`

CERTIFICATE

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly DELHI COLLEGE OF ENGINEERING)

This is to certify that report entitled **"CFD ANALYSIS OF JET IMPINGEMENT TRANSFER OF HEAT IN MICROCHANNEL"** by **MR. ROHIT KUMAR is** the requirement of the partial fulfillment for the award of Degree of **Master of Technology (M.Tech)** in **Thermal Engineering** at **Delhi Technological University, New Delhi.** This work was completed under my supervision and guidance. He has completed his work with utmost sincerity and diligence. The work embodied in this project has not been submitted for the award of any other degree to the best of my knowledge.

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ABSTRACT

This study evaluated a micro-jet impingement heat sink for the cooling of electronic field at micro level devices. In this study, we focused on the 3-D flow of different fluid through the channel and transfer of heat with jet impingement heat sink are simulate numerically using De-Ionized Ultra-Filtered (DIUF) water, water and Performance fluid (PF-5052) , HF-7100 was used as a coolant to flow through the micro-nozzles which is fixed to the channel. For the micro channel heat sink investigated and obtained that the temperature distribution along the flow direction in the solid and fluid regions have linear behavior.

In this work we are using six different martial (copper , aluminium , steel , silicon , titanium , nickel) which is used to make substrate of the micro channel and four fluid (water , De-Ionized Ultra-Filtered (DIUF) water, Performance fluid-5052, HF-7100) are used for flowing through the micro channel and heat transfer coefficient and temperature distribution is obtained .

It is observed that Copper has the highest value of heat transfer coefficient as compared to the other materials as shown in the table 1.

Copper and working fluid De-Ionized Ultra-Filtered (DIUF) water have the highest heat transfer coefficient and Nusselt number value. So that the micro channel which is made by copper with flow of DIUF water in the micro channel are used for better cooling results.

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ROHIT KUMAR

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LIST OF ABBREVIATIONS

A_s	Surface area of substrate base, m^2
A_j	Area of the Nozzle Cross section, m^2
C_p	Specific Heat at Constant Pressure, J/kg-K
d_n	Diameter of the nozzle , m
H_c	Height of the Channel, m
h	Heat transfer coefficient/m^2 K
k	Thermal conductivity, W/m K
l_x	Length of the heat sink ,m
l_y	Width of the heat sink ,m
l_z	Height of the heat sink ,m
n	Number of jets
q	Heat flux, W/m^2

R_{th} Thermal resistance

T_s Temperature of solid, K

T_f Temperature of the fluid, K

ΔT Temperature rise, K

v Velocity of fluid, m/s

T_{in} Temperature of fluid at inlet, K

T_{max} Maximum Temperature, K

Re Reynolds number

W_{ch} Channel width, m

W_{jet} Jets width, m

x,y,z Cartesian coordinates

LIST OF TABLES

LIST OF FIGURES

Figure No. **Page No.**