

# pH Measurement in Deinking Mills (Secondary Fiber)

## Background

Deinking is a process that turns recycled paper products (also called secondary fiber) into raw pulp for production of refined paper products. Lower pulp cost for the pulp mill and reduced burden on landfills are primary motivations for the use of deinking. The net cost of deinked pulp can fluctuate widely, however it is generally lower than wood pulping. Repulped fibers are not as strong as virgin fibers, so they are often blended to meet product requirements.

## The Process

Deinking is named for the part of the recycling process that removes coatings and inks from paper before refining the pulp into a finished product.

The steps involved are:

- Pulping or fibering
- Cleaning and screening
- Washing (or floating) out contaminants
- Thickening or dewatering
- Bleaching (if necessary)

The secondary fiber is combined with pulping chemicals and water in the pulper. The pulper can be operated in batch mode, typically used for smaller loads or continuous mode, when a steady feed of raw material is available. Three types of surfactants are used; detergents remove the ink from the fiber, dispersants prevent redeposition onto the fibers, and foaming agents collect the dispersed ink in the form of foam. Other chemicals such as caustic, sodium silicate, borax, and peroxide may also be used. The pH is generally alkaline. Consistency in the pulper is relatively high at 5–8 % solids.

Heavy items and large particles are removed by centrifugal cleaners and screens. The resulting pulp slurry can be separated from inks and dyes by either multiple washing stages or by flotation cells. Flotation cells cause the ink particles to rise to the surface where they can be skimmed off. The washing process helps remove more fine contaminants but does not capture as much fiber as the flotation process. A combined process using both steps produces the best quality pulp.

Pulp stock from the washers or flotation cells has been diluted by large amounts of water and is thickened before being sent to the refiners or the bleach tower. Bleaching is most efficient at high consistency and the chemicals involved represent a large portion of the investment in the pulp stock. The bleached pulp is washed clean of all bleaching chemicals before being sent to the paper machine.

## The Measurements

pH is measured in the pulper to optimize the efficiency of the surfactants used to remove the ink from the recycled paper. Surfactants are relatively expensive chemicals that are more effective with some help from alkaline conditions. When conditions are too alkaline, the resulting pulp may be discolored and unduly weakened, making a poor quality product. The pH in the pulper is typically between 9.5 and 11, and the temperature is also elevated to speed up the process.

## The Products

pH measurements in deinking mills can be difficult because of the varied nature of the raw material and high consistency of the pulp. Sensors used in this environment must be rugged and chemically resistant. Many pH sensors will require regular daily or weekly cleaning. The TU<sub>pH</sub><sup>TM</sup> 396R pH sensor is well suited to this kind of application. The wide-area junction provides resistance to coating while the patented helical pathway prevents process intrusion into the inner reference chamber. Construction materials of titanium and EPDM hold up well in this nasty process. The 56 pH and 5081pH are ideal instruments for monitoring and controlling pH in pulp and paper mills. Configuration and calibration can be conducted remotely, with any HART compatible Host for the 56 and 5081-HT, or any FOUNDATION<sup>™</sup> Fieldbus Host for the 5081 FF. The combination of the 396R with the advanced diagnostics included in Emerson Process Management pH analyzers provides ease of installation, ease of operation, and the lowest maintenance possible.

## Instrumentation

### 5081 pH/ORP Transmitter

- Remote communication is simple: use the hand-held infrared remote controller or any HART-compatible device.
- Comprehensive pH glass diagnostics to warn user of the need for calibration, maintenance, or sensor replacement.
- Automatic calibration with buffer recognition and stabilization check.
- Robust NEMA 4X enclosure protects the transmitter from harsh plant environments.
- HART and FOUNDATION™ Fieldbus options



### 56 pH/ORP Analyzer

- Process measurements and on-screen data trend graphs easily viewed on full-color screen.
- User help screens show detailed instructions and troubleshooting in multiple languages.
- Data Logger and Event Logger – Download process data and alarm conditions with time and date stamps via USB 2.0 data port
- PID and time proportional control capabilities. Includes synchronized interval timers and four special application functions.



