

DISCFLO

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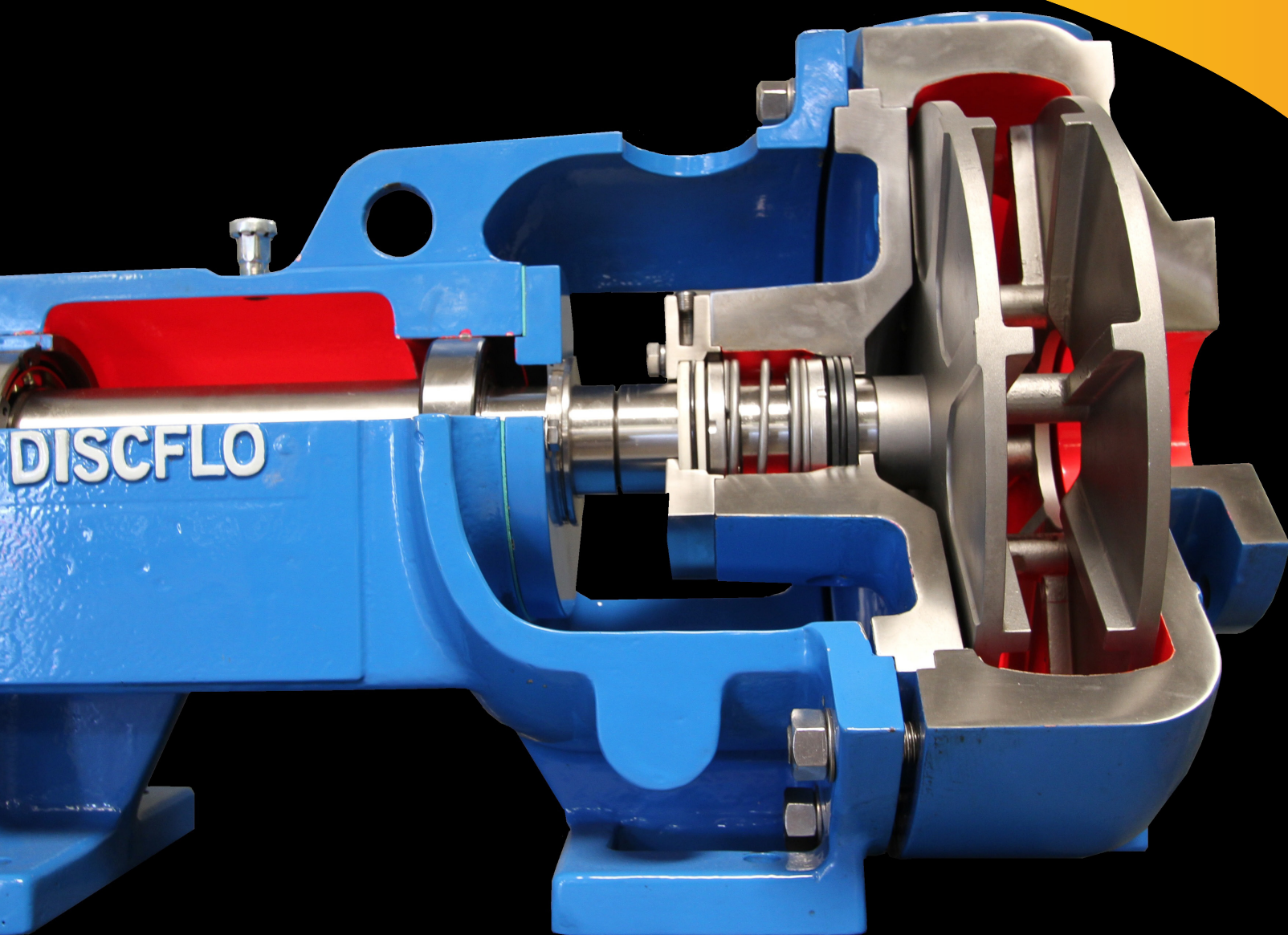
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DISCFLO



PULP AND PAPER

INTRODUCTION

The disc pump has solved some of the toughest problems in the industry. It is able to handle paper stock up to 18%+ density, abrasive and viscous slurries from the chemical recovery process, shear sensitive chemicals such as paper coating slurries, sludge with a high solids content and slurries with high levels of entrained air or gas.

