



FLUID PROCESSING HEATING

PULP AND PAPER INDUSTRY

ENERGY SAVINGS AND OTHER DIRECT STEAM ADVANTAGES

SMART

For over 85 years, smart engineers have used direct contact steam over heat exchangers and spargers to heat liquids and slurries. This proven heating technology has many advantages over other heating methods including energy and time savings, exact temperature control, improved product throughput, optimized product quality and other sustainable needs.

SUSTAINABLE

Energy Efficiency

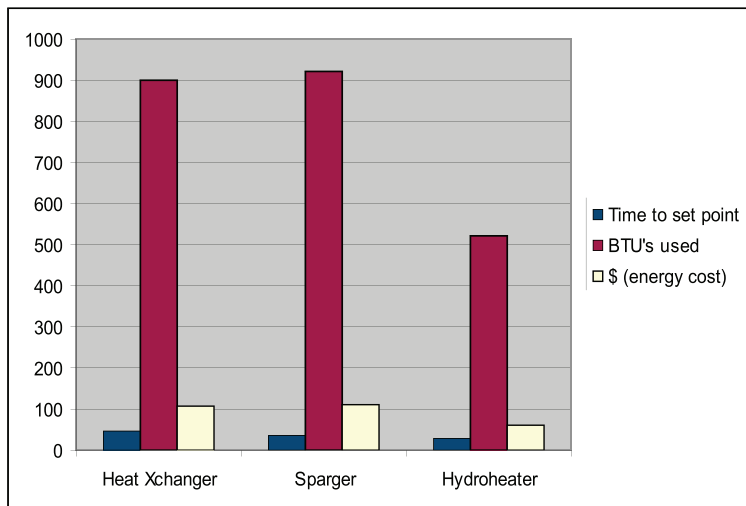
- 15-30% more energy efficient than heat exchangers or spargers
- Uses 100% of steam's energy
- Recognized by the U.S. Department of Energy (DOE) and the Wisconsin Focus on Energy (FOE) as an energy savings technology (grants may apply)
- Less chemical usage

Lower Maintenance and Production Costs

- Factory suggested maintenance once per year
- No hammering or subsequent equipment damage
- No condensate return system needed
- Precise temperature control

Invest in Product Quality and Control

- Uniform and instantaneous heat
- Optimize chemical usage
- Improve bleaching
- Increase production
- Hasten start-up



Actual Readings - Savings in Time, BTU's used and Dollars



HOW THE HYDROHEATER® WORKS

The Hydroheater® is a Direct-Contact Steam Injection control valve exclusively designed by Hydro-Thermal Corporation and is patented. This unique 3-way heating valve precisely mixes metered amounts of steam directly with a liquid or slurry, providing instantaneous heat transfer from the steam to the liquid. This rapid heat transfer causes the steam to condense immediately, eliminating the hammer and vibration associated with less sophisticated heaters.

The Hydroheater employs a unique internal geometry to control the steam injection process. There is no need for an external steam valve.

Two distinct, yet interrelated, strategies for effective and uniform heating of liquids or slurries are used. These methods maximize control of the process for accurate temperature control, smooth operation, and the flexibility to optimize performance under varying conditions.

