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ANALYSIS OF COMPACT HEAT EXCHANGER USING NANOFLUIDES

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ABSTRACT--*The warmness exchanger is a tool used intensively for heat transfer form fluid. The warmth exchanger affords the switch of thermal energy among two or extra fluide at distinct temperature. The warmth exchanger extensively used in area heating. Refrigeration, aircon, power plant, chemical plant life, petrochemical plants, petroleum refineries, and natural gas processing and sewage remedy used a heat exchanger is radiator in a automobile, the warmth is switch thru water to the radiator. If performance may be increase various cloth and geometries* ***shell*** *and tube warmth exchanger broadly used many industries (35%-40%)heat exchanger is used. The strong geometry production smooth preservation and viable improvements.*

Keywords-- *analysis of compact heat exchanger using nanofluides*

I. INTRODUCTION

A Heat exchanger is a bit of equipment constructed for green heat transfer from one medium to another. The media can be separated by means of a strong wall, in order that it in no way blend or can be in direct contact. The warmness exchangers broadly used in space heating, refrigeration, aircon, strength flora, chemical vegetation, petrochemical flowers, petroleum refineries, and herbal fuel processing and sewage remedy. One commonplace instance of a warmth exchanger is the radiator in a automobile , wherein the heat source , being a warm engine-cooling fluid, water switch warmth to air flowing through the radiator.

The plate heat exchanger is extensively diagnosed today as the maximum within your means and efficient type of heat exchanger available on the market. With its low fee, flexibility, easy upkeep and high thermal performance, it's miles unmatched by means of another type of warmness exchanger. The corrugation patterns that set off turbulent flows, it no longer most effective achieves unmatched performance however additionally creates a self cleaning effect thereby decreasing fouling. The maximum commonplace surface sample used is the chevron design.

II. MATERIALS

*The used steel is a commercial duplex stainless steel; 2205 with 10 mm plate thickness. Its nanofluides and mechanical properties are given in Table

Nanofluids in electronics cooling:

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Type of nanoparticle	Thermal conductivity of paricle	Size of particle in solution	Amount of solution
Alumina(AL2O3)	30	30-60nm	100.0ml
Copper oxide(cuo)	401	<50nm	25.0g
Gold(Au)	310	10nm	25.0ml
Gold(au)withsilica coating	N/A	10nm	5.0ml
Iron oxide(Fe2o3)	0.58	30nm	5.0ml
Silver(Ag)	429	20nm	25ml
Titanium oxide(Tio3)	22	21nm	100.0g

III. STATEMENT OF THE PROBLEM

Computation has been carried out for go-drift, plate fin-heat exchanger having triangular fins, which can be positioned among the plates. For this purpose a triangular duct is taken in which a rectangular

Types of heat exchangers :

• Shell and tube warmness exchanger – It is a sort of warmth exchanger which includes a sequence of tubes containing the fluid that should be either heated or cooled with the second fluid being circulated over the tubes that need to be heated or cooled. Shell and tube warmth exchangers are normally used for high strain packages (with strain more than 30 bar and temperature greater than 260 °Celsius) due to its robustness [02]. Figure I illustrates an average shell and tube warmth exchanger.the direction of flow. Air is taken as working fluid and laminar flow is considered.

• Numerous motives which includes a compact layout, a totally massive floor area over a small quantity which can be modified as in line with requirement by growing or lowering the range of plates and advances in fabric generation [03]. It consists of numerous skinny plates slightly separated from every different with provision of a passage for fluid waft for heat transfer. Figure II represents the set-up of a plate warmth exchanger. Plate and shell heat exchanger- It is a sort of warmth exchanger which combines plate heat exchanger with shell and tube warmness exchanger technologies. This offers a number of benefits along with excessive heat switch, high operating temperature, compact size and low fouling to call a few.

• Plate fin heat exchanger- It is a form of compact warmness exchanger drastically used due to its high degree of compactness which allows in saving substances [04]. It is generally fabricated from aluminum alloys for more warmth transfer performance. It consists of fins of various configurations sandwiched among the two plates. Till now basically genetic algorithm has been carried out for optimization of those warmth exchangers to lessen fee [05-10].

