

ERIEZ

FLOTATION DIVISION



● WORLD LEADER IN ADVANCED ●
FLOTATION TECHNOLOGY



WORLD LEADER IN FLOTATION ENGINEERING

The Eriez Flotation Division (EFD) provides advanced engineering, metallurgical testing and innovative flotation technology for the mining and minerals processing industries. Strengths in process engineering, equipment design and fabrication have enabled EFD to assume a leadership role in meeting increasing global demands for minerals flotation systems.

Applications for EFD equipment and systems include, but are not limited to, metallic and non-metallic minerals, bitumen recovery, fine coal recovery, organic recovery (solvent extraction and electro-winning) and gold/silver cyanidation. The company's product line encompasses flotation cells, gas spargers, mini-pilot plants, slurry distributors and flotation test equipment. EFD has designed, supplied and commissioned over 800 flotation column systems worldwide for cleaning, roughing and scavenging applications in metallic and non-metallic processing operations. In addition it is a leading producer of modular column flotation systems for recovering bitumen from oil sands.

EFD has also made significant advances in fine coal recovery with flotation systems to recover classified and unclassified coal fines. The group's flotation columns are used extensively in many major coal preparation plants in North America and internationally.



Liquid tracer tests conducted in our labs verify mixing intensity and residence time distribution. Eriez has 20,000 square feet of lab space dedicated to research and development.

EFD column systems have low maintenance and inventory requirements. Power costs can be 40 to 50 percent lower than equivalent mechanical flotation circuits.



The concentration of minerals by column flotation is a key mineral processing technology. EFD has designed, supplied and commissioned over 800 flotation columns for cleaning, roughing and scavenging duties worldwide.

The benefits of column flotation include:

- **Low capital and operating costs**
- **Lower energy consumption**
- **Low maintenance**
- **Ease of operation**
- **Improved metallurgy**

COLUMN FLOTATION TECHNOLOGY

Flotation columns derive their name from the geometric shape of the vessel. Unlike conventional mechanical cells, column cells are tall vessels ranging in height from 25 feet (7.6m) to more than 50 feet (15.2m). The surface area of a column cell is smaller than that of a mechanical cell which helps to promote a stable and deep froth.

An important feature of the column cell is the froth washing system that provides a means for removing unwanted impurities. Wash water added at the top filters through the froth zone and displaces pulp water and entrained particles leading to a stable froth with improved concentrate grades.

Unlike conventional flotation cells, columns do not use mechanical agitation. Feed slurry enters the column in the upper third of the body and descends against a rising swarm of fine bubbles generated by a gas sparging system. Targeted particles collide with and attach to the bubbles and rise to the top of the column.

Flotation columns incorporate several unique design features to enhance metallurgical performance, including:

- Reduced surface area to cell volume ratio to promote froth stability for froth washing
- Froth washing system to stabilize the froth and to minimize the entrainment of impurities
- Adjustable gas sparging system that offers independent control of bubble size and aeration rate
- Quiescent flotation conditions to promote selectivity and enhance collection within the column
- Circular internal launders to enhance froth stability and minimize loaded bubble travel distances, thus increasing recovery, especially of coarse particles

TECHNOLOGICALLY ADVANCED FLOTATION SOLUTIONS

COMPREHENSIVE ENGINEERING SERVICES

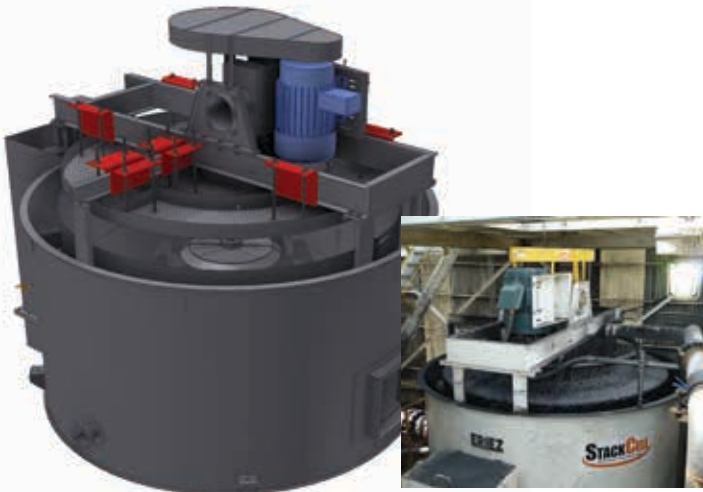
EFD's engineering services include laboratory and on-site metallurgical testing, commissioning, technical auditing, in-plant optimization, training and start-up. The group's world-class technical support ensures optimal separation efficiency and value with immediate access to industry best practices and protocols. Eriez engineers have extensive experience in greenfield installations and plant expansions, having designed and installed column flotation plants treating a total of more than 100,000 tpd (90,718 mtpd). At several sites, Eriez has made complete conversions from mechanical cells to column installations, achieving higher recoveries and grades at lower operating costs.

