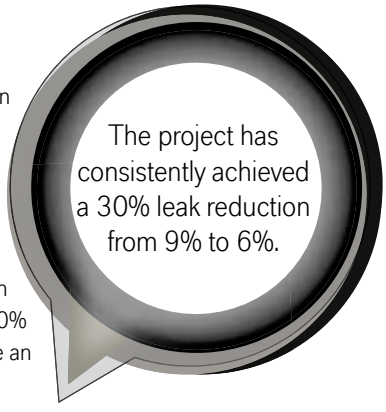
Ein-Hayam Haifa - Leakage Reduction with Pressure Management

By Galcon

This case study is about a pressure panagement project run Galcon in Ein-Hayam is a small residential neighborhood West part of Haifa, the 3rd largest city in Haifa, Israel. 2010 a leakage reduction project using the Galcon Management System was conducted. The purpose was effectiveness of pressure management and its effect on in the city of Haifa towards implementing the solution on a large scale. The project has consistently achieved a 30% leak reduction from 9% to 6% (a number considered to be an unavoidable real loss by utility).



General

During August 2010 Galcon was commissioned by Mei Carmel the Haifa water utility to conduct a test to evaluate the effectiveness of its pressure management system in the Ein-Hayam neighborhood. Galcon's G-DPM solution provides dynamic water pressure management that helps governments, municipalities and water utilities to significantly reduce water and revenue loss from water leakage. The project was designed to provide the water utility a real-life implementation of a Dynamic Pressure Management solution in a small-scale. Its purpose is to allow the water utility to test the following:

- The concept of pressure management and its validity
- Effectiveness of solution in lowering water loss within a real-life implementation within network of utility
- The quality of the solution and the ability of Galcon to implement all aspects with the purpose of expanding the project to other areas.

Galcon took on complete responsibility of the project which included the following activities:

- Analysis of the water network in the area
- Analysis of current state (using a hydraulic model & verifying pressure and supply data from field).
- Analysis of the consumption pattern in the DMA
- Water auditing and balance
- Requirements definition (minimum consumption pressure, firefighting requirements)
- Designing the DMA including all required elements (valves, piping, etc…)
- DMA implementation, including changes that are required in the relevant network (for example closing of pipes and valves).
- Calculating current base-line leakage & performing a water audit using minimal night flow analysis
- Testing the DMA
- Implementing pressure reduction policies: static reduction, day/night pressure, dynamic time and/or flow based pressure management

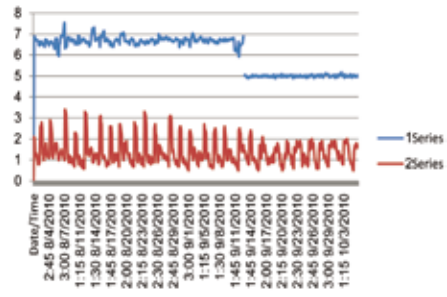


Figure 1

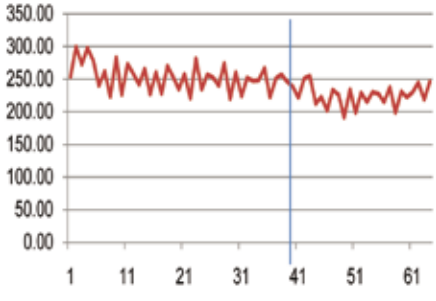


Figure 2

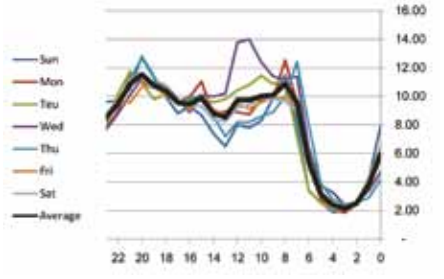


Figure 3

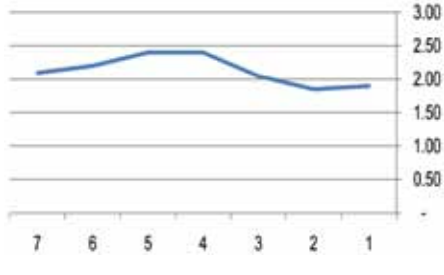


Figure 4

- On-going monitoring, analysis and recommendation

All actions and decisions were taken jointly by the water utility and Galcons' experts to ensure full transparency, understanding and collaboration throughout the project process. The various stages also allowed the water utility to better understand the solution and what real value it provides in terms of reducing water leakage and recouping lost revenue.

