From comminution to flotation: bridging the gap

By Dr Chris Greet
Manager Mineral Processing Research
Magotteaux Australia Pty Ltd

What are the objectives of comminution? Its most basic aim is to liberate. That is, in primary grinding liberate the non-sulphide gangue so it can be rejected during rougher flotation; and in regrinding to liberate the valuable sulphides from the sulphide gangue to achieve a saleable concentrate grade during cleaner flotation, without losing recovery. Therefore, the comminution circuit is an integral step in the process of making a saleable concentrate. By itself, the product from a comminution circuit does not have a commercial value, and like mining it is part of the cost of producing a concentrate that can be sold.

A considerable amount of intellectual energy has been expended over the years by academia and industry alike studying comminution to understand breakage, developing models to predict commintuion operations performance and how to become more energy efficient. Few of these studies have looked beyond grinding to examine its impact on down stream processes.

Of particular interest to the author is the impact of regrind mills on the pulp chemistry and subsequent flotation response in base metal sulphide operations. For it is the chemical reactions that occur within the grinding mill that have an inherent influence on the surface chemistry of the particles we are trying to separate and make a saleable concentrate.

The paper will discuss the methods employed for selecting media for use in regrind mills, and provide some insights into the pulp chemistry of the slurries leaving these mills and how this effects the flotation response. Solutions will be discussed on how to restore the pulp chemistry and improve flotation performance by giving a number of examples from copper and lead/zinc operations.