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A STUDY ON NORTH SOUTH BRIDGE AND PROCESSOR HEAT SINK

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***Abstract*- The appropriate operating temperature of the processor depend upon its manufacturer and processor speed where the sensor is to be found and what programs is currently running. In the present work the studies were performed in order to optimize geometrical fin parameters for natural convective heat transfer from continuous and discontinuous heat sink installed at North and south bridge and at CPU main processor in computer system and discontinuous heat sink proposed for geometrical and cost effective material optimization. In the present work it has been observed that the interrupted fins exhibit a thermal boundary layer interruption which helps increase the heat transfer rate. The study aspires to deal with shortcoming by investigating the effect of fin interruption on the efficiency with which the heat is transferred from the heat sink to the environment. In addition fin interruption leads to noteworthy weight reduction which can lower the manufacturing costs. In contrast adding up interruptions that reduce the heat transfer rate which decrease the total heat transfer rate from the surface area. These two opposing effects clearly indicate that an optimum fin interruption provide the maximum heat transfer rate from naturally cooled heat sink.**

***Keywords*- Heat sink, Interrupted Fins, Natural Convection, North and south bridge etc.**

I. INTRODUCTION

The heat transfer through the heat sinks present in flow channel can be increased by employing modification in passive surfaces, such as extended surfaces with geometrical modifications. These techniques are having wide application such as cooling turbine aerofoil, electronic cooling systems, biomedical instruments, and heat exchangers. The pin fin technology is widely used in many applications such as computer mother board heat sink over microprocessor.

The configuration of productive cooling systems is fundamental for solid execution of high power thickness gadgets. Various disappointment systems in electronic gadgets, for example, between metallic development, metal movement, and void arrangement, are identified with thermal impacts. Truth is told, the rate of such failures about pairs with each 10°C increment over the working temperature (~80°C) of high power hardware [1]. Other than the harm that overabundance thermally can bring about, it builds the development of free electrons inside of semiconductors, creating an expansion in sign commotion [2]. Therefore, gadgets thermal administration is of critical significance as is reflected in the business sector. Thermal administration items demonstrate a development from about $7.5 billion in 2010 to $8 billion in 2011, and it is required to develop to $10.9 billion in 2016, a compound yearly development rate increment of 6.4%. Warm administration equipment, e.g. fans and thermally sinks, represents around 84% of the aggregate business sector. Other primary cooling item sections, e.g. programming, interface materials, and substrates, every record for somewhere around 4% and 6% of the business sector, separately. The North American business sector will keep up its number one position all through this period, with a piece of the overall industry of around 37%, trailed by Asia-Pacific with roughly 23% to 24% [3].This power scattering creates heat, which is a by-item in numerous designing applications. This undesirable by-item can diminish the execution of the frameworks since verging on each building framework is intended to work inside of a specific temperature limits. Overheating so as to surpass these breaking points, could prompt a framework disappointment.

As of now, the thermal misfortunes of influence electronic gadgets are expanding. In the meantime, their sizes are diminishing. Hence, warm sinks need to scatter higher thermally fluxes in each new outline. Accordingly, conceiving proficient cooling answers for meet these difficulties is of fundamental significance and impact sly affects the execution and unwavering quality of electronic and force electronic gadgets.

II. LITERNATURE REVIEW

Singh, B. Ubhi., et.al. [1], they have composed and broke down the warmth exchange through blade expansion in plate balances. They learned about different geometries, for example, rectangular, trapezium, triangular, and round expansions in plate balances. The outcomes demonstrated that plate blade with augmentations gave 5% to 13% more warmth exchange than balance without expansions. The adequacy of rectangular augmentation plate balance is more than alternate sorts of expansion.

