



Vane Feedwell™

Feedwells have a significant influence on thickener performance. The last major innovation in feedwell design was back in the early 1990s – until now. The unique design of Outotec's new Vane Feedwell™ creates conditions for optimal thickener performance.

Benefits

- Reduced plant operating cost
- Reduced flocculant consumption
- Increased underflow density
- Higher solids throughput
- Improved water recovery and clarity
- Increased reagent/mineral recovery
- Stable operation, less downtime

Outotec

Unique. A true performer.

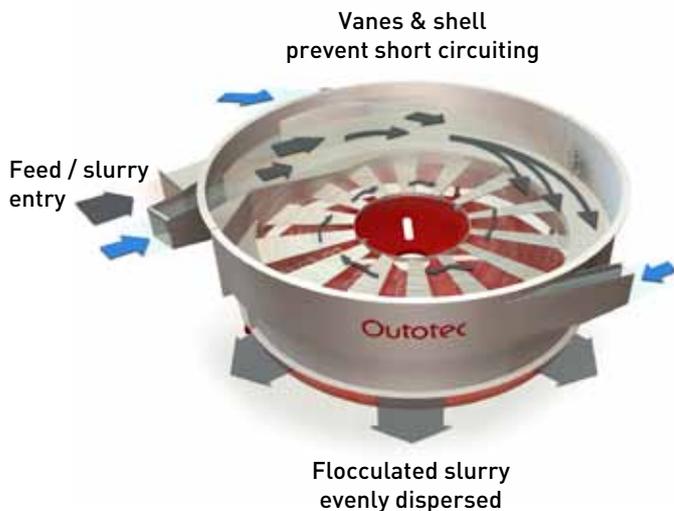
The Vane Feedwell™ is the result of many years of internal research and rigorous site testwork, followed by CSIRO CFD analysis. It is a cutting-edge design and the first major innovation in the thickening industry since self-diluting systems such as Outotec's Autodil™ were introduced.

Applications

The Vane Feedwell™ is a high performance feedwell for the thickening and clarifying industry. The Vane Feedwell™ has also been successfully retrofitted, quickly showing significant benefits in thickener performance. It is now the global standard for all Outotec thickeners.

How does the Vane Feedwell™ work?

Outotec's Vane Feedwell™ incorporates a total of seven global patents into its unique design. One of the main design features is the interconnected upper and lower

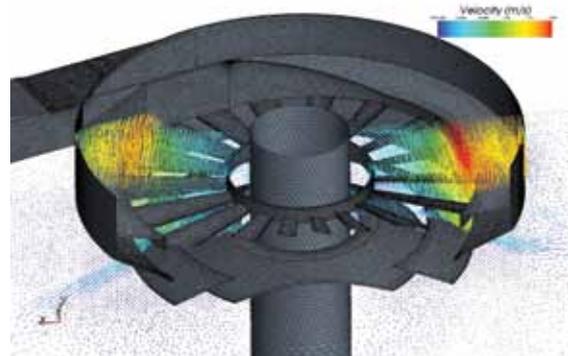


The upper zone, into which feed, dilution water and flocculant are added, provides enhanced mixing and energy dissipation. This maximises flocculant adsorption, eliminates the possibility of coarse/fines segregation and ensures all particles are aggregated together by the flocculant. Efficient operation is maintained in this upper zone over varying feed rates.

The lower zone promotes gentle mixing for continued aggregate growth, with the option for secondary flocculant dosing. This zone also enables aggregates to uniformly discharge under low shear conditions.

Cutting-edge in-house CFD modelling

The previously rudimentary understanding of feedwell and thickener flow patterns is taken to the next level with advanced Computational Fluid Dynamics (CFD). The Vane Feedwell™ and today's thickener designs can truly be optimised for individual duties, resulting in enhanced overall performance.



CFD-generated flow pattern and solids concentration

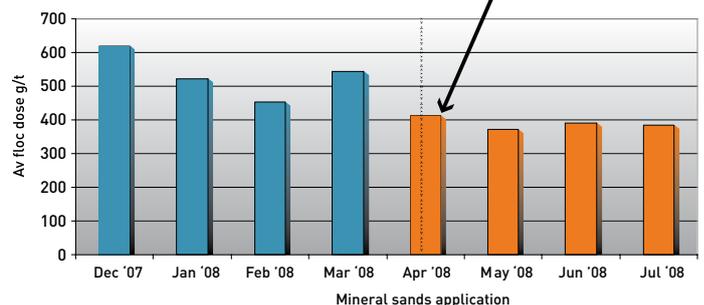
Outotec's highly experienced CFD team can quickly, accurately and cost-effectively produce various design options, with reassurance for full-scale replication. This unique combination of CFD capability, backed by decades of real life experience, generates cutting-edge customised designs.

