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Results

Obtained in collaboration with a national pulp and paper consortium on recovery boilers optimization. Results from the use of one MIVI sensor in a black liquor recovery boiler:

Recovery boiler throughput	Increase by 3-20% Reduction of water wash frequency
Fouling and plugging	Reduction
Chemical reduction efficiency	Higher
Smelt quality	Increased fluidity
Boiler emissions (CO2, SO2, TRS, NOx, Particulate matter)	Reduced
Thermal efficiency	Improvement
Pulping capacity	Increased
Solids concentration	From 73% to 76.5%
Quality	Improved bed stability and control

Benefits

The installation of the **Sofraser MIVI inline process viscometer**:

- Accurately controls the desired level of black liquor concentration
- Standardizes the supply of black liquor for efficient combustion
- Improves recovery boiler efficiency
- Improves pulp and paper mill profitability

Return on Investment

The installation of a MIVI process viscometer in a black liquor recovery process generating an increase of solids concentration from 73 % to 76.5 % provides the following savings:

Solids concentration	+3.5%
Steam recovery savings per year	680,000 USD
Reduction of soot boiler savings per year	1,120,000 USD
Total savings/year	1,800,000 USD

This number compares to other studies showing that routine monitoring of black liquor viscosity can save mills more than \$1,000,000 per year

In this example the use of a Sofraser MIVI viscometer provides **payback of the complete solution immediately after installation.**

Pulp and paper industry end-users:

Paprican, Papeteries de Gascogne, Tembec, ...

Guide for identifying viscosity measurement needs

Topics and Key Points

How do you control the liquor spray?

The traditional method of controlling the liquor spray is by manipulating the burning temperature of the liquor. This is usually done by manual and visual observation of the bed shape. Viscosity is managed indirectly and hence liquor is sprayed at high solids concentrations. Unfortunately, viscosity depends exponentially of solids concentration; small variations in solids concentrations can cause large variations in viscosity even at constant temperature. This behavior makes temperature control ineffective.

Many factors have a complex influence on black liquor viscosity. For given temperature and solids concentration, two liquors may differ in viscosity by a factor 4 due to different chemical composition. It is therefore of the utmost importance to optimize the black liquor spraying and combustion characteristics in the recovery boiler by adequate online measurement, monitoring and direct control of viscosity.

Is the black liquor concentration variable?

Viscosity is correlated to concentration. A variable concentration implies a decrease of combustion efficiency due to black liquor viscosity variations.

Does your black liquor reaches the concentration level defined?

If the concentration is too low, the recovery process wastes a lot of water. If the concentration is too high, you may face pumping problems.

Do you experiment maintenance on your pumping systems?

Frequent maintenance interventions on pumping systems indicate a too high viscosity / concentration of the black liquor.

How much black liquor is recovered in your process?

The optimum recovery threshold must be precisely improved and adjusted by viscosity control in order to improve efficiency.

Are sulfur emissions regular?

Optimized black liquor combustion reduces sulfur emissions.

Are foul smelling gases present?

Malodorous gases indicate that sulfur emissions are not at normal levels and that black liquor combustion is inefficient.

Sofraser recommended solution

MIVI 9510	Possibility to set up relays and alarms Can be combined with external controller
MIVI 9100	Low price positioning Can be combined with external controller

Contact Sofraser for detailed sensor configuration

Competitors in this area:

- Very few competitors

This system is also efficient in:

- other liquid fuels combustion
- petroleum or chemical residues (high temperature preheating) combustion
- coal slurries
- high viscosity liquid fuels combustion
- powder concentration: liquid mixtures and slurries
- water ash mixtures

