Iron Ore 2019 Abstract

The Impact of Sustainable Industrial Practice on Process Suspension Rheology of Iron Ore Slurries

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The iron ore industry is under increased pressure from environmental, legal and financial quarters to use less water, and industrial processing plant designers and operators are now obliged to consider the option of operating at higher concentration. As the concentration of fine particle industrial processing suspensions increases, viscous stresses also increase, and the slurry inevitably becomes non-Newtonian in nature. For some years, our industrial flow process research group has been researching the behaviour of high concentration non-Newtonian suspensions in pipes, valves and fittings, pumps and launders, and these will form the focus of the paper. Problems associated with the processing of large amounts of iron ore slimes is not unique to iron ore producers operating wet ore processing facilities to optimising the value of their bodies, although one South African miner has significantly increased the solids ratio of their tailings.

The aim of this paper is to highlight salient aspects relating to increasing the loading of solids, and their implications on the design of an industrial process handling thickened processing slurry.
The paper will discuss theories underpinning cost effective handling of iron ore suspension, but not limited to

- viscous properties of the iron ore solids,
- conceptual process designs,
- pipes, valves and fittings, pumps and launders, and
- the use of reagents.