### TUPH 396R Retractable pH/ORP Sensor

- Minimum sensor maintenance due to patented TUPH reference.
- Compatible with all Rosemount Analytical and most other instruments.
- Field-proven ACCUGLASS pH glass formulations minimize glass cracking, resulting in enhanced performance and increased life.
- Titanium retractable body for insertion up to 2 inches and easy sensor removal under pressure without process shutdown (ball valve kit shown can be purchased separately).

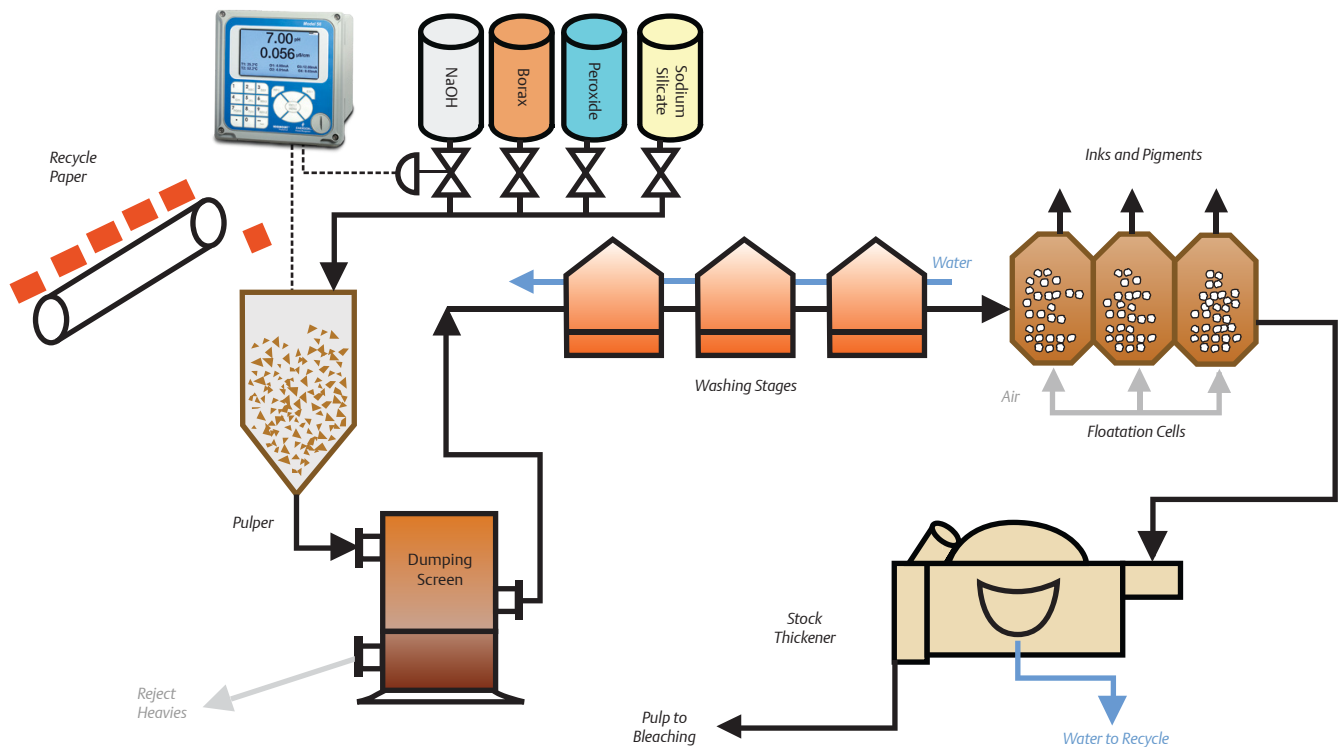


Figure 1

## Notes

[www.RosemountAnalytical.com](http://www.RosemountAnalytical.com)



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