

# Dairy Processing



## On- & At-Line NIR Measurements

- ▶ Achieve Consistent Quality
- ▶ Optimize Drying Processes
- ▶ Reduce Out-of-Spec Product
- ▶ Replace Laboratory Testing
- ▶ Ensure Supply Chain Satisfaction

- ▶ Milk Powder
- ▶ Lactose Powder
- ▶ Whey Powder
- ▶ Fat Filled Powder
- ▶ Infant Formula
- ▶ Casein
- ▶ Cheese

# NDC and the Dairy Processing Industries

**Driving down production costs** through reliable moisture, fat and protein measurements...

## **NDC Technologies**

has over 40 years of experience in the design and manufacture of on-line instruments using NIR (Near Infrared) technology and today operates out of state-of-art facilities in the UK and the USA.

We have an installed base of many thousands of systems worldwide, helping users to improve process profitability and product quality through real-time measurements developed to interface directly to the process.

Available applications include all dairy powders as well as a range of cheese products.

NDC is part of the Spectris Group of Companies.

[www.ndc.com](http://www.ndc.com)

[www.ndc.com/dairy](http://www.ndc.com/dairy)

[www.spectris.com](http://www.spectris.com)

## **Drivers for Cost Reduction**

All dairy powder production facilities control final drying stages with the objective of producing product with consistent and predictable qualities. However, as product and operating costs come under ever increasing pressure, it is always desirable to identify ways to further fine tune the process.

A significant way to reduce production costs is through the introduction of in-process measurements of moisture and fat content.

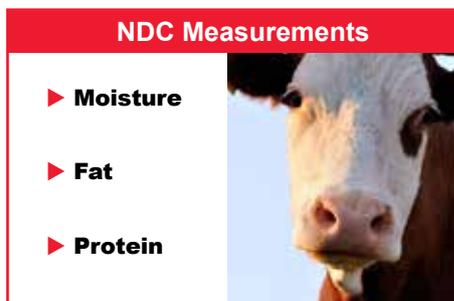
## **Key Production Parameters**

Moisture is the key control parameter, impacting product quality, yield and energy consumption. Real-time, on-line measurement of moisture content of the powder provides feedback which can be used to further reduce product variability, by allowing confident operation of the process much closer to the Upper Specification Limit.

On-line measurement of fat and protein content provides monitoring capabilities to ensure right-first-time production and varies depending on formulation. In-process measurement improves visibility of process trends and helps to confirm that product specifications (whether performance-related or legislative) are met.

