Application Note AN-P4

White Water pH in the Pulp and Paper Industry

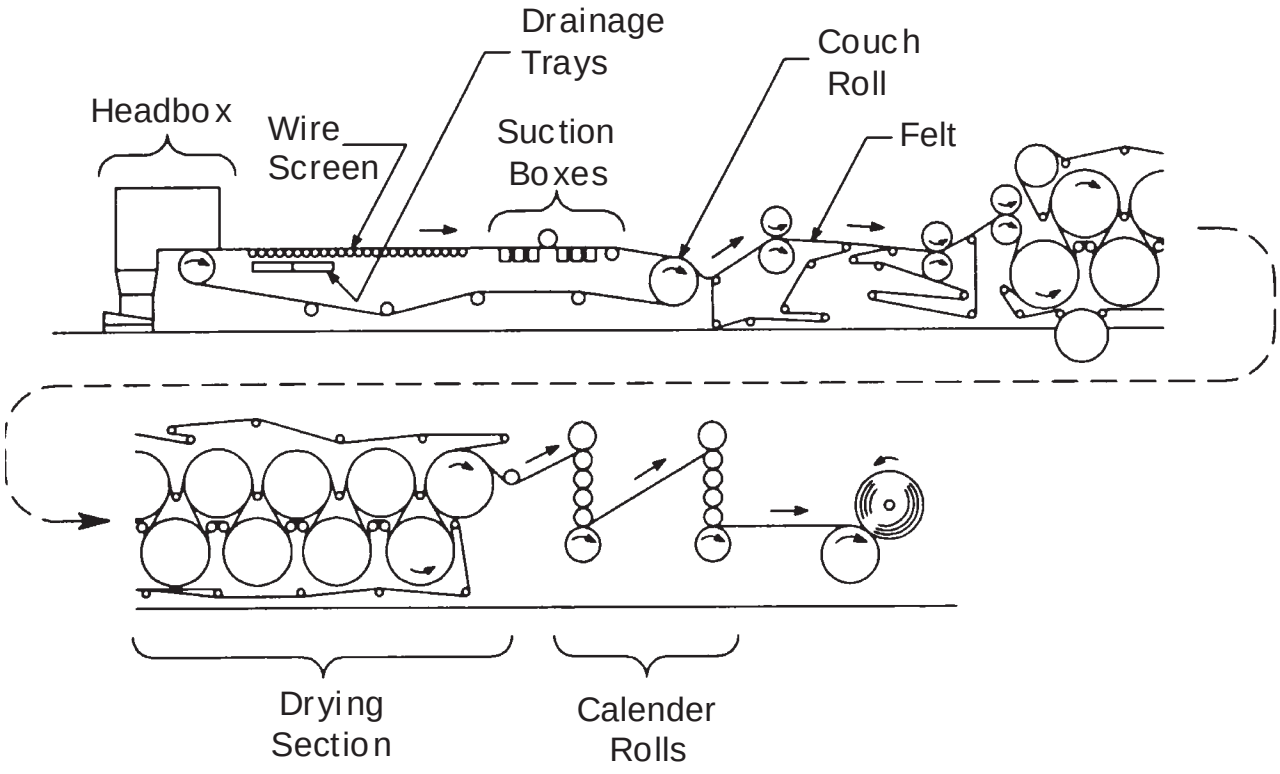
The drainage from wet pulp stock is called white water, regardless of its color or what stage of the process it came from. A pulp and paper plant can use up to 25,000 gallons of fresh water to produce a ton of paper, so it is imperative that plants recycle as much white water as possible. Controlling pH is an important factor in the reclamation of white water.

Background

During the papermaking process, pulp stock is continuously sprayed onto the moving woven mesh brass or bronze cloth screen at the rear section of the headbox. This forms a pulp stock sheet that is over 99% water by weight. The water falls through the wire screen and into drainage trays as the continuous paper sheet is pulled along. Next, the sheet travels through a section of suction boxes to physically extract more water. The sheet then moves onto a couch roll which prepares it to be lifted off the wire screen.

At this point, the paper sheet is barely strong enough to support its own weight (roughly 80-85% water) and is transferred to a felt. The felt takes the continuous paper sheet through a series of presses, leaving the sheet with 71-74% water concentration. The remaining water is removed by evaporation through heating in the drying section of the papermaking machine. The sheet is then rolled for storage and cut.

Figure 1 Typical Papermaking Process



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Plantwide, the single largest source for white water is the papermaking machine. As much as 25-30% of the original pulp stock is recovered as white water. Depending on where the white water is collected and its concentration of paper fibers, white water is considered rich or lean. The rich white water, accumulated in the drainage trays, suction boxes, and couch roll pit, contains the highest percentage of paper fibers. This rich white water is used as make- up water for the beaters and pulp stock dilution prior to entering the headbox.

The excess rich white water, and lean white water that contains a smaller percentage of paper fibers, collect at a device called a save-all that removes the fibers and fillers. This reclaimed white water is used for applications such as wire screen showers, felt sprays, and seal water for vacuum pumps.

Reclaimed white water is always mixed with fresh water since reuse of undiluted white water can cause problems, including suspended solids build-up (felt plugging), accumulation of dissolved solids (slime, foam and scaling), and increased retention of thermal energy (temperature).

Application

Recycling white water is critical in minimizing production costs. It is more economical to reclaim the fibers and fillers from the white water than it is to replace and process them at the waste treatment plant. The pH of the reclaimed white water must be controlled to specific values for each of its many uses. For example, white water used for the beaters and headbox has a high ratio of filler to fiber. Consequently, the pH must be adjusted to precipitate the filler and other non-fiberous suspended matter.

There are many different ways a save-all can clarify water, but one method commonly used is to control the pH to improve flocculation. This method optimizes the removal of filler and fiber debris from the water.

The pH of the save-all effluent must also be controlled to reduce corrosion if it is used as seal water for the vacuum pumps.

Summary

Like most businesses, the key to a successful pulp and paper plant is reducing costs without compromising production and quality. Reclaiming white water is one of the best ways to do this. Roughly 30% of pulp stock ends up as white water. Treatment of the white water is necessary for its important reuse in other areas of the plant. pH control is the most efficient method to treat reclaimed white water.

Instrumentation

A number of different sensors can be used to monitor the pH of white water. Selection criteria include cost, convenience, mounting style, and personal preference.

- Insertion Mount System (process pipe)
- Flow-through Mount System (sample bypass line)

References

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Sutermeister, *The Story of Papermaking,* S.D. Warren Company.

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