

# Energisparende procesmålinger

(Dansk/Engelsk)

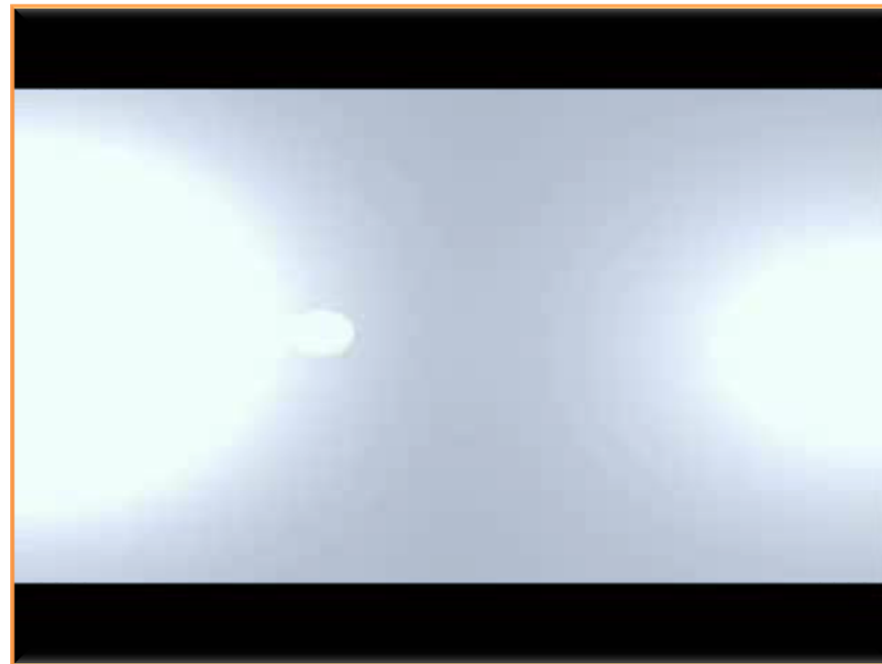
# Source Technology?

- Source Technology er specialiseret indenfor inline analyse af forskelligartede produkter (primært fødevarer og dyrefoder).

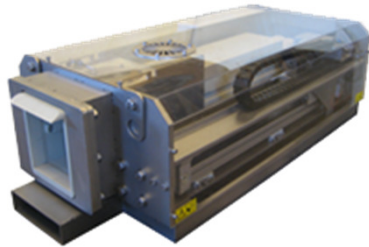


- Source Technology indgår i den Amerikanske koncern Wenger Group, som bla. fremstiller procesudstyr til tørring af diverse fødevarer & dyrefoder.

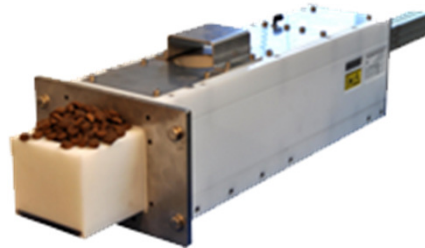
# Fra laboratorie analyse til inline analyse i produktionen



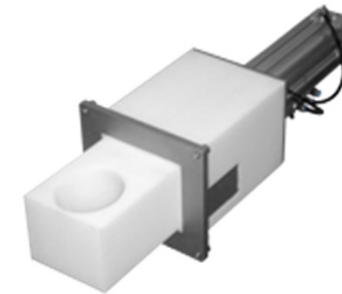
# Source Technology Inline Analysis Samplers



