



Enlarge The Heat Transfer Rate Of AC Evaporator With Diverse Materials

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Abstract: The azeotropic combination of R30 & R160 is made with R160 concentrations of zero%, 20%, 40%, 60%, eighty% and a hundred% in R30 and its miles applied in a Refrigeration unit with superb go together with the go with the waft costs via solving the alternative input parameters ordinary. Both the analytical warmth transfer charges and experimental warmness transfer costs at particular go along with the go along with the glide fees are showing identical outcomes with little deviation. The values are compared to get a smooth photograph of the warmth switch fees at extremely good go with the float prices. In this thesis the evaluation it is recounted that better flow charges of the refrigerant combination increase the warmth switch rates but inside the fee of better art work intake an first rate way to have an impact at the coefficient of overall performance of the refrigerant unit which isn't always beneficial to apply because of the truth the art work usage of the exquisite refrigeration unit ought to be lesser for unit of refrigeration. CFD evaluation to decide the warm temperature switch coefficient, mass go with the float rate, warmth switch charge, pressure drop and tempo at high-quality mass go with the flow prices (1, 1.5 & 2kg/s).

Keywords: Azeotropic Combination; Cfd Analysis; Thermal Coefficient; Refrigeration;

1. INTRODUCTION:

In the refrigeration cycle, warmth pump transfers warmth from a decrease-temperature warmth delivers right proper right into a better-temperature warm temperature sink. Heat could likely without a doubt go together with the waft within the opposite direction. This is the most commonplace type of air con. A fridge works in a good buy the identical way, as it pumps the warmth out of the indoors and into the room in which it stands. This cycle takes gain of the way section changes art work, in which latent warmth is launched at a consistent temperature in the route of a liquid/fuel phase change, and in which varying the pressure of a herbal substance furthermore varies its condensation/boiling trouble. The maximum common refrigeration cycle makes use of an electrically powered motor to stress a compressor. In an automobile, the compressor is driven via a belt over a pulley, the belt being driven thru way of the engine's crankshaft. Whether in a car or constructing, every person makes use of electric powered fan cars for air movement. Since evaporation takes region even as the warm temperature is absorbed, and condensation takes location whilst warmth is launched, air conditioners use a compressor to reason pressure changes among cubicles, and actively condense and pump a refrigerant round. An air conditioner (frequently known as AC) is a home device, tool, or mechanism designed to dehumidify and extract

warmth from a place. The cooling is entire the use of an easy refrigeration cycle. In manufacturing, an entire device of a heating, air goes with the flow, and aircon are known as "HVAC". Its use, in a building or a car, is to offer comfort subsequently of every warmth or cold climate the maximum, common refrigeration cycle the usage of an electrically powered motor to pressure a compressor. Whether in a vehicle or building, anyone uses electric powered fan vehicles for air to flow into. While evaporation takes location while the warmth is absorbed, and condensation takes place on the equal time because the warm temperature is launched, air conditioners use a compressor to cause stress adjustments amongst booths, and actively condense and drain a refrigerant round. A refrigerant is pumped into the evaporator coil, placed within the compartment to be cooled, wherein the low desires reasons the refrigerant to evaporate right into a vapour, taking the heat with it. At the opportunity element of the cycle is the condenser, this is positioned outdoor of the cooled compartment, wherein the refrigerant vapour is compressed and pressured thru each other warmth exchange coil, condensing the refrigerant proper right into a liquid, subsequently rejecting the warm temperature previously absorbed from the cooled place.

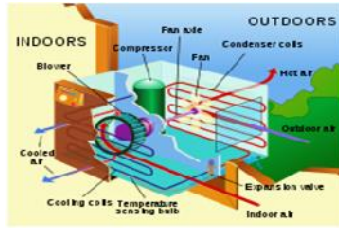


Fig.1.1. A typical home air conditioning unit.

