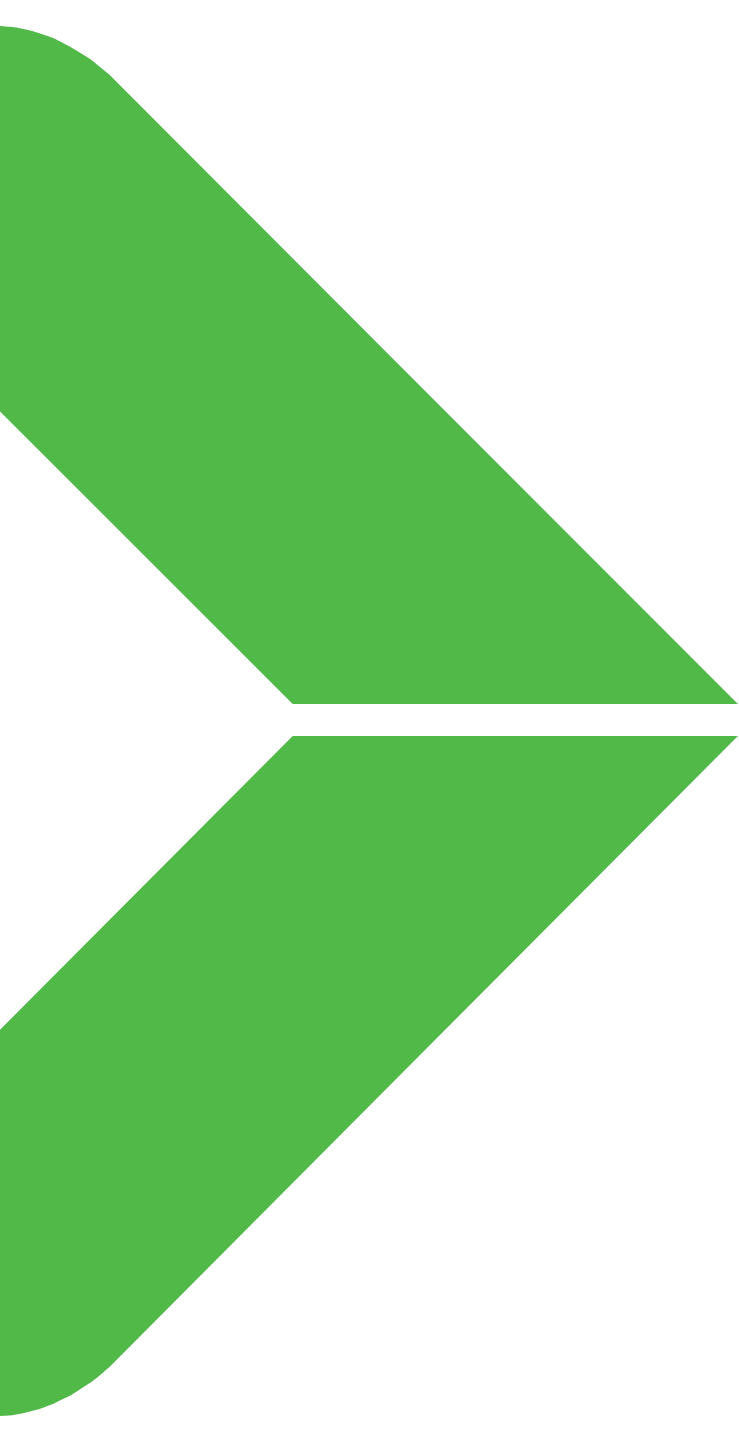


Challenging the conventions in wastewater management

Valmet Automation

Harri Kohonen



Challenging the conventions in wastewater management

Purpose-designed technology for
wastewater applications

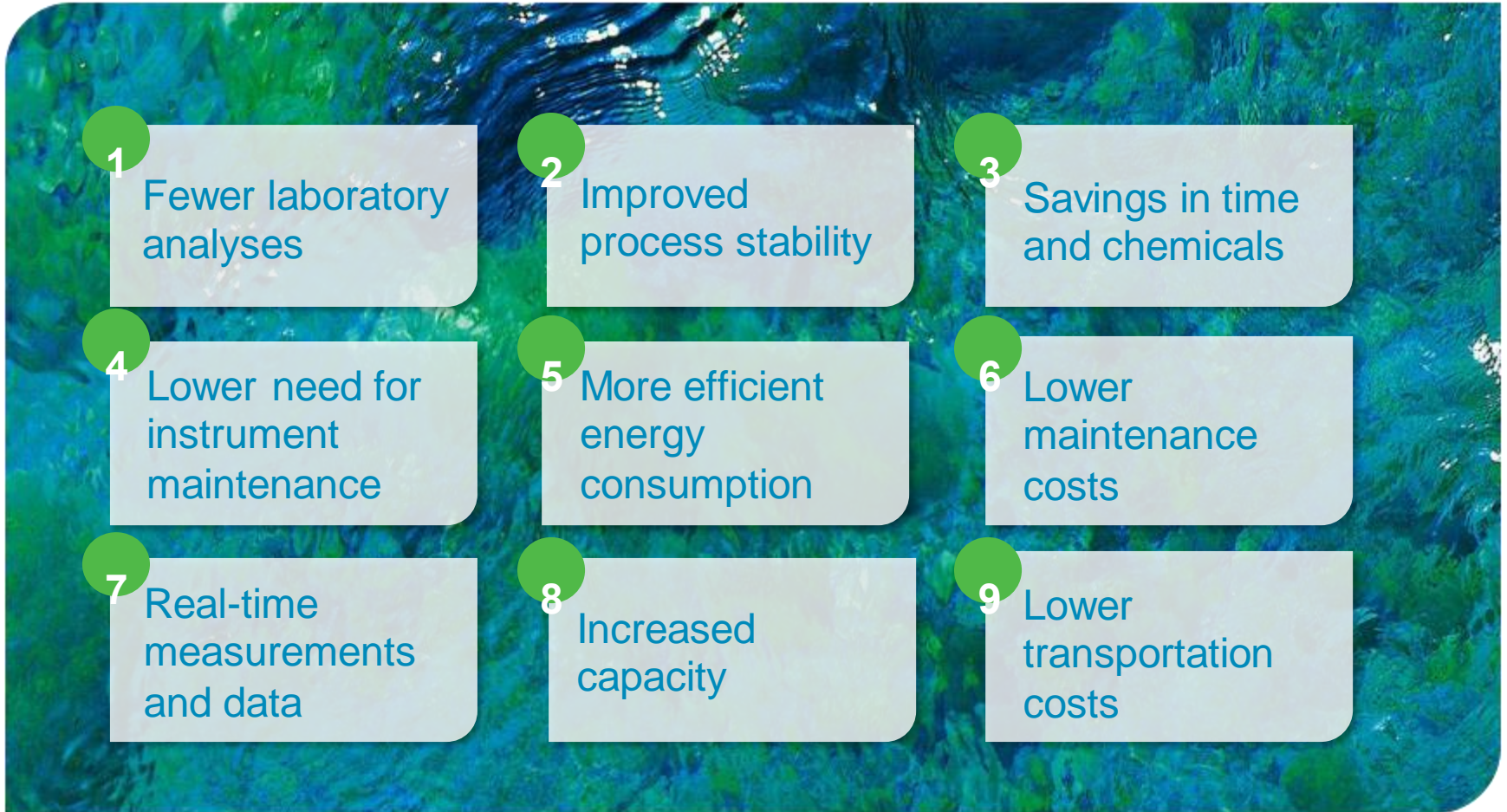
Harri Kohonen

VALMET clients have achieved even:

- **USD1.2 m illion/year savings**
- **up to 50% less polymer at sludge dewatering**
- **50% less circulating material inside the plant**
- **Hundreds of tons' reduction in CO₂ emissions**
- **Improved measurement accuracy**

Pay back time even couple of months

Real value for municipal and industrial wastewater plants



Over 40 years experience of industrial solid measurements, more than 4000 references

Valmet has taken decisive steps to develop global wastewater processing know-how based knowhow of industrial solid measurements. Leading pulp and paper mills have benefitted from our measurement solutions since the 1970's.

1970's

Mechanical consistency measurement



1980's

Optical low-consistency measurement



1990's

Microwave technology



Over 2000 wastewater references globally

As the market leader, Valmet has continuously improved and developed its solutions.

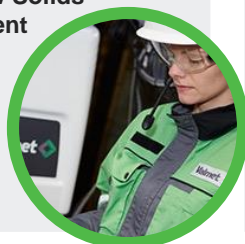
2006

Valmet Total Solids Measurement



2011

