Are we there yet?

The Drive to Double Mining Efficiency

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Comminution of Minerals Uses around 3% of the world's electricity...

...at an efficiency of less than 10%

Declining Head Grades





















The most efficient way to break rock isnot to break it

Exploiting Coarse Liberation



Ore Heterogeneity - Friend or Foe?













Exploiting Ore Heterogeneity... ...Not A New Idea





Measurements



Over 200 performance attributes are continuously displayed/relayed from this truck



Not one of them measures the quality of the payload !







OPTIMISING RESOURCE EXTRACTION





Heterogeneity





Site Trial - Differential blasting for Grade Engineering





Tailor Fragmentation for Destination







Required Technology





Vision for "Grade Engineering"



- Make every handling step an opportunity for coarse upgrading.



Improving Comminution Efficiency CEEC Roadmap

1. Measure and benchmark performance

2. Adopt best practice

3. Use appropriate business drivers and KPI's

4. Share the success: communicate, network, coach





Developing Industry Energy Curves







The Elephant in the Room



Doubling Mining Efficiency - a Whole System Approach

- Embrace macro heterogeneity
 - *Design* for coarse separation
- Develop measurements
 - and accept measurement shortfalls
- Report the whole system
 - To final metal/consumer product, not to an intermediate material
- Supporting management systems
 - Align culture, KPIs, incentives