International Journal of Modern Engineering Research (IJMER)
www.ijmer.com Vol.3, Issue.1, Jan-Feb. 2013 pp-83-85 ISSN: 2249-6645

Improve C.O.P. Of Ice Making Plant With Out Editing Any Additional System

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ABSTRACT: *Now a day industry owner think only profit point of view, in the thermal orientate industry additional system attached and efficiency of plant increase but capital cost of the instrument high and that's why owner of industry rarely attached the system. In this paper focus on the improvement of C.O.P. without editing other system and increase profit also with the help of preventive maintenance.*

KEY WORD: Condenser tube, C.O.P., Amery paper.

NOMENCLATURE
C.O.P. –Co Efficient Of Performance
VCRS – Vapor Compression Refrigeration System
VARS –Vapor Absorption Refrigeration System
CR-Circulation Ratio

I. INTRODUCTION

In this paper focus on the improve C.O.P. of ice making plant without editing any additional system. The Krishna Ice Factory making an ice of 12 tones, to make that ice 48 hours require. This time period is somewhat high than the estimating time, so reduce the time rate of ice making is necessary for the company. If they reduce the time than C.O.P. also increase and profit also increase in some amount. In this company the ice making cycle is VCRS. When heat transfer between an evaporator and the refrigerated area is unusually low (a typical example is by natural convection) and the vapor compression system is on/off regulated, adding a planar PCM to an existing evaporator allows improving the global efficiency [1]. Improve C.O.P. with sub cooling device [2]. The energy consumption of households in the UK is a major factor in the current environmental and strategic supply of energy with some 80% of domestic energy associated with space and hot water heating being provided by electrical radiators or boilers fired with fossil-fuel [3]. The result of this theoretical study show that coefficient of performance (COP) value can be improved by elevating generator temperature up to certain level and lowering absorber temperature. At such elevated generator temperature, value of circulation ratio (CR) is lowered [4]. To overcome green house effect eco friendly refrigerant used ammonia water as a working fluid pair for VARS [5]. The constantly falling temperature over evaporator, refilling of it with more and more liquid refrigerant causes multifold increase in heat transfer coefficient which helps in maintaining refrigeration rate at falling temperature [6].

To be improving C.O.P. mainly three step taken in VARS.
(i) Temperature of generator T_g be as high as possible.
(ii) Temperature of condenser T_c be as low as possible.
(iii) Temperature of evaporator T_e be as high as possible [7].

II. SYSTEM DESCRIPTION

The vapor-compression uses a circulating liquid refrigerant as the medium which absorbs and removes heat from the space to be cooled and subsequently rejects that heat elsewhere. Figure 1 depicts a typical, single-stage vapor-compression system. All such systems have four components: a compressor, a condenser, a thermal expansion valve (also called a throttle valve or Tx Valve), and an evaporator. Circulating refrigerant enters the compressor in the thermodynamic state known as a saturated vapor and is compressed to a higher pressure, resulting in a higher temperature as well. The hot, compressed vapor is then in the thermodynamic state known as a superheated vapor and it is at a temperature and pressure at which it can be condensed with typically available cooling water or cooling air. That hot vapor is routed through a condenser where it is cooled and condensed into a liquid by flowing through a coil or tubes with cool water or cool air flowing across the coil or tubes. This is where the circulating refrigerant rejects heat from the system and the rejected heat is carried away by either the water or the air (whichever may be the case).

The condensed liquid refrigerant, in the thermodynamic state known as a saturated liquid, is next routed through an expansion valve where it undergoes an abrupt reduction in pressure. That pressure reduction results in the adiabatic flash evaporation of a part of the liquid refrigerant. The auto-refrigeration effect of the adiabatic flash evaporation lowers the temperature of the liquid and vapor refrigerant mixture to where it is colder than the temperature of the enclosed space to be refrigerated.

