

Preconcentration; how much value does it really add?

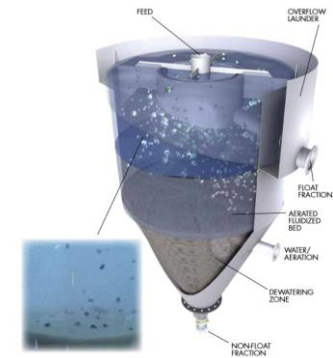
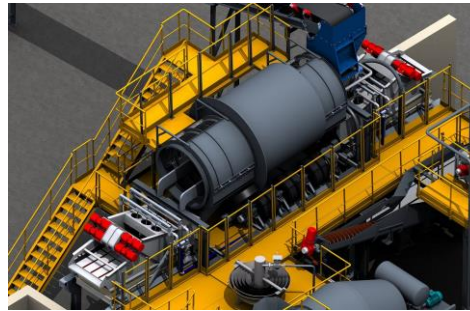
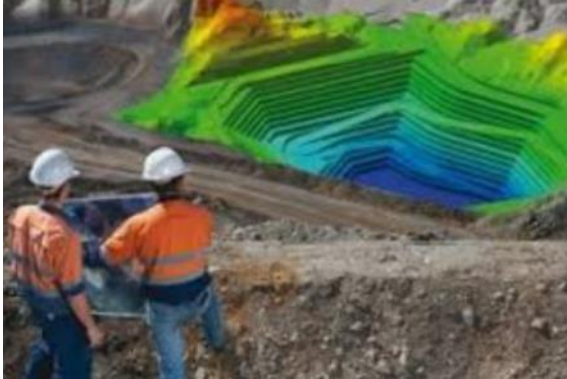
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Agenda

1. Types of Pre-concentration
2. How to measure value
3. Pre-Concentration example
4. Outcomes



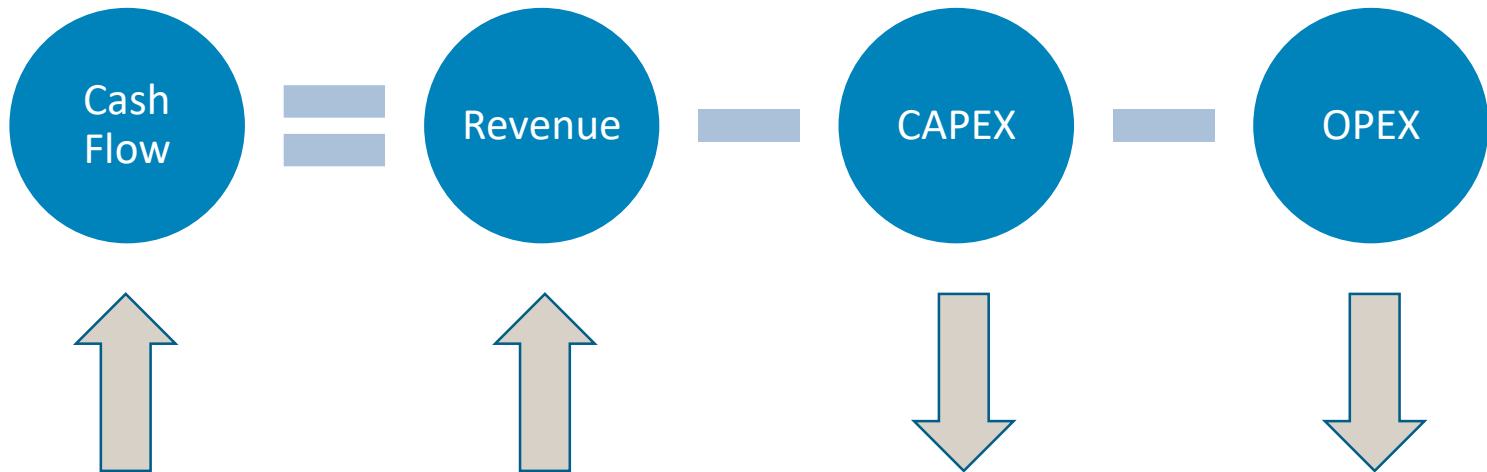
Types of Pre-concentration



How to Measure Value

$$NPV = \sum_{t=1}^{LOM} \frac{Cash\ Flow_t}{(1+i)^t} - \sum Risks \times consequences$$

i = 'discount rate' or 'cash cost'