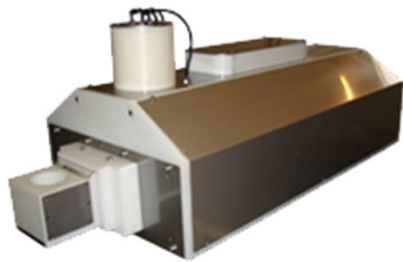
Bulk Density System  
**BDS™**



Product Sampling System  
**PSS™**



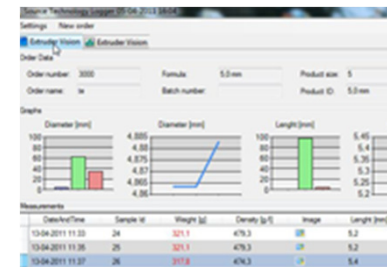
Single Point Sampler  
**SPS™**



Combined Analysis System  
**CAS™**



Dust & Durability System  
**DTS™**



Data logging System  
**DLS™**

# Inline analysis parameters which can be measured with ST sampling technology



Sampling



Bulk density



Dust testing



Sample crushing



Tap density



Durability testing



Product sizing



Moisture



Screen detection



Particle sizing



Burned particles



Float tester



Color

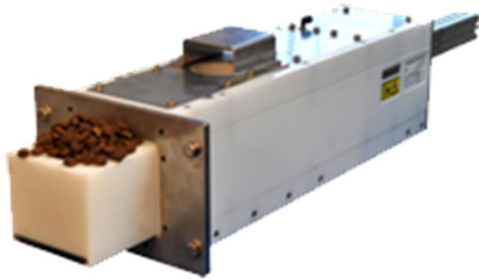


NIR



QA reporting