Valmet Low Solids Measurement



2014

Valmet Sampler



2018

Valmet High Solids Measurement



2008

Valmet Total Solids High-pressure



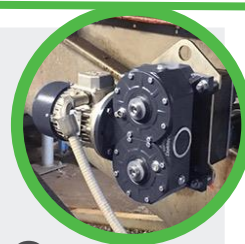
2013

Valmet Sludge Dewatering Optimizer



2016

Valmet Dry Solids Measurement



2019

Valmet Total Solids Measurement (4th Generation)



Analyzer and Measurement Solutions Portfolio

MEASUREMENTS



Valmet MCA
Microwave-based total consistency measurement for demanding applications



Valmet Rotary
Shear force based consistency transmitter especially for chemical pulp mills and bleaching applications at RCF and mechanical pulping



Valmet SP
Blade type transmitter for wide range of consistency applications



Valmet OC
Optical consistency transmitter for many fiber consistency applications with operating range of 0 to 7%



Valmet LC
Optical consistency transmitter for low consistency applications



Valmet Conductivity Measurement
Conductivity, concentration, cooking liquor and caustic measurements for demanding applications



Valmet T5
Reusable total solids measurement for municipal wastewater treatment plants



Valmet LS
Optical total suspended solids measurement for municipal wastewater treatment plants



Valmet Nove and Nove H
Reliable sampling for all pulp graders. New with cutting edge pistons