How to Measure Value

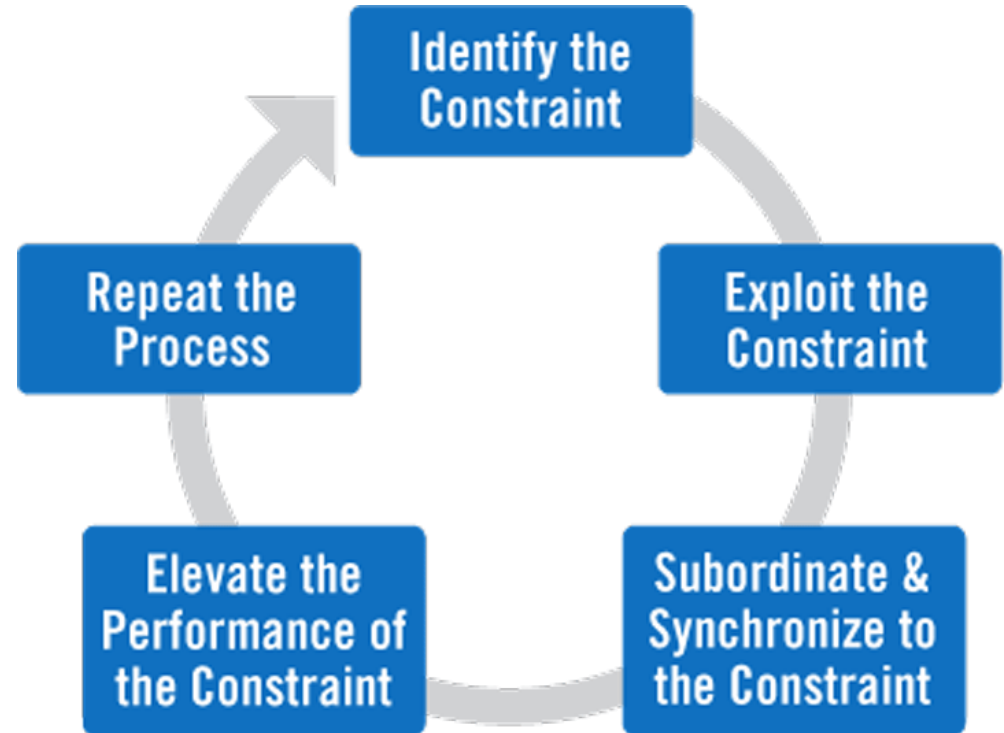
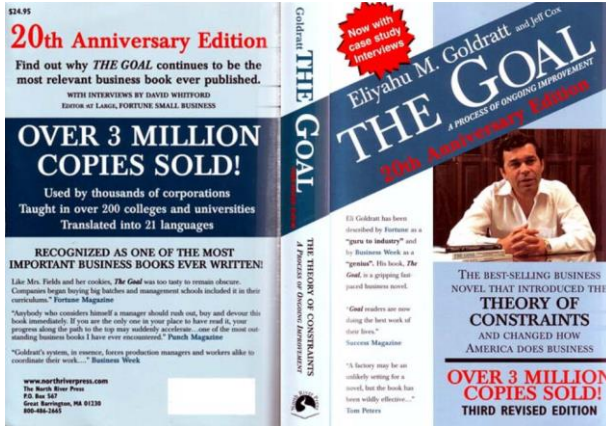
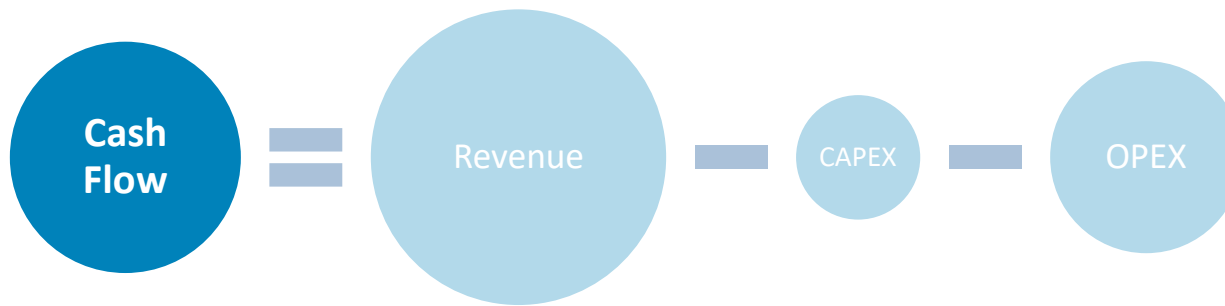
For Mining Companies

