



# Observations for a better world

Hemiselluloosan tehokas hyödyntäminen biojalostuksessa,  
EAKR hanke A75825 seminaari

**VAISALA**



**As our world faces pressing societal  
and environmental challenges...**

**VAISALA**

**...it's more important than ever  
to base decisions on accurate and  
reliable data.**

# Take action, find answers and remove doubts with our measurement solutions



## Weather and Environment

Serves selected environmental and weather-dependent markets where accurate, real-time, uninterrupted, and reliable information is essential to run efficient operations and make informed decisions.



## Industrial Measurements

Provides accurate and reliable measurement instruments and systems to optimize processes, improve efficiency and productivity, minimize energy consumption, and ensure product quality.

# Vaisala in numbers

Net sales in 2021

**437.9**  
MEUR

**13%**

of net sales  
invested  
into R&D

**1900+**

employees  
worldwide

**25+**

offices in

**16**

countries

**300+**

product  
families

Business  
in over

**150**

countries

Employee  
engagement index

**4.14 / 5**

**100%**

renewable  
electricity



# Science-based innovations are the core of Vaisala

- 29% of employees working in Research & Development
- State-of-the-art in-house cleanroom
- Collaboration in the scientific community
- New R&D and innovation center opened in 2021

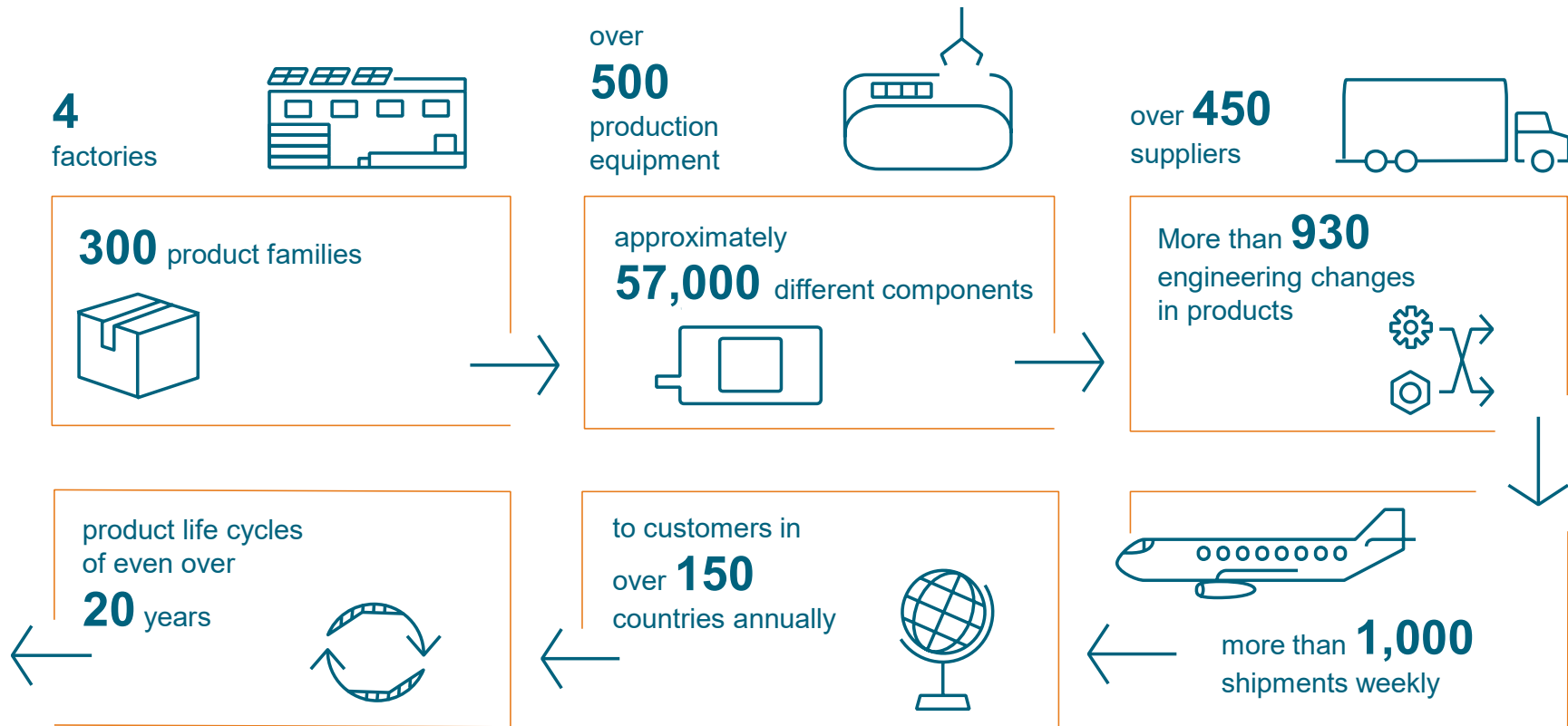
## Significant R&D investments



# Serving customers all over the world



# Operations sources, manufactures, and ships all of our products





**Maximizing our positive handprint through strong  
commitment to sustainability**

**VAISALA**

# Maximizing our positive handprint through strong commitment to sustainability

## Sustainable solutions

- Reliable decisions
- Productivity
- Quality
- Better-informed societies
- Resource efficiency
- Safety

