

GRAVITY SEPARATION

WHY USE GRAVITY SEPARATION?

Gravity separation is the most well-proven and accepted technique of concentrating minerals and has been used as a primary form of mineral concentration for centuries. Due to its high efficiency and low cost, gravity separation is always the first consideration in any flowsheet development program and always features in any flowsheet where there is sufficient differences between the specific gravity of the valuable and gangue minerals.

In the case of gold and PGE, gravity separation can quickly generate a precious metal concentrate that can be sold direct to refineries, resulting in better payment terms, faster payback and immediate cash-flows. The small footprint of these gravity plants means less capital outlay and better security for these small, volume high-value concentrates.

SGS has significant expertise using these techniques to treat a wide range of commodities including gold, tin, tantalum, lead/zinc, platinum and mineral sands. In certain circumstances, dense media separation followed by complex gravity circuits in conjunction with multi gravity separation and/or other separation techniques, is required to provide effective low cost solutions to allow the optimal economic recovery of complex ores.

With our array of equipment and experience, we can readily provide bankable cost effective processing flowsheets and advise on operational best practices during plant start up based on our extensive production experience.

REASONS TO ASSESS GRAVITY SEPARATION

- To reject barren waste as an initial pre-concentration step
- To recover malleable and/or friable coarse heavy minerals from grinding circuit circulating loads. Such minerals are otherwise hard to recover after regrinding
- To pre-concentrate heavy minerals to minimize downstream processing costs
- To concentrate heavy minerals
- To clean low weight yield bulk concentrates
- To scavenging plant tailings
- To generate a precious metal concentrate that can go direct to a refinery rather than a smelter

EXPERTISE AND INNOVATION

While gravity separation is a well-proven technique to mineral processing, careful attention to operating conditions and feed preparation can pay significant dividends.

Recognizing the fact that efficient gravity separation is a function of particle size and specific density differences, SGS has developed several successful techniques to identify feed size preparation criteria to maximize downstream gravity separation efficiency. This has proven to enhance concentrate grades by 5-10%. For instance, the introduction of multi gravity separation techniques in a tin recovery plant as a replacement for the last flotation cleaner increased recoveries 10% and, in another instance, use of specialist techniques and procedures increased tin recoveries by 8%.



Release analysis is used as the preferred data collation and presentation tool wherever appropriate to assess the mineral release from gangue at particle sizes below 1mm.

AREAS OF APPLICABILITY

PRECIOUS METALS (AU AND PGE)

- Creation of a direct refining vs. to-smelter concentrate
- Gravity recovery from grinding circuits
- Separation from base metals and gangue
- Separation from gangue
- Recovery from tailings

BASE METALS (ZN, PB, CU)

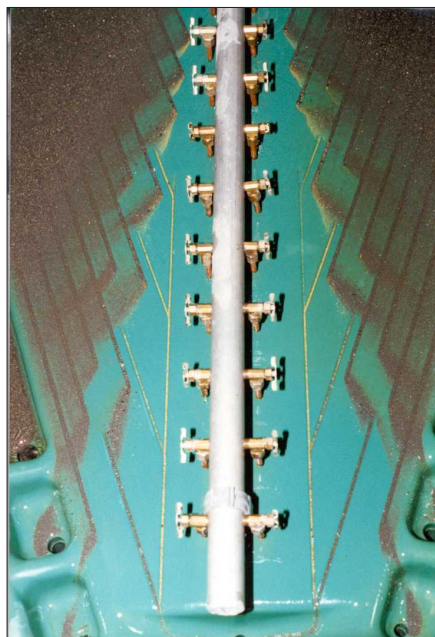
- Separation of base metals from gangue, especially carbonate rocks and marble

LITHOPHILE METALS

- Very appropriate for cassiterite, tantalite/columbite and tungsten minerals.

DIAMONDS

- Dense media separation is the preferred processing route for diamond bulk samples



MINERAL SANDS

- Separation of ilmenite, rutile and monazite from beach sand

RECYCLING

- Separation of metallic zinc and lead from recycled batteries
- Separation of steel from waste
- Slag re-processing
- Precious metal recovery from shredded circuit boards
- Copper recovery from shredded copper cable
- Precious metal recovery from dusts

GARNET

- Separation of garnet from biotite, magnetite and quartz

RARE EARTHS

- Separation of eudialyte and monzonite from gangue

INDUSTRIAL MINERALS

- Separation of graphite from mica
- Separation of muscovite from gangue
- Separation of kaolinite from muscovite
- Silica sand cleaning

CAPABILITIES

SGS can provide bench-scale flowsheet development, pilot scale testing and plant audit and optimization services, depending on the needs of your project or facility. Depending on the scope of a project, all of our metallurgical facilities offer bench-scale and restricted pilot-scale testing while our facilities for integrated pilot plants are located mainly in our Canadian and Australian facilities.

EQUIPMENT

- Knelson and Falcon Superbowl centrifugal bowl concentrators in many sizes (3", 7.5" and 9")
- Gekko and Acacia protocols
- Holman, Denver, Deister, Wilfley, Mozley, Gemini tables ranging in size from full size to "1/8"
- Humphreys, Vickers, Reichert, Carpcoc, and Mineral Technologies, single and double spiral ranging from full size to "pee-wee"
- Reichert & various trays and sluices
- Denver, Hazin-Quinn, Kelsey, In-Line Pressure jigs ranging in size from 12" to 1"
- Bateman 1 tonne/hr and 15 tonne/hr dense media separation plants



CONTACT INFORMATION

Email us at minerals@sgs.com
www.sgs.com/mining