Returning Mineral Processing to Profitability: The Cost Conscious Approach (Part 1)
By Dr Michael Akindeju

As revenues from mining and mineral processing operations become largely volatile and under increased commodity price pressure, businesses and operators are re-thinking cost regimes to remain marginally profitable. Operations can no longer afford inept "business as usual" philosophies to maintain the status quo. Hence, smarter ways of allocating and utilising both Capital and Operating resources have [more than before] are required to sustain design "turnover ratios". It is an imperative that Process Designs and Flow Sheet Developments embrace holistic "Life of Mine" Optimisation philosophies in order to deploy available resources in ways that maximize overall Net Values and deliver maximum Returns to all Stakeholders. The days of only maximizing the reach of Capital Expenditure (CAPEX) at the expense of Operating Expenses (OPEX) should be long gone.

On this purview and in-addition to effective CAPEX strategies, OPEX determine whether a site (once established) remain operational, has a future or will gradually grind to a halt. It is to be expected that OPEX examination for a dying site compared to a progressive site will always highlight the differences in cost management philosophies.

Looking at a typical operating cost structure for a mineral processing plant as presented in Figure 1 and Figure 2, few classical strategies for improving profitability can be conjectured. One of such is the "MinMax" approach, where minimum cost outlay feasible is allowed to obtain maximum Overall Equipment Efficiency (OEE) aimed at achieving maximum practical output.

