Wisconsin Paper Mill Relies on Aquatherm Piping System for Dye Distribution

Project Information

Project	Products Used	Location / Date
Neenah Paper Inc., Industrial	Aquatherm Blue Pipe®	Stevens Point, WI March 2012 – August 2012

Aquatherm Advantages

- PP-R material is highly resistant to chemicals and corrosion
- Simple heat fusion joints are easy to install and leak-proof
- Significant labor savings compared to alternative systems

The Challenge

Installing a pipe material that would be resilient and affordable for transporting dyes used to manufacture brightly colored paper.

The Solution

Over 19,000 ft of pipe, connected by roughly, 4,250 fittings and valves, were installed with zero leaks, passing the rigorous Aquatherm pressure test process the first time.

Unique application puts Aquatherm Blue Pipe front and center with chemical conveyance

Neenah Paper Inc. (NPI) is a producer of premium image and performance-based products, including filtration, specialized substrates used for tapes, labels and other products, and high-end printing papers.

Following NPI's business acquisition of Wausau Paper's Astrobrights® Brand, The Whiting Mill in Stevens Point, WI needed to expand its manufacturing capability to meet the unique demand of producing brightly colored papers. To produce this brightly colored paper, staff at the central-Wisconsin paper mill sought solutions to store and distribute more than 24 different liquid dyes from one of four different sizes of supply tanks to multiple distribution points throughout the mill, and finding the right distribution piping material was top priority.

Numerous types of piping materials were considered. "Stainless steel was the default consideration, but it is expensive and some of the dyes eat through stainless pipe in a matter of weeks, which would result in a mixed-material installation, thus limiting flexibility of moving dyes between different tanks," said Kevin Calhoun, mechanical engineer at NPI.

Seeking a Single Solution

The challenge was in finding a single solution that was less expensive than polytetrafluorethylene (PTFE) tubing or welded stainless steel, more resilient and thermo-dimensionally stable than glued chlorinated polyvinyl chloride (CPVC) or polyethylene (PE) tubing, and with greater chemical resistance than stainless steel or CPVC. On-site demonstrations from competing polypropylene piping providers greatly alleviated technical concerns about the material in general, as well as the quality, speed, and complexity of fusion-welded joints.

Aquatherm's Blue Pipe® pipe system (formerly Climatherm) was a clear frontrunner on all points. Polypropylene Random (PP-R) — which boasts all the unique advantages of Aquatherm Green Pipe® — such as the strengthening characteristics of the faser layer, but is engineered with thinner walls for higher flow rates — is high-heat stabilized, allowing it to be manufactured as SDR 11 instead of SDR 7.4. This reduces the weight of the pipe, improves its flow rate, and keeps it competitive with comparable non-potable systems.

Polypropylene's superior chemical resistance made it a suitable choice for across-the-board use in this particular dye system. "This particular application was primarily focused on the chemical resistance of polypropylene, which, as we learned in our research, is frequently used in lab waste applications as a cost-competitive cousin to PVDF," said Calhoun.

In the end, two factors made the biggest impact. First, Aquatherm's faser-composite technology addressed thermal expansion stability, as well as providing pressure use capability unconventional to plastic piping systems. Second, "Aquatherm stood behind their product with a staggering warranty policy against, not only replacement cost of failed piping, but associated equipment damage due to failed piping, as well as additional per event personal injury coverage," said Calhoun.

> "The job took place during the hot summer months and in lower levels of the paper mill with minimal air circulation. With less than ideal conditions, the men keep a good positive attitude working with Aquatherm because installation was easy and fast. When you accomplish a lot in a day, you go home feeling good." - Tony Heil, Project Manager, August Winter & Sons, Inc., Appleton, WI

On the Clock

Neenah Paper was up against the clock. Despite not starting until March 2012, there was a fixed start-up deadline of August 2012. "NPI takes pride in unmatched customer service and product availability. Missing the August start-up date would have risked service interruptions to customers, so the installation needed to be done quickly, correctly and without issues," said Calhoun. Very little time was available to develop a project budget and very little design work was invested into technical designs, so in order to expedite funding availability, the budget was developed based on using 316 stainless steel welded construction for all piping. Then the challenge was delivering a solution for much less.

"Initial estimates put raw material costs roughly equivalent to that of CPVC. In the end, costs were slightly higher than CPVC, but still less than half the cost of stainless. Aquatherm ended up providing considerable material and labor savings," said Calhoun.

