NIR – a powerful tool for optimizing the fishmeal process

Stefan Lundgren

2017-09-15

Perten INSTRUMENTS
a PerkinElmer company

NIR = Near-InfraRed Spectroscopy

- A fast secondary method used for predicting the relative content of several constituents simultaneously.

Stefan Lundgren

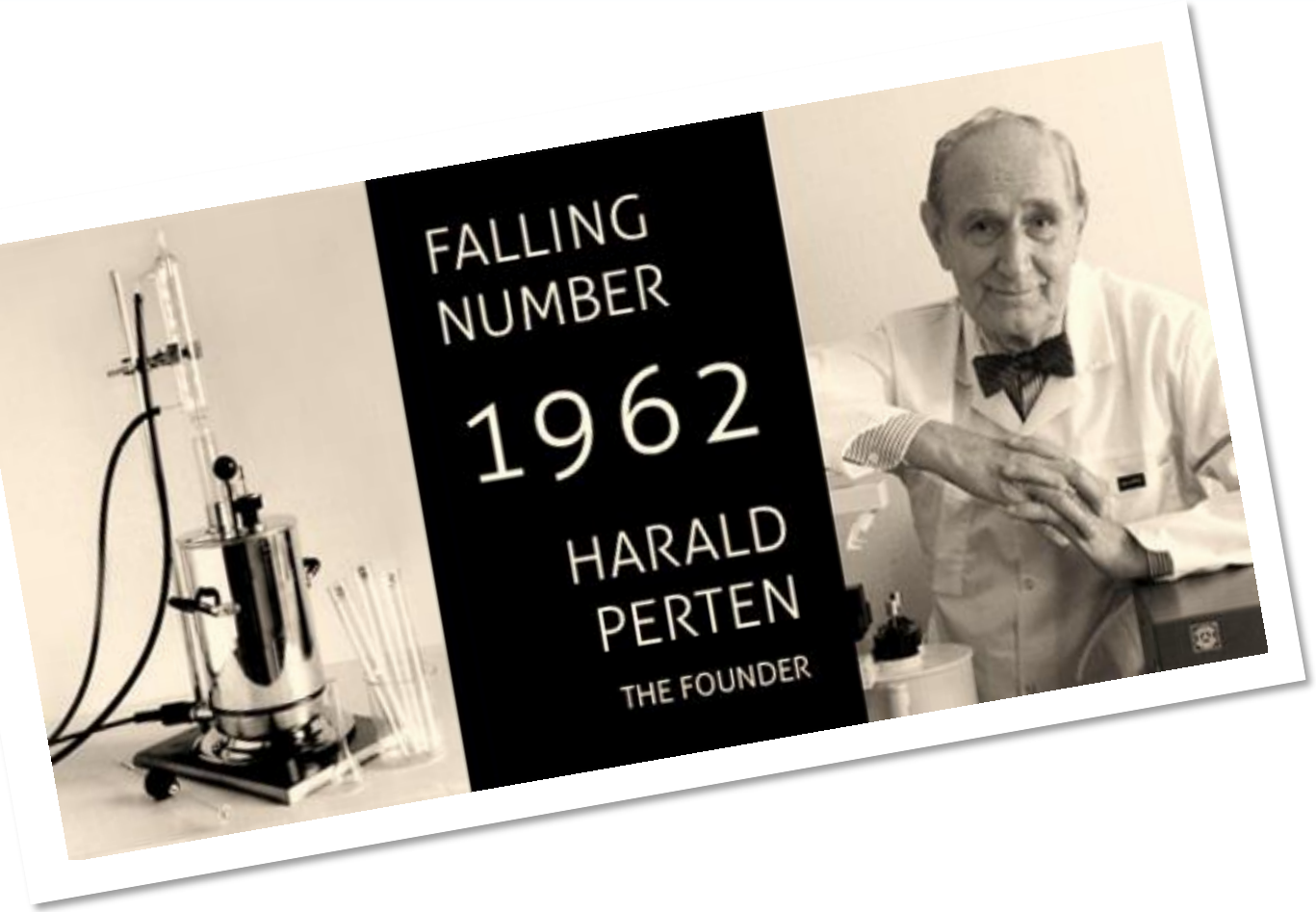
2017-09-15

Perten INSTRUMENTS
a PerkinElmer company

Agenda

- Brief introduction to Perten Instruments AB
- Purpose of using NIR for monitoring the process
- Sampling points in the production process
  - Potential Returns On Investment for NIR analyses
- Pertens range of NIR analyzers for fishmeal analysis
- Some challenges for NIR instruments
- At-line versus On-line analysis
- Challenges for online installations
