Cemstone

Brent Vizanko
Chemical Engineering
University of Minnesota Twin Cities

Company Background

Cemstone Products Company is a ready mixed concrete producer with 43 plants in Minnesota and a total of 57 plants in Minnesota, Iowa and Wisconsin. Many of their largest plants are located in the Twin Cities Metro as is their corporate headquarters, which is in Mendota Heights. Cemstone employs about 600 people, a majority of which are ready-mix truck drivers who deliver concrete to customers. The concrete that Cemstone produces is used to build large commercial buildings such as U.S. Bank Stadium as well as residential walls and driveways.

"Through my internship at Cemstone, I have been able to use my passion for water conservation to find and implement large water savings not typically seen in a residential capacity, further opening my eyes to industrial water use. I now feel fully equipped to make an informed decision on where I would like to work and what jobs fit my specific skill set." ~ BV

Project Background

Cemstone uses water from both private wells and municipal sources depending, on the plant. This water is used in new concrete production, truck rinse down, truck wash out, and saddle tank filling. Cemstone has also built 14 weir systems, which collect surface and rinse water, at their ready-mixed concrete facilities which make it possible to reuse the water used to wash out truck drums. The weir systems also clarify the water so that it can be used in the production of new concrete. Through this project, the company wanted to learn more about how water could be best conserved and reused in their process.

Incentives To Change

Cemstone prides itself on being an environmentally friendly company. Of the 12 plants studied, the average plant uses 4,720,000 gallons of water a year with 47% used in new concrete. By using less water, Cemstone will reduce their water and electricity bills. Another incentive for change is the National Ready Mixed Concrete Association's (NRMCA) Sustainability certification. By earning enough points, awarded for specific environmental practices like water reduction, a ready mixed concrete plant can be certified through the NRMCA. This would put Cemstone in a group of only four companies with a certified plant. Many of the plants that Cemstone operates are within five points of being certified, and reducing water usage will help them reach this goal.

SOLUTIONS

Install Automatic Shut-off Nozzle for Tank Filling

The truck saddle tanks are topped off before each concrete delivery. During this process, hoses overflow while drivers prepare their trucks for loading, spilling 4,390,000 gallons of water per year. Installing automatic shut-off nozzles would stop the flow of water when the tank is full, similar to a gas nozzle. This option is recommended for all 12 plants since it is easy to install and has the potential to save 7.7% of overall freshwater use.

Reuse Weir Water

Of the total water used in concrete production, only 4% is recycled weir water. All concrete process water must

comply with ASTM C1602 standards in order to be used in fresh concrete production and the weir water at each plant is well within these limits. Thus, footing mixtures could use 100% clarified weir water and remaining mixes could expand their usage to 50% clarified weir water.

The water in the basins of the weir system is first used for washing out the truck drums and has a pH of between 9-13 as well as suspended solids, which makes it usable only in the production of new concrete. The pH is too high for use in truck rinse down or saddle tank filling. Adding a CO2 bubbling system to the final bay of the weir system would lower the pH of the water. This would also precipitate out the dissolved solids in the water, which would make the water more usable in hoses and pumps. This option is recommended for plants that do not need a Load and Go system, since this system is cheaper and would provide the same water savings.

The only two sites with a fully enclosed weir system are Burnsville and Minneapolis. The benefit of enclosing the weir system at other sites is the ability to recycle truck wash out water in the winter months. This is recommended at all sites that have a winter water usage of 500,000 gallons or more.

Install Load and Go Wash Systems

Cemstone is currently using 6,430,000 gallons of water annually for rinsing trucks after they are loaded is. A 2,700,000 gallon savings could be realized with a Load and Go Wash System installed at 6 of the 12 plants. The Load and Go system is a high pressure wash system that cleans the truck in 30 seconds as opposed to the average 4 minutes for manual washing. This not only saves water, it also saves time and prevents injuries.

Uniform Driver Training

There is a large discrepancy in how drivers use water, prompting the recommendation of a more uniform training regime. The training should include a portion on water conservation and how to appropriately use the weir systems, the saddle tank, and all hoses at the plant.

Collect Rainwater

The roof area of many of the plants exceeds 5,700 ft^2 which could collect more than 1,000 gallons of water in an average rainfall event. Rainwater is nearly potable and could be used in any application without filtration other than for drinking water. This would be advantageous for dust suppression, saddle tank filling, and cooling the aggregate piles in the summer and is recommended for sites with roof areas of 5,700 ft2 or greater.

Recommendation	Annual Reduction	Annual Savings	Status
Install automatic shut-off nozzles	4,390,000 gallons	$6,700	Being tested
Reuse weir water	7,570,000 gallons	$13,900	Partially Implemented
Install load and go wash systems	2,750,000 gallons 5900 hours	$301,942	Recommended
Uniform driver training	780,000 gallons	Variable	Partially implemented
Collect rainwater for reuse	910,000 gallons	Not known	Researching