

ERIEZ



HYDROFLOAT®

COARSE PARTICLE FLOTATION™



ERIEZ
GLOBAL LEADER IN SEPARATION TECHNOLOGIES

About Eriez

Established in 1942, Eriez stands as a pioneering force in separation technologies, embodying a truly global presence.

With 12 wholly owned subsidiaries across the globe, we proudly design, manufacture, and support our magnetic separation, flotation, metal detection, and material handling equipment on an international scale.

Our dedicated team of knowledgeable and experienced sales engineers collaborates closely with customers, understanding their unique challenges to deliver dependable, high-performance equipment, systems, and solutions.

Whether clients require our standard equipment or custom solutions tailored to their precise specifications, Eriez delivers.

Drawing from more than 80 years of experience across diverse industries, including mining and minerals processing, food processing and packaging, aggregates, metals recycling, and many other sectors, Eriez leverages its extensive experience to design and supply products that elevate productivity, efficiency, and product purity.

Eriez remains steadfast in its commitment to setting the global standard for excellence in key technologies, driving innovation and reliability across industries worldwide.

HydroFloat Coarse Particle Flotation

Increased Recovery

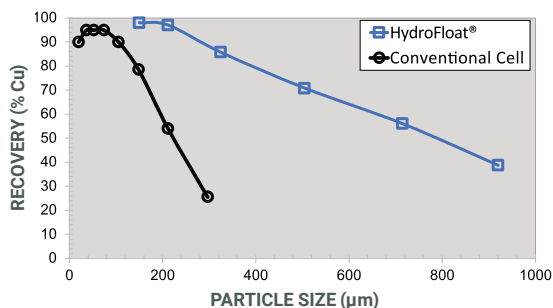
The HydroFloat® is the first and only commercially-proven solution for Coarse Particle Flotation™ (CPF). As an aerated fluidized-bed separator, it combines the benefits of density separation with the selectivity of flotation.

In operation, a feed slurry is introduced at the top of the HydroFloat and descends through a rising mixture of water and fine air bubbles, forming a fluidized bed of solids.

Air bubbles selectively attach to hydrophobic particle surfaces, reducing the effective density of bubble-particle agglomerates and lowering the settling velocity, resulting in an efficient process for transfer to the overflow.

Effective fluidized bed density is controlled to prevent lower-density bubble-particle agglomerates containing target mineral species from penetrating the fluidized bed and reporting to the underflow.

The result of this breakthrough technology is an order of magnitude increase in selective recovery of coarse particles (e.g. +150 µm) with as little as between 1% to 10% mineral surface expression, as well as a corresponding shift in the economic optimum grind size for concentrators.



Recovery by Particle Size for a Copper Sulfide Ore

Comparison of HydroFloat with a conventional flotation cell. The blue curve shows the opportunity to improve recovery and coarsen concentrator grind size using the HydroFloat technology.

Timeline

- **1997** – HydroFloat CPF™ testing initiated in the phosphate and potash industries
- **2002** – First HydroFloat patent awarded
- **2004** – First HydroFloat CPF circuit in operation (potash)
- **2004–2018** – Growth of the HydroFloat CPF technology in industrial mineral applications
- **2018** – First HydroFloat CPF Tailings Scavenger circuit in Cu applications
- **2021** – First HydroFloat CPF Coarse Gangue Rejection circuit in Cu applications
- **2025** – First HydroFloat CPF circuit in iron ore application. HydroFloat CPF flowsheets (improved processing system) patent awarded

Advantages

- Increased probability of bubble/particle collision
- Increased residence time
- Decreased axial mixing
- Increased bubble/particle contact time after collision
- Decreased turbulence and probability of detachment
- No froth layer or associated froth recovery challenges
- Fluidization water transports bubble-particle agglomerates into concentrate launder



