

SNACK FOODS MANUFACTURING APPLICATIONS



Precision
On-Line & At-Line
Measurements of
Moisture & Oil

- ▶ Corn Chips
- ▶ Corn Dough
- ▶ Potato Chips
- ▶ Popcorn
- ▶ Potato Powder
- ▶ Pretzels
- ▶ Puffed Corn

NDC Technologies and the Snacks Industry

Helping you to achieve consistent product quality and customer satisfaction and loyalty...

NDC & Snacks Processing

NDC has over 40 years' experience in the design and manufacture of in-process instruments using NIR (near infrared) technology, and an installed base of thousands of units worldwide, helping users control product quality and improve process performance.

The MM710e On-Line Snack Foods Gauge and the InfraLab At-line Snacks Analyzer are designed to meet the snacks industry's need for accurate, reliable measurements for quality and process control.

Whether the product is fried or baked, potato based or corn based, our measurements of:

- ▶ **Moisture**
- ▶ **Oil or Fat**
- ▶ **Surface Brownness** (MM710e only)

can be used to enhance quality and production control systems, and considerably reduce the need for manual sampling, while Ethernet connectivity enables integration of each measurement system into a factory network for immediate access to data.

Calibration overhead and subsequently, the cost of ownership, are significantly reduced by the NDC "SpeedCal" factory calibrations which will require only the minimum of adjustment to achieve agreement with your local reference method.



Successful Snack Products

An established snack product, whether private label or branded, is associated with key quality attributes by the consumer and differentiates itself by delivering consistent quality and best value.

A new snack product must attract consumers through innovation in taste, nutrition, value and the consumer's perception and experience.

Reducing Product Variability

Moisture control is critical because it affects consistency of both taste and texture, and end-product quality. For example: too much moisture can result in reduced shelf-life and insufficient oil uptake.

Monitoring oil content is essential for maintaining consistent flavor and meeting labelling requirements. It can also give early indication of process changes: for example, potato chip oil content will increase when the slicer knives need changing.

Mitigating against Acrylamide Formation

In addition to helping to manage and control the cooking process in order to fry the product to the maximum acceptable moisture content, controlling the moisture content can also help reduce the formation of acrylamide in potato based snacks.

The moisture measurement is used to control and optimize the cooking process to the point where acrylamide formation is minimized.

NDC moisture measurements are accurate, repeatable and highly stable over the long term for reliable process control.

Improving Profitability

The benefits of effective moisture control are ultimately seen on the bottom line, while the "in-process" advantages may derive from any or all of the following:

- ▶ **Prevention of over- or under-cooking**
- ▶ **Optimal oil uptake**
- ▶ **Optimal fryer operation**

At the same time, process efficiency is enhanced through:

- ▶ **Reduced energy consumption**
- ▶ **Prevention of out-of-spec batches**
- ▶ **Reduced waste**
- ▶ **Uninterrupted production**

