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ABSTRACT

The catastrophic failures of Tailings Storage Facilities (TSF) occurred in the last decade have prompted rigorous scrutiny in the TSF’s management strategies used up to date. This added to an increase in the volume of tailings being generated, which have grown considerably due to lower head ore grades, tighter environmental frameworks worldwide and the scarcity of land and water for mining use, has accelerated the search for different water management approaches in tailings for using water effectively, increasing stored capacity and reducing risks.

An alternative method little explored is the mechanical dewatering using Screw Propelled Equipment (SPE), that has been mostly used in the residue management in the bauxite industry and scantily used in coal residue management and coastal land reclamation.

This study aimed to evaluate the dewatering capabilities of the scrolling process. To this end, a review of the current practices of the bauxite residue management was conducted and a laboratory setup for replicating the deposition and scrolling process was run at the Geotechnical Centre of The University of Queensland.

A sample of bauxite residue from Queensland was used in the study. The sample was mostly composed of silt-size particles with low plasticity. This material was hydraulically deposited as a slurry at 27\% solid content in a 350 mm tall instrumented-tank obtaining approximately 100 mm layer of settled material. Two desiccation stages were assessed for approximately 40 days each where the scrolling effect was replicated using a specially built screw propelled equipment.

The results of the experimental stage suggest a relationship between the solid content of the settled layer when scrolled with the effects of the scrolling process. This research provides insights into a methodology little studied as well as the use of a low-cost sensor that can serve as a decision-making tool in the scrolling process.