

SpotView

Newsletter # 2

Methodologies for water and energy efficiency in the Process Industry!

The objective of the SpotView project is to develop and demonstrate innovative, sustainable and efficient processes and technology components in order to optimize the use of natural resources, especially water, in three industrial sectors (Dairy, Pulp and Paper, and Steel).

This second Newsletter details some of the methodologies and tools to be used during the project for the simulation and assessment of new technologies integrated in industrial processes. These simulation and assessment tasks are parts of the WP3 "Technologies assembling in simulated or operational environment" and WP5 "Environmental and techno-economic evaluation".

WP3 will be dedicated to the combination of selected technologies and processes to optimize water usage in each industrial sectors, and assessment of these combinations in simulated (process model) or operational environment (pilot). This task will be achieved by using process modelling or pilot platforms and will be associated with **economic and sustainability assessment** (eco-design support) to validate and select the best industrial strategies. This activity will determine the **real impact of each technological solution** on the reduction of water usage, wastewater rejects, energy and other resources consumption.

WP5 aims at supporting the development of technology solutions and at assessing the sustainability of the demonstrators through environmental, hazard and techno-economic evaluations.

To attain this objective, the technology components and assemblies will be compared based on technical, economic and environmental Key Performance Indicators (KPIs):

- Environmental benefits evaluation based on Life Cycle Assessment (LCA) methodology
- Occupational risk assessment and evaluation of the compliance with environmental regulations
- Techno-economic assessment

These assessments will be performed for at least three demonstrators installed during WP4.

Eric FOUREST,
Coordinator



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Zoom on Methodologies

- > PDC / Process integration with PDC's PROSYN® Pinch
- > VTT / Tool to study water/energy consumption
- > CTP / Predicting process water quality with chemical simulation
- > LIST / Environmental impact and risk assessment



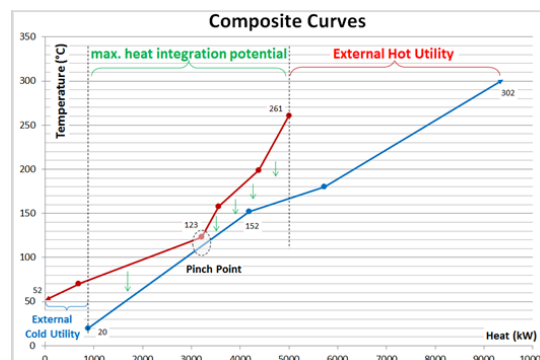
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Process integration with PDC's PROSYN® Pinch

Description: Pinch technology is a simplified thermodynamic method to assess, design and optimize processes of transferring heat between process streams. For quite a long time PDC used various commercially available software, but PDC decided some time ago to develop own software to fulfill its needs and that from clients in a better way. This pinch tool is now part of PDC's proprietary expert system PROSYN® and has already proven its value in many industrial projects.



Application: PROSYN® Pinch can be used in an early process development phase for:

- Process Targeting (determination of maximum heat-integration potential)
- Heat-exchanger-network design (HEN) by user imposed stream matching
- Investigation of process modifications by:
- Changing operating conditions equipment
- Localizing heat pump opportunities (e.g. QPinch's chemical heat pump)
- Utilities Targeting (heat-balancing) & network design

For existing processes, the pinch tool can be used for:

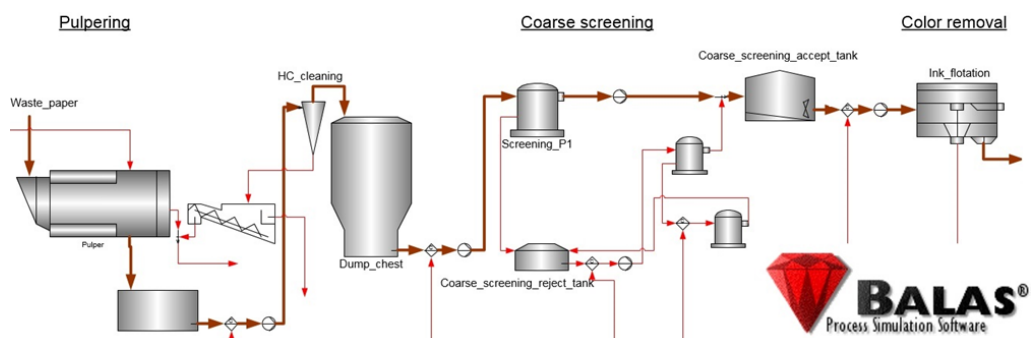
- Performance scan existing HEN (bad matches)
- Check of applied utility-mix
- HEN optimization and modification
- Total site energy efficiency analysis

Process simulation – tool to study water/energy consumption



Description: Process simulation is the imitation of the operation of a real-world process over time. Simulation is used to improve understanding of an existing or new process and show the eventual real effects of alternative conditions. The steady-state simulation software Balas® is created at VTT for chemical processes with emphasis on pulp and paper. In papermaking, it is used in-house and by Finnish engineering companies for evaluating different techniques for water and energy use reduction.

