

HYDROMETALLURGICAL PILOT PLANTS: WHAT THEY SHOULD, CAN AND CANNOT DO

By

Mark Benz

MRB International Consulting, Canada

Presenter and Corresponding Author

Mark Benz

ABSTRACT

The feedstocks for ore beneficiation and subsequent extraction and recovery of metals have always had at least some unique and variable characteristics. Therefore, successful development, selection, implementation, and operation of extractive metallurgical technologies often requires continuous pilot plant testing as a prerequisite. Continuous testwork informs the design effort of the commercial facility by:

- providing improved understanding of the metallurgy,
- aiding the conceiving of a practical flowsheet, and
- determining scale-up factors for equipment and unit operations.

However, even well-run pilot campaigns may not deliver all that is required to design a successful commercial plant. It is vital to appreciate what a pilot plant campaign does demonstrate, and importantly, what it does not. For novel processes this is important since some of the contemplated unit operations (or at least their application) may not have a large-scale operating history or close analogues.

From a hydrometallurgical pilot plant perspective, this paper will present an approach to:

- identify what needs to be ascertained,
- determine if the planned testwork will do it, and
- what can be done if it does not.

The rigorous development of a comprehensive Process Design Criteria document (PDC) plays a critical role. The PDC set the feed parameters and rate, reaction equations and their extent (including the full mineralogical reactions), unit operation and surge criteria and other parameters to allow a mass and energy balance to be developed, and, in conjunction with the balances, to scaleup and design process equipment. The PDC should be a stand-alone document and not contain the calculated values of the balances nor equipment design. There can be no “black-box” assumptions; all PDC values must reference applicable test work or relevant, well proven, verifiable operating practice at the scale of the contemplated project.

The paper will also give historical examples of projects that went to commercialisation that did, or did not, contemplate the limitations of pilot plant testwork.

Keywords: Extractive Metallurgy, Hydrometallurgy, Testwork, Pilot Plants, Process Development, Commercial Scale-up, Technology Implementation