S. R Pawar and R. B. Varasu [2], they have the warmth exchange by common convection from triangular scored blade exhibit. They learned about various indent geometries, for example, balance without score, blade with 20% indent with territory remuneration and balance with 40% indent with range pay as for different parameters, for example, tallness, length, score measurement, balance separating and balance thickness. The studies demonstrated that warmth exchange coefficient is lower in indented blade when contrasted with without score. There was 7% expansion in warmth exchange for 20% scored blade and 10% for 40% indent balance. The warmth exchange increments with expansion in indent size with territory remuneration.

U. S. Gawai, Mathew V. K. et.al. [3], they have done exploratory examination of warmth exchange by pin balance. The outcomes for single blade of aluminum and metal were concentrated on for warmth exchange. The outcomes demonstrated that the warmth exchange coefficient and proficiency of aluminum balance was more prominent than the metal blade.

D. D. Palande and Walunj et. al [4], they have done exploratory examination of grade thin plate blades heat sink under common convection. They have probed blades as for perspective proportion and distinctive radiator data wattage the outcome demonstrated that regular convection heat exchange increments with warmth information. The convective warmth exchange increments with viewpoint proportion.

Hagote and Dahake et. al [5], they have improved the normal convection heat exchange coefficient by utilizing V-balance cluster. They dissected the V-balance utilizing ANSYS CFX and tentatively. They utilized plate blades where the balances were organized at a slant of 60o. The greatest convective warmth exchange got was 600.

Karthikegn, Babu et.al. [6], they outlined and dissected the regular convection heat exchange coefficient between rectangular blade exhibit with expansion and balance cluster without augmentation. The warmth exchange through blade cluster with rectangular expansion, roundabout augmentation, trapezoidal expansion, triangular expansion, 18mm aperture, 20 mm puncturing, 22 mm aperture, 24 mm puncturing were 27.32, 25.63, 25.62, 24.68, 23.82, 23.52, 22.97, 22.63 separately. The blade exhibit with rectangular expansions has least temperature toward the end of balance cluster, when contrasted with balance exhibit with rectangular augmentation, without augmentation and with aperture.

M. Reddy and G. Shivashankaran et al. [7], they have done numerical recreation of constrained convection heat exchange upgrade by permeable pin balance in rectangular channel. They had learned about round, long circular and short curved pin blade heat sink by changing gulf speeds i.e. 0.5m/s, 1m/s, 1.5m/s and 2m/s utilizing ANSYS CFD familiar programming. The outcome demonstrated that the warmth move efficiencies in permeable pin balance are around half higher than strong pin balance.

M. Ali, Tabassum et.al. [8], they have performed warm and water driven examination of rectangular balance exhibits with various aperture size and number. They have done analysis study by taking base range 1088 mm2. They changed puncturing from 0 to 2, and differed aperture breadth structure 0mm to 3mm. The outcomes demonstrated that warmth exchange and weight drop expanded with expansion in Reynolds number for all balances. With trials it was found that with increasingly or bigger holes the proficiency and viability expanded, though the warm resistance and weight drop diminished.

K. Kumar, Vinay et.al. [9], they performed warm and auxiliary investigation of tree formed blade exhibit. They had brought tree formed blade with openings and tree molded balance without spaces for their investigation. They additionally concentrated on the impact of material on the outcomes for the same geometries by taking aluminum composite, auxiliary steel and copper

combination for the same. The outcomes got demonstrated that the abilities of the opened tree balances are superior to without opened tree blades. As indicated by material the copper blades with openings was best for warmth exchange among every one of the balances. The aluminum opened blade was discovered best as it has successful warmth exchange without distortion among every one of the balances taken for the study.

Kumar and Bartaria et al.[10], they have done exploratory and CFD examination of a circular pin balance heat sink utilizing Ansys Fluent v.12.1. They have done the study by changing the measurement of curved pin blade i.e. by shifting the cross-segment territory. The outcomes demonstrated that for every one of the speeds 2mm minor pivot circular pin balance would be wise to warm resistance and weight drop.