Application: Balas® -process simulator will be used to study the influence of rearrangement of internal water circuits and implementation of CR-filter on water consumption, energy balance and build-up of dissolved substances. The scope of the model is SCA Nokia mill (deinking + tissue). The model is first validated with BAT-data, and then adapted to the SCA-mill. The reference case of the SCA-model is validated with measured data and compared with the case(s) including Spotview changes in the process configuration.

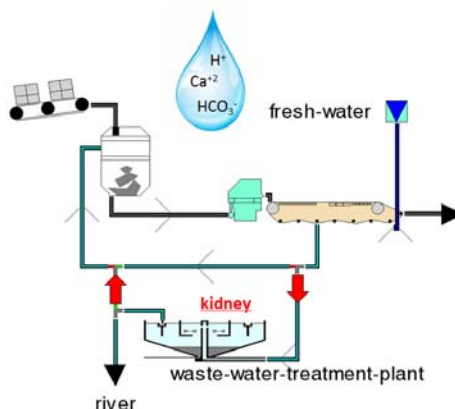


Predicting process water quality with chemical simulation

Description: The reduction of fresh water volume utilization in papermaking industry induces organic and inorganic matters increase in water circuits. CTP has developed since the 90's a process simulation devoted to management of pulps and water flows in a perspective of circuit closure. This tool is based on PS2000 process modelling platform for hydraulic and mass balance simulation, coupled to the PHREEQC chemistry engine. A local chemical speciation is resolved at each node, giving access to the distribution of ionic species, dissolved/precipitated amounts, pH and conductivity.

Application: The simulation tool can predict the consequences of the reuse of a bio-treated effluent as a part of the fresh water usage reduction for a paper mill. After the circuit model is built, the simulation tool is able to calculate at any point of the circuits all the new equilibriums: hydraulic, mass balance, chemistry

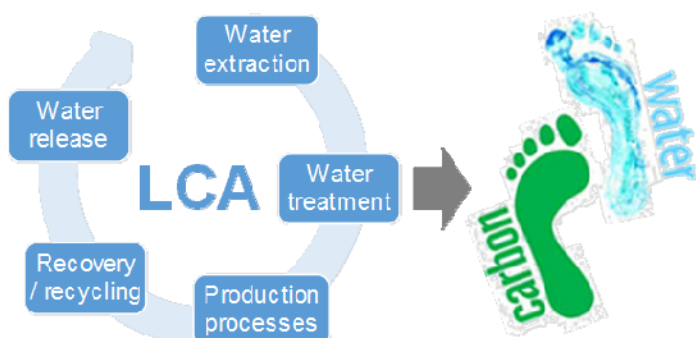
(conductivity) and biochemistry (volatile fatty acids). Consequently the impact of a new process design can be assessed without pilot or lab trials. The implementation of simulation models is an efficient and objective analysis technique, in view of the elaboration and/or the selection of improved water management strategies.,



Environmental impact and risk assessment

In order to ensure that the technologies and strategies implemented within SPOTVIEW project contribute to increase the sustainability of process industry in Europe, a life cycle assessment (LCA) study will be carried out following the ISO standards 14040/44 (2006). In particular, the water footprint and carbon footprint will be evaluated for the water management processes of dairy, pulp and paper, and steel industries, before and after the implementation of water optimization strategies. Inventory data will be collect-

ed with the support of technology suppliers and industrial partners of the project. The comparative assessment, supported by uncertainty analysis, will demonstrate if the project actions could indeed reduce environmental impacts of the three sectors in Europe. In addition, a task including occupational risk assessment and environmental regulation compliance will be performed to certify the safety of the new processes regarding workers' health and water discharge quality.



SPIRE Projects : Cross Cutting Issue Workshop

8th February 2018, in Frankfurt/Main (Germany).

This Workshop is jointly organised by **three SPIRE projects** :

INSPIRE WATER, ReWaCEM and SpotView

Workshop focus

- Efficient water management – current and future needs in the process industry
- Reduce water need and safe water supply
- Innovative technologies and concepts



The flyer, the **registration form** and all the information are available on the INSPIREWATER website (<https://www.spire2030.eu/inspirewater#>).

Participation is free of charge, but all, also project partners, need to register via the registration form.



Communication



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Events for SpotView Project

February 8th 2018

Joint SPIRE Workshop
on Water efficiency in
process industry,
Frankfurt, DE

April 11th 2018

Exploitation Strategy
Seminar, Luxembourg.

October 9-10th, 2018

1st SpotView Workshop,
Asturias, Spain

*More information is
available on
SpotView public web-
site: www.Spotview.eu*

