

Case Study

Lucent Technologies Replaces a Centrifugal Separator with a Pep Media Filter to Enhance Water Quality and Cooling Efficiency

Background

Lucent Technologies, in Holmdel, New Jersey, is a two million square foot facility housing R & D, administrative, process and engineering operations.

Original Cooling System Installation

In 1993, Lucent installed a 5-cell, 6,000-ton ceramic cooling tower to serve 5 x 1,200-ton chillers from Trane and a centrifugal separator to remove airborne elements that are drawn into the cooling tower water basin. The separator had a flowrate of 2,000 gpm with a 40 HP pump.

The Challenge

Operating & Maintenance Cost Evaluation

According to Bob Koenigsmark, Operations Specialist for Lucent Technologies, after several years of operation, the cooling system needed to be updated and an optimization program was put into place. The program aimed to reduce the debris plugging condenser tubes and interfering with their plate and frame heat exchanger. With the existing system, the tower basin had to be cleaned two to three times per year, which included draining and disposing of the water, cleaning, and refilling with water and chemicals. Bob was also periodically rodding out the chiller tubes. In summary, cooling system maintenance was an area for major improvement.

To improve the system, Lucent wanted to keep solids from the circulating water, and focused on the centrifugal separator and PEP was contacted to evaluate the system

The Solution

PEP explained that it is important to remove the particulates at the source. A water analysis was done by an independent EPA-approved lab, which indicated that 95% of the particles are in the 1-10 micron range. The cooling tower is a big air scrubber. Elements in the air enter the cooling tower and deposit into the basin. These elements cause heat exchanger fouling, condenser tube plugging, and have a severe impact on the ability of the water treatment chemicals to perform effectively.

PEP further explained the theories of filtration and that the use of side stream sand filters is effective in removing particles in the 1-10 micron range. Centrifugal separators are not effective in the small particle size ranges.

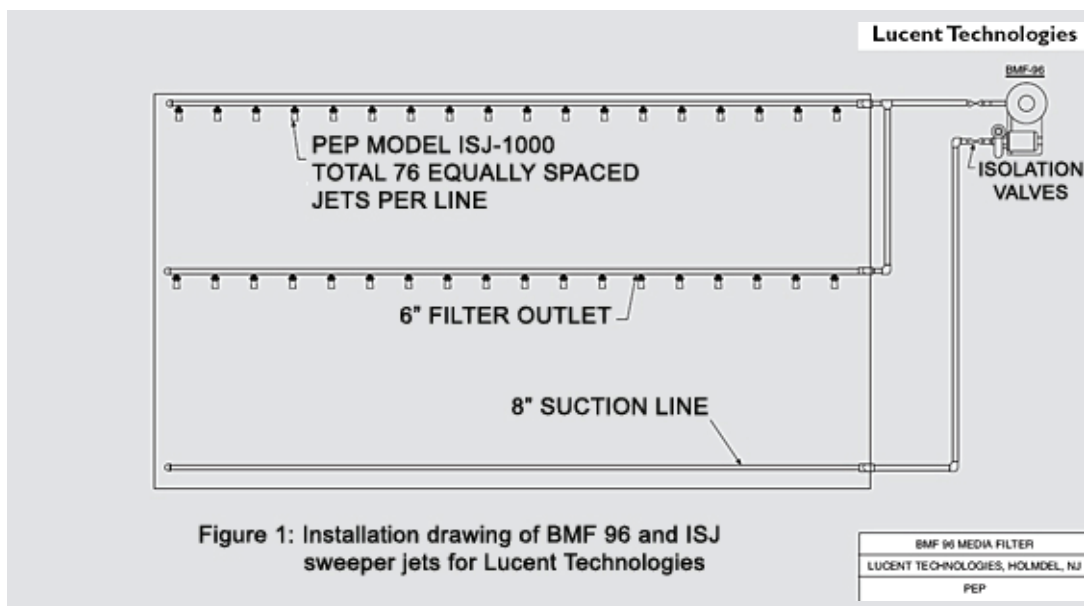
System Sizing & Installation

To engineer a PEP side stream filtration system for the cooling tower, the total system volume had to be estimated. PEP completed this calculation by examining the cooling tower basin, system piping and condenser volumes. The recommended filtration rate is a system volume turnover of once per hour. The selected filter was a PEP BMF-96 Sand Filter System with a flow rate of 1,005 gpm.

The BMF-96, shown in the photograph, is a 96-inch diameter filter with Unigran 85 "round" sand media. The BMF is a skid-mounted package with a system-matched pump, pre-strainer and an automated control system. Specially designed butterfly valves with pneumatic actuation direct the flow for automatic backwashing to self-clean the media.

An automated tower basin cleaning (ATBC) system was installed with the use of ISJ Sweeper jets. The ISJ's are an effective method for preventing the build-up of dirt and airborne debris in the cooling tower basin. The ISJ system directs the solids towards the suction intake of the filter system where they are removed.

PEP designs the ATBC system for each specific application. The basin size and shape, liquid depth, and competing flow characteristics are taken into account to determine the correct jet size, flow rate, and pattern of influence. Figure 1 shows the ATBC system installed by Lucent Technologies.



The Results

Bob Koenigsmark stated that the water is so clean that you can see the bottom of the basin. In addition, the operators are very pleased with the automatic operation, and with the fact that basin cleaning has virtually been eliminated.

The PEP BMF 96 and ISJ sweeper jets are continually keeping the basin free of solids, which is enhancing the chemical treatment program. High quality water has resulted in a more energy and maintenance efficient operation for Lucent Technologies.

