Flour analysis at the push of a button

The research project Flourplus makes use of "Big Data" to facilitates bread production with reproducible quality. Entering the operating figures of a batch of flour into a special software enables the calculation of the appropriate processing parameters.

Photo: BT / Stefan Schütter 2016

2+4 Minuten   2+5 Minuten   2+6 Minuten

A baking experiment to determine the processing parameters adapted to a new flour batch is comparatively elaborate.

Flour is the main ingredient of all types of bakery products. As a natural raw material, it is subject to deviations in quality. This is one of the main causes of quality deviations in the finished bakery product, even in times of largely standardised milling procedures. This situation is exacerbated by the practice of using standard recipes and fixed process parameters. These standard procedures are usually not adapted to the fluctuating flour characteristics. The project Flourplus enables systematic and data-supported adaptation of the processing parameters.

A comprehensive database

The Flourplus provides a correlation model which combines the analytic flour data, process parameters, baking characteristics and consumer perceptions. This is designed to enable the flexible adaptation of processing parameters to fluctuating flour characteristics, thereby producing the best-possible baking outcome. The project team has investigated the scope for adapting the fermentation and proving conditions to the flour quality, thereby reaching an improved understanding of the sensory characteristics of bread. This was followed by analysis using a new statistical method of the relationship between flour characteristics, fermentation and proving conditions and the analytic and sensory characteristics of bread. The system rests on the use of a data base containing the analysis of c. 40 European flour varieties, investigated at ttz Bremerhaven and UCC Cork using c. 20 methods used across Europe. The data sets are analysed with AI algorithms to recognise specific patterns; past findings are then used to generate process instructions for future use. Flourplus seeks to enable the user to unlock the full potential of every kilogram of flour in the bread baking process. The system issues recommendations with which to adapt the production parameters to the batch in real time, so as to react to the natural fluctuations in the flour characteristics. The three-year project (2014 to 2016) is reaching its final phase. The data management, AI predictor algorithms and the user interface are currently running in a number of test projects. Further information about the current progress of the project is available online under: www.flourplus.eu.
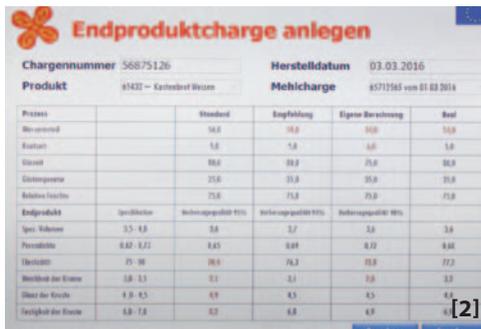
[1] Any bakery can enter its own flour batches with their specific parameters via the Flourplus interface. [2] The user can enter standard processing parameters, his own calculations and real values for every bakery product. The system supplements this with recommendations. [3] A dedicated screen displays the changes to be expected in the bakery product on the basis of actual characteristic data of a flour batch and issues processing recommendations.

This is how it works:

The arrival of a flour delivery with the appendant analysis data poses the question: What next? Should we process the batch with the standard parameters or adapt the production process? The Flourplus data base provides important assistance. This should reduce the various baking attempts or even render them superfluous, thereby permitting a quick decision. The operator can access the system via a user interface. Despite this advantage, the database only holds a restricted number of flours, recipes and process conditions; for instance the influence of raising agents is not taken into account. Entry level 1 (accessible to all users) provides a quick recommendations made on the basis of the analysis data alone, without incorporating additional baking attempts. Entry level two permits the entry of company-specific QA and production data which considerably increases the explanatory power of the calculations. The data on level two is accessible only to the respective company which has provided it. This level also permits the user to define and save individual specifications. The prediction produced by the system is based on the individual changed parameters. Whilst a company is able to protect its sensitive data within the system, it can share certain meta-data with other users to increase the quality of the overall system. Entering the parameters actually used after the completion of batch processing enables the system to "learn" by extending its data set.   Stefan Schütter