Valmet Dry Solids Measurement
Microwave-based dry cake total solids measurement for municipal wastewater treatment plants



Valmet HS
Microwave based High Solid dry cake total solids measurement



Valmet SDO
Sludge Dewatering optimizer

ANALYZERS



Valmet Kappa QC
On-line kappa, brightness and fiber/shives analyzer for chemical pulping control



Valmet Piston & Valmet Screen Extractor
Filtrate sampler for continuous fiber-free sampling



Valmet AT
Automatic online titrator for ClO₂ process management



Valmet Alkali R
Valmet Recovery Liquor Analyzer is modular analyzer concept for chemical recovery process. Green liquor, lime milk, white liquor alkali analyses and recovery boiler reduction degree analysis based on standard laboratory titrations



Valmet Cormec X
Inline brightness sensor for chemical, DIP- and mechanical pulping applications. Also industrial mineral model available.



Valmet PolaroS
Inline chemical residual sensor



Valmet Chip 'n' Bark Moisture Analyzer
A continuous chip moisture measurement to improve digester operation and cooking liquor dosage control



Valmet PolaroS F/FP
Online total/active peroxide and ClO₂, chemical residual sensor



Valmet MAP
Fast and reliable online pulp analyzer for freeness, fiber property and shive content measurement for control applications



Valmet RM3
Total and true ash consistency measurement, ideal for wet end monitoring and control



Valmet WEM
Modular, multiline analyzer for wet end management includes charge, consistency, chemistry and turbidity measurements



Valmet Corroded Valmet Corrosion Reduction Analyzer
Measures from bio power boiler flue gas total chlorine- and sulphur concentration and calculates S/Cl molar ratio for superheater corrosion risk evaluation



Valmet Alkali C
Valmet cooking liquor analyzer is modular analyzer concept for cooking process. White- and black liquor alkali analyses based on standard laboratory titrations.



Valmet DCD
Automatic dirt count analyzer of dry pulp sheets



Valmet Pulp Expert
Fully automatic online analyzer for complete pulp quality specification



Valmet F55
Analyzer for the advanced measurements of fiber properties.



Valmet Paper Lab
Automated paper and board testing analyzer with wide selection of industry standard tests



Valmet Fractionator
Automated laboratory fractionator, e.g. to replace Bauer-McNett.



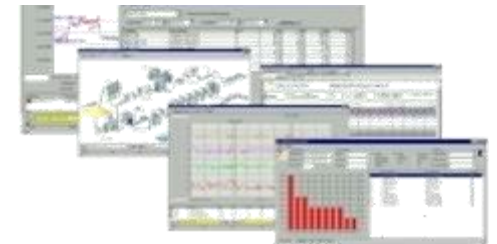
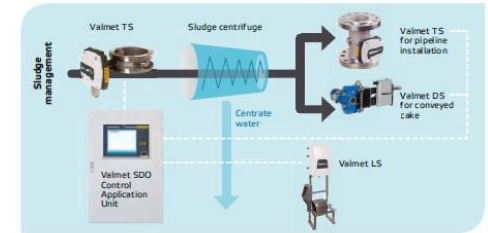
Valmet MR
Moisture analysis for pulp and paper, biofuel and minerals



