

Derrick[®] greatly enhances solids removal in Portland microtunneling project

- Maintain manageable mud properties with the Derrick DE-7200™ VFD™ Centrifuge
- Remove fine solids down to 0um with a semi-clear effluent and a polymer injection system

Background

On a project in Portland, Oregon, James W. Fowler Company used a Derrick 300 m³/hr slurry separation plant in conjunction with a Herrenknecht AVN 2000, 104" microtunneling machine. Representatives from Derrick Equipment Company and Clean Slurry Technology (Derrick's exclusive Western US underground construction agent) worked closely with JW Fowler to design a separation plant to keep pace with the large microtunneling machine in any ground condition, and at maximum penetration and volumetric flow rates. The anticipated geology called for glacial til, sands, and potentially clay, so the separation plant had to be flexible to handle a wide variety of ground conditions.

Solution

Primary solids removal was accomplished by two FLC 2000 4-panel shakers with 7.3 G's of acceleration, outfitted with 500 microns (35 mesh) polyurethane screens. As protection against sticky clays, a Flo-Line Primer with a 5 mesh synthetic screen belt was mounted above the shakers, utilizing a variable speed belt designed to convey out sticky, gumbo clay.

After the primary separation, a 100 HP centrifugal pump was used to feed three 15" sand separator cones with underflow regulators. Oversized material recovered from the sand separators was then fed to another 4-panel shaker with Derrick's patented Pyramid[®] screens for further dewatering and discharge into the muck pit.

Because of the size of the tunnel boring machine (TBM), and the amount of fine solids that could be generated, a Derrick DE-7200 VFD high speed, decanting centrifuge was selected to maximize fine solids removal.



Derrick solids control equipment in Portland, Oregon



Derrick DE-7200 VFD Centrifuge offers up to 15-20 t/hr of solids removal

This unit offers up to 500 GPM and 15-20 t/hr of solids removal.

The centrifuge can be run in two modes: 1) Desilting mode to remove solids down to 5 microns without the use of any chemicals. A cut point down to 5 microns is achieved by running the unit at higher speeds and giving the slurry more retention time in the bowl. 2) Dewatering mode where a polymer solution is injected into the feed line of the centrifuge allowing for a separation down to 0 microns. This helps produce a semi-clear effluent to facilitate onsite mud disposal and minimize the amount of colloidal solids that builds up in the mud system.

Conclusion

The DE-7200 centrifuge proved to be a critical part of the separation process. Because Fowler had constructed several ground stabilization panels using a cutter soil mixing rig to mix cement with the native soils along the tunnel path, as the TBM mined through the cement panels the viscosity and PH of the drilling mud went up considerably. This allowed the shakers to work to their maximum effectiveness so that negligible amounts of fluid were lost to the muck pit, allowing for easy haul off. Provisions were made for PH adjustment to help lower the cost and increase the effectiveness of polymer when tunneling in cement stabilized ground.

By installing a separation plant with properly sized equipment at each stage of separation, JW Fowler was fully prepared to tunnel at their desired production rates with reduced downtime.



Derrick FLC 2000 operating with polyurethane screens



Derrick FLC 2000 shaker discharge

For more information, please contact your local Derrick sales representative.

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