

Making a Splash in Water Management

With the considerable resources of GE integrated into its water management portfolio, Hercules' Pulp and Paper Division focuses on the industry's most pressing needs.

By Ken Patrick

Hercules and General Electric recently expanded and extended a product distribution and joint manufacturing agreement that integrates GE Infrastructure Water & Process Technologies' resources with Hercules Pulp and Paper Division's process chemicals and services capabilities

Basically, the agreement continues a business relationship that developed from GE's acquisition of Hercules' BetzDearborn Division in 2002. The agreement, which now extends to 2009, opens up the technology development resources of GE to the paper industry through Hercules as its exclusive supplier of products and services.

In addition, and importantly, the deal brings GE's expansive financing arm to bear on critical projects that many paper companies today simply could not undertake otherwise.

To examine the functional impact of this partnership in greater detail and explore what it really means to pulp and paper mills, PaperAge met with a team of GE and Hercules water management specialists at Hercules' headquarters in Wilmington, Delaware.

RIVER TO REEL

As Garry Cooney, VP-group leader, Chemical & Paper Industries, GE Infrastructure's Water & Process Technologies, emphasizes, the Hercules-GE partnership is not just an "alliance of convenience," but an arrangement with significant functional substance in that it brings the total resources of both companies together as one.

"When we say we can do it from river to reel, we mean it in every sense. Under our current part-





Participating in the roundtable discussion of water management technologies in the pulp and paper industry were (l-r): Bill Carroll of Hercules, Marshall Lewis of Hercules, Garry Cooney of GE Infrastructure, and Charles Robinson of Hercules.

nership agreement, Hercules and GE share manufacturing capabilities and new product development, which integrates our water management capabilities into one total solution,” Cooney says.

Charles Robinson, director, global new business development, Hercules Pulp and Paper Division, adds that the joint manufacturing agreement allows both companies to cut costs, which can then be passed on to customers. “We’ve been able to close some redundant plant operations on both sides, and by sharing services we’re able to maximize the expertise of both groups.”

Bill Carroll, national sales manager, Hercules Pulp and Paper Division, WMT, notes the water management groups of GE and Hercules focus on similar product and technology applications. “Except for recovery boilers, our industrial treatment applications are basically the same—cooling water, influent and effluent, power boiler waterside and fire-side, etc. All of GE’s advanced applications in these areas continue to be available to the paper industry through Hercules on an exclusive basis.”

OUTSOURCING OPPORTUNITIES

With its recent acquisitions of Ecolochem, along with reverse osmosis (RO) technologies from Osmonics and Ionics’ advanced ultrafiltration technology, GE brings a new dimension of temporary and permanent mobile service/out-sourcing capabilities to the partnership.

This aspect of the agreement, Cooney explains, adds financing, long-term leasing, and building and operating capabilities to create a “total outsourcing package.” The role that GE Capital plays in the relationship “works as a perfect fit for the paper industry’s needs,” he says.

GE was in the process of developing its own mobile water treatment systems when it acquired Ecolochem. “They had the ‘magic’ already in place—the right technology and expertise—which took us forward quickly,” Cooney says, adding that mobile systems can be used either as temporary or permanent solutions, operated by the mill or completely outsourced to Hercules/GE.

An example of a temporary or long-term mill outsourcing solution would be the use of mobile or permanently erected technology utilizing reverse osmosis for boiler feedwater treatment. A full-train demineralization setup would once have been the preferred approach for this application, with a line consisting of a clarifier, filters, polishers, deaeration system, etc., ahead of the recovery boiler, all of which requires a high capital expense and large footprint, Cooney explains.

“With today’s membrane technology, we could put in a micro-filtration plant with RO capability (having the same volume capacity) in a 360-ft² room—mobile or permanent—and get much higher quality operations at lower costs,” Cooney says. Eliminated in the process would be all of the complex and costly operations around the clarifier, back-washing of the filters, operations of the demineralizer, storage tanks, pumps/transfers, etc.

Effluent color removal would be another example. This “age-old,” international problem, Cooney points out, is beginning to impact some mills’ ability to operate “We are currently working with a couple of mills to implement membrane technology, mobile or permanent, that will do the job much better and less costly than other traditional systems they have tried. We think this is going to be major



Mobile water treatment trailers in place at a production facility.

development area for us in the near future.”

Yet a third example of RO application would be the use of membranes to concentrate black liquor, potentially eliminating evaporator trains in the recovery loop and all of their associated energy usage and maintenance headaches. GE has successfully applied similar membrane technology for ammonia and nitric acid recovery in ammonia plants, as well as glycol recovery—“just about any organic or inorganic substances that require energy for concentration and recovery,” Cooney says.

INNOVATION

As Robinson points out, the key focus for both GE and Hercules in their expanded “marriage” is on innovation. “Both organizations always focused on innovation, and especially during the past six months we have increased our collaborative efforts to co-develop new products and technologies and bring them to the market.