III. METHODOLOGY

A. The Motherboard

The main printed circuit board in a computer is known as the Motherboard. The motherboard acts as the connection point where major computer components are attached to. It holds many of the crucial components of the system like the processor, memory, expansion slots and connects directly or indirectly to every part of the PC. The type of motherboard installed in a PC has a great effect on system speed and expansion capabilities.

B. CPU- Central Processing Unit

The processor chip is identified by the processor type and the manufacturer; and this information is usually inscribed on the processor chip e.g. Intel 386, Advanced Micro Devices (AMD) 386, Cyrix 486, Pentium MMX, (old processor types) Intel Core 2Duo etc.

C. Main Memory / Random Access memory (RAM)

Random access memory is volatile memory, meaning it loses its contents once power is turned off. This is different from non-volatile memory such as hard disks and flash memory, which do not require a power source to retain data. When a computer shuts down properly, all data located in random access memory is returned back to permanent storage on the hard drive or flash drive. At the next boot-up, RAM begins to fill with programs automatically loaded at startup, and with files opened by the user a process called booting.

D. BIOS- Basic Input Output System

All motherboards include a small block of Read Only Memory (ROM) which is separate from the main system memory used for loading and running software. On PCs, the BIOS contains all the code required to control the keyboard, display screen, disk drives, serial communications, and a number of miscellaneous functions.

E. CMOS-Complementary Metal Oxide Semiconductor

Motherboards also include a small separate block of memory made from CMOS RAM chips which is kept alive by a battery (known as a CMOS battery) even when the PC's power is off. This prevents reconfiguration when the PC is powered on.

F. Expansion Buses

An input/output pathway from the CPU to peripheral devices typically made up of a series of slots on the motherboard. Expansion boards (cards) plug into the bus. PCI is the common expansion bus in a PC and other hardware platforms. Buses carry signals, such as data; memory addresses, power and control signals from component to component.

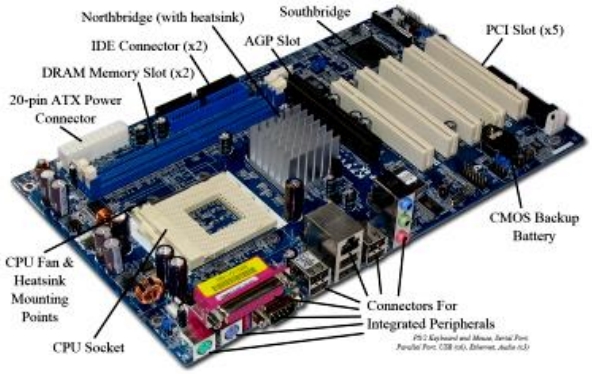

Figure 1: Main parts of motherboard

G. CPU Clock

The clock synchronizes the operation of all parts of the PC and provides the basic timing signal for the CPU. Using a quartz crystal, the CPU clock breathes life into the microprocessor by feeding it a constant flow of pulses. For example, a 200 MHz CPU receives 200 million pulses per second from the clock.

H. Switches And Jumpers

DIP (Dual In-line Package) switches are small electronic switches found on the circuit board that can be turned on or off just like a normal switch. They are very small and so are usually flipped with a pointed object such as a screwdriver, bent paper clip or pen top. Care should be taken when cleaning near DIP switches as some solvents may destroy them.

