

SINGER SOLUTIONS

PDAM Malang City, Indonesia



Client:
PDAM Malang City

Challenge:
Aging infrastructure leading to high leakage rates, pipe bursts and insufficient water supply

Singer Solution:
138 units of S106-2-PR-BT ranging in size from 100mm to 500mm

Result:
Massive savings in water loss reduction, decrease in pipe bursts and more water to reach more customers



Singer Valve S106-2-PR-BT

Pressure Management Saves Indonesian City 75% in NRW, Improves Pipe Breakage by 300%, and Reduces Power Consumption by 33%

Malang City supplies water to 120,000 service connections amounting to approximately 600,000 people, which accounts for about 70% of the city's population. Approximately 30% of the supply to the customers is gravity fed directly from springs to the users and 70% of the supply is pumped to eight storage reservoirs with a total maximum storage capacity of 18,000 cubic meters (4,755,097 US Gallons). However, there was a lack of water supply and low reservoir levels due to leakage and pipe bursts that had led to 30% of the population being regularly deprived of water supply from the normal distribution mains.

With daily pipe bursts, reservoirs dropping to 20% of capacity at night and leakage rates hitting an estimated high of 41% or 400 litres/second (6340 USGPM) – that's 1 million cubic meters per month (264,172,000 US Gallons per month), Mr. Teguh Cahyono, the Director of Non-Revenue Water (NRW), for the city's Water Department, brought a team of experts together to create a water loss management plan.

The consensus was to develop numerous control zones or DMA's with a single source of water comprising a meter and a pilot-operated control valve at the source of the DMA. Once you are able to measure the flow into the DMA as well as flow to your users you are able to manage the pressure. There is a direct correlation to pressure and leakage; if you reduce pressure you will reduce leakage, with the ultimate goal to give clients just enough pressure to serve their needs while eliminating over pressures.

One of the most difficult aspects of the project was getting senior PDAM Malang City water directors and politicians to approve the budget and necessary funding for such an ambitious plan. To

"I can sleep well at night knowing the vast majority of customers now have reliable water."

*Mr. Teguh Cahyono
Director of Non-Revenue Water, City of Malang Water Department*

demonstrate that the goals were achievable and that the ROI would be there, PDAM Malang installed 3 test DMA's and PRV's near a problem reservoir. The pipe bursts stopped, leakage was greatly reduced and reservoir levels were maintained. The directors were convinced and so the budget requirements were approved and the project moved forward at a rapid rate.

DMA construction began with an initial 42 Singer Valve S106-2-PR-BT (100mm – 500mm) being installed. In Malang City the average pressure in the main distribution lines range from 2 bar (29 psi) to 4 bar (58

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psi). In order to reduce this, Singer added two pressure reducing pilots to the main diaphragm operated control valve, one pilot is set lower for night pressure (low demand) and the other is set for daytime pressure (high demand), so they are able to relatively accurately maintain pressure at the critical point. This is typically the most challenging pressure point in the DMA. This technology is controlled by a simple IP – 68 (water proof) timing device controlled by a locally available 9 volt battery that switches pressure at a predetermined time. The new valves were able to reduce the pressure during high demand in the daytime to 2 bar (29 psi) and further reduce the night pressure to 1.5 bar (22 psi).

With the initial 42 units installed, which is less than 30% of the overall requirement of the project, the results were astounding. Leakage was reduced from 41% to a level of 27.7%. In terms of volume, this means leakage has been reduced from 400 litres per second (6340 USGPM) to 250 litres per second (3962.5 USGPM) reducing the leakage rate by 150 litres per second (2377.5 USGPM) or 388,800 cubic meters per month (102,710,000 US Gallons per month). With an additional combination of 96 Singer Pressure Reducing Valves the leakage was reduced to 20%. This results in a savings of 750,000 cubic meters per month (198,129,000 US Gallons per month) and reducing the original leakage rate from the original 1,000,000 cubic meters per month (264,172,000 US Gallons per month) to 250,000 cubic meters per month (66,043,010 US Gallons per month), an incredible 75% reduction!

In addition, larger valves were required for larger main DMA areas. These valves have a unique Single Rolling Diaphragm (SRD) as opposed to the norm of flat diaphragms that often have seat chatter with fluctuating flow. The SRD provides smooth, steady and precise pressure control from maximum to virtually zero flow without the need for low-flow bypass valves. This NRW specific innovation prevents minor surges entering the downstream side of the PRV and is revolutionizing NRW projects worldwide as flow stability, particularly at low flow is crucial in minimizing infrastructure damage.

Prior to the installation of the first 42 valves they had an average of one pipe burst per day. This has been reduced to an average of one pipe burst per month, which has led to huge savings in the annual maintenance budget for the repair of pipe bursts. In addition the entire system makes use of GIS technology allowing for real time monitoring of pressure and flow so that leak detection teams can be dispatched to specific DMA's when data readings are unacceptable and repair crews can respond quickly.

Prior to the PRV installation reservoir levels typically dropped to about 20% of capacity by 4:00 am each morning, due to leakage rates and pipe

SINGER INSTALLATION



Malang City staff personnel testing the new Singer Valve S106-2PR-BT

bursts resulting in extreme water shortages and sometimes no water for those at the ends of the distribution lines. Now the City has reservoir levels at 80% at 4:00 am in the morning, resulting in the vast majority of customers in the DMA zones having water supply 24 hours per day, 7 days a week regardless of demand.

With increased reservoir capacity and greatly reduced leakage rates the City of Malang has been able to expand their distribution main lines and make water available to an additional 25,000 service connections, which amounts to roughly 125,000 people.

Another huge cost saving has been in power consumption. Prior to the new PRV's, the DMA's required two pumps to supply the reservoirs, but due to increased capacity of the reservoirs only one pump is now required to maintain the levels, despite the additional customers. The electrical consumption has decreased monthly from an original 1.2 billion Rupiahs to 800 million Rupiahs per month, an incredible 33% savings!

With a total of 138 Singer Valve PRV's water loss is reduced by 75%, pipe breakage by 300% and power consumption by 33%. In addition, the City of Malang is now able to expand reliable water access to new communities. Mr. Teguh concludes "I can sleep well at night knowing that the vast majority of customers now have reliable water."



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