Vortex grit removal systems

History

Vortex grit settlement traps were first devised in the USA many years ago. The early models did not have any rotating centre columns fitted with blades to endeavour to keep the rags & organics floating, they were simply a small settlement tank that stalled the flow of the incoming sewerage and allowed the heavier solids such as grit & stones to settle in a calm environment.

Later models had an inlet and an outlet positioned such that a vortex was naturally created by the swirling action of the sewerage entering at an angle into the vortex trap to encourage the chamber to act like a centrifuge.

As time progressed and before the days of vacuum tankers there became a need to have the settled grit pumped out rather than shovelled out periodically, so a centre tube appeared with a pump on the other end and later versions featured an air lift pump.

At the time, air lift and centrifugal pumps were the only pumps available and both developed only a modest suction at best and neither could tolerate rags, so the vortex traps became fitted with rotating blades to encourage a gentle upward flow that would keep the organics, rags and other lighter solids at the top whilst still allowing the grit to settle.

These machines had varying levels of success and some were fitted with air bubble diffusers to give more encouragement for the rags to float. Air bubble diffusers were eventually outlawed, as they created unpleasant aerosols.

All these devices fitted to the vortex chambers were aimed at keeping the organics & rags floating and especially keeping rags away from the mouth of the suction pipe. These devices were moderately successful but still didn't address the problem of rags that were still in the sewage, which then carried on to wreak havoc with other machinery downstream.

Present technology

This style of vortex has taken us to the present day and is still in large scale production, but the rag problem is still there and mechanised vortex chambers still endeavour to keep these rags floating.
The inability of the pumps to deal with rags has increased the cost of a simple vortex chamber substantially by having to include and maintain a rotating propeller and gearmotor drive arrangement.

EMS innovation

The EMS grit chamber does not have a propeller drive arrangement. The EMS system allows the grit, stones & rags to sink to the bottom and be removed by an EMS dredging pump that can cope with grit, stones and rags.

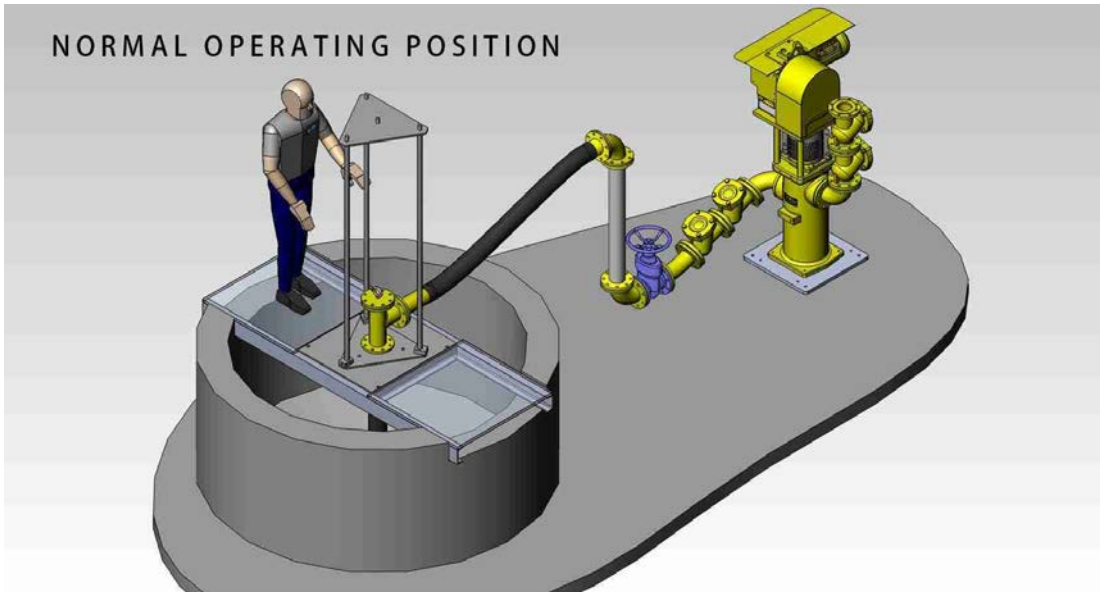
The EMS dredging pump is a mechanically driven ram pump fitted with a tungsten carbide coated ram. Unlike air lift pumps that can draw a suction in the region of 3 metres on a good day the EMS pump draws 9 metres suction EVERY day. Anything that settles on the bottom of the vortex chamber that will fit into the 4" suction pipe is dredged out with the same suction power found only on a vacuum tanker.

Recovery

Many vortex systems become choked time & time again due to the inability to cope with the solids and the poor suction from the pump. When these systems stop working the grit and rags continue to enter the vortex and begin to build up in the bottom of the chamber and overwhelm the suction mouth. The only way to recover the chamber is then to have it cleaned out with a vacuum tanker and possibly strip down the pipe work in the chamber. As time goes on such systems are eventually abandoned due the cost of the vacuum tanker and the ongoing maintenance.