Implementation

Following initial analysis and planning phase DMA was established and system was first installed in August of 2010. At this point initial readings were taken to establish a base-line for the trial. This information was gathered to ensure accuracy and consistency of the information throughout the trial. The system was configured to obtain flow and pressure data every 15 minutes providing 96 readings per day. A water balance was defined based on water meter readings during that period. The water balance was created based on meter readings that were done during the pre-implementation phase. 3 reading were done on 17, 24 and 31 of May. Readings were analyzed and errors corrected. NRW was determined at 9%. Since all meters were changed and readings were taken almost all the NRW is attributed to leakage.

Pressure Reduction

On September 12, pressure was lowered from an average of 7ATM to 5ATM. Following another phase of data gathering a second phase was implemented in which the daily pressure was maintained at 5 ATM and night pressure was lowered to 4.5 ATM. During the following months several different pressure policies were defined and tested within the area. In the final phase it was decided to maintain a time-based pressure policy in order to avoid frequent changes in pressure that occurred when implementing a flow-based policy. The steady state policy is based on the following settings:

- 00:30-05:00: Pressure is maintained at 4.6 ATM
- 05:00-00:30: Pressure is maintained at 5.2 ATM

(*A security band of 0.1 ATM is allowed to avoid frequent pressure adjustments that may cause damage to the network.). Figure 1 depicts the readings and changes from beginning of August to November. The pressure reduction is clearly seen on the 41 day in the sequence. Figure 2 shows the lowering of the overall daily flow into the defined DMA again with a clear drop after the reduction in pressure - 11% on average.

Night FlowAnalysis (Summer)

A night flow analysis was conducted to determine leakage levels based on the evaluation of the usage during the night. To ensure accuracy of the information and since it was established that Ein-Hayam DMA (especially during summer) had a significant amount of water being used on specific nights for gardening - these nights were not taken into account as part of the analysis. The pressure reduction had an effect of 13% lowering in the average night flow between 1 and 4 in the morning as seen in Table 1.

Hour	W/O Gardening			Difference
	Before Pressure Reduction	After Pressure Reduction	Cubic Meter	%
1	3.98	3.76	0.22	6%
2	5.54	4.71	0.83	15%
3	5.86	4.85	1.01	17%
Avg	5.13	4.44	0.69	13%

Table 1

Leakage Assessment

After pressure reduction minimal night flow during the night is 4.4 Cubic CM/H with total usage of 3.8 CM/H.(lower due to lower pressure) The total leakage therefore is approximately 0.6 CM/H or 5,256 CM yearly.

Night Flow Analysis (Winter)

In order to ensure the accuracy of the information assessment were also conducted during the winter season in Israel in order to eliminate seasonal fluctuations. Figure 3 shows the daily flow for each day of the week during months of November till December and the average flow over these days. It is clear that the drop in the minimal flow represents an overall usage drop during the winter season. The finding above is strengthened with the overall average minimal night flow by day as seen in Figure 4. The difference between winter and summer minimal flows can be explained by the following:

- Lower usage due to the changes in weather
- Irrigation of private gardens is stopped during winter
- Summer vacation of the schools in which students are more active in the night resulting in higher usage during this time.

Results

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- Before pressure total leakage was approximately 7000 CM yearly.
- After pressure reduction was implemented the overall leakage was at 4,818 CM yearly.
- This represents a reduction of 32% in leakage.

About the Contributor

Galcon is a leading manufacturer of computerized irrigation controllers and systems for residential and professional gardeners, landscapers and municipalities. Galcon's state-of-the art agriculture irrigation systems are preferred choice of farmers and growers. Water utilities use Galcon's pressure management solutions for managing their water resource and reduce water loses. All solutions are designed to optimize the pressure level in water supply networks of utilities, municipalities and public works. Galcon's systems comply with the IWA (International Water Association) standard.

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