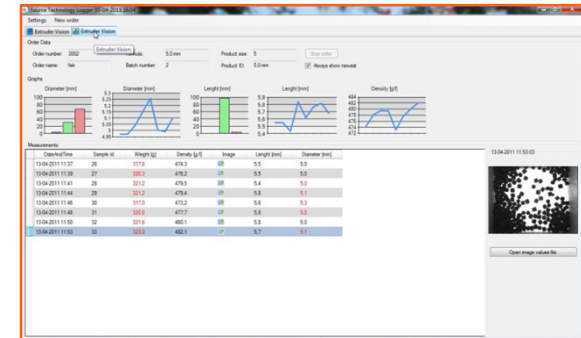
# Transferring of inline analysis data



Inline analysis

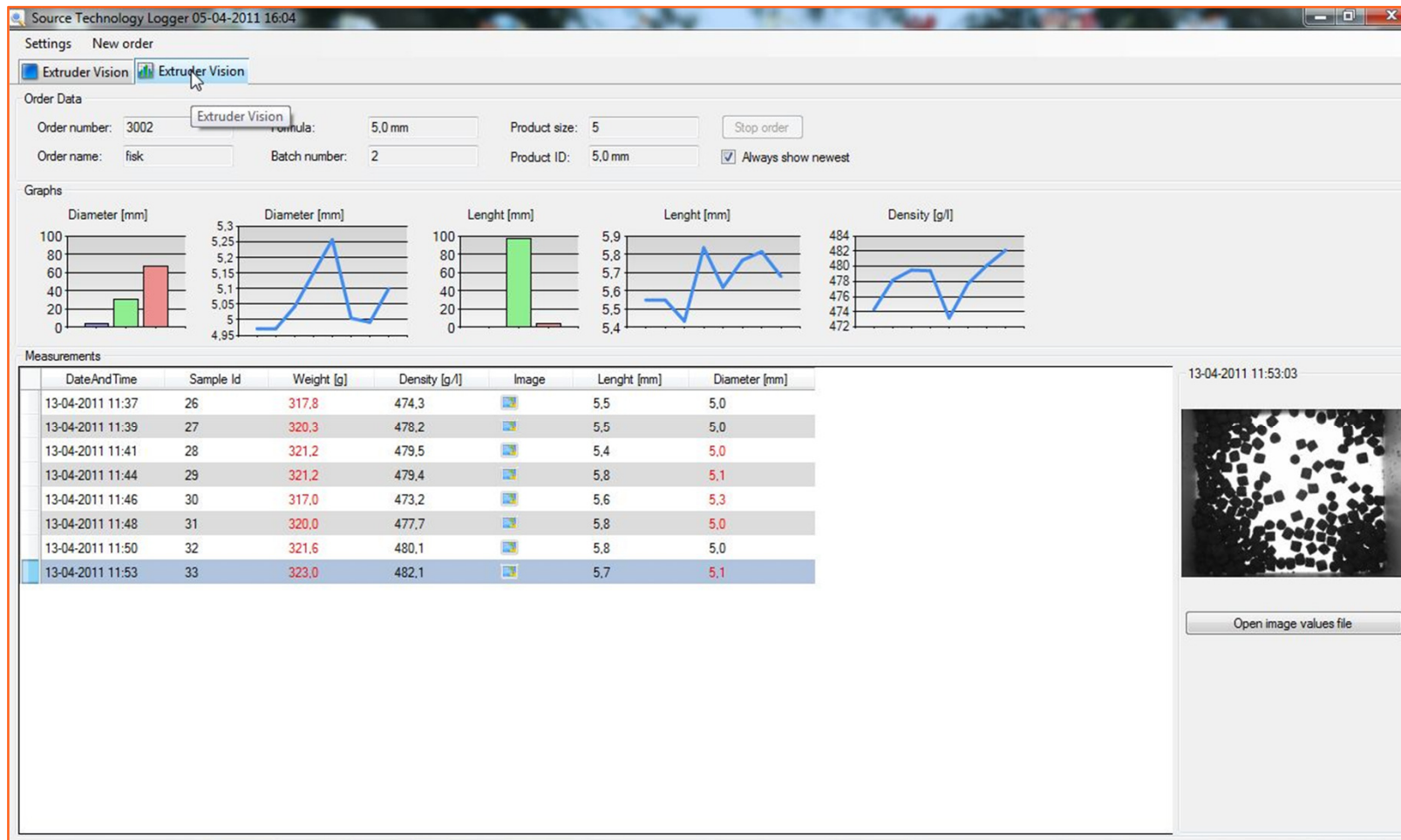


Control room



QA report

# QA software data spread sheet

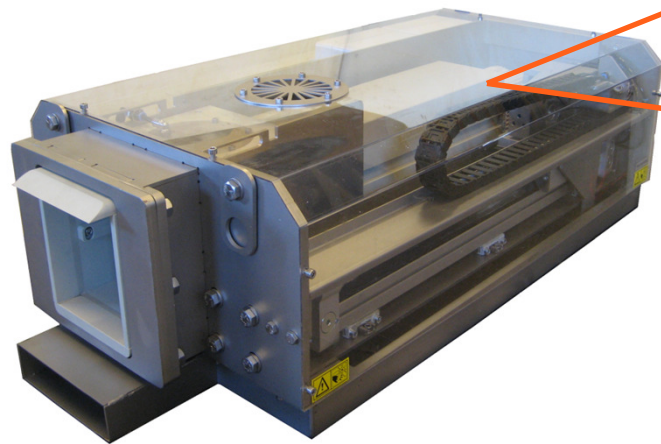


## Manual sampling vs. Inline sampling





# Source Technology inline moisture concept



*Example of inline analysis sampling*



Microwave sensor



NIR sensor

# Experience concerning moisture measuring

- Source Technology have for the last 5 years tested and integrated a total of 6 different types of moisture sensors (total of 25+ inline moisture systems installed) based upon microwave technology & NIR technology.

