

Case Study: Refrigeration Compressors

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Background:

While conducting energy audit for a software industry; the performance of the refrigeration compressors was observed to be quite poor.

Operating Scenario:

The performance of individual refrigeration compressor was computed by noting down all the operating parameters including

- Actual flow rate with a help of ultrasonic non-contact type (Transit-time or Doppler-effect as the case may be) flow meter.
- Power drawn by the compressor motor with the help of clamp on type power meter (Three phase balanced type or power analyzer as the case may be)
- Temperature of chilled fluid at the inlet of the evaporator
- Temperature of chilled fluid at the outlet of the evaporator
- Temperature of cooling water at the inlet as well as outlet of the condenser

The efficiency of motor, density as well as specific heat of chilled fluid is also noted down.

It was observed that the refrigeration compressors were operating below the rated energy efficiency ratio (EER) and delivering poor cooling effect (TR).

Energy Conservation Measures:

The above concerns and issues were addressed by taking the following measures.

- While evaluating the performance, temperature of cooling water was observed to be abnormally high.
- The condition of cooling tower as well as cooling water pumps was quite poor.
- The system was immediately replaced with a new set of cooling tower and pumps.

Outcome:

- The energy consumption of these compressors reduced by around 10%; leading to 5% saving in the overall energy costs.
- The hall conditions improved considerably; especially during summer period due to enhanced output from the compressors.

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