



Increasing energy efficiency in processing – some examples from industry

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Energy efficiency is important across the mining process chain



Mining



Comminution



**Mineral
Separation**



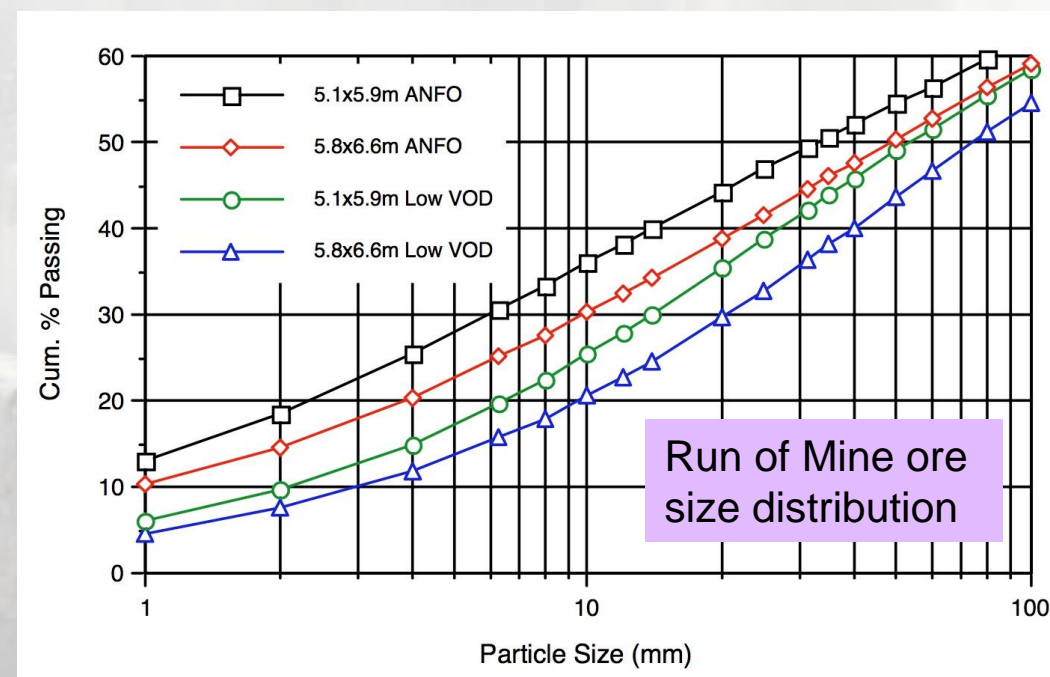
**Metal
Production**

Case Study 1 – Integrated optimisation of blasting and milling (Mine to Mill)

Rock fragmentation in blasting can be considered as the first stage of comminution

Blasting in the mine controls the size distribution of the feed to the concentrator

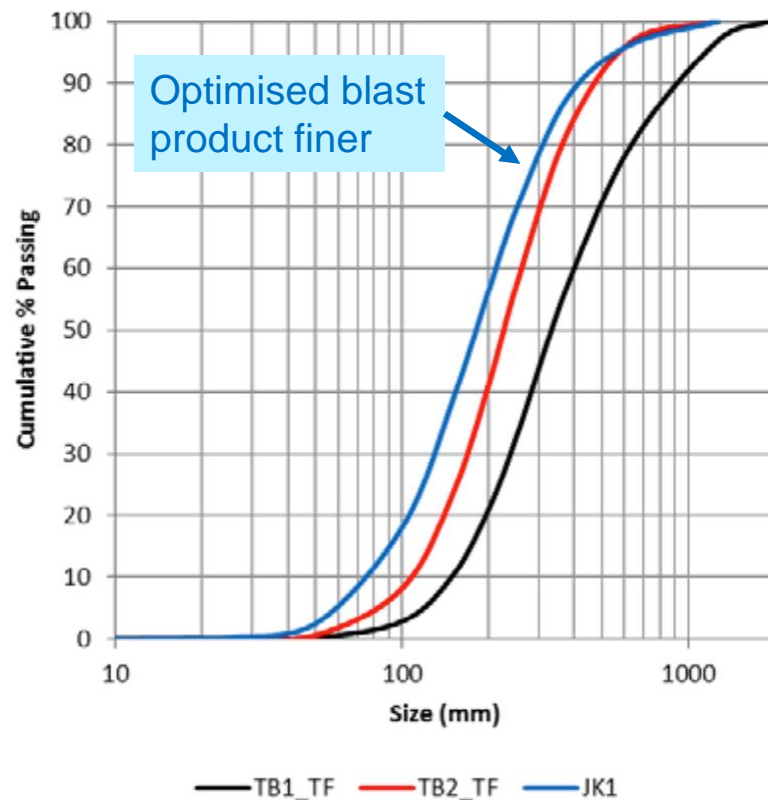
- Understanding characteristics of rock
- Choice of explosive type
- Design of blast pattern
- Blast initiation sequence and timing



