

## Successful Implementation – Energy Conservation Measure

<b>Measure</b>
Replacement of inefficient pumps with Energy Efficient mono-block pumps in Air Conditioning
<b>Equipment</b>
Pumps
<b>Industry / Sector</b>
Engineering
<b>Year of Implementation</b>
1998
<b>Cost Benefit Analysis</b>
o Type of Measure: Low investment
o Annual Energy Savings: 2.0 kWh
o Actual cost savings: Rs. 10.0 lakh
o Actual investment : Rs. 2.00 lakh
o Payback: 3 months
<b>Implementation Highlights</b>
<p>Implementation of the measure has resulted in</p> <ul style="list-style-type: none"> <li>☞ Low cost measure</li> <li>☞ This measure can be duplicated in any centrifugal pump of maximum head of 50m</li> <li>☞ Normally mono-block pumps are of smaller capacity</li> <li>☞ Easy to implement with out any external expertise</li> <li>☞ Application of conversion to mono-block can be find in air conditioning units, cooling towers, DM / soft water plants, drinking water supply, process pumps, etc</li> </ul>

### Summary

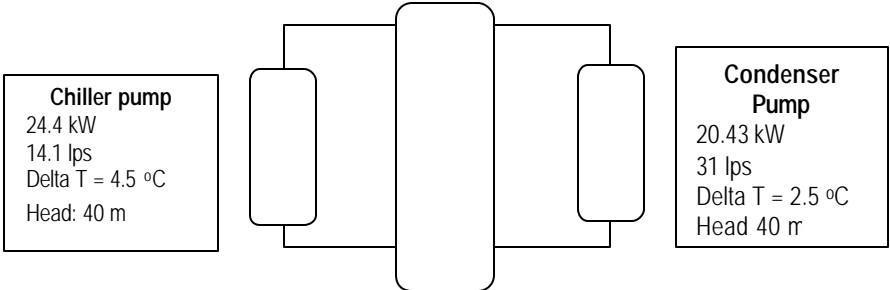
Conversion of centrifugal pumps with suitable Mono-bloc will reduce the compounding losses of centrifugal pumps

**Background**

A leading German engineering company has a production workshop, where the shop was air-conditioned by 2x75 TR units. During the normal operation, depending upon the floor conditions one or two are operated.

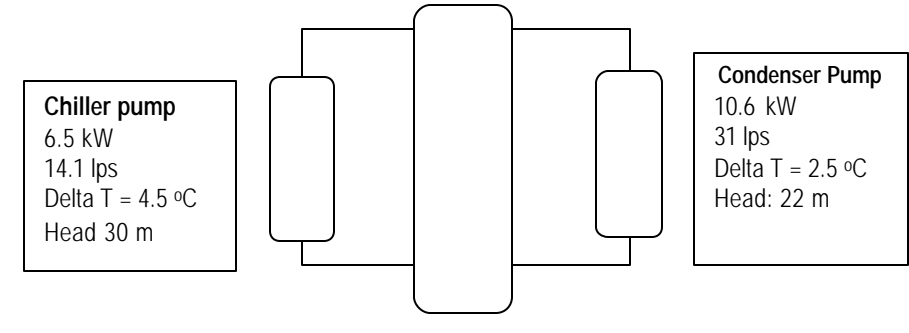
The air conditioning unit has two cooling water pumps and two chilled water pumps of same capacity (41 lps at 45 m head each). At any given point of the time, only one condenser pump and one chilled water pump is operated while other pump is kept as standby. These pumps are centrifugal type and are energy inefficient, considering the application and capacity requirement.

The system can be represented as below with the air-conditioning compressor as the big block in the centre.



Nowadays energy efficient mono-block pumps are available in the market for moderate discharge head and high flow rates. Present centrifugal pumps used for cooling water and chilled water can be replaced with mono-block pumps. More over the head required for the air conditioning system is 22 m for condensor and 28m for chilled water (as per design) while the pumps installed were of 45-m head. The implementation of this measure resulted in significant energy savings.

The pump capacities and power consumption after the implementation were:



**Principle**

In mono-block pumps, the motor forms a part of the pump rotor rather than a separate unit. Moreover the impeller design and pump casing is different when compared with conventional centrifugal pumps. This results in reduction in fixed losses in the pump and motor.

**Details of techno-economics:**

Particulars	Actual energy savings
Annual Total energy savings, lakh kWh	2.00
Annual Cost savings, Rs. lakh	10.00
Cost of Implementation, Rs. lakh	2.00
Simple payback period, Year	3 months

**Implementation issues**

- ☞ This measure is restricted to small capacity & head pumps
- ☞ Can not applied pump slurries and many other process liquids
- ☞ Require changes in foundation of the pump while replacing