The disc pump's superior performance is confirmed by comments by users in pulp and paper mills worldwide, all of whom have reaped significant benefits—both in higher product quality and in reduced wear, maintenance, operating and downtime problems—by moving over to the Discflo pumping system.

The disc pump technology was developed in the late 1970s. The pumps are manufactured exclusively by Discflo Corporation, founded in 1982, at its international headquarters in southern California, USA.

INCREASING PRODUCTIVITY, REDUCING OPERATING COSTS

One of the top paperboard manufacturers in Europe is using the disc pump system throughout its mill in northern Sweden. Applications include pumping lime slurry, black liquor soap, coating waste and lignin/white liquor. One of the toughest uses was pumping a very abrasive and shear sensitive bentonite solution.

Since installation of the disc pumps, the plant manager has not purchased any spare parts for these pumps, and has reported no unplanned maintenance or downtime. The company estimates the savings amount to SEK 50,000 to SEK 100,000 [\$10,000–\$20,000] per pump per year, with a return on its investment of between six and ten months.

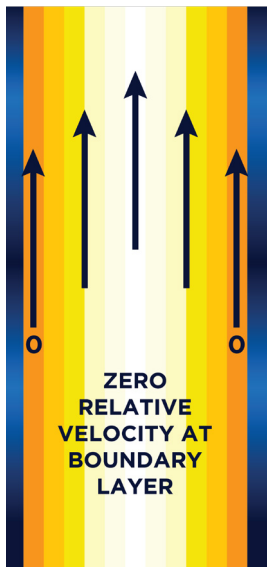


100% American Made Since 1982

HARNESSING THE POWER OF BOUNDARY LAYER VISCOUS DRAG

The non-impingement and laminar flow pumping of the Disc pump is similar to flow through an ordinary pipe. The layers of fluid at the walls are stationary (relative to the rotating discs), creating a protective boundary layer. Viscous drag pulls layers into flows of smooth laminar streams.

- Disc pumps operate on the principles of **Boundary Layer** and **Viscous Drag**. The application of these principles is new in the world of pumps but widely used in other areas of fluid engineering, such as causing friction loss through a piping system. Under laminar flow conditions, streams of liquid travel at different velocities through a pipe, with the layer closest to the pipe being stationary - known as the **Boundary Layer** - and successive fluid layers flowing faster toward the center of the pipe.



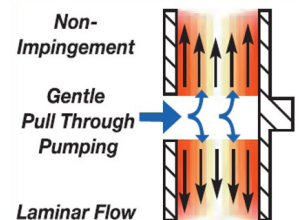
Discflo™ disc pumps employ the principles of Boundary Layer and Viscous Drag, to produce pulsation-free laminar flow. Typical pipe flow showing Boundary Layer and Viscous Drag Hydraulic Principles.

