ISO 9001 CERTIFIED
BROOKFIELD AMETEK

TEXTURE ANALYSIS APPLICATION NOTE:
Bakery/Bread

APPLICATION
Establish a standard compression test method for evaluating the firmness of bakery products.

TEST OBJECTIVE
Firmness is accepted as a measure of freshness and quality. This method is useful for measuring freshness and quality in product development and quality control.

TEST PRINCIPLE
Quantitatively measure the force required to compress the bread sample.

BACKGROUND
The American Association of Cereal Chemists (AACC) developed a standard method for the assessment of bread samples by deformation. The force to compress a bread sample a specific distance simulates gentle squeezing by the consumer when selecting their loaf at the supermarket.

METHOD
One slice of bread 25 mm thick or two slices (each 12.5 mm thick) can be used. The slices can be cut mechanically or by hand provided the end three slices are discarded and the crusts are not removed. A 38.1 mm Ø probe (TA4/1000) at a test speed of 2 mm/s. The location of testing is the center of the bread slice(s) avoiding non-representative areas of crumb. Sample is subjected to 40% deformation and compression load at 25% deformation is recorded in either Newton's or g. Test a load of three samples per loaf.

Table 1
LFRA Settings

MODE:	Normal
SPEED:	2 mm/s
DISTANCE:	10 mm
TRIGGER:	5 g

PROBE:	*36 mm dia. cyl. (AACC) (Ref: TA-AACC 36)*

RESULTS

The following is a CT3 Texture Analyzer Testing Result Graph (using TexturePro CT Software).

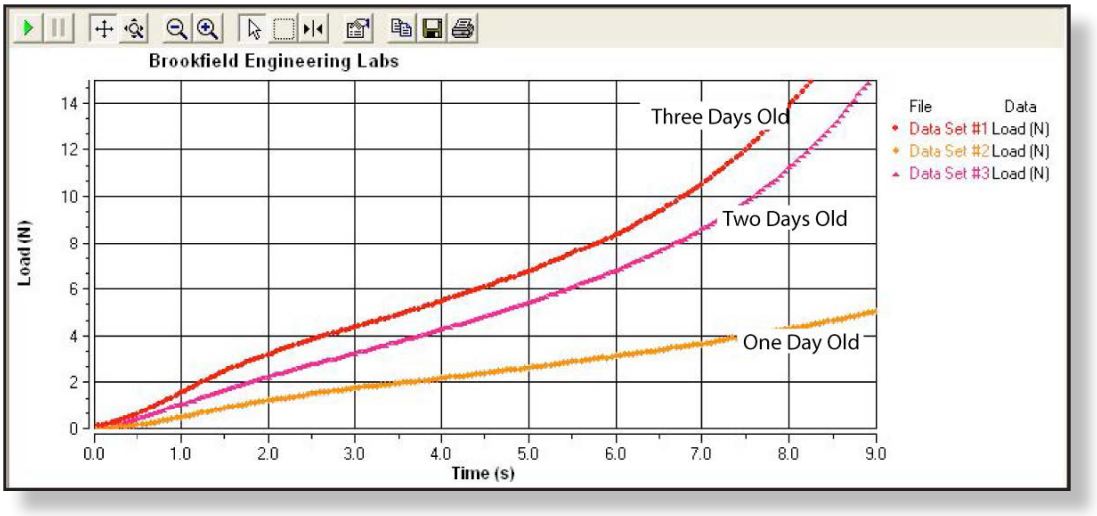

Figure I

EMPIRICAL FACTORS

Test conditions that will affect results generated:

1. Sample size
2. Sample age
3. Test probe employed
4. Position and consistency of sample location

Sample conditions that will affect results generated:

1. Formulation and composition
2. Baking or processing treatments
3. Storage conditions imposed on loaf

RELATED TESTS

TPA type assessment of bread sample
Measurement of bread strength and extensibility
Stress relaxation as an indicator of bread staling

Sample Description Product Name	Aging	Firmness at 25%
Bread Test	One Day	1.956 N
Bread Test	Two Days	3.805 N
Bread Test	Three Days	4.884 N

DISCUSSION

The structure of bread can be defined as a solid foam colloid with multiple pockets of carbon dioxide distributed uniformly through its bulk. Gluten forms the interconnected network that supports the carbon dioxide in small pockets. The end result, when baked, is the aerated honeycomb texture characteristic of bread.

Texture analysis provides a valuable tool for insight into the quality of bread. The method applied within this study has clearly quantified the effect of "staling" on the strength of the gluten matrix.

CONCLUSION

The texture measurement described has been shown to quantify physical characteristics of a range of loaves in the early stages of their life. The simple compression test is ideally suited for production or development environments where it can give an indication of product staling or formulation in relation to enhancers, flour quality or the use of additives such as alpha amalayse.