- Examples of on-line installations for fishmeal

Perten INSTRUMENTS a PerkinElmer company



Our History

- Harald Perten, a cereal chemist, founded the company in 1962.

ICC

AACC INTERNATIONAL Advancing grain science worldwide

FAO FIAT PANIS

Perten INSTRUMENTS a PerkinElmer company

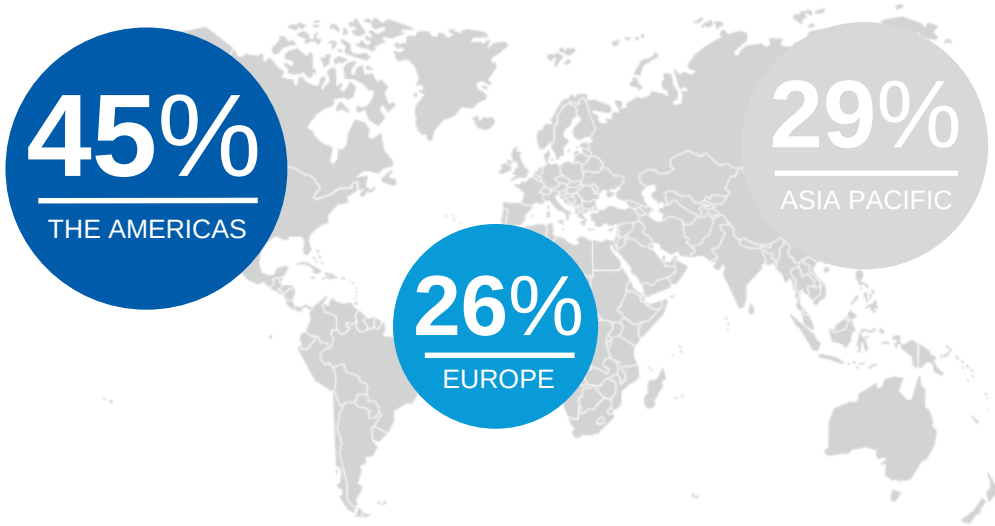
PerkinElmer At A Glance

GLOBAL TECHNOLOGY LEADER

OPERATIONS IN OVER 150 COUNTRIES

9,000 EMPLOYEES

$2.1 BILLION IN REVENUE



Perten INSTRUMENTS
a PerkinElmer company

Bioo Scientific

Food - Feed Safety

- Dairy Testing
- Microbiology/Hygiene
- Pesticides
- Mycotoxins
- Veterinary Drugs
- Ingredient Testing

- Enzyme-based Liquid Assay and Dipstick kits for Histamine in Fishmeal, *validated by AOAC!*

