Bread Dough Hardness & Springiness by Hold Until Time Compression

TVT Texture Analyzer
The TVT Texture Analyzer (Figure 1) offers rapid and objective analysis for different products. The following parameters can be characterized for your product category:

- Stiffness
- Firmness
- Adhesiveness
- Stringiness
- Stickiness

Both international standard methods as well as customer tailor-made profiles are available. Figure 1: TVT Texture Analyzer

Scope
- Determination of dough hardness & springiness by hold until time compression test.

Method Description
The recording of the measurement data commences once the probe reaches the pre-set trigger force. The probe will then compress the sample to the pre-set percentage of the sample height and hold in that position during the pre-set holding time. The probe will return to its starting position once the pre-set holding time is reached.

Calibration
Make sure the instrument is correct calibrated before the measurements. How to perform the calibration can be found in the User’s Manual. Note The compression distance may need to be adjusted. Do not increase to more than 75% of the depth of the sample.

Load cell (recommended) 5 – 10 kg

Probe
P-CY50S, Cylinder probe 50 mm diameter, stainless steel (Figure 2)
Part number: 67.30.50

Figure 2: P-CY50S
Profile settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold Until Time Compression</td>
<td></td>
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<tr>
<td>Sample height [mm]</td>
<td>50.0</td>
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<tr>
<td>Starting distance from sample [mm]</td>
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<tr>
<td>Compression [%]</td>
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<td>Hold time [s]</td>
<td>62</td>
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<tr>
<td>Data acquisition time [s]</td>
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<tr>
<td>Initial speed [mm/s]</td>
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<td>Test speed [mm/s]</td>
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<tr>
<td>Retract speed [mm/s]</td>
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<tr>
<td>Trigger force [g]</td>
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</tr>
<tr>
<td>Data rate [pps]</td>
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</tr>
</tbody>
</table>

Sample preparation

Prepare a 100g dough ball according to a pre-set standard and place it centrally under the probe, Figure 3. Always keep the treatment and amount of dough similar for all samples since the degree of handling and preparation are critical points that influence the results. **NOTE** Air bubbles and an uneven dough surface could lead to variations in the results. It is also suggested to start with the hardest samples to anticipate the force range for the testing.

![Sample set-up](Figure 3: Sample set-up)
Curve Description

In Figure 4 a typical Force-Time curve is illustrated. The stiffness of the dough is taken at the customer force (here 13 mm). The maximum peak force, Force A, and the force after 60 s holding time, Force B, are used for calculating the springiness of the dough.

\[
\frac{\text{Force } B}{\text{Force } A} \times 100 = \% \text{ Springiness}
\]

Figure 4: Hold until time compression test of bread dough.

Data Analysis

The force required to compress the sample to a certain distance is here defined as the stiffness/hardness and can be measured in the units [g] or [N]. Springiness is given as a percentage [%] value. Except raw data (force, time and distance) the program also directly provides calculated results such as mean value and standard deviation.