

Experimental Investigation on Evaluation of Heat Recovery in Air Compressor

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Abstract— Experimental setup of warmth recovery in air compressor is used to pneumatic device, wasted of heat is utilized to improve the efficiency of the compressor and beneficial machines. Compressor runs in excessive speed and produces extra amount of heat or temperature. This heat is wasted from surroundings so, this warmth by way of recuperation used to warmth exchanger. Oil kinds air cooler system is used to take away the heat from air. The warmth trade is inlet hot oil one facet and different side inlet bloodless water then, cold water benefit warmness from hot oil and exchange the section of water. This water is passing via pipe line to system tank and plate types warmness exchanger arrangement thru warmness exchanged. Then hot water is change temperature due to device bloodless water benefit the warmth. Pump recirculation of water within the pipe line and pipe line is unique design (as an insulator) to reduces the warmth losses in ecosystem. Reduces to the heat losses in ecosystem to be continuous of water circulate inside the pipe as a refrigerant. To maintains water move inside the pipe line with the assist of electric pump.

Keywords: Air Compressor, Pipe Line, Motor, Warmness Exchanger (Heat Exchanger), Pump, Valve

I. INTRODUCTION

The upward push in energy costs is an unwelcome fact in these days production and commercial enterprise surroundings. And even as the price of price will increase for herbal fuel, heating oil and electricity may also range from yr to year, the upward trajectory is clear. Strength price reduction techniques are essential to staying competitive. The regulation of thermodynamics and the precept of the conservation of electricity tell us that electricity isn't created or destroyed; it can only trade form. The air that enters a compressor at atmospheric pressure has a base level of power content material. An air compressor is a device that converts electric power, diesel engine into potential electricity saved pressurized air. It is used to pneumatic device (operated tool) in plant. After the compression manner increases the air stress and raises its temperature, the strength becomes available for transfer. The heat have to be removed to maintain proper compressor operating temperatures and to cool the compressed air to make it suitable for plant use. The heat generated by means of compressed air structures can be a very good source of strength financial savings. In truth, almost all (ninety six%) of the electrical strength utilized by an commercial air compressor is transformed into warmness. the quantity of warmth recovered the use of those structures will vary if the compressor has a variable load. however in widespread, very good effects could be accomplished whilst the number one air compressor bundle is an oil-injected rotary screw kind layout. The plate kinds heat exchanger is good warmness exchanger oil thru water. This water passing

through insulated pipe. Insulated pipe is reduces warmth losses to atmosphere or environment. Then utility gadget tank is used second wide variety of heat exchanger (Plate sorts) is touch to water and warmth exchanged to water tank and elevating temperature of water in tank. The recirculation of water in pipe line with the assist of electric pump and storage of water in receiver tank.

These are following venture factor:

A. Air Compressor

Air Compressors are mechanical gadgets that compress gases. it's far extensively used in industries and has various applications. The air compressor is the maximum of used is reciprocating and screw sorts. The air compressor is supply of heat in medium of warm oil. it's miles used to the compressed air in industry motive.

B. Heat Exchanger

Heat exchangers are the devices or system which is used to switch warmness from one medium to any other medium without mixing them. Warmness exchanger is used to the plate's sorts and the nook ports are arranged so that the 2 media flow through exchange channels. The heat is transferred via the plate between the channels, and whole counter-contemporary go with the flow is created for maximum possible efficiency. The corrugation (floor) of the plates gives the passage between the plates helps every plate against the adjoining one and enhances the turbulence, ensuing in green warmth transfer.

C. Pump

Pump is a mechanical tool to lift the water from ground. Pump is varies sorts like as reciprocating, centrifugal, lobe and so forth. The water is recirculation of the pipe line and gets to the water tank

D. PPRC Pipe (Polypropylene Random Copolymer)

These day's bloodless and hot water piping systems has blessings along with its light-weight and smoothness, smooth and shiny internal surfaces and rust-loose, hygienic, easy to meeting and takes the region of galvanized pipes. Utilized in any form of warm and bloodless water pipe structures.