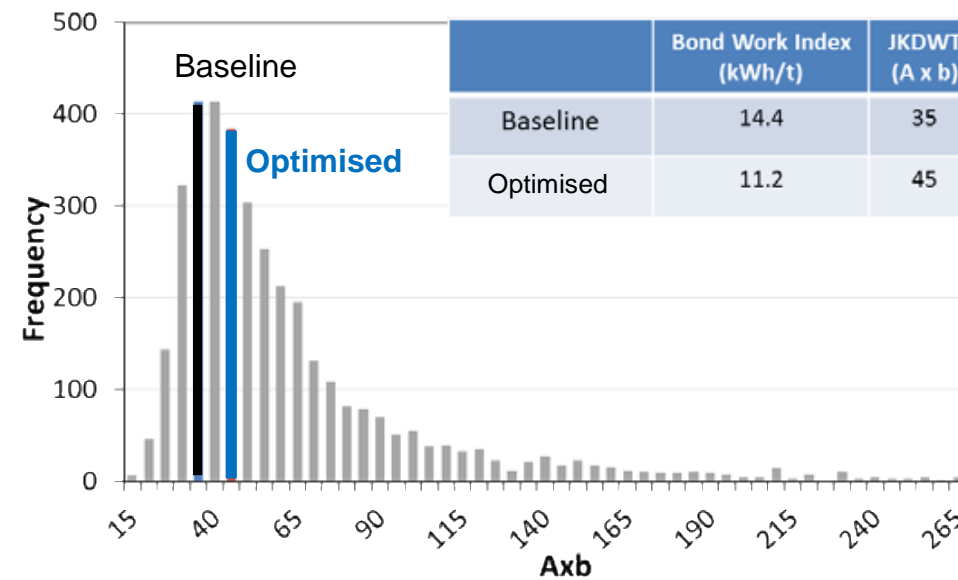
Case Study 1 – Integrated optimisation of blasting and milling