NIR bench top analyzer



Microwave bench top analyzer

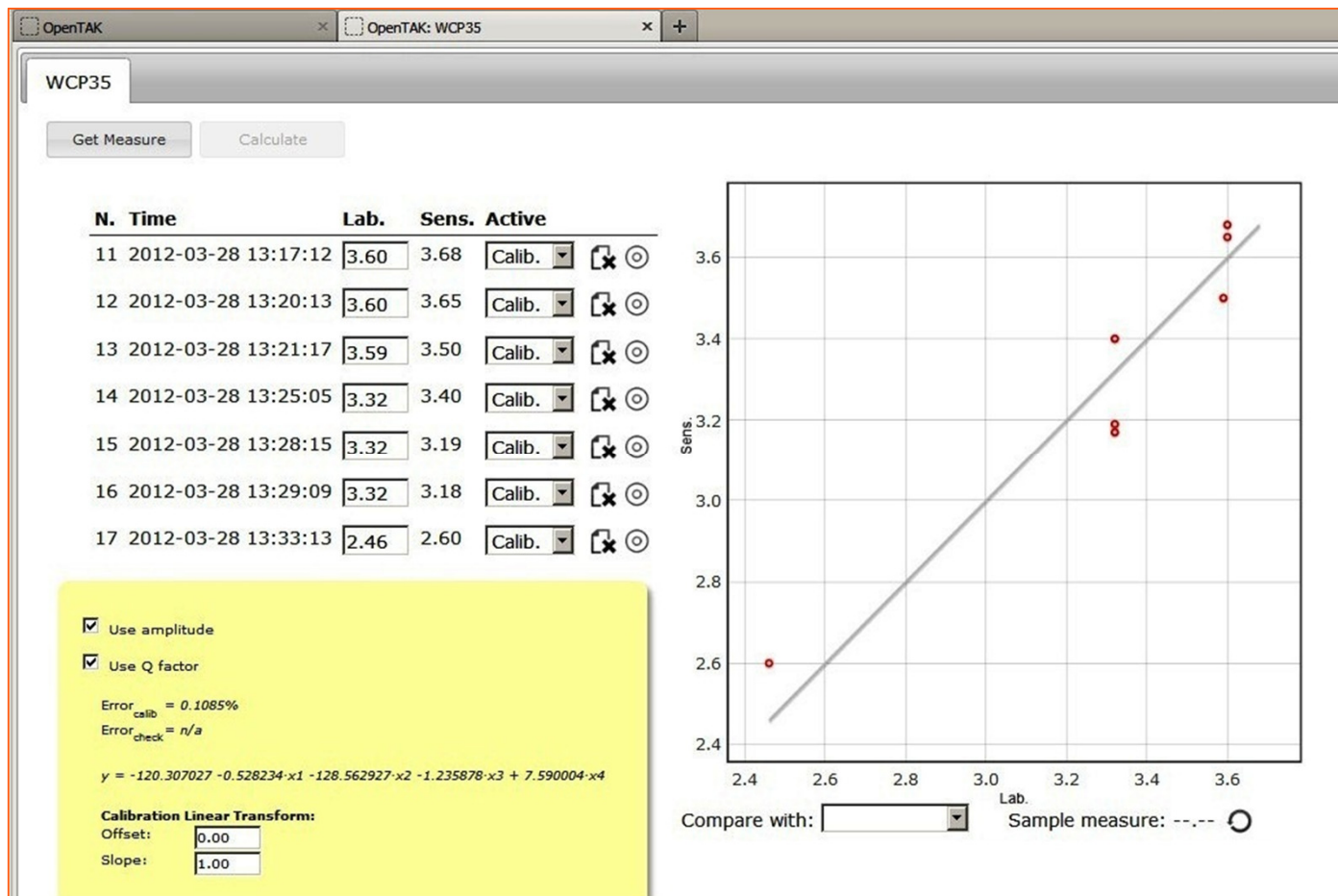


NIR inline sensor



Microwave inline sensor

# Calibration of microwave moisture sensor



# Moisture measurement technology selected is based upon product characteristic



Large product sizes

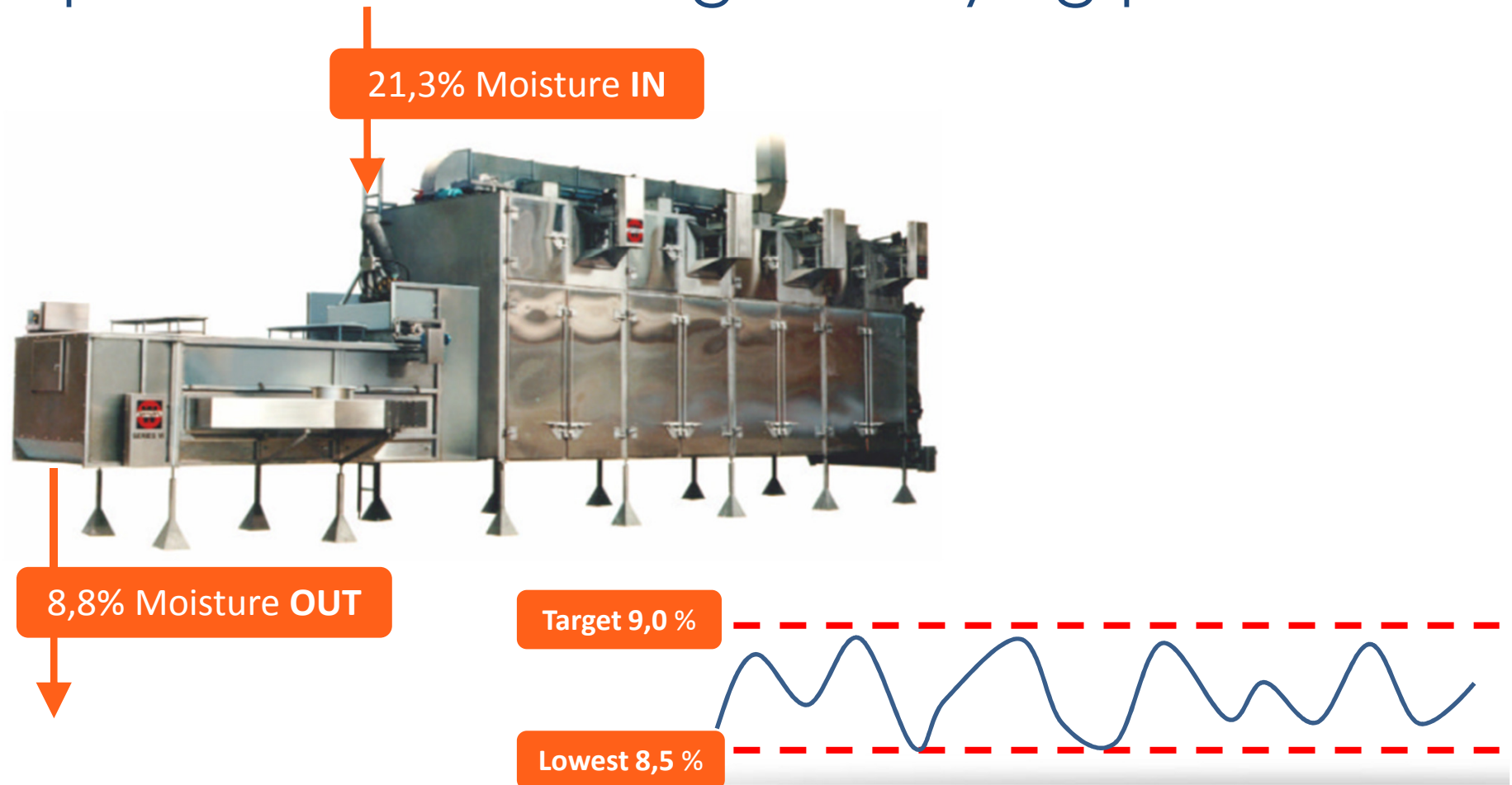
