American Journal of Engineering Research (AJER)
e-ISSN: 2320-0847 p-ISSN: 2320-0936
Volume-14, Issue-12, pp-56-61
www.ajer.org
Research Paper Open Access

Important of Pin Trapezium and Hybrid Fins Heat Sink LED Bulb

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Abstract
The power sector in Libya and other developing countries is under severe stress because of generation supply dificits and high fuel costs .
The electricity supply- demand gap in most developing countries is increasing rapidly as a result of the fast growing demand for electricity to meet econmic growth, increasing urbanization, generation capacity deficits, high costs of new generation capacity, and fuel supply issues .
From a menu of demand- side energy – efficiency efficiency measures, energy – efficient Lighting technologies offer one of the supply – demand gap in many developing countries .
The incandescent Lamps have been found to consume much energy compared to fluorescence fluorescence bulbs .
Recently attention has shifted to Light Emitting! Diodes (LED) for their advantage of using small electrical Energy to deliver Luminous Lights.
As enormous as the advantages of LED's bulbs are over the incandescent bulb's and Compact fluorescence bulb's, The problem of heat dissipation in LED's drastically reduce their efficiency and in Some Cases damage the bulb before One quarter of their expected the ted Life.
one factor that makes it easy or difficult for generated heat to disperse from the source of generation is the temperature of the surrounding air and adjacent materials to the heat source.
Many imported LED bulbs have been found to fail, shortly after installation. This invention addresses this problem by ensuring Large surface areas for Convective heat transfer away from the chip junction, through the installation of a hybrid pin and trapezium fin aluminum heat sink .

Date of Submission: 12-12-2025 Date of acceptance: 24-12-2025

I. Introduction

Access to energy is the dividing Line between the poor and rich Countries.
This explains why the developed Countries of the World have and Consume Far More energy than the developing and under developed Countries. If any Country must tackle the problem of poverty, the country will need to provide energy for her Citizens. Energy efficiency does not mean that we should not use energy, but we should not use energy, but We should use energy in a manner that will minimize the amount of energy needed to provide services. This is possible if we improve inpractices and products that we energy efficient applications, it will help to reduce the energy necessary to provide Services Like Lighting, Cooling heating, manufacturing, Cooking, transport entertainment etc, Hence, energy efficiency products essentially help to do more work with Less energy.
For instance, to room with an incandescent Light bulb of 60 W for one one hour requires 60 w/h (60 watts per hoar)

- A Compact fluorescent Light bulb would provide the same or better Light at 11 W and only use 11 W/h.

This means that 49 W (82% of energy) is Saved for each hour the Light is tarned on (Uyigue et, 2009).
A LED bulb Would achieve the same Luminosity with 2-5 Watts.
The major challenge has been that energy Currently Consume in the Country Experts have asserted that Libya Can save up to half of the energy currently Consumed in the Country if energy is efficiently utilized, The major challenge has been that energy in Libya has undermined important and gains of energy efficiently to the enviroment and economic growth. energy efficiency to the environment and economic growth.
energy efficiency will play a pivotal role in ensuring access tol energy.
Efficiency is not only cheaper than all other options, it also Leads to growth in jobs and personal income. By reducing energy bills, , it free up money that can be spent elsewhere in the 'economy (Lyigue et al, 2009). The new generation green solid-state Light source, LED has been widely regarded due to distinction such as high Luminous efficieny advantages such energy saving, Longlifetime, and being enviroment.
It is being developed for solid-state Lighting (SSL) for general illumination in Commercial and household applications while offering up to 75% saving in electric power Consumption over Convential Lighting systems (Fengze 2011). Compact flaorescence energy Saving Lamps (CFESL) has been the most Common energy Saving Lamp in Libya. This has so far imposed Some challenges which Led to the thought of making moves for the provision of alternatives.