## Sustainable business practices

- Sustainable product design and long product life cycles
- Resource efficiency and use of renewable energy in our facilities
- Occupational health and safety
- Diversity and inclusiveness
- Managing human rights risks
- Zero tolerance towards corruption



# Hemiselluloosan tehokas hyödyntäminen biojalostuksessa

Vaisala Liquid Measurements

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# Vaisala K-PATENTS® Process Refractometer

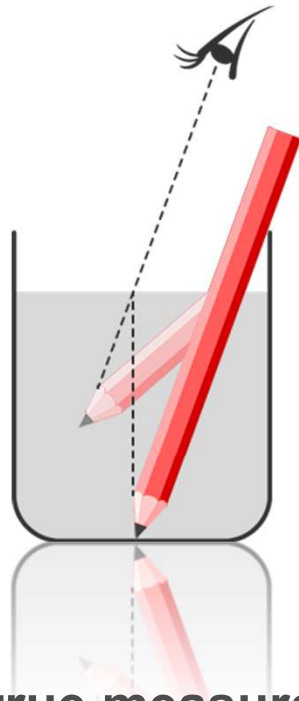
The best way to measure concentrations



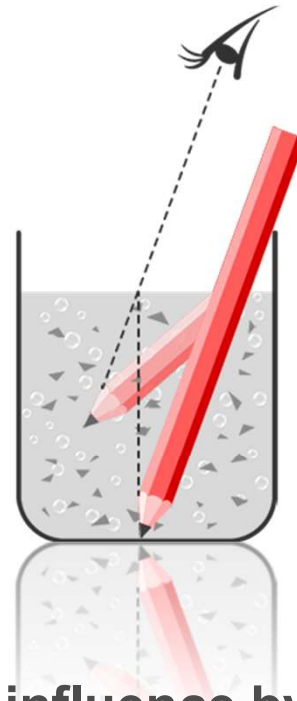
- Accurate
- No calibration drift
- Maintenance free