- NIR (crushed)
- Microwave



Non stable powders

- NIR

# Accuracy of moisture measurement result required for controlling the drying process



# Moisture measurement accuracy achievable



Pellets = 0,05%-0,50%



Powders = 0,05%-0,15%

# Parameters which influence moisture accuracy and repeatability.

Drying accuracy



$\pm 0,05-1,0\%$

Sampling



$\pm 0,05-0,15\%$

Lab. Reference



$\pm 0,05-0,5\%$

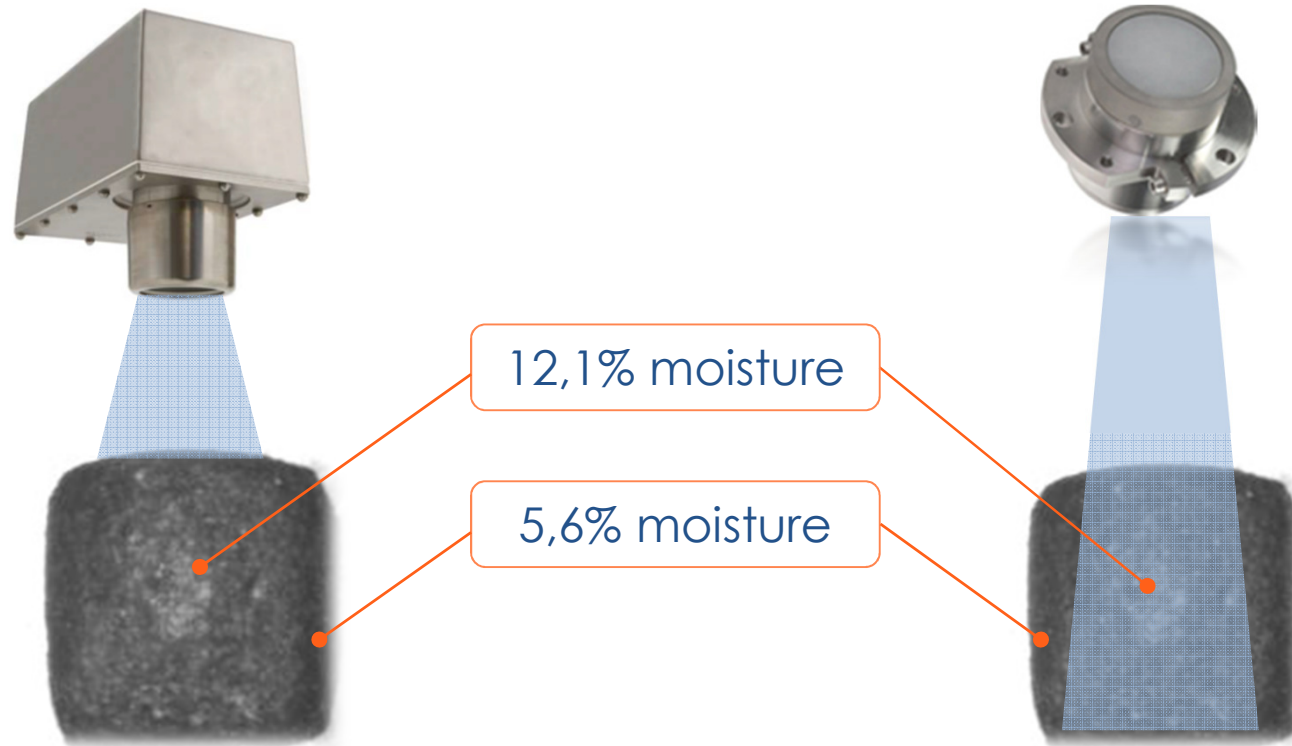
Inline sensor



$\pm 0,05-0,2\%$

## NIR (Near Infra Red) *working principle*

## Microwave *working principle*





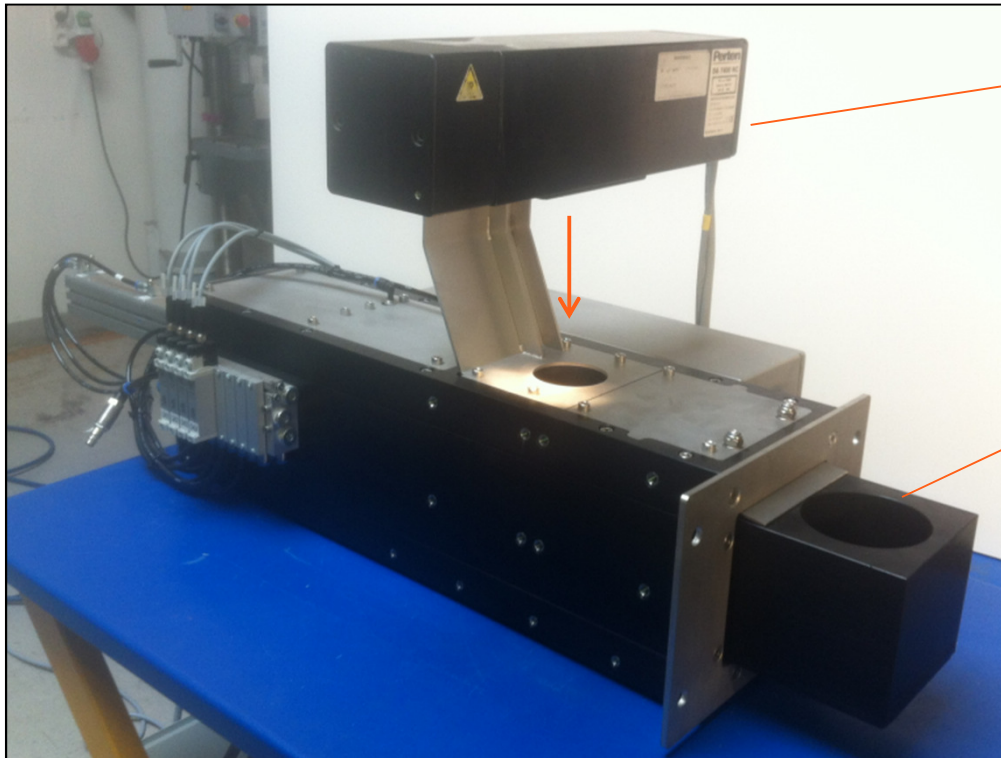
# Typical installation of online NIR device without sampling technology



