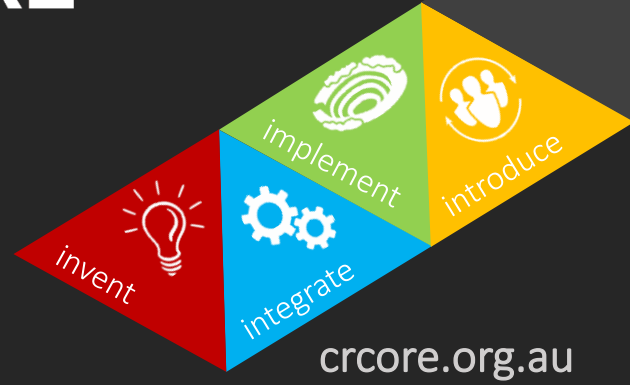


Statistical Interpretation of Grade Distribution

Project number: P1-017
 Program Coordinator: Greg Wilkie
 Project Leader: Vladimir Jokovic
 Timing: December 2019 to March 2021
 Participants: SMI-JKMRC, The University of Queensland and CRC ORE



PROJECT OUTCOMES

- Metal (Cu, Ag, Pb and Zn) does not exhibit well-behaved, lognormal particle grade distributions for smaller particles because the mineral grains start to be fully liberated at those sizes.
- The particle size at which the gangue starts to be fully liberated is ore dependent
- The particle grade distributions for progenies (broken at 0.15kWh/t and 0.5kWh/t) are different to these distributions for the run-of-mine material.
- The particle grade distribution for some particle size fractions can be changed by controlling the breakage energy.

BACKGROUND TO THE PROJECT

- The fundamental idea of Grade Engineering is to exploit the natural heterogeneity of an ore body (spatial, temporal or particle) in order to divert gangue or low value waste out of the mining value chain. This involves rejecting material at relatively coarse particle sizes (typically 10mm to 200mm in size) prior to fine crushing and SAG milling.
- A very little is known about the inherent particle grade distributions that are present in these coarse particle size ranges and could these distributions be changed by applying high or low comminution energy.
- The main aim of this project is to combine different analytical techniques (X-ray tomography and chemical assaying) to characterise coarse ore feeds that cannot be analysed by traditional MLA method in order to measure the particle grade distributions and detect at which particle size the gangue material start to be fully liberated.
- Particle grade distributions are necessary for measuring and modelling gangue liberation and yield curves that can predict mass and value flows going to accept and reject streams.

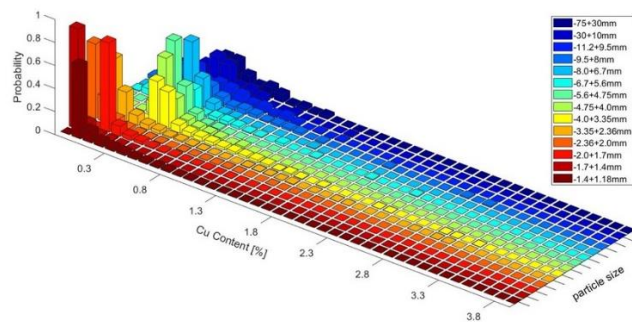
RESEARCH COLLABORATION

The project draws on the research expertise of the University of Queensland and the expertise of CRC ORE.

The Sustainable Mineral Institutes Julius Kruttschnitt Mineral Research Centre (JKMRC) at The University of Queensland has a world leading reputation in breakage testing. The JKMRC has access to a fully equipped Pilot Plant and associated advanced characterisation facilities suitable for the current project. This includes advanced mineralogy characterisation tools (MLA, pXRF, X-ray CT, etc.).

Samples and associated data have been sourced from other CRC ORE approved projects. The Cu sample and data were received as part of the bulk sorting project whilst the Ag/Pg/Zn sample has been sourced from the CRC ORE P3-008 Project.

Particle grade distribution for particles smaller than 1.18mm in size



Particle grade distribution for particles smaller than 1.18mm in size

