Application Note:

Using the ThermoBiscuit™ and BreadScope™ for Conveyorized Oven Lateral Heat Verification

Objectives:

- Collect time vs temperature data in the lateral direction from left to right inside an oven
- Verify oven temperature distribution at multiple zones

Required Materials:

1. Three Measurement Systems
   - ThermoBiscuit with (ThermoSleeve & Strap)
   - BreadScope
   - GateWay™
   - DataLink Lab software with ZoneCue™ & Bread Profile™ add-in modules

2. Three multiple-strap bread pan with mold size of at least 3”x4”x7”

3. Bread dough

4. Bread profile temperatures such as…

Baking Start	usually ~ 95℉ (slightly above proofing)
Yeast kill	usually ~ 140℉
Starch coagulation	usually ~ 165℉
Enzyme kill	usually ~ 185℉
Final core temperature	usually ~ 202℉

5. Oven zone parameters such as …

Number of oven zones	6 zones
Length of each oven zone	20 feet
Oven belt speed	5.714 feet per minute

(120 foot oven with 21 minute bake time = 5.714 feet/minute)

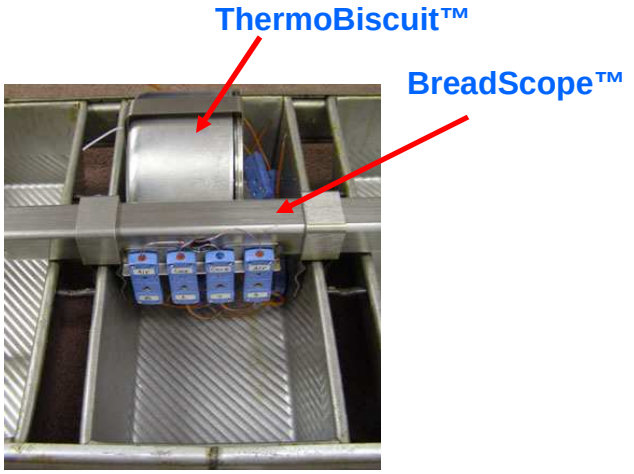
Procedure for collecting temperature data

Step 1. Setup ThermoBiscuit as a data logger

(1a) Install batteries in the ThermoBiscuit (do not replace ThermoBiscuit cover yet).
(1b) Connect ThermoBiscuit to the BreadScope.
(1c) Start DataLink software on a laptop.
(1d) Set up ThermoBiscuit as a data logger following the instructions in ThermoBiscuit Quick Start Guide.
(1e) Copy down the keycode, required for data download.

Note: ThermoBiscuit is now collecting temperature data from BreadScope probes

(1f) Close the software DataLink.
(1g) Replace and secure the ThermoBiscuit cover.

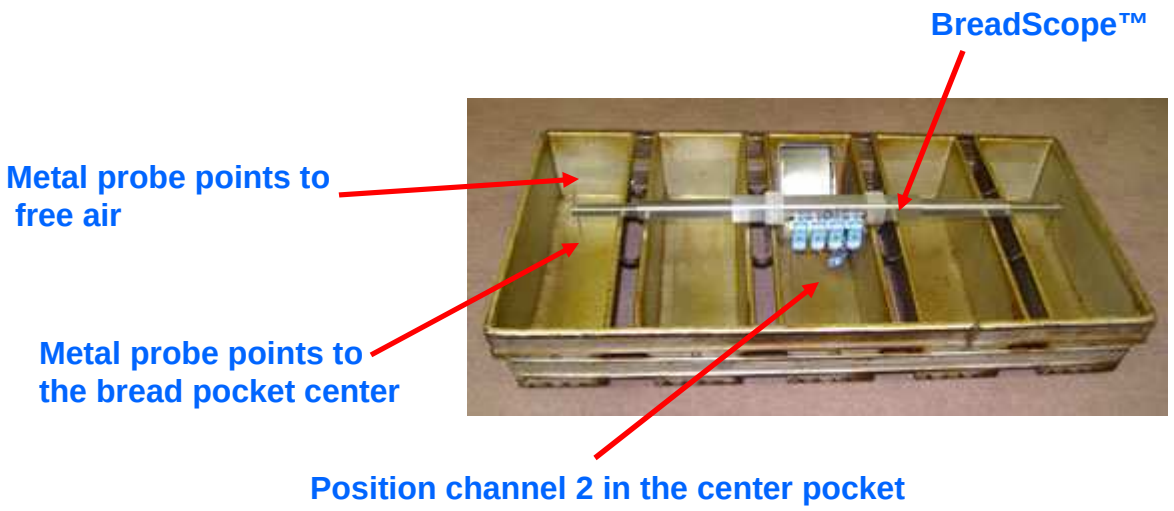


Procedure for collecting temperature data (cnt'd)

Step 2. Prepare hardware for placement in pan

(2a) Install the ThermoSleeve onto ThermoBiscuit
(2b) Adjust the BreadScope probe positions to measure the bread core temperature and the oven air temperature.
Channels 3 and 6 for bread probes
Channels 4 and 5 for air probes

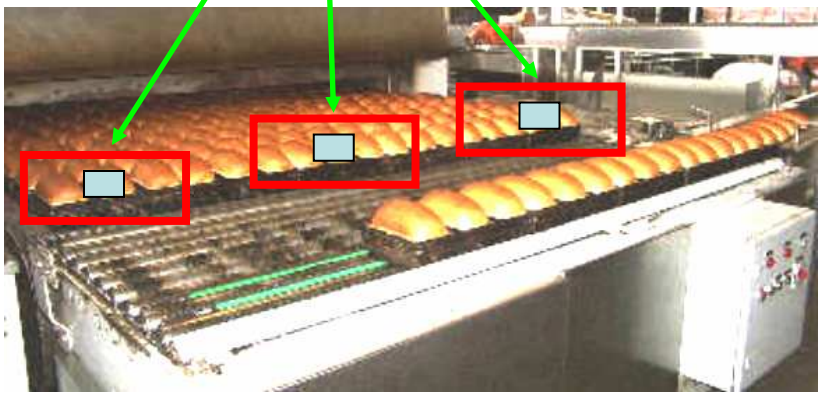
Repeat this procedure for two other systems.