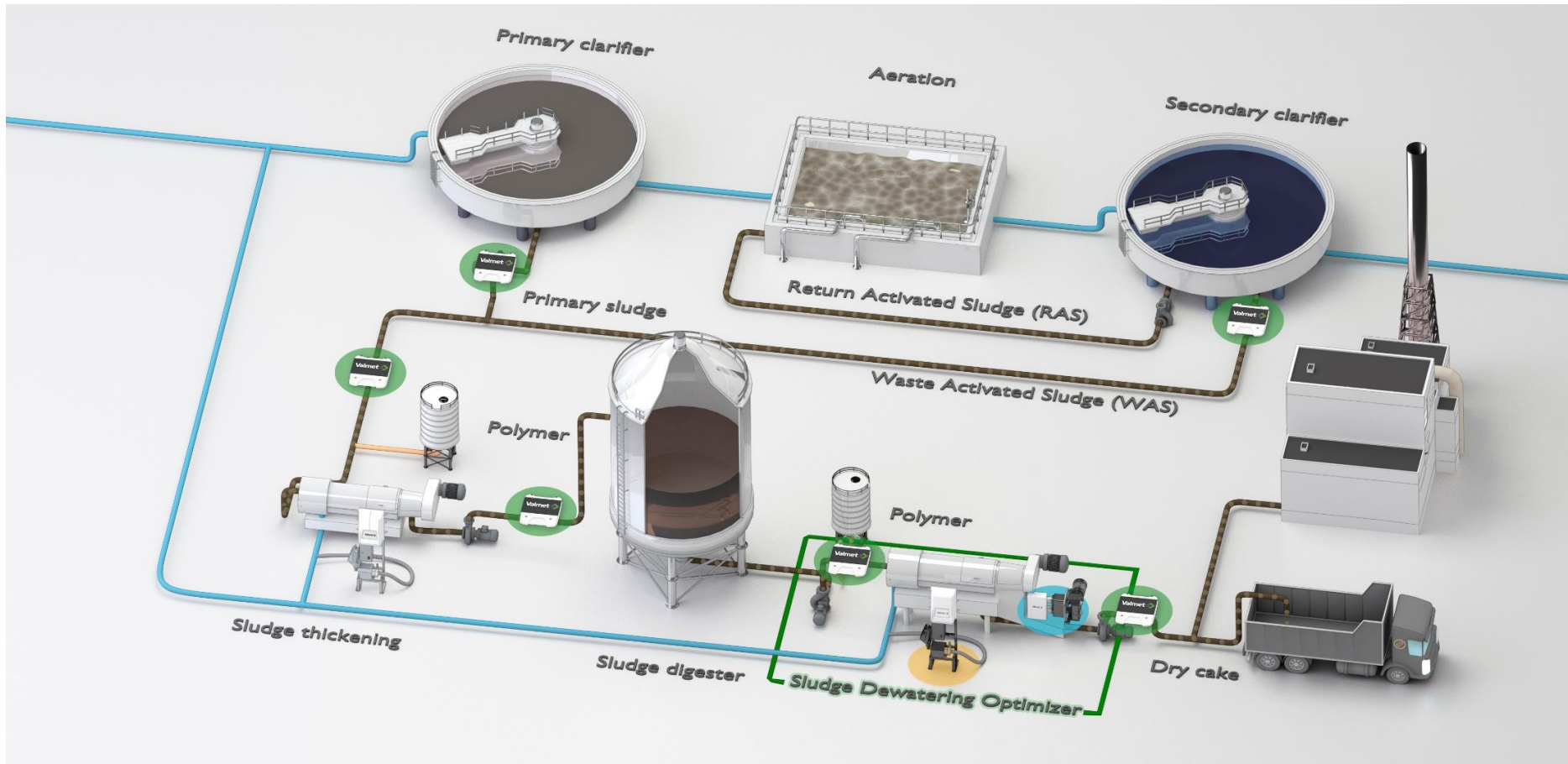
Valmet offering to wastewater management

Advanced measurement technology and controls for municipal & industrial wastewater dry solids management

- Valmet Total Solids Transmitter; Valmet TS
- Valmet Low Solids Measurement; Valmet LS
- Valmet Dry Solids Measurements; Valmet DS
- Valmet High Solids Measurements; Valmet HS
- Valmet Nove, Nove H samplers
- Valmet SDO, Sludge Dewatering Optimizer
- Valmet DNA automation system

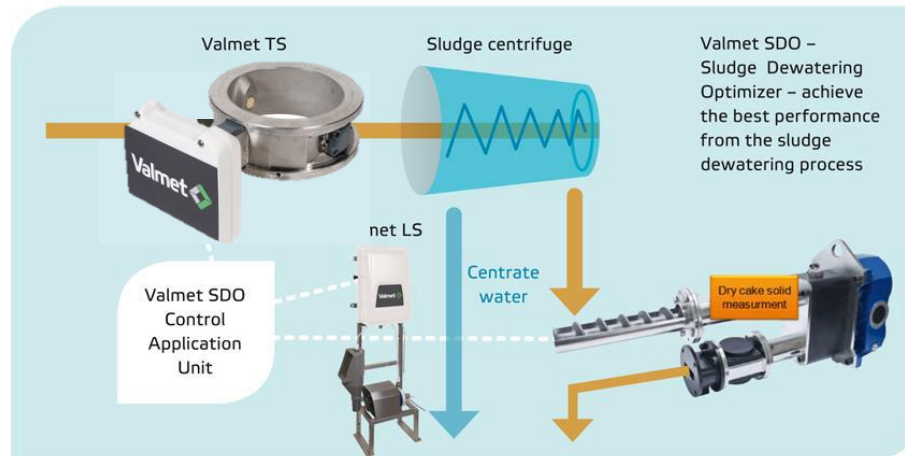
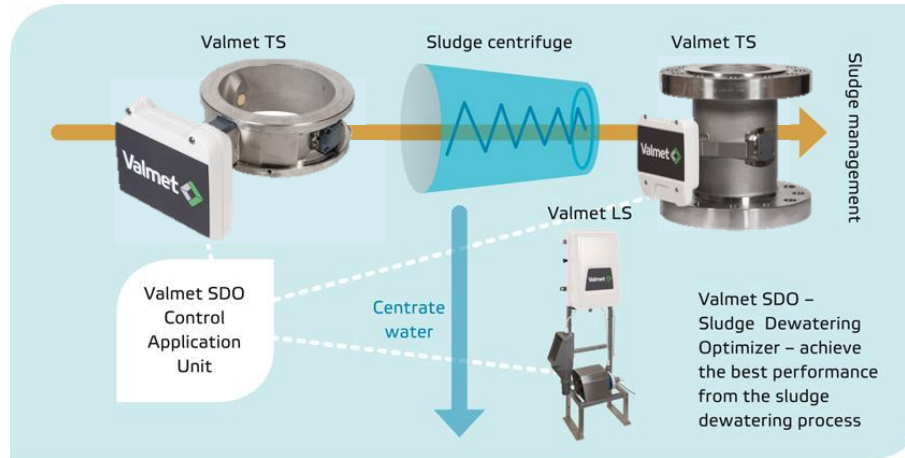


