A

Project Report

On

Implementation of Traditional and Non-Traditional Optimization Algorithms for Heat Exchanger Design

Submitted by

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(109CH0492)

In partial fulfillment of the requirements for the degree in

Bachelor of Technology in Chemical Engineering

Under the guidance of

Dr. Madhusree Kundu

DEPARTMENT OF CHEMICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA

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CERTIFICATE

*This is to certify that the project report entitled, "*Implementation of Traditional and Non-Traditional Optimization Algorithms for Heat Exchanger Design*", submitted by* ***Gaurav Singh****(109CH0492) in partial fulfillments for the requirements for an award of Bachelor of Technology Degree in Chemical Engineering at National Institute of Technology, Rourkela is prepared by him under my supervision and guidance and this work has not been submitted elsewhere for a degree.*

Date: 8th June , 2013

Place:

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ABSTRACT

The transfer of heat to and from process fluids is an essential part of most of the chemical processes. So the Heat Exchangers (HEs) are used extensively and regularly in the process and allied industries and are very important during design and operation. The most commonly used type of heat exchangers are double pipe heat exchangers and shell-and-tube heat exchangers. Shell-and-tube heat exchangers are used extensively in engineering applications like power generations, refrigeration and air-conditioning, petrochemical industries etc. These heat exchangers can be designed for almost any capacity. A primary objective in the heat exchanger (HE) design is the estimation of the minimum heat transfer area required for a given heat duty, as it governs the overall cost of the heat exchanger. However, many number of combinations of the design variables are possible. The design variables in a double pipe heat exchanger are-inner pipe diameter and thickness, outer pipe diameter and length of the exchanger. The design variables in a shell and tube heat exchanger are- tube outer diameter, tube pitch, tube length, number of tube passes, baffle spacing and baffle cut. Kern's method is used to find the heat transfer area for a given design configuration. The heat exchanger thus designed should perform the given duty subject to some pressure drop constraints and have the minimum heat transfer area.

Keywords: Heat exchanger design, Shell-and-tube heat exchanger, Double pipe heat exchanger, Optimization, Genetic algorithms.

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