2. RELATED STUDY:

The maximum common refrigeration cycle makes use of an electric motor to electricity a compressor. In a car, the compressor is pushed via a belt over a pulley, the belt being pushed by means of the engine's crankshaft (similar to the driving of the pulleys for the alternator, power steering, and so forth.). Whether in an automobile or building, both use electric powered fan automobiles for air movement. Since evaporation happens whilst heat is absorbed, and condensation takes vicinity whilst warm temperature is released, air conditioners use a compressor to reason strain adjustments among compartments, and actively condense and pump a refrigerant around. A refrigerant is pumped into the evaporator coil, placed within the compartment to be cooled, wherein the low strain reasons the refrigerant to evaporate proper right into a vapor, taking warmth with it. At the alternative aspect of the cycle is the condenser, which is placed outdoor of the cooled compartment, in which the refrigerant vapor is compressed and compelled via every other warm temperature trade coil, condensing the refrigerant into a liquid, thus rejecting the warmth previously absorbed from the cooled area. By putting the condenser (wherein the warm temperature is rejected) inner a compartment, and the evaporator (which absorbs warm temperature) inside the ambient environment (in conjunction with out of doors), or merely running a normal air conditioners refrigerant in the opposite path, the general impact is the other, and the compartment is heated. This is normally called a heat pump, and is able to heating a domestic to relaxed temperatures (25 °C; 70 °F), even supposing the outdoor air is underneath the freezing point of water (0 °C; 32 °F). "Freon" is a trade name for an own family of haloalkane refrigerants synthetic by using the use of DuPont and other organizations. These refrigerants had been generally used because of their advanced balance and safety homes. However, those chlorine-bearing refrigerants achieve the top environment once they break out. Once the refrigerant reaches the stratosphere, UV radiation from the Sun cleaves the chlorine-carbon bond, yielding chlorine radical. These chlorine atoms catalyze the breakdown of ozone into diatomic oxygen, depleting the ozone layer that shields the Earth's floor from robust UV radiation. It is inside the evaporators in which the actual cooling impact

takes vicinity in the refrigeration and the air con systems. For many people the evaporator is the principle a part of the refrigeration machine and that they don't forget other elements as less beneficial. The evaporators are warmth exchanger surfaces that switch the warm temperature from the substance to be cooled to the refrigerant, consequently removing the warm temperature from the substance. The evaporators are used for enormous fashion of several packages in refrigeration and air strategies and sooner or later they will be available in big sort of shapes, sizes and designs. They are also categorized in distinct way depending on the technique of feeding the refrigerant, manufacturing of the evaporator, course of air move across the evaporator, application and moreover the refrigerant control.



Fig.2.1. Evaporators in AC.

3. DESIGN AND METHODOLOGY:

CAD is an essential business art considerably used in many packages, at the side of the automobile, shipbuilding, and aerospace industries, business and architectural layout, prosthetics, and plenty of extra. CAD is also extensively used to provide computer animation for pc graphics in films, advertising, and technical manuals. The modern ubiquity and electricity of computer systems endorse that even perfume bottles and shampoo dispensers are designed the usage of techniques extraordinary through engineers of the Nineteen Sixties. Because of its giant monetary importance, CAD has been a prime driving pressure for research in computational geometry, computer photos (each hardware and software program application), and discrete differential geometry.

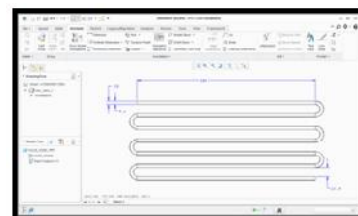


Fig.3.1. 2D design.

Pro/ENGINEER Wildfire is typical in three-D product format, imparting agency-essential productiveness equipment that promotes first-class practices in the layout at the equal time as making sure compliance together with your company and employer requirements. Integrated Pro/ENGINEER CAD/CAM/CAE answers allow you to format

quicker than ever even as maximizing innovation and outstading to ultimately create notable merchandise.

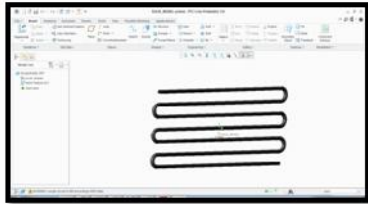


Fig.3.2. Basic 3D model.

4. ANALYSIS RESULTS:

Finite Element Method (FEM) is likewise called Finite Element Analysis (FEA). Finite Element Method is an easy evaluation method for resolving and substituting complex issues through less complicated ones, acquiring approximate solutions. Finite detail method being a flexible tool is used in numerous industries to remedy several sensible engineering problems. In finite detail approach, it's miles feasible to generate the relative consequences. One of the primary programs of FEA modified into, definitely, too is searching for out the stresses and lines in engineering factors underneath the burden. FEA as quickly as carried out to Associate in Nursing sensible version of an engineering element, desires an sizable quantity of computation and consequently the improvement of the technique has depended on the delivery of appropriate digital computer structures for it to run on. The technique is presently carried out to issues related to an outstanding range of phenomena, further to vibrations, warm temperature conductivity, hydraulics and herbal philosophy, and a tremendous range of fabric houses, like linear-elastic (Hookean) conduct and behaviour associated with deviation from the regulation (as an instance, bodily property or rubber-elasticity).

