

A Pump War Story: Back to Basics

BY GARY WAMSLEY

Did you ever work for a crusty old boss who has seen and done about everything around your facility? Well, I sure did. Never will forget him giving me the following advice (in the midst of a big equipment rebuild project—when things were a bit behind schedule):

“Remember that about 95 percent of what you do in plant engineering has already been done by someone else. This stuff is not rocket science, you know. If you are having some difficulty, just go get some good advice from your peers. At least, find out what not to do. Profit by their mistakes. It may eliminate a lot of time-wasting effort and expense.”

Recently a company had hired me to visit its plant and conduct some pump training for staff engineers and maintenance guys. About mid-way through the first morning session I learned that the plant engineer was

new. The previous one had been “let go.” Moreover, the main reason that the company wanted the training was that the plant process water pumps were experiencing very high failure rates (like one every six months).

There were three Goulds 100 hp end suction ANSI process pumps that supplied all of the cooling and washdown water for the site. Normally one pump operated continuously. During daily washdowns a second unit would come on automatically to supply the additional demand for two or three hours. The units were rated for 300 gpm at 130 psig, but often ran out on the curve to well over 700 gpm (therefore the large motors).

The system was an open-circulation design. Most of the water discharged

into trenches and returned to a large settling basin for re-use. A shallow well reservoir pump replaced evaporation and blowdown losses.

The problem with the 100 hp pumps was bearing and mechanical seal failures. At a rebuild cost of \$15,000 every six months, the boss was quite frustrated. The maintenance guys were doing the rebuilds with no success. I quickly learned that the engineers were blaming maintenance and maintenance was blaming the buyer in purchasing. They had even called in the local Goulds

the pit entered through a concrete channel from the settling basin. As such, there was a large stainless screen on the end of the suction pipe to keep out rats, snakes, cattails, paper, etc.

Their plant fabrication drawing indicated 62 square inches of opening in this stainless mesh screen. The Goulds manual clearly specified a screen opening requirement of three times the open area of the pipe (86 square inches for the recommended 6-inch suction pipe).

However, the suction pipe was 4 inches with a short-radius elbow bolted directly onto the pump 4-inch intake flange.

For 500 gpm flow, I calculated a net positive suction head available of 21.1 feet.

Here was a classic case of cavitation gone wild, especially for high flow rates before a second pump started up. The pressure controller was a rudimentary device. Operating a single pump above 400 gpm was cause for the cavitation related vibration.

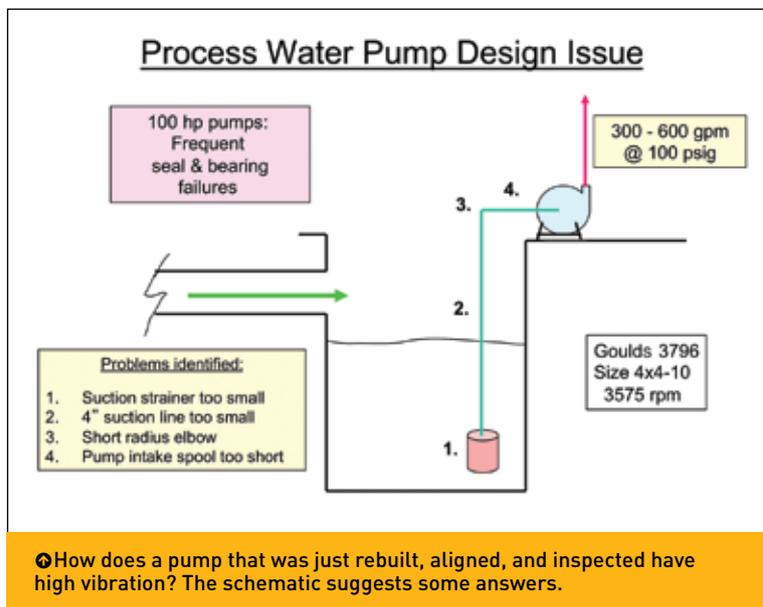
I made a sketch of the conditions and pulled

the plant engineer aside the second day to show him what I'd identified. He had suspected a technical issue, but was swamped with the demands of the new job. He agreed with my suggestion that “when all else fails – read the instruction book.”

At the end of day two all the maintenance guys agreed that they had learned a lot during the training session. They planned to get right into making system piping changes.

That crusty old boss had given me sound advice that still applies today.

Gary Wamsley is an engineering consultant at JoGar Energy Services in Atlanta with over 30 years of industrial utilities experience. He can be reached at www.jogarenergy.com.



service technician to handle a pump rebuild and train the maintenance crew how to “do it right.” That rebuild job also lasted only six months.

The maintenance guys took me to the pump house to check out the equipment. The installation looked quite normal, but vibration was high. So, how does a perfectly good pump that was just rebuilt, aligned, and inspected have high vibration?

After collecting some data and making a quick sketch, I asked to see the installation and operation manual. It took over two hours to find the book (in the back of an engineering department file cabinet).

The Goulds instruction book was for a Model 3796, size 4x4-10 with a suction lift of eight feet nominal. Return water to