

New Filter Helps Luxury Hotel Conserve Energy, Water, Chemicals...And Its Four-Star Reputation

In a four-star, luxury hotel, there's no room for discomfort. And behind the scenes – just as with any business – there's no room for wasted resources, whether it's water, energy, labor and money. Or all of them put together.

The lobby and main building of the Amway Grand Plaza boasts the elegant Beaux Arts architecture of the Roaring '20s, when it was named one of the 10 best hotels in America. An adjoining glass-and-steel tower extends the property's reach to 29 floors and rounds out the capacity to 645 guest rooms.

But despite the combination of classic grandeur and modern grace, the task of keeping rooms cool through sultry Midwestern summers was anything but elegant.



The Amway Grand Plaza Hotel in Grand Rapids, Mich. is a luxury property, so clean water and comfort are vital.

Old System Faced Challenges

The Grand Rapids municipal water supply is loaded with rust and sediment from a century-old supply system. And the HVAC system was prone to the classic challenges facing cooling towers. Open to the sky, water in the tower constantly collects dirt, pollen, cottonwood fluff, insects, and whatever else flies by – as well as ambient heat. As water evaporated in the cooling tower's tank, it left behind scale, which formed a substrate for bacterial colonies.

Rust and sediment collected in piping. Dirt, scale and slime plugged nozzles and fins. As the system's heat exchange efficiency was steadily diminished by contaminants and warm water, chillers and condensers ran full-blast all summer long, slowly losing ground in the battle to cool the hotel.

When the system could finally be brought down for maintenance, the challenges continued.

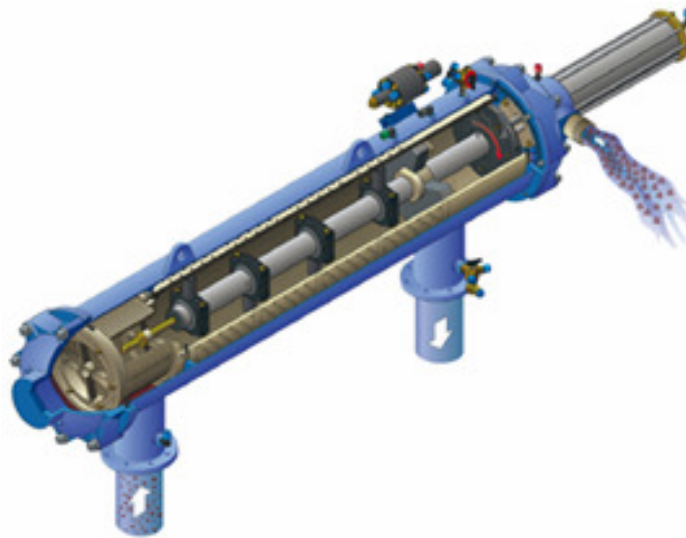
“Just to get into that cooling tower, we have to rent a scaffold, take off the top of the cooling tower, get men into the tower, remove 90 percent of the nozzles, blow down the water, clean out

the system, see which nozzles work – because most of them break when you try to clean them – and replace most of them, which costs a fortune,” says Efrain Melendez, Energy Manager for the Amway Grand Plaza Hotel. “Just the labor alone took a week and cost \$5,000.”

Meanwhile, water was constantly being lost from the system. Some evaporated during the heat exchange process. Some went down the drain during maintenance blowdowns and periodic overflows when sediment and scale plugged the outdoor holding tank. New water brought new contaminants, and required the usual chemical treatment with oxidants, anti-scalants and biocides. Then most of it ended up down the drain again over time in an endless, costly cycle.

Energy Team

The energy team assigned to the project replaced the traditional outdoor evaporation tank with a system that directs water from the heat exchangers back into the building, where it is filtered and recirculated through the cooling loop. Continually recycling clean, cool water dramatically reduced energy, water and chemical waste – immediately.



The Amiad system uses focused back flush nozzles to automatically remove trapped sediment without interrupting filtration.

