

Degree of Bake: Biscuits, Crackers or Cookies.

Real-Time On-Line Measurement of Degree of Bake/Surface Brownness.

Taste, texture and appearance are all key quality attributes that determine the success of a food product in the market. Testing of the product during the manufacturing process for moisture and colour is important to ensure final product consistency and “freshness”. Typically, manufacturers utilise off-line colour testing to determine the surface brownness or degree of bake (DOB) of a product, which can be time-consuming and does not provide instant outputs to a PLC or control system.

The NDC Technologies' Solution

All of NDC Technologies' near-infrared (NIR) gauges and at-line NIR analysers, not only provide an accurate and consistent measurement of moisture, fat/oil, protein and other key parameters that affect the quality and consistency of end products within the food industry, they can also be specified with the DOB option.

Gauges equipped with this option have an additional measurement channel, which provides a precise, numeric value for the DOB of the food product. This eliminates the need to rely upon the operator's perception of colour, which can be highly subjective when judged with the human eye. Measuring product colour in this way provides consistent colour standardisation and better product quality.



In a world where food yields have become ever more important, improved control of moisture and colour offers financial benefits such as:

- ✓ **Reduced start-up times and less wasted product**
- ✓ **Production of more consistent, within specification product (minimise “checking”)**
- ✓ **Improved operating efficiency**

The DOB measurement is designed to closely imitate the response of the human eye to changes in brownness and the readings used as highly repeatable and dependable real-time feedback to the process controller. If necessary, they can also be calibrated to provide a reasonable correlation to the L or L* colorimetric measurement, in a similar way to the NIR measurements, though there may be occasions where this may not be desirable.

In particular, the DOB measures perceived “brownness” as opposed to brightness (L or L*), which means the gauge will distinguish between samples that are different in brownness to the naked eye but the L or L* reading may not indicate this difference by the same amount. Conversely, the L or L* reading may also show a difference between two samples that look visibly similar in brownness.

Measurement Performance

DOB measurement data from a number of biscuit types of varying surface brownness, ranging from pale “straw” colour to dark brown is presented overleaf. The photographs show the range of brownness for each type with their corresponding DOB reading listed, and the graphs show calibrated DOB readings compared with their corresponding L* reading.

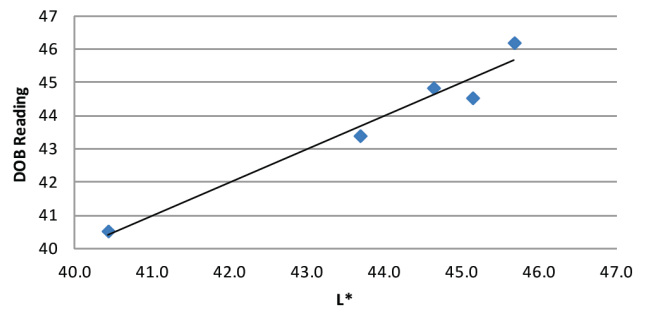


40.5



46.1

Cinnamon Biscuits

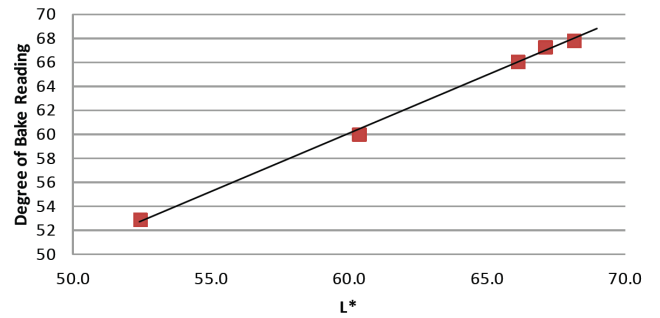


52.9

60

67.8

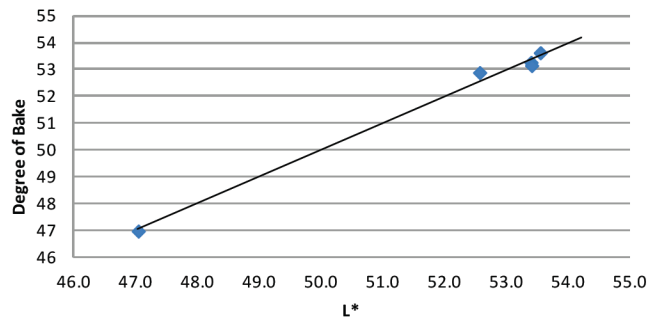
Rich Tea



47

52.8

Ginger Biscuits



Summary

The data shown in this note demonstrates that NDC Technologies' NIR gauges and at-line NIR analysers are capable of generating meaningful measurements of surface brownness on a variety of biscuit (cookie) types. They can readily detect over-baked or under-baked products, which when combined with the moisture measurement of the biscuit itself, can provide real-time feedback to the process operator for process optimisation.

The DOB measurement is suitable for biscuits with no inclusions e.g. chocolate chips, raisins, nuts, etc. For biscuits containing any of these inclusions or for biscuits with a sugar coating or containing cocoa powder, please contact your LIMAB Product Specialist for guidance.

About LIMAB UK

LIMAB UK is a leading supplier of non-contact laser and optical measuring systems for industrial applications. Our products and services are used by manufacturing companies to improve efficiency, reduce manufacturing costs and improve quality through measurement testing and process control. We are the official distributor for NDC Technologies for their range of NIR moisture measurement gauges.

To ensure that we maintain the highest level of service and product quality, LIMAB UK operates a quality management system accredited to ISO 9001:2015.



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