Flotation machine

RCS™ 300

New flotation concept
The new flotation concept RCS™ 300

The RCS™ (Reactor Cell System) flotation machine has been developed to combine the benefits of the circular cell concept with the unique features of the DV™ mechanism to create the ideal conditions to maximize flotation performance for roughing, scavenging, and cleaning duties.

Maximum flotation recovery and performance have been achieved by careful attention to tank design.

- A very active lower zone for good solids suspension and transport, designed to maximize and create multiple particle-bubble contacts for recovery of the full range of particle sizes present.
- An upper zone with reduced turbulence to prevent particle-bubble separation of the coarser sizes.
- A quiescent cell surface to minimize particle re-entrainment.

New improved DV™ flotation mechanism

The new patent pending design improves air dispersion and bubble size distribution. The patent-protected DV™ (Deep Vane) mechanism impeller consists of a unique arrangement of vertical vanes with shaped lower edges and air dispersion shelf. The mechanism design produces powerful radial slurry pumping to the cell wall and gives strong return flows to the underside of the impeller to minimize sanding. Additionally it is the only mechanism to give maximum slurry recirculation to the upper part of the impeller. Vertical diffuser vanes promote these radial flow patterns and completely eliminate slurry rotation in the tank.

Enhances flotation performance:

- Maximum particle-bubble contacts within the mechanism and the flotation tank.
- Effective solids suspension during operation and re-suspension after shutdown.
- Effective air dispersion and distribution throughout the complete cell volume.
- Small even size bubbles gives a smooth froth surface and fast froth removal.

Reduces operating costs

- Mechanism designed to minimize local high velocity zones within the impeller and diffuser to extend wear life.
- Impellers and diffusers are supplied in high abrasion-resistant elastomers or molded polyurethane.
- Impeller profile is designed to minimize absorbed power.
- The RCS™ 300 has been tested thoroughly at Asorco Hayden concentrator plant.
Tank design features

- Circular tank concept with low level slurry entry and exit to minimize slurry short circuiting.
- Modular tank design to simplify construction, shipment and site installation.
- Cell superstructure designed to rigidly support the flotation mechanism and drive and to act as a support for both the drive maintenance platform and a walkway which extends across all cells in the flotation bank. Where environmental regulations apply, the complete cell top can be enclosed to minimize the release of ultra-fine particles into the concentrator atmosphere.
- Wear protection is only required in high wear zones.
- Peripheral launders with radial fingers and froth on one side only.
- Internal dart valves

Level control
Pulp level control is by conventional pneumatically operated dart valves with level sensor and float ultrasonic.

Ease of maintenance

- The DV™ mechanism is fully suspended from the cell superstructure and can be removed as a complete unit for routine maintenance.
- Wear parts can also be replaced within the flotation machine without removal of the mechanism.

Air control

- Flotation air is provided by a separate air blower.
- Aeration rate is manually or automatically controlled at each mechanism.

Proven drive systems

- Gearbox drive with extended output shaft bearings and Drywell construction is standard.
- Ready for Visiofroth installation.
Tests have proven that the air dispersion is extremely even and bubble size distribution good both making the froth surface calm and preventing geysering and waving, all due to the new patent pending Impeller design.
Extensive CFD simulation and DEM modelling has been done to ensure the right scale of parameters and good performance.

Excellent performance

Recovery losses in the flotation circuit should be seen as a lost opportunity. Metso has extensive flotation circuit analysis capabilities. This includes the ability to characterize the operation of the cells in a flotation circuit using cell hydrodynamic and froth sensors, conduct and manage flotation circuit surveys, mass balance survey results, analyze mineral liberation data and develop models for flotation circuit simulation. These results can be analyzed to determine opportunities for improvement in flotation circuit performance.

For a given ore type and regime, we can develop relationships between grind size and grade-recovery achievable in a particular flotation circuit, thus enabling the operation of the flotation circuit to be linked and therefore optimized within the constraints of the blasting and grinding operations.

Flotation circuits often consist of very large cells and variable stream flows. Often, the operation of industrial cells cannot be easily changed for plant trials, and it’s almost impossible to measure the outcome of any change. Metso has developed a 3m³ test cell to enable flotation testing at a realistic scale. The rig allows key operational parameters such as air rate, froth depth, feed flow rate, impeller speed, impeller size, froth launder configuration to be changed. It is fully instrumented and controlled by a PLC to enable stable operation and has been designed so that representative samples of all key samples can be collected in a safe manner.

This test cell is available for hire within Australia. Metso can also provide assistance with the development of the test cell experimental program and specialists to perform the test work. Recent consulting and RTD projects that have been undertaken using the RCS test cell includes the following:

- Evaluation of frothers for improved flotation performance.
- Investigation of circuit configuration options.
- Effect of launder configuration on flotation performance.
- Effective energy and power studies.
- Effect of density on flotation performance.

In addition we also have more test cells available around the world.

\[ CDF \text{ simulation front view of velocity vectors with inflow} \]
RCS™ flotation machines are available in sizes 0.8 m³ to 300 m³

**Cell dimensions**

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<tr>
<th>RCS™</th>
<th>∅A</th>
<th>B</th>
<th>C</th>
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**Specifications RCS**

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<tr>
<th>RCS™</th>
<th>Cell volume (1) m³</th>
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<th>Connected motor (2) kW</th>
<th>hp</th>
<th>Air requirements (2) Am³/min</th>
<th>kPag</th>
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</table>

(1) Effective volume   (2) Per cell, slurry 1.35 S.G.
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