## **Return on Investment**

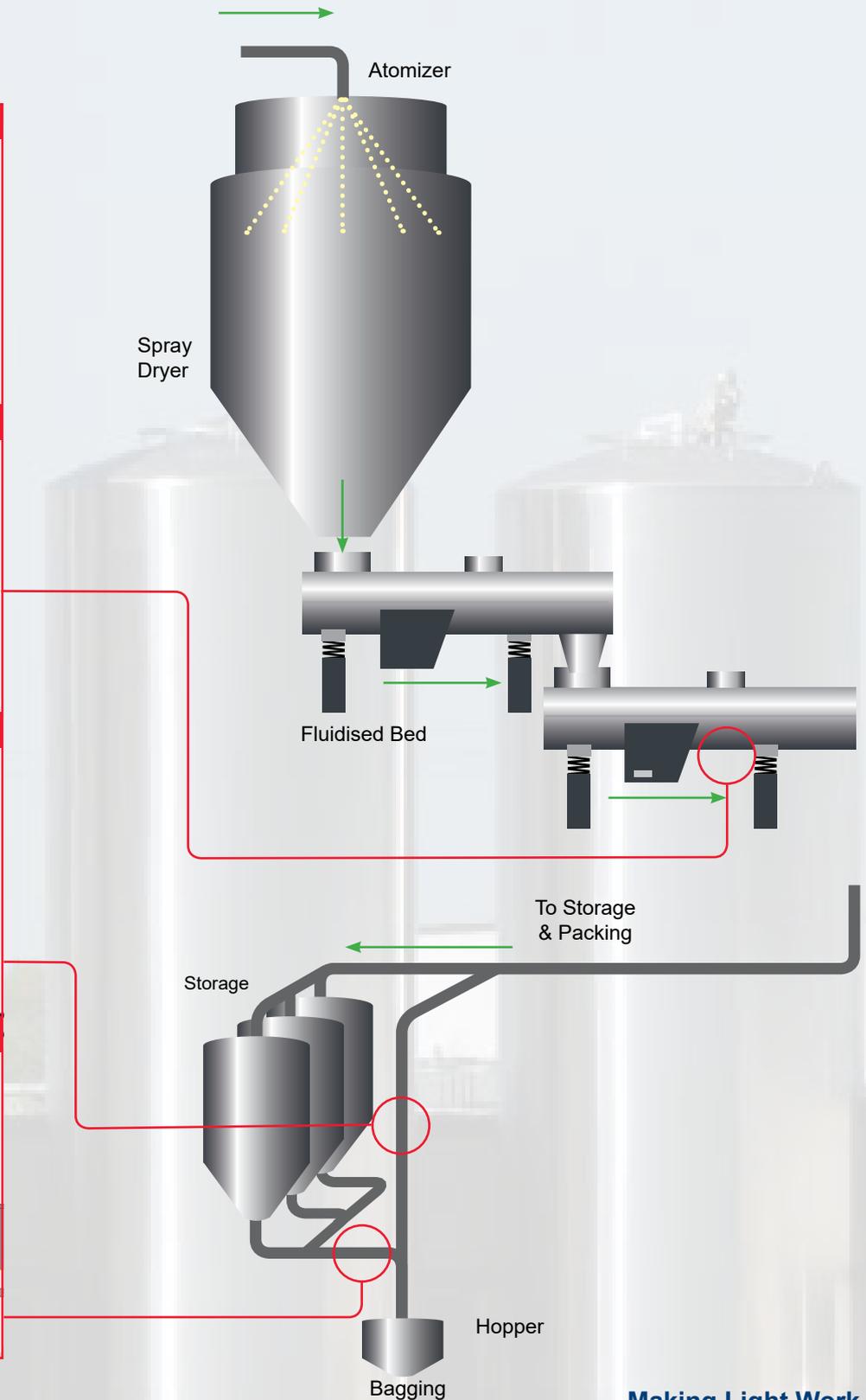
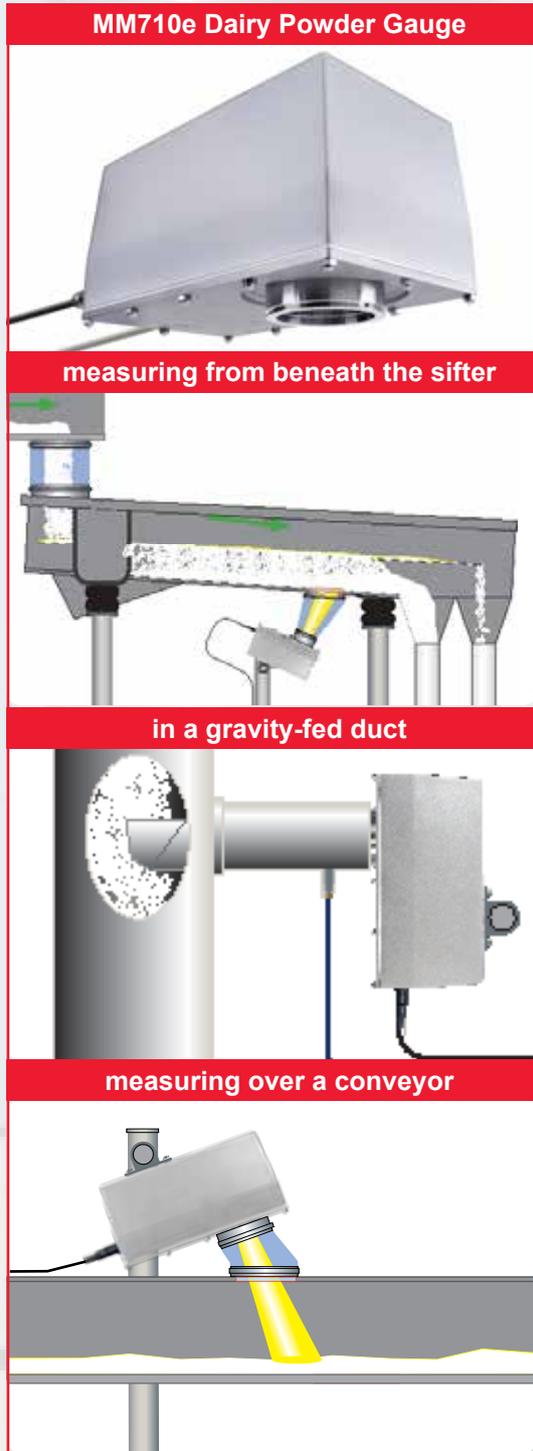
The Return on Investment for such measurements is very rapid, through more consistent product yield and optimized usage, with the added benefits of energy savings through optimal operation of the dryers.