Perten INSTRUMENTS
a PerkinElmer company

DeltaInstruments
An Advanced Instruments Company

Protein – Fat – Lactose – Somatic Cells for the dairy industry

Analytical solutions for Agri Food Industries

Grain

Flour

Food

Feed

Perten INSTRUMENTS
a PerkinElmer company

Compositional analysis

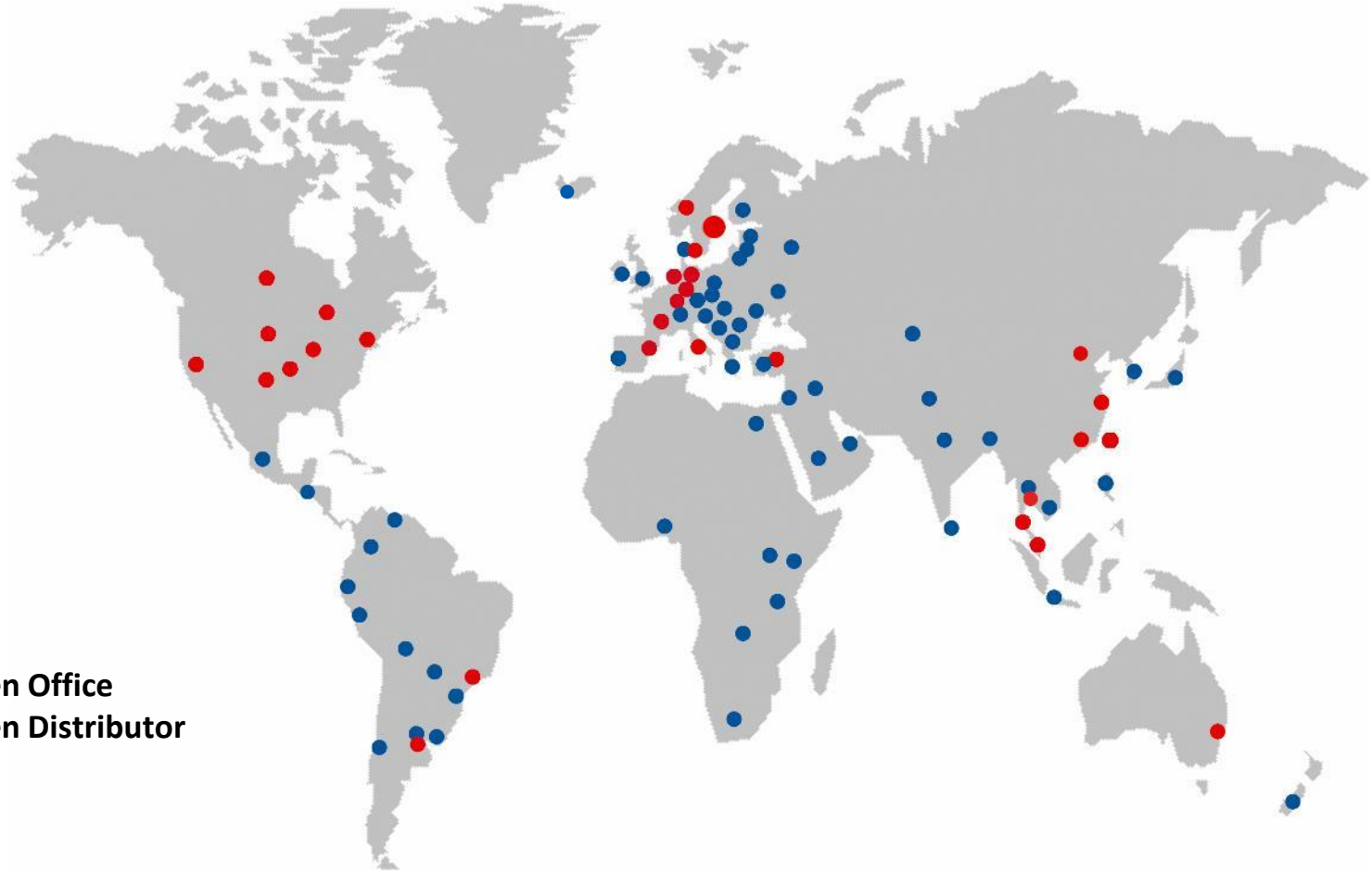
Perten INSTRUMENTS
a PerkinElmer company

Functional analysis

Perten INSTRUMENTS
a PerkinElmer company

Global presence

With distributors we cover more than 100 countries around the world.



Perten INSTRUMENTS
a PerkinElmer company

Purpose of using NIR

To get the information when it's needed
…and use it for making a difference to the process or product quality as it's needed.

