

Manufacturing and Thermal Analysis of Helical Coil Heat Exchanger

Ajit Daphal, Dhiraj Kale, Aadesh Gaikwad,
Navin Chettipelli, Prof.P.V.Jatti

Mechanical Department
JSPM's Bhivarabai Sawant Institute Of Technology And Research,
Wagholi, Pune, Maharashtra

Abstract: *The exchange of intensity is vital cycle in many designing applications; by and large the intensity exchanger is utilized to move the intensity. Heat exchangers are the gadgets which works with the trading of intensity between two liquids which are at different temperatures isolated by a strong divider. Yet, because of consistent progression of liquid in the containers of intensity exchanger might erode the cylinders too as decreases the nature of liquid like corruption of warm conductivity, mass stream rate, thickness and thickness. So this paper centers around the advancement of helical loop heat exchanger in which intensity move execution is improved by fluoropolymer helical curl tube in tube heat exchanger. Due to use of such material productivity and life of intensity exchanger increments. It has been broadly detailed in writing that intensity move rates in helical coils are higher when contrasted with those in straight cylinders. Helical loop heat exchanger has minimal structure and high intensity move coefficient, helical curl heat exchangers generally utilized in modern applications like power age, atomic industry, process plants, heat recuperation systems, refrigeration, food industry, and so forth. Process heat move with regular shell and cylinder heat exchangers is natural to many architects' in many ventures.*

Keywords: *Helicalcoil heat exchanger, non destructive, warm conductivity, minimal expense, light in weight, hot vegetable oil base*

1. INTRODUCTION

Heat recuperation is the catch of energy contained in liquids in any case that would be lost from an office. Heat sources might incorporate intensity siphons, chillers, steam condensate lines, hot pipe gases from evaporator, hot air related with kitchen and clothing offices, fumes

gases of the motors, power-age hardware. Helical loop Heat exchanger is one of the gadgets which are utilized for the intensity recuperation framework. An intensity exchanger is a gadget used to move heat between at least two liquids with various temperatures for different application including power plants, atomic reactors, refrigeration and cool framework, car ventures, heat recuperation framework, substance handling and food businesses. Normal instances of intensity exchangers in regular use are air pre-warmers and conditioners, car radiators, condensers, evaporators, and coolers . Other than the presentation of the intensity exchanger being improved, the intensity move upgrade empowers the size of the intensity exchanger to be extensively diminished. Helical curl heat exchangers are one of the most well-known gear tracked down in numerous modern applications. A few examinations have shown that helically snaked tubes are better than straight cylinders when utilized in heat move applications. The divergent power because of the curve of the cylinder brings about the optional stream advancement which upgrades the intensity move rate. This peculiarity can be helpful particularly in laminar stream system. Warm execution and strain drop of a shell and helically looped tube heat exchanger with and without helical pleated blades have been examined by Naphon. Naphon and Wong wisers gave a writing survey on heat move and stream qualities of single-stage and two-gradually ease stream in bended cylinders including helically wound tubes and spirally looped tubes.

2. MOTIVATION

Helical loops are utilized for different cycles, for example, heat exchangers since they can oblige an enormous intensity move region in a little space, with high intensity move coefficient. In the snaked tube, the stream adjustment is because of radiating powers. The divergent powers are following up on the moving liquid because of the shape of the cylinder brings about the advancement of optional stream which improves the intensity move rate. This peculiarity can be helpful particularly in laminar stream. Helical looped tubes are utilized in an assortment of uses including food handling atomic reactors, conservative intensity exchangers, heat recuperation frameworks, synthetic handling and clinical gear.

3. PROBLEM STATEMENT

From the writing audit, it uncovered that there are not many examinations on the intensity recuperation framework. Perhaps the main procedure are utilization of helical curl heat exchanger. Heat move from boiling water to cold water by helical curled tube for heat recuperation framework. The course through the bended cylinder builds the optional stream development and upgrades the intensity move rate, which is unimaginable in straight cylinder. A couple of examinations on the intensity move coefficients of roundabout loop heat

exchangers thinking about the mathematical impacts. The distributed exploration paper shows the impact of progress calculations, arch proportion, loop pitch and helix on warm and hydrodynamic execution. The intensity move coefficients of shell and helically snaked tube heat exchangers researched tentatively. Three intensity exchangers with various loop pitches were chosen as test segment for both equal stream and counter-stream arrangements. Every one of the expected boundaries like delta and outlet temperatures of cylinder side and shell-side liquids, stream pace of liquids, and so on were estimated utilizing fitting instruments. Absolutely, 75 trials were performed from which the cylinder side and shell-side intensity move coefficients were determined. Observational connections were proposed for shell-side and cylinder side. The determined intensity move coefficients of cylinder side were likewise analyzed.

