EDDY PUMP CASE STUDY

FLATIRON CONSTRUCTION – Georgetown Wet Weather Treatment Station

Customizable EDDY Excavator Dredge Pump Attachment Provides Creative Solution for a Wet Weather Treatment Station

By EDDY Pump Corporation

Taking advantage of the diversity of a modular excavator dredge pump attachment and a water jetting ring, Boulder-based Flatiron Construction was able to creatively design and build an equalization basin at depths of more than 80-feet to dredge a wet weather treatment station in historic Georgetown, Colorado.

The Challenge

As part of a large wet weather treatment station, the project required the construction of an equalization basin. The basin was built by installing 104 individual secant shafts adjacent to one another in a circumference that created a large 100-foot diameter shaft. The large shaft then had to be excavated at depths of more than 80 feet, with approximately 25,000 cubic yards of material.

The major challenge was that the current contract documents did not allow the shaft to be dewatered during excavation. The water table was encountered approximately 10 feet below the surface. The conventional excavation equipment methods were not able to achieve the 80-foot depth. Another challenge was that the onsite crane was not able to support the clamshell-type excavation typically deployed for similar applications.

The Solution

The 6-inch hydraulic-powered EDDY Pump Excavator Dredge Pump Attachment can be deployed in many diverse ways, making it customizable for challenging applications. Because the excavator attachment is modular it can be deployed in various ways to suit the needs of the end user. For example, it can be mounted on an excavator, hung from a cable/crane, or used as a diver-operated submersible unit, among other possibilities. One piece of equipment can handle multiple jobs.

Based on the soil characteristics and limited equipment options, Flatiron worked with EDDY Pump to choose a dredge pump with the modular attachment as the method to excavate the 80-foot depth.

The original dredge pump required three lines to operate:

1. Power (which was originally thought to be electric)
2. Water source
3. Discharge line

While developing the solution, many questions surfaced. “We needed to determine how all of these lines could be supported at the 80-ft depth. We also needed to know how we would be able to know the current depth at any point in the excavation,” said Ken Horton, construction manager for Flatiron Construction.

Flatiron used a 6-inch hydraulic-powered EDDY Pump Excavator Dredge Pump Attachment with a Water Jetting Ring, which was deployed in a different way to address the specific challenges of this application. Instead of deploying it from an excavator, the entire piece of equipment was attached to leads, suspended from a crane, and then submerged into the pit.

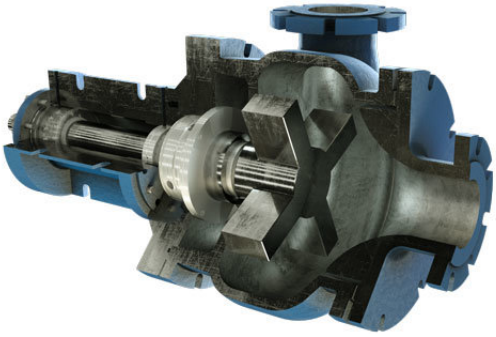
Water-Jetting Rings are a material agitation system which utilizes nozzles attached to the suction of a pump that shoots high-pressure water jets to break up consolidated material, thereby increasing the amount of material fed to the pump or dredge. Water jetting systems usually come equipped with a number of nozzles which can blast water at several hundred psi.

“We used pile driving leads to act as both a frame to support the three lines, and they became a giant depth measurement tool,” Horton said. “Only one crane was required to hold the entire apparatus. We used hydraulic power instead of electric, which allowed the pump and power cord to be submersed without any worry of electric shock. For the water source, we used the water from within the secant shaft to power the jet pump. The water was collected from the discharge and directed back into the secant shaft, thus recycling the jet pump water and not introducing an outside additional source.”

How the Technology Works

The EDDY Pump Excavator Dredge Pump Attachment is a state-of-the-art dredging system that is unique to the market and improves the process for high solids pumping while using the hydraulic power of the existing excavator. This technology easily pins into the existing bucket linkage and is powered off of the excavators' auxiliary hydraulics. In harsh conditions that demand more power and production, a HPU (Hydraulic Power Unit) is used to meet the project needs.

The pump and equipment are both built and designed by EDDY Pump, ensuring the perfect fit along with maintenance support. The technology can be used for hydraulic barge unloading, mining tailings ponds, slurry ponds, liner safe dredging, heavy construction, dewatering, rail car offload and other applications.



Using a cutterhead or high-pressure water jetting rings (depending on the dredging application), the patented pump technology outperforms all centrifugal, vortex, and positive displacement pumps in a variety of the most difficult pumping applications.

Flatiron created weldments that mounted to the EDDY Pump, allowing it to be mounted and fixed into the pile driving leads, Horton said.

"Traditionally, a pile hammer slides vertically within the leads during the pile driving," he explained. "In this case, the leads were used as a framework to support all of the pump apparatuses."

The pump and cutterhead suction dredge work in conjunction to make this the optimal dredging system for handling compact material, highly viscous materials, and for pumping high solids. This pumping system can easily pump slurries up to 4,500-feet without the need for a booster pump.

For large rocks and distances of more than 2,000-feet, an HPU (Hydraulic Power Unit) is recommended for max production. All EDDY Pump suction dredges and excavator cutterheads are powered by field-proven, U.S.A.-built, industrial slurry pumps.

The core of this design is the patented EDDY Pump technology and redefines the pumping industry by being the only pump that utilizes the principles of a tornado to create a synchronized eddy current. This pump is not a centrifugal, positive displacement, or vortex pump, but instead the most efficient high solids and high specific gravity pump on the market. This translates to the ability to pump higher percent solids of material with less water.

Results

The use of one crane rather than two helped Flatiron to save significant money on this project.

“Also, it was significant that we were able to avoid using an outside water source to power the jet pump,” Horton said. “The dredge pump would produce approximately 150 cubic yards per hour regardless of the excavation depth, which is double clamshell production at shallow depths, and triple clamshell production at deep depths.”

The use of the dredge pump provided continuous spoil material to the stockpile/loadout area.

“We were able to place the crane in a position away from the spoil area, which increased site mobility,” Horton said. “Clamshell excavation is typically very messy. Besides the crane not being able to support a clamshell, the dredge pump is a much cleaner operation.”

About Flatiron Construction

Flatiron Construction develops innovative solutions to build critical infrastructure and landmark projects. Flatiron builds roads, bridges, rail, airports, dams, industrial, water and underground projects from common to complex, large-scale jobs. Delivering successful projects under a variety of contracting methods, Flatiron has unparalleled design-build and public-private partnership experience and expertise. Founded in Boulder, Colorado, in 1947, and named for the unique rock formations there, Flatiron now operates across the U.S. and Canada. Flatiron is a subsidiary of German-based HOCHTIEF, one of the world’s largest international construction service providers. www.flatironcorp.com

About EDDY Pump Corporation

Founded in 1984, Eddy Pump Corporation provides its clients with the most breakthrough technology and service the industry has to offer. Serving various industries including the U.S. Navy, oil & gas, mining, wastewater, paper/pulp, dredging, fracking, chemical, and others, the core of the company is the patented EDDY Pump technology. The EDDY Pump is not a centrifugal, vortex or positive displacement pump. Instead, it is a patented design built to harness the power of a tornado into fluid dynamics, creating a synchronized eddy current. This design enables the EDDY Pump to handle material once deemed impossible or cost prohibitive. The EDDY Pump does not have an impeller, but instead a geometrically designed spinning rotor that creates an eddy current. Based on this design, a higher suction is created without being restricted by the critical tolerances needed by other pumps. www.eddypump.com