Heart of the System

A 7.5-hp Patterson pump was specified, along with a 200 gpm, automatic self-cleaning Amiad M104LP screen filter at the heart of the system.

The Amiad unit contains a four-layer, 100-micron screen constructed of 316L stainless steel. Just millimeters from the inside surface of the screen is a scanner with an array of focused suction nozzles that draw filter cake from the screen during the unit's automatic self-cleaning cycle. When a set pressure differential is reached between the two sides of the screen (typically 7 psi), an outlet valve connected to the suction scanner opens. Water and filter cake are pulled through the suction scanning nozzles at a velocity of 50 feet per second by the pressure differential between operating and atmospheric pressure. The scanner operates in a spiral pattern, ensuring that the suction nozzles clean the entire screen in a 20-second back-flush cycle. The process takes place without interrupting the operation of the filter.

The patented cleaning nozzle and screen media are designed to allow impingement between the two surfaces during the cleaning process. The nozzle automatically adjusts itself along the screen surface to compensate for any irregularities, minimizing tangential flow and maximizing the cleaning process at the nozzle orifice.

The automatic self-cleaning screen filter has a very small environmental footprint. The back flush cycle uses just 1 percent of the flow water through the system, and the filter's 120-volt motor draws minimal power.



Compact and reliable, the Amiad filter helps keep the hotel's cooling tower running efficiently while reducing water, energy and chemical bills.

Experience with Amiad

Melendez was quite familiar with Amiad technology – in 2008, he installed an Amiad SAF 4500 with a 10-micron filter to filter the water supplying the hotel's domestic hot water system and return loop to solve a critical problem.

For years, rusty water from the city was causing customer complaints and lost room revenues. "Periodic utility work sent even more debris through the delivery system", says Melendez, plugging toilet diaphragm valves, sink aerators and showerheads.

"Installing the Amiad filter stopped the problem immediately", says Melendez. In fact, the point-of-entry filtration system effectively shelved a \$100,000 plan to replace all the galvanized pipe on 26 floors of the hotel's tower with stainless steel pipe. "With the Amiad filter, they forgot they had the problem because the water was never brown or yellow again," he laughs.

Return on Investment

Melendez is carefully watching the impact of the new filtration system on the Amway Grand Plaza's cooling system.

"We know it's quantifiable," says Boyd. "We're measuring it every day. Every time the filter back flushes, we know. We know what their water bill was before. We're starting to build a data log of what they're doing now. We think they'll see a 30-to-40-percent savings in the total lifecycle cost of their cooling tower system – equipment, maintenance and operation."

Though it will take a year or two to gather solid numerical data, Melendez likes what he's been seeing right from the start. The benefits of his cooling tower filtration system cover a wide range of environmental variables:

- **Less water.** "In my system, the water's not wasted – my water bill will be three-quarters less than it was before," he predicts based on his observations this summer. That's a lower domestic water bill for the hotel as well as a decreased burden for Grand Rapids' wastewater treatment plant.
- **Less chemical use.** "We're sending clean water to the cooling tower and it goes back to the tank and filter to be pumped back to the cooling tower, so it's always clean," Melendez points out. "The filter cleans the water so fine I almost don't need any chemicals."
- **Less energy.** "Right now, the refrigerators, cooling towers and chillers are on 'low,'" he says on a warm, early-autumn day. "The water coming inside the building will pass through the filter at a cooler temperature and get back to the cooling tower at a lower temperature. That will give you close to 10 degrees at least. The condenser will be running cooler. Amps in the chiller will be running lower. We run cooler and the temperature will be making it comfortable."

Melendez emphasizes that the key word is "comfortable." At the end of the day, the hallmark of success will show up not just on the utility bills or in conversations with the city's public works leaders, but in the satisfied comments from the guests at the hotel.

"It's not only how much water we save or how much energy we save," says Melendez. "We have a building with comfort. That's the most important thing we look for."