E. Control Valve

Gadgets which are used to adjust and control the drift and pressure in any assigned manner are known as manipulate valves or definitely valves. However, in this section we will discuss only the primary capabilities and operating standards of few ordinary and trendy purpose valves. Valve actuator and pump are interlocked, assuring a safe, smooth and efficient operation.

II. LITERATURE SURVEY

Nikhil Patel, Prof. B.Shah, Dr.A.Raman [1]: This paper offers with the design and evaluation of screw compressor. The twin-screw compressor is a effective displacement system used for compressing air to slight pressures. It contains of a couple of intermeshing rotors with helical grooves machined on them, contained in a casing which suits closely round them. The rotors and casing are separated by using very small clearances. Through the usage of CFD can discover performance of various profiles easier. A suitable system for optimization of the screw compressor form, size, and measurement is defined here, which results within the most appropriate layout. Compressors for that reason designed gain higher shipping fees and better efficiencies than those using conventional approaches. The overall performance of method air screw compressors is particularly depending on their rotor profiles and clearance distribution

R.saidur, N.A.Rahim, Hasanuzzaman [2]: in this paper are evaluation is compressed air is the use of to the keep the electrical power and playback duration of electricity efficient methods and heat recuperation of wasted gases thru saving power and utilization of the power. On this paper has been attention that strength is waste in which location and answer of the paper is education in addition to attention of the people.

Mariusz Broniszewski, and Sebastian Werle[3]: on this discuses are manufacturing of compressed air consumes three% of the total strength consumption in Europe. that allows you to produce compressed air, approximately 10-20% of strength transferred to compressor is used, the relaxation is misplaced due to loss of tightness and heat losses. Its possibility to install recuperation systems on air compressors to recover the misplaced waste warmth and it's manipulated to useful paintings. it is funding may be supported by using co-financing in the form of electricity performance, which the production plant might be capable of sell after receiving them from Polish electricity Regulatory office in go back for completing an investment that is composed improving waste warmth from air compressors. in this paper conclude the end result of growing consciousness need to be making plans sports that could intention at increasing strength efficiency in production flora by using analyses of profitability of funding in healing structures of waste warmth from technological processes of manufacturing flowers and secondary processes e.g. along with manufacturing of compressed air. Additional advantage of implementing this for enhancing power performance is opportunity for gaining white certificates that could significantly shorten payback time of the funding.

Sreejith, Deepak Das [4]: on this paper major benefit over a conventional heat exchanger in that the fluids are uncovered to a much larger floor place because the fluids unfold out over the plates. the heat switch charge of the heat exchanger is excessive and alternatively temperature modifications. on this paper designed the plate warmth exchanger for the specified running situations. Within the design calculated the overall heat switch coefficient of plate type's heat exchanger. Heat transfer rate and the wide variety of plates required for the plate heat exchanger are calculated. This paper value optimization of the designed plate warmth

exchanger turned into accomplished and it has been observed that there's a vast drop in the cost of the heat exchanger. on this paper design of pressure and temperature limits of both layout, choice focus on preliminary fee, protection necessities, and future working conditions.

Stephenraj, M.ok.Sathishkumar [5]: on this venture, the warmth transfer efficiency is improved by using enforcing the whole baffle design and travel tube layout and reading it thru CFD drift simulation, to discover the heat transfer fees. From the simulation results the most beneficial baffle layout and journey tube layout for max warmth switch price is recognized. Additionally this paper deals with discover the proper fluid for optimum heat switch fee. The drift simulation evaluation is accomplished for numerous baffle arrangement warmth exchangers and maximum warmth switch angle is used to 35⁰ baffle association offers better heat switch consequences. Most warmth transfer price the flow tube layout was modified and pleasant layout became observed by way of multi model optimization approach. Ultimately the baffle become connected with our selected waft tube and positioned inside the warmth exchanger, end result temperature drop of the working fluid (water) is acquired and which changed into gives right outcomes.