Designs are founded upon data collected in laboratory, pilot and plant tests and audits of flotation rate constants, grade to recovery ratios, residence time requirements and practical operating experience. Results are analyzed and integrated into key column design parameters that include cell body geometry, height to diameter ratio, launder design, instrumentation selection and the most critical element in column flotation performance, gas sparging requirements. EFD proprietary CPT sparging systems are recognized as industry standards with over 5,000 in operation around the world.

EFD's engineering capabilities provide for continuous refinement of its equipment and process systems, as well as introducing new flotation technologies to the minerals processing industry. Recent achievements include the development of the StackCell that provides a reduced footprint, lower capital, operating and maintenance costs for high volume applications. Placing these units in series provides recovery while allowing for a high grade float product through froth washing.



Engineering expertise enables the EFD to continuously refine products and systems in accordance with evaluative studies and testing results. Customers benefit from the ongoing analysis and input of leading flotation experts in the design of proprietary processing systems.



EFD's manufacturing capability, combined with its design engineering experience, enables it to efficiently fabricate and test new product designs while continually improving existing products.

More complete information is available at <http://flotation.eriez.com/>



CPT SPARGERS™

Flotation depends on the generation of bubbles that are correctly and uniformly sized and that are evenly dispersed across the column. The key is to generate the optimal number of bubbles of the correct size at the right rate. EFD provides spargers for a range of separation applications including fine and coarse mineral flotation, liquid/liquid separation, oxygen leaching service and air/water mixing duties. Spargers are designed, engineered and optimized for each application to ensure the generation of the best possible bubble distribution pattern.

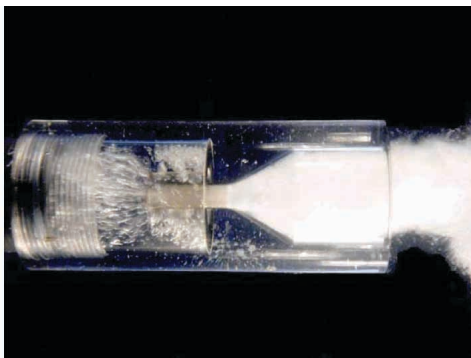


CPT SlamJet® spargers are self actuating, adjusting automatically to pressure fluctuations, and “slam” closed on loss of supply air.

CPT SLAMJET®



The CPT SlamJet® sparger represents the leading edge in gas bubble generation technology. The sparger can be removed without draining the column or shutting down the system, and automatically shuts off in the event of a supply gas failure to prevent process fluid from backing up into the gas line. A single, large-bore orifice virtually eliminates plugging or fouling. The simple design and durable construction of CPT SlamJet® spargers ensures a long operating life.



CPT CavTube™ sparger generates ‘pico bubbles’ substantially increasing the surface area available to the desired target particles.

CPT CAVTUBE™

The CPT CavTube™ sparger uses hydrodynamic cavitation to produce fine bubbles that enhance separation for improved product grade and recovery. CPT CavTube™ sparging systems are used in a variety of column flotation applications including iron ore, phosphate, fluorite, niobium, feldspar, mica, coal and molybdenum.

CavTubes are offered in a number of materials of construction for maximum wear life. Studies have shown CavTubes create finer bubble dispersions and have a significantly longer wear life than the outdated static-mixer design.



HydroFloat™ is an air-assisted density separator for the separation/concentration of coal, iron ore and other minerals that modifies the density of the mineral component. This ten foot (3m) diameter HydroFloat is processing coarse potash.

HYDROFLOAT™

Using a novel separation system, the Eriez HydroFloat™ separator significantly increases recovery of coarse particles. The novel characteristic of this separator is the formation of a hindered “teeter” bed of fluidized solids into which small air bubbles are introduced. The primary benefit is the flotation of very coarse material (up to 6 mm) that are otherwise lost using conventional methods.