4. SHELL AND TUBE HEAT EXCHANGER

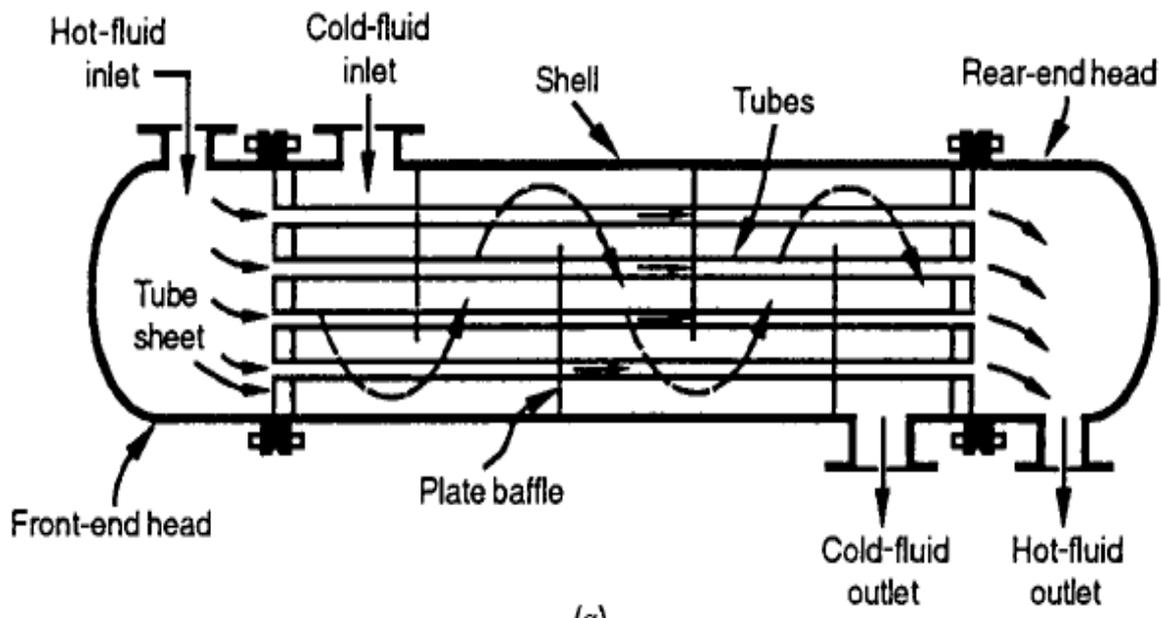


Fig.1: Shell and tube heat exchanger

5. COMPLETE LOOK OF PROJECT

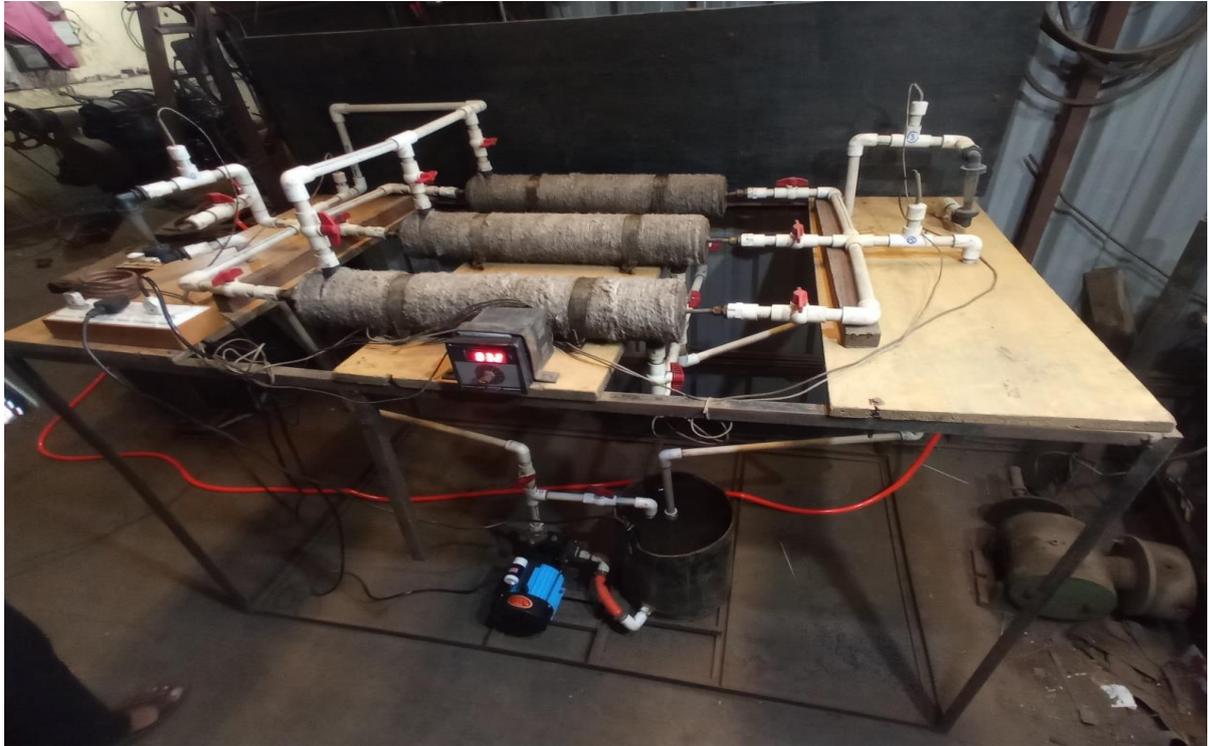


Fig.2: Project Prototype

6. METHODOLOGY

In straightforward shell and cylinder heat exchangers, heat is moved from one liquid to the next working liquid without obviously connecting with the isolating dividers while in helical loop heat exchangers, there happens choppiness because of helix of the loop. This choppiness of the liquid causes vibrations in the helical curl. However, these-vibration are not adequate at low speed (mass stream rate). Mechanical plan of helical loop heat exchanger comprises of the plan computations which relate the material strength, stability, heartiness and so forth with the working circumstances in which the framework is to be introduced. In the helical curl heat exchanger, the strength expected of a component in a framework is a significant factor. Consequently, strength is a plan thought for the defend of math and the components of the component.