In-process measurement solutions for dairy powders and cheese

# Process Measurement Locations

**Engineered Solutions** for Optimized Product Presentation at Key Measurement Locations in Powder Processing



# Measurement approaches

**On-line or at-line** using the MM710e on-line gauge or the InfraLab at-line analyzer

## Installation Considerations

A choice of installation methods ensure that product is presented to the MM710e Dairy gauge in order to achieve reliable measurement.

Since the process is virtually completely enclosed, installation often requires the use of an industry-standard sight glass using food-safe materials such as sapphire.

**Over a Conveyor:** the gauge optics tolerate fluctuation in the distance from the gauge's measurement window to the surface of the product of  $\pm 100\text{mm}$

**Beneath the Sifter:** with the gauge measuring face-upwards, a flexible sealing tube between gauge window and sight glass should be used to avoid excessive powder build-up on the measurement window

**In Gravity-fed Ducts:** the specially engineered NDC PowderVision Sampler is used to capture, measure and eject samples back into the product stream without removing them from the process

See the NDC Foods Brochure for a more detailed overview of interface, connectivity and other hardware options.

## Alternative Approach: At-Line

We also recognize the need in many dairy powder processes for accurate at-line grab sample testing.

Achieving a complete three component analysis in less than 10 seconds, the fast, easy-to-use InfraLab de-skills and speeds up sample testing.

Designed to be calibrated to, and act as a replace for, external or in-house laboratory gravimetric or LOD methods or wet chemistry, the InfraLab also enables the measurement of a larger much more representative sample.

## Cheese Processing

The InfraLab is also the recommended solution for Cheese Processors. Grated into the sample dish, cheese samples can be analysed for moisture and also fat and protein. Provided with separate calibrations for each cheese type, the InfraLab can be used for:

- ▶ Cheddar and other hard Cheeses
- ▶ Cottage Cheese
- ▶ Mozzarella
- ▶ Curd

See overleaf for more details....

## NDC Advantages

**Increased Product Quality & Consistency:** through continuous real-time measurement and control

**Optimized Yield:** by operating closer to upper specification limit

**Increased Productivity:** with faster start-ups and optimized dryer throughput

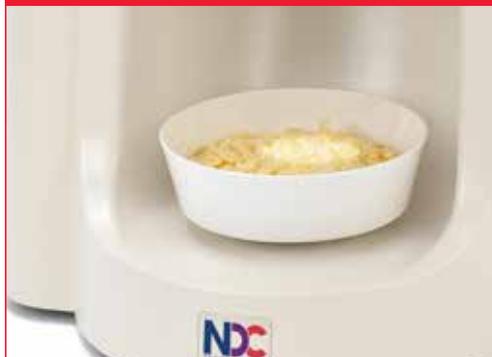
**Energy Savings:** by close control of the final stage drying operation

**Waste Reduction:** thanks to right-first-time production and avoiding rejected batches

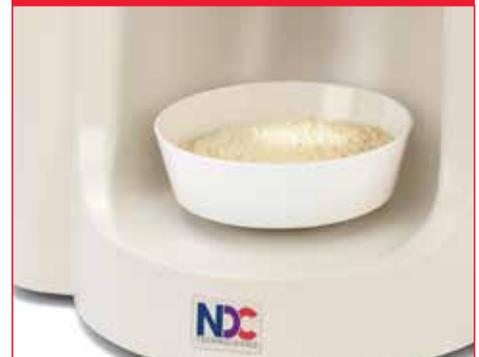
Milk powder through a sight glass



InfraLab sample: cheese



InfraLab sample: milk powder



# Dairy Applications

Combining in-depth process understanding with robust NIR technology...

Dairy Powder Applications			
Product	Moisture	Fat	Protein
Full Fat Dairy Powder	■	■	■
Lactose Powder	■		
Skimmed Milk Powder	■		■
Non-dairy Creamer	■	■	■
Infant Formulae	■	■	■
Whey Powder	■		■
Casein	■		

Dairy Powders can be measured on-line using the MM710e dairy gauge, or at-line using the InfraLab dairy analyzer.

Measurement Performance		
Component	Range and Accuracy	
Moisture	0 - 5%	0.1
	5 - 50%	0.2
	80 - 85%	1.0
Fat	10 - 50%	0.28 - 0.5
	35 - 50 (dry weight)	0.5
Protein	10 - 35%	0.6

The Accuracy values exclude sampling and reference method errors and are indicative of the results 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. Consult NDC for more details

Cheese Applications			
Product	Moisture	Fat	Protein
Cheese Curd	■		
Cottage Cheese	■		
Grated Hard Cheese	■	■	■
Grated Mozzarella	■	■	■

These and similar cheeses can be measured at-line only, using the InfraLab dairy analyzer. Fat can also be expressed as % dry weight.