20% Increase in Water Recovery



10% to 20% Decrease in Energy Consumption



Facilitates Dewatering and Disposal of Dry Tailings



10% to 35% Increase in Processing Capacity



2% to 6% Increase in Global Recovery

Proven Hydrofloat Applications

To date, more than 80 HydroFloat units have been successfully installed across a range of applications, including:

- Copper (Cu/Mo, Cu/Au)
- Gold
- Iron Ore
- Polymetallic Ores (Pb/Zn/Cu)
- Platinum Group Metals (PGM)
- Phosphate
- Potash
- Lithium
- Coal



Features

- **Solids Loading:** 15 to 20 tph/m²
- **Flotation Air:** < 0.5 cm/s
- **Fluidization Water:** Consumption varies with ore particle size distribution and specific gravity. Most water is recovered easily in the downstream dewatering process due to high sedimentation rate of coarse particles.
- **Feed Particle Size:** The HydroFloat is used commercially for flotation of particles up to 4 mm (potash). For copper sulfide applications, typical feed size range is 600 µm or 800 µm x 106 µm, depending on the liberation characteristics of the ore.
- **Feed Preparation:** HydroFloat feed generally requires pre-classification to optimize performance due to the effect of particle size on solids settling rate.
- **Solid Content:** The weight percent solids in the HydroFloat feed typically ranges from 50% to 60%. The tailings produced from the cell have a similar weight percent solids as the feed (>55%).
- **Liberation:** 3D Tomography and Mineral Liberation Analysis (MLA) studies have proven that the HydroFloat can recover target mineral species with as low as 1% to 10% hydrophobic surface expression.
- **Plug Flow:** The HydroFloat behaves similar to a plug flow reactor. This allows flotation to occur in a single stage. The tailings produced in this cell are final tailings.
- **Reagents:** The HydroFloat technology works with similar reagents as used in conventional flotation processes.
- **Reliability and Maintenance:** With no internal rotating or moving parts, the HydroFloat has exceptional operational availability and low maintenance costs. Unplanned downtime due to mechanical failures and abrasive wear of internal components are greatly reduced as compared to conventional flotation cells.

Circuit Design & Sizing

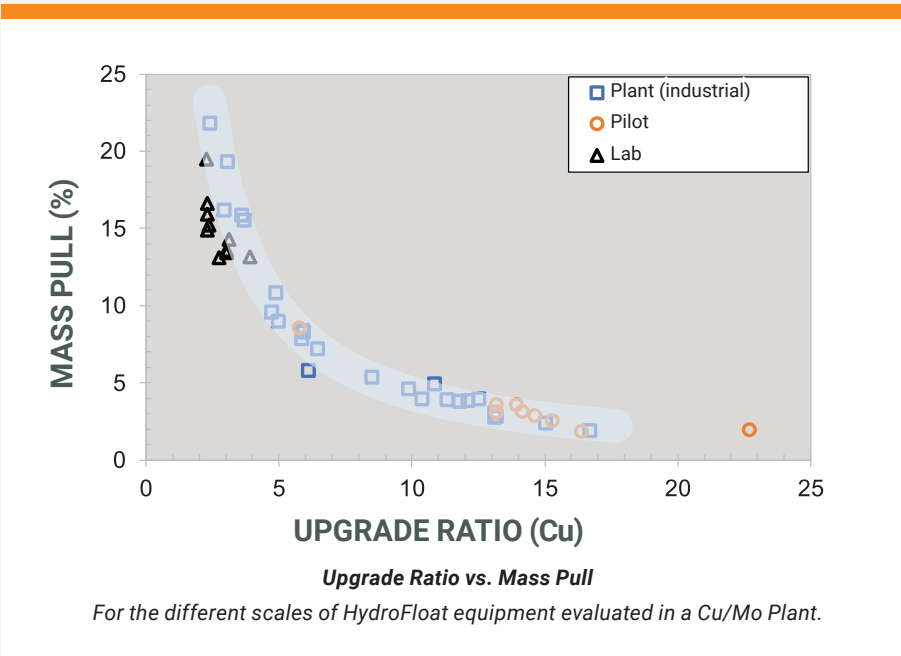
With more than 30 years of Coarse Particle Flotation knowledge and experience, Eriez' highly qualified team of metallurgists can identify and evaluate the most effective options to integrate the HydroFloat CPF process into brownfield and greenfield projects. Utilizing industry-proven test equipment and procedures, specification and sizing of HydroFloat equipment is simple and definitive.