- NPV
- NPV/CAPEX
- IRR
- Capital Efficiency (Metal Production / CAPEX)
- Capital Intensity (CAPEX / NPV)

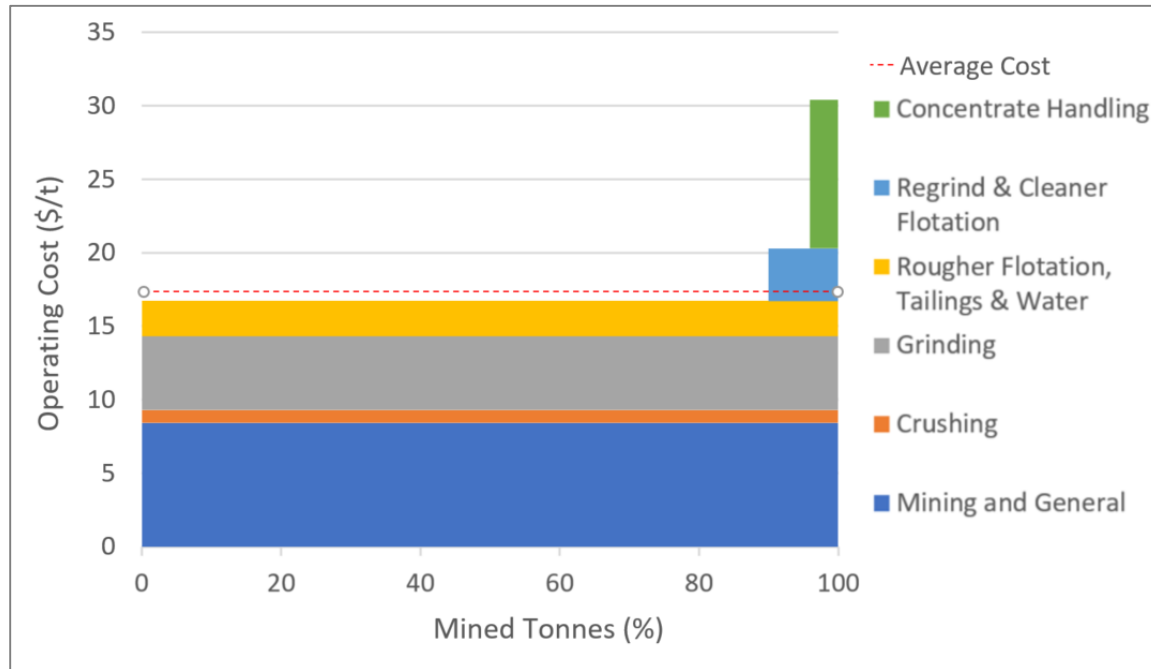
For Financiers

- Debt ratio
- Debt to equity ratio
- Interest coverage ratio
- Quick Ratio (liquidity to pay debt)
- Operating profit margin
- ROCE (Return on capital employed)
- ROE (Return on Equity)
- Gross margin
- Operating margin
- EBITDA

