



## Wet end filtration is essential

Many additives are used in the wet end of a paper mill. These materials are received, stored, processed and metered into the stock to impart a particular attribute or chemical state. Filters are used to remove particles that can detrimentally affect the quality of the paper or paperboard by creating defects or equipment variability that affects the paper's uniformity. Machines control the addition of additives, and they are not able to compensate if debris passes or if plugging occurs.

### *Interruption potential*

Any oversized, undissolved solids in an additive stream have the potential to interrupt equipment operation or create dry end defects. Unfortunately, many opportunities exist for solids to be picked up or formed as additives are transported, mixed, or diluted. Consequently, wet end additive filtration can help minimize process variability.

Where filters are used in the wet end depends on the original engineering of the paper machine and is modified as the process and products change over time. Filters are added when particles affect the delivery of the additive or the quality of the end product. Flow rate, media

type, particle retention, and the characteristics of the additive and its debris will dictate the type of filter most appropriate for additive filtration.

Continuous multiple tube filters or multiple bag filters are often recommended in the receiving area due to higher flow rates. But the flow rates are relatively low at an additive's point of use. Mechanically cleaned-in-place filters can, therefore, be used at an additive's point of use since they can maintain a low differential pressure and also prevent contaminant extrusion through the media.

### *Specific applications*

It is important to keep the differential pressure low for retention aids, to prevent gel-like contaminants from squeezing through the screen. Mechanically cleaned-in-place filters clean the filter media before any pressure buildup occurs.

Coarse residue in pigment slurries can result from contamination during transport and storage, from contaminants in make-up water, from inadequate make-down of clay agglomerates, aggregation of clay particles resulting from phosphate degradation and from coarse accessory material not removed during processing.

Filtration helps control starch in two ways. First, variability is prevented in starch make-down and converting equipment. In steam converted starch operations, filters prevent clogging of steam chamber orifices. Second, proper concentration is maintained by preventing orifice plugging downstream. If an orifice becomes plugged and concentration decreases, off-quality paper will result.

Precipitated calcium carbonate is filtered as it is received from the satellite plant and again just prior to use. Depending on the solids content, it can be critical to keep the slurry moving through the piping system due to the potential for settling.

### *Where to filter*

The most common place for an additive filter to be located is just before the additive is used on the paper machine. This is the last opportunity to catch unwanted particles. For many additives, this location is after the point where dilution water is added.

Normally, the higher the dry solids and the higher the viscosity, the more filter surface area is used. As liquids are diluted, the solids drop and thicker liquids become thinner; so less surface area and a smaller filter are required. At the same particle retention or mesh size, the dilute form of an additive will use a less expensive filter. The dilute form can also filter finer, and less expensively, than the thicker form at the same filtration cost.

In some instances, filtering before the additive is diluted may be the preferred strategy. The best time to remove a particle is when the flow rates are the lowest and the particle size is at its

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largest. Filtering after dilution may be too late. After pumping, mixing and storage, particles are made smaller and become more difficult to remove. After dilution, flow rates are also higher, which usually requires a larger filter system.

### *White water dilution*

If the water source used for diluting additives is clarified white water, then it is necessary to ensure that the filter system can handle the fiber content of the water. Fiber containing additives requires special handling and may restrict the filtrate quality by limiting how fine the additive can be filtered.

By controlling the wet end, a papermaker also determines product quality at the dry end and controls the overall productivity of the process. Wet end filtration removes oversized particles and debris from a variety of additive. This allows manufacturers to minimize equipment plugging and improve the overall product quality. ■