II. Problem Statement

The introduction of the first practical visible sold State LED occured in 1962, and was invented by Nick Holonyak of the General Electric Company.
It was discovered that the wavelength of an infrared Gats died could be shifted to the Visible spectrum by the introduction of phosphate dopants.
The introduction of a compatible large band gap material raises the overall band gap thus shiting emission into the Visible spectrum.
White LEDs Can exhibit exceptional Life time exceeding 50000 hrs, when operated under ideal Conditions, unlike an incandescent bulb filament operating at over 1000 C, an LED device temperture kept under 120 C^0. In order to meet this requirement the package and system materials and thermal design become Crucial.
Unlike traditional 5mm devices with thermal resistance of 300-400 K/W a power LED package resistance needs to be less than 20k/w. At elevated tempertures the Lumen depreciation with time is enhanced performance High power LEDs are becoming popular in recent years. Normally, a bout twenty percent of power input to LED is Converted into the Light energy and the remaining eighty percent of energy Converted. rato heat, so it is important to dissipate the generated heat. The higher power, the more the heat is produced. If the heat could not be dissipated immediately, if will Concentrate on the tiny LED chip and cause the junction. temperature of the chip to rise fo a harmful Level. It has been experimentally demonstrated that the Life of LED decreases with increase junction temperture of the chip to rise to a harm ful level, it has been exponentail demonstrates that the life of LED decreases with in crease junction tempertare low junction tempezture is essential for LED performance, which is a distinguishing feature of LED Lamp Versus traditional Since the market requires LEDs have high hig power and packaging density, it poses a Contradiction betwen power density and the operation torperture especially when LEDs are operated at anormal or higher driver current to obtain the desired Lumen output.

III. Objective

The objective of this development is to develop and incorporate a hybrid heat heat sink in LED bulbs production fo quick heat dissipation from the hot spot; Leading to prolonged Bulb Life theref By saving mony from enhancement of the Bulbs operational Lives .

IV. Methodogy

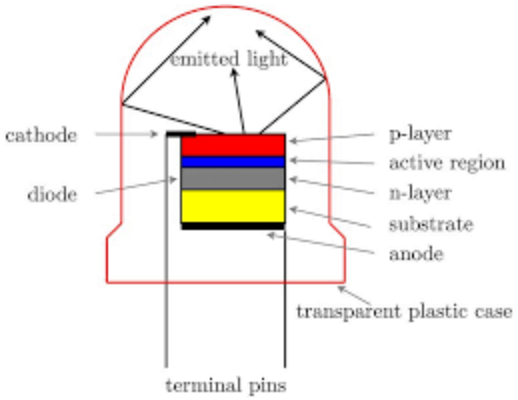
The Work includes the assessment of the failure modes LEDS "followed by heat sink surface area configuration analysis and the determination of hybrid hybrid sink structure for enhanced Capacity heat dissiption from the hot spot. The methodology is known for high accuracy for Conductivity gradient and also incorporate fluid machanics .

V. disscustion

Conventional LED bulbs

The Certain elements found in the middle of the periodic are normally normally instilators, but they can be turned into conductors with chemical lical process called doping and are then Called Semiconductors.- Neither pure silicon (Si) nor garmanium (Ge) is great Conductors.

They form. Crystal Lattice by having each atom share all of it's 4 valence electrons with neighbour ato The total of eight electrons be jiggled out of place by an incoming is however, the Crystalline Crystalline array Coloped (mixed with If, electrons Cannot easily an is (mixed with an impurity, which five Valence hichaaber of the Lattices will The curren change. Four bonds will still be made.



LED . Structure

but there will be a Leftover electron that Can Wander through the crystal
This is Called an . n.type semiconductor Boron can also be used to dope a pure Crystal of silcon. But since boron only offer 3 of the four electrons that a silicon atom needs, each silicon center is left with a hole.

