Clean energy

Opportunities for improvement: de-risking ore sorting

Cleaner copper mining in a carbon neutral world

In this fourth in a series of notes, Ellen Thomson, PGNAA & Minerals Senior Applications Specialist at Thermo Fisher Scientific, considers the perceived hurdles of ore sorting, and how they can be overcome to achieve economic success.

Last time, I took an introductory look at ore sorting, outlining its potential to deliver multiple gains, as well as highlighting various options and the importance of taking a tailored approach. Today, I will concentrate on how we can help miners develop a solution that works for them and will reduce risk, focusing on the choice of sensor technology.

Which sensor is right for my ore?

The sensor that is going to deliver successful ore sorting for your mine is the one that reliably and accurately differentiates the material that you want to process, at an acceptable rate.

Let's unpack this statement. Firstly, it means identifying technology that works for your ore body and concentrator. At an established mine, ore characteristics and variability are observable on a routine basis, while at a greenfield site, there may be far less data to base decisions on. Either way, it's vital to know whether the candidate technology can detect the target elements in the minerals where they are, to be able to differentiate economically processable ore.

Since 'no sensor = no sorting', reliability is crucial. And the implications of accurate data require very careful consideration. False acceptance unnecessarily dilutes the head feed grade, while false rejection means hemorrhaging high-value material. The schematic below illustrates how both of these outcomes critically impact the economics of ore sorting, and quantifies the practical and economic implications of the unrivaled precision and accuracy of the Thermo Scientific™ CB Omni™ Fusion Online Elemental Analyzer, our market-leading prompt gamma neutron activation analysis (PGNAA) system.

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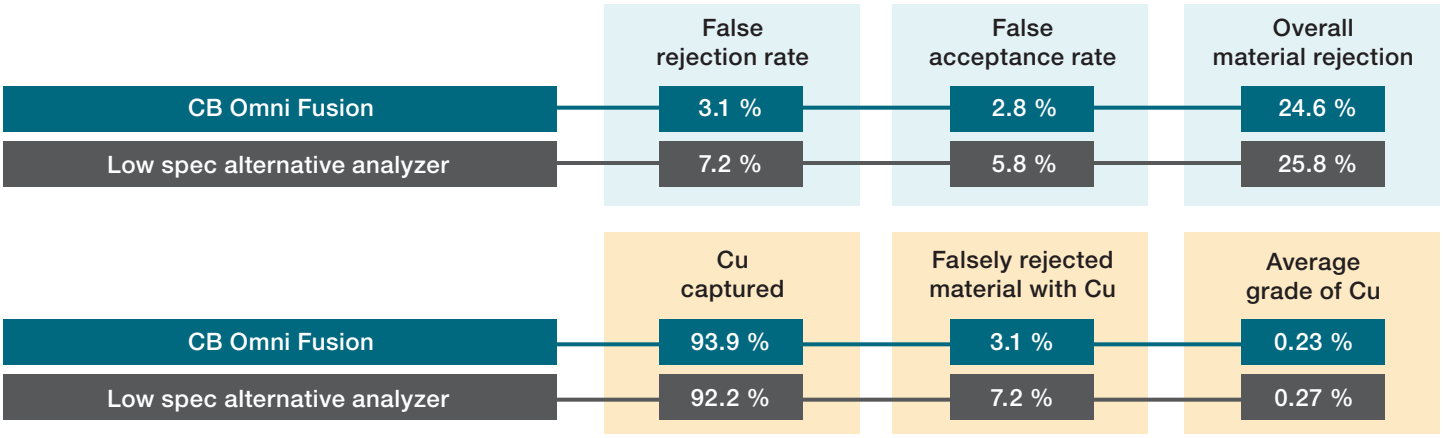

Comparing the CB Omni Fusion with a lower spec alternative shows how its higher performance translates into higher copper capture with less material (3.1 % cf. 7.2 %) of lower average grade (0.23 % cf. 0.27 %) rejected.

The final point – 'at an acceptable rate' – focuses our attention on the speed of analysis. Faster measurement means a more responsive solution capable of handling higher flow rates. Conventionally, PGNAA and pulsed fast thermal neutral activation (PFTNA) – a closely related technique – have been relatively slow, but with state-of-the-art systems, measurement times are now in the order of just 30 seconds.

Helping you find a reliable solution

Our services can help you to identify a sensing solution that meets all of these goals.

For example, we offer rental systems that can be installed as a low-cost solution to commence a site trial. Placing a Thermo Scientific CB Omni Agile analyzer on an ore-carrying conveyor provides immediate access to ore analysis. The resulting data allow miners to understand and quantify variability in the grade and composition of the ore body, with no requirement for sampling. This approach is ideal for established mines and provides a real-life test of the technology, allaying concerns over accuracy, measurement time, and reliability.

For greenfield projects, site trials aren't an option. Therefore, an alternative approach is to perform factory feasibility studies where we work directly with your samples to optimize an analyzer to meet requirements. Careful sample selection is essential here but, again, the results can significantly enhance confidence in the capabilities of the analyzer.

We can also provide reassurance with respect to placement. It's a common belief that ore sorting equates to the measurement of the head feed grade, but our PGNAA technology is already providing crucial data for sintering and roasting applications, demonstrating its utility across the mining value chain. This highlights an interesting long-term proposition for ore sorting: sequential application throughout the process streamlines the amount of material handled in each operation, thereby maximizing economic recovery.

The bottom line is that there is no substitute for trying a sensor to acquire sufficient confidence to invest in ore sorting. Therefore, my parting recommendation for anyone considering ore sorting would be to start by placing a PGNAA analyzer on your conveyor to establish the potential at your mine!

Learn more at thermofisher.com/copper