# Principle

Refractive Index  $n_D$  measurement

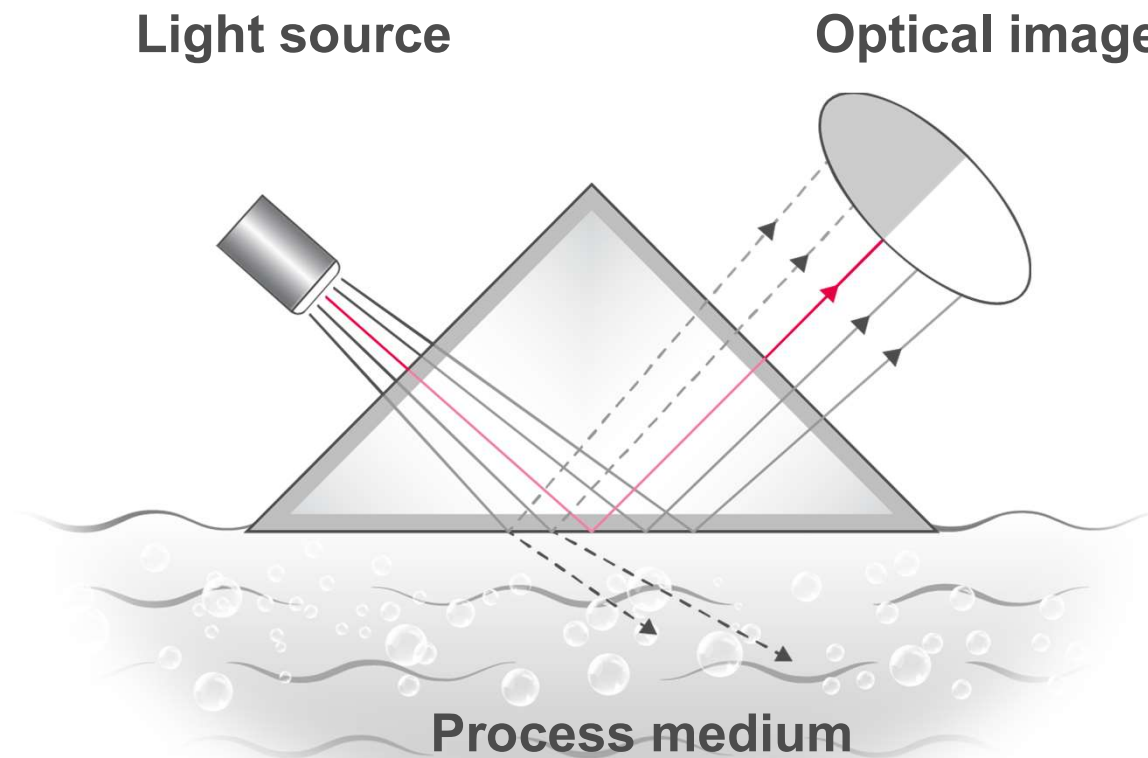


**The only true measurement  
of dissolved components**



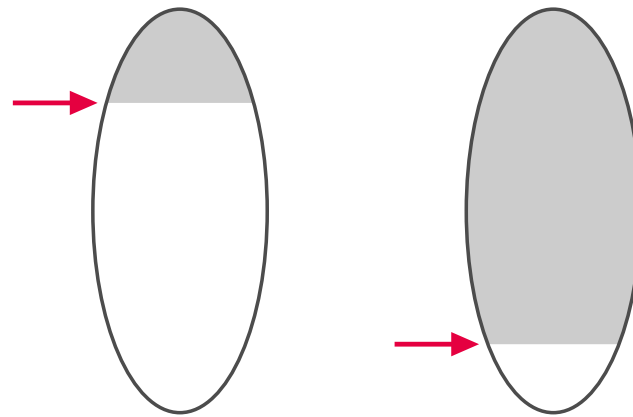
**No influence by particles  
or bubbles**