Perten INSTRUMENTS
a PerkinElmer company

Why use NIR in production control

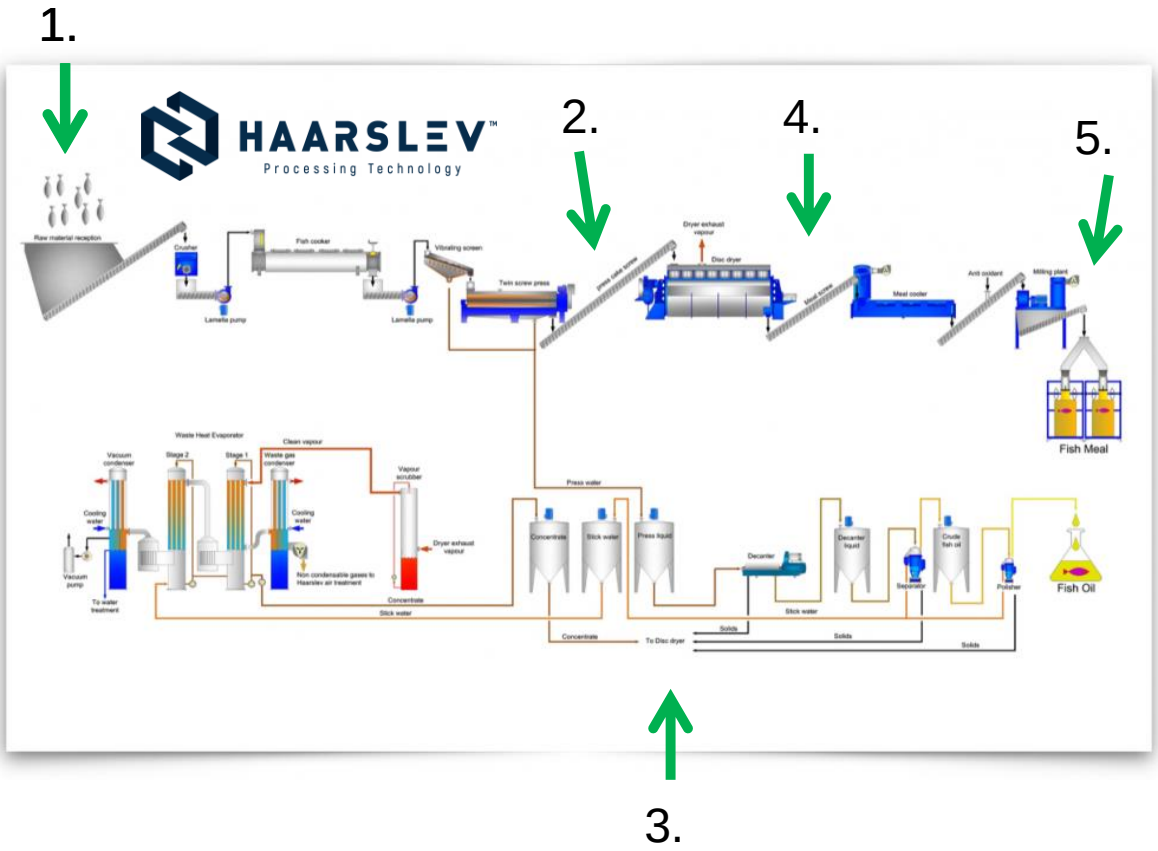
- NIR analysis is easy
  - (For some instruments and products) Grind the sample
  - Fill the cup or dish
  - Select product
  - Start analysis

  10-60 seconds later:

  - Get your results
- Anyone can use it

Perten INSTRUMENTS
a PerkinElmer company

Sampling points for NIR analyses



1. Raw materials
   (DM, Fat, Salt, TVN)
2. Presscake
   (Fat, Moisture)
3. Grax
   (Fat, Moisture)
4. Dryer/s
   (Moisture)
5. Finished product
   (Moisture, Protein, Fat, Salt, Ash, TVN, Cadaverine, Histamine)

