

## FORECASTING CHANGES OF PASTRIES PRODUCTS WITH THE USE OF CAPACITIVE MEASURING CONVERTERS AND CURRENT CONTROL OF THEIR STRUCTURAL CHANGES.

A new type of high-precision, highly stable and highly sensitive 3-kontakt lines capacitive measuring converters for the first time allows to put a question about the possibility of control of structural changes made by baked product in time, for example, due to it dries, hardening, aging. And therefore, we should expect that the real is also the possibility of building such capacitive measuring systems for the prediction of the state and of the changes in the physical-chemical properties of the product during its storage.

Among such 3-kontakt lines capacitive measuring systems the best is the class of so-called converters with "cross-capacitances", based on the of Lampard-Thomson theorem, which are practically do not sensitive both: to the presence on the electrodes moderate films of oxides and mud, for example - very heterogeneous remnants on them previously controlled substances, as well as to certain inaccuracies of manufacture and installation of electrodes. In these sensors for the first time is possible separate control of the thickness of the object or its dielectric constant on the basis of the use of the effect of M.M.Gorbov.

Justified also appears measurement of full electric resistance of pastries for its two components - not only for reactive (capacitive), but also active, because the last one is particularly sensitive to it's dry in view of the high electrical conductivity of the water. Capacitive conductivity can be sensitive to changes in the microstructure of the between-pore walls of the crumb of loaf, when grain partially pasted starch compacted and decrease in volume, what leads to the creation of air layers between grains of starch and mass of coagulated albumin.

Such control is turned out as appropriate also because of the fact that certain additives (e.g., fats and some others) is relatively little slow changes the properties of the crumb of loaf, which can be defined by objective measuring instrument methods, and at the same time conceal the process of hardening, allowing pastries to maintain freshness, which determines by organoleptic methods and by degustation.

As the technical means of this control - in the class the most accurate, the most stable and the most sensitive among all the modern electrical measuring transducers - 3-way capacity systems with "cross- capacitances", constructed on the basis of Lampard-Thomson theorem, - may be developed by the authors planar and cylindrical (pipe) capacitive measuring converters of high accuracy and noise immunity.

The first of them are, for example, three-, or five electrodes sensors with flat ones, all of which lie in the same plane, on which is placed the product. But for the need for separation control on conveyor the composition (state), or volume of the product or the raw material sensors become a four, or corresponding six electrodes due to the additional electrode, installed at a definite distance in a parallel plane to the other electrodes. In this case on the result of the measurement have influence only the dielectric permeability, or the thickness of the controlled object on a conveyor.

There are also designed cylindrical flow capacitive measuring converters allow to carry out high-precision control of the composition (kind) delivered in the pipeline substance (integral controls), and granulometric (differential) control of the size and the composition of the particle impurities in it. The sensors do not distort the flow of the delivered substances, so as not contain any of the electrodes inside him. Mechanically transducers are a parts of the pipe in the form of three electrically isolated between a metal cylindrical electrodes of the same diameter with the pipeline. The middle electrode, as the tube in general, electrically grounded, and the other two electrodes of length equal to the pipe diameter, are measuring. Length of the middle ring-electrode is 0.3 diameter of the pipeline.

An experimental study of the nature of distribution of the electric field in such a sensor has show its heterogeneity with low sensitivity by the walls of the pipeline, which excluded the possibility of differential control of the parameters of the substance. Therefore, to control the size and composition of the particles impurities in the flow was developed a modification of such a sensor, in which the diameter of electrodes increased by 30 %. Formed additional ring-shaped space is made from the non-conducting pipe with a dielectric permeability, close to the one of controlled flow.

In the case of temporary stable and noticeable changes of a dielectric permeability of controlled flow can be used a modification of transducer, where additional ring-shaped space is hollow and filled in with an auxiliary substance - for example, with a controlled substance without impurities. Internal cylindrical surface of the ring-shaped space must be limited from the controlled stream by non-conducting pipe with a dielectric permeability, close to the one of the controlled flow.