Optimizing sludge dewatering system with Valmet



Valmet SDO Control Application unit

Dewatering concept, unique offering



Sludge dewatering offers big savings potential

Valmet's online tool calculates sludge dewatering savings



Superior solids measurement solutions for wastewater

Sludge and polymer dewatering

Sludge to dewatering m³/d
 Sludge to dewatering TS %
 To dewatering TS sludge 58.8 ton/d
 Polymer costs €/kg
 Polymer usage kg/ton

Dry Cake from the dewatering

Dry cake ton/d
 Dry cake TS %
 Dry cake TS 46.48 ton/d

Further processing of the dewatered sludge

Further processing costs €/ton
 Price of fuel €/MWh

Savings when less material is circulated

% less from level 3000 mg/l to 1800 mg/l
 Polymer savings 19057 €/a
 Dewatering operation savings 10842 €/a
 Other costs saving 28791 €/a
 Summary **58690 €/a**

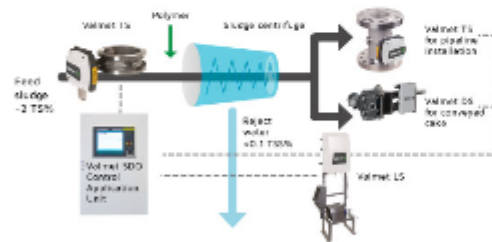
Savings When less polymer is used in the dewatering

% less from level 5 kg/ton to 4 kg/ton with price 2.7 €/kg
 Polymer savings **66709 €/a**

Savings when higher TS in the dry cake

% dryer from level 27.5 % to 28.25 %
 Transport savings and further processing savings **90071 €/a**
 fuel costs savings **18771 €/a**

234241 €/a
Total Savings



Reject Water

Reject Water Flow m³/d
 Suspended solid mg/l current value mg/l
 Suspend solid material other circulation cost €/kg
[Read More](#)

Dewatering unit


Operation costs €/h
[Read More](#)
 Feed capacity m³/h

Metric
 Imperial



ROI





Measurements and Control applications

Valmet Wastewater measurements portfolio

Valmet Total Solids Transmitter, **Valmet TS**

- microwave based measurement for Measuring Total solids 0...50 %TS (vs. opticals 0...4%TS)
 - sludge sedimentation, digestion, fermentation
 - sludge pumping and treatment applications
 - dewatering, preheating
 - chemical dosing (polymer)
 - dry cake transporting costs, incineration



Valmet TS

Valmet Low Solids Measurement, **Valmet LS**

- LED based measurement for Measuring Total Suspended Solids 0...0,5 %TSS
 - Optimizing
 - selection of correct polymer type
 - polymer dosage
 - centrifuge capacity and runnability
 - internal solids cycle management of the plant

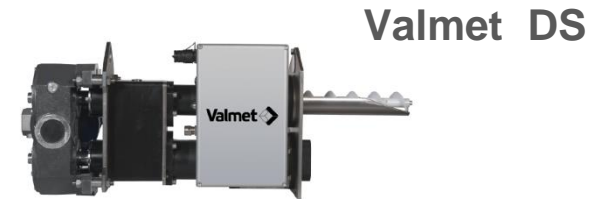


Valmet LS

Valmet Wastewater measurements portfolio

Valmet Dry Solids Measurement, **Valmet DS**

- microwave based measurement for municipal sludge
 - Measuring Total Solids 15...35 %TS
 - Optimizing
 - Dry cake transporting costs, incineration
 - polymer dosage
 - centrifuge capacity and runnability



Valmet High Solids Measurement, **Valmet HS**

- microwave based measurement for example thermal dried sludge
 - Measuring Total Solids 30...100 %TS
 - Thermally dried municipal waste water sludge. Moisture 5...55 %. Savings in energy consumption for not over drying the sludge. More stable moisture improves process control after the dryer.
 - Thermally dried municipal waste water sludge before incineration. Moisture 1,5...25 %. Minimal moisture to the incineration plant means lower side fuel expenses and smaller emissions.