NDC: Part of Your Quality Strategy

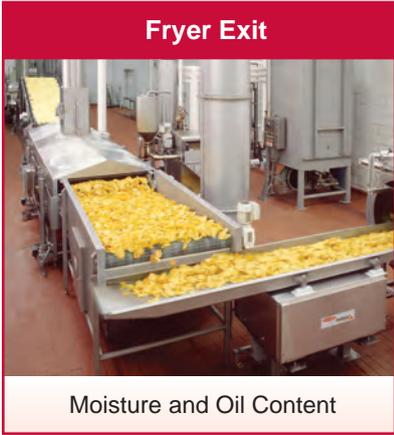
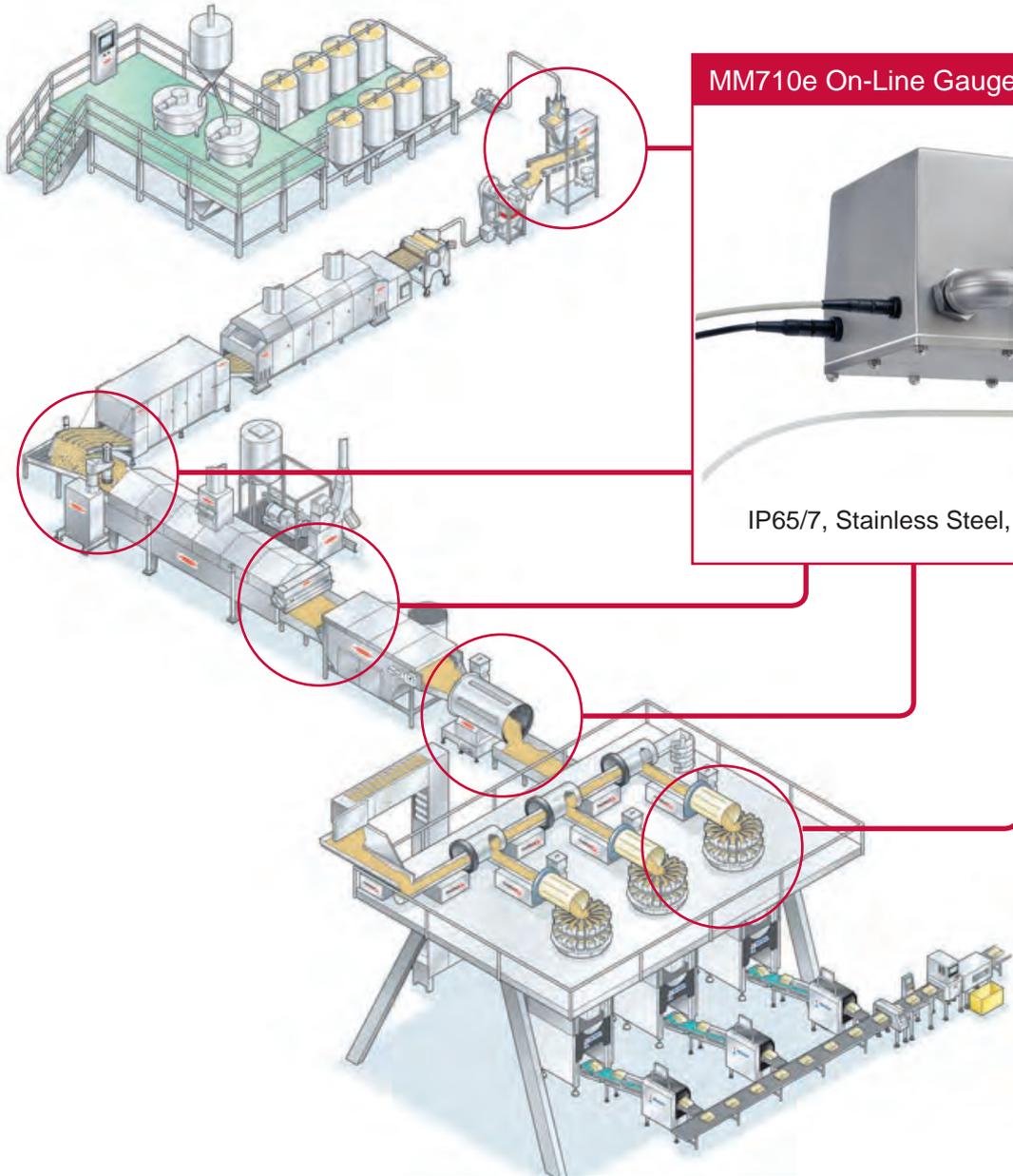
NDC's customers use the MM710e snacks gauge to reliably measure and then control product moisture. Simultaneous measurement of the product oil content is also offered, while an on-line measurement of the surface brownness or degree of frying or baking is optional.

Our in-process measurements help users to achieve product quality and consistency goals while reducing manufacturing costs and greatly improving process visibility.

