PROCESS SENSORS
(EUROPE) LIMITED

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CORPORATION

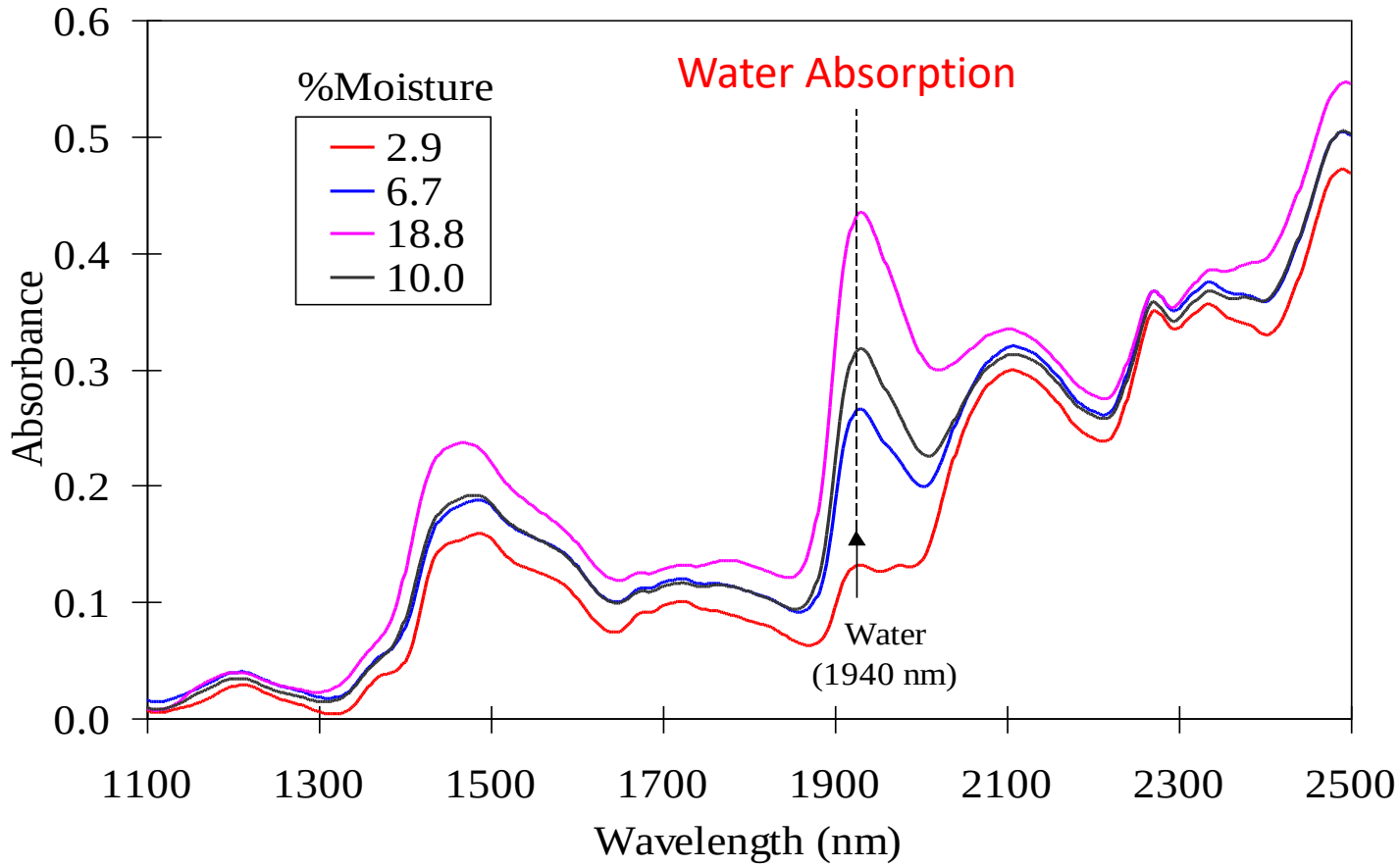
Near Infra Red measurement instruments

The Light Spectrum

Wavelength Range (nm)	400-800	800-1100	1100-2500	2500-10000
Primary Interactions	Electronic	Vibration Overtones	Vibration Overtones	Fundamental Vibrations

- Between visible (what you see) and IR (heat)
- Different materials absorb NIR light at specific wavelengths.

Principle: Water molecules absorb light at specific wavelengths



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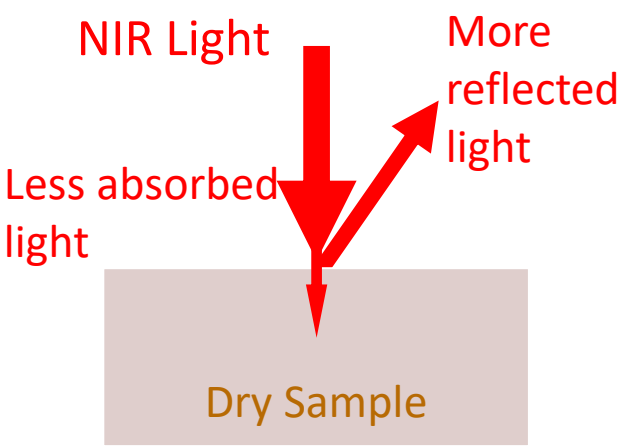
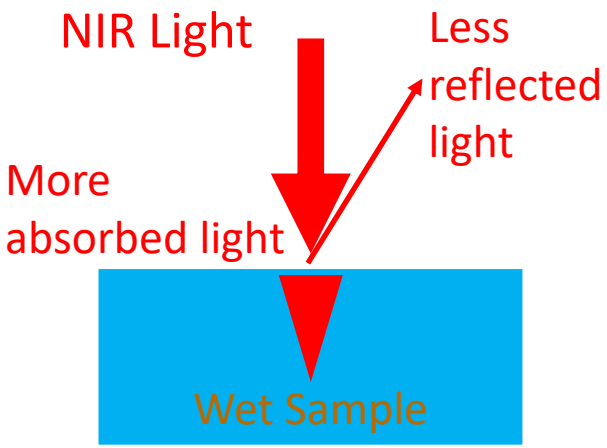
NIR Theory

- Water absorbs NIR light
  - Specific wavelengths only
  - Other materials = other wavelength(s)
- More water gives:
  - More light is absorbed
  - Less light is reflected





