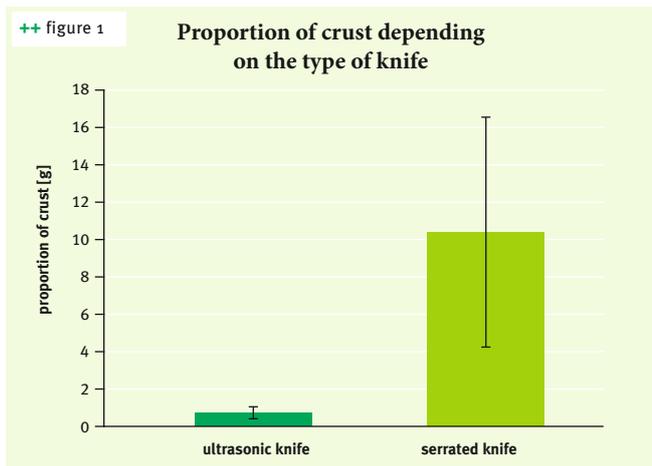
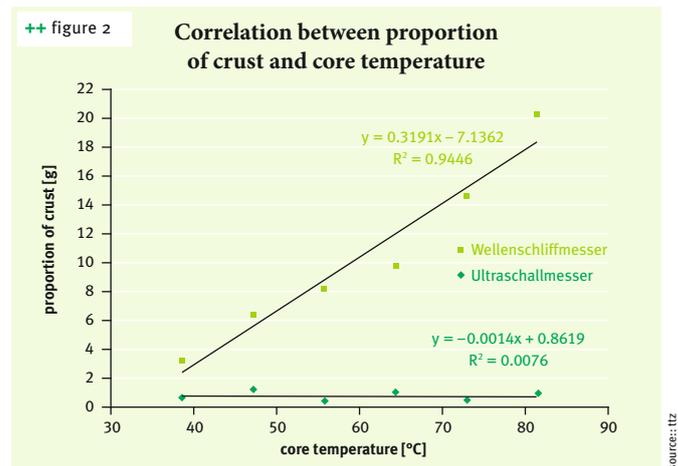


Ultrasonic cutting for baked rye products

IN ITS “ULTRASONIC CUTTING” PROJECT, THE TTZ BREMERHAVEN HAS DEVELOPED AN INDUSTRIAL CUTTING PLANT THAT ALLOWS BAKED GOODS CONTAINING RYE TO BE CUT IN BOTH THEIR COLD AND THEIR HOT STATE



++ figure 1
Illustration of the proportion of crust depending on the type of knife. Here the total average value for each “knife type” is an aggregate from n = 6 in each case



++ figure 2
Illustration of the correlation between proportion of crust and core temperature

+ Wheat and rye cereals are the main raw materials in the baking industry. Products composed of these are sterile immediately after the baking process. However, they are cooled down to approx. 30 °C to assist the cutting process. Although this prevents the baked goods or crumb being damaged during the cutting operation, the relatively long cooling time of approx. 2 h makes the surface of the baked product particularly vulnerable to renewed contamination by microorganisms from the room air or ambient air. In the “ultrasonic cutting” project, the ttz Bremerhaven, Germany, together with a plant constructor (Döinghaus cutting and more

GmbH & Co. KG, Salzkotten, Germany), has developed an ultrasound-based technology that enables loaves and bread rolls to be cut in the semi-frozen or hot state at about 60 °C to keep microbial contamination as small as possible.

Within the context of the project, the research services provider compared two cutting knives and cutting systems: a conventional serrated knife and the newly-developed novel ultrasonic knife with a diameter of 400 mm that can be rotated up to 50 rpm. A comparison between knives sharpened on one side and on both sides was also made.

In addition to the cutting temperature, the variables studied which affect the product quality and appearance of the baked goods also include the belt speed and rotation of the ultrasonic and serrated knives, the shape of the baked product, the crust thickness, the different proportions of rye flour or the effect of various acidifying components in the sourdough. Microbiological studies of microorganism contamination on the surface of the baked goods after the baking process were also carried out.

The series of experiments show that the ultrasound cutting technology enables good quality cutting of products with a core temperature of approx. 60 °C. The innovative cutting plant offers other advantages in addition to reducing the risk of microbial contamination: products cut with the ultrasound knife show a significantly better cut pattern – whereas products cut using conventional technology have a coarse surface and rough pore structure. The ultrasonic knife does not damage the pores. Cutting waste is also reduced significantly compared to conventional cutting technologies. +++



++ figure 3
Product with a core temperature of approx. 60 °C, cut with the innovative ultrasonic knife

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