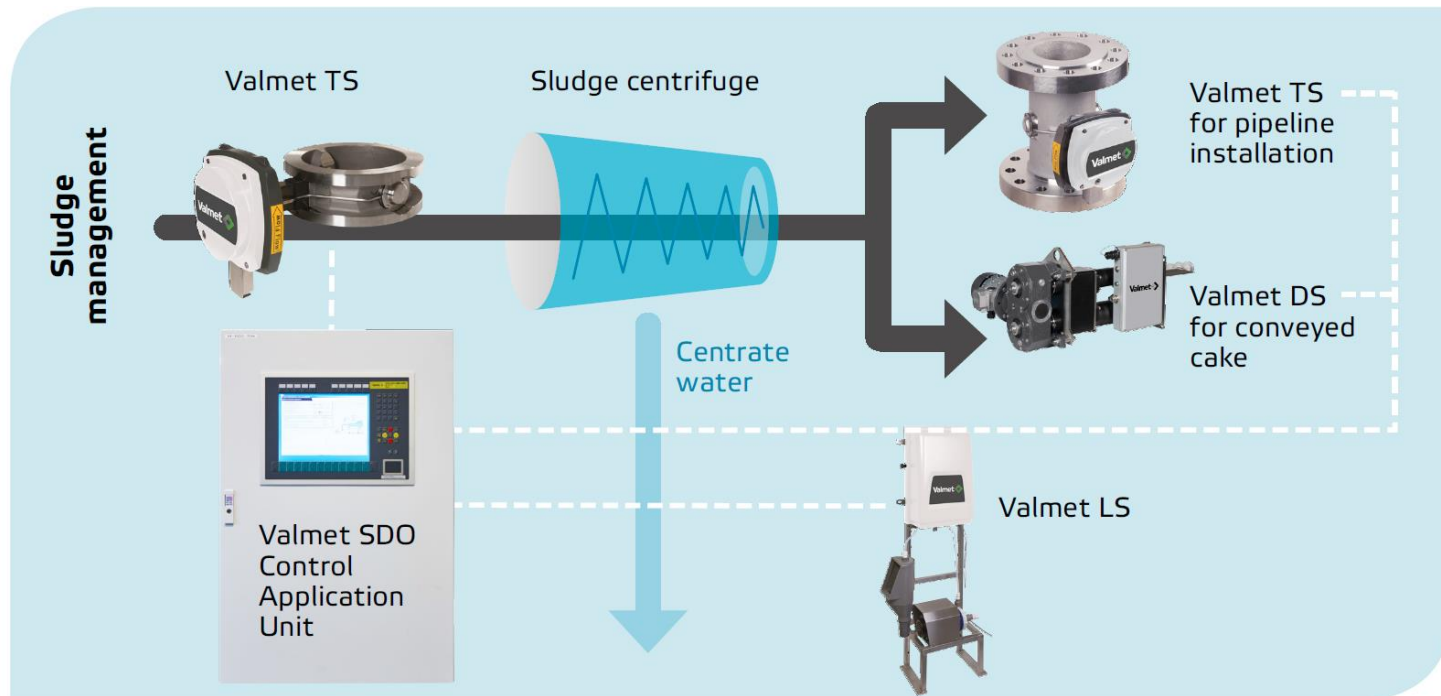


Valmet Sludge Dewatering Optimizer (Valmet SDO)

Harri Kohonen

Valmet Sludge Dewatering Optimizer (Valmet SDO) and associated measurements

Solids amount in the dry cake and centrate optimized, polymer usage minimized, massflow to the centrifuge stabilized




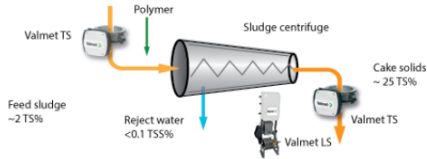

Valmet SDO brings big benefits to the end customer

- Online measurements together with optimization application improves the process performance at the sludge dewatering
 - Continuous on-line monitoring of the application, quick reaction to the process disturbances
 - Minimization of the amount of dried sludge with a significant impact on further treatment costs
 - Optimization of solids circulating in the plant, which affects the consumption of polymers, the operating costs of the centrifuge and the chemical and pumping costs in relation to the solids amount . When the amount of circulating solids is minimized, the processing capacity of the plant can be maximized.
 - Polymer selection in real-time in actual slurry process and polymer quality monitoring
 - Optimal polymer dosing and continuous minimization of the use of polymers
 - Continuous 24/7 optimization
- The administration of the circulating solids also improves the function of the biological process
- The number of laboratory samples can be reduced
- Valmet SDO is a "window" to the process and makes visible things that have not previously been detected
 - Operators run the process based on mass flow instead of flow measurements