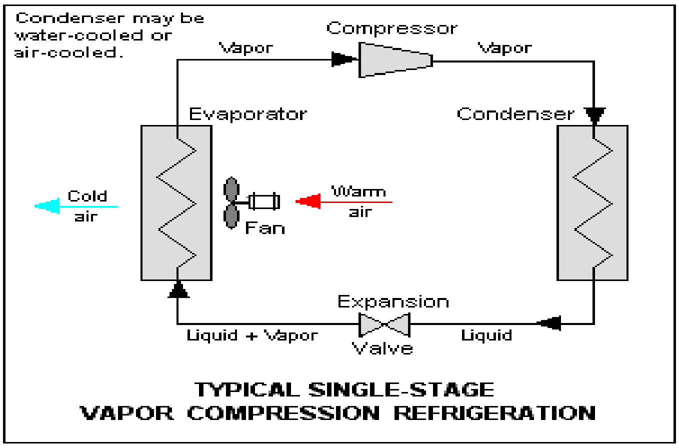

Fig. 1 Schematic diagram of vapor compression refrigeration system

The cold mixture is then routed through the coil or tubes in the evaporator. A fan circulates the warm air in the enclosed space across the coil or tubes carrying the cold refrigerant liquid and vapor mixture. That warm air evaporates the liquid part of the cold refrigerant mixture. At the same time, the circulating air is cooled and thus lowers the temperature of the enclosed space to the desired temperature. The evaporator is where the circulating refrigerant absorbs and removes heat which is subsequently rejected in the condenser and transferred elsewhere by the water or air used in the condenser.

To complete the refrigeration cycle, the refrigerant vapor from the evaporator is again a saturated vapor and is routed back into the compressor.

III. Experimental work

To be improve the C.O.P. of the VCRS the temperature of evaporator decrease or throttling temperature decrease or condensing temperature decrease. For decrease the temperature of condenser cleaning the tube of the it, because the tube of condenser irrigate at the terrace and open in the atmosphere. Due to that tube has been corrosion and erosion from the peripheral surface and result of that heat transfer rate should been change. That reason the condenser temperature should not dropout, during the cleaning work condenser tube clean from algae. Reason of that work heat transfer rate increase and temperature of the tube decrease as compare to the previous days and the result of this work C.O.P. increase and ice cooling rate increase and profit should be also increase.

IV. Calculation

Fig. 2 before removing the corrosion and algae from the condenser tube

Temperature° C	h_f	h_g	S_f	S_g
-6	153.5	1436.8	0.6128	5.4173
38	361.9	1471.5	1.3281	4.8950

C.O.P. $=\frac{N}{W}=\frac{h_1-h_4}{h_2-h_1}=\frac{1297.31-361.9}{1471.5-1297.31}=\frac{935.41}{174.19}=5.37$

Fig. 3 after removing the corrosion and algae from the condenser tube

Temperature° C	h_f	h_g	S_f	S_g
-6	153.5	1436.8	0.6128	5.4173
36.5	354.55	1470.98	1.3047	4.9108

C.O.P. $=\frac{N}{W}=\frac{h_{1-h_4}}{h_{2-h_1}}=\frac{1301.5-354.55}{1470.98-1301.5}=\frac{946.95}{169.48}=5.59$

V. Result and discussion

Before the cleaning of condenser tube C.O.P. of the plant is 5.37 and 12 tones is ice making time require 48 hours and selling cost of the ice is 12,000 Rs/-.

After the cleaning of condenser tube C.O.P. of the plant is increase up to 5.59 and due to cleaning 12 tones ice making time decrease up to 46 hours 2hours saving at every 2 days so every 46 days 12,000 Rs/- are net profit which is additional profit of the that time period due to making of 12 tones ice.

VI. Conclusion

Without editing of additional system only maintain the plant and conduct preventive maintenance C.O.P. is increase and maintaining it without edition expenses.

Preventive maintenance conduct routinely and due to that profit is also increase.

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