Procedure for collecting temperature data (cnt'd)

Step 3. Bring the ThermoBiscuit system to the bread production line.

(3a) Take out three bread pans out of the production line.
(3b) Remove bread dough from the central mold only.
(3c) Position the ThermoBiscuit system into the empty mold and place the BreadScope such that the product core temperature probes are positioned in the center of each mold with proofed dough.
(3d) Repeat the three steps above for three individual systems.
(3e) Return the bread pan with ThermoBiscuit back to the bread production line. Make sure that the **three ThermoBiscuit systems will line up laterally** to measure the oven air temperatures at the center, right, and left of the same oven zones.



Procedure for collecting temperature data (cnt'd)

Step 4. Getting ready to download data

(4a) Wait for ThermoBiscuit / BreadScope to exit the oven.
CAUTION- DEVICES ARE HOT! POSSIBLE BURN HAZARD!
(4b) Remove bread pan with ThermoBiscuit / BreadScope from the production line.
(4c) Remove ThermoBiscuit / BreadScope system from the bread pan and place on a suitable surface. Do not unplug probe connectors.
(4d) Remove ThermoSleeve and strap from ThermoBiscuit

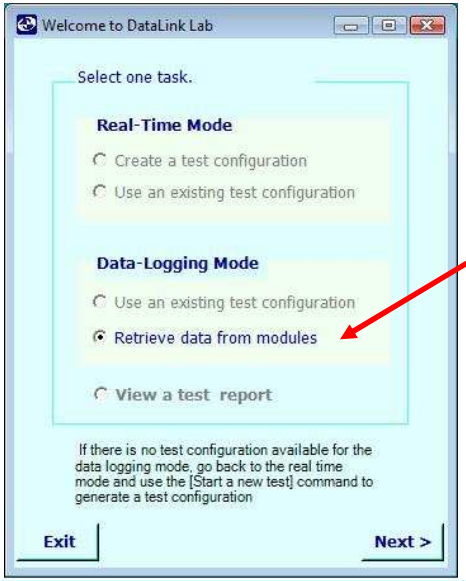
Note: ThermoBiscuit is now ready for download.

Procedure for collecting temperature data (cnt'd)

Step 5. Download temperature data

Note: One wireless network can simultaneously download data from three ThermoBiscuits
(5a) Place the ThermoBiscuit / BreadScope system next to the laptop.
(5b) Start the DataLink software and select [Retrieve data from a data logger].
(5c) Follow instructions in ThermoBiscuit Quick Start Guide to download data.
(5d) Remember to save the three Excel reports and three JPEG data charts.
They are distinguished with serial numbers.

Note: Data report is now available for review.



Select this item

Baking Analysis using temperature curves

Baking Analysis of Bread Profile

Bread Baking Profile

Start Time		2009-12-16T10:59:51			
End Time					
Total Bake Time		21	Minutes	42	Seconds

Is the baking time duration correct?

Channel 3-Bread Core Temperature					
Yeast Kill at 145		66.05	%		
Starch Coag. at 165		70.97	%		
Enzyme Kill at 190		79.34	%		
Final Core Temp. at 202		13.21	%		

Does the bread profile meet expectation?

Channel 6-Bread Core Temperature					
Yeast Kill at 145		66.82	%		
Starch Coag. at 165		71.43	%		
Enzyme Kill at 190		78.88	%		
Final Core Temp. at 202		13.9	%		

Time duration from the beginning to yeast kill

Time duration from the beginning to starch coagulation

Time duration from the beginning to enzyme kill

Time duration stays above 202 Fahrenheit

Compare three baking profiles from left to right.

Senario 1. Lateral temperatures vary from left to right

Step 1. Compare BreadScope air probe temperature readings (Channels 4 and 5) to confirm that the data from all three oven locations are consistent.

Step 2. Compare air probe temperature readings (Channel 2) to confirm that the data from all three oven locations are consistent.

Step 3. If there are any inconsistencies at the two steps above, verify that the operations of the oven components at the anomaly zones.

Senario 2. Anomalous Baking Profile vs. Anomalous Oven Zone

Step 1. Compare bread core temperatures (Channels 3 and 6) to confirm that the baking profiles are consistent at the three oven locations.

Step 2. If there is any anomaly, confirm the anomaly baking profile occurs at the same location as the anomaly zones.

For example, the oven temperature curve at the left side is higher than center and right locations. It causes the left-side bread to be baked with more heat. Therefore, the baking profile at the left side shows that the bread core temperature stays longer above 202° Fahrenheit.

Senario 3. Generate a standard baking profile for production

Step 1. Use the Excel report to provide a **bread profile table**.

Step 2. Use the JPEG chart to provide a **bread baking curve**.

Step 3. Generate a specific report for each product line configuration:

- Different oven zones
- Different bread ingredients
- Different bread pan size and depth

Step 4. Run the oven sanity check every week to confirm the production consistency.

We are sure you will find
ThermoBiscuit system
useful for your production lines.

Please enjoy its convenience and benefits.