from the process of measurement;
- fix processes in the mode of per-frame shoot with discreteness ≥ 1 sec for a long time;
- use in researches process the equipments that do not have an electro outlet signal;
- visualize the process of measurement;
- do not use PC for fixation of material's characteristics.

Considered an appliance of DVC in examples:

- 10 Determination of carbon level in steel and coefficient of linear thermic expansion (CLTE) in a temperature range of 50-900° C.
- 20 Determination of tin-lead solder composition.
- 30 Determination of the exact capacity of condenser of high-capacity type.

Summaries

1) Created simple mount for dilatometrical discovery of steel. Using of DVC in per-frame mode of shooting allowed to avoid an involvement of skilled staff for tracking experimental dependencies and negative influence on reliability and accuracy of results. During processing of data were discovered temperatures of phase transitions and determined percentage of carbon in steel and CLTE both structural modifications of steel.

2) Determined a content of a specimen TIS (tin-lead solder) without an influence of operator. If a curve of chill is taken by PT-0102 and PC, then into PC automatically put data of temperature and time (in Escel). In that case DVC is not used.

3) Determination of volume of condenser with DVC lasts for 2 – 15 minutes. Experimental points can be fixed every second. This expands an interval of measurement of volume in field of relatively small volumes (~2 mcF). Durin an appliance of PT-0102 and PC data is automaticially taken into Excel and later on changed in values of U, I, q etc.

In shown examples in a hand mode (without appliance of DVC or PT-0102 and PC) is impossible to achieve trustworthy results.

DCV allows to apply simple tools for carrying experiments with a high reliability of the obtained results.