Effective grade control in mining by energy-dispersive X-ray fluorescence – Advantages of new technology

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Shortage on ores and increasing prices for base metal ores are making low grade resources attractive for exploitation. The process control of the mining and processing step up to the final grade control of the concentrates will become more challenging in future than it was with the current resources. This will enforce a stricter analytical regime in the mining process and will increase the analytical works to be done along the workflow.

Latest developments especially in technology for energy-dispersive X-ray fluorescence spectrometry has lifted the analytical performance of such units closer to traditional wavelength dispersive X-ray fluorescence spectrometers. Silicon drift detectors with increased count rate capability, better multichannel analyzers with fast signal processing for enhanced linear range plus more brilliant X-ray sources are leading finally to better analytical precision. Thin detector entrance windows are extending the linear range of the units down to F. This enhanced analytical performance paired with the compact size and low installation requirement makes modern EDXRF instruments the ideal choice for process control close to the production line in order to increase the efficiency along the process.

The analysis of low and high grade iron ores and the separation from waste rock according to the cut-off levels is quickly possible within 3-5 minutes total measurement times. Copper ores and the final concentrates can be quickly controlled, the decision to feed the mined material to the floatation can be done close to the process. Application examples are given in comparison to older energy-dispersive technology and to wavelength-dispersive XRF spectrometers.