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Open Pit Oil Sands

WESTECH

DWN: RCS



WesTech **Drive Units** are specifically engineered for the high torque requirements of minerals thickeners. They are designed with a direct in-line high efficiency speed reducer and motor stack as well as a durable precision bearing. State-of-the-art torque protection and rake lifting capability ensure an unrivaled customized design for each application.

Open Pit Oil Sands Mining

The term “oil sands” is actually a bit of a misnomer. The deposits are saturated with a tarlike substance known as bitumen. A great deal of processing is required to separate this bitumen from the associated soil and other debris. One of the two most common ways to recover bitumen from oilsands is through open pit mining of deposits which lie near the surface. Oil sands deposits which lie within 75 meters of the surface are typically recovered via mining. This process is much the same as strip mining for coal or any other mineral.

Mining shovels remove the oil sand and load it into large mining trucks. These trucks carry the oil sands to mobile crushers. The crushed material is stockpiled for the next step.

Slurry

The oil sands broken up in these crushers are then fed to rotary breakers with the addition of hot water to remove rocks and other debris. The resulting slurry is pumped through a pipeline and chemicals are added as required. The slurry reports to a primary separator where it is classified into three distinct cuts – the overflow, the middle means, and the underflow.

The middle means are sent to flotation units where the floating material is recovered and returned to the head of the primary separator. The underflow from the flotation units is combined with the primary separator underflow and sent to a trash screen. The oversized material from the screen is washed and is returned to the mine via pipeline to fill in mined-out areas. The undersized material is sent to

a further bank of flotation units. Floated material off the secondary flotation units is also recovered to the head of the primary separator while the underflow is sent to the tailings thickener.

Bitumen

The overflow from the primary separator is sent for processing via steam heating of the bitumen. Bitumen is deficient in hydrogen. Bitumen must be upgraded to synthetic crude oil specification in order to be an acceptable feedstock for refineries. This is done by the addition of hydrogen or the rejection of carbon, or both. Upgrading uses natural gas as a source of heat and steam for processing and also as a source of hydrogen. Other hydrocarbons such as naphtha may also be used for upgrading.

In the tailings thickeners the suspended solids are settled to a sludge which is sent to a horizontal vacuum belt filter for dewatering. The filtrate from the horizontal belt filter is returned to the head thickener for reprocessing. The dried cake from the horizontal belt filter is sent to tailings piles or landfills for disposal.

Overflow

The overflow of the tailings thickener is water which is recovered for recycling back into the circuit. This is not solely due to restrictions on water usage. It is therefore critical that treatment processes involving water recovery in reuse are employed in this application. The combination of tailings thickener(s) and vacuum dewatering equipment results in maximum water recovery.