City of Limassol, Cyprus, recognizes Dorot's Pressure Management Solutions as Effective and Profitable

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By Dorot Control Valves

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Limassol or Lemesos is the second-largest city in Cyprus, with a population of 100,952 (city) and about 180,000 (urban area) (2011). It is the largest city in geographical size, and the biggest municipality on the island.

The Water Board of Lemesos continuously strives for further improvement of the operational performance of its network. To this end it has applied pressure management with fixed downstream control as a standard for all DMAs using DOROT S-300 Control Valves. Where possible the Water Board is examining to optimize the pressure further using advanced techniques such as DOROT flow modulation or multi-point control valves in order to achieve further reduction thus driving leakage to even lower levels.

Flow modulation is the most advanced method of pressure regulation and it is increasingly gaining ground as the benefits from using such a method are becoming known and are backed up by tangible evidence from field applications worldwide. With this method, pressure is continuously controlled based on the demand so that at the critical point in the network the pressure is always maintained at the minimum level of service thus achieving maximum pressure reduction at any time whilst maintaining the desired level of service to the customers. Recent advances in technology have introduced systems with continuous monitoring of the pressure at the critical point / points and the data is fed to self-learning algorithms which in turn control the PRV / PRVs in order to maintain the desired pressure in the system. In this way the response to any pressure changes in the system is immediate and the maximum pressure reduction is achieved always maintaining the set level of services to the customers.

Flow modulation provides an advanced method of controlling pressures and the outlet pressure is continuously controlled and varied so that the pressure required at the critical point in the network is always maintained at acceptable levels. In this manner, during periods of high demand, the valve adjusts itself to increase the flow in order to maintain acceptable pressures in the system. When demand in the system is reduced, the valve readjusts so that excess pressures are reduced thus reducing leakage further.

Dorot S-300 "Hymod" Control Valve

In order to examine the benefits of this technique the Water Board installed flow modulation on an existing PRV in DMA 230. It should be noted that since the installation of the fixed outlet PRV in this DMA, no proactive leakage repair activity was undertaken except for reported leaks. The reason behind this was to have a clear picture of the benefit that each pressure management method will have in reducing leakage. The benefit can clearly be seen in Figure 2 below. It is evident that after installing a fixed outlet there was a reduction in the Minimum Night Flow (MNF) of 4,1 m3/hr. When flow modulation was effected there was a further reduction of 2,5 m3/hr, which proves that provided the conditions are such that favour the application of flow modulation further reduction in leakage is possible.

Savings associated with implementation of dorot pressure reducing valve & dorot flow modulator valve

In order to highlight further the benefits in applying flow modulation the daily water consumption of DMA 230 was plotted for exactly the same period in 2006 when pressure was controlled by fixed outlet PRV and in 2007 when pressure was flow modulated. It is evident from Figure 3 that the installation of flow modulation resulted in a reduction in the volume of water registered by the area meter over the 101 days period under examination of the order of 6.000 m3 which means that over a 12 month period the volume saved will be of the order of 21.500 m3 valued at approximately €17.000.

Without a doubt, flow modulation is an investment worth making considering that the cost of modulation together with its installation in the case of DMA 230 was less than €3.000.

Water Savings Due To Dorot's Flow Modulation

Multi-Point PRV
This method of pressure management is a variation of a fixed outlet PRV. It has more than one fixed downstream pressures depending on demand. The fixed outlet PRV is set so that irrespective of demand the pressure immediately downstream of the PRV is

fixed at a given value. The Multi Point PRV has several settings of pressure which are effected automatically depending on demand. The PRV can also be set to change over from one pressure setting to the other based on time. In this trial it was set to operate at two flow control points and it was installed in DMA 123 which supplies water solely to the port of Lemesos.
The use of this type of pressure management was chosen for this area due to the irregular demand of water at the port. For flows up to 20 m3/hr, sufficient for all activities in the port area apart for providing water to any ships docked in the harbor, the pressure setting is at 1.7 bar. In case of supplying water to a ship the flow immediately increases beyond 20 m3/hr and the pressure changes to the second setting which is set at 4.7 bar in order to satisfy the demand.
The system operates only a few hours a day at the high pressure in order to supply water to the ships. Once demand falls below 60 m3/hr the pressure setting changes back to 1.7 bar. This system was an improvement to the fixed outlet in that pressure surges were eliminated and the MNF was reduced from 12 m3/hr to 5 m3/hr.

Conclusions (by the author)

Based on the experiences gained in trialling advanced pressure management methods the following conclusions could be reached:

- Flow modulation seems to be more efficient in district metered areas, eliminating pressure shocks to the area since the pressure is continuously controlled based on the demand (smooth change over time).
- Other forms of pressure control, e.g. multi-point PRV, are beneficial based on the specific operational conditions of the network.
- The payback period in most cases is very short (only a few months) depending on the size of the PRV.
- Reduction in the produced volume of treated water can be achieved by efficiently applying pressure management techniques.