Locations where HydroFloat CPF technology has been evaluated for base mineral flotation.

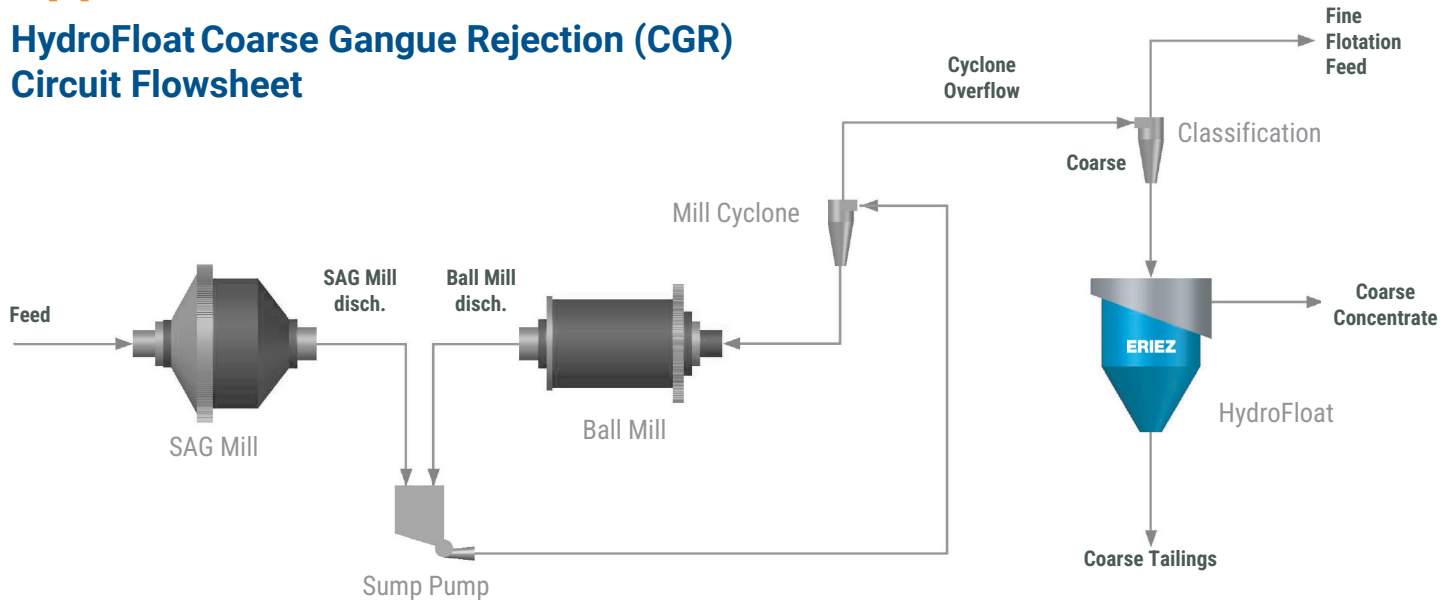
Metallurgical Scale-Up

HydroFloat metallurgical performance is accurately predicted using both laboratory-scale and pilot-scale HydroFloat equipment. Laboratory-scale units enable steady-state, continuous testing, with results routinely used to size full-scale industrial installations and support process performance guarantees. In-plant pilot testing is also available to demonstrate HydroFloat technology at a larger scale and to confirm metallurgical performance across a wide range of feed characteristics.