CASHFLOW AT MINIMUM CAPITAL IS A KEY FOCUS

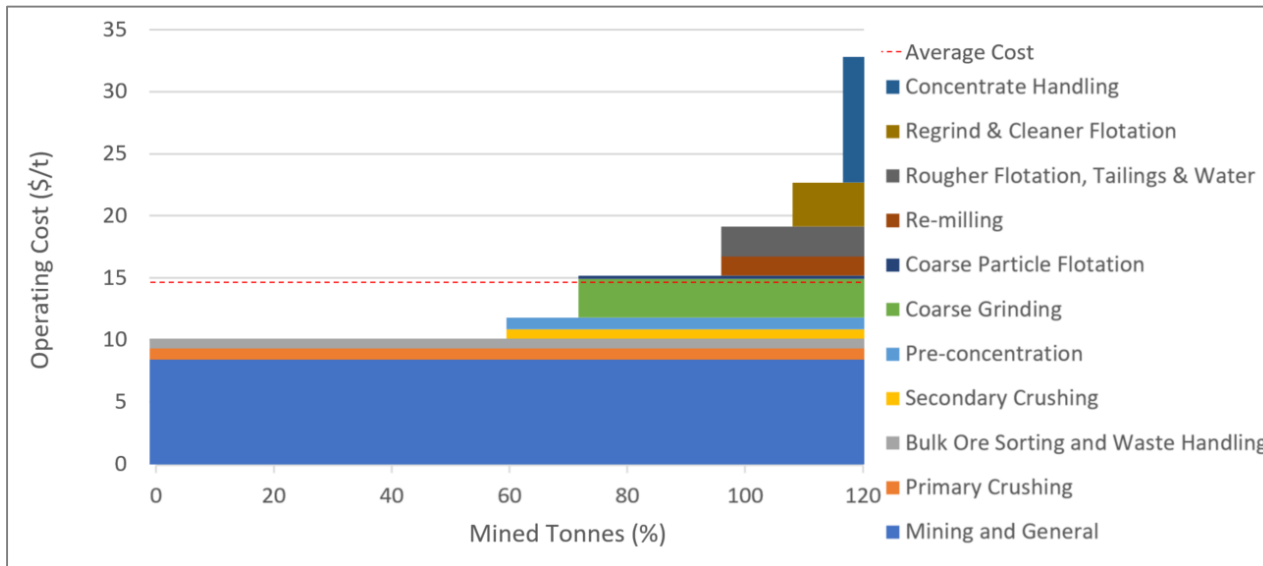


OPEX Structure for Conventional Circuit



- Average OPEX of \$17.50/t ore mined
 - 100% mined @ \$8/t
 - 100% crushed, milled & rougher float @ \$9/t
 - 10% regrind & cleaner float @ \$3/t
 - 3% to concentrate @ \$10/t

OPEX Structure for Preconcentration Circuit



- Average OPEX of \$15/t;
 - 120% mined, crushed & sorted @ \$10/t
 - 50% of mined tonnes pre-concentrated @ \$2/t
 - 40% of mined tonnes coarse grind & CPF @ \$3/t
 - 20% of mined tonnes remilled, rougher float & tails @ \$4/t
 - 10% of mined tonnes regrind & cleaner flotation @ \$3/t
 - 3% to concentrate @ \$10/t

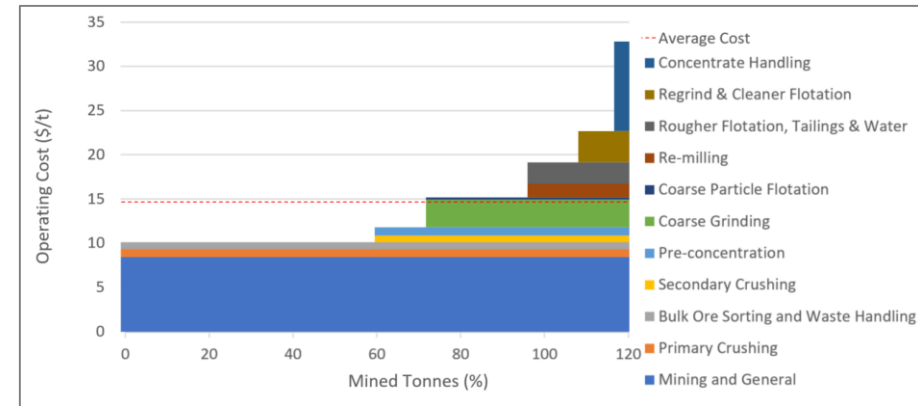
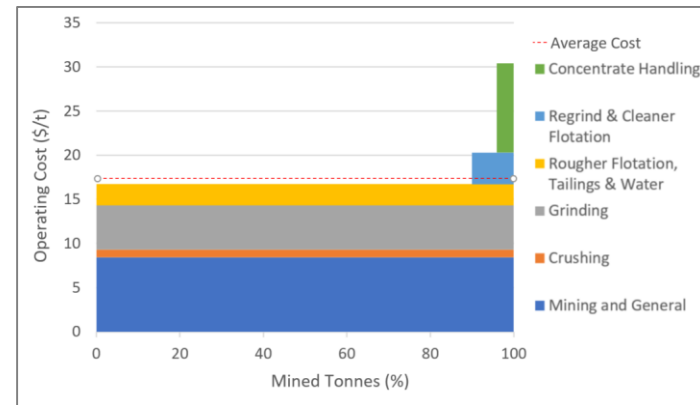
Outcomes

On first inspection, why bother?;

