

## Directional Nozzles 101

Water tends to move in an anti-clockwise direction in the Southern hemisphere (unless there is a strong current or force pushing it the other way). If you place a nozzle parallel or close to the wall, it creates a strong circumferential current around the wall area, but leaves a dead spot in towards the centre area. This has been confirmed by sediment patterns being mainly present in the centre of a tank.

When nozzles are directed into the centre tank area, they 'knock out' the entrapped section of water. Sediment patterns are more evenly distributed across all the floor area, with small clear areas downstream of posts and pipe work (this indicates distinct water movement across all areas of the tank). The additional upwards angle prevents thermal layers from developing – while water will circulate anti-clock wise, it will remain in parallel layers, unless the flow is angled upwards. A complete mix of the stored water is not achieved until both directions are achieved.

Reports on testing done in the USA recommend CYCLIC mixing, rather than constant mixing. Constant mixing (as in an electric 24/7 mixing unit), creates entrenched patterns, whereas cyclic mixing (as on the daily inflow cycle) does not allow those patterns to develop.

Modelling does not always produce the same results as experienced in full size tanks, due to Reynolds Numbers causing discrepancies as the size increases.

Tanks with mixers (or nozzles) facing CLOCKWISE, always seem to have dirtier walls and the sediments are settled more to the outside areas, rather than in towards the centre...as if the water is reluctant to go in that direction, and is 'fighting back'... I have no scientific proof to back this up, only an observation from years of tank inspections, where the client didn't have a direction policy for the installation contractors and the mixers appear to have been placed 'pot luck' in either direction.

The whole concept of directional nozzles is to change the direction of the water and to improve water quality at no energy cost - unlike a mechanical mixer which

requires ongoing power and maintenance. With wall mounted inlets, by directing the water up and off the floor area, sediments remain in place and are not disturbed by the inlet velocities. With floor mounted inlets, the vertical upwards direction is wasted from an energy viewpoint - by directing the water into a planned pattern, water is circulated efficiently and effectively.

Two-way nozzles are an improvement to having water come in and out of the same pipe penetration. The incoming water is moved around inside the tank and away from the outlet area, reducing the chances of 'short circuiting' occurring. Two-way nozzles are designed to let water in under velocity and also for the water to be able out-flow without any restrictions. This is achieved by a one way flapper valve fitted into the side mounted box.