

Modelling of the yeasted dough in the mixing machines

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A wide application of the advanced dough-making technologies in bread production involves the use of intensive mechanical processing of the semi-finished products. In this regard, double-speed dough-mixing machines of the periodic operation with intensive dough kneading have become a frequent practice in bread making industry resulting a transition from a continuous stream of dough kneading to periodic one because there are no continuous dough-mixing machines of intensive action. The creation of the dough-mixing machines of continuous action is currently important.

The intensification of the mixing process can be performed by increasing the frequency of the body rotation or changing its structure that leads to changes in the structural and mechanical dough properties and provides the reduction of the duration of the dough fermentation.

Intensive mechanical dough processing while kneading has a positive impact on the quality of the finished products with the use of the advanced dough-making methods. The application of the screw working bodies of various modifications is suggested as the working bodies that provide continuous transportation and intense impact.

Depending on the type and composition of the mixture various types of the screws are used: solid, tape. The mixing effect is higher in the tape working bodies than in the mixers with the solid screws. The redistribution of the particles in the tape mixers is due to the opposite motion of the mixture under the action of the tapes. The highest effect of mixing is reached with the screws that have a perforated surface of the helix, but at the same time they have a lower effect of transportation. Solid screws provide transportation and intensive mechanical dough processing

Mixing the components occurs in machines with the screw working bodies due to the friction of the mixture on the walls of the screw and trough while moving and sliding. To provide the work of the screw it is necessary that the adhesive force of the mixture with the screw is less than its friction force on the walls of the trough. To study different types of the mixing bodies is suggested on the basis of the theoretical studies that are placed in pairs in the mixing trough capacity, with the same pitch, the opposite direction of the helices and counter rotation. A combined working body consists of one helix of the solid screw that provides a directed movement of the components into a mixing zone of the tape working bodies; the solid screw delivers the mixed components into a zone of intensive mechanical processing by the screw with the varied pitch.

Thus, modelling of the dough kneading process for different constructions of the working bodies of continuous action is suggested using the software package Flow Vision. Data analysis enables to suggest a construction of the compound working body that provides a three-stage process of dough kneading in the dough-mixing machines of continuous action.