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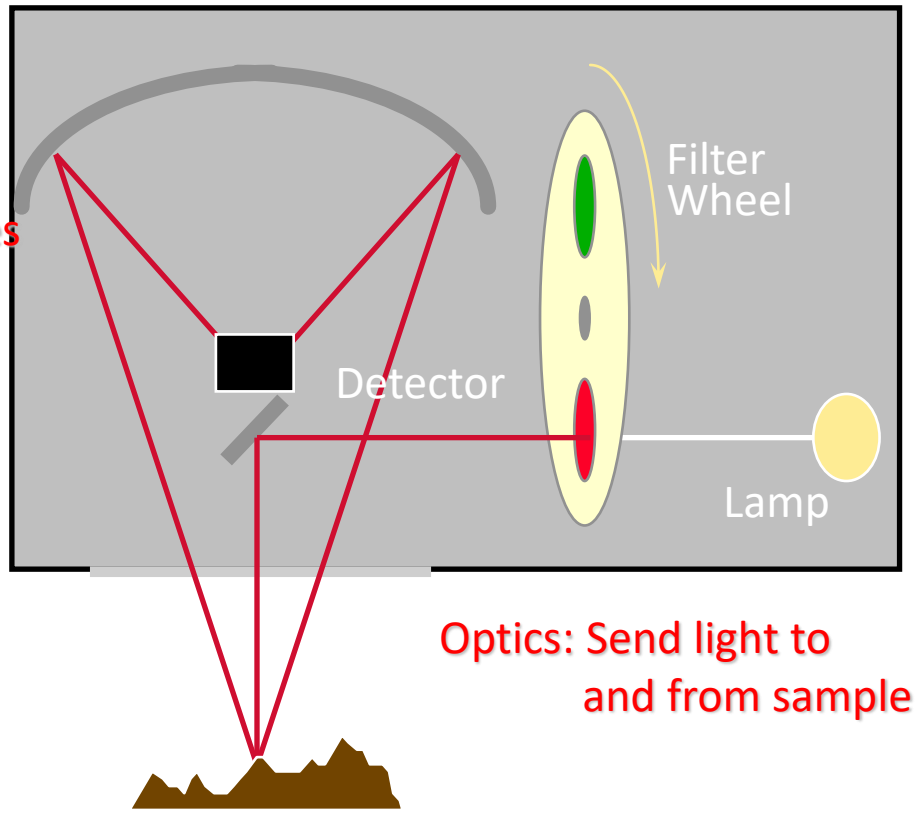
Basic NIR Sensor

Filter Wheel: chops into selected wavelengths

Electronics:
calculate % moisture

Detector: measures
reflected light



Lamp: Provides
NIR light

Optics: Send light to
and from sample

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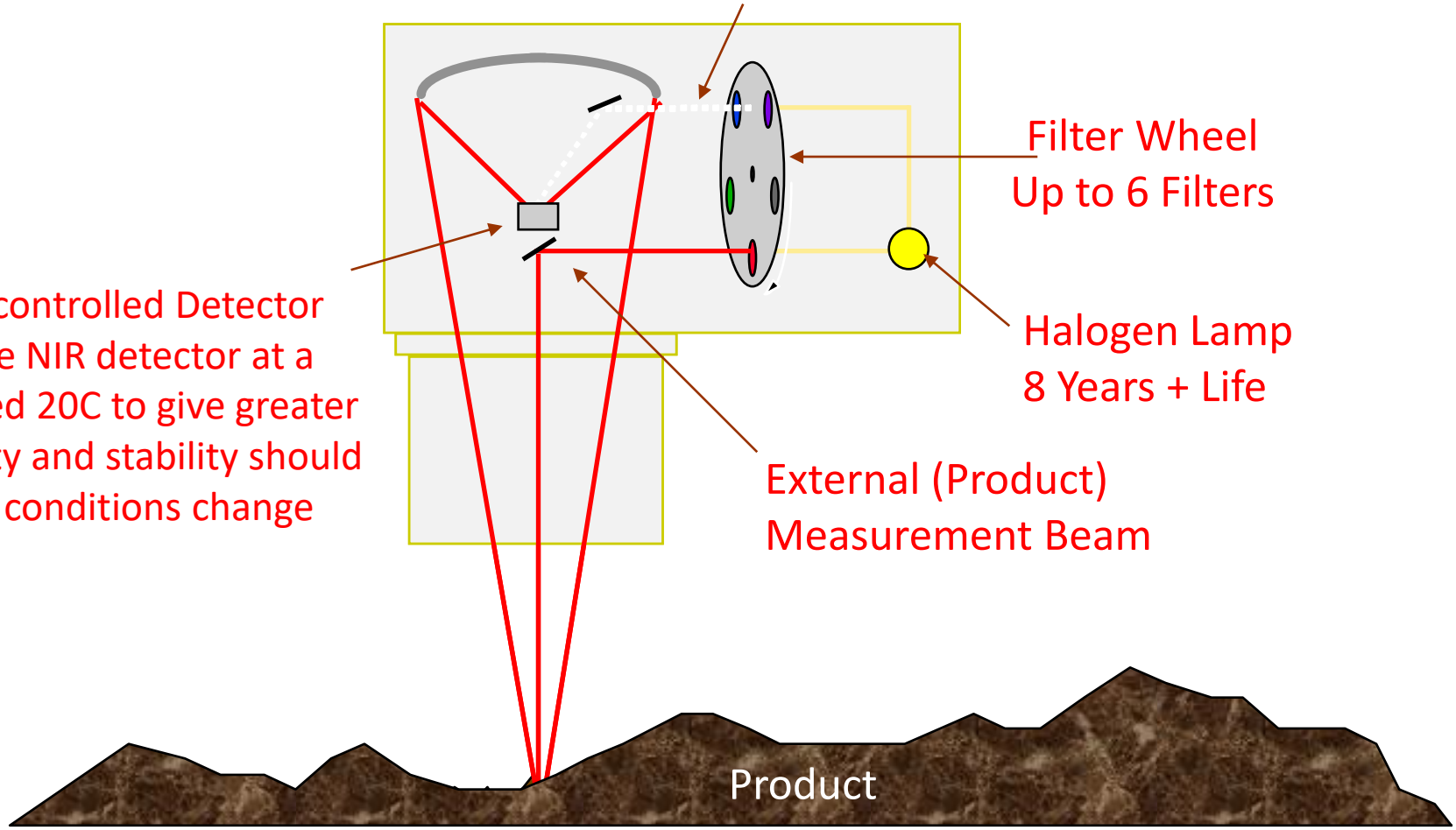
Advanced Technology

Internal Reference (Prime) Beam
Continuously compensates for any source drift



Available measurements

NIR :Applications:

Measurement for :- powders, granules, flaked and sheeted products

Optional added constituents or measured parameters:
Second constituent NIR
Product Temperature
Product Colour

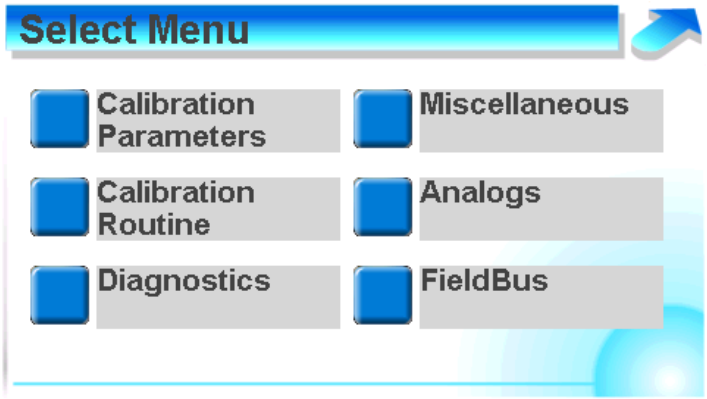
RF applications:

Moisture measurement for whole products, bulk , bale, sheeted or liquids.

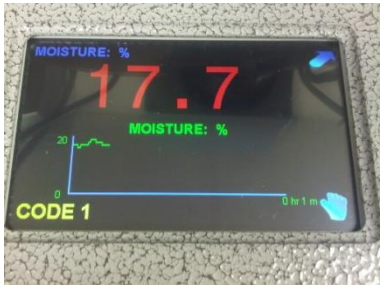
MCT360

LCD touch screen HMI with advanced features.

On screen graphical process trending.



Process alarm display colour change for recognition.



