GORMAN-RUPP PUMPS DNet

Education Safety

Pump Maintenance Know-How

It's no secret that a pump that runs at peak efficiency uses less fuel, experiences less downtime and costs less to operate. The time you spend maintaining your pump is actually an investment in its lifetime performance and value. In fact, there are many ways that a diligently maintained pump can reduce your costs, while increasing efficiency. For instance, by ensuring your pump investment brings an ease-of-service design, the time you spend on maintenance can be significantly minimized.

Using the information below, see if you can identify some of your own trouble spots, and uncover potential solutions to get you back on the road to good pump health – boosting profits along the way.

Commons Signs of Inefficiency in a Self-Priming Pump

A noticeable difference in pump flow
Take notice of the discharge flow. Has it visibly decreased? Is it taking your pump longer to do the same job than it used to? The slowed flow may be caused by a collapsed suction hose lining, a leaking gasket, a plugged suction line or a damaged or worn impeller or wear plate.

To determine the cause of any decrease in flow, the discharge pressure and the suction vacuum should be measured while the pump is operating. If the pump discharge pressure and suction vacuum were measured at start up, the latest readings should be compared to the originally recorded readings. When troubleshooting any pump and system, follow the high abnormal reading taken earlier. A higher than normal discharge pressure reading will indicate a decrease in suction vacuum, and could be a sign of a clogged or partially clogged discharge line, a closed valve, air unable to evacuate or any obstruction outboard of the point the gauge was installed into the discharge line. It is common practice to install gauges approximately two to four pipe diameters from the pump.

Both gauges can also decrease. If they do, the problem is located between the installed locations of the gauges. In this case, the problem is within the pump. A clog at the eye of the impeller, wear, wide clearances and air induced into the suction line could all cause both gauge readings to decrease. Note that gauge readings almost always teeter back and forth. But again, follow the problem to the highest abnormal gauge reading.

The pump isn't re-priming as rapidly as it once did. Most commonly, slower re-prime can be attributed to excessive face clearance. If this is not the cause of your slowdown, check the following:

Is the seal leaking?
Is all hardware at the gaskets tight?
Is the cutwater section of the volute badly worn?
Is the re-circulating port clogged?

A maximum vacuum check can be performed to determine the location of the problem. Fill the pump with the minimum amount of water than what the volute casing normally retains for re-priming. To do so, simply remove the suction flap valve, priming the volute casing and energizing the pump. After the pump achieves dynamic operation, turn the pump off and allow the liquid in the pump to return to the sump.

Whatever product remains in the volute casing is the minimum left for a re-prime cycle. Install a vacuum gauge on the suction side of the pump and close a valve in the suction line outboard of the gauge. If there are no valves in the suction line, a solid gasket without an inside diameter hole may be installed in a pipe joint to create a "valve" effect. Energize the pump and inspect the vacuum gauge. The pump will pull a vacuum against the closed valve or solid gasket. This reading is the equivalent to the pump's lift capabilities. If a vacuum gauge calibrated in inches of mercury (Hg) is used, multiply that reading by 1.13 to convert to feet of water.

The pump is making excessive noise
If your pump sounds like a bunch of marbles rattling in a can, this may be an indication of cavitation – and could be caused by a suction lift that's too high, a suction hose that's too long, plugged or has a collapsed lining, a clogged strainer, a combination of any of these, or perhaps a problem on the discharge side of the pump. Failing bearings can also cause excessive noise. Noise should be qualified as mechanical or hydraulic noise. Run the pump briefly without water. If the noise is no longer present, the noise is one of a hydraulic nature. If the noise is present after removing the product, the noise is mechanical. Again, a quality set of gauge readings will direct your attention to the problem side of the system if the noise is deemed to be a hydraulic noise.

The pump is clogging frequently
If a pump's suction check valve is clogged, the strainer may be too large or too small, or face clearance could be too wide. Alternatively, the strainer may be stuck in mud, plugging the suction side.

