

## Successful Implementation – Energy Conservation Measure

<b>Measure</b>
Speed Reduction Of Compressors To Match Actual Plant Refrigeration Load and Improve Heat Exchanger Heat Transfer Efficacy
<b>Equipment</b>
Refrigeration compressor
<b>Industry / Sector</b>
Clarisis Organics- Baroda/Chemicals
<b>Year of Implementation</b>
2000
<b>Cost Benefit Analysis</b>
<input type="checkbox"/> Install Type of Measure : Marginal Investment
<input type="checkbox"/> Annual energy Savings : 1,15,000 kWh
<input type="checkbox"/> Actual cost savings : Rs 5.2 lakhs
<input type="checkbox"/> Actual investment : Rs 10,000/-
<input type="checkbox"/> Payback : 18 Days.
<b>Implementation Highlights</b>
<ul style="list-style-type: none"> <li>▪ Low cost measure</li> <li>▪ Implementation was done by in-house team</li> <li>▪ Can be duplicated in any industry</li> <li>▪ Less maintenance after modification</li> <li>▪ This measure has won award from PCRA in 2001 for <i>Unique Contribution in the field of Refrigeration</i></li> </ul>

**Summary**

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**Background** The company situated near Baroda manufactures benzene derivatives. The major load in the plant was refrigeration. Two compressors were working; one for chilled water and the other for brine.

Refrigeration compressors were operating at 50 to 60% of the time only. This indicated excess capacity of compressor. It was suggested to reduce the speed of compressors by 40% by changing pulley size, keeping in view of the minimum speed of operation recommended by the manufacturer.

**Principle** The refrigeration capacity is proportional to the speed of the compressor. Hence it was suggested to reduce the speed of brine compressor from 750 rpm to 500 rpm and the speed of chilled water compressor from 780 rpm to 400 rpm. The compressors' operating hours, after reducing the speed, were expected to increase. Since, under this derated condition, the existing evaporator and the condenser are oversized, the specific power consumption was expected to reduce resulting in energy savings.

#### Details of techno-economics:

Equipment	Rating	Before modification		After modification	
		Actual kW	KW/TR	Actual kW	KW/TR
Chilled water plant compressor	90 kW	74	1.2	35.6	0.7
Brine plant compressor	55 kW	53	1.6	32.3	1.2

Energy savings on brine chiller = 60500 kWh/annum = Rs 2.7 lakhs/annum  
 Energy savings on water chiller = 54,500 kWh/annum = Rs 2.5 lakhs/annum  
 Investment for 2 nos pulleys = Rs 5000/- each = Rs 10,000/-

#### Implementation issues

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