Paddington Gold Operations, WA

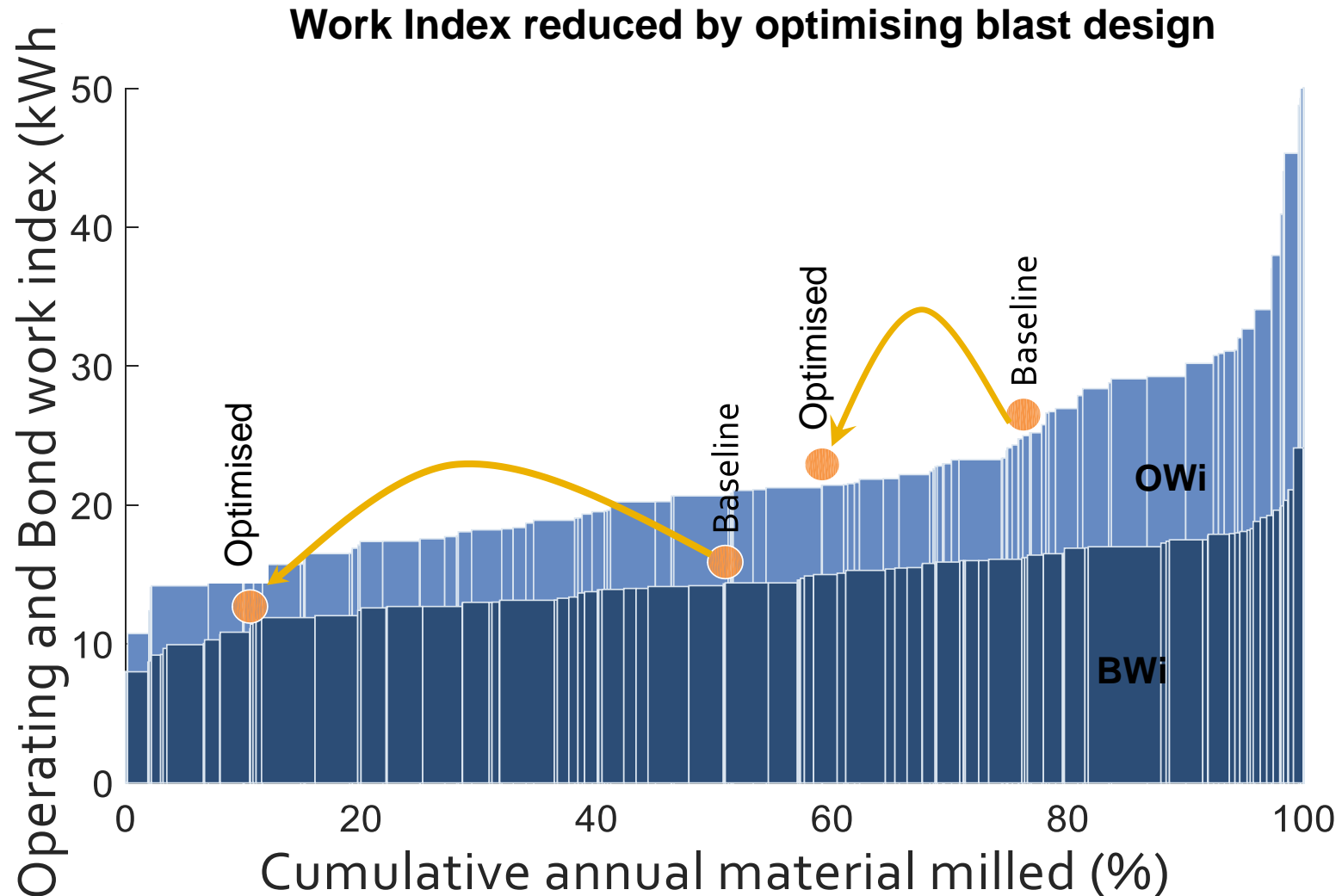
Optimised blast produces finer product



Blast product has lower Bond Work Index and higher $A \times b$ (=“softer”)

