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S. Kartunov

International Bulgaria-Ukraine-Projekt “Examination of the Standart micromechanical components and selection of new materials in their technological manufacturing processes”

Purpose

1. Examination of the standart micromechanical components and selection of new materials in their technological manufacturing processes.

Tasks

1. Examination of micromechanical components of working mechanisms with application in apparatus manufacturing, microtechniques and statistical processing of the data from the achieved results.

2. Development of algorithm and methods for working with the automated system "MICROSYS" - Software "Mechanical Desktop" and "COSMOS" for modeling and simulation of the behaviour of microcomponents in consequence of the change of the parameters of the technological processes and the materials without their direct manufacturing, and with estimating of their practical applications. Making a statistical processing of the data from the achieved results.

3. Development of new modules for the "MICROSYS" automated system for modeling and simulation of the behaviour of microcomponents in consequence of the change of the parameters of the technological processes and the materials without their direct manufacturing.

Inculcating of the results from the research in the studying process in the "Microtechnique" discipline from the educational planes of the bachelor degree of the speciality "Machine and apparatus engineering" in TU - Gabrovo, and the discipline "Informational technologies in micro- and nanotechniques" of the speciality "Apparatus engineering" in NTUU "KPI" and inculcate it in other specialities in TU-Gabrovo, Bulgaria and NTUU "KPI" Kiev, Ukraine.

Results

- For component-drives coding of MT there is chosen coding by means of mono-codes [1, 2]. Dendriform structure of the coding allows us a repeatedly updating of each hierarchy level and adding of new levels according to a new classification sign. The coding is by means of five-digit mono-code. The actuators coding is up to the 5th level. The structural coding model of actuator has been shown on Figure 1.

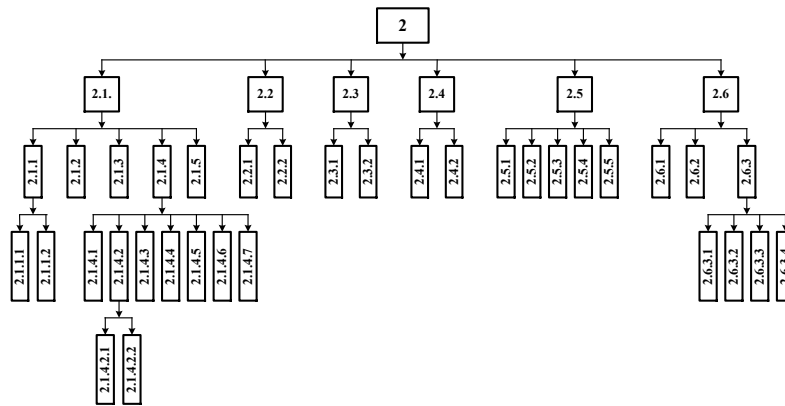


Figure 1. Structural coding model of actuating micro-mechanisms [2]

- Accuracy research of technological processes and analysis of the factors influencing the fabrication of the microelements (on first place the material). A link was developed, between constructive and technological development, based on decision tables. The processes of geometrical modeling and engineering analysis of the developed object are connected to choice of group TP or the sequence of operations for element fabrication via table methods for making a decision. Example of group TP for fabrication of basic group FME (flat membranes with double sided stoppers) was developed with general constructive and technological properties and variant method for technological development was realized [3].

- Slight additions from zincous oxide (0,5 mol %) cause sharp fall in the thick layer conductivity, i.e. zinc acts like acceptor. All of the six investigated variable factors significantly influence the achievement of exact value for thick layer quadratic resistivity as the single correlation coefficients for second, third, fifth and sixth factor (glass powder content in the paste x_2 , %; temperature of heat treatment x_3 , °C; pressure of doctor blade x_5 , N/mm; movement speed in conveyer furnace x_6 , mm/min) have the same value which fact restricts operation mode variance in the course of manufacturing process. Thus the zinc doping is usually fulfilled via introducing zincous salt solution of Chlorine ($ZnCl_2$) or Fluorine and Antimony in the formative layer. The resistive pastes based on zincous oxide system ($SnO_2 - Sb_2O_3 - ZnO$) are mostly applied for resistors with broad temperature range of operation (60÷500 °C) and with temperature coefficient of about $\pm 3 \cdot 10^{-4} \text{ deg}^{-1}$ [2]. Total results – [4].

References:

- [1] Kartunov S., V. Todorova, *Microsystemstechnique*, Gabrovo, Technical University, 2002. (in Bulgarian)
 [2] Kartunov S., *Integrated system for automated design of micro-components and selection of its product technology*, Gabrovo, DSc Thesis, 2007. (in Bulgarian)
 [3] Картунов С., И. Диордица, *Исследования в области обработки микрокомпонентов и миниатюрных деталей*, Крaнево, 8.МНК «АМО», 2008 (in Russian)
 [4] Kartunov S., *Студия и доклад с резултатите от изследванията по договор M-716/2007 и проекта, която е депонирана в МОН на Украйна и България, НТУУ „КПИ”, Киев, Украйна (Studie u. Ergebnissevortrag nach Vertrag M-716/2007 und Projekt in Ministerium der Ausbildung in Bulgaria und Ukraine, NTUU “KPI” Kiev, in Bulgarian and in Russian)*

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