Customer savings based process data

ROI tool in English, German, Chinese, Spanish, Japanese, and Korean language


Superior solids measurement solutions for wastewater

Sludge and polymer dewatering Sludge to dewatering <input type="text" value="2800"/> m3/d Sludge to dewatering TS <input type="text" value="2.1"/> % To dewatering TS sludge 58.8 ton/d Polymer costs <input type="text" value="2.7"/> €/kg Polymer usage <input type="text" value="5"/> kg/ton	Dry Cake from the dewatering Dry cake <input type="text" value="169"/> ton/d Dry cake TS <input type="text" value="27.5"/> % Dry cake TS 46.48 ton/d	Further processing of the dewatered sludge Both <input type="text" value="Both"/> Further processing costs <input type="text" value="55"/> €/ton Price of fuel <input type="text" value="35"/> €/MWh	Savings when less material is circulated <input type="text" value="40"/> % less from level 3000 mg/l to 1800 mg/l Polymer savings 19057 €/a Dewatering operation savings 10842 €/a Other costs saving 28791 €/a Summary 58690 €/a
			Savings When less polymer is used in the dewatering <input type="text" value="20"/> % less from level 5 kg/ton to 4 kg/ton with price 2.7 €/kg Polymer savings 66709 €/a
Reject Water Reject Water Flow 2565.6 m3/d Suspended solid mg/l current value <input type="text" value="3000"/> mg/l Suspend solid material other circulation cost <input type="text" value="0.1"/> €/kg Read More			Savings when higher TS in the dry cake <input type="text" value="0.75"/> % dryer from level 27.5 % to 28.25 % Transport savings and further processing savings 90071 €/a fuel costs savings 18771 €/a
Dewatering unit Operation costs <input type="text" value="10"/> €/h Read More Feed capacity <input type="text" value="62"/> m3/h			<div style="background-color: #27ae60; color: white; padding: 10px; border-radius: 5px; display: inline-block;"> 234241 €/a Total Savings </div>
<input type="button" value="Save Draft"/> <input checked="" type="radio"/> Metric <input type="radio"/> Imperial			 <input type="button" value="ROI"/>

Advanced technology which takes care of Centrate TSS Dry Cake TS interactions

Difficult to control with separate loops but easy with Valmet SDO MPC technology



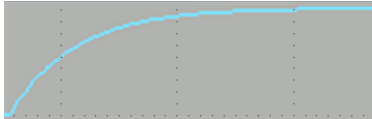
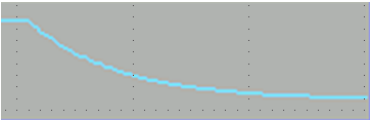
Controlled variables

Manipulated variables

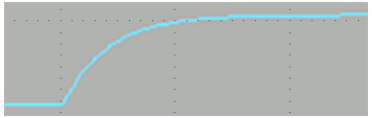
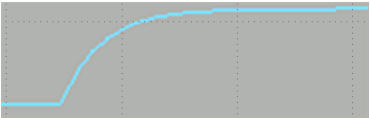
Polymer 