# Typical installation of online Microwave device without sampling technology

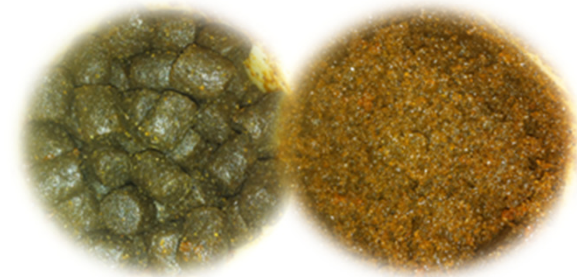


# NOS™ (Nir On Sample) concept



NIR sensor

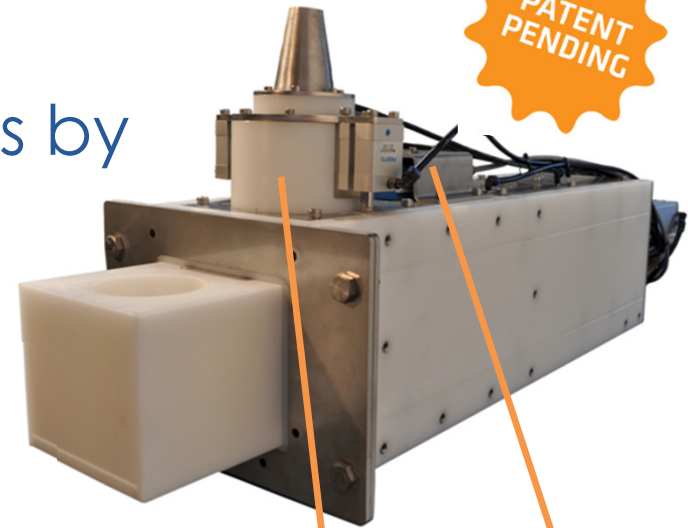
Sampling cup



# NIR Crusher

Break down of large size products by means of crushing technology

PATENT PENDING



Crusher



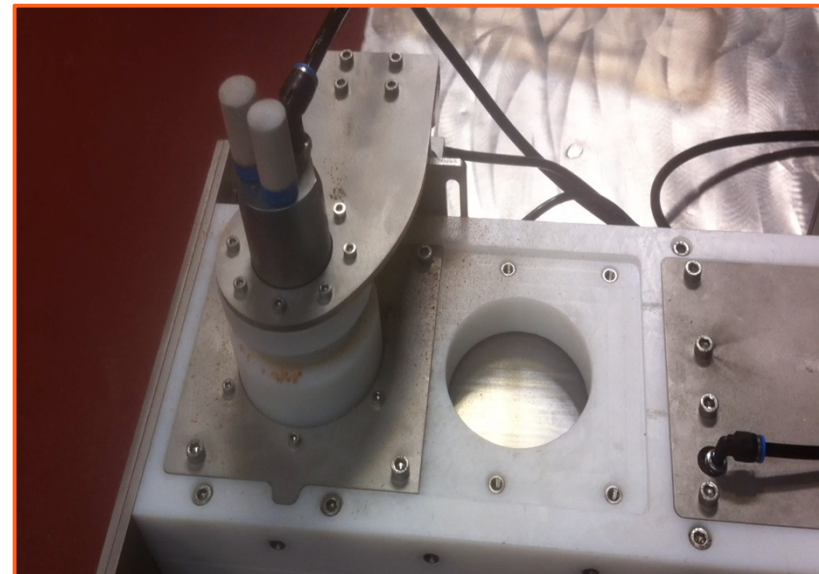
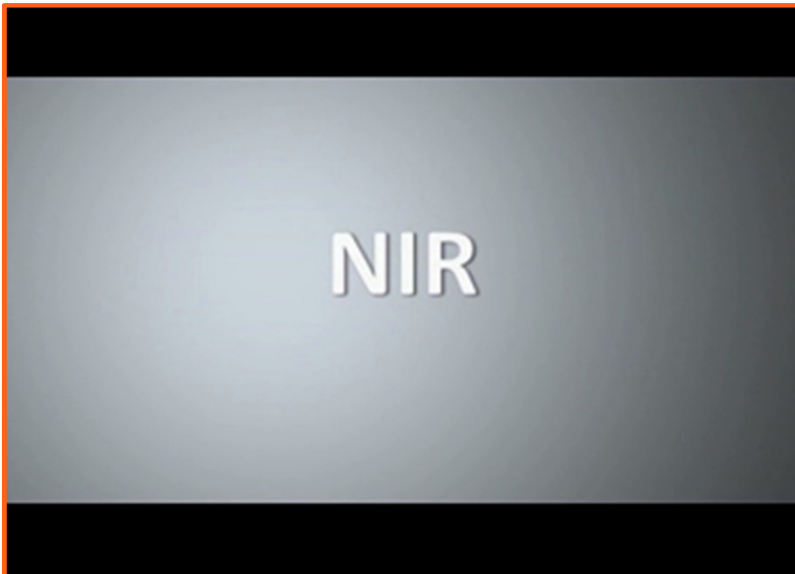
NIR sensor



