

Upgrade options do not mean an entirely new system

One of the main issues facing small water systems across Kansas today is aging water plants and plant equipment. One such place is Cherokee County Rural Water District No. 2.

During a recent visit to Cherokee RWD 2, I had a discussion with operator J. W. Stephenson about the pressure tanks the system uses to deliver water to the distribution system. The water plant was built in the early 1960s and still uses the original equipment to deliver pressurized water to the customers and to the system's water storage tank. The system is somewhat of the typical hydro-pneumatic system; there are numerous such systems in southeast Kansas.

Stephenson exclaimed, "The district has had several issues with the old equipment and we've asked if it would be possible to replace the current pressure tank system with new equipment." The answer to his question was simple, at least at first thought,

variable frequency drives or VFDs for short. What are VFDs? What are their advantages over a pressure tank system, these are the questions we will discuss in this article.

Pressure tanks consist of several components. The design includes a water tank that holds several hundred gallons, usually two alternating pumps that pump

water from the clearwell into the water tanks, and an air tank with a compressor to keep air in the water tank. The air compressor is needed because air can dissolve in water causing the air space in the tank to get smaller over time, causing the water pumps to run more often for

drop to a lower pressure of perhaps 40 psi before the water pump comes on again. Basically the pressure tank system has multiple systems working together to perform the job of delivering water to the distribution system and then to consumers.

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short periods. Eventually this short running time can cause pump failure. Finally the last component of the system is a pressure switch which allows the water to pump up to a set pressure, say 60 psi, then

Benefits of VFDs

A variable frequency drive is a system for controlling the speed of a motor by changing the frequency of the electrical power of the motor. A VFD makes an



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J.W. Stephenson, operator at Cherokee RWD 2 at Riverton, Kan., checks pressure and water levels in one of the district's hydro-pneumatic tanks. This design concept was used extensively on water systems constructed in southeast Kansas.

Alternating Current or AC motor act like a Direct Current or DC motor. Why would this be used? A motor equipped with a VFD can be added to a pressure tank system to pump water at a constant pressure into the distribution system. When the pressure in the system begins to drop the VFD changes the frequency of the power to motor increasing the pumping rate, which in turn maintains the desired water pressure.

What are the benefits of using a VFD? The first obvious benefit would be the elimination of several pieces of equipment that the system currently maintains – the water tank and the air tank. Steel water tanks have a tendency to develop leaks over time and air compressors eventually fail. Second, motors equipped with VFDs have soft starts. The soft start is unlike single speed motors that start abruptly, significantly reducing motor life. The third benefit of a VFD equipped motor is the ability to maintain a constant pressure leaving the water plant, unlike pressure systems that have reduced pressure towards the end of the cycle. A pump equipped with a VFD can maintain constant pressure at all times. The fourth and probably most important benefit is cost saving in terms of electrical power. In a study conducted by a variable frequency drive company a centrifugal pump rated at 25-horse power running 23 hours per day had a reduction in energy usage of 45 percent.

The one issue most systems would have concerning switching to a VFD would be cost. VFDs can be expensive yet due to the ever-increasing use of and cost of electricity and maintenance, VFDs may make be a sound choice when systems consider replacing that aging pressure system.

Training pays

I recently attended a KRWA-sponsored training session on electrical safety and programmable logic controllers. I know that KRWA has been

the session without cost. A similar training could have been marketed as ‘for-fee’ training. But in my experience, that’s not KRWA’s approach. When small systems are already pinched for funds,

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sponsoring training sessions on electrical safety and trouble shooting and a session on VFDs for many years. I was impressed with the practical manner in which Bob Blume conducted the session. Regardless of how many years of experience anyone had, no one left the class without gaining some new information. It frankly was a joy to attend this training because it was relevant. KRWA provided

the investment of time by small system operators and owners to attend a training to learn how to improve operations and probably save money is important and should be rewarding. Watch the KRWA training calendar at www.krwa.net for future sessions in your area. If you also have an interest in a topic, please give KRWA a call or send a note.



The image above shows a Variable Frequency Drive (VFD) by WASTECH Controls & Engineering, Inc. Components include a fully automated control and local operator interface. Units can be customized for more sophisticated applications such as in water treatment and production processes.