
Production: EXTRUDED SNACK

Objective: Measure of fracturability of extruded snack sample using a 5-bladed Kramer shear cell

Type of action: Cutting test

Test mode settings:

Speed	Test mode	Trigger	Target	Hold
2 mm/s	Distance (c)	0 gf	48 mm	0 sec

Accessory:

Kramer shear cell - 5 blades, Platform

Sample Preparation:

Remove the snacks from their packets just prior to testing and weigh out into equal portions. It is important that this weighed amount is enough to fill the Shear Cell by 50% of its capacity.

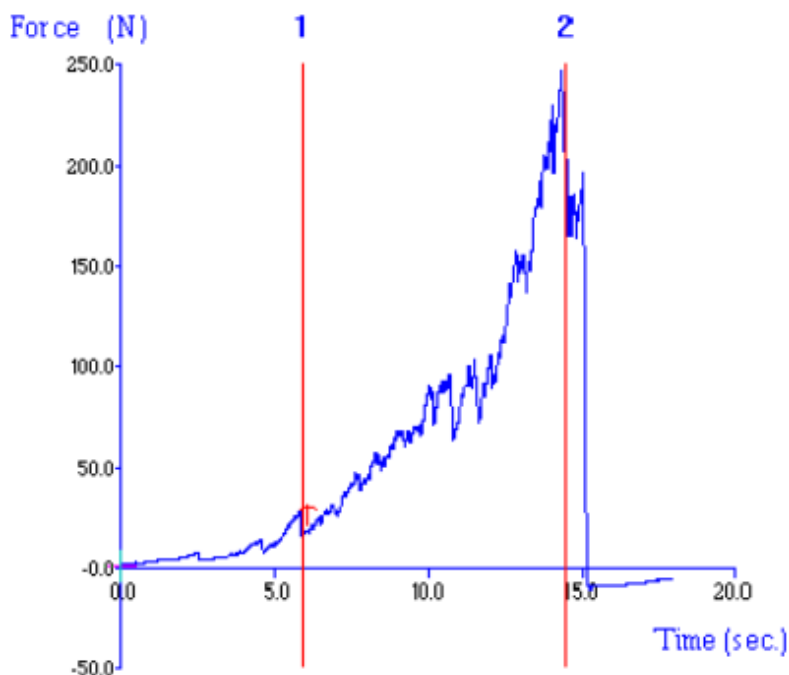
Test Set-Up:

The empty Shear Cell (Perspex front forward) is secured in the Heavy Duty Platform, which is loosely fixed onto the machine base. The blades are attached to the load cell carrier by means of the rapid locating adapter and lowered slowly into the sample cell and through the base slots. The Heavy Duty Platform is then moved until clearance is visible between the blades and their respective slots. The blades are then raised above the cell to allow for placement of the test sample.

Before carrying out the test using a 'zero' trigger one must calibrate the blades to acknowledge the bottom of the cell as a zero position. To do this, lower the blades, so that they close to the bottom of the cell. Click on **CALIBRATE HEIGHT**. Specify the distance that you want the blades to start from for each test - e.g. **45mm** is suggested. (Note: place a piece of thin flat card in the bottom of the cell to calibrate and then remove this before testing.)

The blades will move down and touch the card and then move up to the specified start distance. For the comparison of results it is crucial that the test always begins at the same distance from the bottom of the cell, this distance can be programmed into the **CONTROL PROBE** feature.

Prior to each test ensure that there is good clearance around the blades to avoid frictional effects, i.e. so that the blades are not touching the sides of the cell. Running a 'blank' test i.e. a test without any sample in the cell can check this. The blades are then raised above the cell to allow for placement of the test sample. Running a spatula (or other) horizontally across the outside edges of the blades is recommended to ensure that the blades are hanging freely. Place the sample into the cell, distribute pieces evenly and run the test. In between tests clean the blades and the grooves of the cell to remove any remaining sample, as this will cause variable results.

Typical plots:

The left curve was produced from testing 6g of extruded snack at 20C.

Observations:

As the blades come into contact with the sample, fracture can be observed as a series of force peaks. The number of major peaks (e.g. over 10g force threshold) is considered as an indication of 'Crispiness'. Another indication of 'Crispiness'/'Fracturability' was also used, Linear Distance, which is measured by calculating the length of the curve between two anchors. After the blades have crushed the sample to 10mm above the cell base they then proceed to return to the starting position.

Data Analysis:

☒ Linear Distance (from 6 to 14 second)

Results

Sample	Mean Linear Distance (+/- S.D.)	Mean No. of major peaks (+/- S.D.)
A	873.3 +/- 75.4	59.0 +/- 4.4

Notes:

- The Kramer shear cell is a multi-bladed device. The sample to be sheared is often variable configuration or structure. The result is an average of the forces required to cut through the sample of variable geometry.
- The extent of crushing in this application has been based on use of the Kramer Shear Cell with a 250kg load cell. A greater degree of crushing would therefore require a Heavy duty Analyzer.
- When attempting to optimize test settings it is suggested that the first tests are performed on the hardest samples to anticipate the maximum testing range required and ensure that the force capacity allows testing of all future samples.