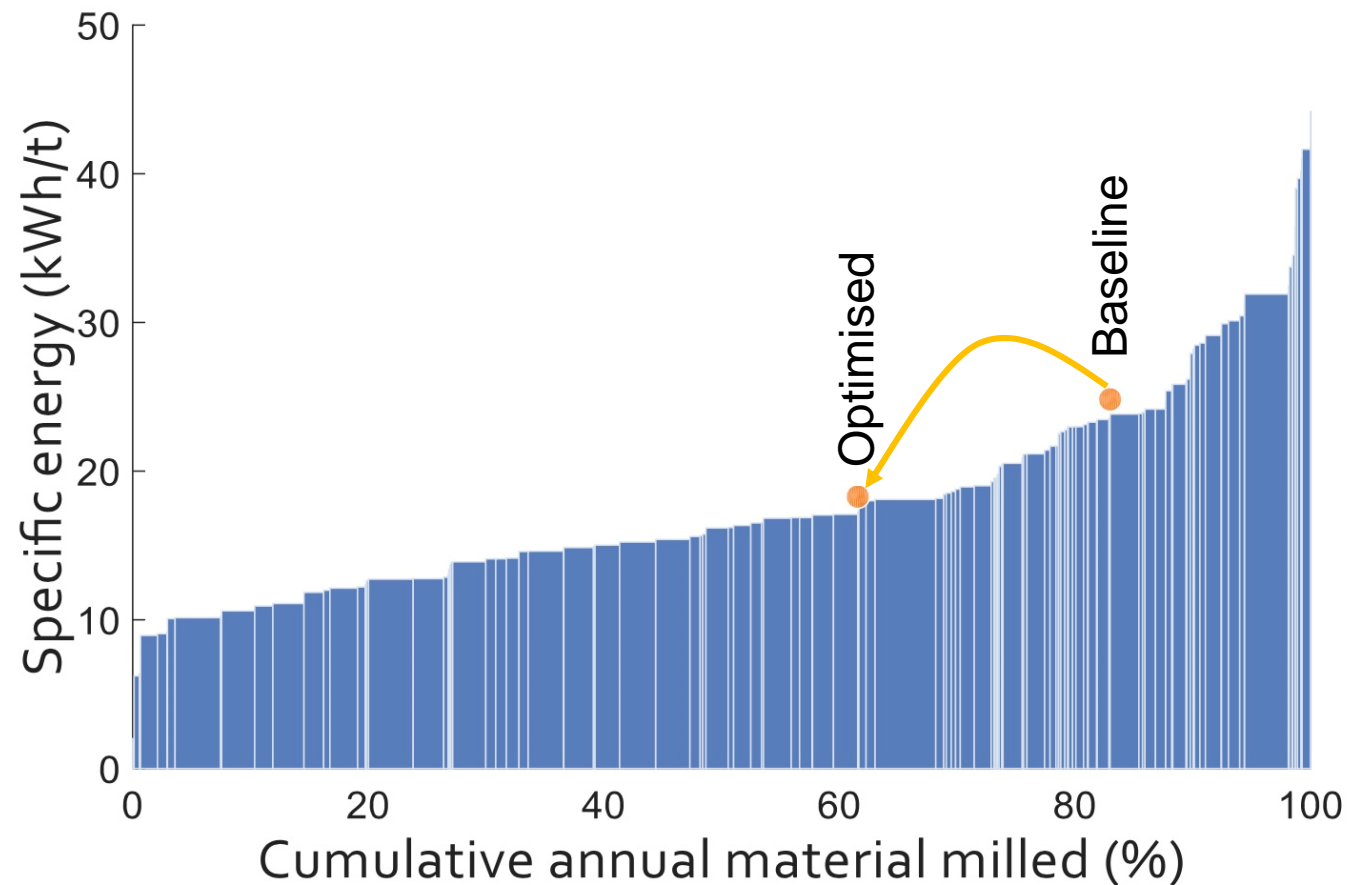


Case Study 1 – Integrated optimisation of blasting and milling