Internal Modulation

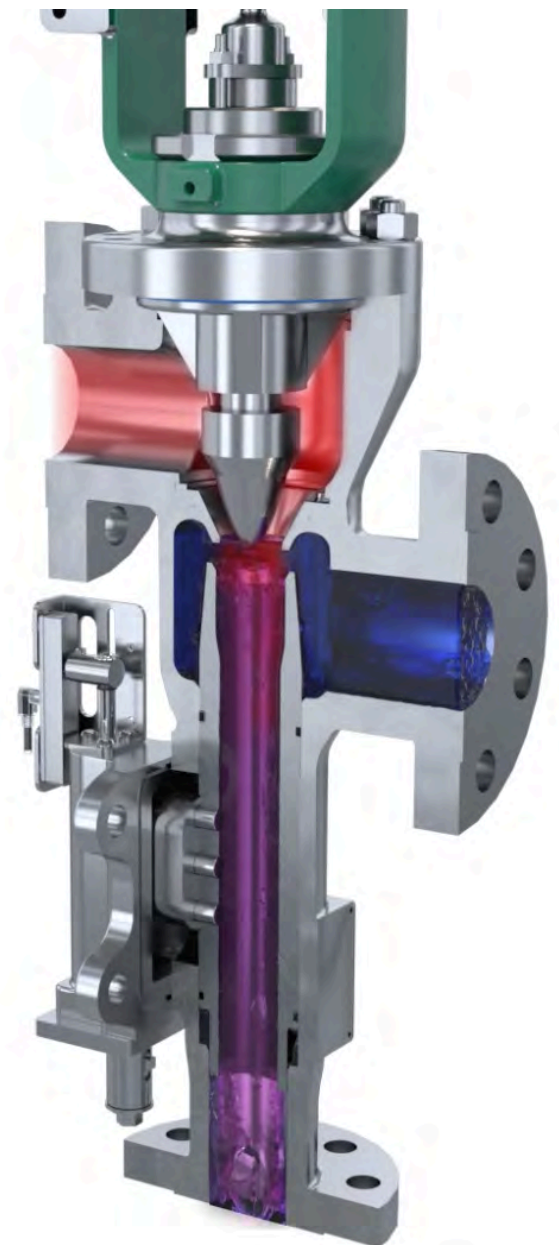
No other Direct Steam Injection device can claim this unique design, assuring precise steam control and producing predictable results based on the stem plug's position. A variable-area steam nozzle or diffuser meters steam flow at the point where steam and liquid first contact and mix. This technique eliminates the need for an external steam control valve.

Choked Flow

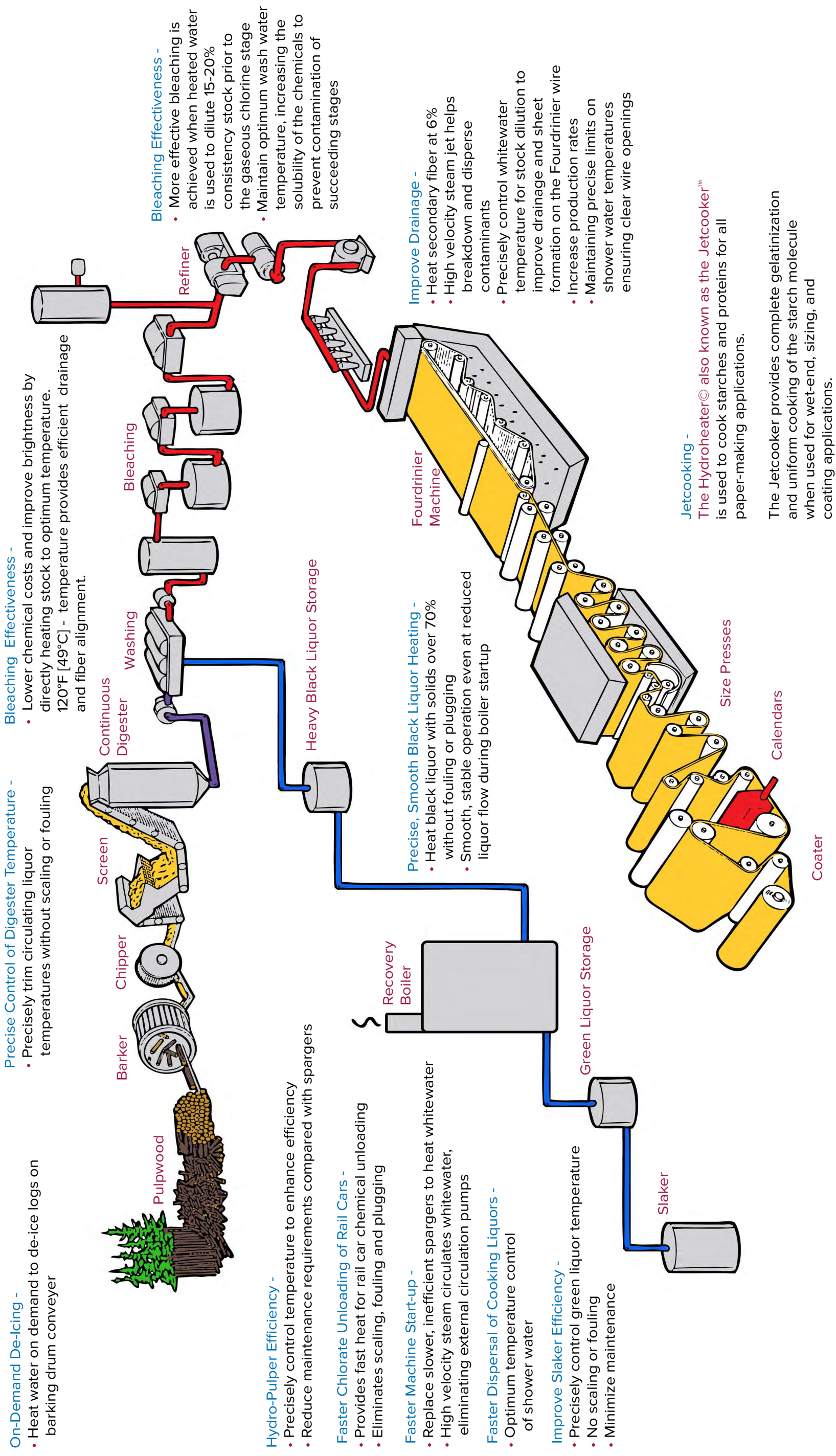
Choked flow is the phenomenon of accelerating a vapor to maximum velocity by creating a pressure differential through an engineered nozzle or diffuser. Establishing choked flow precisely controls the heating of the liquid by metering the steam mass flow.