Courtesy of Haarslev Industries A/S

Perten INSTRUMENTS
a PerkinElmer company

Perten's range of NIR Analyzers

- At-line analysis – DA 7250 Benchtop

Perten INSTRUMENTS
a PerkinElmer company

DA 7250 NIR Feed Analyzer

- 3rd generation diode array NIR from Perten
- Designed for feed and food applications
- 6-second analysis
- Stand-alone analyzer with touch screen
- *Anything, Anywhere, Anytime, Anyone!*

Perten INSTRUMENTS
a PerkinElmer company

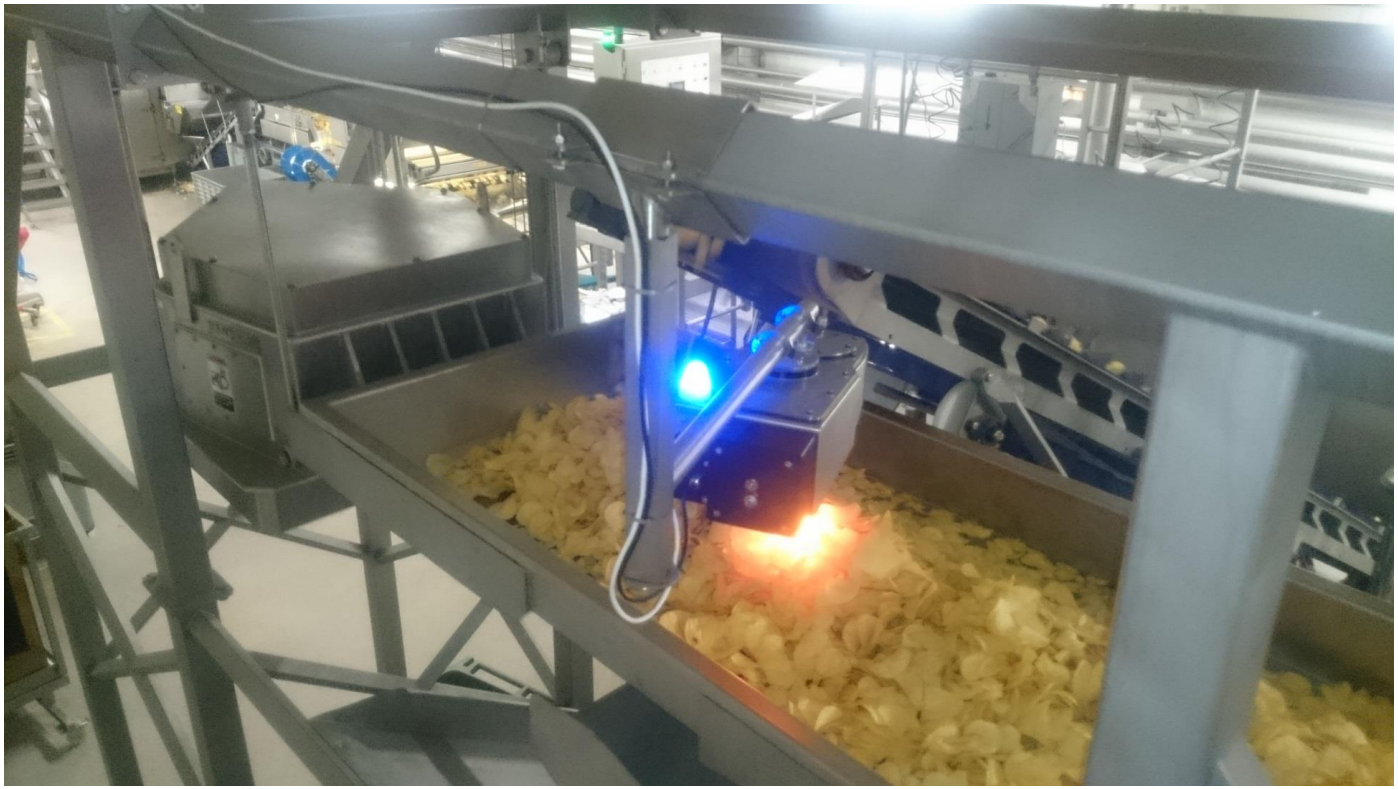
Perten's range of NIR Analyzers

- In-line analysis – DA 7300 Process Analyzer

Perten INSTRUMENTS
a PerkinElmer company

Perten's range of NIR Analyzers

- On-line analysis – DA 7440 Process Sensor



Perten INSTRUMENTS
a PerkinElmer company

Challenges for NIR instruments

- Variations in raw material – Fish species
  - Full spectrum detectors vs filter-based detectors

Some challenges for NIR instruments

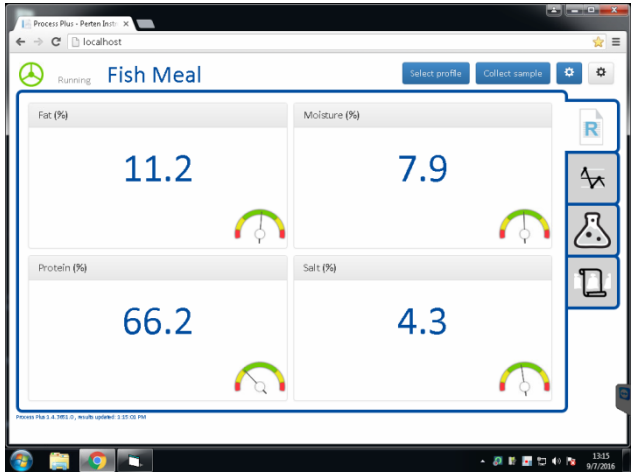
- Variations in raw material – Fish species
  - Full spectrum detectors vs filter-based detectors
  - Calibration models – Honigs Regression
    - Finding similar samples in a large database of fishmeal materials

