The Origins of Vortex Technology

Best Performing Grit Removal Systems on the Market Since the 1960s

Wastewater Application Sheet - Hydro International's History of Vortex Innovation

Vortex Applications

- Municipal wastewater grit separation and washing
- Surface water pretreatment
- Drinking water intake sand removal
- Solids / liquids separation

Advantages

- All hydraulic process
- Highly efficient with even very small particles

Early Smisson Prototype

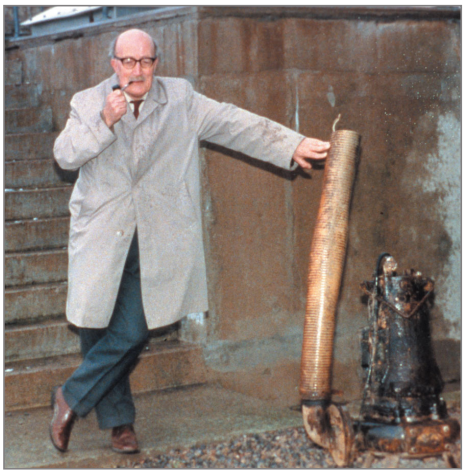
Vortex technology is in Hydro's DNA

Early Eutek TeaCup® Pilot

Hydro International's products have evolved over the last 50 years from simple vortex overflows to the advanced hydrodynamic vortex separators and complementary technologies of today. Hydro's founding father, Mr. Bernard Smisson, designed the very first vortex overflow in England in the 1960s. Faced with space constraints while trying to construct a conventional side weir overflow, he developed a circular weir overflow configuration based on a vortex flow regime. This first generation separator was found to effectively retain 70% of the pollution load. As a result, hydrodynamic vortex separation technology was born.

In the early 1970s, Mr. Smisson was invited to the United States as an advisor to the APWA and EPA, which resulted in a series of projects that culminated in the development of the swirl and helical-bend flow regulators/settleable-solids concentrators and the swirl degritter. He later returned to the United Kingdom to continue his pioneering research on vortex technology where he addressed the issues of high headloss and solids deposition and refined the design to further improve performance. This low energy rotary flow separator device was subsequently patented and commercialized. In 1980 Hydro International was formed to promote the hydrodynamic vortex separator and vortex flow control technology around the world.

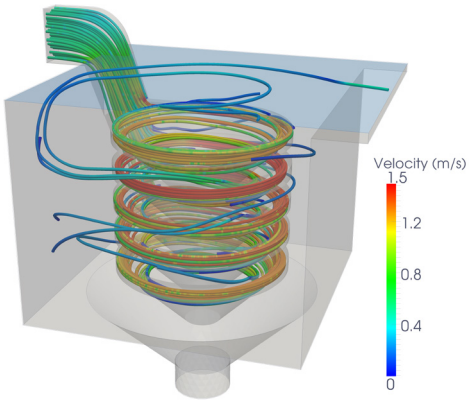
The significance and simplicity of the swirl degritter, which harnessed the energy in a flow stream to separate solids in an all-hydraulic separator with no moving parts, was not lost on a young Ph.D. researcher in America. In the early 1970s, Dr. George Wilson, founder of Eutek Systems, which is now a part of Hydro International, was hired by the National Canners Association to develop a product to remove silt from vegetable process water in order to keep sediment out of the collection system. By literally turning the swirl concentrator upside down and accelerating the velocity, the TeaCup classifier – a high energy rotary flow separator device with very high removal efficiencies for fine sand particles, was created.



Bernard Smisson

George Wilson

Hydro International Lab Testing Facilities



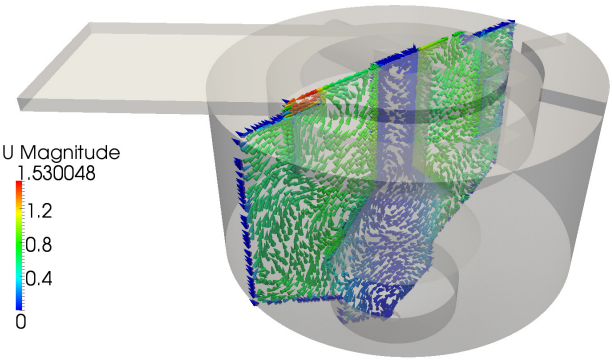
HeadCell® CFD Analysis

Through constant research and continuous development, Hydro International's products have evolved from direct descendants of those first generation efforts into the state-of-the-art water management technology solutions of today. You could say vortex technology is in the Hydro DNA.

Today, we continue to study, test, model, optimize, and innovate the application of vortex flow regimes. We conduct detailed investigations of low, medium, and high energy rotary flow regimes, optimal volute configurations and arrangements for flow modifying static internal components. Drawing on our deep understanding of the fundamentals of vortex motion and the forces involved allows us to guarantee performance of our technologies and transform concepts into products that address immediate and long-term needs in the water sector.

Hydro's two hydraulic test facilities enable us to experiment with full-scale prototypes for our entire product portfolio to continuously improve performance as well as develop new products. Our first-hand knowledge and expertise in test protocols and methods have been utilized by regulatory agencies around the world to aid development of performance standards for stormwater and wastewater solid-liquid separation processes and vortex flow controls.

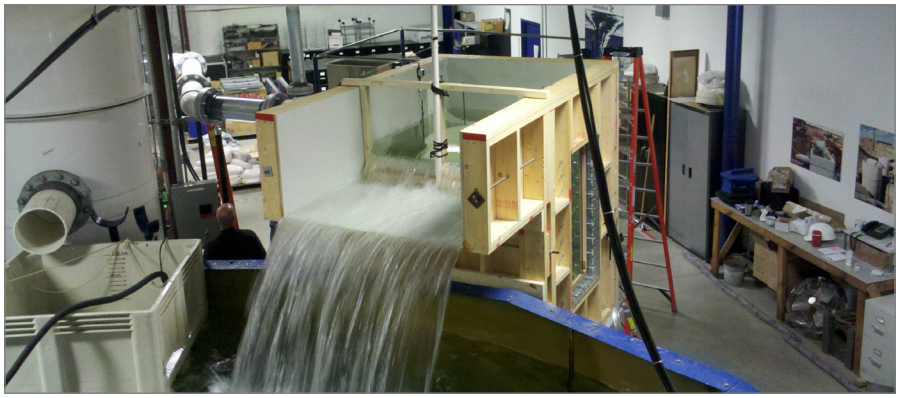
As one of the earliest adopters of Computational Fluid Dynamics (CFD) to model liquid / solids separation in the water industry, our unparalleled CFD expertise allows us to assess flow patterns and velocities within systems and treatment processes. Our CFD analyses are verified through lab testing, and used to gain insights into complex fluid processes and assist in developing design equations for our products. We collaborate with universities around the world on initiatives that include verification work and further our understanding of the science behind our technology platforms.



Grit King® CFD Analysis

The proof, however, comes in real world results. The performance of our technologies have been field verified by Hydro as well as independent agencies allowing us to clearly state expected removal efficiencies. Our customers benefit from low maintenance technologies that require little power and, most importantly, achieve the promised results.

Today, Hydro is a truly international company, which provides localized engineering solutions, helping our customers achieve their water management goals with a broad range of vortex and complementary technologies.



Hydro International Lab Testing Facilities

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