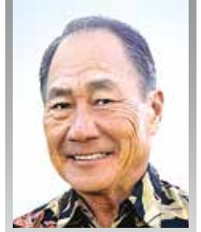
How Clean Is Your Cooling Tower?



John Arizumi

Latest advances improve efficiency and greatly ease maintenance

Every large air-conditioned commercial building will have a cooling tower system to remove the rejected heat from the air-conditioned spaces within the building. In Hawaii, we see cooling towers in hotels, office buildings, hospitals, schools, pretty much any project that uses water-cooled air conditioning equipment.

Cooling towers use an evaporative water-cooling process. This provides the greatest amount of heat removal relative to size. A condenser-water pump transfers the warm water from the HVAC chiller through a sprinkler-sprayer onto a lattice atop the cooling tower. Warm water sprayed on the lattice is cooled by the flow of outdoor air generated by the tower's fan system. The lattice's honeycomb-like mesh enhances this evaporative-cooling process. Cooled water is then collected in the catch basin to be pumped back to the condenser.

By taking advantage of innovations like fiberglass construction, improved fan placement and catch basin-free design, builder managers can reduce both the lifecycle cost and maintenance demands of cooling towers

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Of all the components that make up the HVAC system, the cooling tower is by far the most difficult and expensive to maintain. Keeping a clean cooling tower assures the highest energy efficiency and minimizes the risk and liability of contaminants, such as fungus, silt, algae and Legionnaire's disease. Yet, because of the difficulty in performing this maintenance, it is often neglected until the situation really demands attention.

Maintenance is even more of an issue in Hawaii, where salt air corrodes metal parts and shortens the life of a tower. Additionally, most towers feature a top-mounted propeller fan design. This puts the fan blade and drive motor assembly directly in the most corrosive warm, moist discharge air. This is especially problematic because replacement of these parts usually requires use of a crane.

The catch basin that collects the cooled water must be regularly cleaned of algae, silt, solids and other contaminants that arise from exposure to the elements and sunlight. Maintaining a badly neglected tower is like working in a dirty swamp. The process can also waste a lot of water, as the towers require chemically controlled water systems along with adequate bleed-off water.

Traditionally, cooling towers have been constructed of galvanized steel. Stainless steel is starting to replace that to prolong the cabinet casing life from corrosion. But the maintenance of the fan/drive assembly, the water chemistry system, and regular cleaning of the basin, and water bleed-off still remain as costly expenses.

Fortunately there are some new innovations in cooling towers that can help both facility owners and managers breathe easier. For example, constructing the tower of fiberglass instead of steel is a simple way to avoid constant and costly corrosion problems. With the proper design and materials, such as half-inch-thick reinforced fiberglass square-corner posts, and sturdy quarter-inch reinforced fiberglass panels, fiberglass towers can now stand up to even hurricane-force winds.

One even more clever design idea is to invert the fan assembly from the top of the tower to the bottom and have it push air up instead of down so the blades and motors sit outside the most corrosive air streams and are in a much easier location to maintain. Making the fans modular allows for fan staging to increase energy efficiency.

Other recent advances include a unique water collection and draina system. This keeps the fan assembli completely dry and entirely elimina the problematic catch basin, requir just a small enclosed sump. There a also improved variable spray nozzle These spray water in a square—rath than circular—pattern matched to lattice surface area for greater econ and efficiency.

All these features allow the cooli tower water to be kept completely of sunlight, minimizing the growth of algae and sludge. This drastically reduces the amount of chemicals a water bleed-off. And the total pack of advances can result in a tower that will last up to 35 years, with a significantly lower life-cycle cost than galvanized or stainless steel towers.

You will find some of these advances in cooling towers from several manufacturers. But you only find all of them in units from a pioneering company called Tower Tech. This company designs and manufactures towers so well-suited to buildings in Hawaii that Carrier Hawaii decided to include them in the wide mix of HVAC products we offer commercial customers.

Keep in mind that maintenance is still key to even the most advanced cooling tower. You will just find that it is a great deal easier if you select the right unit for this environment. ❖

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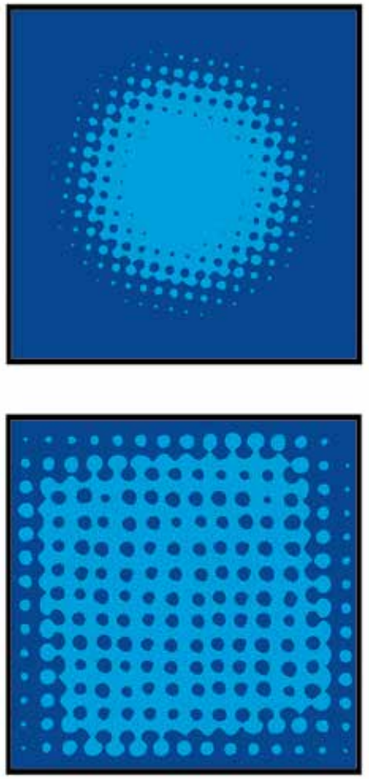

Compared to a traditional spray nozzle, the patented square spray nozzles in select new cooling towers distribute water more evenly. This cuts water and energy usage, reduces scaling and lowers maintenance cost