Torque 

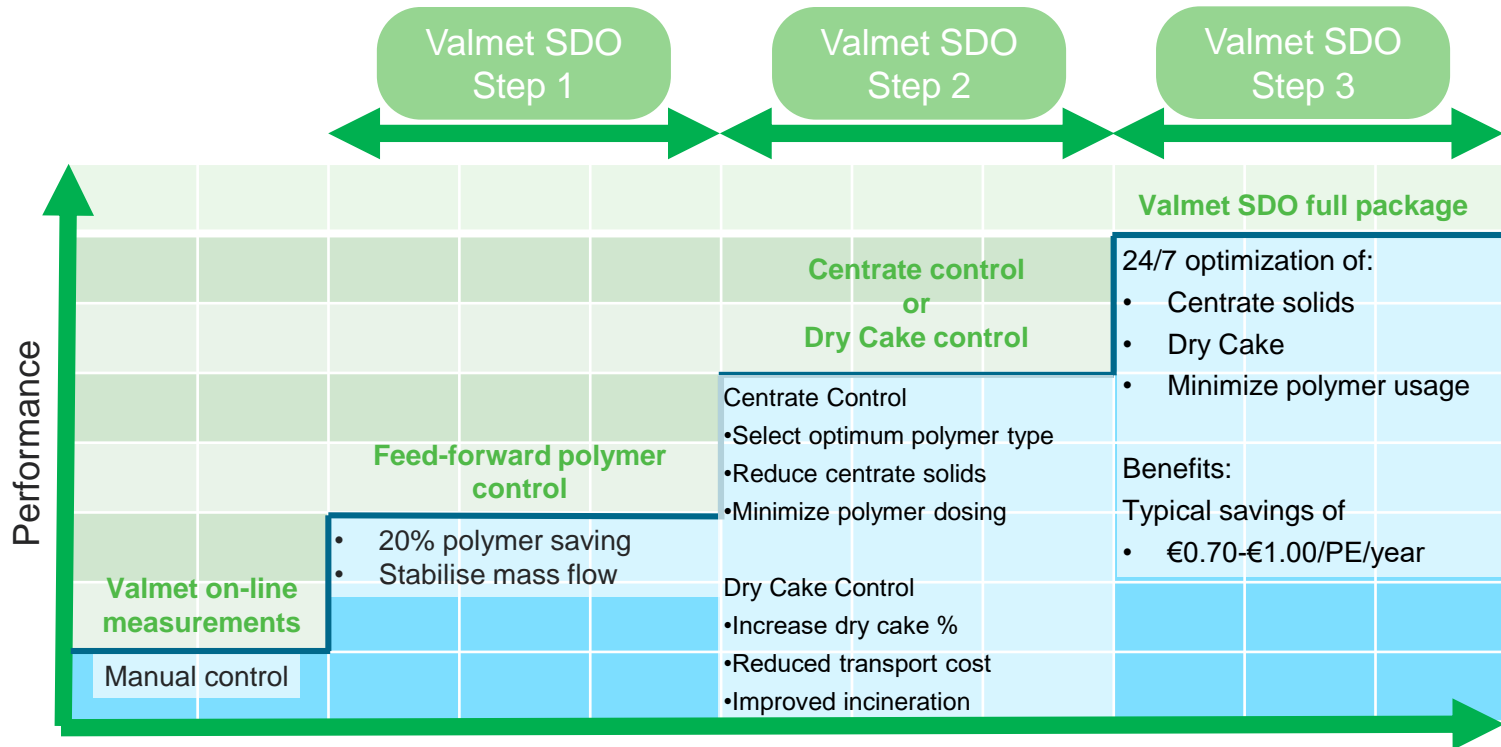
Centrate TSS



Dry Cake TS



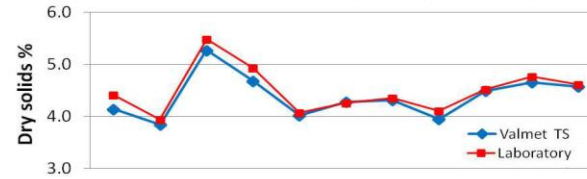
Maximizing performance with the modular Valmet SDO



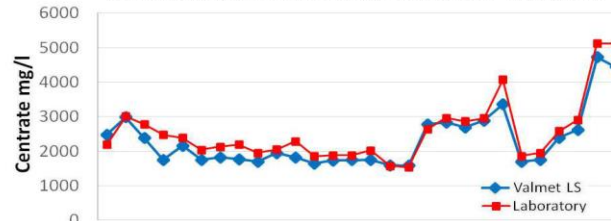
Measurements needs to reliable and accurate



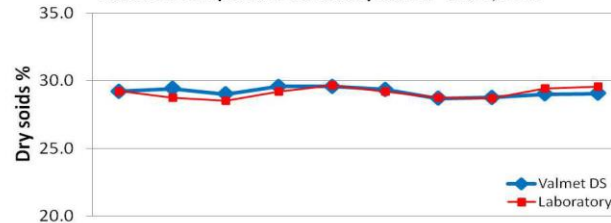
Valmet TS compared to laboratory Dec 1, 2015 – Feb 4, 2016



Valmet LS compared to laboratory Dec 18, 2015 – Feb 4, 2016

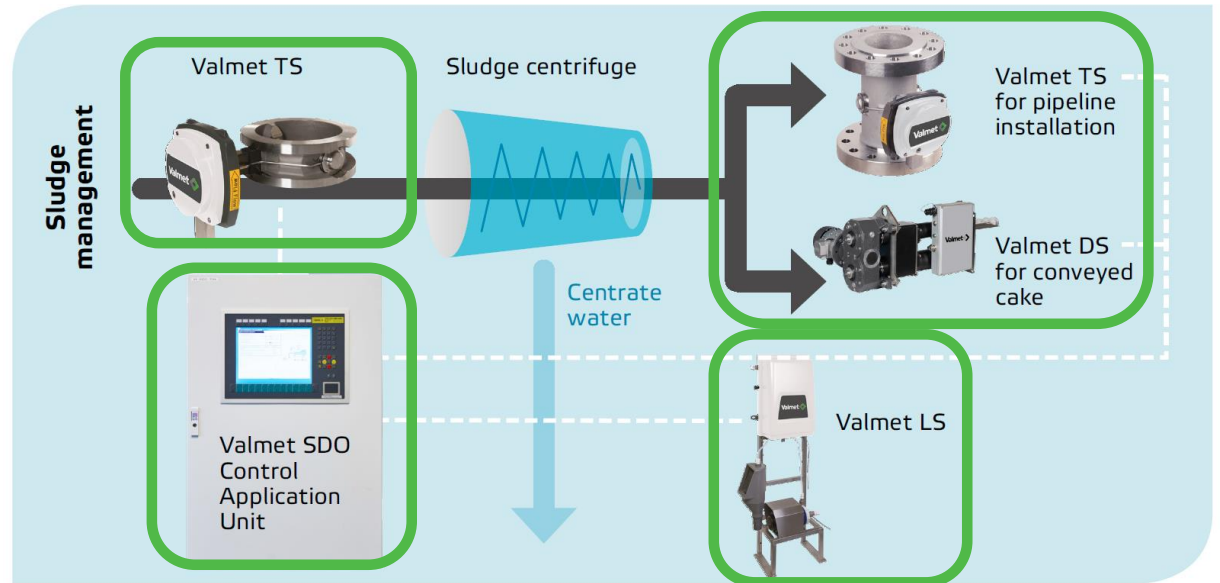


Valmet DS compared to laboratory Jan 12 – Feb 4, 2016



Typical Valmet SDO scope

- Estimated Investment
Estimated ROI 1 – 1.5 years
- Additional centrifuges need less investment



Valmet SDO

- Proven and unique technology
 - Multivariable controls
 - Unique measurement portfolio
- Verified references
 - 5 x Valmet SDO references
 - About 2000+ Valmet TS installations
 - 10's Valmet LS and Valmet DS installations
- Documented savings



Valmet TS Global Presence 04/2018