A profit maximiser

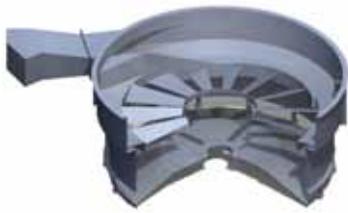
The Vane Feedwell™ design ensures a highly efficient thickener operation. As a result, cost savings can be significant.

- Reduces flocculant use and operating costs
- Improves thickener operability
- Increases thickener capacity
- Maximises water recovery
- Improves underflow density
- Improves overflow clarity

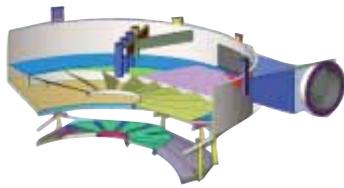
Vane Feedwell™ RETROFIT



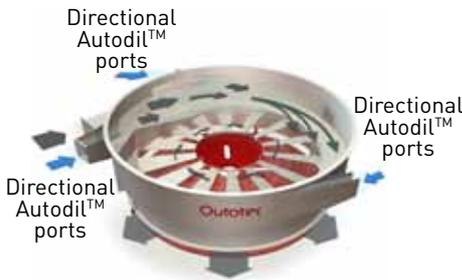
What makes the Vane Feedwell™ so different?



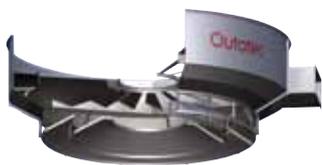
Vanes and radially sloped shelf



Upper and lower zones, with feed transition box



Directional Autodil™



Double deflector cone



Turbodil™

Unique features

Unique benefits

Vanes

Creates upper and lower zones
Two global patents

- Mixes and de-aerates incoming slurry
- Dissipates energy, prevents short-circuiting
- Maximises flocculant adsorption
- Promotes full 360° distribution of feed solids

Radially sloped shelf

Creates upper and lower zones
Global patent

- Increases solids residence time
- Minimises coarse/fines segregation
- Dissipates energy
- Facilitates uniform solids distribution
- Prevents short-circuiting
- Eliminates possibility of solids build-up due to radial slope

Upper and lower zones

Ensures feedwell performs distinct functions effectively

- Enhances mixing, energy dissipation and aggregate growth
- Uniform discharge under low shear conditions
- Remains efficient at lower than design feed rates

Directional Autodil™ ports

Introduces dilution water in complementary direction to feed flow
Global patent

- Promotes feed/dilution liquor mixing
- Achieves slurry density for optimal flocculation
- Reduces short-circuiting

Tangential feed & transition box

Elevates feed entry into upper zone
Global patent

- Optimises feedwell design geometry
- Ensures all feed dilution occurs in upper zone
- Focuses feed entry momentum into upper zone

Constant feed velocity system

Maintains design feed entry velocity
Global patent

- Preserves optimal feedwell performance for given feed flow conditions
- Reduces short-circuiting by maintaining design feed flow velocity

Flocculant spargers

Enables dual zone flocculant addition

- Promotes efficient flocculant distribution
- Encourages continued aggregate growth in lower zone
- Reduces flocculant consumption

Double deflector cone

Creates second exit annulus
Global patent

- Optimises feedwell design geometry
- Distributes flocculated solids evenly on exit
- Reduces short-circuiting
- Eliminates upflow dilution

Turbodil™

Forced dilution system, upstream of feedwell
Global patent

- If required, enables very low feed densities for optimal flocculation
- Variable dilution to suit process conditions

Outotec develops and provides technology solutions for the sustainable use of Earth's natural resources. As the global leader in minerals and metals processing technology, Outotec has developed over decades several breakthrough technologies. The company also offers innovative solutions for the chemical industry, industrial water treatment and the utilization of alternative energy sources. Outotec shares are listed on the NASDAQ OMX Helsinki.

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