Application: Pre-Concentration

HydroFloat Coarse Gangue Rejection (CGR) Circuit Flowsheet



HydroFloat CGR Benefits

Reduce Energy Consumption

In base metals applications, increase ball mill grind size (P80) to 250 μm to 500 μm without affecting global recovery, resulting in 30% to 50% energy savings in the ball mill circuit.

Reduce Footprint

30% to 40% of the gangue will be removed from the process through the HydroFloat tails. Consequently, the conventional flotation plant size will be 30% to 40% smaller.

Improve Disposal of Tailings

HydroFloat CGR tailings have a P80 of 350 μm to 600 μm and a very low fines content, resulting in exceptionally high hydraulic conductivity compared to conventional tailings. This improves the economics of tailings dewatering and enables dry disposal without filtration, thereby reducing concentrator water consumption and the tailings storage facility's (TSF) environmental risks. HydroFloat CGR tailings represent 30% to 45% of the total concentrator tailings.

Increase Recovery

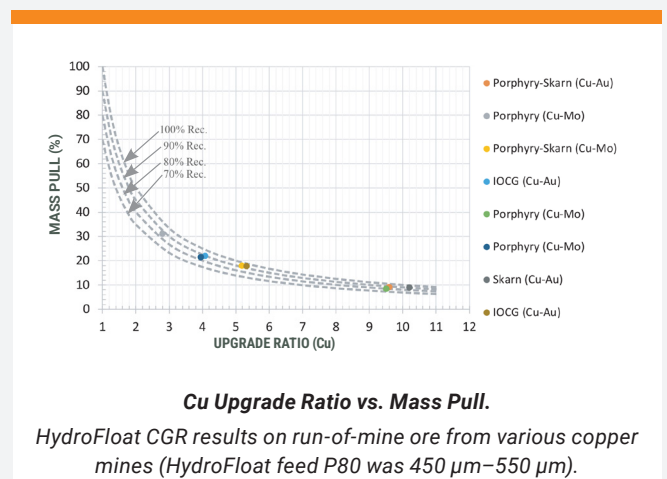
In addition to recovering coarse particles, HydroFloat CGR circuits reduce overgrinding, minimize ultrafines losses, and improve recovery in the conventional rougher flotation process.

Increase Production

For brownfield expansion projects, a HydroFloat CGR circuit facilitates a simultaneous increase in mill P80 and increase in mill capacity by 10% to 35% without any reduction in global recovery.