# Critical Angle Measurement





# Borderline Measurement

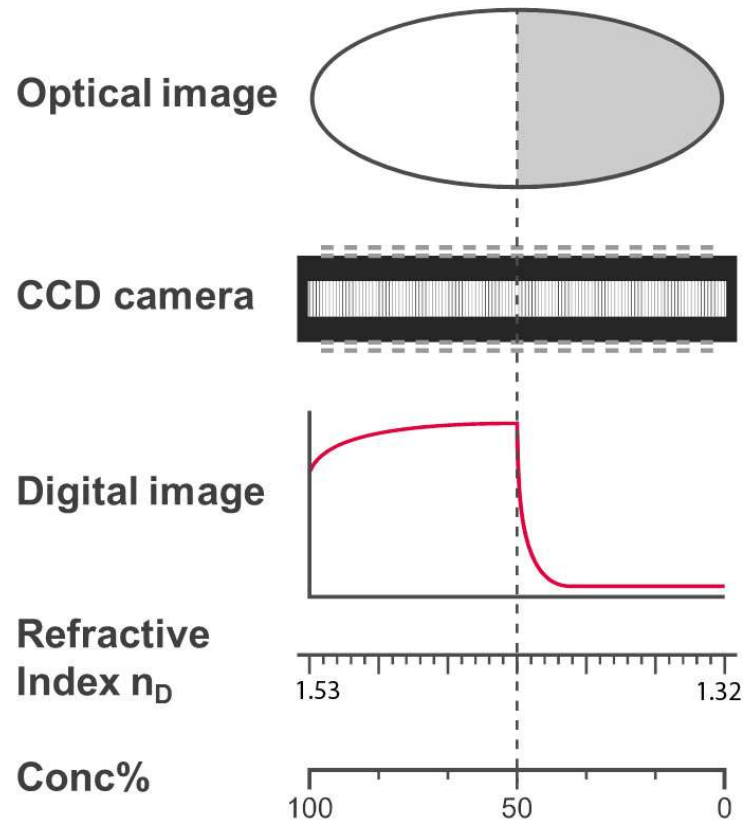


Low concentration      High concentration

Optical images

# Digital Camera

No drift possible

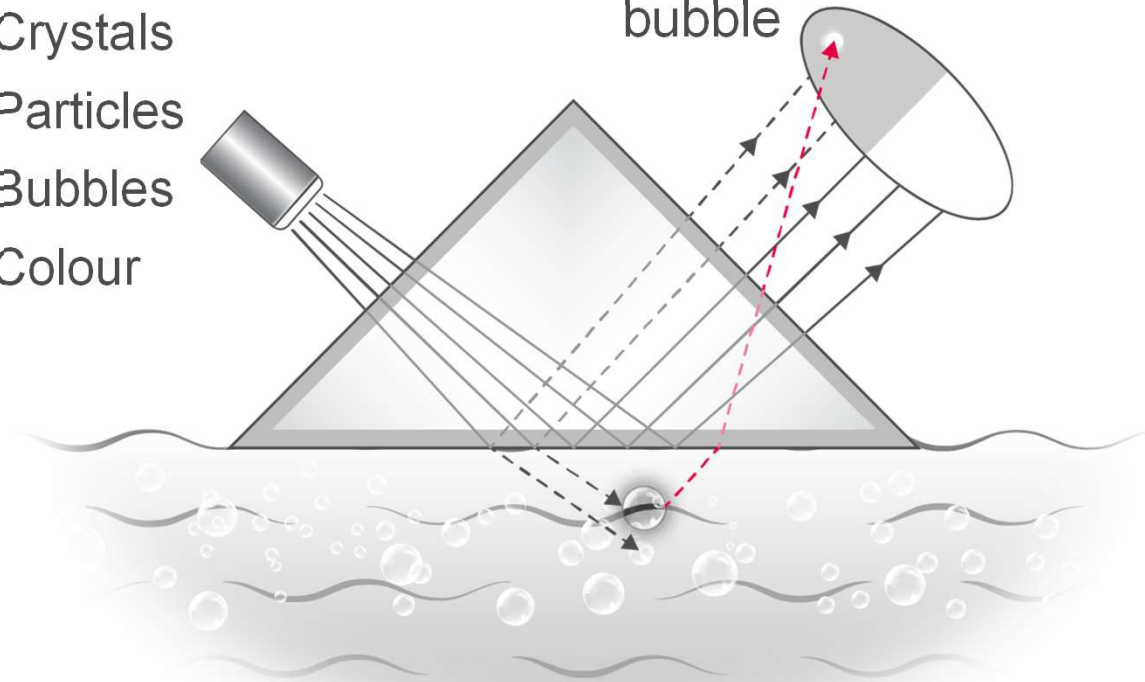


# No Measurement Error

Caused by:

