

Why is the efficiency of a chiller important?

A chiller is an equipment that enables a refrigerant to remove heat load from a coolant (eg. Chilled Water) and remove the unwanted heat to a cooling medium (eg. Cooling Water or Ambient Air). It consumes a significant amount of energy used in a chiller plant in comparison with other components, such as a cooling tower or pump. Hence, improving the efficiency of chiller is important, which can provide the following benefits:

- 1) Lower energy consumption
- 2) Savings on utility bill
- 3) Maintain the cooling capacity of the chiller close to its clean and new state

How to improve the efficiency of a chiller through ongoing maintenance?

There are many ways to improve the efficiency of a chiller. Proper ongoing maintenance is a “low hanging fruit” and can be kick started quickly with minimal cost. The following are some of the common items to include in chiller maintenance practice:

- 1) Monitor the efficiency of the chiller. The efficiency of chiller, which is energy consumption per cooling load, can be represented in the unit “kW/refrigeration ton”. Any unusual drop in efficiency should trigger investigation and rectification actions taken to bring the chiller back to normal operating condition. With the advancement in Information Technology, online monitoring can be done and alerts can be issued to operators when attention is needed.
- 2) Effective cleaning of chiller evaporator and condenser can clear fouling and scaling. Thus, heat exchange efficiency can be improved and chiller can operate at its full capacity and optimal efficiency. In addition, maintaining good cooling water quality for a water cooled chiller can reduce fouling and scaling in the condenser.
- 3) Keeping the refrigerant amount and composition within the chiller vendor’s recommendation.
- 4) If the coolant is prone to freezing, it is important to prevent icing in the evaporator as icing will reduce the heat exchange efficiency greatly. Take care that the temperature settings are correct. If anti-freeze is used, check that the concentration is kept within the recommended range.

Other “low hanging fruits”

While chiller design is critical to the efficiency of an existing chiller, changes are often disruptive and costly. Ideally, one should always operate the existing facility at its optimal (eg. reduce operation at partial-load efficiency based on heat load pattern study). Hence, keep a look out for energy saving opportunities!

Process Safety is Everybody’s Responsibility!

An initiative of the Process & Engineering Committee

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