Willard Says……

Fascinating stuff you should know about hydraulic dredging.

The Discharge Pipeline—Lift, Length & Wear

Lift

Lift, more properly called static lift, is the vertical distance between the surface of the water the dredge is floating on and the point the dredge discharge pipe is open to atmosphere.

One reader was concerned that his discharge pipe was inclined up to the discharge point. He thought that this incline would cause more resistance to flow than if it were vertical. Not to worry. Friction loss has to do with the actual total length of the discharge pipe from the pump to the discharge point. Friction will be reduced slightly if, by inclining the discharge pipe upward into the process plant, the overall length of the pipeline is shortened.

The static lift is not affected if the discharge pipe rises or falls below the water surface at one or more points between the dredge pump and the discharge point.

Dredge pumps must develop sufficient head (pressure) to overcome the natural tendency of water and solids to remain at rest and cause them to flow as slurry through the dredge system. Head includes vacuum to make water and solids flow into the pump suction, head to overcome friction in the discharge pipe and head to overcome static lift. Taken together these heads are called the Total Dynamic Head (TDH) and a dredge pump has a limited ability to develop TDH. Head required to cope with static lift diminishes the maximum length of pipeline that can be served by a pump. For that reason static lift should be kept to a minimum.

Whether the rise is gradual or vertical is of no consequence.

Some plant designers require that the pipeline from the dredge be located on the ground and rise vertically into the process plant feed box. In this case, the vertical pipe section can be one size larger than the horizontal discharge pipe. The velocity in the oversized vertical pipe will be slower than in the horizontal, however, it will still be faster than the falling rate of the particles so they will be carried upward to discharge. Oversized vertical pipes wear at a slower rate, have less friction loss and may fit into the process plant layout better than an inclined pipe.

Length

The discharge pipeline does have to be long enough to reach from the dredge to desired discharge point and a little longer. Naturally, it is an advantage to keep the pipe as short as possible so that the amount of power required to deliver the slurry is kept to the minimum. Do not shorten the discharge pipeline to the extent that it hinders free movement of the dredge. First priority should be given to achieving maximum dredge production.

One reader found that he could take 900 feet of pipe of his discharge line. That is a lot of too-much discharge pipeline! Check to make sure that you do not have excess pipe in your line.

It is wise to develop a mining plan for your deposit so that you can keep the pipeline as short as possible and anticipate when or if a booster pump will be required. A good mining plan may eliminate or at least postpone the need for a booster pump.

The question often comes up, "How far can I pump?" For some clues to the answer to that question see willardsays.com…*Pipeline…How Far Can a Pump Pump?*

Wear - Rotating Pipe

The discharge pipe, steel or plastic usually suffers wear only on the bottom quadrant—the bottom ninety degrees. A significant amount of money can be saved by rotating the pipe about 120 degrees before it wears too thin and is ruined. Rotating can more than double the pipe's service life.

Steel pipe can be run until it is worn to a wall thickness of an eighth of an inch because that thickness is enough to keep the pipe from bursting due to pressure.

Plastic pipe should be rotated when about half of the original wall thickness is worn away. Plastic pipe needs to retain a significant wall thickness to prevent bursting due to internal pressure.

Permanently mark or brand the pipes with the date of rotation and worn-bottom-of-pipe location for future reference.

It is a rare dredger who rotates his pipeline. Most run it to ruin. If you want to become one of the rare breed and save money by rotating your pipe before it self-destructs you should buy a thickness tester. Caterpillar has one for sale and you can find others on the Internet. Press this instrument against the surface of a pump shell, pipe or other homogeneous (all one kind) material and it will display the thickness. With it you can check the thickness of the bottom portion of your pipeline without need to open it or drill a hole in it. Periodically check the thickness at several locations to determine when the pipeline should be rotated.

Contact willard@willardsays.com with questions, comment or criticism.