- Crystals
- Particles
- Bubbles
- Colour

Light reflected from a bubble

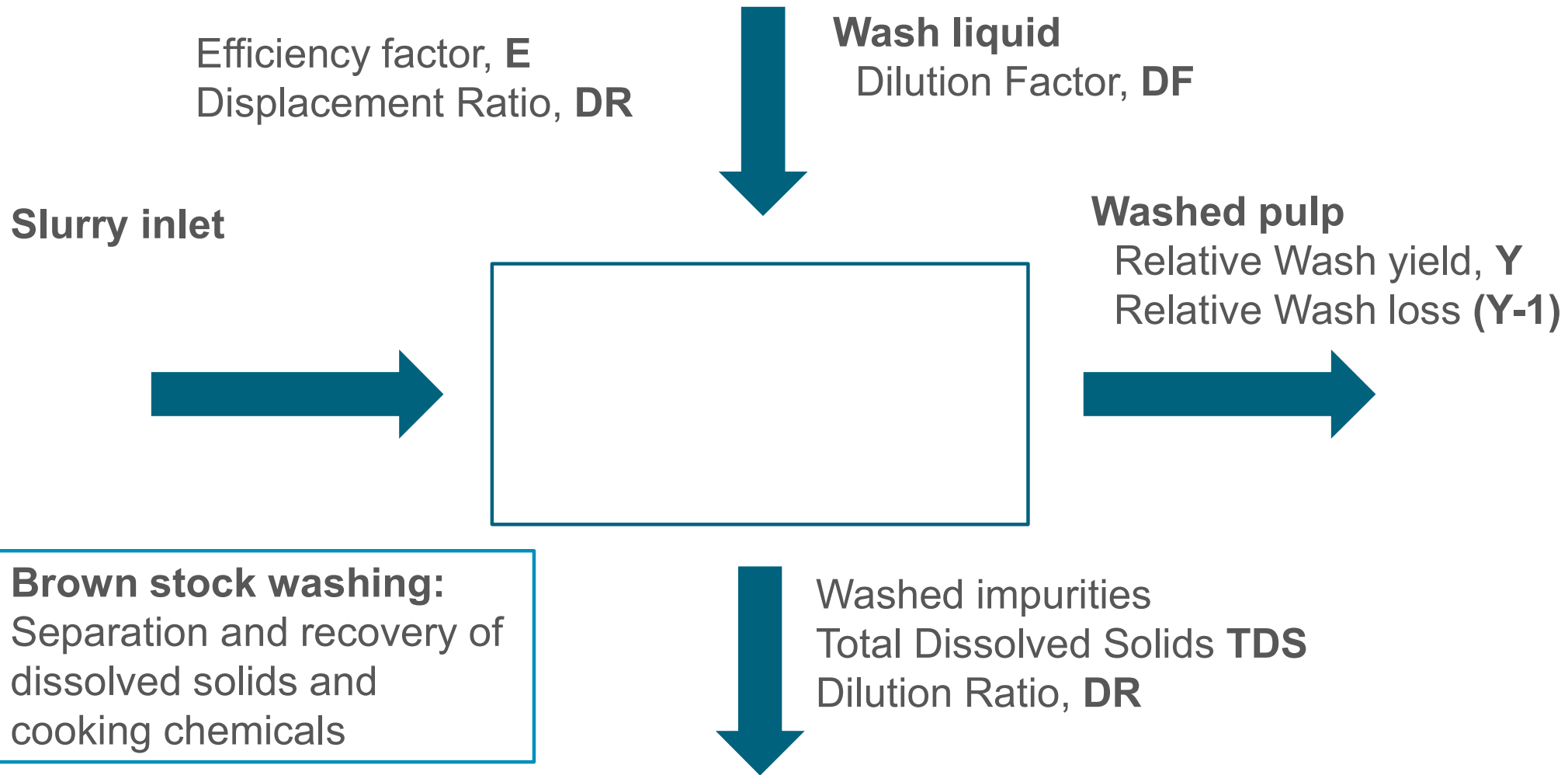


## SAFE DRIVE™ PROCESS REFRACTOMETER PR-23-SD

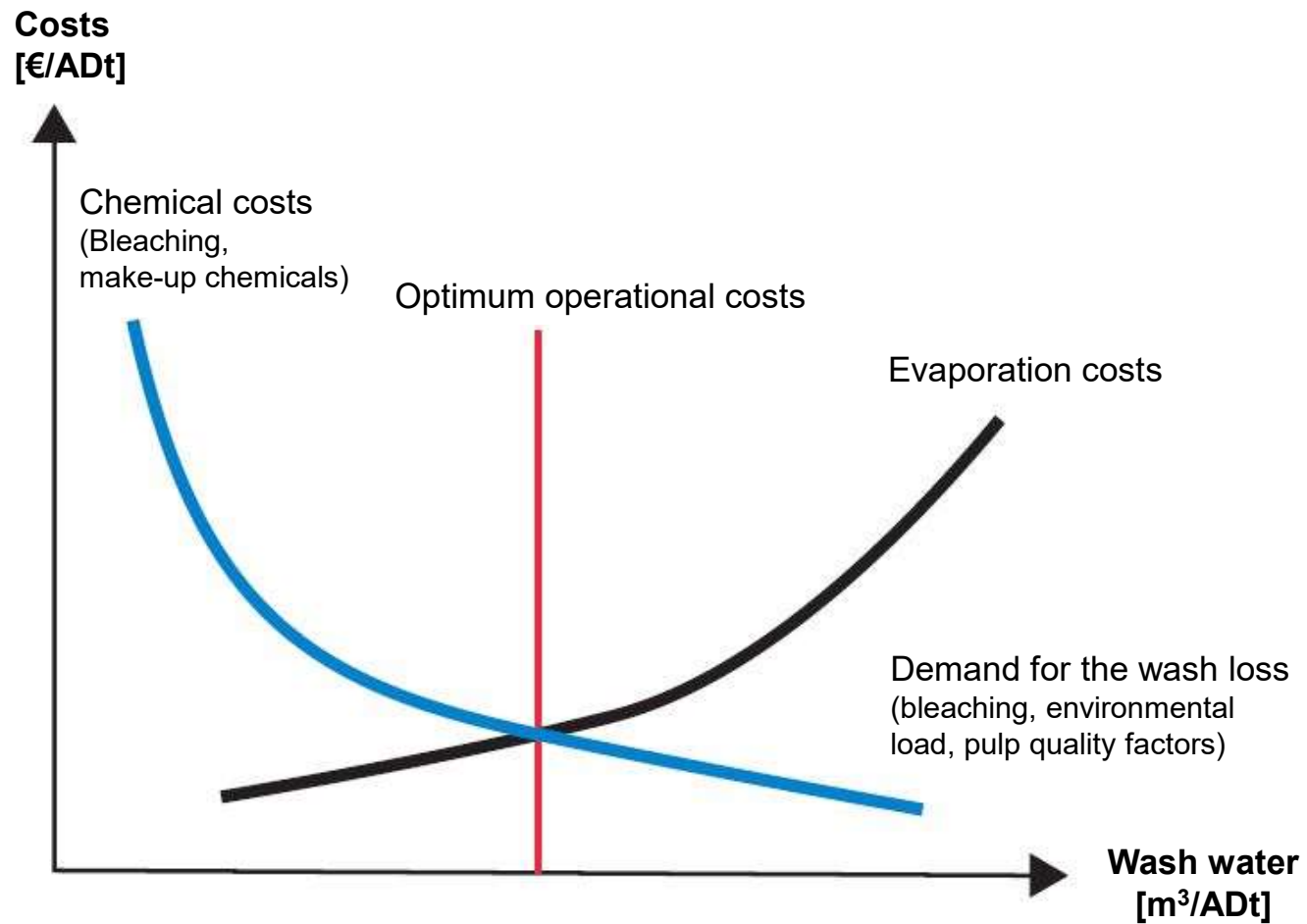
For Digester, Brown Stock Washing and Oxygen Delignification Optimization

- Accurate, reliable and continuous inline **TDS measurements**, for better control and continuous optimization of cooking and washing stages
- **Improved economics and environmental performance** of cooking and washing process





