PERFORMANCE IMPROVEMENT OF SCREW COMPRESSOR THROUGH THE ENERGYAUDIT

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ABSTRACT

Screw compressor used to produce compressed air in refineries have a two rotors. A parameter adjustment method for a C.O.P. using graphical method was developed. The parameter were automatically adjusted by the data of performance at rated point. Upon using the proposed adjustment method for parameter, output values of the simulation model agreed quite well with performance data at rated point. The old compressor has decrease the efficiency with respect to the time. This method decreases the calculation time required in obtaining refrigerant thermodynamic properties and also increase the efficiency of the compressor. The efficiencies obtained were the highest reported for screw compressors in the open literature review.

KEYWORDS

- Screw compressor
- Ammonia
- Parameter adjustment
- Graphical Method
- C.O.P.

INTRODUCTION

As we know, compressors may be simply classified as dynamic compressor and displacement compressors confine successive volumes of gas within a close space and increase the pressure by reducing the volume of the space. The displacement compressors are also classified as two type rotary compressor and reciprocating compressor. As a major type of rotary and positive displacement compressor the screw compressor has been playing more and more important role in the application of compressor.

The compressor consist of a single screw motor which meshes with two rotary seals. There are two shaft in screw compressor one is driving shaft and another is driven shaft. They both connected with gear. There is an electric motor which is used as the power tool for driving shaft. The ammonia is enter gap between the screw and compress the ammonia.

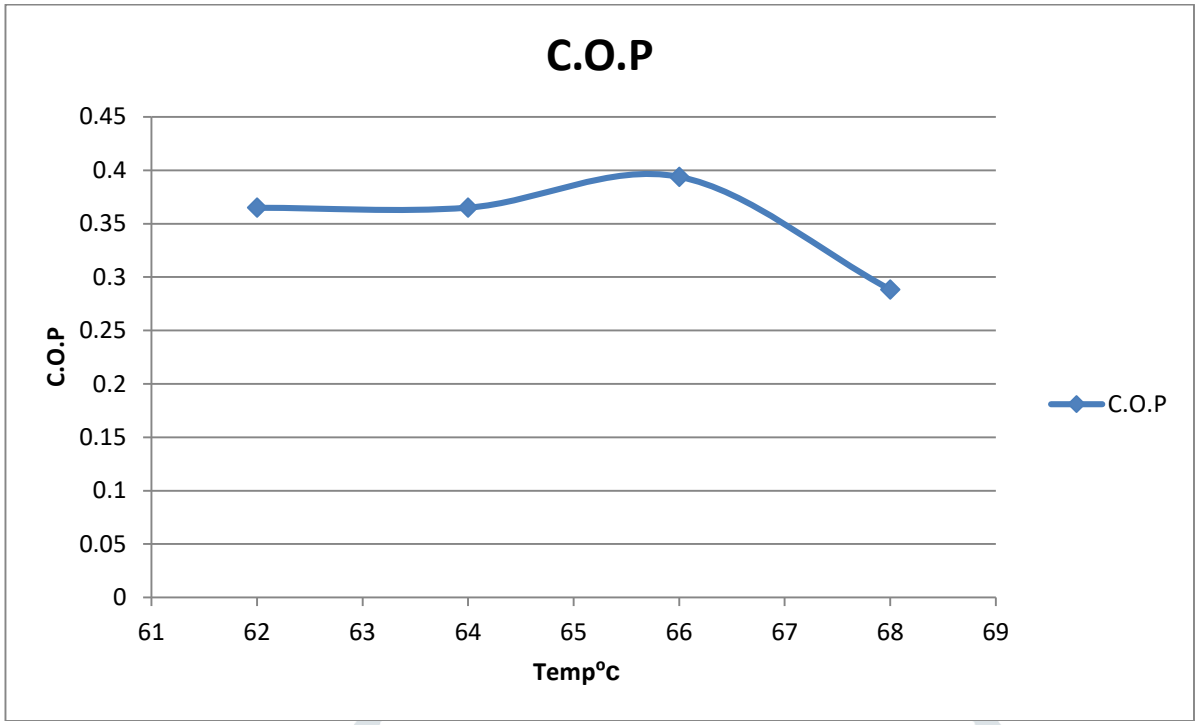

fig. 1 C.O.P. versus Temperature graph

IN above figure we have find the C.O.P and the C.O.P is too much low then industry is necessary to increase the C.O.P. The use of low C.O.P then the industry get more use of Electric energy therefor, it is consume more cost of the Industry.

