



## Successful Implementation – Energy Conservation Measure

<b>Measure</b>
Optimization of operation one pump
<b>Equipment</b>
Pumps
<b>Industry / Sector</b>
Chemical
<b>Year of Implementation</b>
2001
<b>Cost Benefit Analysis</b>
⦿ Type of Measure: Short term
⦿ Annual Energy Savings: 2.25 lakh kWh
⦿ Actual cost savings: Rs. 10.13 lakh
⦿ Actual investment : Rs. 2.00 lakh
⦿ Payback: 3 months
<b>Implementation Highlights</b>
Implementation of the measure has resulted in  Can be implemented in all types of industrial units  Normally scope for reduction in energy consumption will exist in pumping system

### Summary

Blockages in the piping system were hindering the flow of water. Identification of the blockage after a detailed study & its removal reduced the pumping energy consumption by 50%.

### Background

A leading chemical company has two pumps to meet the various processes water requirement. Total process water requirement is 900 m<sup>3</sup>/day but in actual practice varies 800 –1100 m<sup>3</sup>/day.

Plant has two process water pumps. These two pumps are operated simultaneously and are interlocked, thus operate in parallel. The water flow rates of individual pumps was measured and also total water flow, when both pumps are operated in parallel, was also measured.

**The pump details – before implementation**

Pump ID code	Unit	Pump # 1	Pump # 2	Parallel operation
Return flow	lps	13.89	13.89	
Rated head	m	50	50	
Rated power	kW	11.0	11.0	
Actual flow	lps	14.0	14.0	16.0
Actual head	m	50	50	57.5
Actual power	kW	10.38	11.70	22.08
Hydraulic power	kW	6.90	6.90	
Efficiency	%	66	59	

It can be seen that when only one pump is operated the pumps are performing satisfactorily. When two pumps are operated in parallel the increased flow is only 2 lps against 12-14 lps. The pipe size was found to be of desired diameter. This indicated that the line is choked and resisting water flow.

Immediate measures were taken to rectify the system and it was found that the line was blocked near the NRV, thereby restricting the flow when two pumps are operated in parallel.

After rectifying the line, one pump is operated since one pump delivers 14 lps (i.e., 1209 m<sup>3</sup>/day) and which can meet the process requirement. For the other, pump level controller was installed based on level of water in the overhead tank. This second pump is operated only based on the level, when one pump can not cater the requirement of the plant due to sudden demand.

**Details of techno-economics:**

Present power consumption by two pumps	: 22.08 kW
Power consumption by one pump	: 12 kW
Energy savings	: 10 kW
Annual Energy savings @ 4200 h	: 0.42 Lakh kwh
Annual energy savings	: Rs. 1.74 Lakh
Investment	: Marginal
Payback period	: Immediate

**Principle**

Blockages in the piping system hinder the flow of fluids and consume considerable energy at the pumping end for normal flows to be maintained. These blockages may happen due to entry of foreign matter by oversight during maintenance, by corrosion & collection of material at corners, valves etc.

**Implementation issues**

- ☞ Though significant energy saving potential in water pumping system exists, a detailed systematic study is essential to identify the energy saving measure through measurement and analysis.
- ☞ Identification of the blockage in a complex pipe system is time consuming and needs pain-staking efforts.