These heaters operate in pulp and paper mills worldwide to heat everything from water to medium consistency pulp stock. Beginning with log-deicing, bleaching, and starch cooking, direct steam injection saves time, space, energy, bottom-line dollars, and volatile emissions.

Some heaters are capable of ΔT of 250°F [139°C] flow rates up to 25,000 GPM [5,678 m³/h] or more depending on fluid property analysis, and can typically heat water or slurries to 40% solids [50,000cP], depending on steam pressure and other variables. Each heater is custom designed for specific operating conditions and carries a 100% performance warranty. Please contact a Hydro-Thermal representative to help determine the right heater for your application.

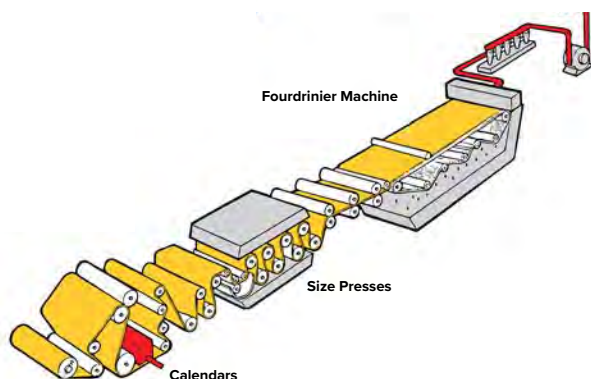
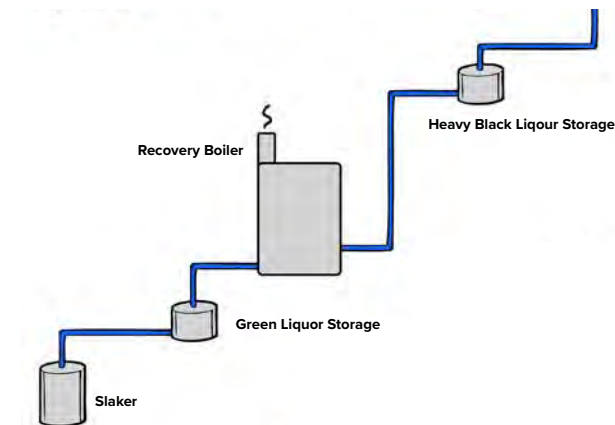
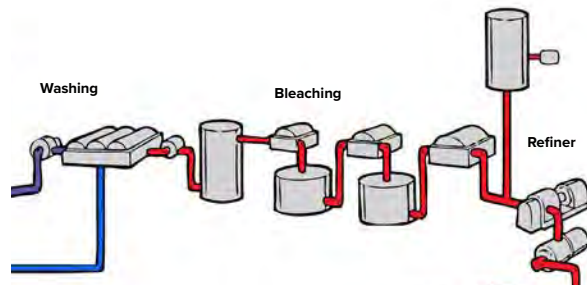
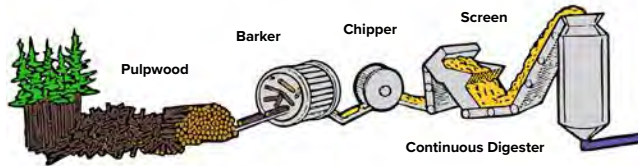