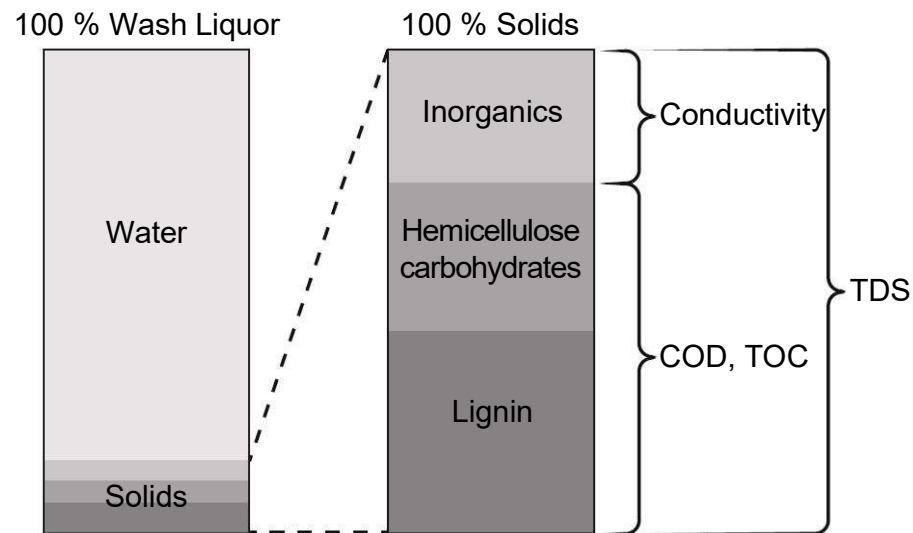
# USE OF WASH WATER AND COSTS





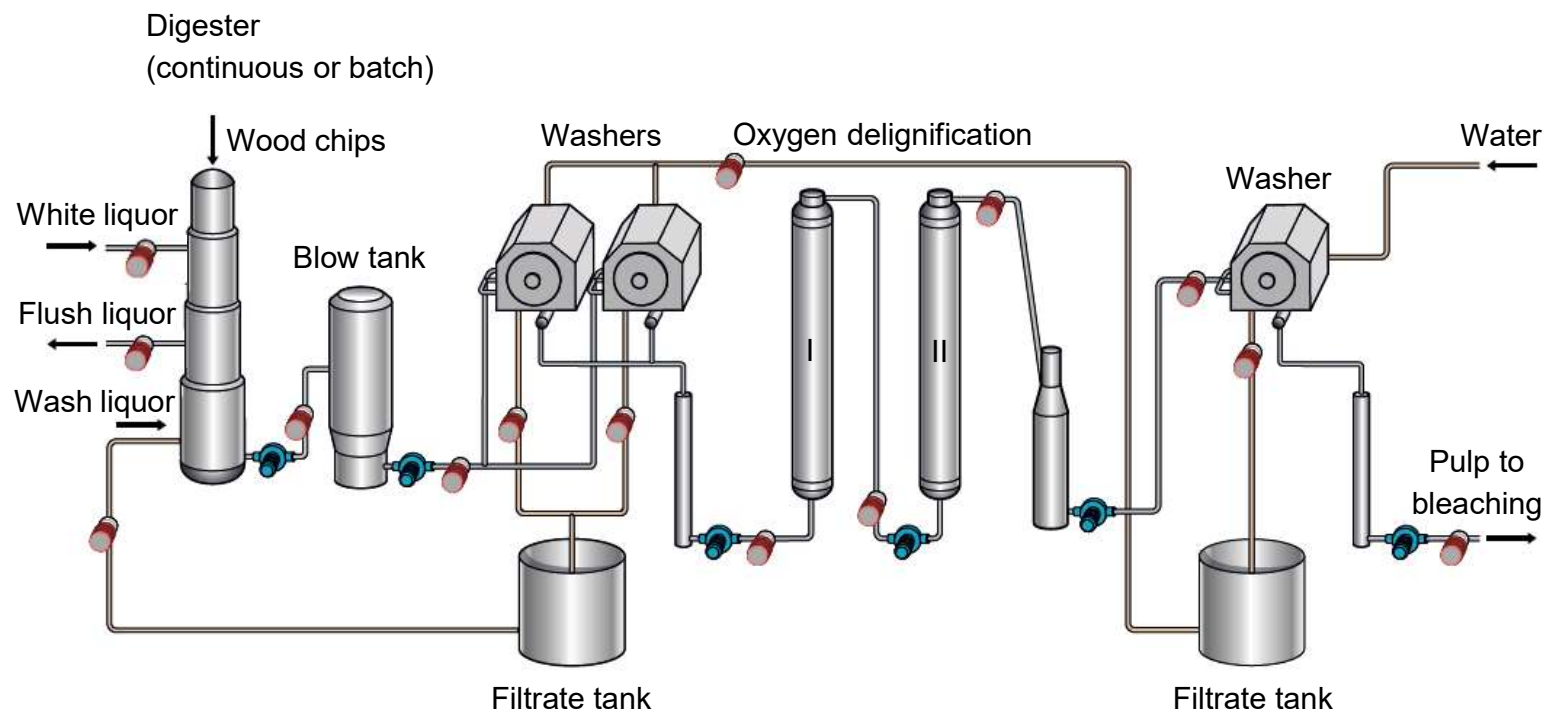
## INLINE TDS MEASUREMENTS

- Monitoring and optimizing washing efficiency requires **accurate, reliable, continuous and real time wash loss measurements**.
- **Real wash loss measurements** should account for the dissolved organic and inorganic fraction in the pulp suspension.