FLUID -R30:

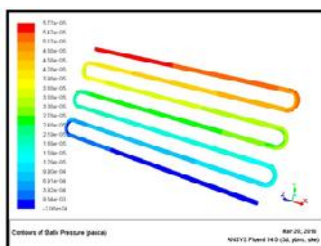


Fig.4.1. Pressure.

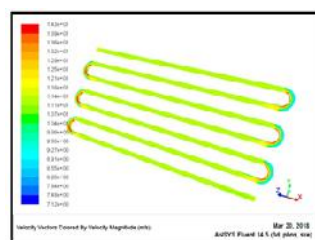


Fig.4.2. Velocity.

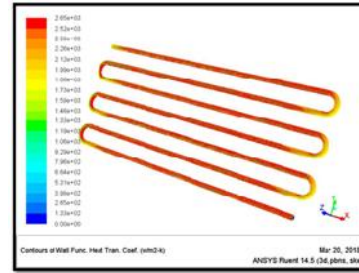


Fig.4.3. Heat Transfer Coefficient.

FLUID- R 160:

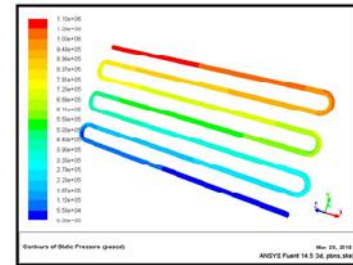


Fig.4.4. Pressure.

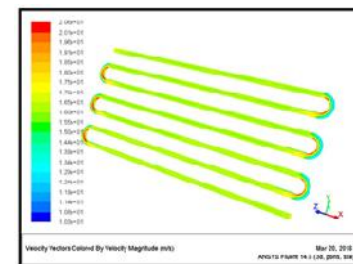


Fig.4.4. velocity.

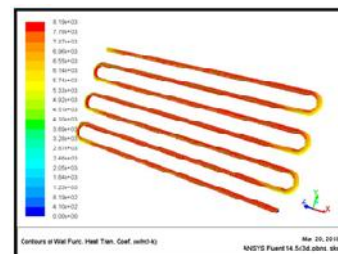


Fig.4.5. Heat Transfer Coefficient.

VOLUME FRACTION AT 0.8:

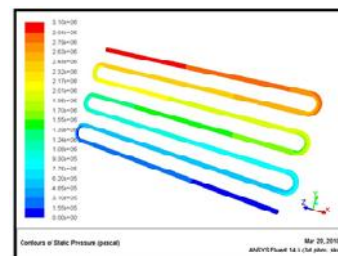


Fig.4.6. Pressure.

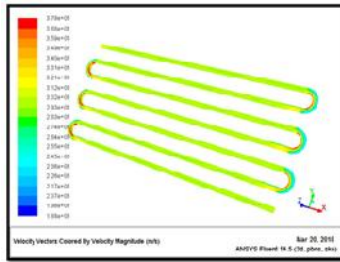


Fig.4.7. Velocity.

Mass Flow Rate		(kg/s)
inlet		2.0000002
interior-nsbr		8898.8883
outlet		-2.0078874
wall-nsbr		0
Net		-0.0078871764
Total Heat Transfer Rate		(w)
inlet		-88515.5
outlet		88798.781
wall-nsbr		0
Net		283.28125

Fig.4.8. Mass Flow Rate & Heat Transfer Rate.

5. CONCLUSION:

The azeotropic aggregate of R30 & R160 is made with R160 concentrations of 0%, 20%, 40%, 60%, eighty% and one hundred% in R30 and it is applied in a Refrigeration unit with particular drift costs by means of the use of fixing the alternative enter parameters steady. The analytical heat switch expenses at specific glide expenses are showing identical effects with little deviation. The values are in contrast to get a clean image of the heat switch charges at one-of-a-type go with the flow fees. So, moderate flow price i.e. 1.5 kg/min is suitable and advocated for the refrigeration unit using our refrigerant blend. Though the eye of R160 inside the R30 doesn't comply with a specific fashion in the heat transfer expenses at particular go along with the flow prices, it is been positioned that better R30 interest combinations consume greater paintings for pumping and drift as R30 is denser than R160 that is once more no longer, in reality, helpful because it lowers the COP of the refrigeration unit. Also, better concentrations of R30 shows corrosion within the tubing used in the evaporator and condenser devices. So, it's far counseled that better concentrations of R160 are yielding fruitful outcomes in assessment to better concentrations of R30. Then 20% R30 & eighty% R160 is used given that it's far giving better warmth transfer prices with decrease artwork intake. From the results, it's been showed that 20% R30 – eighty% R160 combination at 1.5 kg/min flow charge is exceptional suitable for the refrigeration unit without compromising the COP of the unit.

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