Figure 2: North and south bridge heat sink

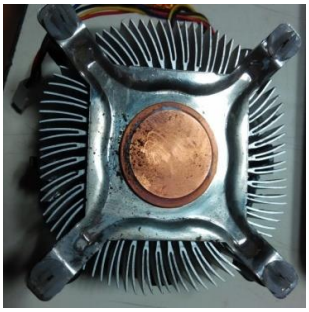

Figure 3: CPU heat sink with copper block on bottom side of the motherboard

Figure 4: CPU heat sink with copper block on fan side of the motherboard

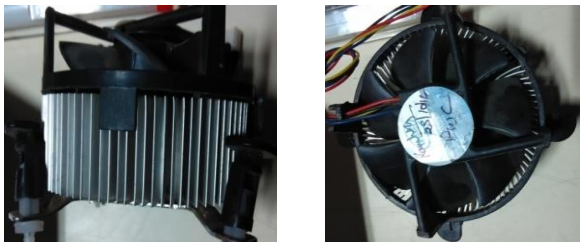

Figure 5: Complete assembly of CPU Heat sink with Fan

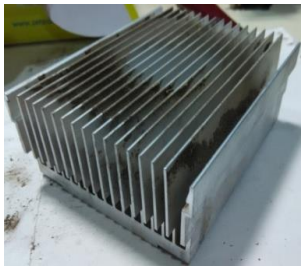

Figure 6: CPU Heat sink

Figure 7: CPU Heat sink

IV. CONCLUSION

The studies were performed in order to optimize geometrical fin parameters for natural convective heat transfer from continuous fins installed in our computer system and discontinuous fin proposed for geometrical and cost effective material optimization.

Carefully estimating thermal resistance is important for the long-term reliability of any Integrated Circuit. Design engineers should always correlate the power consumption of the device with the maximum allowable Power dissipation of the package selected for that device using the provided thermal resistance parameters. Discontinuous fin maximize the total natural convective heat transfer as compared to continuous fin. In the present work two types of CPU heat sink are used for thermal analysis first one is rectangular heat sink and another one is circular. Since rectangular heat sink are checked for continuous and discontinuous heat sink from which discontinuous heat sink gives better heat convection from the heat of central processing unit. The circular CPU heat sink design is safe and generating temperature on it is not serious to intense it that is why CPU heat sink is safe during the thermal analysis and there is no need to change its design.

REFERENCES

[1] P. Singh, H. Lal, B. S. Ubhi, "Design and Analysis for Heat Transfer Through Fin with Extensions", International Journal of Innovative Research in Science, Engineering and Technology, Vol.3, Issue 5, May 2014.

[2] Sachin R. Pawar, R. Yadav, "Computational Analysis of Heat Transfer by Natural Convection from Triangular Notched Fin Array", IJST- International Journal of Science Technology & Engineering, Vol-1, Issue 10, April 2015.

[3] U. S. Gawai, Mathew V. K., Murtuza S. D., "Experimental Investigation Of Heat Transfer By Pin Fin", International Journal Of Engineering And Innovative Technology (IJEIT), Vol-2, Issue 7, January 2013.

[4] A. A. Walunj, D. D. Palande, "Experimental Analysis Of Inclined Narrow Plate- Fins Heat Sink Under Natural Convection", IPASJ International Journal Of Mechanical Engineering(IIJME), Vol. 2, Issue- 6, June 2014.

[5] R. Hagote, S. K. Dahake, "Enhancement Of Natural Convection Heat Transfer Coefficient By Using V- Fin Array", International Journal Of Engineering Research And General Science, Vol-3, Issue-2, April 2015.

[6] V. Karthikeyan, R. Suresh Babu, G. Vignesh Kumar, "Design and Analysis of Natural Convective Heat Transfer Coefficient Comparison between Rectangular Fin Array with Perforated and Fin Arrays with Extension", International Journal of Science, Engineering and Technology Research (IJSETR), Vol-4, Issue-2, February 2015.

[7] M. Reddy, G. S. Shivanshankar, "Numerical Simulation of Forced Convection Heat Transfer Enhancement by Porous Pin Fins In Rectangular Channels", International Journal of Mechanical Engineering and Technology (IJMET), Vol-5, Issue-7, July 2014.

[8] M. Ehteshum, M. Ali, M. Tabassum, "Thermal and Hydraulic Performance Analysis of Rectangular Fin Arrays With Perforation Size and Number". 6th BSE International Conference On Thermal Engineering (ICTE 2014), Procedia Engineering

[9] K. Kumar, P. Vinay, R. Siddhardha, "Thermal and Structural Analysis of Tree Shaped Fin Array", Int. Journal of Engineering Research and Applications", Vol-3, Issue- 6, Dec 2013.