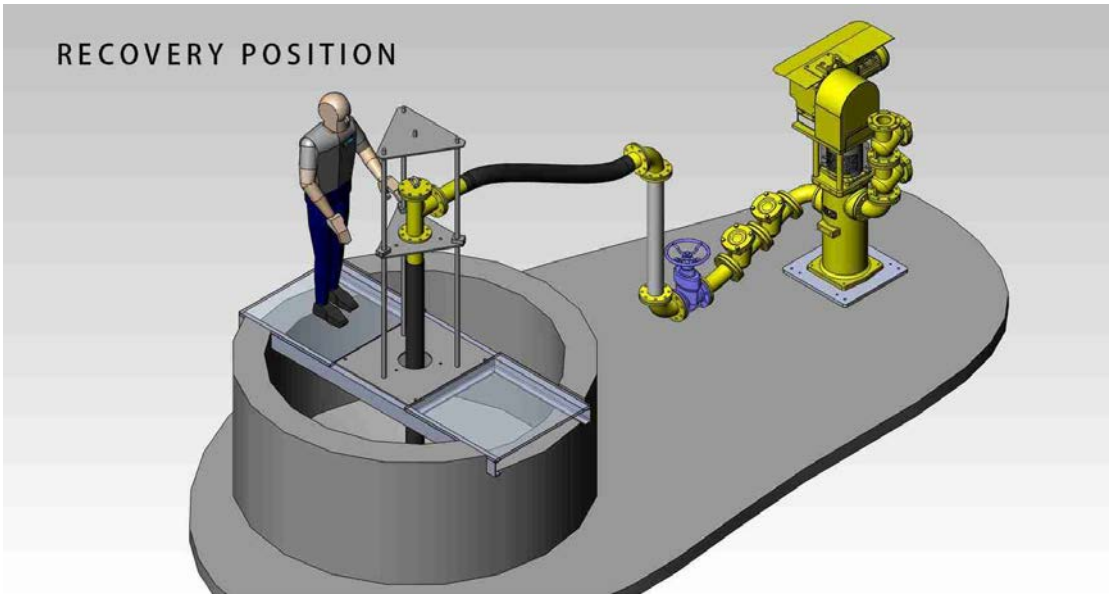
Unlike conventional vortex chambers fitted with a propeller drive arrangement the EMS design has no rotating gearbox & drive mechanism. It simply comprises a bridge from which the suction tube is suspended. This allows the suction tube to be flexible and to be easily removed from the chamber.

It's foolhardy to state that such systems don't choke, of course they do, but when this happens the suction tube in the vortex is easily brought to the surface to be cleaned out.



When the suction tube is re-installed into the chamber its suspension frame allows it to be lowered into the grit gradually over a few hours or days if need be so that the suction mouth can eat its way into the grit deposits at the bottom of the chamber, which by now will be substantial.

This action of using a flexible suction tube and lowering it into the grit is identical to the way the vacuum tanker operates, and remember the EMS dredging pump on the other end of the suction pipe has the same 9 metres suction power as a vacuum tanker.



The cost of the EMS dredging pump is much more than the cost of an airlift or centrifugal pump but weighed against this is the saving of not having to buy and maintain a mechanised propeller arrangement.

Rags & classifiers

As we've said, the EMS system allows the rags to sink to the bottom of the vortex rather than keeping them afloat to carry on further into the works.

Being at the bottom of the vortex the rags will be sucked out by the EMS pump and transferred along with the grit to the EMS classifier.

Many screw classifiers feature an internal screw formed around a centre tube. This centre tube has a bottom bearing that needs a constant grease pressure lubrication unit, which also needs maintaining. The centre tube also can encourage rags to wrap themselves around it to the extent where the rag 'bundle' on the tube can jam the machine & stop it.

The EMS classifier is designed & built to deal with rags. The large diameter, centreless screw is formed from 20mm thick high tensile steel. It rides upon 20mm thick stainless steel wear bars that form a cutting edge between the screw and the wear bars, so rags tend to be shredded inside the classifier and the centreless screw provides no place around which the rags can wrap themselves.

The powerful drive motor of the classifier not only cuts through rags it also allows the classifier to fill with grit before switching on and discharging its contents, so there is far less wear & tear on the classifier. The classifier can stand idle all day whilst the grit is building up inside and then discharge in a matter of minutes. This means less maintenance & less power consumed. Please check the YouTube link on our website www.emsgb.com to see this working.

Grit washing to back-wash organics can be provided inside the classifier if required at minimal cost.

EMS grit removal systems bring new technology to an old problem with the massive suction power of the EMS ram pump and the rag tolerant design of the robust EMS classifier.