

HARDNESS TESTING OF BISCUITS

The snap characteristics of hard and brittle biscuits were evaluated using a three-point bend assembly as an indicator of bake profile.

Requirement

A speciality biscuit manufacturer wanted to measure objectively biscuit hardness. Three different samples were evaluated representing:

- too soft
- ideal
- too hard

The markers generated were required to monitor and control a baking line, improve production consistency and objectively adjust formulation and oven profile to maintain an 'ideal' texture.

Solution

Conditions imposed by the TMS-Pro texture analyser together, with good experimental design accommodated natural variation within the sample set.

A snap test was proposed to break the biscuits at speed creating a single massive fracture.

Benefits

Crispness

- Break characteristics can be used to optimise product formulation and handling during manufacture e.g. optimised mix times, oven profiles and starting moisture contents.

Brittleness

Hardness

- Properties evaluated over shelf-life demonstrate the effectiveness of packaging in preventing moisture migration from atmosphere in brittle products.

Break Point

Fracture

- Break properties can be used to determine sensory preference during development.

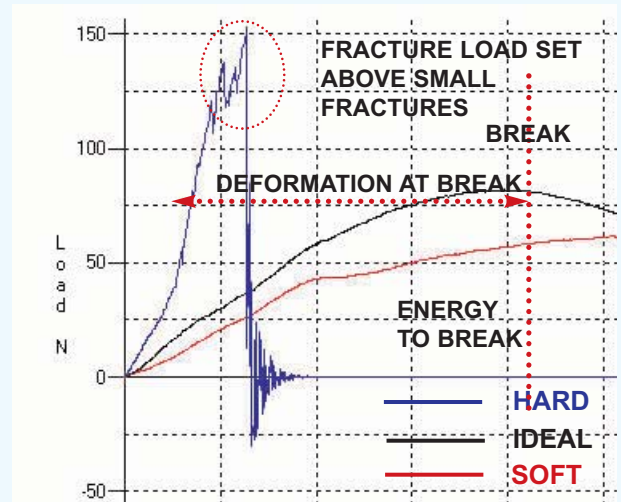


The biscuit sample is supported at two points. The travelling beam moves down at maximum speed and snaps the sample creating a single massive fracture.



Sample variation was removed from the three sample sets. Each batch was checked for size, surface properties, breaks and presence of large particulates.

Characteristics			
Parameter	FTC System		
	TMS-Pro	TMS-Console	Manual Stand
Break Force	✓	✓	✓
Displacement at Break	✓		
Work at Break	✓		
Modulus	✓		



Conclusions

The method followed has demonstrated a clear difference between hard and soft samples. The differentiation between soft and ideal product is much smaller and highlights the need for large sample sets.

The deformation to break in the ideal and soft samples is much greater than that of the hard product. This is also reflected in the work characteristics where the hard and much more brittle samples fractured and failed very quickly in comparison to their soft counterparts.

Reproducibility of this technique is dependent on test speed. It is essential to cause a massive fracture and not propagate small breaks if clear differentiation between samples is to be made.

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