

SOLVING SCALE PROBLEM IN PROCESS TANKS WITH SWIRL FLOW AGITATION

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ABSTRACT

Scale deposition is an on-going problem in many hydrometallurgical processes. Examples include neutralization processes for acidic tailings treatment in the gold, zinc and nickel industries, precipitation in the alumina Bayer process and crystallisation in the lithium carbonate process. Scaling leads to blockage in pipes, in slurry transfer launders and jamming of valves. Scale deposition on flow instruments can also lead to difficulties in monitoring and controlling the plant operation. Scale in tanks and impellers can lead to loss of effective tank volume, inhibition of heat transfer, and more severely, can lead to tank stoppage due to bogging. In some large-scale tanks, scale formation leads to deformation of the tank shells and bending of the agitator blades and shaft. Clean-up of scale lumps is not only time consuming, but it can also pose significant OH&S risk, e.g. from fall of lumps of scale which can cause human injury and damage to equipment.

To address the challenges caused by scaling problem in the hydrometallurgical process, CSIRO Fluids laboratory has been undertaking research and development since early 2010 to solve this problem via design innovation, in close collaboration with the technical staff at alumina and gold processing plants. This research program has led to the successful application of CSIRO Swirl Flow® for solving scale problem in large scale tanks. In this paper we will present a few case studies demonstrating how to solve the scale problem in a gold neutralisation tank and in alumina precipitation tanks. We will also present our latest laboratory scale modelling method involving a Gypsum scale system mimicking scale formation in plant scale tanks.

Keywords: Scale, tanks, agitation, Swirl Flow. Crystallisation, Neutralisation.