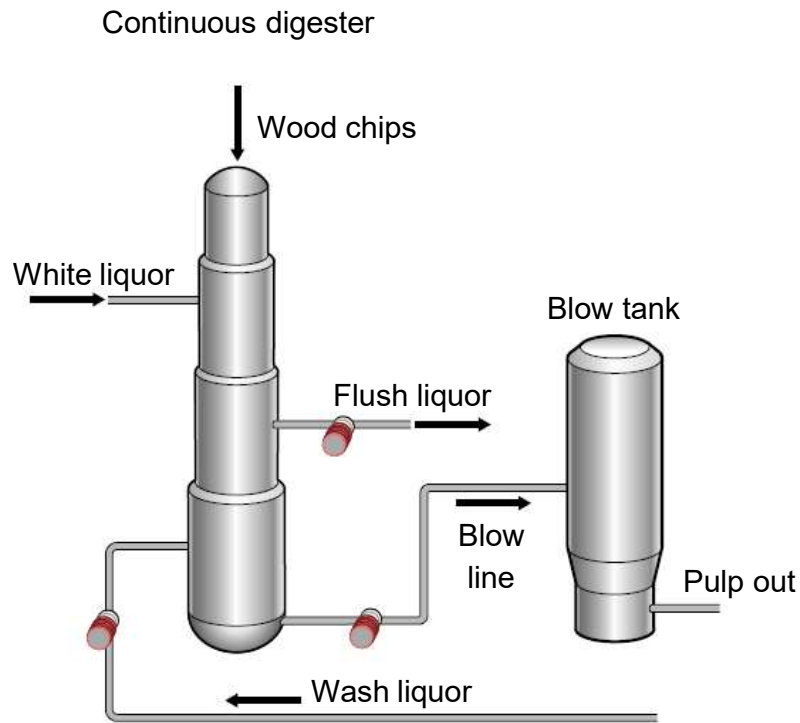
## TDS MEASUREMENTS FOR BSW allow better control and operation