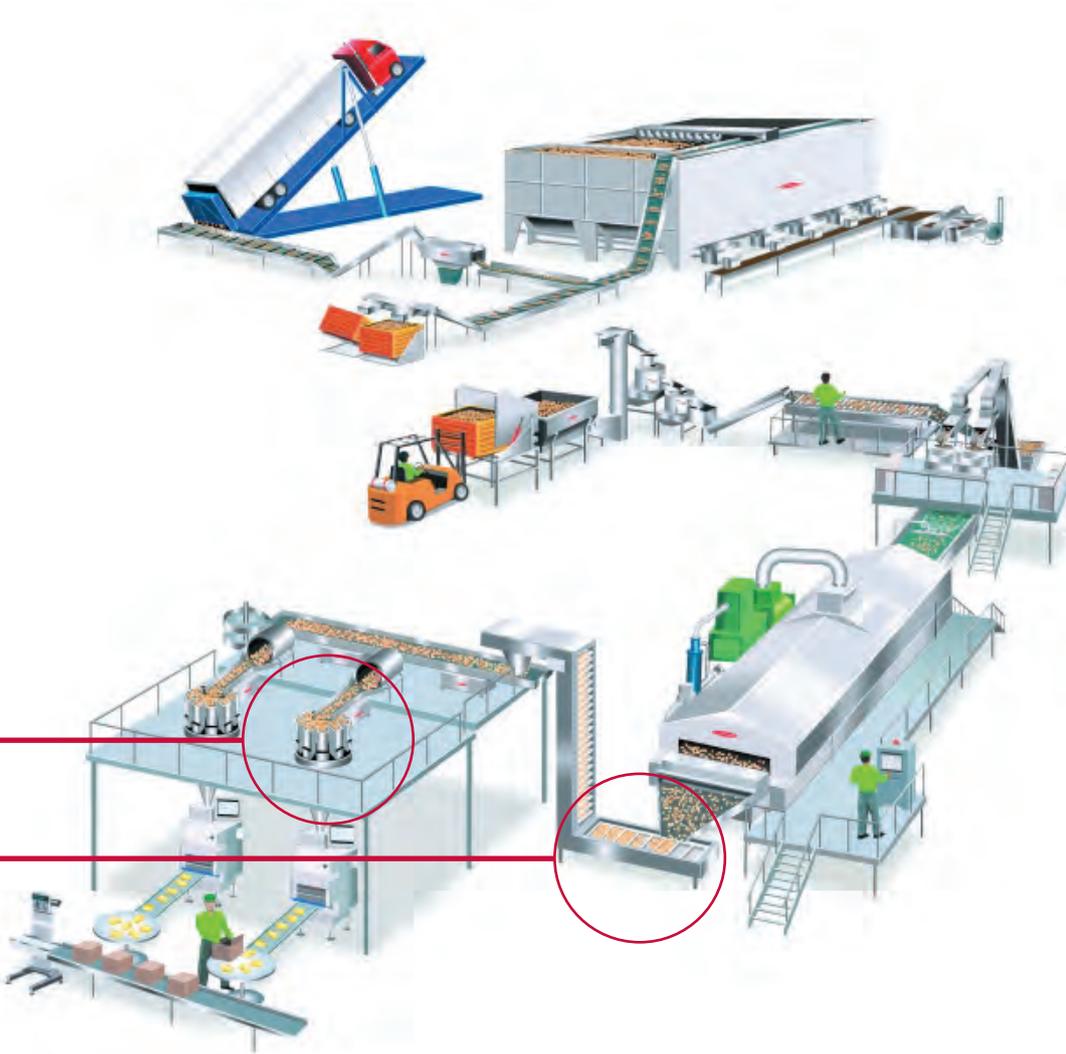
We also recognise the need in many processes for accurate at-line sampling or lab testing: the fast, easy-to-use InfraLab benchtop analyzer de-skills and speeds up routine sample testing.

It too benefits from the convenience of Ethernet connectivity and features substantial data storage capacity, USB download and full user access to all measurement and calibration data via the InfraLab Manager software provided.

Corn Snacks Processing



Potato Snacks Processing



NDC Advantages:

The implementation of in-process measurements can help the snacks processor to:

- ▶ **Maintain customer loyalty through consistent quality**
- ▶ **Increase productivity by ensuring right-first-time production and reduced waste**
- ▶ **Reduce overhead costs through automation**
- ▶ **Instantly detect process changes**
- ▶ **Meet labeled specification for oil content**

NDC measurement systems are characterized by their:

- ▶ **Low cost of ownership**
- ▶ **Minimal calibration and maintenance requirements**
- ▶ **Maximum reliability**

Exit of the Oven



Moisture Content

Flavoring and Packing



Moisture and Oil Content

We acknowledge the kind permission of Heat and Control for the use of images contained in this brochure:

www.heatandcontrol.com



Applications Overview

NDC Applications Engineering: in-depth process understanding & robust IR technology...