- Similar metal production
- Similar OPEX

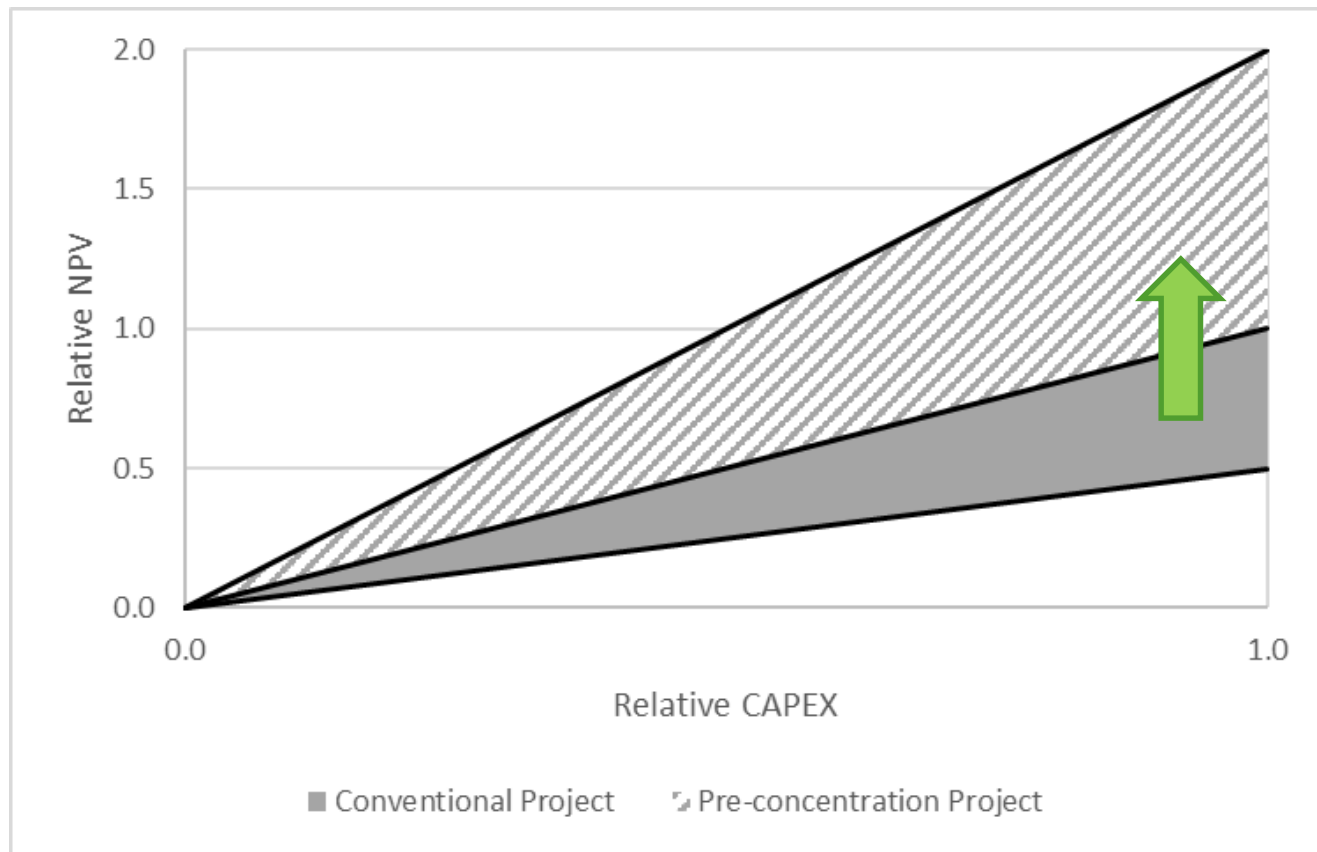
But....

- Reduces total milling energy by 40%
 - Deconstrains bottleneck by >60%
 - Enables low-capex expansions to the rest with excellent NPV, IRR, NPV/CAPEX etc.
- Additional tonnes can come for free (at incrementally lower grades)
 - Reduces mining OPEX
- Increases tailings stability and improves rehabilitation
- Reduces fine tailings (tailings dam) by 75%
- Reduces total water by 50% - further reducing OPEX
- Reduces cutoff grade – increasing reserves and mine life
- Add waste dumps / tailings back into reserve – at lower incremental mining costs
- Fast development timeline compared to greenfields projects



How much value does preconcentration really add?

- Can be up to twice the NPV/CAPEX of a conventional project



Questions?

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