



Application: Whitewater Heating

White water is a fine particle slurry used throughout the papermaking process. Its name derives from fine fiber particles in the water that give it a milky white appearance. White water drains from the paper stock into pit below the paper machine and is used for a variety of uses in the papermaking process.

The primary use of whitewater in the paper mill is stock dilution at the wet end of the paper machine. Accurate temperature control of the stock is critical to achieve optimum machine speeds, high quality paper, and lowest operating costs. The optimum operating temperature of the stock is typically 115-140°F. Consistent stock temperature reduces variability in the sheet formation process. It helps in the dispersion of the fiber particles, increases sheet drainage, and helps promote the attraction of the various organic and inorganic additives to the fiber. These additives (such as Alum, Starches, Calcium carbonate, and Titanium dioxide) are often expensive and can have a significant impact on financial performance. Poor temperature control may lead to poor retention of these additives in the paper sheet, causing them instead to fall into the whitewater tank, where they may cause problems later in the process.

White water tanks are often heated with steam spargers in the whitewater chest. Steam Injection Heaters that use an external steam control valve, must reduce steam pressure to control temperature output, which leads to **low velocity steam flow**. Low steam velocity leads to poor steam mixing. Externally controlled steam injection heaters may lead to:

- Ineffective condensation of the steam from the spargers, leading to **steam hammer & vibration**, resulting in damage to the chest walls leading to expensive repairs.
- **Energy losses** results when steam escapes from the tanks and venting to atmosphere.
- **Poor temperature control** and dispersion of heat leads to hot and cold zones to be present in the whitewater chest, leading to variable stock temperatures at the paper machine head box.

PSX Heater Solution

ProSonix' unique method of steam injection utilizes an internal steam control to precisely deliver the appropriate mass flow of steam for the required heating. This is achieved via an integral Pneumatic Actuator, and a **variable position stem plug** in the steam jet diffuser. We do not throttle or regulate steam pressure. This design offers a precise method of steam control through a **choked flow control delivery of the steam**. Choked flow is the phenomenon of accelerating a vapor to maximum velocity by creating a pressure differential through an engineered nozzle. By establishing choked flow, the **steam mass flow can be metered** to precisely control the heating of the liquid. This produces predictable results based on position of the stem plug. Through a **variable-area steam diffuser**, steam flow is metered at the point where steam and liquid first contact and mix. Internally Modulated DSI heating controls the mass flow of the steam and not the pressure.

Key Direct Steam Injection Benefits

- Energy savings resulting from faster tank time and reduced heat loss to atmosphere
- Lower maintenance due to the PSX heater's self-cleaning design
- Fewer process upsets and elimination of steam hammer
- Reduced chemical costs resulting from better temperature control
- Better temperature control allows for higher machine speeds & more consistent paper quality.

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