Measurement Performance

Indicative values for the measurement accuracy for each parameter:

- ▶ Moisture: range 0 to 4%, Accuracy 0.1%
- ▶ Moisture: range 5 to 25%, Accuracy 0.5%
- ▶ Oil: range 20 to 45%, Accuracy 0.5%
- ▶ Surface Brownness*: range - user selectable

The Accuracy quoted is twice the standard deviation of the residual differences between the MM710e on-line measurements and the values obtained for samples taken from the line and tested in an approved reference method in the laboratory. Delivered pre-calibrated, both MM710e and the InfraLab are designed to be quickly adjusted to agree with your primary reference methods, such as gravimetric oven or wet chemistry, using the NDC software provided.

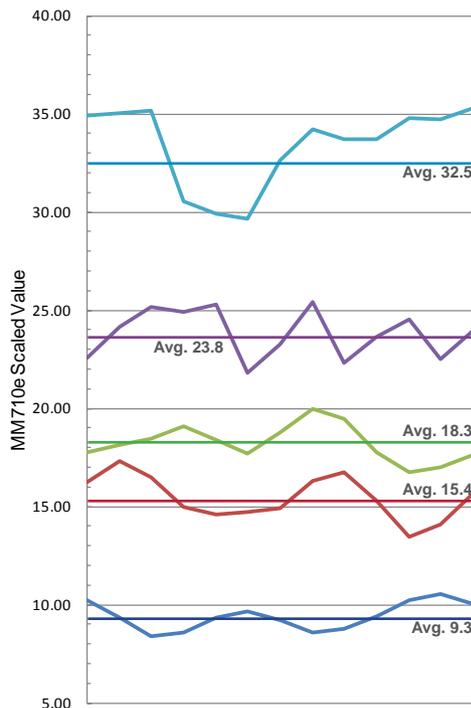
NDC Snacks Applications			
Product	Moisture	Oil	Surface Brownness
Corn based snacks - fried	■	■	■
Corn based snacks - baked	■	■	■
Potato based snacks - fried	■	■	■
Potato based snacks - baked	■	■	■
Extruded snacks	■	■	■
Potato chips/crisps	■	■	■
Corn chips/Tortillas	■	■	■
Popcorn	■		
Potato Powder	■		
Pretzels	■		
Puffed corn	■		

For other applications, please consult NDC's Applications Technical Support Group
* Surface Brownness Measurement is provided only by the MM710e on-line gauge

Potato Chip Brownness

The color of a fried potato product such as a potato chip or crisp is a strong indication of whether or not it has been fried to perfection. Being able to monitor the surface brownness while simultaneously measuring the moisture (and/or oil content) delivers greater process insight and the results can also be used to minimize Acrylamide development.

The NDC MM710e snacks gauge is available with the measurement of degree of brownness as an option on either a moisture gauge or a dual component moisture and oil gauge. Brownness measurement values are displayed with the other parameters on the HMI or Operator Workstation screen and can be output in analog or digital format.



For more information about NDC, the MM710e, the InfraLab, and our applications capability, please see the NDC Foods Industry brochure or visit our web pages: www.ndc.com/food; www.ndc.com/mm710e; www.ndc.com/food/infrolab; or www.ndc.com/snacks.

MM710e and InfraLab

MM710e for Real-time Measurements, InfraLab for Rapid Sample Analysis...



MM710e Key Features

The MM710e, NDC's Ethernet-enabled On-Line Gauge, is complemented by a range of "Devices" that connect to the gauge to enable flexible networked arrangements of single or multiple gauges:

Devices:

- ▶ HMI (supervisor interface)
- ▶ Operator Workstation
- ▶ Switched Network Hub
- ▶ User Port

Key Options:

- ▶ Vortec Cooler
- ▶ IP67 Housing
- ▶ Reference Standard

Connectivity:

- ▶ Analog or Digital
- ▶ Industrial Ethernet
 - EtherNet IP
 - Modbus TCP
 - ProfiNet
- ▶ Fieldbus
 - DeviceNet
 - Profibus



NDC Technologies is represented in over 60 countries worldwide. www.ndc.com

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Document#:FB&T-BROC-Snacks-EN-2018NOV26
Date of Issue: November 2018
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