Particle size analysis for process control: A new approach with Dynamic Image Analysis.

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ABSTRACT

Particle size analysis is a critical step for ore materials in mineral processing. Analysis of industrial minerals (natural aggregates) and crushed rock-mass to sands and gravel, through to the floatation products, characterisation of feed and tails, to magnetic separation products in heavy mineral sands.

Comminution, an energy intensive process requires continuous monitoring, particularly with changes in ore types where blending practice hasn't been carried out. Over crushing develops too many fines, crushing too little creates overly coarse particles. The crushing process can be monitored and controlled by understanding the size distribution and shape of the crushed product.

This paper will investigate the current techniques for site-based particle charaterisation, whilst highlighting new developments for greater control. Optical microscopy, laser sizing and sieve shaking are well known and highly trusted techniques. They can give some reliable information on the size but they lack the capabilities to provide added value. This paper will introduce you to an emerging technology that is Dynamic Image Analysis that will allow for particle size and shape characterization to be carried out within minutes, yielding accurate and reproducible results. Under this technology, there will be no issues in characterizing oversized particles and no assumptions such as particles are spherical. Dynamic image analysis generates highly reproducible data of particle size, shape, sphericity, aspect ratio, roundness and transparency. Interesting new parameters provide more in-depth characterisation to assist in greater control, creating opportunities for better decision making in real-time. The technology has proven to work well for fine, agglomerated particles and wet suspensions. These features allow this technology to be presented as a "mine-ready" solution, allowing operators and metallurgists to optimize their measurement process for quick and accurate particle size characterization results.