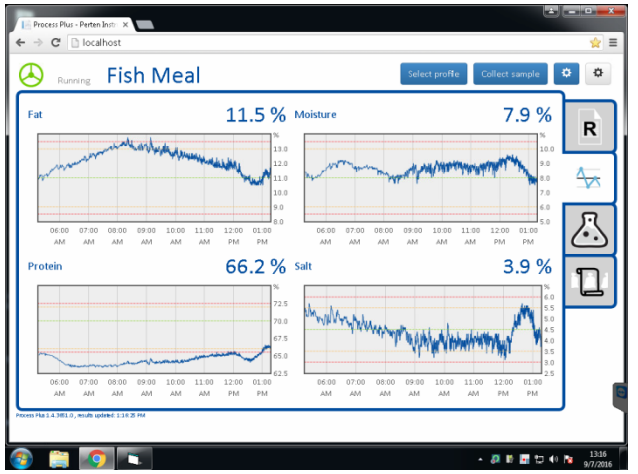
Some challenges for NIR instruments

- Variations in raw material – Fish species
  - Full spectrum detectors vs filter-based detectors
  - Calibration models – Honigs Regression
    - Finding similar samples in a large database of fishmeal materials
- Varying sample temperature
  - Temperature correction – External Parameter Orthogonalization (EPO)

At-line versus On-line analysis

- At-line is more flexible
  - Will service several control points
  - Shows situation at that moment
- In-/On- Line gives a continuous view of the process
  - One sensor per control point
  - Clearer view of trends
  - Sudden changes can be adressed as they happen
  - Complete batch history (Mean, SD, Min, Max)





Perten INSTRUMENTS
a PerkinElmer company

Challenges for online installations

- Access to material and sample presentation
  - Between two transport screws (augers)
  - Between chute and transport screw
  - In transport screw
- Sample temperature
  - Typically 80 – 90 ℃ after press and dryers
- Calibration models
  - Perten NIR analyzers share calibration models
  - Online sensors adjusted to correlate with laboratory NIR