STACKCELL®

The EFD StackCell® is a proprietary flotation system that concentrates the energy used for bubble generation into a compact volume. An impeller in the aeration chamber, located in the center of the cell, shears the air into extremely fine bubbles in the presence of feed slurry, thereby promoting bubble-particle contacting. Unlike conventional, mechanically-agitated flotation cells, the energy imparted to the slurry is used solely to generate bubbles rather than to maintain particles in suspension. This leads to reduced mixing in the cell and shorter residence time requirements.



StackCell® offers column-like performance in a substantially smaller footprint than conventional cells. These compact, stackable units offer considerable savings for new installations and are ideal for expanding capacity in an existing plant.

PHOSPRO™

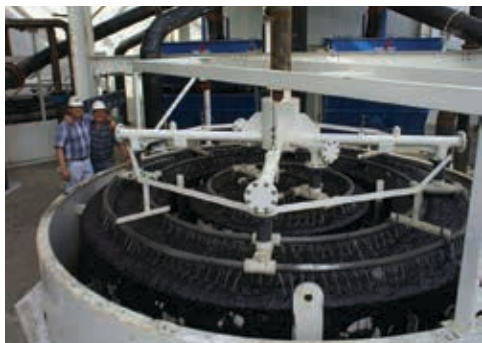
PhosPro™ column flotation cells are an alternative to mechanical cells and are particularly well-suited to the production of fine and ultra-fine phosphate concentrates. PhosPro™ flotation cells have been demonstrated to reduce power consumption while improving metallurgical performance. The cells also reduce reagent consumption as a result of improved froth characteristics in the column, and reduce the level of slimes generated within the flotation circuit.



K-PRO™

K-Pro™ Potash Recovery Systems provide effective, low-energy recovery of (-500 micron) potash particles. The flotation technology ensures a good mix of bubble sizes, and a non-turbulent environment that promotes efficient bubble-particle contact and adhesion. K-Pro™ systems also utilize multiple circular internal launders to significantly reduce the travel distance for loaded bubbles and further enhance coarse particle recovery.

More complete information is available at <http://flotation.eriez.com/>



The benefits of CoalPro™ include:

- Low capital and operating cost
- Low maintenance cost
- Ease of operation
- No large feed or recirculation pumps
- No downcomers with complex piping

COALPRO®

Column flotation has gained wide acceptance in the coal industry as a technically sound and economically viable technology for producing high-quality products. CoalPro® brings together the well-proven technology of column flotation and the innovative design capabilities of EFD to meet the special requirements of coal producers. The CoalPro® is widely used in the eastern United States and Australia treating a variety of classified (150 x 45 micron) and unclassified (150 x 0 micron) raw coals to produce low-ash products.

MPP™

The Mini Pilot Plant (MPP™) is a laboratory-sized pilot plant system that produces results that are more accurate than standard locked cycle-tests. The MPP™ has the processing power of a conventional, full-scale pilot plant at a fraction of the cost. Engineers can design flotation circuits with confidence by extracting the maximum amount of metallurgical information from a minimum amount of ore sample.



Using only drill core samples a metallurgist can:

- Run continuous flotation test campaigns
- Simulate the continuous operation of rougher/scavenger/cleaner circuits
- Develop full circuit flow-sheet designs
- Derive mass balances and circulating loads
- Produce full grade recovery curves
- Test ore zone variability

RSPDISTRIBUTOR™

The rotating, slurry-powered distributor (RSP) accurately divides a stream of pulp into two or more metallurgically and volumetrically equal and separate process streams. The RSP Distributor is ideally suited for feeding multiple flotation columns or other process equipment. The 'no-motor' low-maintenance design has made the RSP the distributor of choice for high-flow, multi-stream distribution.



WORLD AUTHORITY IN ADVANCED FLOTATION TECHNOLOGY

Customer-Focused Service Spanning the
World of Minerals

Eriez Flotation Division is committed to providing state-of-the-art equipment and process solutions for new and existing projects worldwide. We understand and quickly respond with integrity, competence and effectiveness to the needs of our clients. Our versatility is demonstrated by the diversity of our engineering services and the varying sizes of projects we have successfully completed around the world.

Contact the nearest Eriez Flotation Division office for technical support or design engineering to suit your specific application.



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Formerly known as Canadian Process Technologies, Inc., CPT is a wholly owned subsidiary of Eriez Manufacturing Co. Eriez provides advanced testing and engineering services in addition to sparging and column flotation equipment for the mining and minerals processing industries. Eriez, SlamJet and StackCell are registered trademarks of Eriez Manufacturing Co.

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