The pump is overheating
In this case, very likely, the flow of liquid into or out of the pump is being restricted. Improper impeller clearance could be slowing re-priming, the suction strainer or recirculation port in the volute casing may be clogged or the pump's ability to handle air through an air release line, air release valve or open ended discharge line may be obstructed. Never open a hot pump. Allow the pump to cool to the touch prior to opening. Even after cooling, there may be lingering pressure inside the volute casing.

Peak Efficiency and Profitability Checklist

The Suction Line

Check for air leaks
Using a vacuum gauge, make sure that the suction line, fittings and pipe plugs are airtight. Pumps, such as Gorman-Rupp pumps typically have a tapped hole for easy connection of a vacuum gauge. Use pipe dope to seal gauge threads and pipe plugs. A vacuum gauge will fluctuate or give erratic readings while handling air during operation. At shut down, the suction gauge reading will display the vertical distance from the gauge tap to the product level. If this vacuum falls off after shut down, atmospheric pressure is entering the suction pipe causing the pump to lose its static lift. Replace the suction flap valve if worn and check for air leaks if the product returns to the sump. Replace leaky seals and badly worn hoses, if necessary.

Check the suction hose lining
The rubber lining in a suction hose can pull away from the fabric, causing partial blockage of the line. If the pump develops a high vacuum but low discharge pressure, the hose lining may be blocking suction flow. Gauge readings during operation will be higher than normal with the lining collapsed. To rectify this problem, simply replace the hose. Check the suction strainer. Frequent inspection and cleaning of the suction strainer is particularly important when pumping liquids containing solids. Gauge readings during operation will be higher than normal if debris obstructs the flow through the strainer. Always use the proper size strainer to prevent the pump from clogging.

The pump itself
Check the volute casing, impeller vanes, wear plate or wear rings and attaching hardware. A removable cover plate on the pump allows for quick, easy access when inspection of the impeller and wear plate is needed. These components should be inspected every six months or sooner, depending on pump application because they are subject to faster wear when pumping abrasive liquids and slurries. Gorman-Rupp wear plates and wear rings, for instance, can be replaced without replacing expensive castings. A shut off test can be performed to measure the internal wear. Start the pump and allow it to achieve full flow. Slowly close a discharge valve and record suction and discharge gauge readings. Those reading should equal the maximum pressure noted on the pump performance curve at zero flow.

Check the impeller clearance
Pumping efficiency will be reduced if the clearance between impeller and wear plate or wear rings is beyond the recommended limits. If the clearance is less than recommended, components will wear by rubbing, causing excess work for the engine or motor. Check the impeller clearance against the pump manual specifications and adjust it if necessary. A shut off test can be performed to verify not only wear but face clearance as well.

Check the seal
Better pumps are equipped with a double seal, which is lubricated under pressure by a spring-loaded grease cup, or an oil-lubricated seal for long, trouble-free service. Some pumps are equipped with a single seal that is lubricated by the liquid being pumped. Sand or other solids can cause rapid wear of the seal faces. Check and replace the seal if worn. The maximum vacuum test will qualify the integrity of the pump's seal. Replace the seal liner or shaft sleeve if they have scratches.

Check the bearings
Worn bearings can cause the shaft to wobble. Eventually the pump will become noisy and overheat. Worn bearings will reflect higher amperage readings due to the increased wear. Sooner or later it will freeze up and stop. Replace bearings at the first sign of wear to alleviate destructive damaged caused when bearings fail catastrophically.

Check the engine or motor
The pump may not be getting the power it needs to operate efficiently. The engine may need a tune-up, or the motor may need service. Refer to the owner's manual often for optimum efficiency.

The Discharge Line

Check the operating condition

Check air release devices, valves, check valves and shock control devices for proper operation. Old discharge lines are subject to internal rusting and pitting, which cause friction loss and reduce flow by as much as 15%. A discharge gauge reading will increase with the additional losses. Replace badly deteriorated lines.