- Continuous monitoring of individual process steps

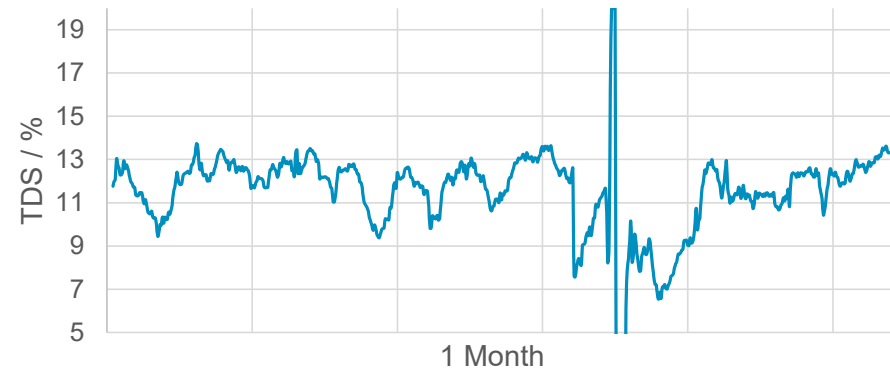


# CONTINUOUS DIGESTER

## benefits of controlling the digester washing zone and blow line



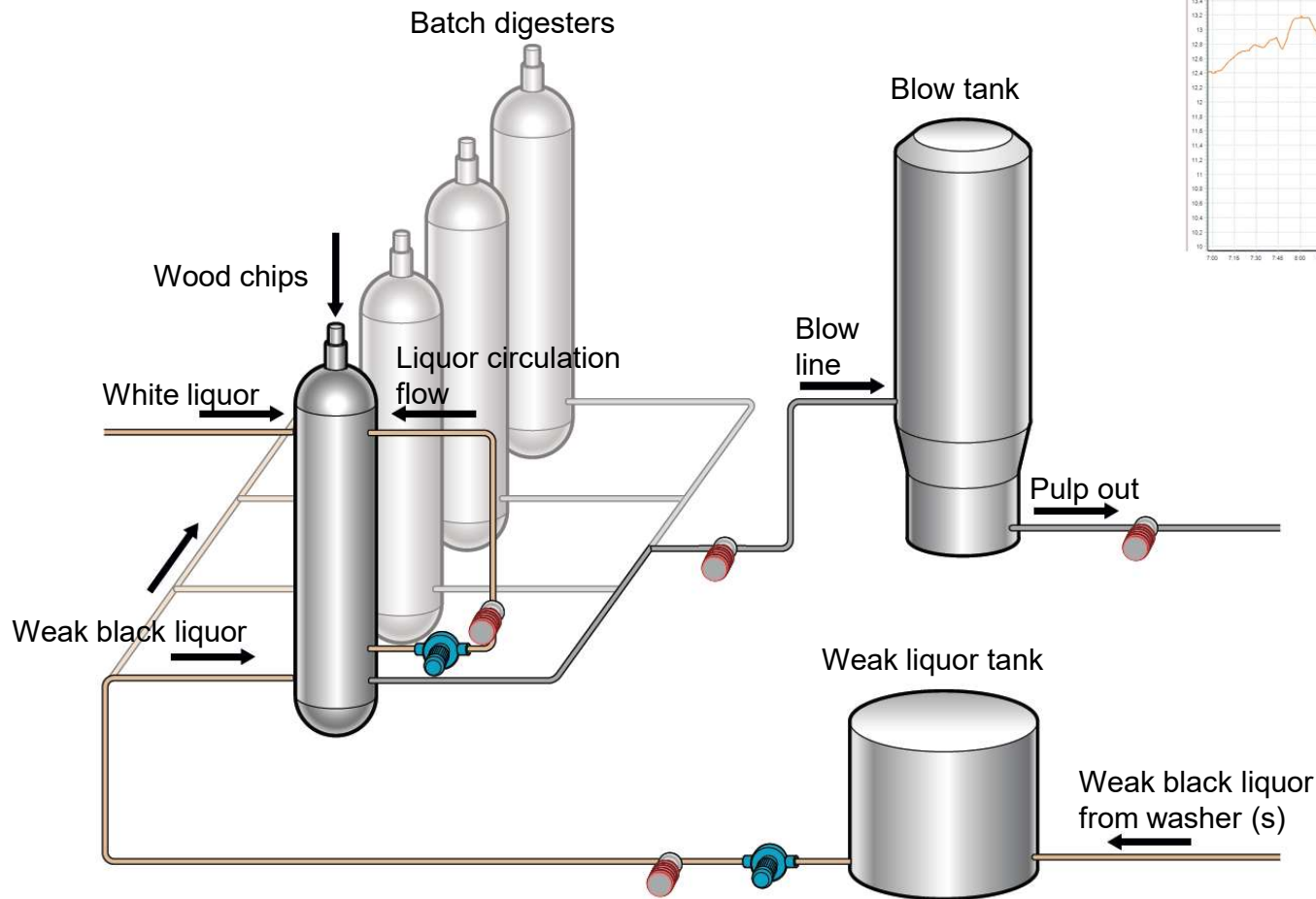
SAFE DRIVE™ PR-23-SD



- TDS measurements enable control of the efficiency of the digester cooking and washing zone
- Enable monitoring the performance of the digester
- Facilitate the calculation of mass balances in the washing zone
- Aid in the creation of operation models for the digester

# BATCH DIGESTER

## benefits of controlling liquor circulation



- Quick response to process changes
- Prevent disturbances from being carried over into subsequent stages
- Process variables such as DF can be optimized in accordance with the feed pulp properties
- Mass balances can be monitored.

## TDS MEASUREMENTS

### benefits of controlling pulp discharge to bleaching



- Enables monitoring the success of the washing operation
- Low wash loss in the pulp suspension, better pulp quality
- Reduced amount of chemicals required in the bleaching stage
- Reduced costs of effluent treatment plant, improved environmental performance

## PERFORMANCE FEATURES

### SAFE-DRIVE™ Process Refractometer PR-23-SD

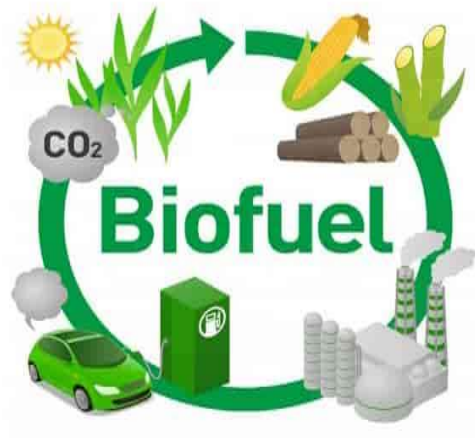
- Indicates TDS in solution, suitable for all concentrations
- Measures precise concentration of liquid substances
- Detects organic materials with large molecular size, such as lignin
- Not influenced by COD caused by methanol
- In-line, real-time measurement, immediate response time, suitable for control
- Mounts directly in the pulp line
- Low operating costs, maintenance-free





# Renewable biofuels and biochemicals are the future

- Bioethanol
- Biodiesel
- Biomethanol
- Biobutanol
- Bioglycol
- Bioglyserol
- Bioglyserine
- Bioammonia
- Biomethane
- etc



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