

DESING OF A HYBRID MECHANICAL FLOTATION SYSTEM FOR ENHANCING FINE MINERAL PARTICLES

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Flotation in mining industry is a very significant separation technique. One of the main technical challenges of the mineral industry is the exploitation of fine (45-100 μm) and ultra-fine (<20 μm) mineral particles. It is known that fine and ultra-fine particles are difficult to float, leading to losses of valuable minerals, mainly due to their low collision efficiency with bubbles. Based on knowledge gained through literature review, flotation of fine particles can be enhanced either by increasing the apparent particle size or by decreasing the bubbles size. To this end, the best practical approach was to combine conventional air bubbles and micro-bubbles from water electrolysis.

Consequently, the design, fabrication and operation of a bench scale micro-bubble through water electrolysis generator is proposed. Moreover, this electrolysis unit is adapted on a mechanical Denver type flotation cell. The resulting hybrid flotation device is capable of producing substantial quantities of bubbles with varying diameters. The significance of this process is that micro-bubbles, attached on the surface of fine particles facilitate the attachment of conventional-sized bubbles and subsequently increase the flotation recovery of particles. Preliminary experimental results so far indicate the enhancement of fine particle flotation when conducted on the hybrid flotation device, by approximately 10% with the addition of micro-bubbles (<40 μm in size).

References

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