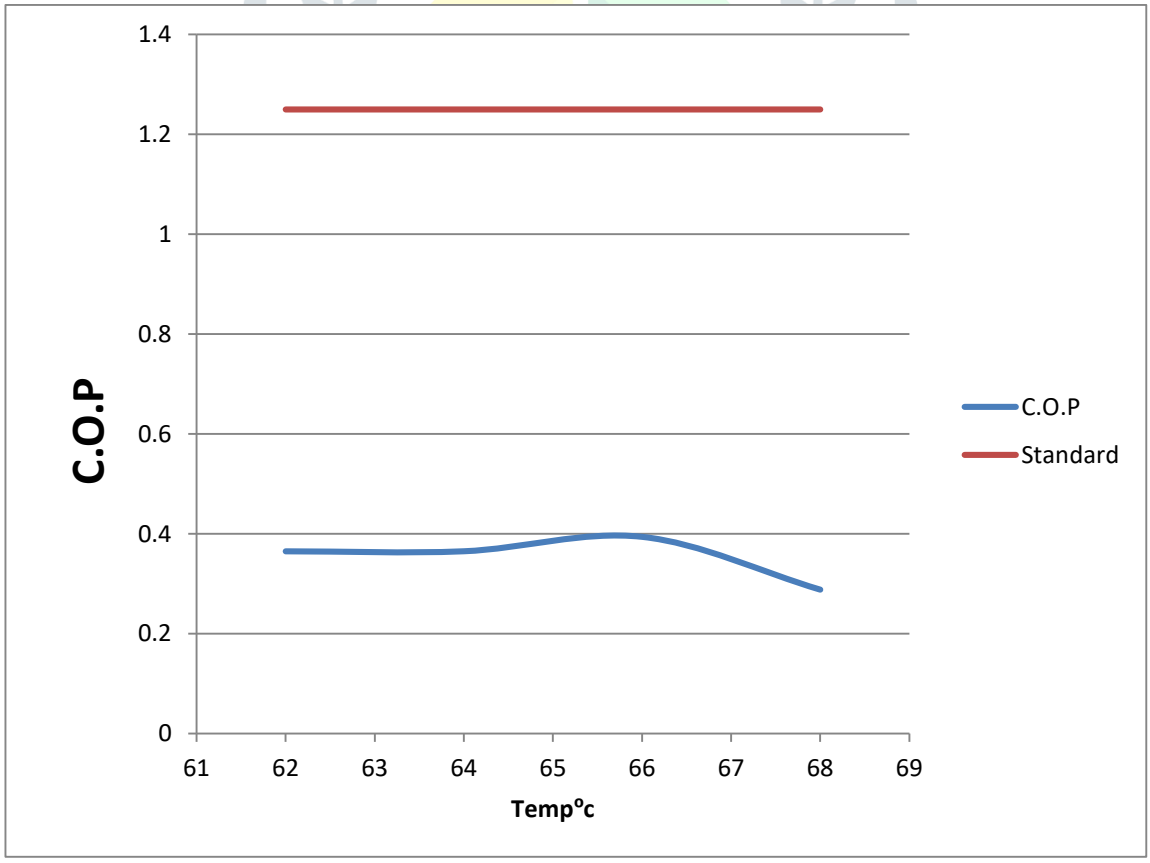

fig. 2 Comparison of C.O.P. between standard data and practical data

In above the Graph the C.O.P is compare with the Standard Data. x-axis is represent temp^{o}c and y-axis represent C.O.P of refrigeration. The standard value of C.O.P is 1.25

COMPARISION DATA

Parameter	Standard Value	Practical Value
Flow (m^3/s)	1	1.5
Rotational Speed (rpm)	2500	3000
Co-officient of Performance	1.25	0.36,0.38,0.39,0.29

Table : 1 Comparison parameter between standard value and practical value of screw compressor