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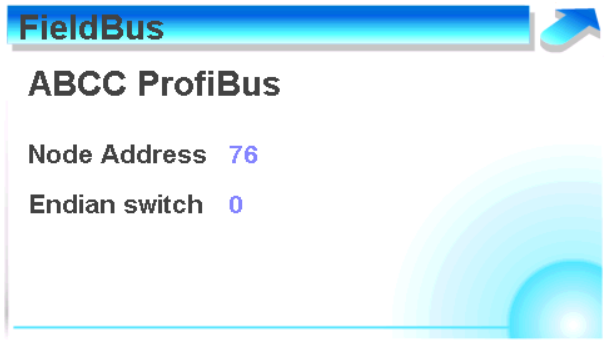
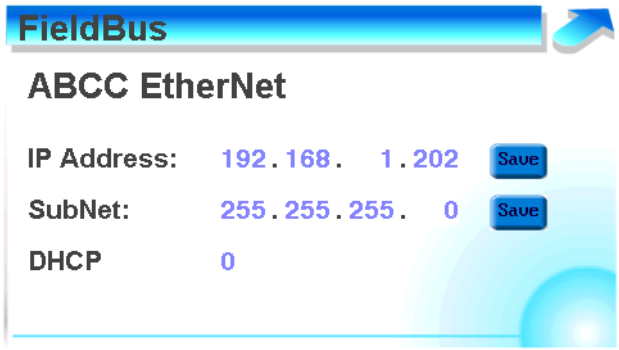
MCT360



Fitted field bus
Simple to set up.



Point of installation sensor back up.

Other interactive feature include:
Active diagnostics.
Language selection.
One touch averaging with statistical data and other advanced features.

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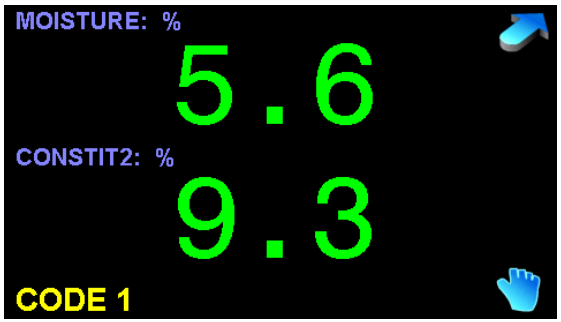
MCT366

Can be used in high temperatures up to 60 C ambient with out the need for cooling.

Stainless steel construction

Wash down 2 piece unit low power sensor.



LCD Touch screen display

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MCT660 Bench top moisture gauge

LCD touch screen.

Computer software for greater flexibility.

Fast, measurement in seconds.

Accurate, repeatable.

Built in turntable for sample Average, and use on non homogeneous product.

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MCT330

Simple bench top moisture tester

Simple intuitive menu
Fast measurement in second
Accurate and repeatable

Low cost

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Applications

Food manufacture

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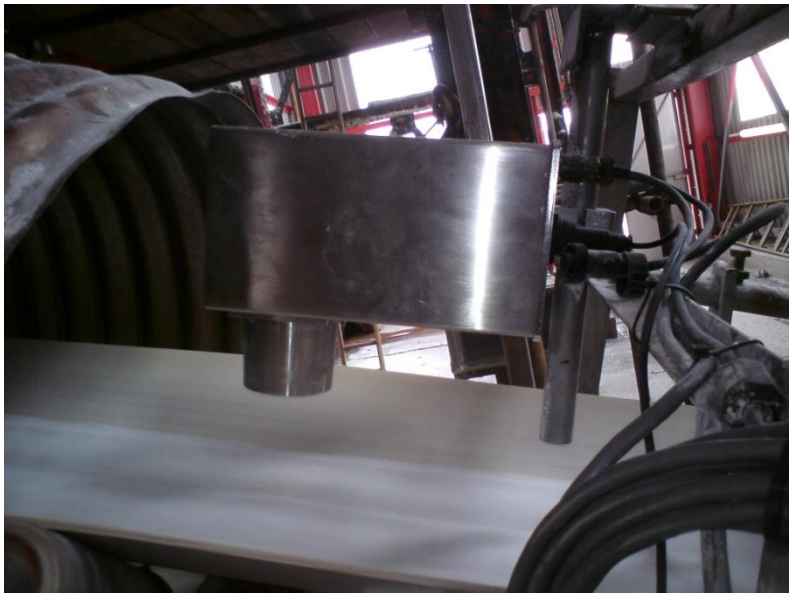

Moisture in biscuits and wafer and snacks

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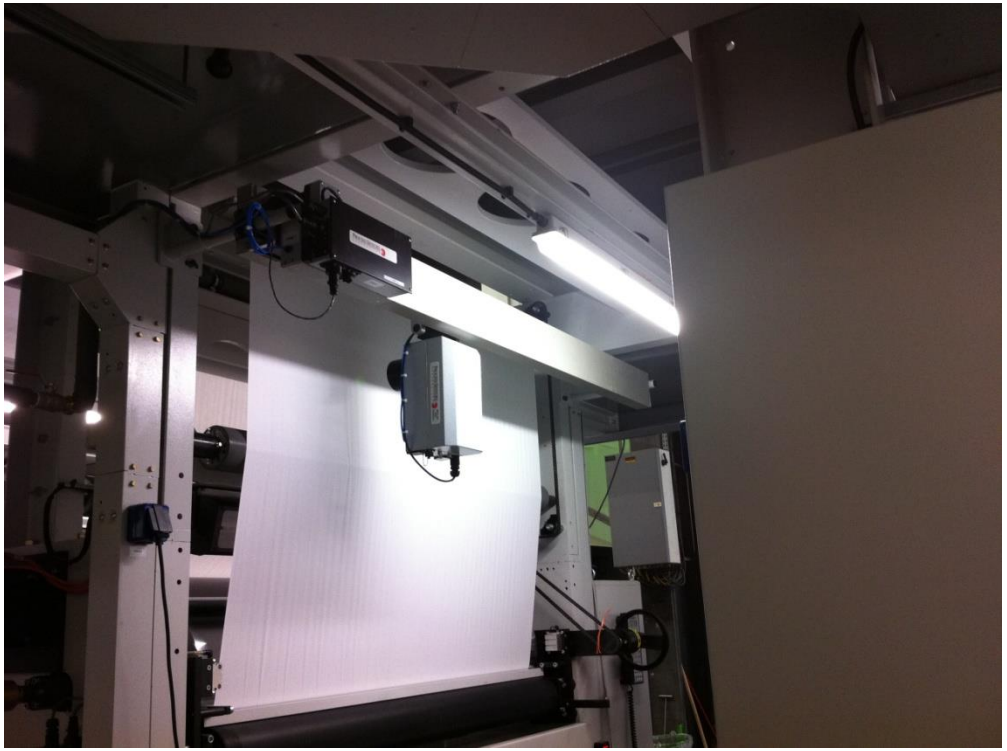

Paper and converting lines.

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Advanced measurement on reflective surfaces, for coating systems measurement.

