

# Manufacturing Innovation Insider Newsletter

## Rx for Maintenance-Intensive Cooling Towers: Think Plastic to Avoid Throwing Good Money after Bad

Brock Equipment Company puts an end to \$10,000/year maintenance costs by replacing a metal-lined cooling tower with an engineered-plastic tower

**M**etal cooling towers lined with galvanizing or other coatings have been around for a long time; in many instances, far too long. Like an aging fighter, decades-old metal cooling towers frequently become high-maintenance, while performance drops off sharply. Over time, these towers are increasingly thin-skinned, inefficient, and can cause unscheduled process disruptions. Secondary damage can also be caused by chronic “leakers,” and outdated tower fans and motors often consume more energy than necessary. All of this adds up to a classic “money pit” for plant maintenance personnel that rely on cooling towers to support key process equipment.

In the past, the prevailing cure for a leaking or corroding cooling tower was simple (although not easy). You either repaired it or replaced it. However, repairs such as re-skinning or coating tower linings often take weeks and shut down critical processes if maintenance isn’t already scheduled. Welding patches on galvanized linings might work, but typically not for long.

“We were spending between \$5,000 and \$10,000 a year on cooling tower repairs – patching metal, putting in rubber seals and gasketing. In other words, ‘band-aid’ fixes just to keep the tower from leaking,” says Marvin Richer, president of Brock Equipment Company, a Crystal Lake, IL manufacturer of hydraulic pumps and related tools.

On the other hand, replacing towers is time-consuming and expensive, as is the installation of additional towers to increase cooling capacity.

“Given our choices, we were most likely going to install a new tower similar to the old one,” Richer



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says. “But first I wanted to look into a new plastic type of cooling tower that was said to be more reliable and require less maintenance than the old-fashioned metal-lined models.”

What Richer was looking for has become a new prescription for replacing ailing cooling towers or adding capacity: engineered molded plastic cooling towers. Just as advanced plastics have replaced metal in many high-tech and industrial applications, plastics also offer a remarkably comprehensive solution to the chronic deficiencies of metal-skinned cooling towers.

When selecting cooling towers, the focus of any plant engineer beyond efficiently meeting duty requirements is on reliability, reduced maintenance and ease of installation. Given these considerations and a choice between metal and plastic towers, many engineers are opting for the latter, which are now high-capacity, light-

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weight, and often more energy efficient.

With Brock Equipment, it quickly became clear that they were “throwing good money after bad” by continually spending time and money on their old, deteriorating galvanized metal-lined tower installed in 1950.

“As the tower got older not only did we have ongoing leak problems, we started to have a structural problem,” Richer explains. “Water is pretty heavy, and the tanks that hold the water on the bottom were getting heavier and heavier as we added more and more materials to fix the leaks. All that weight was beginning to bend the structural members that held the cooling tank together.”

Metal cooling towers like Brock Equipment’s are also subjected to constant changes in pH, requiring chemical treatments that attack the galvanized metal lining, essentially wearing it out in just a year or so. Environmental conditions such as sunlight, pollution, salt air, and harsh process chemicals may also contribute to galvanized steel’s early demise. With this inherent vulnerability, metal-lined cooling towers generally carry only a one-year warranty.

On the other hand, engineered molded plastic cooling towers are one-piece so there are no problems with seams, welds, and patches that wear prematurely. Competitive in price, these new towers are also rust and corrosion-proof. Those manufactured by Delta Cooling Towers ([www.deltacooling.com](http://www.deltacooling.com)), for example, are rotary-cast with a single or double-wall UV-protected, polyethylene shell that is virtually impervious to weather conditions and harsh environmental elements. The warranty on these towers is indicative of their durability: Delta product casings carry a 15-year warranty.

Brock Equipment’s cooling tower does not interface with manufacturing processes, but supports an absorption-chiller that conditions plant air, a demanding application that is clearly affected by tower downtime. For this reason, the reduced maintenance requirements and extended life of molded plastic cooling towers were very appealing to Marvin Richer.

“We thought this might be a better technology than galvanized steel,” Richer explains. “If you are fa-



*Old metal cooling towers are a classic “money pit” for plant maintenance personnel that rely on cooling towers to support key process equipment.*

miliar with plastics, you know that engineered plastic used to form Delta towers is very tough and this has proved to be the case. The new cooling tower has been trouble-free for over three years. We still have normal maintenance. We clean in the spring and make sure the filters are clean. But there has been no repair work on the tower, no leaks at all.”

In the past, plastic cooling towers were considered “too small” for many industrial processes. For that reason, galvanized metal cooling towers were deemed the primary choice for packaged applications above 250 tons. Unfortunately, over time these galvanized metal towers have recurring maintenance costs and costly process downtime.

However, factory-assembled plastic towers such as Delta’s TM Series can now be combined to provide up to 2,000 cooling tons in a single, modularized unit. Modular cooling towers also facilitate an extra margin of cooling capacity that can be advantageous in adjusting to operational heat load or outflow changes, or in upgrading to meet future cooling requirements.

The modular design of plastic cooling towers has also introduced new flexibility in conserving valuable real estate. By molding towers in a rectangular shape, some manufacturers enable users to cluster cooling towers in a group that occupies a much smaller footprint.

“With the new Delta system we actually got more cooling with less tower,” says Richer. “Our old

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45x20x18 metal cooling tower was replaced by a light-weight plastic model that is only half that size, yet has slightly greater cooling capacity.”

Through the use of plastic cooling towers, utility savings can also be realized. While the cost of electric power to drive cooling tower fans may seem incidental compared to process costs, they add up. In the case of the engineered plastic towers manufactured by Delta, direct-drive motors are employed to power the cooling fans. With no pulleys, bearings and belts, these motors prove more efficient, and hence, provide substantial savings in energy costs while also delivering more horsepower.

“The two motors installed on the old tower were each 40 HP, 3-phase, 480 Volts. On the new tower there are four 10 HP motors,” Richer says. “So we now have only half the power requirement. Plus the new motors are more efficient than the old ones. We have not measured the energy savings, but it’s there.”

The inherent design advantages of the latest plastic cooling towers also include easier installation (especially on rooftops) because a lightweight plastic shell weighs as much as 40% less than a steel tower, while being 5-10 times thicker. For applications that require mounting flexibility, Delta pioneered an induced-draft, counter-flow design that incorporates I-beam “pockets” in the tower basin for reinforcement, so that a plastic tower can be easily mounted on standard I-beams or imperfect concrete pads.

“The installation of our new tower took a total of four days,” says Richer. “In fact, the installation of the tower was a one-day deal, but some pipes coming into the building had to be reconfigured so that took extra time.”

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