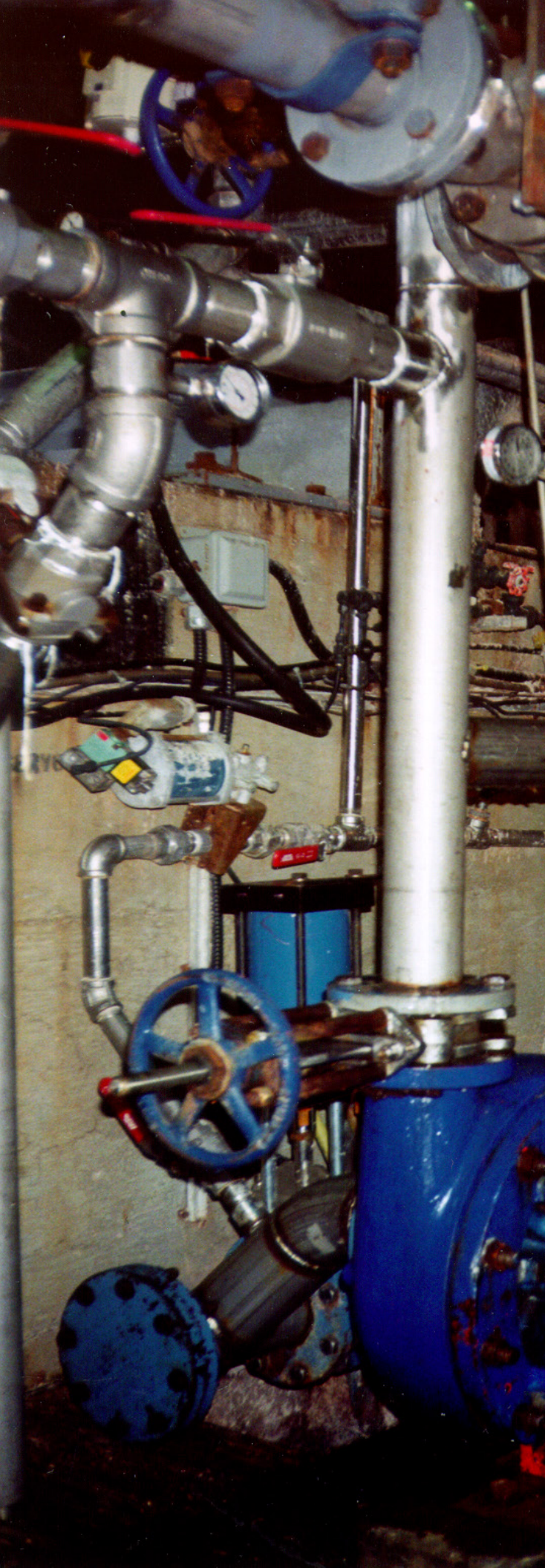
- Similarly, when a fluid enters the disc pump, a boundary layer is formed on the surfaces of the Discpac, a series of parallel discs which form the pumping mechanism. As the discs rotate, energy is transferred to successive layers of molecules in the fluid between the discs via the **Viscous Drag Principle**, generating velocity and pressure gradients across the width of the Discpac. This combination of boundary layer and viscous drag results in a powerful force that “pulls” the product through the pump in a smooth, pulsation-free flow.

- The fluid being pumped moves parallel to the Discpac, so it does not impinge on the moving parts of the pump. It is this **Non-Impingement** and **Gentle Pull-Through** pumping action which distinguishes the Discflo™ pump from other pump systems on the market, all of which use some kind of impingement device to “push” product through the pump.

- By minimizing contact between the pump and the material being pumped, wear on the disc pump components is greatly reduced, pump downtime is rare and in the case of shear sensitive materials, damage to the product by the pump is eliminated. The disc pump’s problem-solving ability in hard-to-pump applications is unparalleled in the world of pumps. . . making the Discflo™ truly the future of pump technology.

Boundary Layer/Viscous Drag Unique Pumping Principle





FLUIDS PUMPED:

HIGHLY VISCOUS FLUIDS

BECAUSE THE DISC PUMP USES FRICTION, THE HIGHER THE VISCOSITY, THE MORE EFFICIENTLY IT PUMPS. FLUIDS—INCLUDING BLACK LIQUORS, HIGH DENSITY STOCK, AND EFFLUENT—UP TO SEVERAL 100,000 CPS CAN BE PUMPED.

SLURRIES WITH A HIGH SOLIDS CONTENT

HANDLES SLURRIES CONTAINING UP TO 80%+ SOLIDS WITHOUT CLOGGING, WEARING EXCESSIVELY OR COMING TO A STANDSTILL. EXAMPLES INCLUDE PUMPING CLARIFIER SLUDGE, VARIOUS TYPES OF EFFLUENT AND PIGMENT SLURRIES.

SEVERELY ABRASIVE FLUIDS

PUMPS THE MOST SEVERELY ABRASIVE FLUIDS WITH NO PROBLEMS AND MINIMAL WEAR, INCLUDING GREEN LIQUOR DREGS, LIME SLURRIES, TITANIUM DIOXIDE, AND FLY ASH.

FLUIDS WITH HIGH VOLUMES OF ENTRAINED AIR/GAS

HANDLES FLUIDS WITH VERY HIGH LEVELS OF AIR/GAS ENTRAINMENT WITHOUT VAPOR-LOCKING OR CAUSING PUMP CAVITATION, INCLUDING DAF SLUDGE, AND PAPER STOCK.