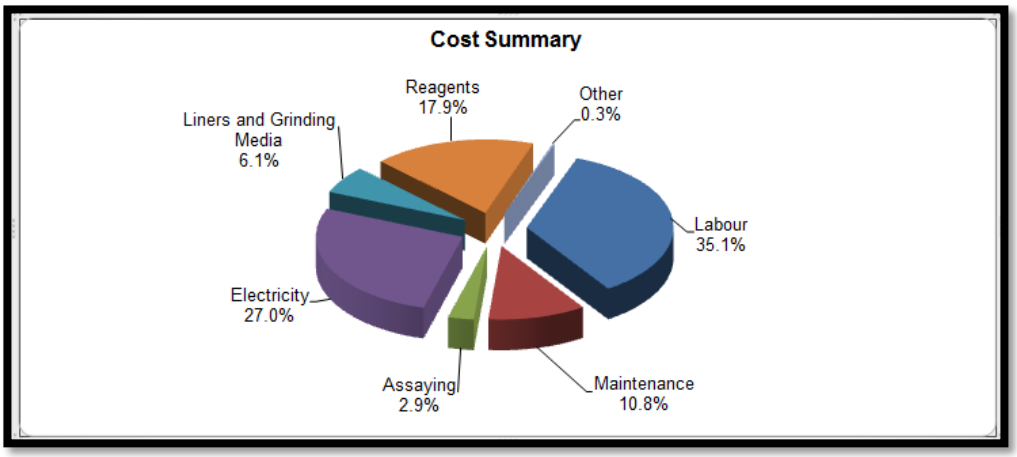

Figure 1: Typical Mineral Processing Cost Summary

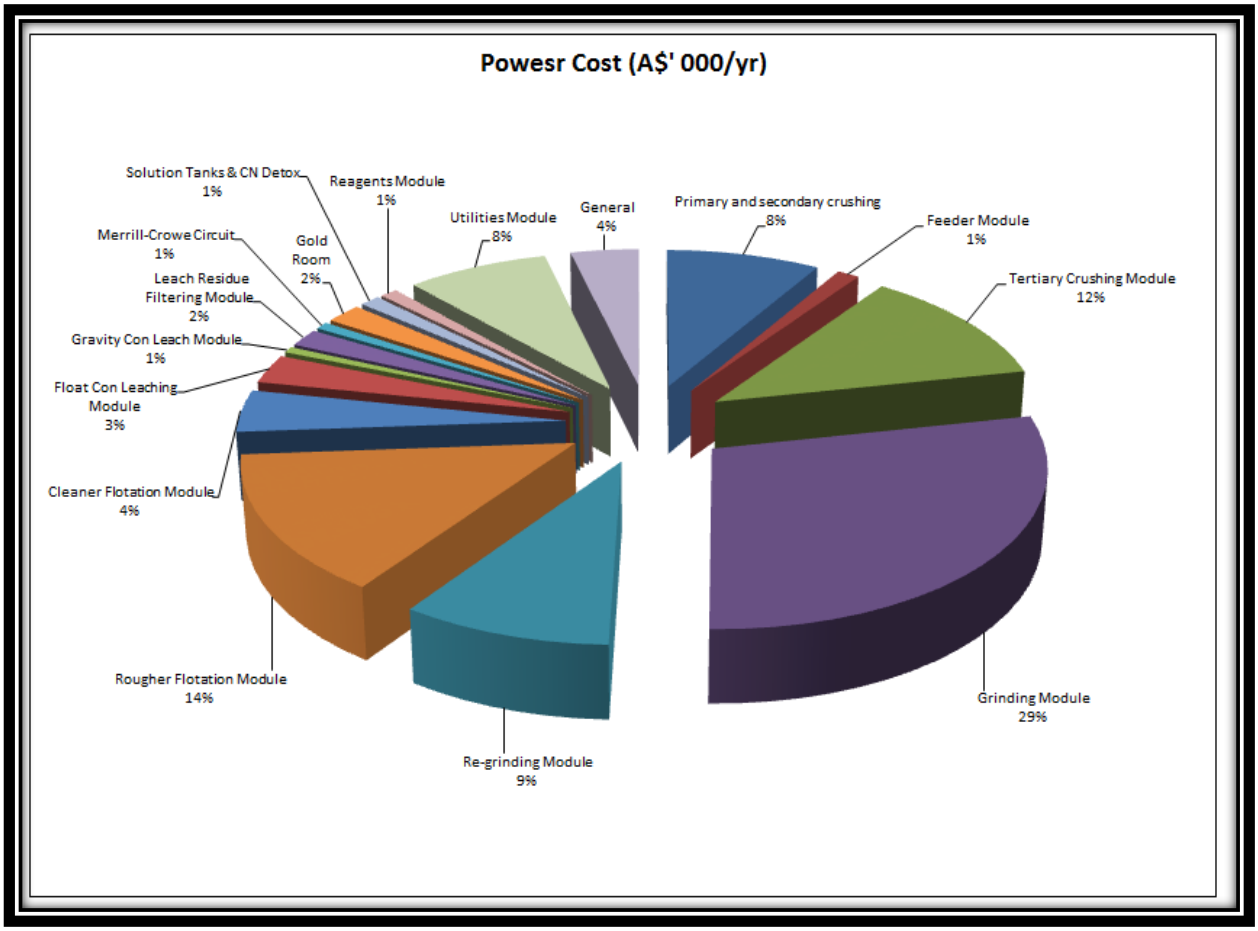

Figure 2: Typical Mineral Processing Power Summary

In Figure 1, electricity, reagents, and the liners for crushers and grinders contribute 27%, 6% and 18% respectively to total operating cost, while Figure 2 presents further breakdown for electricity showing that utilities contribute 8% to total power costs.

By way of illustration on improving profitability, implementing the MinMax—in this case to obtain lower OPEX for electricity, reagents, and the liners for crushers and grinders, could include some of the following:

1. Flow sheet optimisation
2. Selecting energy efficient crushing and grinding equipment which will result in lower average mean time between failures (i.e. shorter and far-in-between down-time). This also includes consideration for the design to include the use of liners that have longer life and are easy to replace
3. Optimising process conditions to reduce reagent consumption
4. Substituting expensive and/or hazardous process reagents with *"holistically cheaper"* reagents. This includes using less hazardous reagents and hence reducing the cost for ensuring compliance with safety requirements, etc.
5. Incorporating Heat Integration principles into the process flow sheet to take advantage of heat sources and heats sinks to reduce the overall cost of utilities associated with heating and cooling. Some typical heat sources include excess heat generated from stripping columns, gold room operations, and oxidation steps of leaching processes, while heat sinks include safety shower tepid water regulation and reagent storage tank temperature regulations to prevent freezing during winter in cold climates

While implementing the above can arguably result in up to 10% cost savings, and in some instances when critically looked at from the exploration phase may achieve up to 25% alternative savings from projected cost; they are by no means the only strategies that can assure viability for mineral processing operations,

other strategies can include, but not limited to effective mining campaign, strategic plant layout, process outsourcing, guaranteed just-in-time supplies, price hedging, forward contracts, etc. amongst many.

For the opportunity to further discuss cost optimisation strategies with Dr Akindeju please contact us <www.minassist.com.au/contactus> and we will organise a consultation.

Author Brief Profile

Michael Akindeju, the Principal Process Engineer and CEO of MKPro Engineering Pty Ltd, is a Chartered and Registered Professional Chemical Engineer, a Senior Member of the American Institute of Chemical Engineers, Member of the Institute of Chemical Engineers (UK & Australia), and a Member of the Australia Institute of Mining and Metallurgy— with apt cross boundary experiences, including in academia-- with a bias for NG/LNG, Mineral Resource and Waste Water Process Designs, Equipment Selections and Sizing; Performance Improvement; Research and Development; Resource Management; Project Costing; Banking and Finance; and Commerce in Engineering.

Michael has helped several Manufacturing, Mineral Resource and Oil & Gas process plants to realize and surpass their corporate production targets by providing technically sound but cost conscious process designs and site installations tailored to suit both their current and forecast raw material bases.