ADVANCEDTECHNOLOGY

By George Wootten

Raising the Bar in **Control Valve Stations**

Water for the city of Warren, Mich., is supplied by the Detroit Water and Sewage Department. Improvements to the existing 42-in. transmission main resulted in higher line pressures.

Line pressure was expected to vary from 50 to 100 psi. To reduce the high pressure, Warren decided to install four new factory-built pressure reducing stations. One of these connections, Groesbeck Highway, is a 36-in. connection using a true 36-in. diaphragm control valve. This station is the largest factory-built control valve station ever manufactured using a single control valve.

Background

The Engineered Fluid, Inc. (EFI) representative for this project was Kerr Pump & Supply, Oak Park, Mich. The project consulting engineer was Anderson, Eckstein and Westrick, Inc., Shelby, Mich. The project engineer was Lyle E. Winn, P.E. With the decision to use factory-built pressure reducing stations, the engineer and the city solicited design proposals and interviewed station and control valve manufacturers. EFI was chosen as the designer and controls integrator. Cla-Val of Huntington Beach, Calif., was selected as the control valve manufacturer. Installation of the stations was competitively bid.

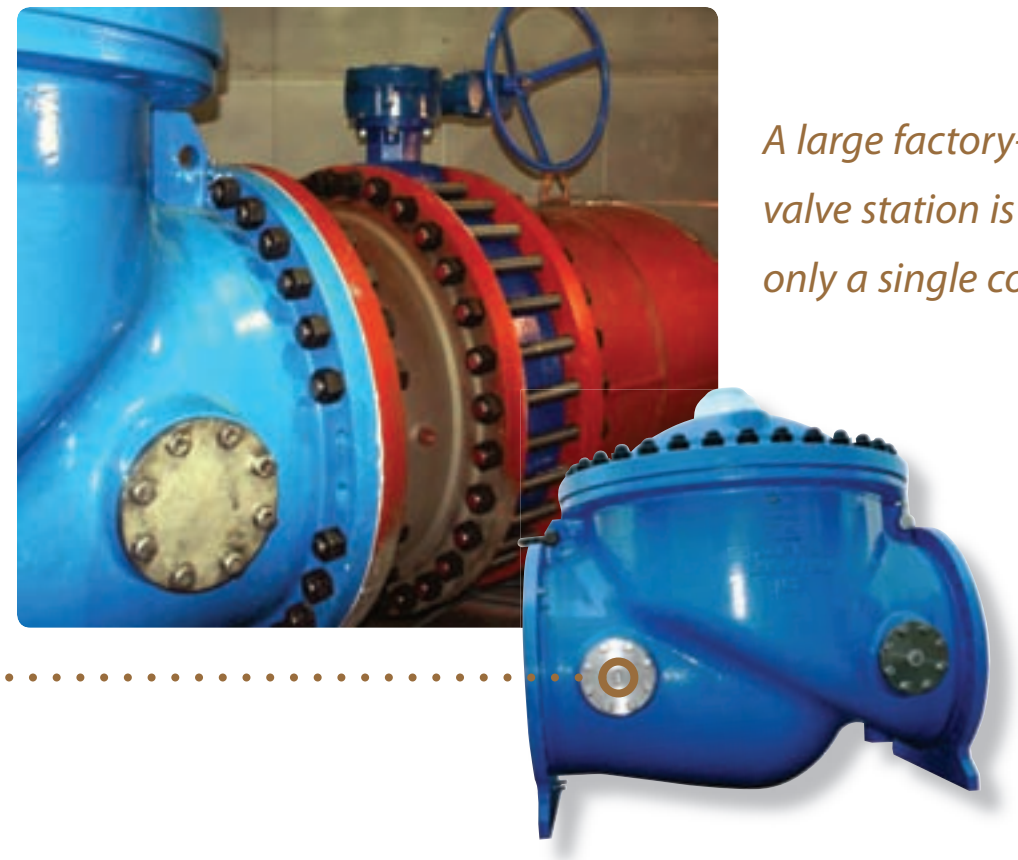
EFI was responsible for fully integrating the mechanical aspects of the pressure reducing stations with the control requirements for single system responsibility.

Overview

The project design requirement was to maintain discharge pressure within ±1 psi of the outlet pressure set point. EFI accomplished this level of control with a dual-solenoid, electrically operated pilot system. Outlet pressure and inlet backpressure sustaining control was provided. Set point control was accomplished through use of an EFI programmable logic controller (PLC)-based control and telemetry system.

The PLC receives analog signals from inlet and outlet pressure transducers as well as a valve position indicator. The analog signals are processed by the PLC algorithms and compared to the set points and control valve position.

Based on the deviation of actual pressures from the set points, the PLC sends signals to the respective solenoid points. The solenoid valve lets water into the cover chamber for



A large factory-built control valve station is made with only a single control valve

closing action or lets water off the cover chamber to open the valve. The solenoid valve actions maintain the inlet backpressure sustaining and outlet pressure set points. The inlet backpressure sustaining and outlet pressure set points are changed locally at the stations or remotely by telemetry link to the Warren Department of Public Works (DPW) for varying system requirements.

Warren operators can override the automatic controls to manually open or close the valves, locally or remotely. Station status, inlet and outlet pressure, valve position and alarms are transmitted by the telemetry control system to the Warren DPW offices.

At times, the pressure differential available to power the control valve is insufficient to operate the valve. To ensure sufficient hydraulic pressure to control the 36-in. valve, a pilot-controlled water system was designed for the station. This control water system includes a pump, bladder tank and controls for pump start/stop based upon pressure.

The control and isolation valves and the valve control system are constructed into a watertight steel capsule. The construction of the steel capsule is designed to resist corrosion and provide a long service life. All manufacturing steps are performed under a total quality management program.

Particular attention for the capsule construction is given to material selections, surface preparation, welding and coatings for long-term corrosion resistance. The transmission piping is $^{3}/_{8}$-in. wall steel pipe.

Metal inert gas is utilized and combined with automatic equipment for precise weld heat settings, weld wire feed rates and weld laydown rates. WWD

George Wootten is vice president for Engineering Fluid, Inc. Wootten can be reached at 618.533.1351 or by e-mail at info@engineeringfluid.com.

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