



Ohio State University Project

The Challenge

Need a pump that can pump or recirculate algae water without harming marine life

The Discflo Solution

Discflo's unique laminar flow and non-impingement pumping is ideal for this delicate task



Discflo Corporation

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Case Study

Pumping Marine Life and Algae

Karasawa Fine Ltd / Taiyo International, Japan



Smithsonian Institution installed Discflo Disc Pumps in 1993.

Discflo has been given an exciting new opportunity to be an integral part of the fight against damaging algal bloom. New technology has been developed and patented by Dr Yukihiro Karasawa of Karasawa Fine Ltd and marketed by Taiyo International of Japan that will make use of Disc pumps non-impingement, laminar flow pumping to protect native aquatic life.

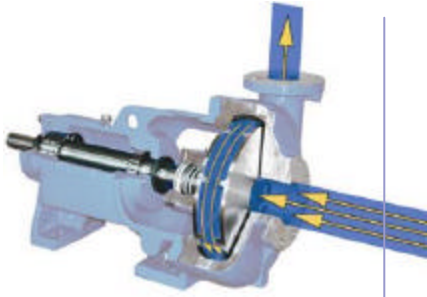
Coastal regions worldwide and virtually every state in the US have experienced devastating effects of algae bloom. Some blooms produce toxins and are so dense they discolor huge areas of water. Others are not visible but still threaten human and marine life, causing illness and death in humans from toxins in contaminated seafood, and mass kills of fish, marine mammals and seabirds.

Although algae bloom is a natural phenomena that has occurred for centuries, there is evidence that they are increasing in frequency and size. According to the National Science and Technology Council, mitigation of the harmful effects of algal bloom costs millions of dollars every year in the US alone.

Methods of control include chemicals, flocculant, and bio agents. All of them create problems. Dr Karasawa's new technology kills off bloom without chemicals, bio-agents, or flocculant. The technology uses a nozzle for solid/liquid multiphase flow. It will be introduced and the theory explained at a drinking water and environment technology show in Japan, November 12, 2001. Representatives of Taiyo arrived at Discflo headquarters in El Cajon in summer 2000 for initial testing.

Discflo has a long and successful history in applications where threats to aquatic life is a concern. Disc pumps are used in research projects at scientific institutions and universities, including the Smithsonian Institution in Washington and Ohio State University's Olentangy River Wetland Research Park.

Call Discflo now to find out how our pumps can solve your problems.



Case Study

Pumping Delicate Crystal Slurry

Pharmaceutical Co/ESI Technologies, Ireland

The Challenge

Existing PC pump was leaky, unreliable

Unacceptable level of costly product damage

Needed pressure relief valves and suction strainer

The Discflo Solution

Disc pump can run dry without damaging pump

Smooth flow through Disc Pump improves product quality, yield

No need for pressure relief valves and suction strainer

Saving \$3000 per batch



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This case study is based on an article that appeared in World Pumps Magazine April 2002. The article was contributed by Phil Soltan of ESI Technologies, Discflo's distributor in Ireland.

When ESI arrived on the scene at a large pharmaceutical plant in Ireland, a progressive cavity pump was being used for centrifuge feed of a delicate and expensive crystal slurry. The pump was leaky, unreliable, and causing unacceptable product damage.

The company was experiencing terrible losses and looked to ESI Technologies for help. ESI recommended a pump from Discflo Corporation to the pharmaceutical company. A Disc pump ANSI model 402-14-2HHDL was installed a little over a year ago (*in 2001*) with a double mechanical seal and a variable speed drive. The disc pump can be inadvertently deadheaded and the suction valve closed so it was the perfect choice for a company looking for a pump that could run dry without damaging the solution or the valuable product.

The product manufactured by the pharmaceutical company is so delicate and expensive that the casing internals on the solution had to be highly polished in order to eliminate the possibility of turbulence caused by rough spots.

Disc Pump Advantage

Disc pumps do not use centrifugal force or positive displacement. They operate on the boundary layer/viscous drag forces that produce a laminar flow with no pulsation. A boundary layer of fluid adheres to the discs and is stationary relative to the discs.

As the discs rotate, kinetic energy is transferred through layers of fluid molecules between the discs, generating velocity and pressure gradients until the entire fluid mass is in motion. The product is "pulled" through the pump in a smooth, pulsation-free flow.

This is significant for two reasons. First, laminar flow conditions provide the best protection for shear-sensitive and delicate products. Non-impingement and laminar flow pumping has almost zero impact on the product.

Second, laminar flow means lower NPSHr (net positive suction head required). The disc pump has NPSH requirements that are about half to a third of that required by conventional pumps plus the curve is stable through to shut off.

See next page . . .



*Live algae can be pumped
without harm by Disc Pump*

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Case Study

Pumping Marine Life and Algae

Harbor Branch Oceanographic Inst, Florida

The Harbor Branch Oceanographic Institution is using the Discflo pump technology to pump live algae. The Disc pump, used as part of the BioFence system from Applied Photosynthetics, is able to pump the live single-celled animals without destroying them. The pump has been operating since mid-October 1998 and says Stephen Gerber of Gerber Pumps, Discflo distributor in Florida, "pumps are running well."

Aquatic Ecosystems of Florida purchased a demo unit, a 1510 Disc pump with a smooth plastic Discpac, for testing by Applied Photosynthetics, the UK-based manufacturer of the Bio-Fence system. The Disc pump has a design capacity of 40 GPM at 14-15 ft TDH.

While some algae have a hard shell and can therefore be pumped with centrifugal pumps without destruction, other algae species have flagellae - soft protruding parts - that would be destroyed by regular centrifugal impellers.

The trial tested the Disc pump on 15 sensitive species of algae and found that it did not damage any of them. The BioFence system previously used an air-operated diaphragm pump which was high in maintenance, larger than a Disc pump and required a compressor.

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Case Study

Pharmaceutical Co/ESI Technologies, Ireland

Centrifuge feed applications are typically low flow and low NPSHa (net positive suction head available). Pumps operating under these conditions can suffer from loss of capacity excessive vibration, and frequent cavitation causing excessive component wear, leakage and eventually pump failure.

Another benefit is that the Disc pump largely avoids cavitation problems because with laminar flow the pressure variations are smaller. The NPSH requirements are, therefore, lower. Also, when cavitation does occur in the Disc pump, the boundary layer of the pump surface acts as a shock absorber, minimizing damage and vibration. Even under low NPSH conditions, Disc pumps suffer little wear.

Phil Soltan of ESI Technologies sums up the benefits as he sees them: "For pharmaceuticals, it all comes down to this: the smoother the flow, the better the product quality and yield."

Discflo Installation

The Discflo pump installed at the pharmaceutical company in Ireland has improved product quality, eliminated leaks, and increased reliability. Although the product and production details are proprietary, the engineer who installed the pump under trial reported that production increased and processing time was reduced by 15%. Savings amounted to about \$3000 per batch and the pump paid for itself in about one week's time.

An additional benefit of the disc-operated pump design installed at the pharmaceutical facility in Ireland was that the need for pressure relief valves, which are mandatory on positive displacements pumps, was eliminated. And because the new Discflo pump can handle larger solids than the previous pump, a suction strainer or filter was no longer required either.

The pharmaceutical company has gone from a pump that was always in trouble to one that has, so far, required no attention at all. One reason is that, unlike conventional centrifugal pumps, disc pumps are designed with a tangential discharge.

A tangential discharge creates equally distributed loads, no stress concentrations and very little shaft deflection. The Discflo pump has no radial loads and very low axial loads. This results in a longer life for the seals and bearings.

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