MACHINE WET END TEMPERATURE CONTROL

This case study is taken directly from a senior student project done by UW-Stevens Point students Ashley Buelow, Alex Pohl, Steve Schlosser, and Doug Weber.

OBJECTIVE

Focus on increasing and stabilizing the UWSP Pilot Paper Machine's stock temperature to increase drainage on the Fourdrinier and minimize drainage variability. The project wanted to:

- Identify the potential impact of installing a temperature control system
- Research various control systems to find the ideal system
- Install and optimize the new temperature control system
- Target a 3% increase in consistency prior to Couch roll

END USER

The University of Wisconsin at Stevens Point, Paper Science, and Engineering School. The school runs a pilot paper machine as part of their learning experience.

DESIGN CONSIDERATIONS

Fluid:	Whitewater/Thick stock loop	**Discharge Temperature:**	140°F [60°C]
Flow Rates:	140-200 GPM [32-45 m^3/hr]	**Fluid Supply Pressure:**	20-40 psig [1-3 bar]
Inlet Temperature:	58°F [14°C]	**Steam Supply Temperature:**	100 psig [7 bar]

PROCESS CHALLENGES

The paper machine's stock preparation and the wet-end temperature were not constant, and they had difficulty controlling the temperature of the water. This caused temperature fluctuations and unstable machine operations.

MACHINE WET END TEMPERATURE CONTROL

SOLUTION

The team investigated several forms of water heating technology. It determined that direct steam injection (DSI) was their best solution because of its ability to hold a constant set-point temperature. The students also compared different DSI heaters brands and determined the EZ Heater® was their best option because it offered the inherent properties of direct steam injection water heating. It also provided internal modulation, a self-cleaning design, and required far less maintenance than other direct steam injection options.

RESULTS

The students carefully measured and analyzed their results (see their report) and found they far exceeded their stated goal of increasing paper consistency by 3% before the Couch Roll. Paper consistency before the Couch increased as much as 11% because of the accurate temperature control of the EZ Heater. The project also found a fantastic bonus result in cost savings due to better temperature control. Runability increased so well that now the team had the ability to run more highly refined grades of paper. The dryer capacity was a limiting factor in the student's ability to run these grades in the past.

It is estimated that the better runability will result in a 66% increase in production and decrease production time needed by 7%, saving over $23,000/ year in production costs. The team also predicts that they will obtain more contract work and ultimately increase sales due to the use of the EZ Heater and its temperature control.

The EZ Heater has also been instrumental in performing repulping studies, where the thick stock pulp is required to be at specific test conditions (temperature) for cleaning and screening. Without the EZ Heater, this source of contract work would not have been possible.

Production Rate Before Steam	150 lbs/hr [68 kg/hr]
Production rate after Steam	225 lbs/hr [102 kg/hr]
Change in Production Rate	75 lbs/hr [34 kg/hr]
Price per lb of Paper	$4.50 usd/hr
Nuway Run Hours per Year	70 hrs/yr
USD Saved per Hour	$675.00 usd/hr
Additional Est. Steam Usage	-$265.00 usd/yr
Annualized Savings	$23,360.00 usd/yr

The UWSP Paper Science and Engineering program is committed to preparing students for successful technical careers in the pulp, paper and allied industries. This mission is accomplished by promoting excellence in instruction, undergraduate research opportunities, industrial internships, and involvement in professionalorganizations.

Need more information about Hydro-Thermal products?
Go to www.hydro-thermal.com or
contact us at info@hydro-thermal.com

400 Pilot Court | Waukesha, WI 53188
(262) 548-8900 | (800) 952-0121

PP-327 Rev1/2011