WHERE DO YOU NEED A HYDROHEATER IN THE PULP & PAPER PROCESS?



HYDROHEATER® ARE EFFECTIVE IN MANY APPLICATIONS

Our talented group of engineers understand these processes and can help you explore saving energy, money, time, and maintenance in your plant. Call a representative today!



BLEACHING

- Lower costs
 - Tighter temperature control equals less energy
 - Accurate temperature equals less chemical usage
 - Faster warm-up of processes
- Process stability for efficient operations
 - Accurate temperature, tighter brightness control, less bleaching chemicals
 - Uniform heating with optimal temperature achieved at varying flow rates
 - Smooth operation with minimal pressure drop
- Robust and simple installation

GREEN LIQUOR HEATING

- Precisely trim heating of circulating liquor
- Minimal maintenance without scaling or fouling
- Simple and compact installation
- Increased through-put

BLACK LIQUOR HEATING

- Heat 70% solids black liquor without fouling or plugging
- Smooth, uniform heating under varying conditions
- Precise temperature control ($\pm 1^{\circ}\text{F}$ [$.5^{\circ}\text{C}$]) prior to spray gun

WHITewater

- Demonstrated energy efficiency
- Temperature accuracy at varying flow rates
- Simplicity (use low pressure steam)
- Small footprint

STARCH COOKING

- Perfectly cooked, gelatinized wet-end starches
- Achieve exact viscosities for size press coatings

HYDRO-THERMAL PRODUCTS



Hydroheater®

- Light to medium duty applications
- All pulp bleaching sequences (EOP, EO and PO)
- Thorough starch cooking for better sheet formation



Solaris®

- Thickens stocks up to 13%
- In-line mounting
- Straight-through design
- Up to 25,000 GPM [5,678 m³/h]



EZ Heater®

- Hot water on demand
- Felt and fabric cleaning
- High turndown wash stations
- Boiler pre-feed



EZ Skid™

- Turn-key systems
- Plumb in water, steam and air
- Simple pre-engineered or made to highly complex specifications

Solutions Center and R&D

Hydro-Thermal maintains a research and development lab in our plant to test our heaters in any process. It is available for customer use as well.

In addition, we are active in many energy savings projects and research on using pulp and paper residuals and by products in next generation Biofuels.



About Hydro-Thermal Corporation

The leader in DSI for over 85 years, Hydro-Thermal has a strong legacy in the pulp and paper industry. This knowledge has been successfully leveraged to energy savings and second generation biofuels. Let Hydro-Thermal apply this expertise to your processes.

100% Performance Warranty

If, at any time and for any reason, a Hydroheater should fail to perform as designed,* and Hydro-Thermal is given adequate opportunity to provide a remedy, Hydro-Thermal will, after receipt of the unsatisfactory unit, reimburse 100 percent of the original purchase price.

**Proper replacement of wear parts required*

Need more information about Hydro-Thermal products?

Go to www.hydro-thermal.com or contact us at info@hydro-thermal.com

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