pH MEASUREMENT IN THE HEADBOX

BACKGROUND

Control of pH levels in the stock preparation section of a paper mill is essential to the process of effective papermaking. Although pH is also controlled upstream of the headbox, the last opportunity to control the pH of the pulp slurry occurs at this location.

PROCESS

Raw fiber from the pulp mill has poor cohesion, low bursting and tensile strengths, and a tendency to flocculate. Therefore, the fiber is unsuitable for paper manufacturing and must undergo further processing in refineries, cleaners, and chests prior to delivery to the headbox. During this processing, additives such as resins, dyes, fillers, sizers, and chelating agents are blended with the fiber to provide better fiber binding, strength, smoothness, color, and opacity.

The headbox receives the processed pulp and serves to smooth out any outstanding variability in the pulp flow. Figure 1 illustrates the role of the headbox in this part of the process. Uniform flow velocity and composition are required for the paper machine to smoothly produce good quality paper. The head pressure in the headbox determines how quickly the headbox discharges onto the forming wire. Pressure is varied depending on the speed of the wire (throughput) and the type of paper being produced.

Normally, the stock coming to the wet end of the paper machine has a higher pH than desired. Alum or sulfuric acid is added to reduce the pH to the optimum level. Stock pH is typically controlled to around 4.5 to foster proper binding of the fibers into the paper sheet. The acid or alum is added either to the recycled white water feed or to the stock upstream of the fan pump. Since alum is added for other reasons than simple pH control, many mills add both alum and sulfuric acid as part of their papermaking process.

The headbox is the first wet end component of the paper machine, and headbox stock has high suspended solids. pH measurement in this location is difficult because sensors are prone to clogging and fouling, requiring frequent cleaning and replacement. Despite these problems, the benefit that pH control conveys in strength and other paper properties are so great that headbox pH measurement cannot be ignored. Recent improvements in probe design have taken the hassle out of making this measurement.

INSTRUMENTATION

The Model 396 TUpH™ Insertion/Submersion sensor was designed specifically for harsh, high suspended solids applications such as this. The reference junction has a high resistance to coating, due to its large surface area and small pore size. Therefore, maintenance costs and downtimes typically associated with cleaning sensors are reduced.

The Model 396 is only available without a preamp and is compatible with all Rosemount Analytical analyzers and transmitters, such as the Model 54e pH/ORP microprocessor analyzer and the Model 5081 pH/ORP Smart transmitter.

INSTRUMENTATION

Model 5081 pH/ORP SMART™ Transmitter

- Handheld infrared remote control link activates all the transmitter functions.
- NEMA 4X (IP65) weatherproof, corrosion-resistant enclosure.
- Comprehensive pH glass and reference diagnostics.
- HART and AMS compatible.
- FOUNDATION Fieldbus optional

Model 396 pH/ORP TUpH Sensor

- Polypropylene reference junction for reduced maintenance.
- Rugged stainless steel body.
- Disposable tough design.
- Suitable for flow-through, submersion and insertion applications.

MODEL 54e pH/ORP SMART™ ANALYZER

- Comprehensive pH glass diagnostics to warn user of the need for calibration, maintenance or sensor replacement.
- Heavy duty NEMA 4X (IP65) enclosure of epoxy-painted aluminum.
- Fully descriptive diagnostic messages and easy-to-use interface for operation in English, French, German, Italian, or Spanish.
- Automatic calibration with buffer recognition and stabilization check.
- HART and AMS compatible.

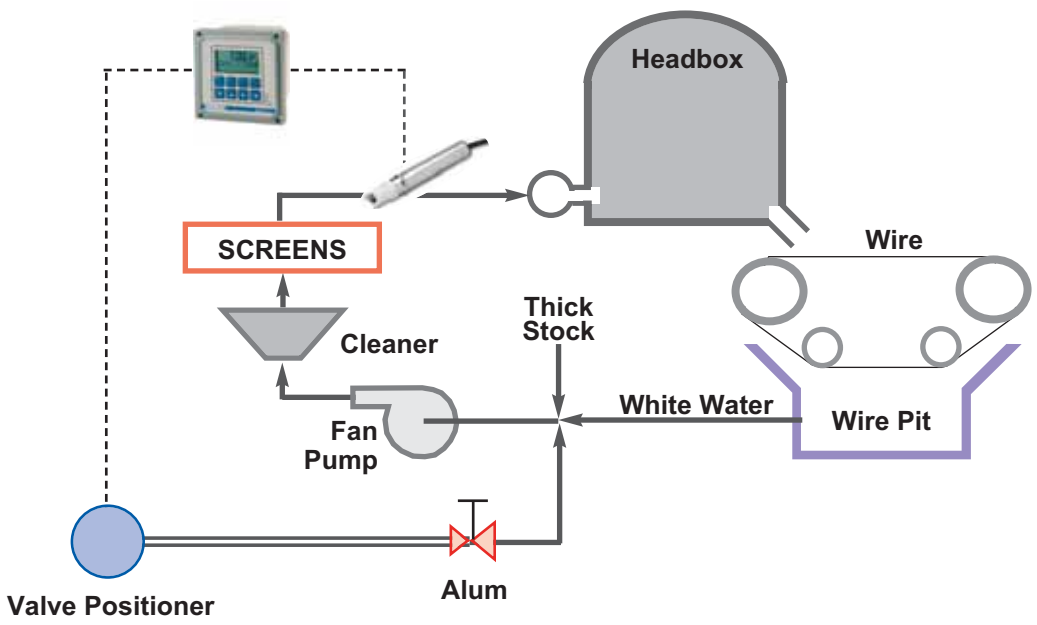

FIGURE 1. pH Measurement in the Headbox

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