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Fast measurement on harsh environments

Chemical, mineral and aggregates

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Moisture in the mixing stage on Harsh environments

Moisture on open conveyors

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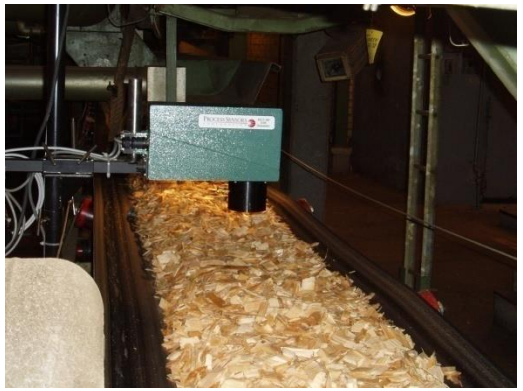

Wood Processing, MDF, Chip board, OSB, composite board, fuels pellets and others

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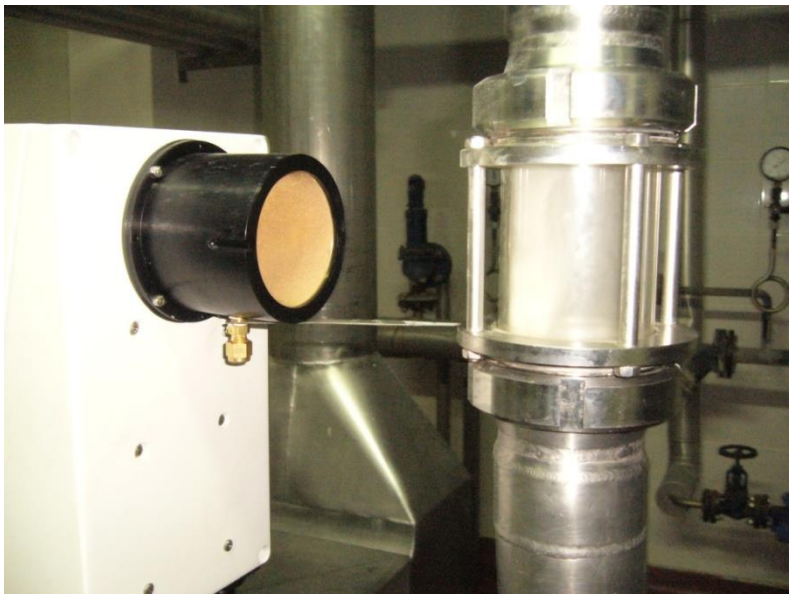
Installation of the MCT for measurement through windows



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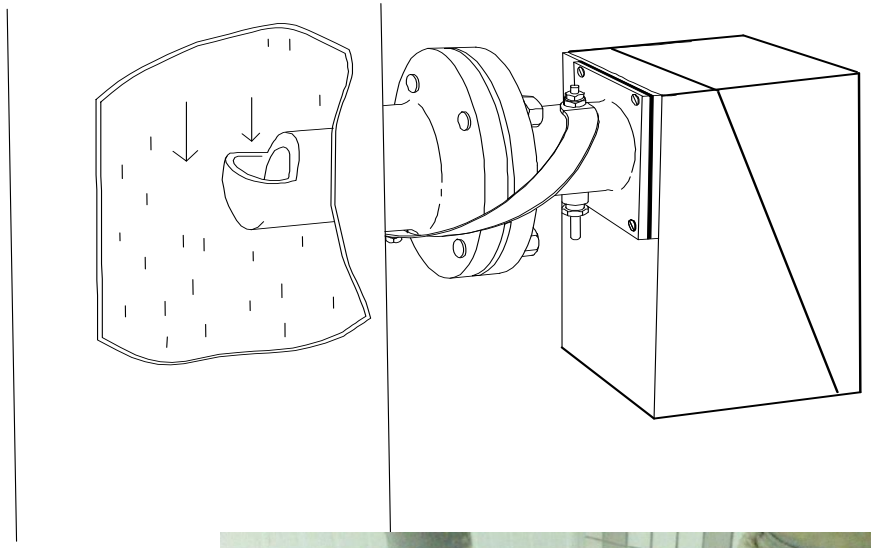
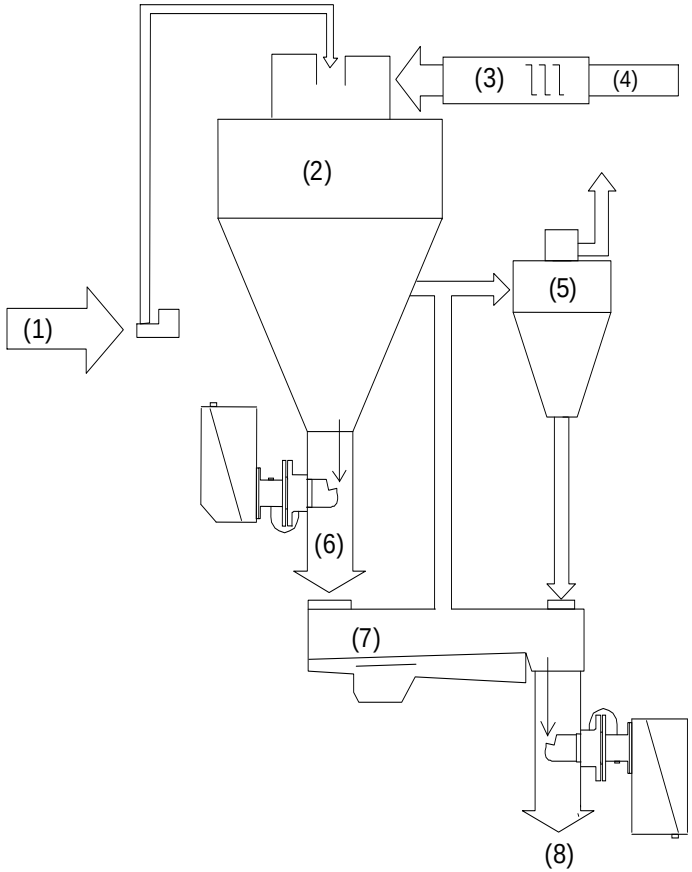
Powder sampler for dry applications in gravity chutes





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Colour Measurement

MCT-MultiPlex™

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What Is Color & How Do We Measure It

•Color Measurements try to replicate what the human eye will see
•Eliminate the variation between individual perceptions with a standard comparative scale

Three main color scales are employed in the industries we serve:

- **CIE L*a*b***
- **Hunter L,a,b**
- **Agtron**

The **most important determining factor in scale selection is consistency** in using the same scale, and historic data in a specific color scale.

CIE L*a*b* and Hunter L,a,b are both based on the established CIE L*a*b* scale. This scale uses three parameters to represent human eye color perception and plots it into a tristimulus three dimensional format.

- The “L*” axis representing Light to Dark values
- The “a*” axis representing Red to Green values
- The ”b*” axis representing Yellow to Blue values

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•The CIE L*a*b* tries to correct or match the non-linearity present in the human eye by using the “cube root” of the XYZ scale

•The Hunter L,a,b makes it calculations based on the “square root” values of the XYZ scale.

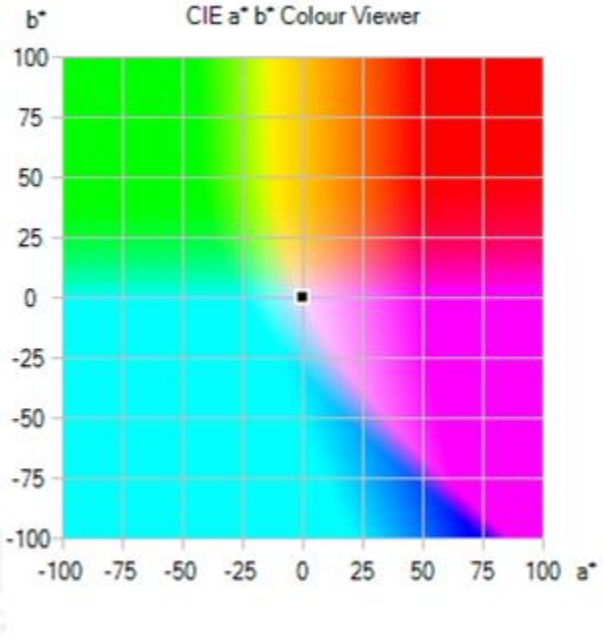
•Both scales work as long as they are used consistently. Allegedly the Hunter has greater color discrimination in the yellow zone on low values and the CIE has greater color discrimination on darker colors.

