ENHANCEMENT OF HEAT EXCHANGER USING HELICAL RIB

Shaikh Vasim[1], Varpe Aradhana[2], Gadhe Vishal[3] ,Thorat Dipali [4,]Prof.Pardeshi S.C.[5]

[1] *Student, Mechanical Department, SND COLLAGE OF* ENGINEERING & RESEARCH CENTER YEOLA*, NASHIK-423401, Maharashtra, India*
[2] *Student, Mechanical Department, SND COLLAGE OF* ENGINEERING & RESEARCH CENTER YEOLA*, NASHIK-423401, Maharashtra, India*
[3] *Student, Mechanical Department, SND COLLAGE OF* ENGINEERING & RESEARCH CENTER YEOLA*, NASHIK-423401, Maharashtra, India*
[4] *Student, Mechanical Department, SND COLLAGE OF* ENGINEERING & RESEARCH CENTER YEOLA*, NASHIK-423401, Maharashtra, India*
[5] *Ass. Professor in Mechanical Department, SND COLLAGE OF* ENGINEERING & RESEARCH CENTER YEOLA*, NASHIK-423401, Maharashtra, India*

ABSTRACT

A heat exchanger is a device used to transfer heat between a solid object and a fluid, or between two or more fluids. The fluids may be separated by a solid wall to prevent mixing or they may be in direct contact. They are widely used in space heating, refrigeration, air conditioning, power stations, chemical plants, petrochemical plants, petroleum refineries, natural-gas processing, and sewage treatment. To enhance the rate of heat transfer there are basically two methods active and passive. In this work we are using active method. i.e. We are using the a component like the helical rib within heat exchanger to increase heat transfer rate.

Keywords: heat exchanger, helical rib,etc

INTRODUCTION

A heat exchanger is a device used to transfer heat between a solid object and a fluid, or between two or more fluids. The fluids may be separated by a solid wall to prevent mixing or they may be in direct contact. They are widely used in space heating, refrigeration, air conditioning, power stations, chemical plants, petrochemical plants, petroleum refineries, natural-gas processing, and sewage treatment.

1.1 Types of heat exchanger:-

Double pipe heat exchangers are the simplest exchangers used in industries. On one hand, these heat exchangers are cheap for both design and maintenance, making them a good choice for small industries. On the other hand, their low efficiency coupled with the high space occupied in large scales, has led modern industries to use more efficient heat exchangers like shell and tube or plate. However, since double pipe heat exchangers are simple, they are used to teach heat exchanger design basics to students as the fundamental rules for all heat exchangers are the same.

1.1.1 Shell and tube heat exchanger:-

Shell and tube heat exchangers consist of series of tubes. One set of these tubes contains the fluid that must be either heated or cooled. The second fluid runs over the tubes that are being heated or cooled so that it can either provide the heat or absorb the heat required. A set of tubes is called the tube bundle and can be made up of several types of tubes: plain, longitudinally finned, etc. Shell and tube heat exchangers are typically used for high-pressure applications (with pressures greater than 30 bar and temperatures greater than 260 °C). This is because the shell and tube heat exchangers are robust due to their shape.

Several thermal design features must be considered when designing the tubes in the shell and tube heat exchangers: There can be many variations on the shell and tube design. Typically, the ends of each tube are connected to plenums (sometimes called water boxes) through holes in tube sheets. The tubes may be straight or bent in the shape of a U, called U-tubes.