Consequently, there ought to be adjustments in the mechanical plan of the helical curl to decrease the impacts of these constraint plan conditions.

7. APPLICATIONS

Utilization of a helical curl heat exchangers were increment the intensity move coefficient contrasted with a likewise dimensioned straight cylinder heat exchanger. The utilization of the helical loop heat exchanger is as per the following: 1. Hot pipe gases from boilers can give a wellspring of waste intensity for an assortment of purposes. The most well-known use is for preheating kettle feed water. Heat exchangers utilized in pipes should be developed to endure the exceptionally destructive nature of cooled vent gases. 2. The refrigeration pattern of a climate control system or intensity siphon gives a chance to recuperate heat for water warming. 3. Heat exchangers can be put on debilitates of responding motors and gas turbines to catch heat for water warming or steam age. 4. Water coats may likewise be put in on motors in request to catch heat from the motor and exhaust in series. A portion of this hardware likewise goes about as a silencer to supplant or enhance commotion decrease gear expected to meet clamor control necessities. 5. Helical curls are utilized to recuperate the intensity from the vent gases, hot air from kitchen, fumes gas from the motors. 6. Helical curls are utilized for moving intensity in compound reactors and disturbed vessels since heat move coefficients are higher in helical loops. This is particularly significant when compound responses have high warms of response are done and the intensity created (or consumed) must be moved quickly to keep up with the temperature of there activity. Likewise, on the grounds that helical curls have a reduced setup, more intensity MANUFACTURING AND THERMAL ANALYSIS OF HELICAL COIL HEAT EXCHANGER 19 exchange surface can be given per unit of room than by the utilization of straight cylinders. 7. In view of the minimal setup of helical curls, they can be promptly utilized in heat move application with space restrictions, for instance, in steam ages in marine and modern applications.

8. FUTURE SCOPE

Throughout this exposition, many inquiries, thoughts and potential open doors became clear. The work introduced in this postulation gives as a powerful examination of helical loops. The proposing issues for the future review are given underneath

- The CFD investigation is expected to notice genuine stream design.
- Exploratory examination of waste intensity recuperation from vent gases in kettle.
- Trial investigation for cooling oil for gas powered motors.
- In marine applications for cooling of decontaminated water.

9. CONCLUSION

In this work, heat move from the boiling water to cold water by utilizing helical looped tubes by fluctuating the pitch of the curls are examined tentatively for the intensity recuperation framework. The relative review made for a similar limit conditions and convective surface area of curl. The intensity move examination made in the laminar stream area. From the consequence of the current review, it was found that the cylinder side intensity move coefficients of the more prominent pitch shows higher worth of intensity move coefficient. The trials information were utilized to decide Nusselt number of inside the snaked tube with for various pitch. It was seen that the general intensity move coefficient increments with expansion in the curl side Reynolds number for a consistent stream rate inside the shell. The outcome shows that intensity move is something else for the sharp sounding loop.

REFERENCES

- [1] Salimpour M. R. Heat move Coefficients of shell and snaked tube heat exchangers, *Experimental Thermal and Fluid science*, 2009, 33, pp. 203-207.
- [2] Shokouhmand H., M.R. Salimpour, Akhavan-Behabadi M.A. , *Experimental examination of shell and wound tube heat exchangers utilizing wilson plots, global Communications in Heat and Mass Transfer*, 2008, 35, pp. 84 92.
- [3] Heat Transfer Coefficients for Particulate Airflow in Shell and Coiled Tube Heat Exchangers W. Witchayanuwat and S. Kheawhom *World Academy of Science, Engineering and Technology* 53 2009.
- [4] *Basics of Heat Exchanger Design*. Ramesh K. Shah and Dušan P. Sekulic.
- [5] *A few exploratory examinations on heat move increase for stream of fluid through roundabout cylinders utilizing curved points and tapes* , Ranjit Gouda (10400015) and Amit Bikram Das (10400023), branch of synthetic designing public foundation of innovation Rourkela, 2008
- [6] *Trial Prediction of Heat Transfer Correlations in Heat Exchangers* Tomasz Sobota *Cracow University of Technology* , Poland.
- [7] *Reduced heat exchangers choice, plan and activity*, John E. Hesselgreaves, division of Mechanical and substance Engineering, Heriot Watt University, UK(2001) 8. *Heat exchangers choice rating and warm plan* by Sadik Kakec, CRC press, Washington D. C.