DA 7440 mounted after second dryer

Perten INSTRUMENTS
a PerkinElmer company

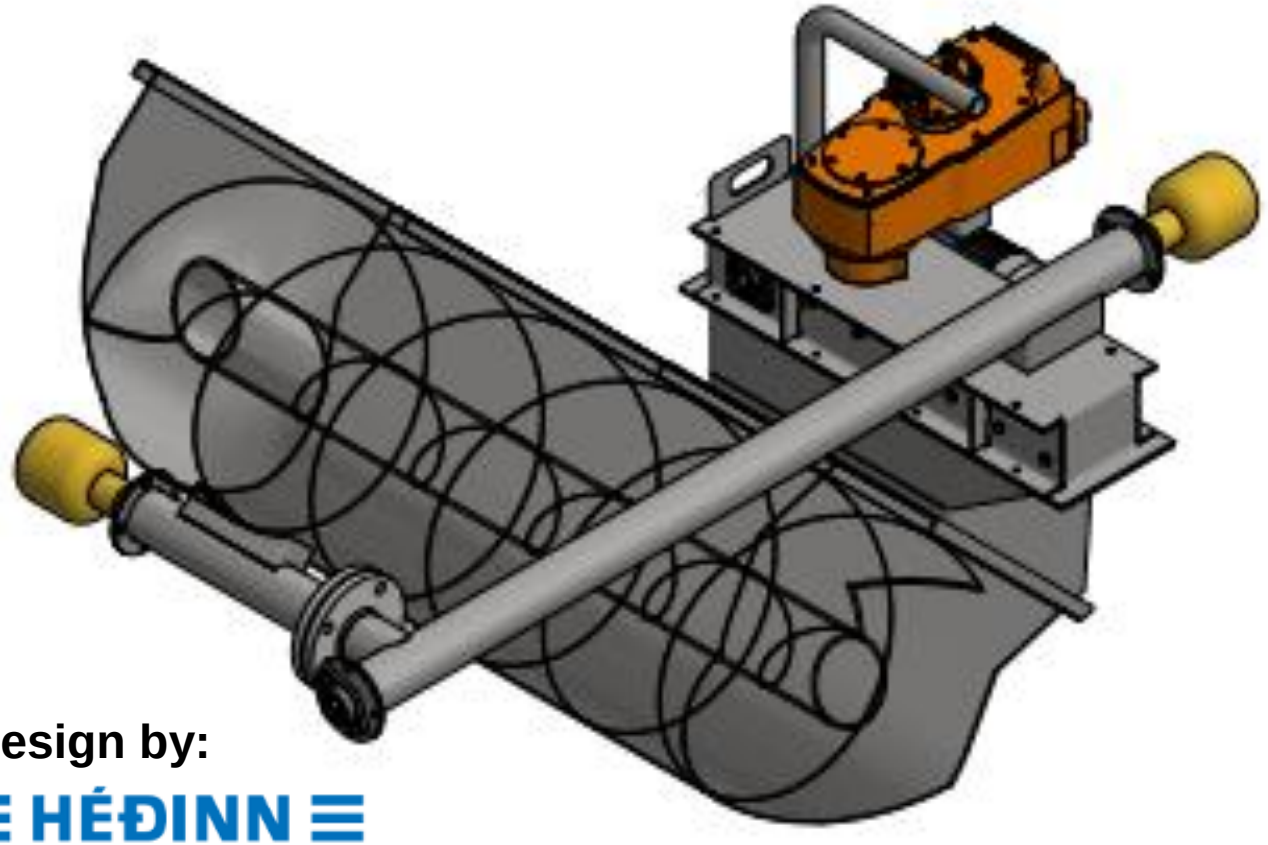
Sampling conveyor

Perten INSTRUMENTS
a PerkinElmer company

In a transport screw

Perten INSTRUMENTS
a PerkinElmer company

In a transport screw



Design by:

HÉÐINN

Stefan Lundgren

slundgren@perten.com

+46-703-920120

Perten INSTRUMENTS
a PerkinElmer company


Perten
INSTRUMENTS
a PerkinElmer company