

## Bread Dough Hardness, Adhesiveness & Stringiness by Penetration

### 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 stiffness, adhesiveness & stringiness by single cycle penetration test.

### Method Description

The recording of the measurement data commences once the probe reaches the pre-set trigger force. The probe will then penetrate the sample, through the holes insert, to the pre-defined distance. The probe will return to its starting position once the pre-set distance is reached.

### Calibration

Make sure the instrument is correctly 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-CY05S, Cylinder probe 5 mm diameter, stainless steel

(Figure 2a)

Part number: 67.30.05

Figure 2a: P-CY05S

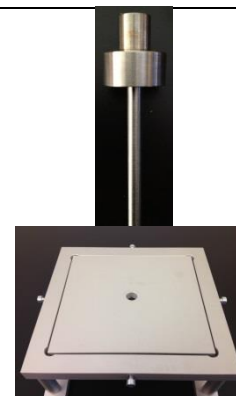
#### Rig

HDS, Heavy duty stand w 10mm Ø holed insert (Figure 2b)

+ a 3 cm high support to place the dough on under the hole

Part number: HDS: 67.50.80; HDSIH10: 67.50.81

Figure 2b: HDS + HDSIH10



## Profile settings

### Setting Parameter

Single Cycle Compression

Sample height [mm]	30.0
Starting distance from sample [mm]	5.0
Compression [mm]	15.00
Initial speed [mm/s]	1.0
Test speed [mm/s]	0.7
Retract speed [mm/s]	0.7
Trigger force [g]	10
Data rate [pps]	100
Distance above trigger [mm]	2.0
Adhesiveness	Marked <input checked="" type="checkbox"/>

## Sample preparation

Prepare a 50g dough ball according to a pre-set standard and place it on a 3 cm high support (dish, bowl etc) 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.

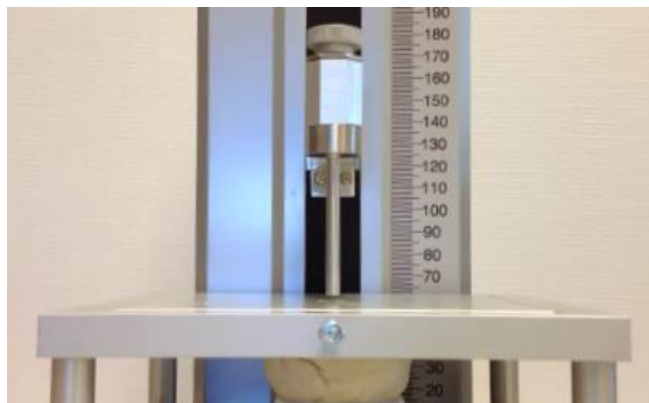


Figure 3: Sample set-up

## Curve Description

In Figure 4 a typical Force-Distance curve is illustrated. The maximum peak<sup>+</sup> force indicates the stiffness/hardness of the dough at the pre-set penetration depth. Stringiness is the distance (width) of the negative peak (see Figure 4), during which the sample is connected to the probe as it moves away from the sample. The minimum of the negative peak indicates the stickiness of the sample and the area of the negative peak is a result of the adhesion.

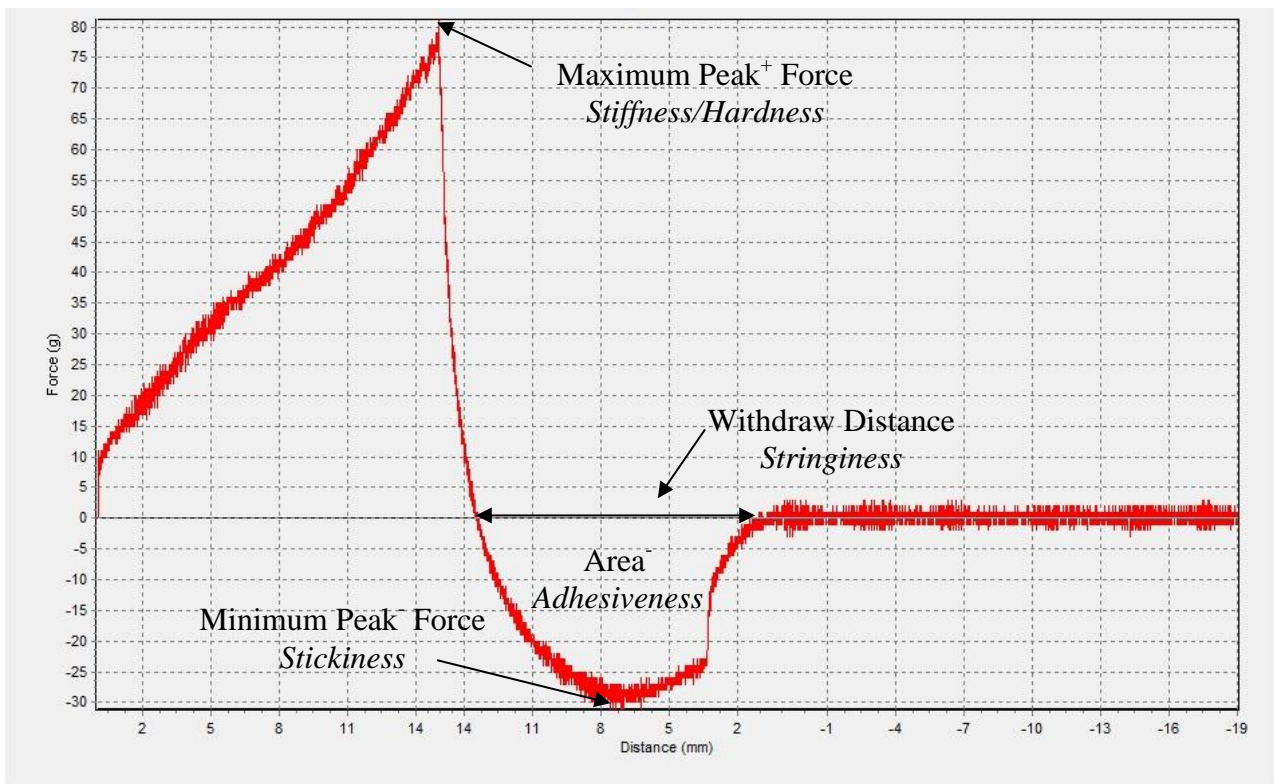


Figure 4: Single cycle penetration test of bread dough.

### Data Analysis

The force required to penetrate the sample to a certain distance is here defined as the stiffness/hardness and can be measured in the units [g] or [N], which is also the units used for the stickiness. Stringiness is measured in [mm]. Except raw data (force, time and distance) the program also directly provides calculated results such as *mean value* and *standard deviation*.