MAXIMIZE MINERAL RECOVERY WHILE REDUCING CAPEX AND OPEX
STACKCELL® FLOTATION OF SULFIDE ORES

The StackCell technology offers significant advantages over conventional flotation cells in full-scale operations. Lab and pilot-scale tests on low-grade copper in both rougher and scavenger applications prove the StackCell offers step-change rate improvements leading to economic benefits.

Eriez Flotation Division’s StackCell is a highly efficient flotation machine using focused energy input to enhance fine particle recovery for particles less than 15 microns, and vastly improved kinetics in the sweet spot of the “elephant curve” which includes particles from 15 to 150 microns. This patented technology decouples the particle contacting zone within the cell from the phase separation process. As a result, the overall unit size can be reduced by an order of magnitude while maintaining the same capacity and metallurgical performance. The implications of this step-change in technology are numerous and include a reduction in energy consumption of more than 30 percent and reductions in plant height, footprint and foundation loads of up to 60 percent.

StackCell Advantages vs Conventional Flotation:
• 20 to 30% Savings in Capital Costs
• 30 to 40% Less Power Consumption
• 60 to 70% Reduction in Plant Loading

StackCell Patented Technology:
• Two-Stage System
• High-Shear Bubble Formation
• Accelerated Flotation Kinetics
• High Throughput/Low Residence Time
• Low Energy Input
• Efficient Froth Washing Option
• Small Footprint
PRINCIPLES OF OPERATION

The StackCell® is a two-stage flotation device. A cross-section is shown below. The first stage (center of tank) is an energy intensive, low residence time chamber consisting of a rotor-stator (4) that creates high turbulence to mix air and feed slurry together (1). In this zone, the kinetics of particle attachment are maximized while the 2nd stage (outer tank) allows for froth/pulp separation.

Instead of operating with a large tank volume, the StackCell forces bubbles and particles to collide within a small contacting chamber mechanically isolated from the remainder of the tank. This approach creates a significant reduction in residence time compared to conventional technology, and allows the energy input to be used solely for gas dispersion and contacting and not for particle suspension as with conventional cells.

StackCell Achieves Comparable Mineral Recovery and Improved Kinetics

The StackCell technology clearly demonstrated superior kinetics to conventional flotation cells while achieving comparable recoveries in side-by-side rougher and scavenger circuit testing.

<table>
<thead>
<tr>
<th>Rougher Circuit</th>
<th>Copper Recovery</th>
<th>Retention Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>StackCell Flotation</td>
<td>77.8%</td>
<td>2-minutes</td>
</tr>
<tr>
<td>Conventional Flotation</td>
<td>78.3%</td>
<td>12-minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scavenger Circuit</th>
<th>Copper Recovery</th>
<th>Retention Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>StackCell Flotation</td>
<td>26.7%</td>
<td>2-minutes</td>
</tr>
<tr>
<td>Conventional Flotation</td>
<td>27.0%</td>
<td>18-minutes</td>
</tr>
</tbody>
</table>

The StackCell’s Economic Advantages

Based on pilot-scale test results, an engineering study was undertaken to compare the StackCell and conventional tank-cell technology at an equivalent capacity and metallurgical performance.

20 to 30% Capital Cost Savings

When compared to a traditional roughing application, a StackCell circuit can offer capital savings of 20 to 30%. This includes both flotation equipment and reduced air supply equipment. The small unit size also reduces shipping and installation costs as well as plant maintenance.

30 to 40% Less Power Consumption

Energy input in the system is focused on shearing air to generate greater bubble surface area while forcing intense contacting of bubble and hydrophobic material. No energy is required to keep particles in suspension as seen with conventional cells. In comparison, the StackCell approach offers a reduction in energy consumption. In addition, the total air requirement is approximately 30% less than that of a comparable conventional circuit. These factors contribute to an overall reduction in power usage.

Cut-Away of Eriez StackCell

1. Feed Inlet
2. Froth Discharge
3. Tails Discharge
4. Rotor
5. Wash Water Pan

Pilot-Scale Test Results* - Sulfide Ores

Tests results show that the StackCell’s patented technology produces similar metallurgical performance as conventional technology with a substantially shorter retention time. To achieve the increase in flotation rate, a unique, high-shear, bubble-particle contactor is used in lieu of the conventional rotor-stator mechanism found in mechanical flotation cells.

<table>
<thead>
<tr>
<th>Model</th>
<th>Diameter*</th>
<th>Height*</th>
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<tbody>
<tr>
<td>Pilot</td>
<td>610</td>
<td>610</td>
</tr>
<tr>
<td>1</td>
<td>1220</td>
<td>1220</td>
</tr>
<tr>
<td>5</td>
<td>1830</td>
<td>1830</td>
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<td>10</td>
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<td>3650</td>
<td>2450</td>
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<tr>
<td>35</td>
<td>4270</td>
<td>2450</td>
</tr>
<tr>
<td>45</td>
<td>4880</td>
<td>2450</td>
</tr>
</tbody>
</table>

* Millimeter – Tank only
Eriez Flotation Division (EFD) 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, HydroFloat, SlamJet and StackCell are registered trademarks of Eriez Manufacturing Co.

**WORLD AUTHORITY IN ADVANCED SEPARATION TECHNOLOGIES**

Customer-Focused Service Spanning the World of Minerals

The Eriez Flotation Division (EFD) is focused on addressing specialty flotation applications through innovative technology and expert support.

EFD is committed to providing state-of-the-art equipment and process solutions for new and existing projects worldwide. We understand and quickly respond 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.

Our state-of-the-art test lab and pilot facilities in Erie, PA are available to demonstrate and pilot solutions based on your unique needs.

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

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