

Dough relaxation through electromagnetic pulses

Reference No: B78143

CHALLENGE

Dough undergoes during the processing a considerable mechanical stress (given for instance from kneading). Because of this mechanical stress some of the chemical bonds (for example covalent or hydrogen bonds) between the polymer chains are broken and the polymers tend to align one to the other. This conformation worsens the processability of the dough, negatively influencing the following steps in the preparation process (such as rounding and molding). For this reason dough must rest for a certain time after kneading (usually between 15-60 min) before being further processed. During this resting period the chemical bonds can reform, and the polymer chains take a more compact and random conformation. This conformation leads to a higher plasticity and extensibility of the dough and consequently improves the processability. The relatively long resting period results on the other hand in a considerable time delay in the overall preparation process. Furthermore, during this resting time the climatic conditions must be precisely controlled, which usually requires a complex plant design.

INNOVATION

The present invention provides a method for applying an alternating electromagnetic field to the dough, in order to improve its plasticity. Experimental results (see Figure) have shown, that it is sufficient to apply said electromagnetic field for a short time (in the order of magnitude of few seconds), in order to obtain a plasticity comparable to that obtainable with a resting period between 25-40 min. This allows for reducing the processing time about 20%. The parameter of the electromagnetic field (amplitude, frequency, duration) can be easily controlled, which makes the process highly controllable. The control of these parameters is much easier than the controlling the climatic conditions during the resting time.

COMMERCIAL OPPORTUNITIES

This invention is relevant for all the sectors in the backing industry.

DEVELOPMENT STATUS

A device for applying the method object of the invention has been built and the method has been tested in the context of the complete preparation and baking process. The application of the electromagnetic field did not show any drawback with regard to the final product. The mechanical properties of the dough after the treatment have been measured (see Figure).

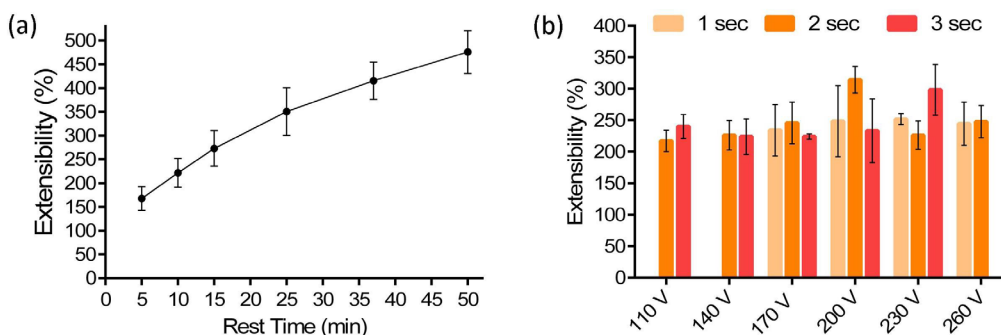


Figure: measurement of the dough extensibility through a Kiefer rig. (a) the extensibility of the dough increases for increases rest time. (b) the application of a voltage between 110-260 V for a time between 1-3 seconds leads to the same extensibility as that obtained with a rest period of 22 minutes.