One such example of innovative development is a wet chemistry testing method GE is developing that will make traditional reagent-based analysis obsolete and reduce water testing time as much as 90%. With this new technology, instead of the usual time-consuming laboratory testing of boiler feedwater, condensates, etc., every shift (or more frequently), mills can simply place a single drop on a special disk and insert it into the test unit. A complete, highly accurate analysis is available in a matter of minutes rather than three or four hours typical with manual lab methods.

Marshall Lewis, business manager, Hercules Pulp and Paper Division., WMT, says that odor control is another area where innovation has been transferred from GE through Hercules to the paper industry. There are a myriad of odor generating sources in a pulp and paper mill, but the two main areas, he explains, are the pulp mill and waste treatment plant, which require totally different odor control technologies.

While most mills collect and burn noncondensable gases (NCGs), a GE technology that treats hydrogen sulfide in a liquid phase to prevent it from ever being off-gassed in the first place is now being successfully applied in the paper industry. “We can also biologically treat to minimize volatile fatty acids (VFAs) as an odor source, and we’ve been apply-



Pulp and paper mill power boiler and water cooling tower (on the right).

ing some new technologies to treat generic atmospheric odors,” Lewis notes.

Lewis says that mill effluent closure, a concept that “has received a lot of lip service over the years,” is beginning to be re-examined seriously in the industry today. “With energy costs going up the way they have in the past few years,” he emphasizes, “the energy components of water reuse/recycle

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—Marshall Lewis, Hercules

and minimization have become progressively more critical and closure economics are becoming more favorable.” Lewis further explains that although pulp and paper may not be as “cooling-intensive” as other industries such as chemical processing, it typically does have high water con-

servation and a lot of cooling-critical applications such as turbine condensers, evaporator condensers, etc. “Cooling water treatment is an area that has been somewhat overlooked in the industry.”

RECOVERY BOILER DEVELOPMENTS

In addition to its expanded boiler water treatment capabilities, the GE marriage has also placed some interesting new technologies on the boiler fireside into Hercules’ portfolio. One fuel additive that GE has had considerable success with in high-pressure coal- and oil-fired power industry boilers is now being applied by Hercules to recovery boilers in the paper industry.

Known as “popcorn technology,” a substance is blown into the furnace, sticks to the walls, and integrates with deposits as they are forming. As temperatures rise in the furnace, the HAS (heat activated silica) substance starts to expand disproportionately, which fractures the deposit and prevents further deposition growth.

“There’s always been a need, or desire, to find something that could be fed into recovery boilers that would help keep them clean,” Cooney says. “We’re positive this technology is the answer to recover boiler cleanliness on the fireside, and will keep them from fouling and dramatically extend their runs without depending too much on soot blowing. All we need is a series of trials to prove the technology, and already we have some willing participants lined up.”

Lewis points out that “this is completely different from any other technologies tried with recovery boilers in the past.”

VITAL FEW AUDIT

Also in the Hercules portfolio, under the Asset Protection umbrella, is a service known as the Vital Few Audit (VFA). Available to customers as well as potential customers, the VFA has two major components—promotion of best practices and the onsite water systems audit itself.

As Robinson explains, Hercules has developed an extensive listing of various operating practices for water programs, and based on a mill’s processes, equipment, boiler pressures, etc., the audit team will recommend those optimum for a site’s operations. “We really push our reps in a mill to stick with those best practices and resist any ‘cheating’ on the system just to save a little here and there.”

Typically, the audit team is comprised of five or six experts with 15 - 20 years of experience in the paper industry. The team carefully goes through a mill’s water systems looking for practices that fall into either the “vital few” or “significant other” categories. A vital few area involves any failure that could shut the mill down. A significant other area involves practices that could and should be improved but probably would not shutdown a process.

According to Robinson, vital few practices can range from the very simple, such as an un-insulated caustic feed line that could freeze and shutdown operations, to the complex, such



Water clarifier in a pulp and paper mill.

as conditions in a high pressure boiler that could eventually lead to tube rupture. “We look at every practice in great detail—for example, are there procedures to assure that automatic condensate dumps will perform as desired?...are the on-line conductivity meters properly installed and routinely calibrated?...is the entire dump system operated periodically to assure proper operation when needed?”

“If a team finds more than three particular situations that could shut a mill down, generally there’s a problem,”

Robinson emphasizes.

Lewis points out that most events impacting asset protection and reliability are related to water contamination. “We look very closely at potential contaminant sources

and safeguards, or especially the lack of safeguards, to prevent the failure of supposedly ‘simple’ components that can shutdown a mill for two or three days and cost millions of dollars.”

Basic maintenance at its “core level” begins with a mill’s water systems, Lewis says. Water, especially in the pulp and paper industry, is the primary vehicle for almost all corrosion, deposition, fouling, and failure problems in a mill. Careful attention to water systems can have a significant payback, he points out. ■

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