Problem Solved

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VFDs enable this single pump station to serve dual functions – as both a booster system and a tank fill system – by using multiple program settings.

The Erwin, TN, Utility District had a customer with a big problem.

The NN Ball and Roller manufacturing plant had a fire. After the fire the insurance company demanded that the water supply be upgraded or they would cancel coverage. The Utility would have to take water from a new water main to gain additional capacity.

They decided to add a new pump station to supply water to the plant and to an elevated storage tank. The pump station would also have to supply water to a second elevated storage tank located at another elevation.

Designing one pump station to function as both a booster system and dual tank fill system presented a unique engineering challenge for the Utility.

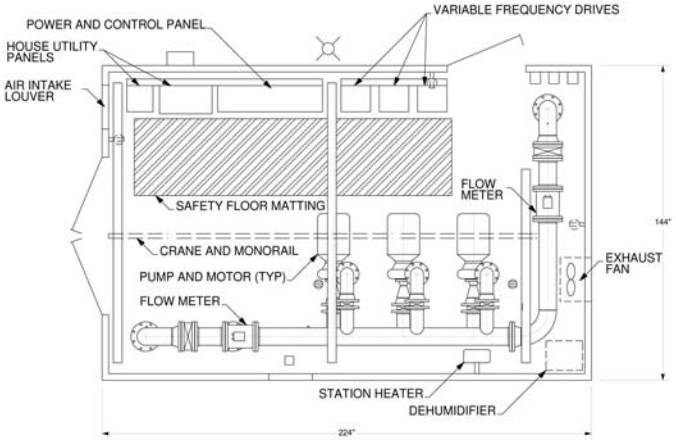
Howard Brown, general manager for Erwin Utilities and a designer in his own right, outlined general requirements and asked for proposals. According to Brown, "The main reason we chose a package system is because of the time constraints. Packagers build faster than contractors on-site, and factory construction quality is better than field construction."

Design criteria and specifications were issued in a hurry. NN Ball and Roller's insurance company required the new water system upgrade to be done immediately. Water and Waste Equipment (Cleveland, TN), a local representative of SyncroFlo (Norcross, GA) was contacted and put David Romaine, a senior application engineer at SyncroFlo, in touch with Brown.

Romaine reviewed the application, ran a system analysis, and worked closely with Brown in recommending a design to meet the unique hydraulic requirements of the project, allow fast delivery, and do it all within the budget. Howard remarks, "We were able to install the package ourselves. This eliminated the need, cost, and delay of hiring a general contractor."

The project consisted of a prefabricated pumping station designed to produce 1,500-gpm (2.2-mgd) at a net boost of 108-psig.

The system included three end suction centrifugal pumps, flow meter, control panel, variable frequency drives and instrumentation and PLC-driven control logic. The



This plan view shows the station layout of the three end suction centrifugal pumps with two discharge connections, flow meter, control panel, variable frequency drives and instrumentation.

The Erwin pump station is mounted with interconnecting piping and wiring inside a pre-fabricated building that includes all utilities, lighting, environmental controls, ventilation, and plumbing.

pump station was mounted with interconnecting piping and wiring inside a pre-fabricated building which included all utilities, lighting, environmental controls, ventilation, and plumbing.

For maintenance convenience, a monorail beam and one-ton hoist and trolley was installed over the pumping equipment. Other convenience accessories included an exterior security light with photocell, battery-backed emergency lighting package, and a hose bib for wash down.

The final pumping solution consisted of three variable-speed pumps with two discharge connections. The variable-speed aspect of the design allowed the pump station to serve as booster system, as well as a tank fill system, by using multiple program settings – one set for each hydraulic function.

The VFDs not only enable this pump station to function as a booster system and a tank fill system, the station can also adjust itself based on one of four variables by using multiple program settings in the PLC to make the VFD's provide the correct pressure.

In booster mode, the pressure is based on flow rate. In tank fill mode, the pressure is based on tank level at the present tank or at the future tank. If the need should arise, the settings can even be adjusted to prevent drawing down the suction pressure in either mode.

Only VFDs can simultaneously provide this kind of versatility and precision hydraulic control. In addition, the VFDs reduce energy consumption any time the pumps are running with a higher suction pressure and/or at lower flow rates.

The pumps, which were selected to maximize the affect of VFDs, are regularly seen running at 80 percent speed while pumping 160-gpm. This translates into a reduction of 10.2-hp, or 37 percent, based on computer generated pump curves.

Each discharge connection has its own flow meter and motorized isolation valve to permit water to serve either of the two elevated storage tanks, or to allow water to flow from the upper tank to the lower tank for circulation purposes.

The pump station can pump water to the NN Ball and Roller plant and use the upper tank in parallel to fight a fire. In addition, one or both tanks are used to supply water if the power fails or if the pumps are out of service.

This versatility of capacity and redundancy was the perfect solution for Erwin Utility's problem at NN Ball and Roller. The pump system has now operated for over a year and runs perfectly, according to Brown.

Unique factory testing capabilities allowed system verification and operation prior to start-up, which avoided delays that Erwin could not afford.

P&S

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