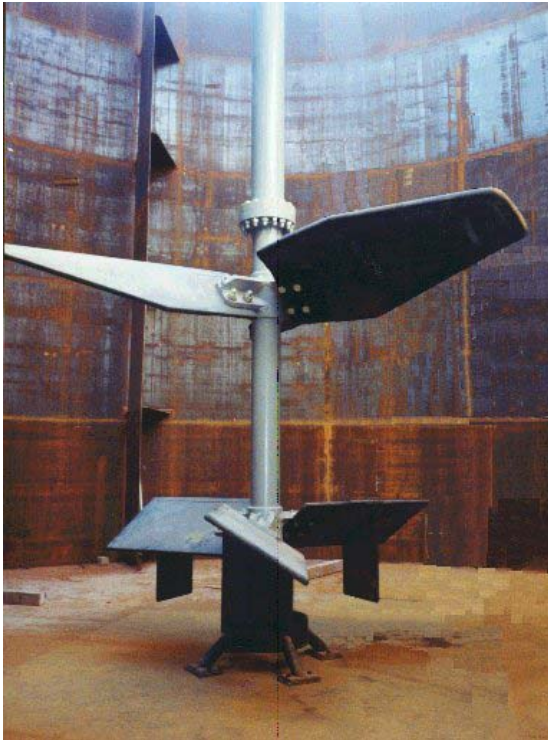


Large Agitators maintain Copper Concentrate homogeneity in Pipeline Surge tanks.

By: Peter McGovern. P.Eng.

MISSISSAUGA, ON - October 7, 1998 - Hayward Gordon Ltd, a Canadian manufacturer of agitators and pumps has successfully supplied large concentrate pipeline surge tank agitators for two new major South American copper mines. Both the Minera Alumbra and Minera Dona Ines de Collahuasi Mines are located high in the Andes on the Argentinean and Chilean sides respectively; both had chosen a slurry pipeline as the most cost-effective method of transporting the concentrate to the shipping location.

As concentrate is produced from the floatation plant, it is held in large storage tanks located at the minesite end of the pipeline. These tanks provide surge capacity to the pipeline as production rates fluctuate. The design of the storage tanks and the agitators are a key component in assuring the successful operation of the pipeline.



The greatest fear of any slurry pipeline operator is sanding out of the pipeline. Slurry velocity through the pipeline and a homogeneous slurry feed to the pipeline are critical. Hayward Gordon agitators are required to provide the uniform suspension of the 65% copper slurry in the surge tanks over as wide a range of tank levels as practical.

The impeller configuration installed in both installations is a dual blade design, which maximizes live surge capacity of the tank in the most power efficient manner.

When the tank is between 1/3 full and full, the primary upper, rubber covered, high efficiency hydrofoil impeller provides almost all the required pumping capacity to suspend the solids. This Hayward Gordon medium solidity, high efficiency impeller has over the years proven to be an excellent impeller for meeting the process needs of higher density concentrate and Gold leach applications.

Like any hydrofoil impeller, its only drawback is its drop in efficiency when located too close to the tank bottom. Optimum positioning of this style of impeller necessitates a high minimum liquid level in the tank to assure efficient power utilization. This reduces the effective live volume of

the surge tanks and consequently their effectiveness if installed alone.

To maximize the live surge capability of the tank while fully benefiting from the hydrofoil efficiency, a second low level impeller has been utilized. This low level rubber covered low angle PBT is less susceptible to operational inefficiency when located close to the tank bottom; as the power draw from this impeller is a fraction of the overall draw, inefficiencies are negligible. The lower impeller stabilizes the main impeller as the slurry level passes through it and continues to provide suspension of the slurry when the slurry level is below the main impeller.

The drive system for the large 132kW agitators was selected and built by Hayward Gordon to provide long maintenance free life and a degree of process flexibility. The main gearbox is a proven Hayward

Gordon double reduction gearbox specially designed for agitator service. It incorporates carburized and ground gearing, rugged steel housing, L-10 bearing life in excess of 100,000 hrs, a dry well output seal and oversized output shaft.

On the input to the gearbox is a V-belt reduction set: - this provides an easy, inexpensive method of changing the agitator speed should the process conditions change.

After one year of operation at the Minera Alumbrera plant, the Hayward Gordon agitators have consistently proven they can fully meet the design criterion: - homogeneous feed to the 300km long pipeline and maximum utilization of the tank storage capacity.



300 km away at the other end of the pipeline, similar large tanks receive and provide surge capacity for the filter plant. While not as critical, a similar design philosophy was used for the agitator design for these tanks.

Hayward Gordon agitators have been provided on other projects in South America and on many other mining and mineral extraction processes. With successful installations in Solvent extraction, high pressure autoclave leaching, bio-oxidation and other common processes, Hayward Gordon provides an expertise that can help the client optimize an agitator selection to provide the right process response at the right price.

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