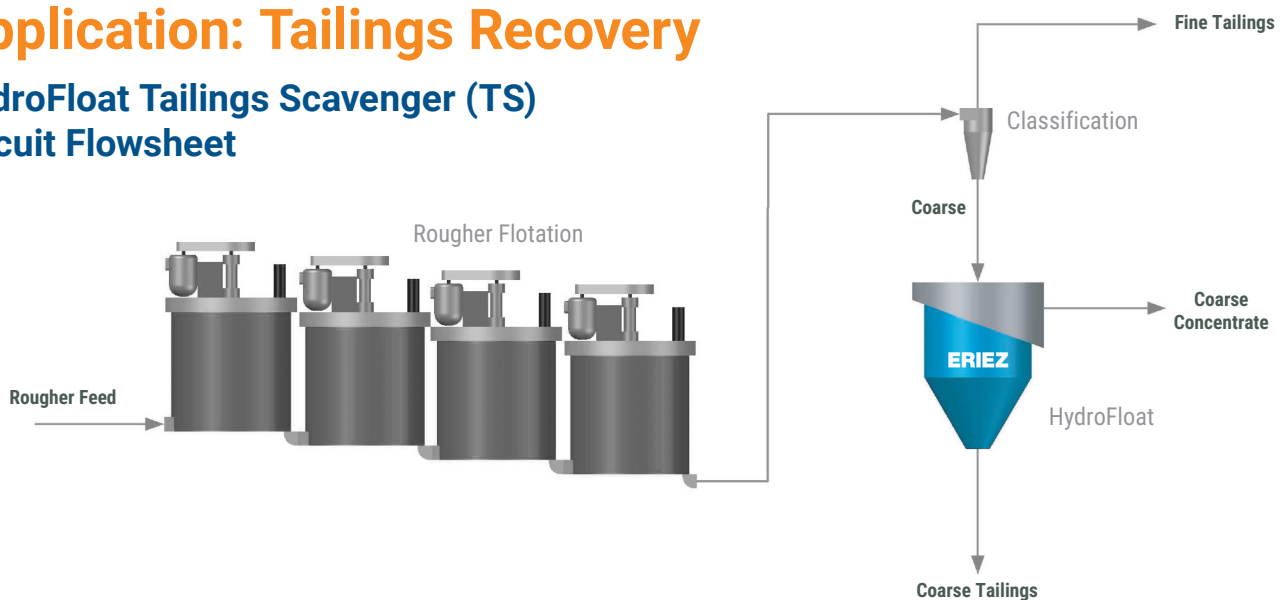
Reduce Water Consumption

With the HydroFloat CGR process, 30% to 55% of the plant throughput is processed in coarse fractions, which simplifies solid-liquid separation and improves water recovery. It is estimated that implementation of the HydroFloat CGR process in combination with advanced dewatering processes can improve water recovery by 20%.



Application: Tailings Recovery

HydroFloat Tailings Scavenger (TS) Circuit Flowsheet



HydroFloat TS Benefits

Increase Recovery

The HydroFloat Tailings Scavenger (TS) provides selective recovery of semi-liberated and fully-liberated minerals contained within the coarse size fraction of rougher flotation tailings, thus increasing global plant recovery. For example, HydroFloat TS has been demonstrated to increase global recovery of copper concentrators by 2% to 6%.

Simple Implementation

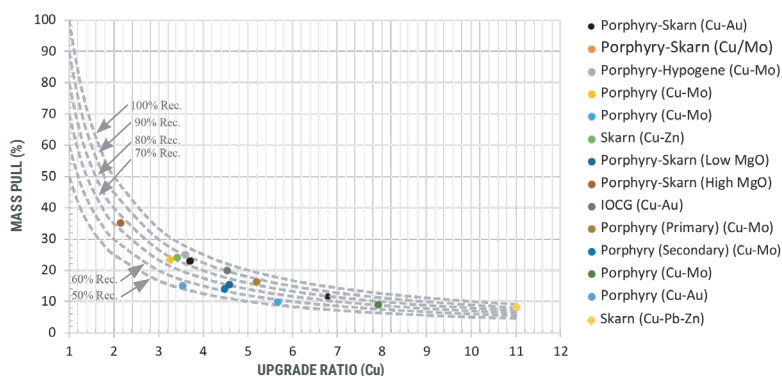
Construction of a HydroFloat TS circuit does not interfere with the operation of the conventional plant. Therefore, construction can advance without impacting plant production. The CPF plant tie-in can be made during the concentrator-planned maintenance shutdown. This type of CPF project can also facilitate separate project financial structures from the concentrator.

Increase Production

The increased recovery of coarse particles by HydroFloat TS enables higher mill throughput without reducing global recovery. The corresponding increase in flotation feed P80 results in a reduction in rougher recovery, which is offset by the additional recovery of the HydroFloat TS plant. The HydroFloat CPF also provides the company with an additional opportunity to generate revenue from old TSF reclamation projects.

Increase Profitability

Additional concentrate produced by the HydroFloat TS process has lower operating expenditures (OPEX) than concentrate produced by the conventional plant, as mining, transport, and primary comminution costs are already incurred in the CPF TS projects. Therefore, this additional production improves the aggregate profitability of the concentrator.



Cu Upgrade Ratio vs. Mass Pull.
HydroFloat TS results for various copper mine tailings.

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