Handling Slurries

The need for handling slurries is required in many industries. A slurry is a sloppy fluid containing some degree of pulverized solids such as organic matter, geological/metallurgical-derived or manufactured such as in foodstuffs. Slurries are often solid-laden such as malt mash in breweries, 'underflow' in mining or corrosive such as lime chemical in waste water treatment. This article examines the features and benefits of using a peristaltic pump for handling slurries.

A fermenting cellar at a brewery demanding a pump to handle thick solid-laden slurry

Process examples

- Breweries & distilleries
- Mining
- Agricultural
- Anaerobic digestion & bio gas production
- Wastewater & sewage
- Foodstuffs

Left: A Verderflex pump circulating abrasive and corrosive lime slurry at Barston STW
Right: A Verderflex handling mining slurries which are especially abrasive with metallurgical and geological particles.

Process points

Hose pumps can circulate slurry with an SG of 1.6 to 1.8 or with a solid content of up to 80%. Unlike centrifugal pumps, which suffer from continuous downtime and are unable to pump high SG slurries, peristaltic hose pumps can pump these dense fluids whilst maintaining high levels of plant operation. This is thanks to the reliable and predictable pumping principle of a peristaltic pump. For example, the Verderflex pump can transfer malt, yeast and kieselguhr in breweries where many other pumps would suffer from clogging, excessive wear and even causing damage to the product.

High viscosity

Peristaltic pumps can handle fluids with high viscosity and solids content. The peristaltic pumping action creates a powerful suction in to the pump. Combining this suction force with the open inlet and passage-way through a flexible hose permits viscous fluids and solids to be 'pushed' and 'sucked' through the flow path. For example, the Verderflex peristaltic pump is used in anaerobic digestion systems to circulate and transfer slurries to help 'churn' the slurry and maximise the surface area of the slurry to assist the process of bio gas production.

Water usage

Peristaltic pumps reduce water consumption. Hose pumps can circulate slurry with an SG of 1.6 to 1.8 or with a high solids content. A traditional centrifugal pump loses efficiency when the SG of the slurry reaches 1.3 or a solid content of 30%. With this limitation, centrifugal slurry pumps have significant process water demands. At a manufacturing plant processing slurry, the additional water required make the slurry flowable can cause a huge expense with the extra fluid capacity being incorporated into the system and the associated costs.

Power consumption

Peristaltic pumps use less power. At mining plants and large metals recovery centre processing in the region of 75 ore tonnes per hour, a VF125 hose pump draws around 35 kW whereas a centrifugal slurry pump needs over 70 kW; a saving of over 50%. This translates directly into reduced electrical requirements. Power rationing is a concern for many manufacturing centres. There is also a significant economic case – in the above example, the hose pump reduced annual operating power demand by over 210 MWh.

Compact footprint

The pump can also be installed in any rotation thanks to the peristaltic principle creating a strong suction lift and discharge. The pump is self-priming and can run dry as the only moving mechanism is the rotor pushing the hose. This allows more flexibility for the system design as the peristaltic pump can operate in any orientation and space where many other pumps can not.

Leak free

Where slurries are corrosive and/or abrasive many of the alternative choices to a peristlatic pump feature shaft seals such as progressing cavity pumps. This pump type has integral seals requiring regular replacement and representing a clear leakage risk. Peristaltic pumps are seal-less and consequently have a much lower contamination risk.

Shear-sensitive

The peristaltic pump has a very gentle pumping action that minimises damage to fluids, for example, when dosing fragile cell cultures in bio-oxidation reaction techniques, this uses a live culture to free gold from sulphide ores, reducing Cyanide usage and improving process yields. The same requirement is also demanded in polymer and flocculant dosing – Verderflex peristaltic pumps are used extensively in the dosing of sewage and wastewater.

Reduction in chemical usage

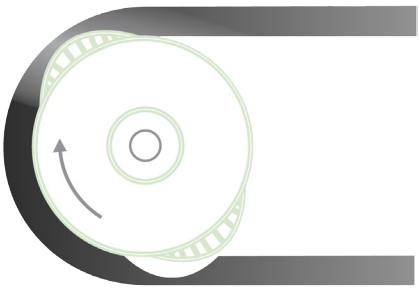
The peristaltic pump's gentle pumping action reduces reagent usage.
A peristaltic pump's gentle low shear pumping action maintains particle size; minimising the use of flocculants and other process reagents. Conventional high shear technologies such as progressive cavity or screw pumps significantly increase reagent usage. These pumps are inefficient when handling such fluids thus raising the operating costs and post-processing costs due to flotation reagent carry-over.

Lower maintenance costs and downtime

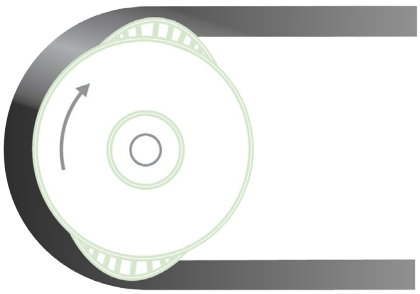
Where slurries are acidic and/or highly abrasive, conventional centrifugal slurry pumps use impellers made from increasingly expensive and non-standard materials with a service life that is measured in days. In contrast, on a peristaltic pump, only the rubber hose is in contact with the pumped liquid. The hose encounters less wear than an impeller so the spares cost is a fraction of the equivalent centrifugal pump, with the service life measured in months. Abrasion resistant peristaltic pumps lower maintenance costs as the robust peristaltic working principle reduces pump downtime and as the hose can easily be changed in situ, maintenance hours are similarly reduced.

In the event of a blockage such as the attempted passage of a solid or debris beyond the scope of the original specification, the peristaltic action can be easily reversed at the flick of a switch.

The Verderflex Dura range has been used extensively in wastewater treatment applications in sewage works around the UK and Europe handling corrosive and abrasive lime chemical which minimises downtime, spares costs and maintenance hours.



The rotor/shoe assembly revolves, compressing the flexible hose creating a 'seal' between the suction and discharge side of the pump



The product is drawn into the pump, travelling through the hose, contained from any moving parts

The product is 'pushed' out of the discharge port. The product remains intact and the cycle goes on.

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