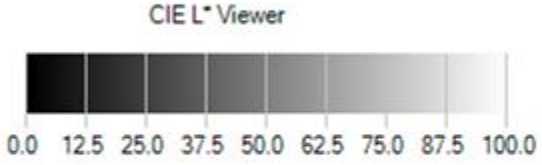
•The Agtron scale is based on red-yellow-green-blue (RYGB) reflectance to provide a numeric score for each of these color bands in the visible spectrum. There are several other color scales too.

•The MCT-MultiPlex Color Meter is a white light source Color Meter with flexible software to meet your color measurement needs.

Lab Colour Scale

- L is the Lightness scaled from 0 black to 100 white.
- a and b are the chromatic (Colour) coordinates.
- a is the green to red axis with negative a values indicating green colours and positive values indicating red colours.
- b is the blue yellow axis with negative b values indicating blue colours and positive values indicating yellow colours.





MCT-MultiPlex Color, Moisture, Fat/Oil, Maillard Reaction and Temperature Measurements

- Color CIE L*, a*, b*;
- Hunter L, a, b;
- Agtron RGB

- **L: Light to Dark (0-100 Light)**
- **a*: Red to Green**
- **b*: Yellow to Blue**

- Moisture, Fat/Oil/Flavorings
- Height/Thickness (application dependent)
- Temperature option

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Moisture and colour measurement sensors

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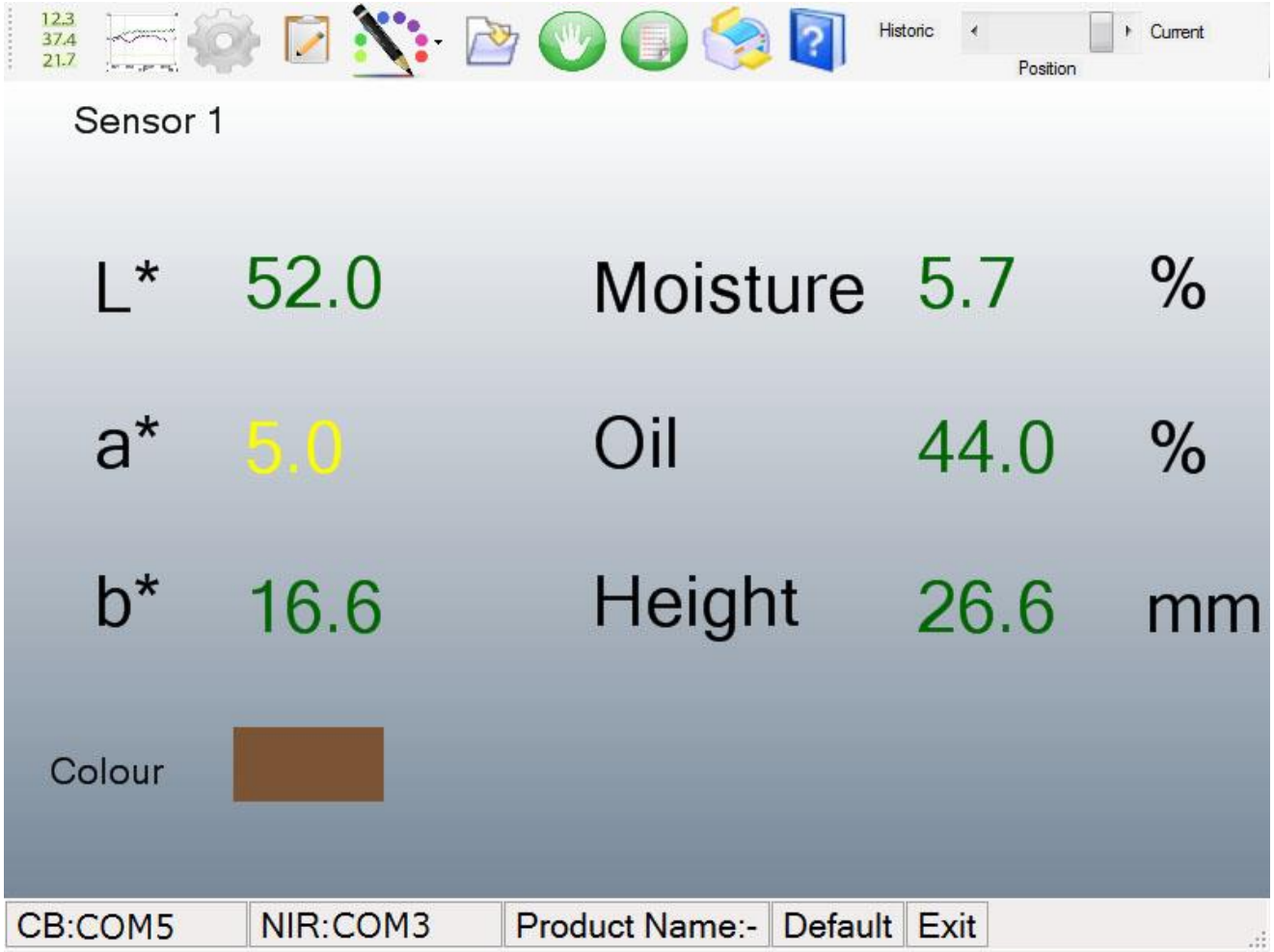
MCT-MultiPlex™ Operator Interface Display



