Achieving Environmental Compliance Via Ion Exchange Resin Regeneration

ACM Technologies turns industrial wastewater into a revenue stream.

To its customers, ACM Technologies is chiefly regarded as an authority on ion exchange resin regeneration, heavy metals removal, and resource recovery. But what the company really sells, according to Jeffrey Gottlieb, the firm’s president and CEO, is assurance.

“Our customers know there’s potential liability whenever they send their wastewater materials to a processing facility—they don’t know where the wastewater is going, and they might not know if the company they’re working with is fully permitted or properly regulated,” Gottlieb explained. “But when they come to us, they can be assured that we are fully compliant with all the proper regulatory authorities, and that we can document how the waste materials are shipped, handled, and processed.”

Those assurances are made possible through the innovative processes at work at ACM Technologies’ newly expanded central regeneration facility in Forest Hill, Md., about a 40-minute ride from Baltimore. Originally christened in February 2008, the 16,500-square-foot, state-of-the-art operation offers a significant upgrade over the company’s former facility, which was roughly one-third the size of the new digs. More importantly, the larger space provided much-needed elbow room for new equipment designed to boost production capacity and increase product quality.

“We simply outgrew the old plant,” Mike Warner, ACM Technologies’ general manager of East Coast operations, said of the former 4,000-square-foot plant. “In fact, our new processing area alone is bigger than the old facility was in its entirety. Not only is the new facility large enough to handle all the trucks we have coming and going every day, but it has also improved our efficiencies across the board.”

Indeed, it has. The sprawling facility is replete with both small- and large-vessel regeneration equipment. This ensures thorough process treatment and a quick turnaround for ACM’s customers—legions of electroplaters, EDM specialists, as well as other industrial users.

“Not only can we process all kinds of wastewater, we also have the ability to take care of acid and base neutralization, along with many of the other end-by-products that customers look for,” Warner said. “These facilities are going to be extremely valuable to our customers.”

Gottlieb agrees. “We’ve always worked with the idea of an environmentally friendly service,” he explained. “But we’re now seeing real numbers come in, and it’s very impressive.”

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As a slew of other industrial operations that generate nasty wastewater, the company can accept resins both in-bulk and in-tank, thereby easing the pick-up and drop-off process for customers while alleviating any concerns finishers may have about the handling of their wastewater. (See Figure 1 flow chart.)

“We fabricate and service closed-loop ion exchange systems that are regenerative to provide zero discharge to any metal finishing application that’s out there,” said Warner, who holds a Maryland State Industrial Class 6 wastewater treatment operators and superintendents license. “Our systems will take care of cyanide, chrome, basically everything.”

For finishers, the upside is tangible. Through ion exchange, Warner notes, finishers can eliminate water bills, operator costs, and reagent chemical costs while utilizing a system he says is less expensive than conventional metal-hydroxide precipitation methods. Furthermore, the resins—after regeneration—are tested and certified by ACM on site. “By handing it over to us, finishers don’t have to worry about the regulators outside their doors, because there are no metals going down the drain,” Warner added.

And that’s welcomed news to customers who need to ensure compliance with EPA mandates related to the handling of effluent. “Everything we do revolves around the regulations we’re required to follow,” Warner said. “Over the course of eight years of doing business here in Maryland, we’ve never had one violation of any sort—no effluent or OSHA violations.”

**CASE HISTORIES**

Beyond helping the company achieve important milestones, ACM Technologies’ innovations are solving real challenges for customers. Case in point: One micro-electronics company based in the Midwest encountered a problem with zinc effluent in the discharge from its combined metal finishing/waste treatment operation. The final treatment process involved precipitation, clarification, and final filtration. While heavy metals and hazardous organics were reduced to acceptable levels, trace amounts of zinc occasionally rose above the limits allowed.

An analysis of the problem revealed the situation was caused by tiny levels of phosphates in the water that complexed with the zinc. Solution: The effluent was treated by reducing the pH sufficiently to break the phosphate complex. Next, the zinc was removed using a strong acid cation resin. By combining pH control and the use of sodium and hydrogen cycle ion exchange resins, the zinc was successfully—and continually—removed below the effluent standard set by the EPA. Since that time, ACM reports, compliance has been maintained at 100% for 18 months, and zinc loadings on the resins have averaged more than 70% of total capacities.