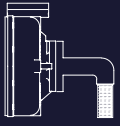
FLUIDS CONTAINING LARGE AND/OR STRINGY SOLIDS

DISCS IN THE DISCFLO PUMP CAN BE SPACED AS FAR AS 20 INCHES APART TO HANDLE LARGE SOLIDS, INCLUDING EFFLUENT, KNOTTER REJECTS AND LIME SLUDGE, BECAUSE SOLIDS ENTERING THE PUMP MOVE TO THE AREA OF HIGHEST VELOCITY—THE MIDWAY POINT BETWEEN THE DISCS—AND PASS THROUGH THE PUMP WITHOUT CLOGGING.

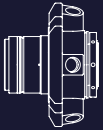
DELICATE AND/OR SHEAR SENSITIVE PRODUCTS

VIRTUALLY ELIMINATES PRODUCT DAMAGE DURING PUMPING. PROVEN SUCCESS IN HANDLING SHEAR DAMAGING, SHEAR THICKENING (DILATANT) AND SHEAR THINNING (THIXOTROPIC) PRODUCTS, SUCH AS LATEXES, POLYMER EMULSIONS, STARCHES AND KAOLIN CLAY SLURRIES.

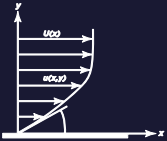
DISCFLO ADVANTAGES



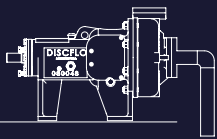
NO PULSATION



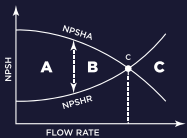
LONGER SEAL LIFE



LAMINAR FLOW



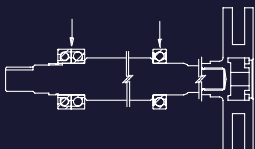
**HIGH SUCTION
LIFE CAPABILITY**



VERY LOW NPSH



**EXCELLENT MEAN
TIME TO REPAIR
(MTTR)**



NO RADIAL LOAD



**EXCELLENT MEAN
TIME BETWEEN
FAILURE (MTBF)**

APPLICATIONS

PULPING OPERATIONS - White liquor (extremely caustic) Stock and black liquor mixture Washed stock Cleaned stock, up to 18%+ density

CHEMICAL RECOVERY - Heavy black liquor, 100,000s cP Weak black liquor Weak liquor (abrasive, alkaline) Green liquor with dregs (very abrasive, high temperature) Green liquor (abrasive) White liquor and mud (caustic, alkaline and abrasive) White liquor (hot, caustic and abrasive) Lime slurry (abrasive, high solids)

POWER HOUSE OPERATION - Ash slurries Scrubber solutions, lime slurries

BLEACHING PROCESS - Paper stock, to 18%+ density Sodium hydroxide, high solution Chlorine dioxide

PAPER MANUFACTURING - Clay slurries, clay slips Emulsions: PVDC, PVA, latex, silicone Starch, raw and cooked Casein or soy protein, raw and cooked Wax, paraffin and microcrystalline Inks, solvent and water-based

EFFLUENT TREATMENT - Sodium hydroxide solutions Lime slurries Polymers, coagulant aids Sludge Knotter rejects

Long Life for Pump Components

Very few spare parts needed for the Discflo pump over its lifetime. The pump uses a heavy duty shaft which has close-to-zero axial loading and no radial loads, increasing bearing and seal life.

Low Life Cycle Costs

Proven reduction in maintenance needs, repairs and downtime in hard-to-pump applications, compared to all other pump designs. Savings up to 90% have been reported.

No De-Watering

Paper stock is gently processed without impingement through the pump—in effect pulled rather than pushed through it—as a homogeneous liquid, ensures that de-watering does not occur.

Maximum Paper Freeness

Independent tests have confirmed that there is no measurable loss of freeness to paper



Disc pump have been successfully installed in a wide range of other industries, including the following:

- Chemical and petrochemical industries
- Pulp & Paper manufacturing industry
- Oil refining and drilling operations
- Metal, mining and mine de-watering industries
- Municipal wastewater and utility plants

