

Green Lake, WI

A Small Plant's HeadCell Grit Removal Solution

Wastewater Case Study Project Profile

Objective

A new grit system was installed to protect this small plant's new treatment processes from the abrasion and deposition impacts of grit on the plant's new SBR and sludge dewatering systems.

Solution

A HeadCell® / TeaCup® / Decanter system provided the protection that the plant needed.

Plant Equipment

- One (1) 6' 4 Tray HeadCell®
- One (1) 24" TeaCup®
- One (1) 1.5 yd³ Decanter

Project Parameters

- 0.5 MGD Average Flows
- 1.75 MGD Peak Flows

The City of Green Lake is located on the north side of Big Green Lake in Green County Wisconsin, about 30 miles west of Fond du Lac. This quaint community is the oldest resort community west of Niagara Falls, and has been the county seat since the mid 1800's. Green Lake is known for its fishing and recreational tourist community during the summer months.

With a population of just over 1,100 the town still retains its charm as a vacation destination. Activities include camping, biking, hiking, golf and water sports of all kinds. Big Green Lake is known for its excellent fishing with several state record catches coming from the pristine waters. Big Green Lake is the state's deepest natural inland lake at 237 feet and covers more than 7,300 acres. Warm summer weather brings visitors from throughout the Midwest to enjoy the cool lake breezes. In 2006 the city began planning for a significant upgrade to its wastewater treatment plant. The design team of Kunkel Engineering Group and McMahon Associates, Inc. was hired to design the plant improvements.

The original plant was built in 1983 and did not include grit removal. As a result, grit accumulated throughout the plant process tanks, particularly the aeration basin. This required periodic shutdown of the process tanks and hiring a contractor to vacuum the deposited grit from the tanks. The pending upgrade would include the use of an SBR treatment system as well as an upgrade to sludge dewatering. Plant personnel were concerned about grit settling in the process tanks, as well as grit wearing on the belts and rollers of the new belt filter press that would be used for sludge dewatering. The impact of these problems drove the plant to include grit removal in their upgrade project.

The city was familiar with mechanically induced vortex grit removal systems and initially thought that it would be the technology of choice. At the direction of the project design team, plant personnel visited a hydraulically driven HeadCell® grit removal system in northern Illinois. The City liked the HeadCell® system because, unlike the mechanically induced vortex grit system, it had no moving parts in the basin. The only moving part was the grit pump which could be located in an easily accessible area.

Based on the positive feedback given by the operations personnel at the Illinois plant, the city wanted to consider the Hydro International system for their pending upgrade. The city took an innovative approach to bidding the project in which designs were prepared for both the Hydro International system, which included the HeadCell®, TeaCup® and Decanter, and a mechanically induced vortex grit removal system with a grit washing and dewatering classifier.

The bidding contractors were required to include the Hydro International system in their base bid, while providing an alternate bid for the mechanically induced vortex system. The low bidding contractor provided an alternate bid to add \$28,000 to provide the mechanically induced vortex system. Equipment and construction costs for the mechanically induced vortex system contributed to the difference. The city elected to not accept the alternate bid and utilize the Hydro grit removal system.

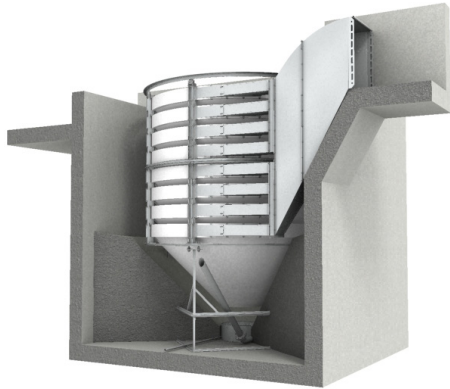
The HeadCell® is a modular, multiple-tray settleable solids concentrator that removes coarse and fine grit with minimal headloss. The high-efficiency flow distribution header evenly distributes influent over multiple stacked conical trays. The stacked trays greatly increase surface area in a very small footprint. Long approach channels are not needed reducing concrete and installation costs. The HeadCell® design would allow the plant's peak flow of 1.75 MGD to be treated in a 9-by-9-ft footprint.

"This system works great! We are removing more grit than we thought we would and there are virtually no odors."

- Glen McCarthy, Plant Superintendent

Project Highlights

- Lower installed cost than competing low-performance mechanically induced vortex systems
- Performance grit washing minimizes odor issues
- 95% removal of grit 75 micron and larger



HeadCell®



Operating HeadCell® Submerged in Tank
(inlet duct is visible on the left)



In the HeadCell®, tangential feed establishes a vortex flow pattern where solids settle into a boundary layer on each tray and are swept down to the center underflow collection chamber. It captures very fine particles due to the large surface area and short settling distances. Evenly distributed flow eliminates short-circuiting. The settled solids are pumped to the TeaCup® grit-washing system, which discharges a concentrated grit stream to a Decanter grit dewatering unit.

The TeaCup® separation and classification unit washes organics from grit captured by a grit separation system—in this case a HeadCell® grit separator. It minimizes organic content to reduce objectionable odor and makes the grit suitable for landfill disposal. The separation and classification unit uses a combination of a free vortex-type flow regime and boundary layer effects to capture, classify and remove fine grit, sugar sand and other high-density solids. Grit and fine abrasives are then discharged into the Decanter unit for dewatering in preparation for landfilling.

Installation went smoothly and the system was commissioned in early 2008. The operations personnel have been very happy with the project and the plant is producing effluent well below permit levels. The volume and quality of the output grit has been a pleasant surprise to the operations people. Grit volume increases significantly during wet weather flows. Over 3 ft³ of grit is removed each week from this plant under average flow conditions 0.5 MGD.

The Ideal Grit Removal System

A HeadCell® / TeaCup® / Decanter system provides the ultimate in grit removal protection. All of the processes are designed to work together as a system which can virtually eliminate grit deposition problems for any size treatment plant. The system provides an integrated package of separation, washing, and dewatering solutions which enables performance levels that are unmatched by any other type of system. The system is guaranteed to capture 95% of all grit 75 micron and larger with less than 25% unattached organic content.

HeadCell® – Separation

The HeadCell® grit separator has significant surface area which enables it to capture grit and organic particles. Structured flows, combined with the stacked tray design, allow solids to rapidly contact this surface area.

TeaCup® – Washing

The TeaCup® uses a free open vortex and the boundary layer effect in order to remove grit from organic content. The TeaCup® operates entirely on hydraulic forces. No moving parts, durable stainless steel construction, and no electrical requirements give the TeaCup® a long product life along with very low maintenance requirements.

Decanter – Dewatering Bin

The Decanter is a grit dewatering container suitable for smaller plants that require performance dewatering. The Decanter has a durable galvanized steel design, a high efficiency wedgewire dewatering screen, and rolling casters.



Green Lake's TeaCup® and Decanter