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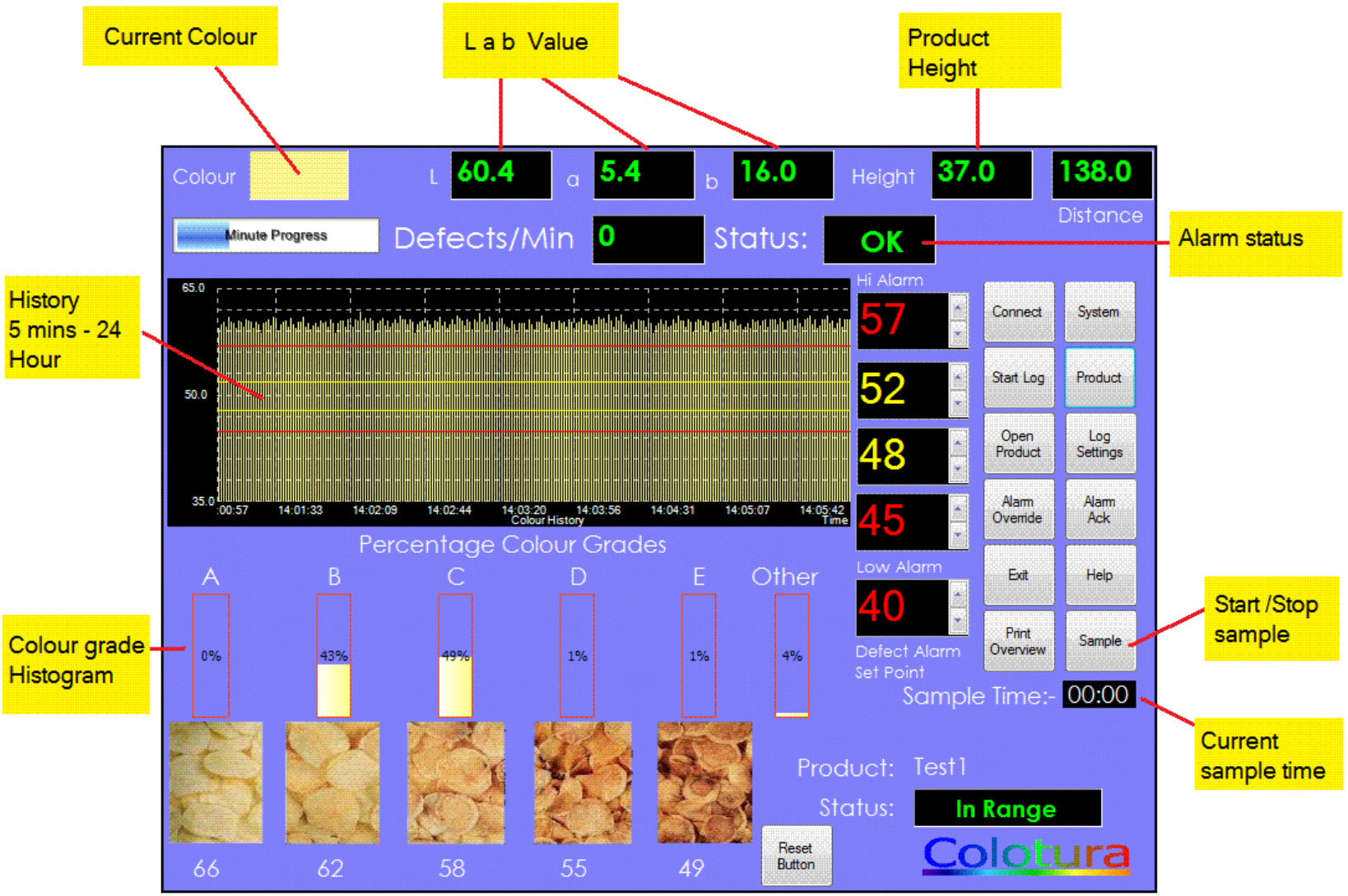
Integrated colour measurement system



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RFM 1000

Radio Frequency Moisture measurement

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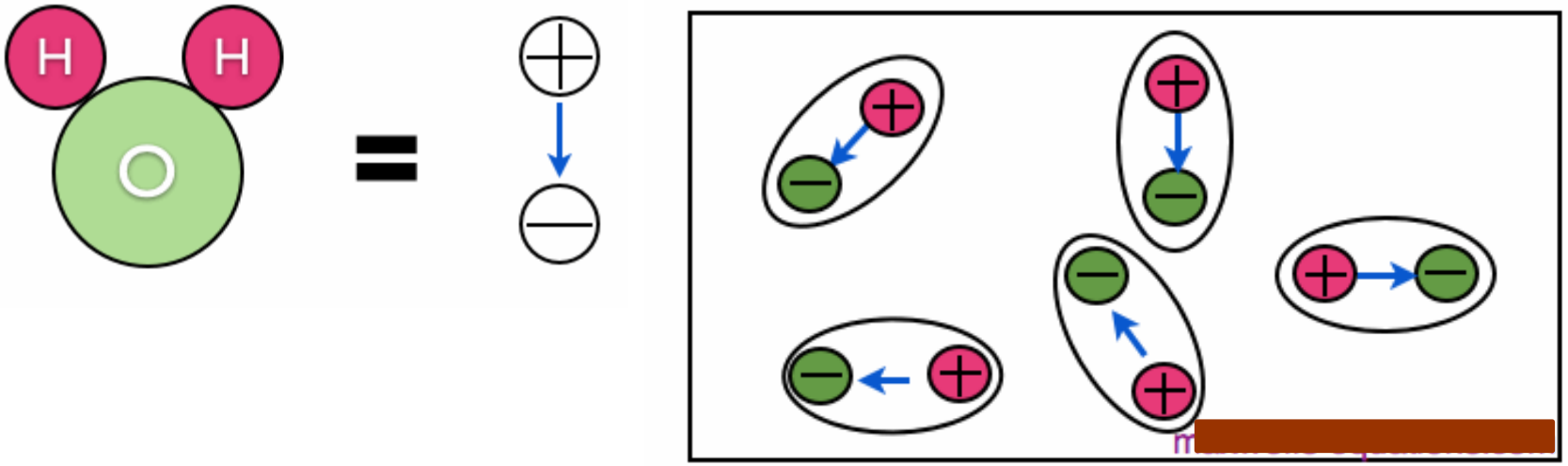
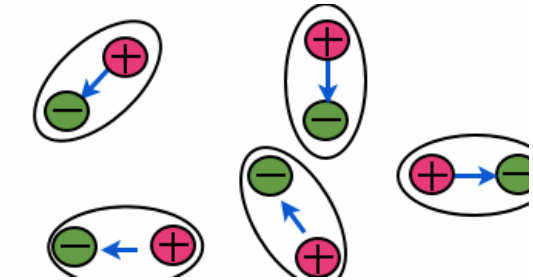
Measurement of moisture is based upon the change of dielectric constant in the product.
The dielectric constant is a measure of an electrical insulator in an electromagnetic field. Water molecules have a dielectric value of 80 when compared with air of 1, most materials we would measure moisture in exhibit a dry dielectric value of 3-8.

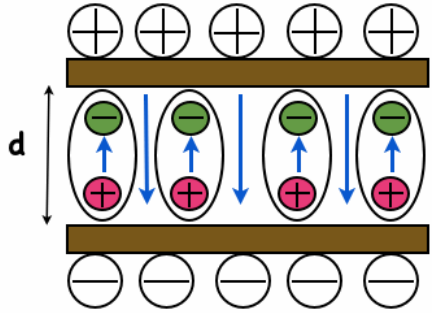


The RF Antenna and the product form a capacitance within the sensor generated radio frequency electrical field at 5.6 – 6.4 MHZ, these are In effect separated by the dielectric (water molecules).

The RF Field polarizes the water molecules, more or less water molecules change the dielectric this in turn changes the frequency of the tuned circuit this change in frequency is directly proportional to the moisture variation.

