

Fabcon, Inc. of Savage, Minnesota, manufactures precast, prestressed fabricated concrete panels.

Prior to the changes:

- 3 million gallons of water used monthly
- 2.9 million gallons of water discharged monthly
- 20,000 tons of solid concrete waste landfilled annually

Changes made:

- Installed air-cooled hydraulic pumps
- Recycled waste concrete
- Recycled water

Benefits:

- Reduced water use by 4,000 gallons per day, saving \$5,400 annually
- Saving \$46,000 in disposal costs and \$115,200 in landfilling costs annually

Cost:

- \$11,765 for air-cooled hydraulic pumps
- \$225,000 for the closed-loop water recycling system

Savings:

- \$259,000 during the first year
- \$191,090 annually
- Eliminated a one-time service availability charge (SAC) of \$68,394

Concrete manufacturer reduces water use and solid waste

Background

Fabcon, Inc. employs over 225 people and manufactures prestressed, precast concrete panels for use in constructing concrete buildings. They manufacture approximately 290,000 tons of finished product annually.

With an increased growth in its business, Fabcon expected its water use to increase from 42,500 to 65,952 gallons daily. This would have resulted in a one-time service availability charge (SAC) of \$68,394 from the local publicly owned treatment works (POTW), in addition to a \$2,250 monthly cost for the extra water.

Fabcon was concerned about future access to water and the impact that its water use had on the surrounding community and environment. As a result, the company evaluated ways to reduce water use.

Fabcon also generated approximately 20,000 tons annually of solid concrete waste, which was crushed on site and sold or used for fill. Fabcon was interested in finding a more beneficial use for the waste concrete.

Process Changes

Closed-loop Water Use System

Fabcon set a goal to find a closed-loop water use system to avoid increasing the amount of water purchased from the City of Savage and discharged into the sewer system.

In mid-1994, Fabcon installed a filter system that passes process water through a series of filter plates to capture and remove solid wastes. The filtered water is directed into a 24,000-gallon reservoir where it is held until needed by the plant.

Two primary problems are caused by reusing the filtered water. First, the water contains a large amount of calcium carbonate, which plugs the filter plates and increases the water pH to 12.

To reduce the pH, sulfuric acid is added to the filtered water to reduce the pH to seven. This also prevents the water from clogging pipes and spray nozzles when it is reused within the plant.

The second problem is filter plugging. To solve this problem, hydrochloric acid is periodically backflushed through the filters to remove excess calcium build up from the filter media. A liquid calcium chloride solution results from this filter cleaning process, which is then sprayed on the roads surrounding the facility for dust control.

Material caught by the filters consists primarily of calcium chloride, magnesium, iron and silica and is produced in solid “cakes” approximately 4’ x 4’ x 2”. Fabcon dries these cakes to approximately 30% moisture, then stores them in roll-off containers until they can be sent to a recycling center. The cakes are mixed with Fabcon’s waste concrete and crushed into Class Five road base for use in parking lots or underlayments for asphalt or concrete roads.

The filter cakes produce a material superior to limestone, which is traditionally used as Class Five base. This reduces the need for mining limestone and keeps a beneficial product out of landfills. Fabcon recycles approximately 8,000 tons annually of filter cakes.

An additional problem was caused by silica build up in the recycling loop when reusing filtered water. To solve this problem, the water in the holding tank is periodically drained off and used in the batching process. The holding tank is then refilled with fresh water supplied by the City of Savage. This uses approximately 6,000 gallons of non-recycled, fresh water annually.

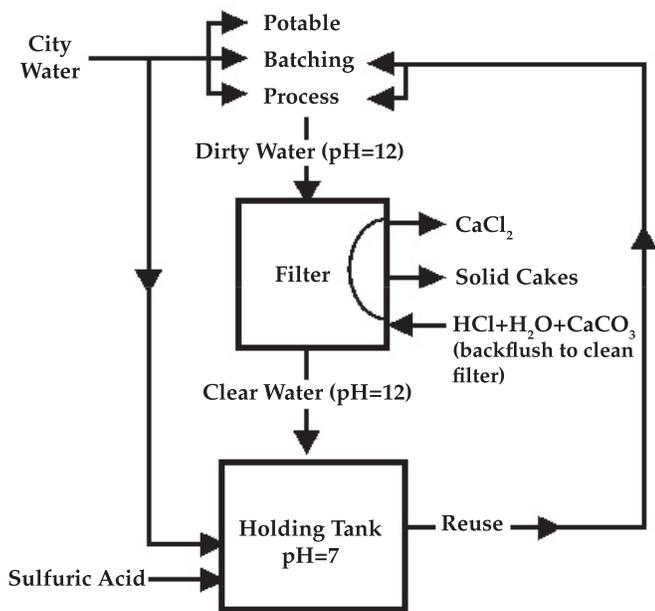
The closed-loop water reuse system supplies all of Fabcon’s water requirements, except for potable water needs. This new system saves over 38 million gallons of water annually (see Figure 1).

Air-Cooled Hydraulic Heat Exchanger

Fabcon used a water-cooled heat exchanger to cool its hydraulic pumps, which consumed approximately 1.7 million gallons annually of water. This water was used once and then discharged directly into the sewer. By changing to an air-cooled heat exchanger, Fabcon has completely eliminated that use of water in its facility.

In addition to saving 1.7 million gallons of water annually, the air-cooled heat exchanger reduces heating and cooling costs. Its reversible fan motor pushes warm air into the plant during the winter, which reduces heating costs. In summer, the fan is reversed to recirculate and push warm air out of the plant. The new air-cooled system also eliminates the possibility of contaminating the hydraulic oil with water, which requires off-site treatment and disposal.

Figure 1: Closed-loop Recycling System



Recycling Concrete Waste

Fabcon produced approximately 20,000 tons annually of waste concrete from its sawing and brushing operations. Until 1994, waste concrete was crushed on site at a cost of \$7.66 per ton.

Fabcon found a recycler that would accept the material for a cost of \$5.94 per ton (\$3.00 per ton for recycling disposal and \$2.94 per ton for transportation costs). To keep trucking costs down, trucks return with loads of rock for making concrete from a facility near the recycler. By recycling the waste, Fabcon saves approximately \$47,600 annually in disposal costs.

Summary

Due to its closed-loop water-recycling system and solid waste recycling, Fabcon will continue to realize the following annual savings on an annual basis.

Fabcon's Annual Cost Savings

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|--|------------------|
| Recycling filter cake | \$22,850 |
| Recycling solid concrete waste | 47,600 |
| Air-cooled hydraulics | 5,440 |
| Recycling process water | 115,200 |
| Subtotal | \$191,090 |
| One-time savings from SAC fee for 1996 | 68,394 |
| Total | \$259,484 |

Awards

In 1994, Fabcon received a Governor's Award for Excellence in Pollution Prevention as a result of their efforts. Fabcon also has encouraged its competitors and other industries in Minnesota to observe its pollution prevention and solid waste reduction practices. Much of the motivation to implement these practices came from concern about the long-term effect that its manufacturing processes had on the quality and quantity of the local water resource. By reusing its water, Fabcon is helping to alleviate the pressure on a limited resource in a rapidly growing community. By recycling its solid waste, Fabcon is keeping usable resources from filling valuable and limited landfill space.