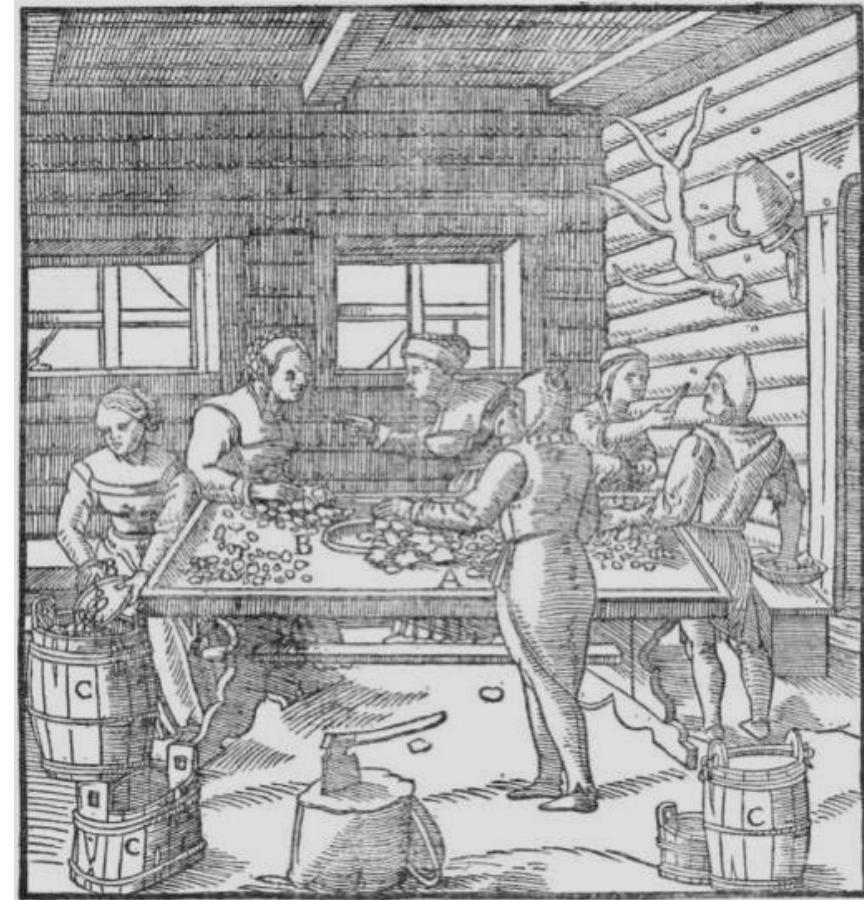
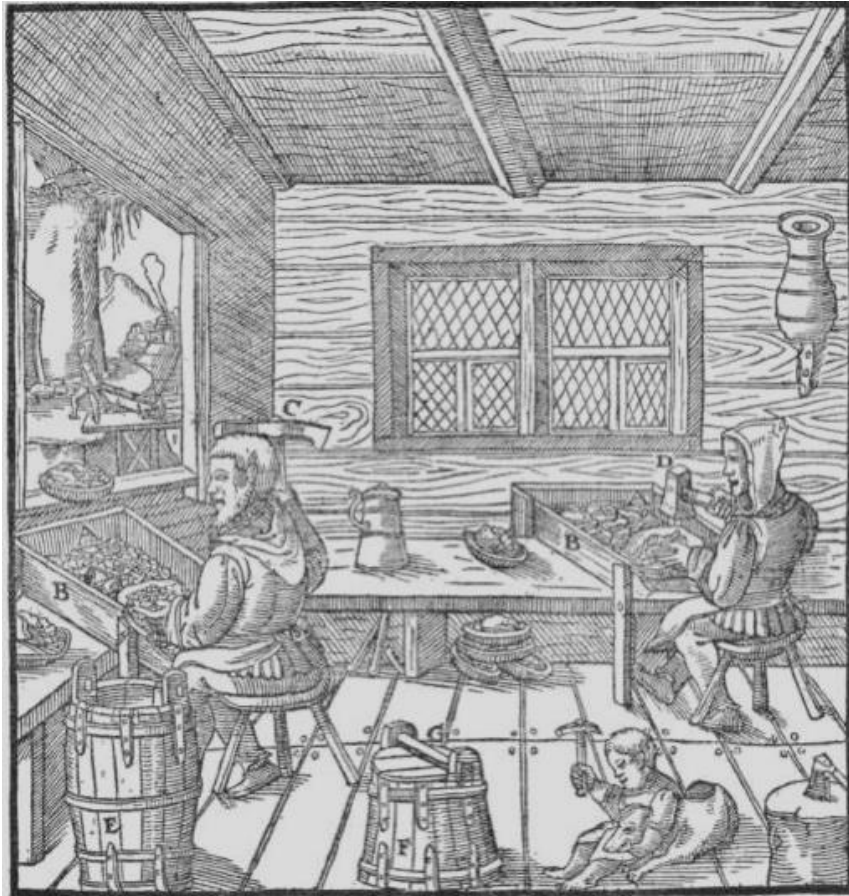