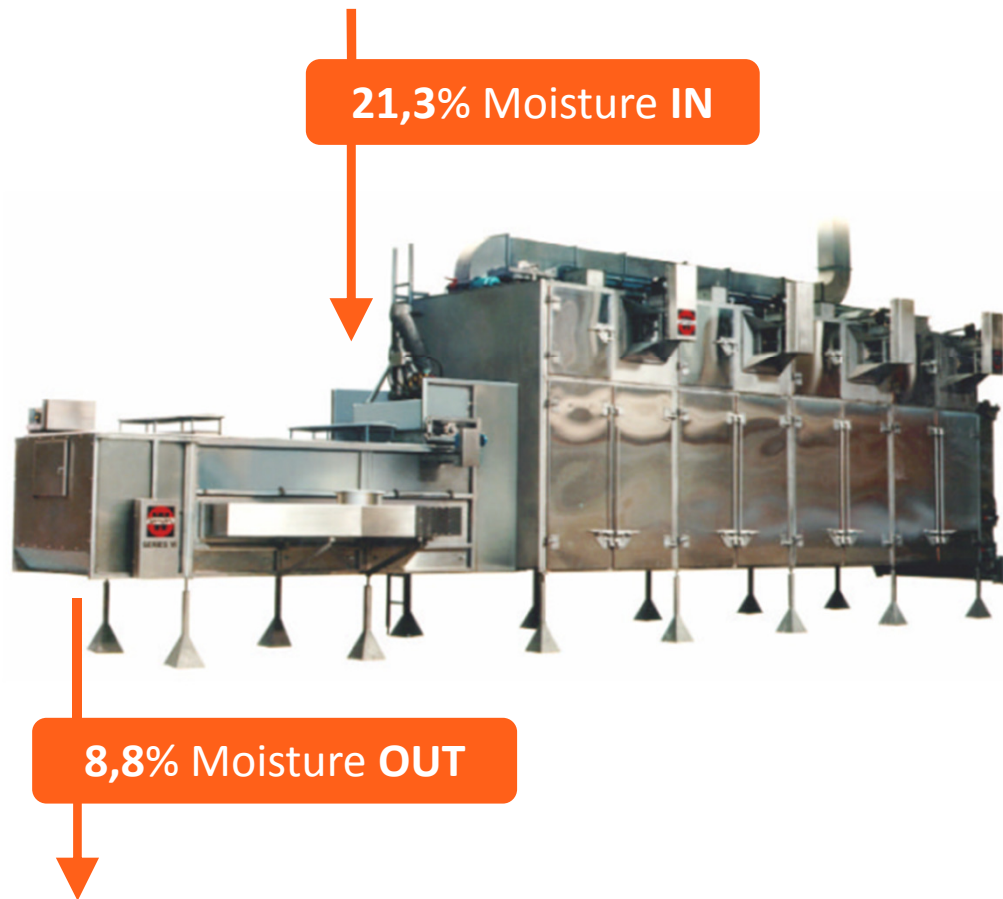
Sample before & after crushing

## NIR with product crushing technology

The sample is introduced to the NIR sensor and can afterwards be verified in the laboratory.



# Automatic drying control



$\Delta$ Moisture	XX%
Capacity	XX kg/hr
Energy requirement	XX kW/hr

Drying parameter to be adjusted

Retention time
Temperature
Air quantity

## Case study

# European petfood operation

## Effect of controlling moisture levels at petfood operation site in Europe

- Effect on extra sold product by weight
- Effect of reduced drying (energy savings)
- Effect of reduced labor for analysis



## Effect of improved moisture control - Additional sold product by weight

Parameter	Value
Annual production	200.000 ton
Average moisture saving	0.45 %
Increase in sold product by weight	841 ton/year
Selling price per ton	1.500 €/ton/year
<b>Annual savings</b>	<b>1.261.500 €/year</b>

## Effect of improved moisture control – Reduced drying energy consumed

Parameter	Value
Annual production	200.000 Mton
Average moisture saving	0.45 %
Total reduced drying by weight	841 Mton/year
Total saved energy	750.000 kW/year
<b>Annual savings</b>	<b>40.000 €/year</b>

## Total savings for petfood operation site

Parameter	Value
Additional sold product by weight	1.261.500 €/year
Savings in drying energy cost	40.000 €/year
Lab. & operator analysis cost	25.000 €/year
<b>Total annual savings</b>	<b>1.326.500 €/year</b>

Future potential technology for combining moisture and water activity measuring.

### Moisture content

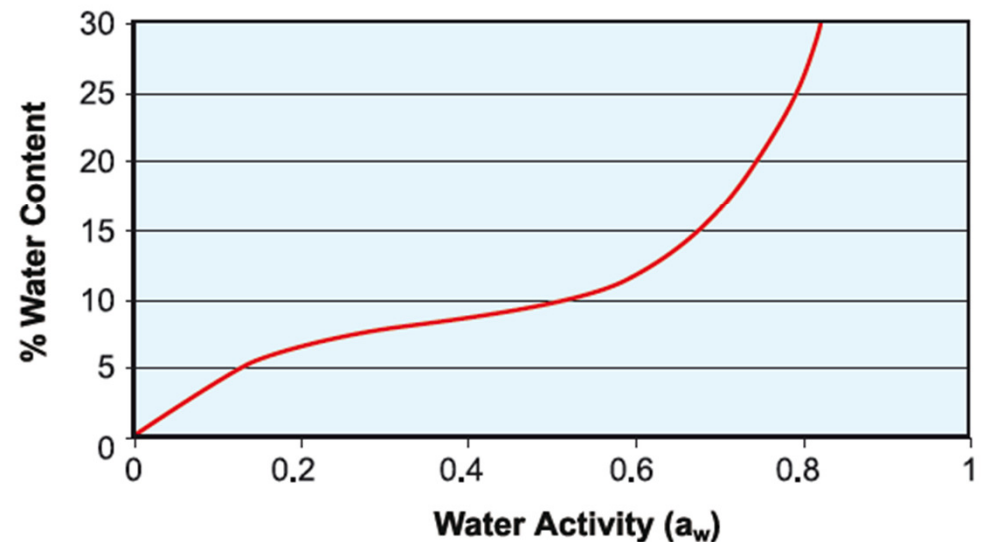
- Mold reference point
- Nutrient balance
- Volume by weight

### Water activity

- Molding control
- Product stability
- Shelf life

## Typical end target for moisture content

- Moisture set-point is typically due to avoiding potential molding of products (<9.5%)
- By measuring both moisture content and water activity the moisture content can potentially be increased 1-4%.



Tak fordi I ønskede at høre om inline proces- og energimålinger.

[WWW.SOURCETECHNOLOGY.DK](http://WWW.SOURCETECHNOLOGY.DK)