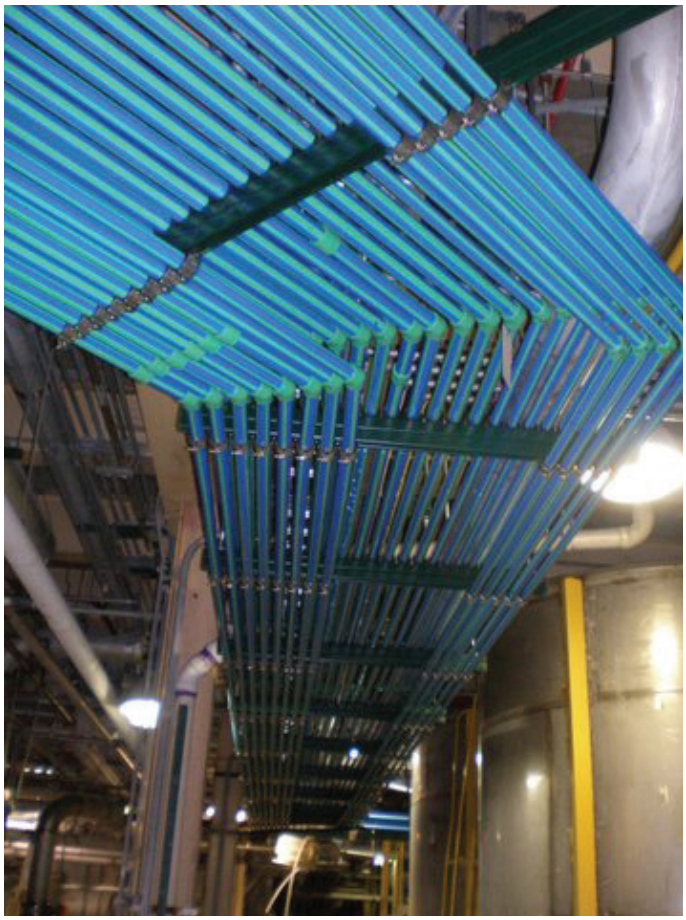
The task seemed tall. Approximately 2,500 ft of 1 1/2-in. pipe and more than 1,000 fusion joints would be used to transfer dye from totes to one of dozens of bulk tanks. About 5,450 ft of 1 1/4-in. piping and another 3,400 ft of 1-in. piping, held together by more than 4,500 fusion joints, needed to transfer dye from the bulk tanks to one of nearly 400 service taps and valves.

A little more than 1,000 ft of ¾-in. pipe would carry diluted dyes. Another 6,750 ft of ½-in. pipe, connected by at least 1,750 fusion joints, would carry dye from the metering pump area to where it is injected in the process. In all, more than 19,000 ft of pipe, connected by roughly 4,250 fittings and valves — more than 7,300 fusion welds — were installed with zero leaks, passing the rigorous Aquatherm pressure test process the first time.

"When the pressure test was done at the completion of the job, Neenah Paper did not have one recordable leak at any of the joints," said Brad Murphy, account manager, Columbia Pipe & Supply, Schofield, WI, which served as the Aquatherm distributor on the job.

Complicating the task at hand was that the workers had to endure extreme conditions in some of Wisconsin's hottest temperatures. "The job took place during the hot summer months and in lower levels of the paper mill with minimal air circulation. With less than ideal conditions, the men keep a good positive attitude working with Aquatherm because installation was easy and fast. When you accomplish a lot in a day, you go home feeling good," said Tony Heil, project manager, August Winter & Sons, Inc., Appleton, WI. "And, doing come cost comparisons between 316 stainless and Aquatherm for the Neenah installation at Whiting Mill, we saved about 58 percent of the install labor and 51 percent on material cost."

While many competitors traditionally supply all polypropylene valves with threaded ends, Aquatherm has found on thermal cycling applications — for which Aquatherm material is largely used — the plastic threads are a failure point. Aquatherm only offered fusion-welded joints and molded-in metal joints. Since nearly all of the valves in the system needed to be threaded to adapt to some other instrument or piping system, such as a hose barb and length of hose, adding a third-party all-plastic threaded adapter wasn't an option due to cost and space.



"Working together, Columbia Pipe & Supply and Aquatherm found a solution to modify and source polypropylene threaded valve ends. Aquatherm and Columbia Pipe & Supply really went the extra mile for this job," said Calhoun. Additionally, Skip Newton, with Aquatherm's local manufacturer's rep, PVF Solutions (Arlington Heights, IL) provided tireless support in working with all the key players on the job.