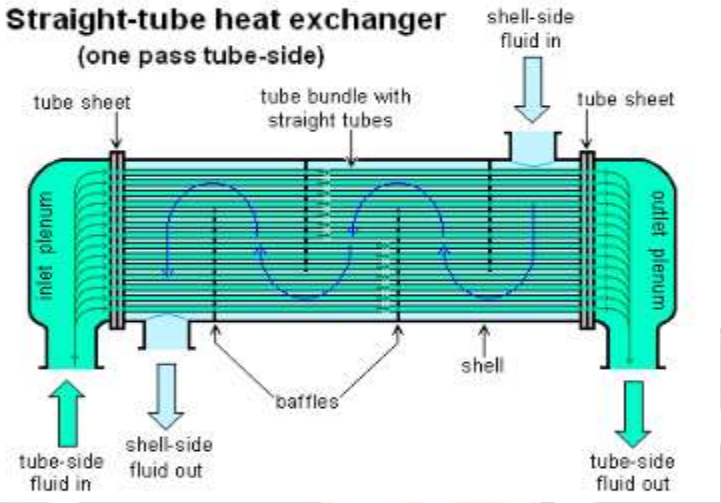

Fig 1 Shell and tube heat exchanger

1.1.2 Plate heat exchangers:-

Another type of heat exchanger is the plate heat exchanger. These exchangers are composed of many thin, slightly separated plates that have very large surface areas and small fluid flow passages for heat transfer. Advances in gasket and brazing technology have made the plate-type heat exchanger increasingly practical. In HVAC applications, large heat exchangers of this type are called plate-and-frame; when used in open loops, these heat exchangers are normally of the gasket type to allow periodic disassembly, cleaning, and inspection. There are many types of permanently bonded plate heat exchangers, such as dip-brazed, vacuum-brazed, and welded plate varieties, and they are often specified for closed-loop applications such as refrigeration. Plate heat exchangers also differ in the types of plates that are used, and in the configurations of those plates. Some plates may be stamped with "chevron", dimpled, or other patterns, where others may have machined fins and/or grooves.

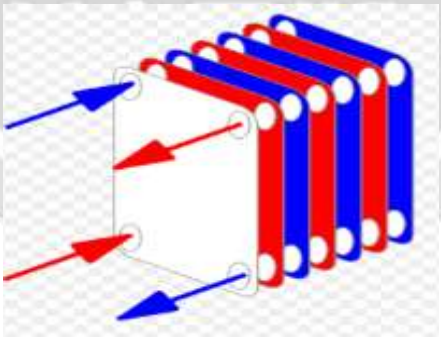

Fig 2 Plate heat exchanger

1.1.3 Plate and shell heat exchanger:-

A third type of heat exchanger is a plate and shell heat exchanger, which combines plate heat exchanger with shell and tube heat exchanger technologies. The heart of the heat exchanger contains a fully welded circular plate pack made by pressing and cutting round plates and welding them together. Nozzles carry flow in and out of the plate pack (the 'Plate side' flow path). Plate and shell technology offers high heat transfer, high pressure, high operating

temperature, uling and close approach temperature. In particular, it does completely without gaskets, which provides security against leakage at high pressures and temperatures.

Fig 3 Plate and shell heat exchanger

PROBLEM STATEMENT

To enhance the rate of heat transfer there are basically two methods active and passive. In this work we are using active method. i.e. We are using the a component like the helical rib within heat exchanger to increase heat transfer rate. Following fig 4 indicates the dimension of helical rib which is going to used in experimental work in project stage II.

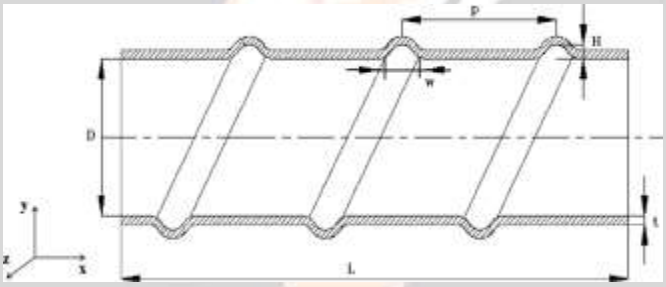

Fig 4 Dimension of helical rib

METHODOLOGY

Following methodology is implemented further in project work in the further work with study of different literature survey.

