"Mostly froth and bubble – a lifetime of flotation research".

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Abstract

Since its inception for base metal recovery at Broken Hill in 1905, mechanical flotation machines have been developed that are very efficient for a particular range of particle sizes. For base metals, this range is typically between about 75 to 125 µm. Recoveries of fine and ultrafine particles below 75 µm decline with decreasing particle size. Such particles can be recovered by mechanical cells with a rotor and stator, by using long residence times. At the other end of the size spectrum, recoveries start to decline with increasing particle size, and there is a limit beyond which they are essentially zero, even with fully liberated minerals. This behaviour has been known for many years, pointing to the need to improve the performance of flotation cells as head grades have declined, and ores have become more complex.

Graeme Jameson first saw a flotation cell when he took his first job in the assay laboratory of a tin smelter in Sydney, Australia at age sixteen. It had been used to recover bismuth and other trace metals for use in bearing metals for the war effort. While studying part-time for a degree in chemical engineering, he became interested in the dynamics of bubbles and particles, an interest he continued when he went to study for a PhD with Dr John Davidson at Cambridge in the UK. On graduation, he went to the oil industry in the US for two years after which he joined Imperial College London. Here, he met Dr Joe Kitchener, a well-known flotation surface chemist in the Royal School of Mines.

Knowing of his interest in bubbles and particles, in 1969 Dr Kitchener encouraged Jameson to focus his research on physical aspects of flotation, seeking first to discover why fine particles were so slow to float, and then to develop new machines that would overcome the barriers.

This presentation will describe the research and outcomes that have led to the introduction of three new flotation machines: the Jameson Cell, licensed to Mt Isa Mines Ltd, then Xstrata Technology and now Glencore Technology, Brisbane; the Concorde Cell for ultrafines and rheologically-challenging ores, licensed to Metso Outotec, Helsinki; and the NovaCell for coarse particles, licensed to Jord International,Sydney.

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