

MINERAL PROCESSING – GOLD LEACHING

PROJECT DESCRIPTION

Cyanide and oxygen are required to dissolve microscopic gold particles from finely ground ore at the gold mill. A slurry containing 50% by weight ore flows continuously through a series of large tanks to extract the precious metal. The slurry is first aerated without cyanide present to minimize the cyanide consumption (pre-aeration). It then flows into the CIL, (Carbon-In-Leach), tanks where cyanide, oxygen and activated carbon are added. The oxygen and cyanide dissolve the gold, which is then absorbed onto the activated carbon. The carbon loaded with the gold is screened out of the slurry and processed further to make gold bars.

MIXPRO® CHALLENGE

To design the agitators to maximize the customer's profit. Furthermore, the customer wanted to add the pure oxygen down the agitator shaft in both the pre-aeration and CIL. Most of the oxygen is added into the pre-aeration tanks. Agitation in the CIL tanks will chip the activated carbon and these fine carbon particles (loaded with gold) will not be collected by the screens that are used.

The agitators must uniformly suspend the slurry throughout the tanks, disperse the added oxygen, and uniformly distribute the activated carbon throughout the slurry. Not all the oxygen gas added into a slurry will be transferred for the various reactions which can be seen as bubbles breaking at the slurry surface. Less oxygen gas is needed to satisfy the reactions when vigorous agitation is used, though this requires more electrical power.



RECOMMENDED SOLUTION

We calculated the cost of the oxygen gas needed and electricity for various agitator designs and justified an agitator significantly larger than was expected for the pre-aeration tanks. We recommended the smallest possible agitator for the CIL tanks to achieve slurry uniformity and minimize carbon-fines & gold losses. To simplify our customer's future maintenance, the impeller blades were made to be identical.

We have created many agitators where air is added down the shaft. However, adding pure oxygen down the shaft is much different. We researched the special requirements for pure oxygen piping and developed innovative solutions to safely deliver the oxygen gas below the impeller. We also recommended that an oxygen sparger be affixed to the end of the shaft that would create small bubbles using the high pressure inherent in pure oxygen systems and were asked to provide them. After much research and testing in our laboratory, a suitable oxygen sparger was developed.

PROJECT SUCCESS

After commissioning the agitators, the customer stated; "There is only one word I can say about MIXPRO® Agitators - Outstanding!". In our follow-up visits, only the smallest of bubbles, (1 mm), could be seen breaking the slurry surface.

FOR MORE INFORMATION CONTACT:

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