Virgin Territory

Because the mechanical contractors were new to the project, there was some initial apprehension. "Since August Winter & Sons, Inc. were installing this for the first time, the pipefitters needed to be trained and certified on the product prior to commencing work on the job," said Murphy. Following final selection of Aquatherm as the system of choice, Calhoun worked with Columbia Pipe and Aquatherm to coordinate installer training of NPI and August Winter personnel. Following the training course, the installers were very confident in their abilities, and within a couple days of working with the product were fusing pipe with ease.

"All the guys in the field say it is easier and faster to install than PVC," said Heil. Exuding confidence in the product, contractors from August Winter even utilized custom-made jigs to ensure high productivity and joint uniformity. "We built a jig to align the pipe when putting couplings and lengths together so the pipe would lay straight in the channel," Heil added.

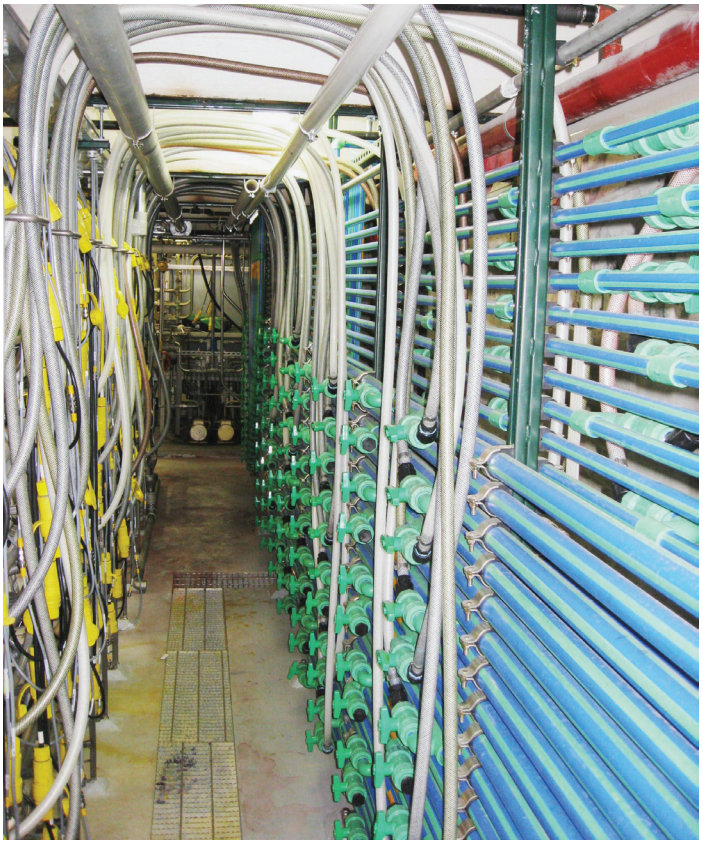
Above and Beyond

Nearing the end of the project, an off-cut was discovered in the facility's waste barrel with a dimensional anomaly on the ID of the pipe. Columbia Pipe and Aquatherm quickly analyzed the segment and offered several possible solutions. The system could be operated without concern of failure as long as the service pressure didn't increase beyond a specified point in the future.

"People in the paper industry know change is always happening so replacement was considered," said Calhoun. Aquatherm was aware that the defect occurred and thought all suspect pipe had been recycled at its manufacturing facility in Germany. That continuous quality data allowed Aquatherm to narrow the down suspect pipe to one pipe size within a 30-minute manufacturing window.

August Winter and Columbia Pipe staff inspected every foot of the suspect pipe size in the system for the specified date and time code and Aquatherm replaced the pieces found with the defect. "While we unfortunately and accidentally received product intended for recycle, the event showed Aquatherm truly holds itself to very high quality standards, keeps meticulous production quality logs and, like its post-installation warranty, stand 100 percent behind the quality of its product," said Calhoun. Aquatherm's ability to quality-control the batch of pipe and validate and confirm the batch numbers easily for tracking was rather unique in the industry, according to Newton.

Since initial start-up in August 2012, the mill has not had any issues with the piping system. It is now considered a viable alternative for most any type of piping additions to the mill from compressed air and potable water to chemical delivery, pending satisfactory chemical resistance analysis. "The bundles of brilliantly colored pipe also make for a great discussion point during customer tours," said Calhoun.



The German-manufactured pipe has been one of the world's most durable and greenest piping systems for four decades and proven successful in 70-plus countries. Aquatherm piping systems offer many performance and environmental benefits, such as:

- Eliminating toxic materials, glues and resins, and open flames from the piping installation equation
- The fusion welding process, which creates seamless connections that last a lifetime without leaking or failing
- An optional faser-composite layer in the pipe reduces linear expansion of the pipe by up to 75% compared to plastic piping

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