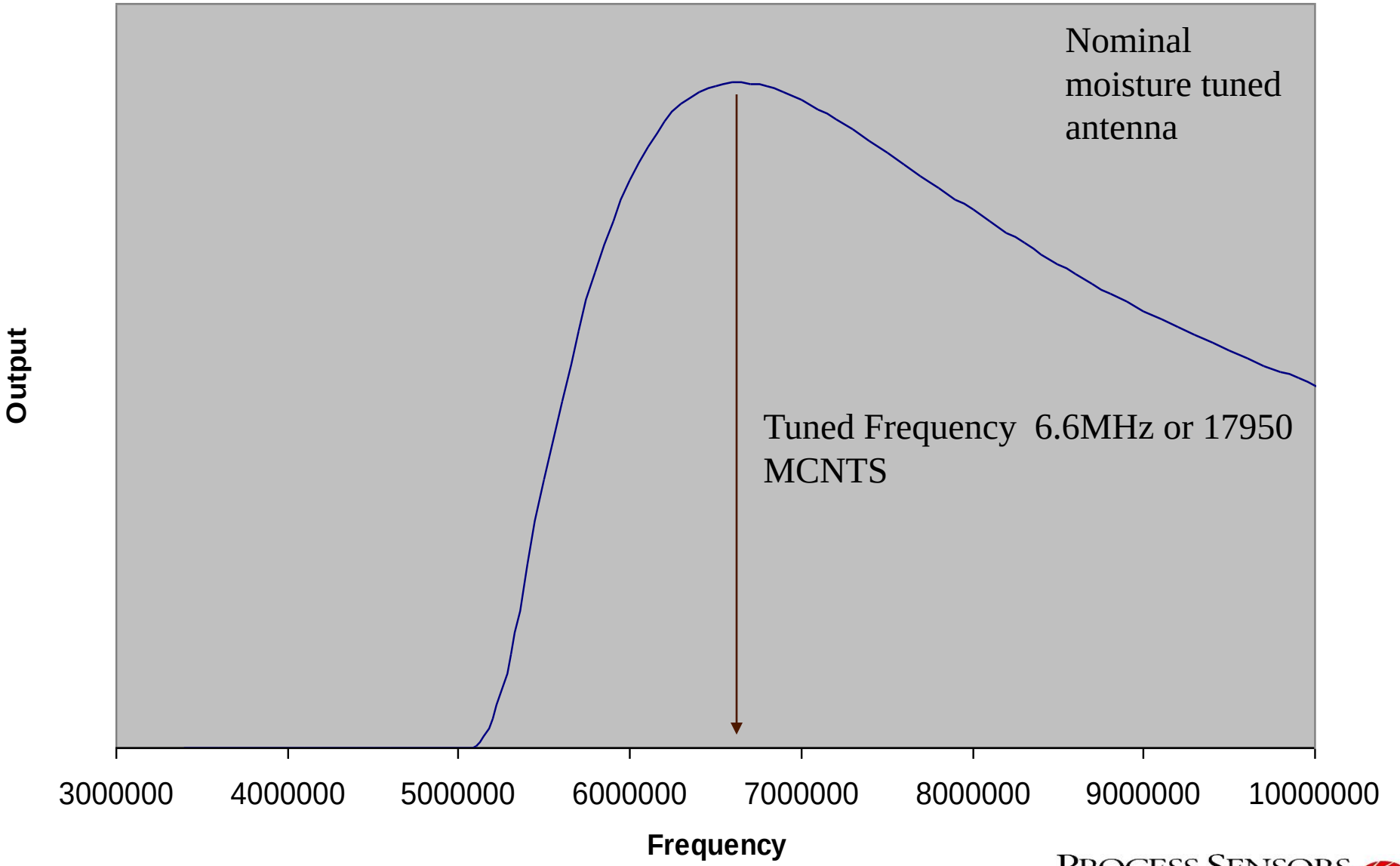


In the absence of an externally applied electric field, the water molecules have random orientations.



The Molecules are aligned by their Dipole Moment and the external Electric Field.

Frequency Response



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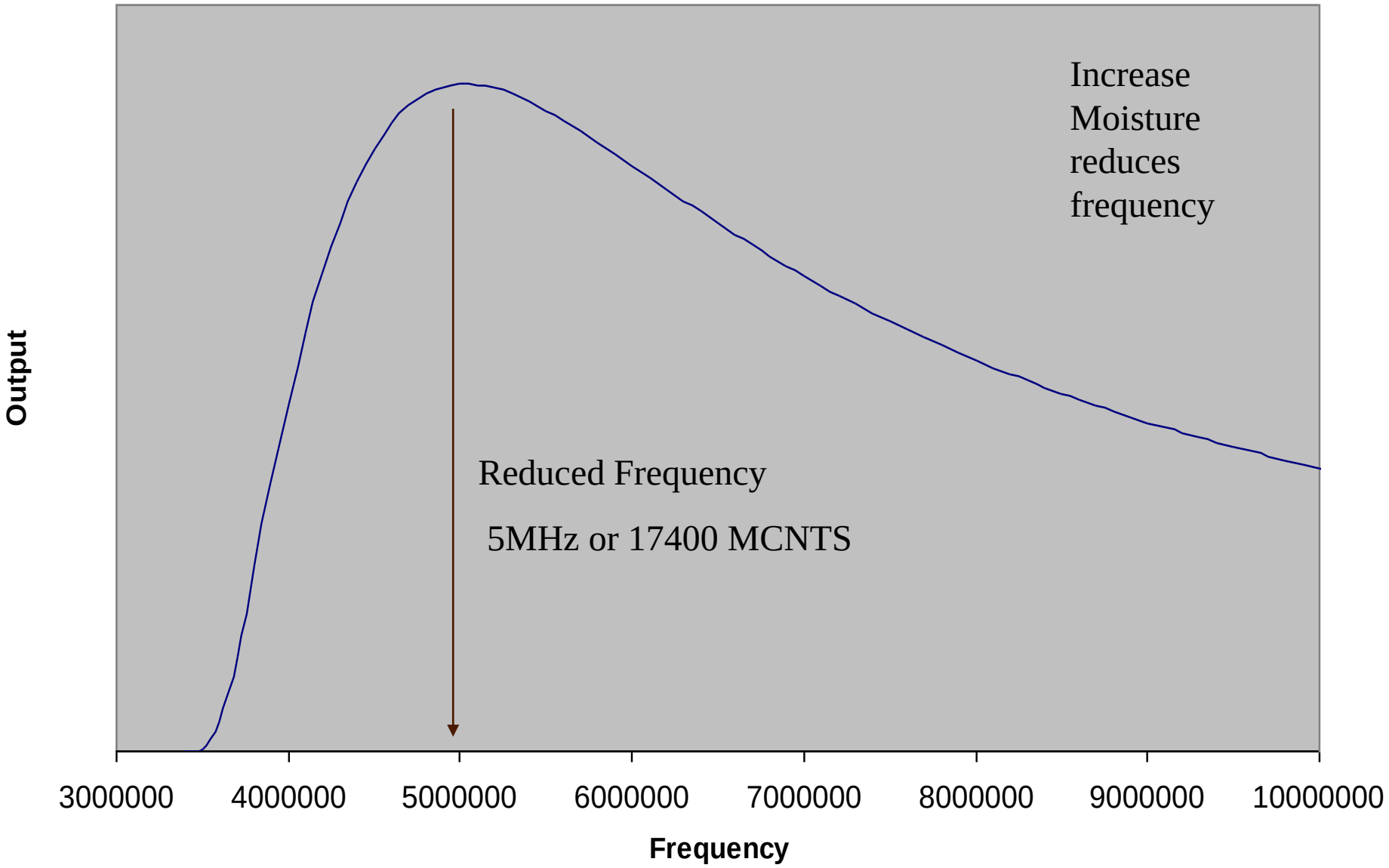
Frequency Response