A.S. mota, E.P. Carvalho and Mauro A.S.S. Ravagnani[6]: In this paper gift one-of-a-kind fashions for layout and optimization of the heat exchanger. Each fashions used in arithmetic design simulation. Then examine for unmarried and multi plate warmth exchanger. The top-rated units were the equal for both approaches, and agreement becomes done between the effectiveness values. The version using algebraic equations has the drawback of best being relevant to PHEs sufficiently massive not to be suffering from quit channels and channels among adjacent passes. The main gain of the use of this model is its preferred applicability to any configuration, without having to derive a specific closed-form equation for every configuration. in this paper disadvantage is the excessive complex implementation of the simulation, and 2nd method is quite simple.

Mr.Sachchidanand, J.Nimankar and Prof. Sachin Dahake [7]: This paper is a evaluate of warmth exchangers. Begins with the introduction and class of warmth exchangers consistent with contact kinds, surface compactness, and range of fluids, waft arrangement and creation features together with their applications. In this subject widespread developments have driven in the past few years. Due to which there are types of heat exchangers available inside the marketplace relying on the one-of-a-kind use and distinct packages. In present day shell and tube warmth exchanger is the maximum not unusual kind heat exchanger extensively utilized in oil refinery and different big chemical system, as it fits high pressure utility. The shell and tube warmth exchangers are also broadly utilized in one-of-a-kind industries because of its easy in renovation and coffee in value. A Computational fluid dynamics can be used as design tool within the preliminary stage of design of shell and tube warmth exchanger.

Akshay kumar Magadam, Mr. T. C. Mestri [8]: In this paper performance of Parallel and Counter drift warmth Exchanger considering temperature changes in water and lubricating oil are to be study. in this paper realize that to heat exchanger performance varies from fluid to fluid

and temperature to temperature. Also calculated LMDT by using varying go with the flow rate and temperature of warm water and cold fluid. The overall performance compares of Parallel and Counter glide. The overall performance of such warmth exchangers underneath distinct working conditions is also discussed. On this paper are conclude that the heat transfer fee is extra counter flow warmth exchanger the use of water or some other oil as heat carrying medium. All of us research is executed taking water as a operating fluid both as warmness carrying and excellent heat soaking up medium. Warmness transfer may be better by using converting the cloth of construction of pipes, taking liquid as a warmness absorbing medium having excessive unique heat, converting mass glide prices.

Ankush S. Patil, H. S. Farkade [9]: On this paper goal may be both to get rid of warmness from a fluid and to feature warmness to a fluid. In top notch volume the research is going on for further enhancing the heat transfer via warmth exchangers. Within the gift paper, studies achieved by means of diverse researchers to growth the effectiveness of heat exchanger. Analysis it's been found that corrugated plate warmness exchanger have maximum fee of warmth transfer. on this paper are concluded that a variety of research paintings has been carried out within the discipline of heat exchangers. Conventional strategies are observed to be very pricey and time eating. CFD has emerged as boon for researchers. With the help of CFD, you can still determine effectiveness, warmth switch charge targeted parameters effortlessly. Among all kinds of heat exchangers corrugated warmth exchangers are observed to have highest charge of warmth switch.

III. CONCLUSION

The air compressor is more often than not used is compress the air (pneumatic) in enterprise cause, however industry ignore warmth recovery within the air compressor and wasted of warmth in environment. in this paper are concluded that waste heat is get better through with the help of heat exchanger and the use of useful paintings in enterprise. . warmth exchanger is one of the maximum efficient gadgets to transfer heat from one fluid to other fluid. we've changed layout of heat exchanger and decrease the losses and will increase of the efficiency. These days shell and tube heat exchanger is the maximum common type heat exchanger extensively utilized in industry, oil refinery and chemical enterprise, due to it appropriate of excessive strain utility. we've got design sizeable is counter flow heat exchanger are used, due to its high heat transfer fee.

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