Case Study 1 – Integrated optimisation of blasting and milling

Overall energy consumption reduced by optimising blast design



Case Study 2 – Preconcentration



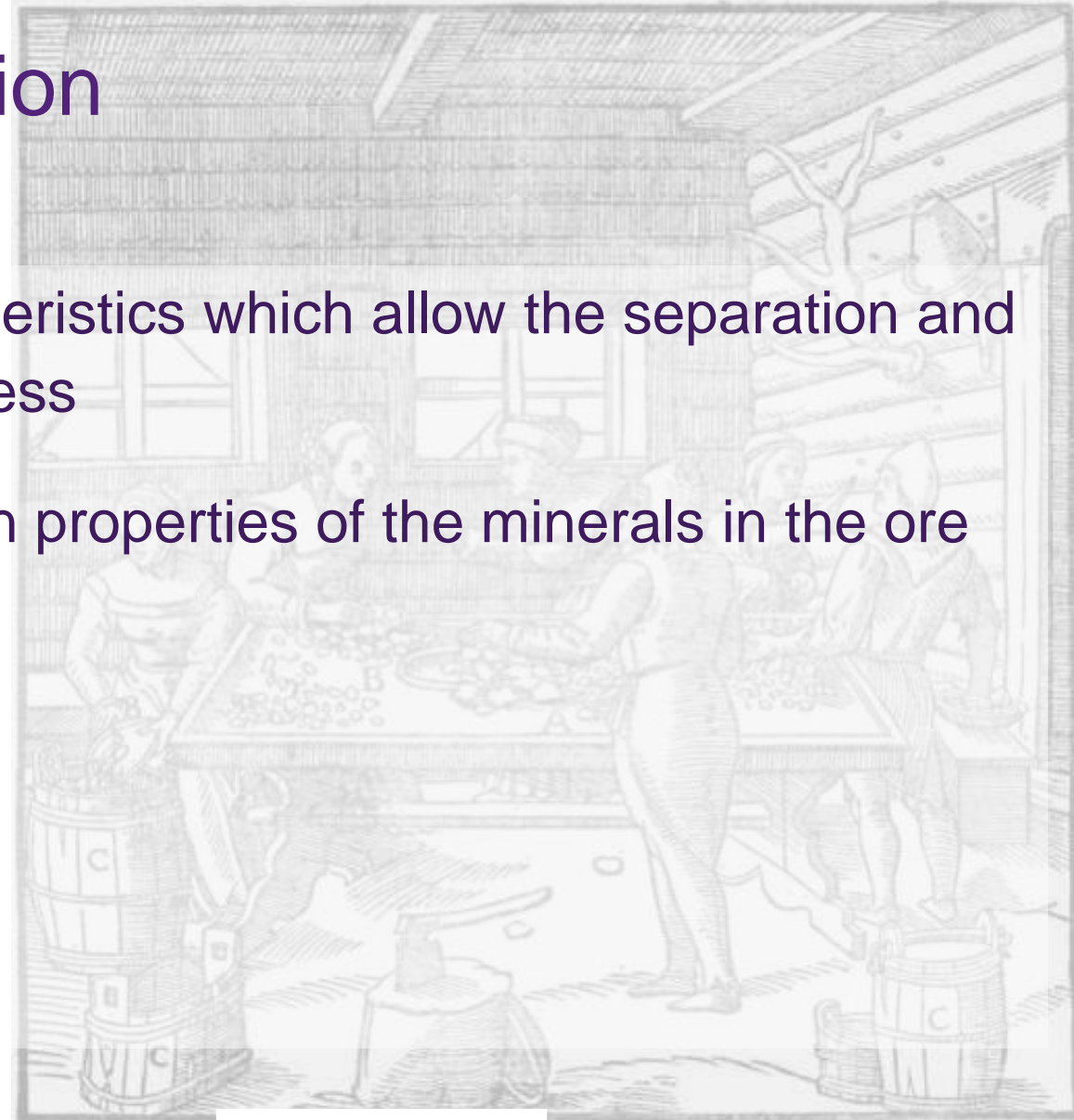
When, either through ignorance or carelessness, the miners while excavating have mixed the ore with earth or broken rock, the work of sorting the crude metal or the best ore is done not only by men, but also by boys and women. (Georg Agricola, 1556, De Re Metallica)

Case Study 2 – Preconcentration

Preconcentration exploits certain ore characteristics which allow the separation and rejection of waste at early stages in the process

Methods used in preconcentration depend on properties of the minerals in the ore and include:

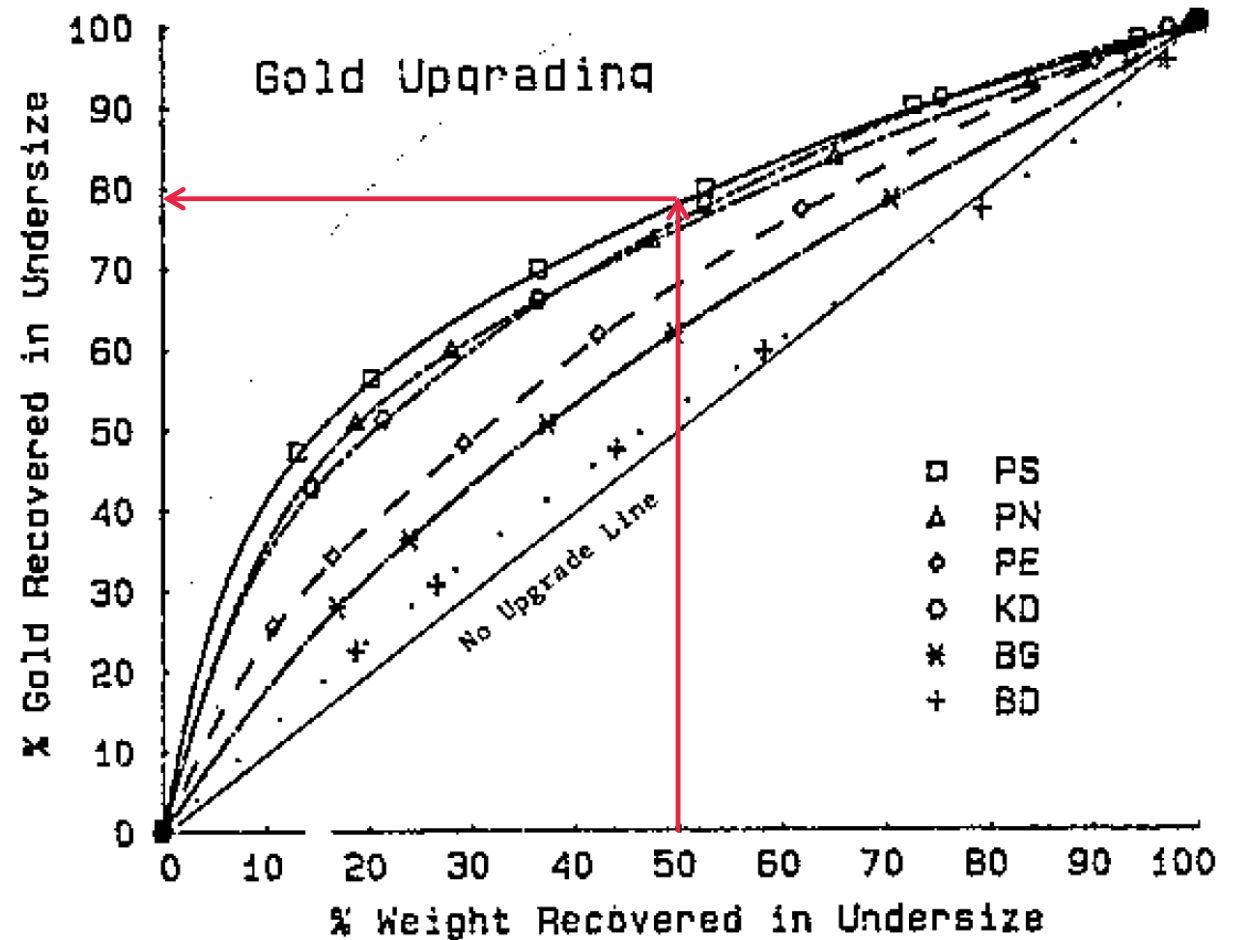
- *Screening*
- *Dense medium separation*
- *Ore sorting*
- *High Voltage Pulse + Screening*