Parameters

Compact plate condenser	Value
Coolant flow rate	60lpm
Thickness of single plate	1mm
Surface enlargement factor	1.12
Plate effective hydraulic diameter	4mm
Total heat transfer area radiator	$3m^2$
Coolant tank capacity	10l
Fin length	8.59
Fin pitch	2.5

Compact Heat Exchanger

In forced-convection warmness transfer between a gas and a liquid, the warmth transfer coefficient of the fuel can be 10 to 50 instances smaller than that of the liquid. The use of particularly-configured surfaces may be used to reduce the gas aspect thermal resistance. For warmness switch between gases, the difficulty in inducing the desired warmth change is even more stated. In this example particularly, the use of greater surfaces can drastically reduce warmth exchanger size. This is the motivation in the back of the design of a class of warmth exchangers with decreased size and greatly improved fuel aspect warmness transfer, which are known as "compact" Compact heat exchangers may be classified by the kinds of compact elements that they employ. The compact elements usually fall into five classes:

Circular and flattened circular tubes. These are the simplest form of compact heat exchanger surface. The designation ST indicates flow inside straight tubes (example: ST-1), FT suggests drift interior directly flattened tubes (example: FT-1) and FTD shows glide inner directly flattened dimpled tubes. Dimpling interrupts the boundary layer, which tends to growth the warmth switch coefficient with out growing the waft pace. Tubular surfaces. These are arrays of tubes of small diameter, from zero.9535 cm down to 0.635 cm, utilized in carrier in which the ruggedness and clean capacity of the traditional shell-and-tube exchanger are not required. Usually, tube sheets are relatively skinny, and soldering or brazing a tube to a tube sheet offers an adequate seal against inter leakage and differential thermal enlargement.

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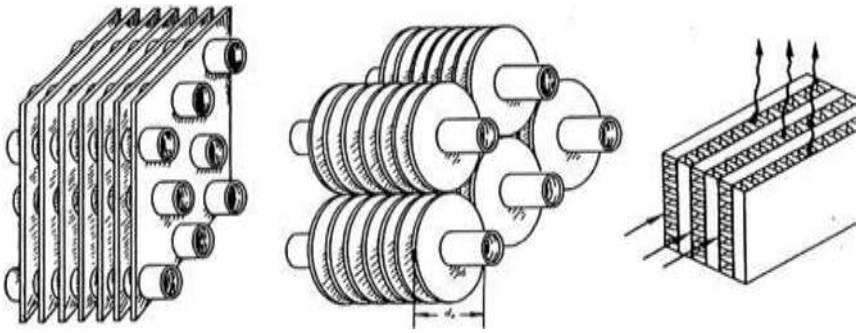
Compact heat exchanger types:
● Plate and frame heat exchanger ● Brazer plate heat exchanger ● Welded plate heat exchanger ● Plate fin heat exchanger ● Brazed plate -fin heat exchanger ● Diffusion-bonded plate-fin heat exchanger ● Spiral heat exchanger ● Printed circuit heat exchanger

Plate Fin Heat Exchanger :

Plate warmness exchangers are generally designed to gain turbulence throughout the entire heat switch location on the way to get the best feasible warmness transfer coefficient with the bottom viable pressure drop and allow for near temperature technique. Consequently this means smaller warmth exchangers and on occasion even less heat exchanger.

1.2.3 Tube Fin Heat Exchangers

In a tube fin warmth exchanger, round, rectangular, and oval tubes are used and fins are employed both on he outdoor, internal or on the both aspects depending upon the software. The liquid flows via the tube and the gasoline flows in pass float course along the fins.



IV. CONCLUSION

The overall performance of the warmth exchanger can be stepped forward with the aid of mounting Protrusion at the floor. The surface geometries, that are popular in one of a kind business packages, are wavy fins, off strip fins, perforated fins and louvered fins. This work might be for the enhancement of warmth switch by using the usage of longitudinal vortex turbines in the form of winglet.

1. The vortex generator with the attack angle of 45° it will provide the better effectiveness of the heat transfer enhancement.
2. It will be increase in the angle of attack of the winglet, there is increase in both combined Spanwise Nusselt number and the average temperature.
3. The pressure drop in channel with the longitudinal vortex generator increases rapidly with the increase of attack angle of the winglet.
4. The winglet when located near to the inlet it will be provides good results.

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