For other applications, please consult our Applications Technical Support Group

## Calibrating the MM710e and InfraLab

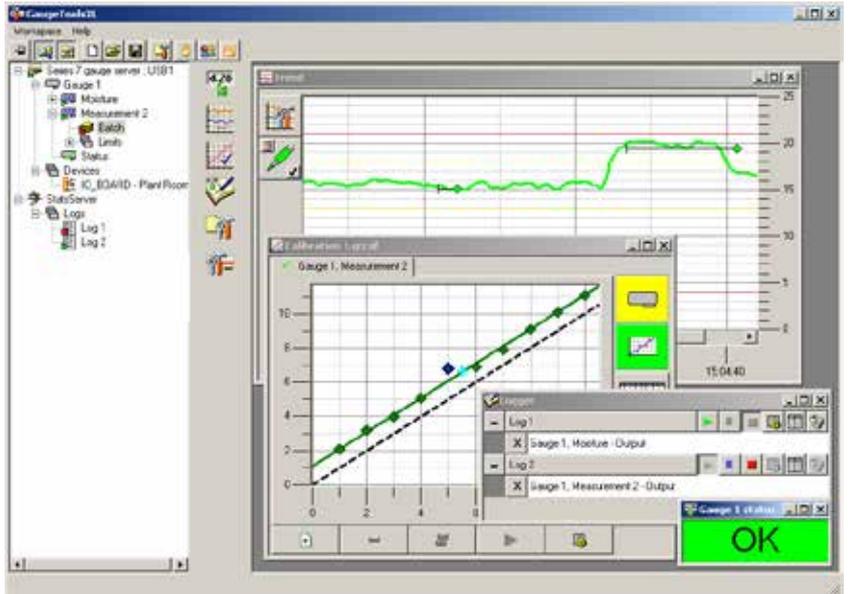
MM710e and InfraLab are supplied pre-calibrated for each component with NDC's factory calibrations. Because of the variability of local reference methods, and the need to ensure the NDC instrument agrees with the customer's preferred method locally, both instruments can be adjusted to agree with the customer's reference methods eg: gravimetric oven or wet chemistry, using the software provided.

For the MM710e, NDC provides GaugeToolsXL™ Calibration Software, and for the InfraLab, InfraLab Manager software, to enable accurate adjustment of the instrument output to agree with the preferred compendial method.

The software features the following tools:

- ▶ Graphic & Textual Displays
- ▶ Trending & Data Logging
- ▶ Calibration
- ▶ Archiving
- ▶ Product Set-up
- ▶ Diagnostics

Example GaugeToolsXL screenshot



For more information about our applications capability, please visit:

[www.ndc.com/dairy](http://www.ndc.com/dairy) or [www.ndc.com/cheese](http://www.ndc.com/cheese)

# MM710e and InfraLab

## MM710e for On-Line Measurements, InfraLab for Rapid Sample Analysis: ...

### MM710e: On-Line



#### Key Features of the MM710e

The MM710e, NDC's Ethernet-enabled On-Line Gauge incorporates a range of "Devices" to enable flexible construction of single or multiple gauge arrangements with a choice of interfaces and connectivity:

#### Devices:

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

#### Connectivity:

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

#### Key Options:

- IP65 or IP67 Housing
- ATEX Certified Housing
- Auto Reference Standard

### InfraLab: At-Line



#### Key Features of the InfraLab

The InfraLab can be used in production areas or laboratory environments to provide rapid, sub-10-second analysis of single component moisture or multi-component moisture, fat and protein, simultaneously, of grab samples taken from the line.

Requiring no special sample preparation and no special operator skills, the InfraLab stores up to 10,000 measurement files, for up to 200 products, which can be accessed via its USB or Ethernet ports to a memory stick, PC or local network.

An alternative configuration uses a permanent connection to a remote or local PC running InfraLab710 Software for enhanced data management and advanced user options including calibration development.

For more information about the MM710e or the InfraLab, please visit:

**[www.ndc.com/MM710e](http://www.ndc.com/MM710e) or  
[www.ndc.com/food/InfraLab](http://www.ndc.com/food/InfraLab)**

NDC Technologies is represented in over 60 countries worldwide. [www.ndc.com](http://www.ndc.com)

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