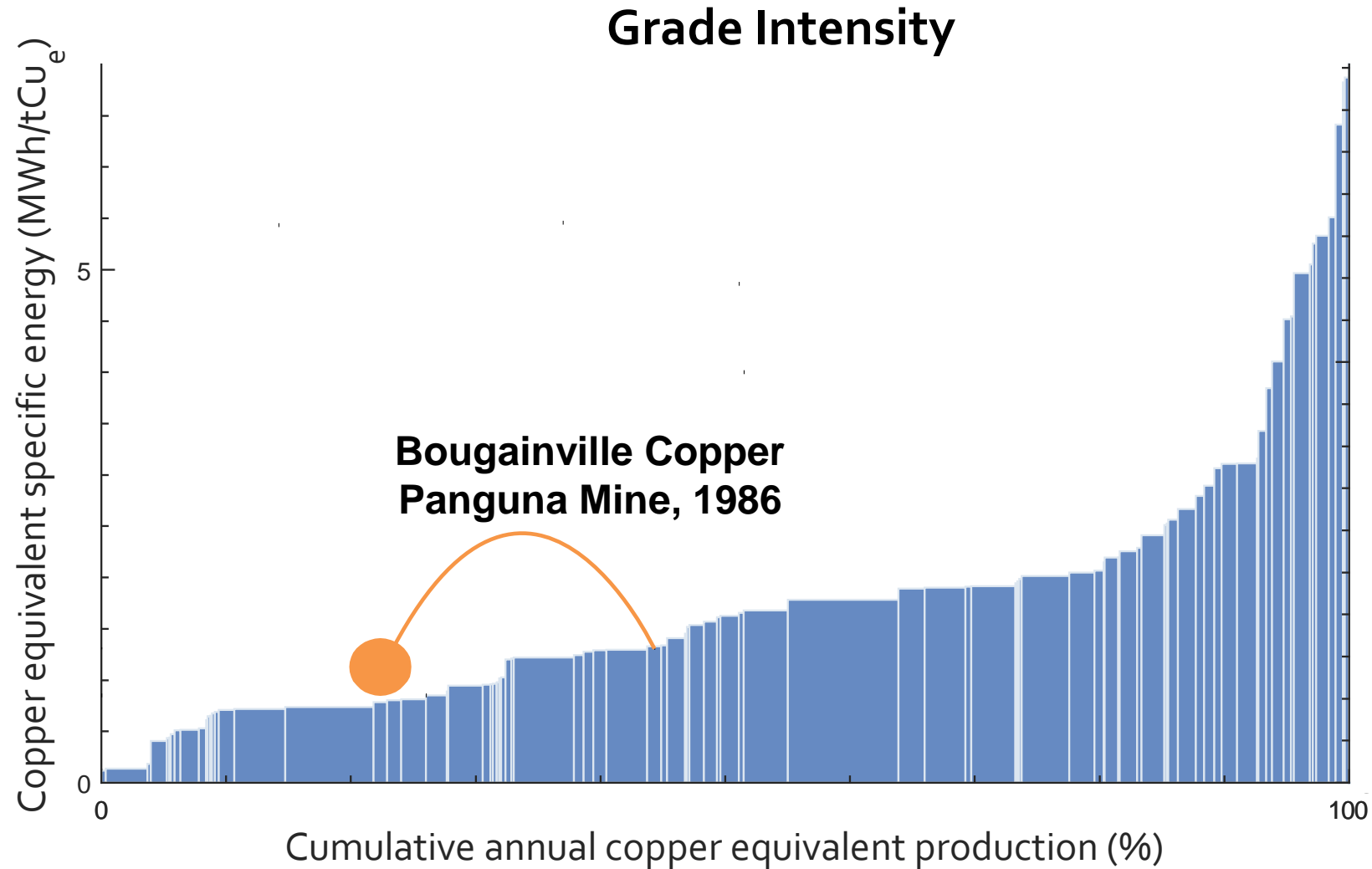
Case Study 2 – Preconcentration by screening

Bougainville Copper Panguna Mine, 1986

- Gold and copper minerals preferentially deported into finer sizes after blasting
- Test program measured amenability of major ore types
- Preconcentration by screening to upgrade gold and copper was viable



Case Study 2 – Preconcentration by screening





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CREATE CHANGE

Thank you

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Image courtesy Barbara Zluc