Bread Dough Properties by Double Cycle 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 properties by double cycle 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 a pre-defined strain of the sample height. After the first compression, the probe returns to its starting position before the second compression begins. A pre-set wait time decides when the second compression starts. After the double compression, the probe returns to its starting position.

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-CY35S, Cylinder probe 35 mm diameter, stainless steel (Figure 2)
Part number: 67.30.35

Figure 2: P-CY35S

Profile settings

Setting Parameter	
Multiple Cycle Compression	
Sample height [mm]	35.0
Starting distance from sample [mm]	5.0
Number of cycles	2
Compression [%]	50.00
Paus [s]	12
Distance above trigger [mm]	20
Adhesiveness	Marked ☑
Initial speed [mm/s]	5.0
Test speed [mm/s]	5.0
Retract speed [mm/s]	5.0
Trigger force [g]	20
Data rate [pps]	200

Sample preparation

Prepare a 50g 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. Preferably by using a doughLAB equipped with a 50g mixing bowl. *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.*

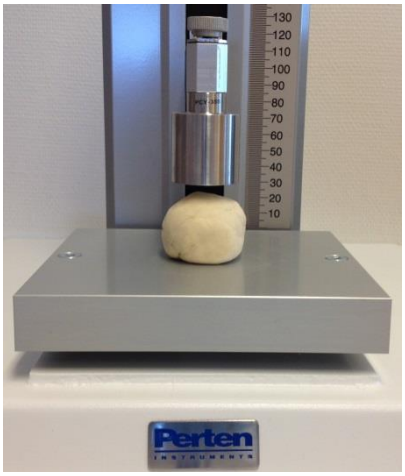

Figure 3: Sample set-up

Curve Description

In Figure 4 a typical Force-Time curve is illustrated. The two peaks are representing the force required during the two compressions. Force A and Force B represents maximum hardness/stiffness for first and second compression respectively. Force A is defined as the hardness/stiffness.

Springiness is a type of recovery measurement of the sample and gives a value to what extent the sample springs back after the deformation during the first compression. The springiness is here measured as the compression distance for the second peak (y) divided with the compression distance for the first peak (x) (Figure 4).

$$\frac{Distance\ y}{Distance\ x} \times 100 = \%\ Springiness$$

Resilience is the area under the curve during the withdraw (a_2) divided with the compression area (a_1).

$$\frac{Area\ a_2}{Area\ a_1} = Resilience$$

Cohesiveness is the total area of the second peak (B) divided with the total area of the first peak (A).

$$\frac{Area\ B}{Area\ A} = Cohesiveness$$

The pre-set wait time between the two compressions is important for some products, where a too long wait time will allow the sample to spring back more than it would do under its normal conditions.

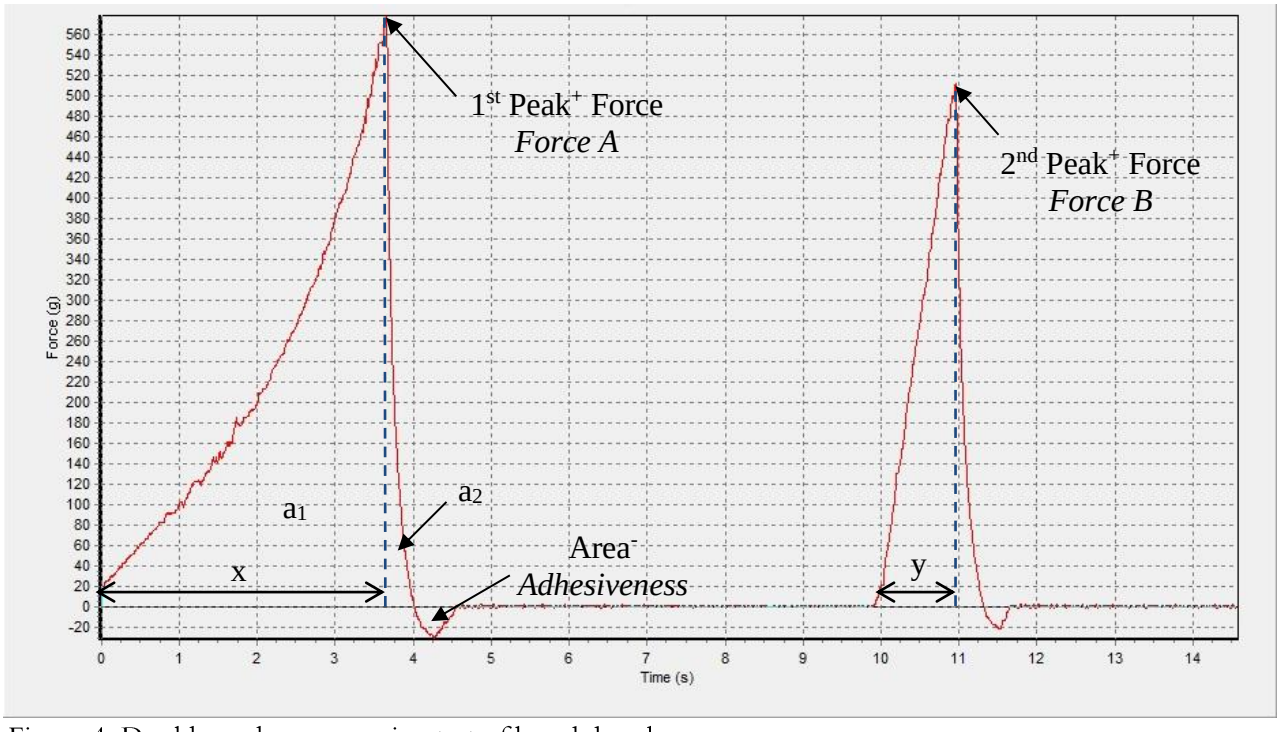

Figure 4: Double cycle compression test of bread dough.

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***.