Another scenario involved a metal plating operation. The problem: Following the final treatment of a combined effluent that involved chlorine destruction of cyanide, it was found that copper was coming through at levels above the permit requirements—at times reaching several parts per million (ppm). A subsequent analysis indicated that several hundred ppm of other dissolved metals were also present. The copper was present in an amount equal to only one-half to 1% of the total cations in the water supply. At first glance, ion exchange appeared to be uneconomical due to the requirement of removing nearly 100 other metal ions for each ion of copper.

The solution for this particular situation called for a selective resin for copper. Despite unfavorable conditions, the special resin provided complete removal of copper with little or no reduction in hardness and other ions, and provided more than 20,000 bed volumes between regenerations. Interestingly, in this case it was determined to be less expensive to dispose of the resin rather than regenerate it. The reasoning: Throughput capacities were so high that resin replacement and disposal (solid) were less expensive than operating a regeneration process and then disposing of the regenerant wastewater.

While these solutions proved effective in solving specific problems, ACM Technologies highly recommends strict adherence to established metal finishing protocols. “The finisher still has to use good plating practices and know how to set up their lines—stagnant rinses, counter flow rinses, etc.,” Warner said. “But as far as regulated metals and cyanides are concerned, our systems can handle them.”
ROOM TO GROW
As demand increases for ACM’s proven wastewater treatment solutions, the company is looking to position itself for the future by expanding its customer base and pursuing new end-use applications. Objectives range from ramping up capacity to meet an anticipated growth in electroplating wastewater treatment services, to tapping into new technologies and innovations designed to further streamline the effluent regeneration process and automate labor-intensive tasks such as mixed-bed resin separation and packaging.

ACM Technologies has another, more aggressive goal: expand the number of ion exchange facilities beyond the East Coast. (In addition to its Maryland facility, ACM operates another regeneration plant in Plantation, Fla.) Specifically, the company is looking to establish a presence in the Midwest, which would help the company service that region of the country as well as points farther west. At present, ACM Technologies—through its sister company ResinTech—has set-up a “depot” in Los Angeles, Calif. Customers located in the West may utilize this facility as a pick-up and drop-off point for their tanks, which are then consolidated and shipped back east for processing.

“Within six to 12 months we’re looking to set up a facility in the Midwest—possibly as close as Ohio or far west as Chicago,” said Larry Gottlieb, ACM’s vice president. “That’s something we’re going to have to do to grow our volumes significantly. We also realize that a good way for us to expand our business is through acquisition, and we’re actively looking at opportunities as they come up.”

Of course, ACM Technologies wouldn’t be so bent on expansion if it didn’t believe there were untapped opportunities—even in a mature industry such as the metal finishing sector. While the company acknowledges that its clientele is increasingly shifting toward EDM machining firms and companies specializing in groundwater remediation, it’s not counting finishers out. The reasoning: As long as electroplating effluent is classified as hazardous wastes there will be a need for specialists with the expertise and capability to handle it.

“With all that’s facing the metal finishing industry today—business moving overseas, rising costs, environmental pressures—we still feel the market is going to come back,” Warner said. In his opinion, some outsourcing initiatives are backfiring. “We refuse to give up on the metal finishing industry.”

For more information, visit www.acmix.com or call (410) 420-8001.

NOTES
1. Electrical discharge machining (EDM), sometimes referred to as spark machining, is a nontraditional method of removing metal by a series of rapidly recurring electrical discharges between an electrode (the cutting tool) and the workpiece in the presence of a dielectric field. The ensuing minute metal chips are removed by melting and vaporization, and are washed away by the continuously flushing dielectric fluid. EDM can cut materials regardless of their hardness or toughness, but is limited to the machining of electrically conductive workpiece materials. The EDM process is most widely used by the mold-making tool and die industries, but is increasingly applied to make prototype and production parts, especially in the aerospace and electronics industries in which production requirements are relatively low.

2. ACM Technologies operates as a centralized waste treatment facility in Maryland and is bound by a stringent list of daily discharge limitations. These include OSHA regulations, Maryland DEP regulations, proper documentation for hazardous materials handling, etc.