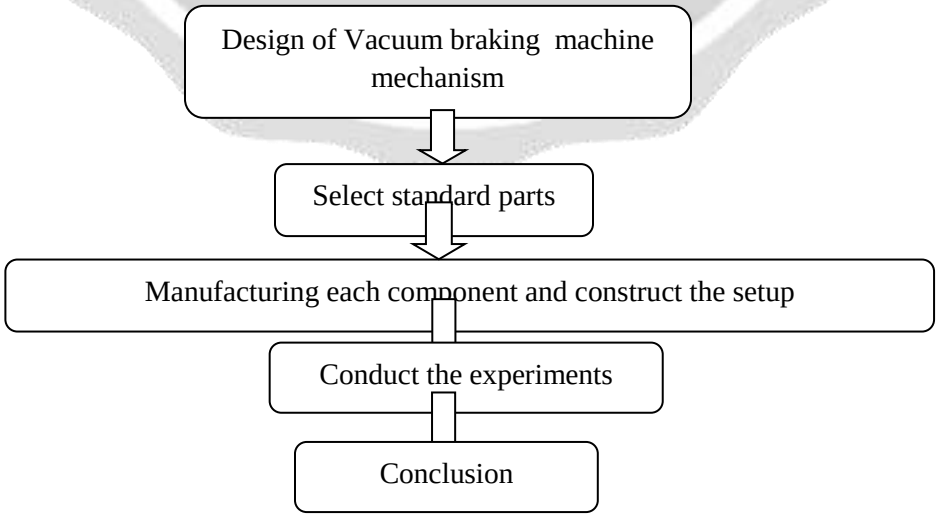

Fig 5 Proposed methodology for the project work

REFERENCES:

[1] Nianben Zheng, Peng Liu, Zhichun Liu, Wei Liuet, "*Three-fluid cross flow heat exchanger effectiveness revisited"*. J Heat Transf 1995;117:226e9.

[2] Qing Zhang, Huixiong Li , Weiqiang Zhang, Liangxing Li, Xianliang Le, *"Optimization study and heat transfer comparison of staggered circular and elliptic tubes in forced convection*". 2001;44:3953e61.

[3] Wei Wang , Yaning Zhang , Bingxi Li , Huaizhi Han b, Xiaoyan Gao, *"Finite element analysis for co-current and countercurrent parallel flow three-fluid heat exchanger."* Int J Numer Methods Heat Fluid Flow 2006;16:324e37.

[4] Abdalla Gomaa , M.A. Halim and Ashraf Mimi Elsaidet, *"Compound heat transfer enhancement for shell side of double-pipe heat exchanger by helical fins and vortex generators."* Heat Mass Transf 2012;48:1113e24.

[5] www.freefullpdf.com

[6] www.sciecedirect.com

8.BIOGRAPHY

	Mr. Shaikh Vasim Mehamud, student of the Snd Collage of Engineering & Research Center Yeola, Nashik-423401, Maharashtra, India.in the year 2017-2018 in the mechanical Engineering. Work on the project "ENHANCEMENT OF HEAT EXCHANGER USING HELICAL RIB". Email id- shaikhvasim1994@gmail.com
	Mss. Varpe Aradhana Laxman, student of the Snd Collage of Engineering & Research Center Yeola, Nashik-423401, Maharashtra, India.in the year 2017-2018 in the mechanical Engineering. Work on the project "ENHANCEMENT OF HEAT EXCHANGER USING HELICAL RIB". Email id- alv1406@rediffmail.com

	Mr. Gade Vishal Rajendra, student of the Snd Collage of Engineering & Research Center Yeola, Nashik-423401, Maharashtra, India.in the year 2017-2018 in the mechanical Engineering. Work on the project "ENHANCEMENT OF HEAT EXCHANGER USING HELICAL RIB" Email id- vishalgade2015@gmail.com
	Mss. Thorat Dipali Gulabrao, student of the Snd Collage of Engineering & Research Center Yeola, Nashik-423401, Maharashtra, India.in the year 2017-2018 in the mechanical Engineering. Work on the project "ENHANCEMENT OF HEAT EXCHANGER USING HELICAL RIB". Email id- thoratdipali1995@gmail.com
	Prof. Pardesi S.C..Assistant Professor, of the Snd Collage of Engineering & Research Center Yeola, Nashik-423401, Maharashtra, India.in the year 2017-2018. In the mechanical Engineering. Work on the project "ENHANCEMENT OF HEAT EXCHANGER USING HELICAL RIB". Email id- sunny308@gmail.com