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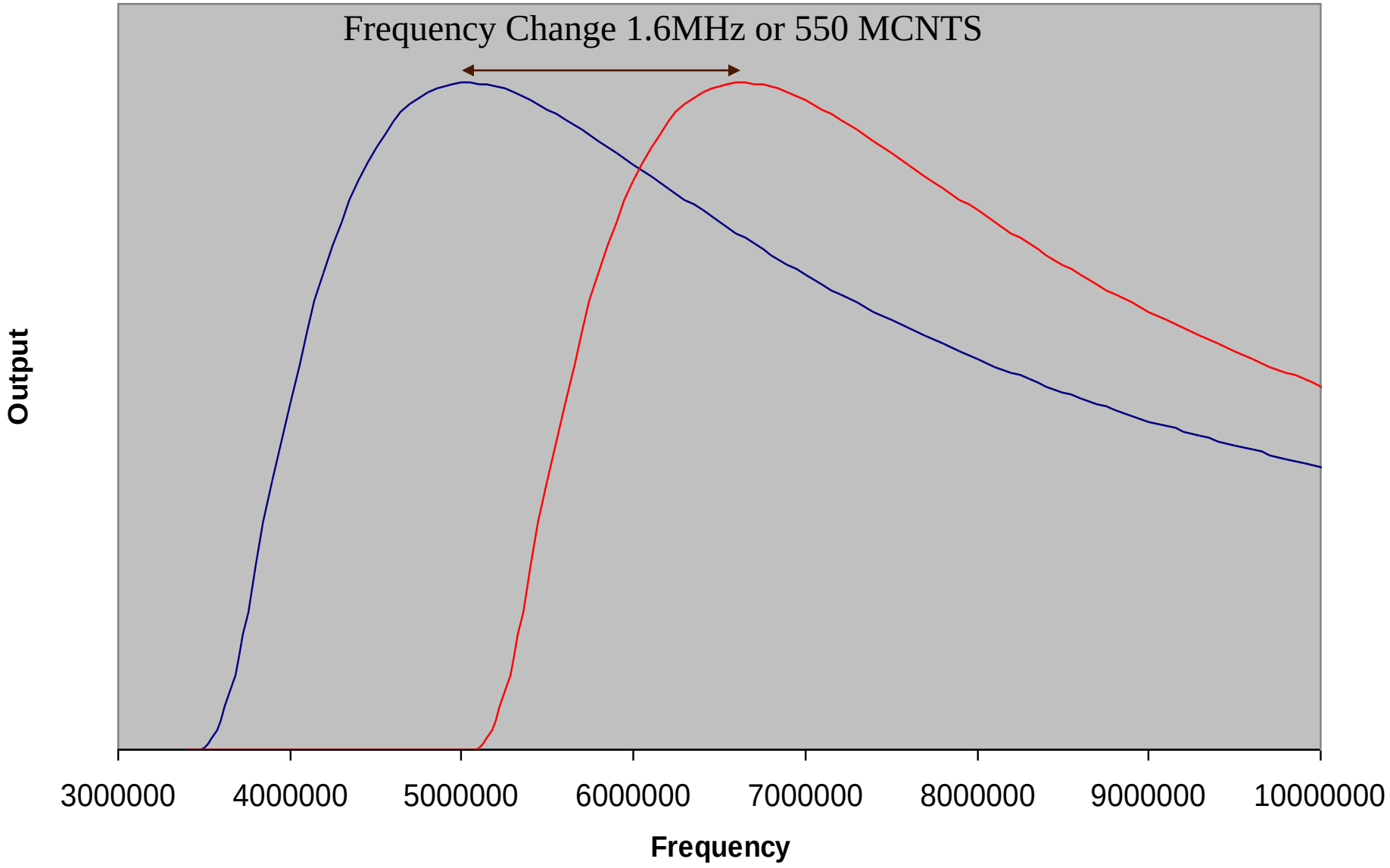
Frequency Response



Moisture in:

Syrups
Caramels
Toffees
Fondants
Butters
Oil

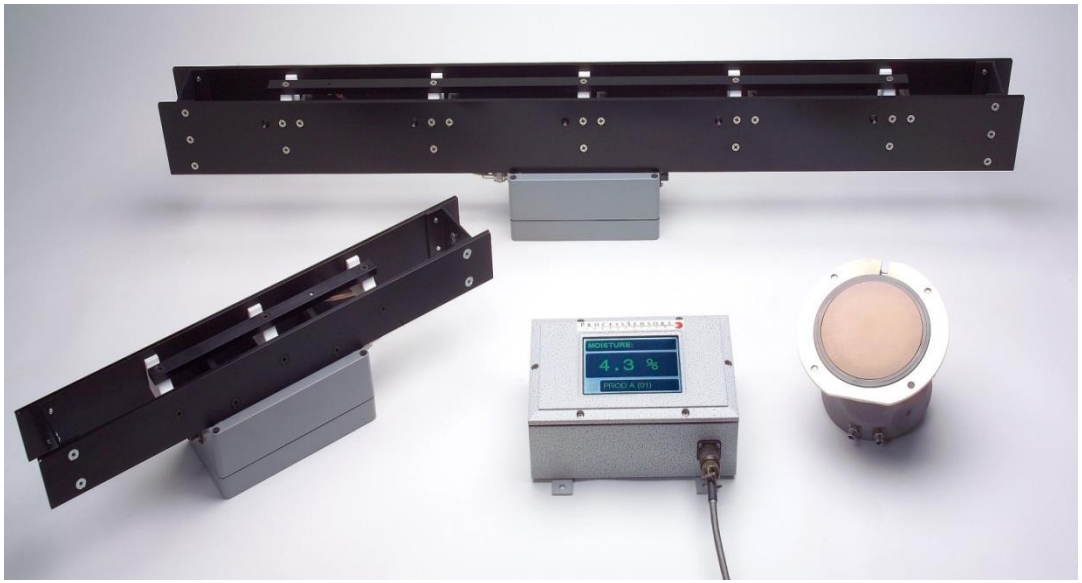
Pipeline sensors for measurement of moisture in viscous liquid applications, Typical installations in the food industry include sugar type products where Potential moisture migration can impede the texture of the product, there may Also be quality and legislative targets to adhere to.

Application in normally a vertical pipe to ensure the sensor is full, flexible build for Differing pipeline diameters from 1 ½ inch up, and fittings for most line connections

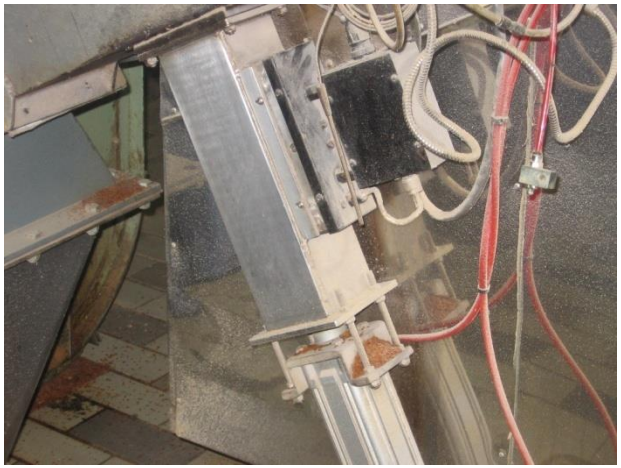
Moisture in:

Syrups
Caramels
Toffees
Fondants
Butters
Oil

Labcheck offers a moisture measurement of viscous liquids, many methods
For measuring the moisture content in the laboratory or off line include the need
For chemical titration, these are slow, use a very small sample and require replacement
Chemical solvents, in an increasing environment of health and safety plant protocol
Often requires reduced use of such equipment, the Labcheck is simple quick and
Does not require the use of chemicals.



Many sensor designs, open Frame, enclosed, sampling and pipeline.



Sampling sensor for pellets and granules

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Moisture in bails.

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