Inductive conductivity in brownstock washing.

**Background**

Paper is made from wood fibres. Fibres in solution are called pulp. Pulp, chemical pulp to be more specific, is simply speaking made by cooking wood chips in certain strong chemical solutions, mostly alkaline solutions. The chemicals at elevated temperatures and pressures decompose the wood. The pulp coming out of the digester is called brown stock because it is still “dirty”. It is washed in several stages with increasing cleanliness. Fresh water is added at the end, the last stage washer. From there the washing solution goes to the next stage, becomes more concentrated, goes one stage further, and so on.
Washing solution and product are counter flowing. The goal is to achieve clean stock with the minimum amount of fresh water used. The reason is not only to save water, but also to avoid unnecessary dilution of the chemicals that are washed out. These chemicals are recovered in the recovery boiler, and a high concentration of water makes this process inefficient or even impossible.

**Additional information**

pH is another important parameter in the brown stock washing process, having to do with the different behavior of fibers in solutions of different pH. Accurate measurement of pH and conductivity is vital to execute the optimal control strategy.

**Process**

The concentration of chemicals in the solution coming out of the last stage washer determines the cleanliness of the stock as well as the dilution factor. At this stage fresh water is added to the system. The amount determines the cleanliness of the stock, and the concentration of chemicals in the solution going to the recovery boiler. There is a fine balance between effective washing and conservation of the liquor concentration for downstream necessary.

Even though it is called dilution factor, we are still looking at fairly high concentrations, with conductivity in the range of 50 to 100 mS/cm, depending on the individual plant, process, and stock. That corresponds to concentrations in the low one digit per cent range. Dilution in that sense is relative to the two digit concentrations in the digester area.

In summary, cost savings in the brown stock area require long-term control of the dilution factor. Conductivity is a very good way to determine the dilution factor on-line.

Inductive conductivity is the best solution in applications with contamination and chemicals. Inductive conductivity gives reliable readings to control the process and thereby assure quality in the most economical fashion.

**Mettler-Toledo Solution**

**Inductive conductivity sensor InPro7200 series**

The best solution for this application is an inductive conductivity sensor. With this type of sensor no electrodes are directly in contact with the process, and is therefore not directly affected by contamination. PEEK is a very good material for this application because it is resistant against the chemicals used.

The sensor should be installed in the washer or in the drain line, where it would see a representative sample of the washing solution. Placing the sensor near the fresh water inlet is therefore not recommended.

**Inductive conductivity transmitter Cond Ind 7100 e**

As far as the transmitter is concerned, the Cond Ind 7100e series is the best choice. Simple operation, precise and reliable measurements as well as low cost of ownership reduce effort and expense.

With its unique user interface (pictographs) and continuous transmitter and sensor diagnostics, this transmitter unit can be employed in all process applications.