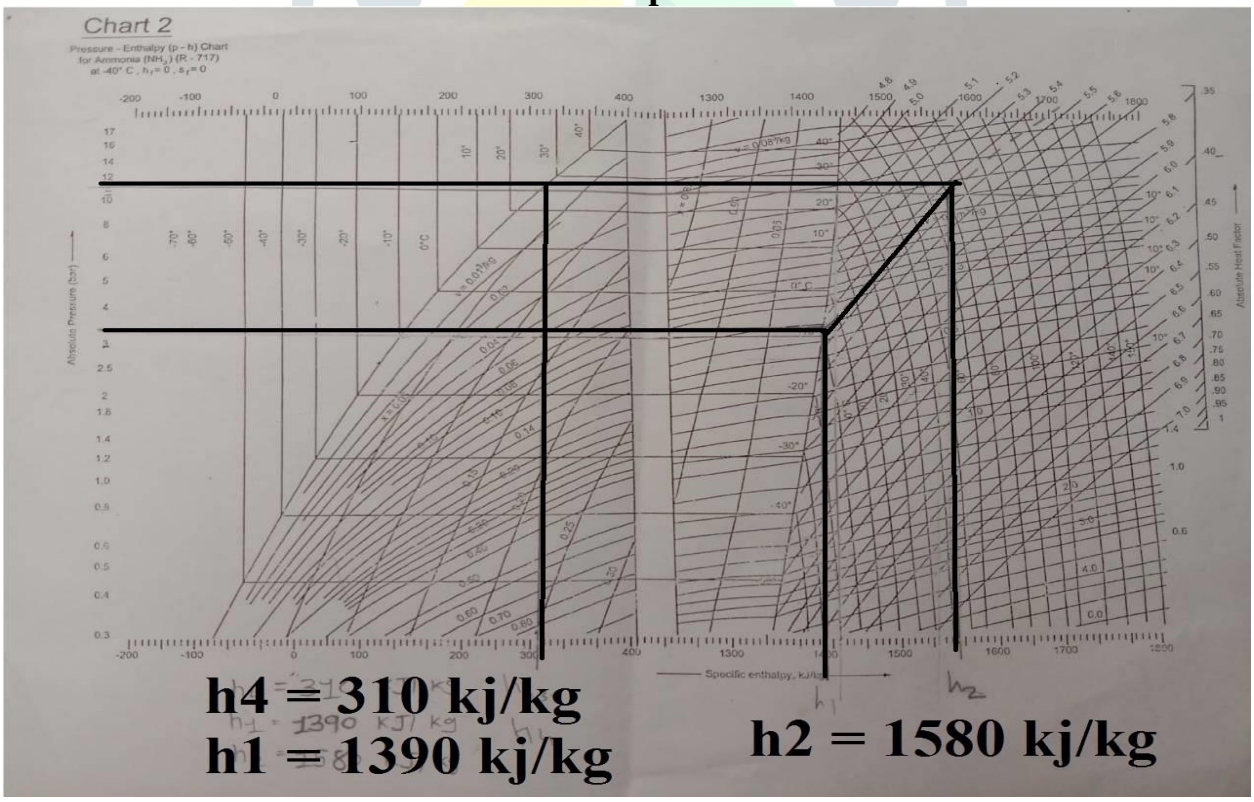

fig. 3 : Pressure- Enthalpy(p-h) chart for ammonia (R-717)

Calculation

- Mass flow rate (m)

$m(h_1-h_4)= TR\times 210$

$M= TR\times 210/(h1-h4)$

per 1hr use 8 TR

Inlet pressure = 3.29 bar

Outlet pressure = 11.39 bar

h_1 = 1390 kJ /kg

h_4 = 310 kJ / kg

$m= 8\times 210/(1390-310)$

$m= 1.555\ m^3/\ sec$

1 year power = 189914 kw

Per day power = 189914/365 = 220.31 kw

Specific power = 520.31/1.5 = 346.kw

C.O.P. = $h_2-h_1/520.31$

C.O.P. = 0.365

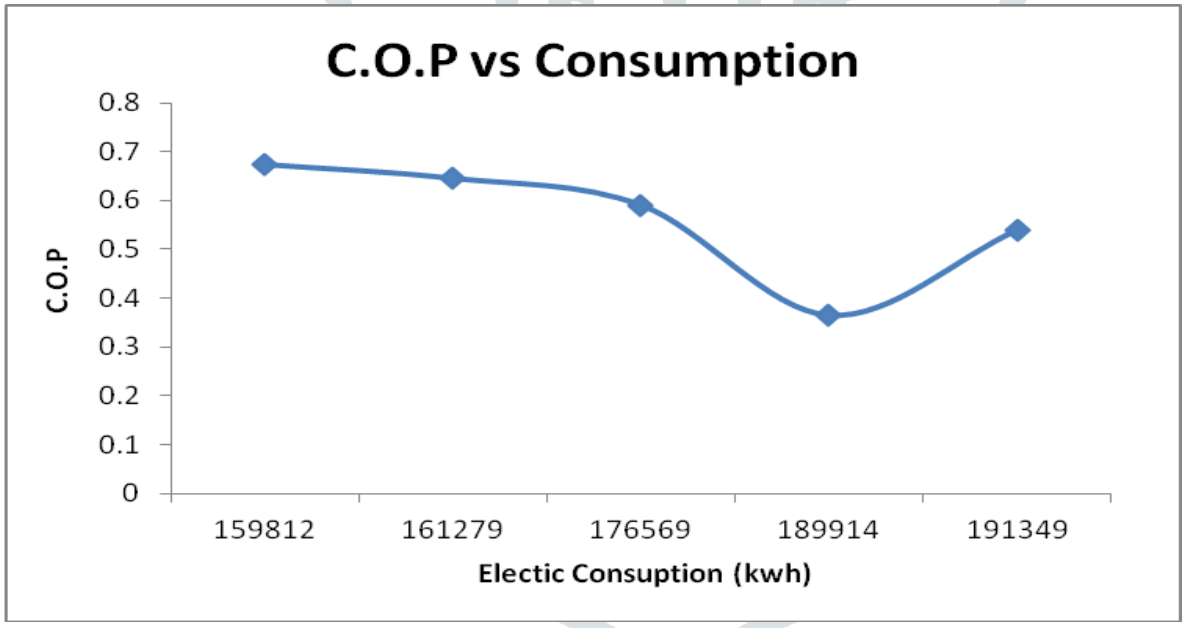

fig.4 C.O.P vs Consuption

In this graph the C.O.P is increase by the reduce of the input parameter Electrical energy is shoud be low supply and get Increase the C.O.P

CONCLUSION

we conclude that after auditing in AMUL industry in compressor plant and comparing with standard data we find that isothermal efficiency of compressor is low by applying effect subcooling reduce. The electrical energy consumption we can increase our C.O.P . The save the money as well as electric energy.

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