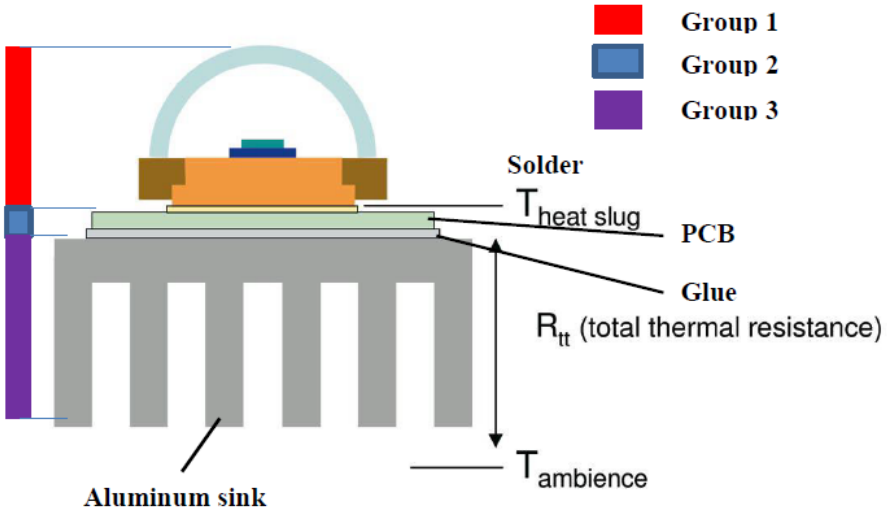


Figure 3: Schematic diagram of LED bulb structure

Semiconductors arranged with p-type and n-type having a junction as shown in fig. above are called diods. Diods only allow electricity to flow in one Direction through them.

VI. Heat Sink

There are two ways for the Cooling of the Heat Sink: passive Cooling and active Cooling However, the fan for active Cooling witt Cause Some problems, such as noise and short life time, thus normally active cooling is not suitable for LED Lamps.
The heat is dissipated mainly by natural Convection of the Lighting body itself. The design of the Lighting body with the function of heat sink is playing an Important role in LED product today.

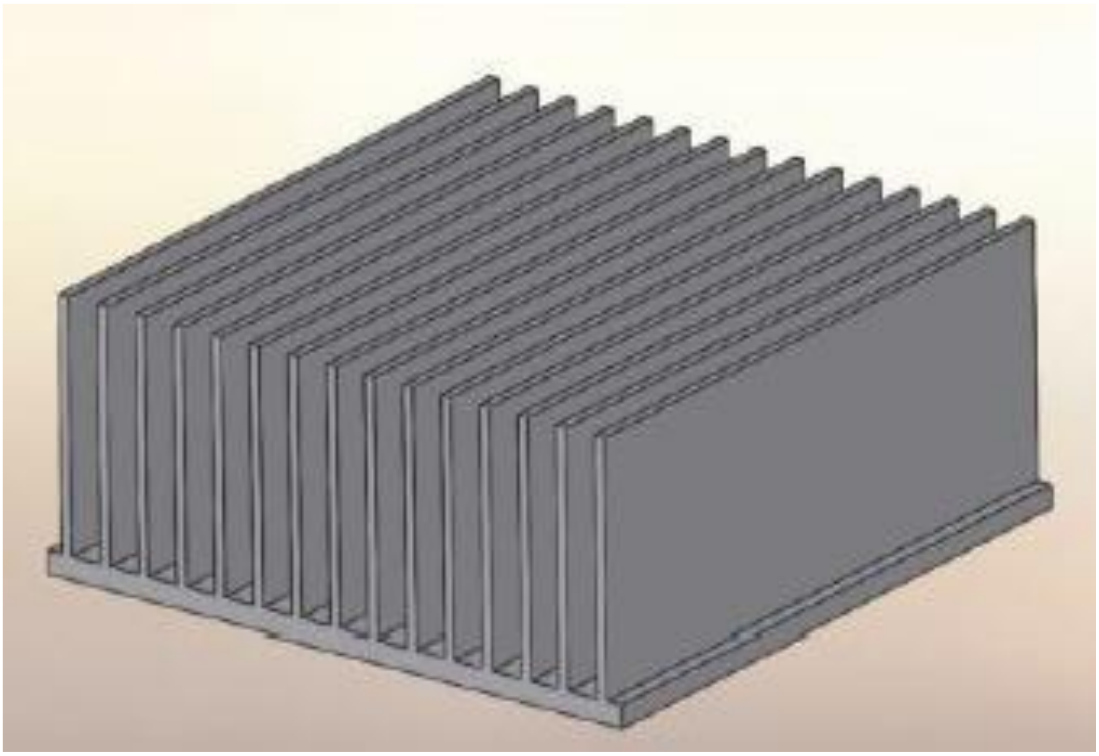


Plate 1: Rectangular heat sink for LESS

Heat Sink

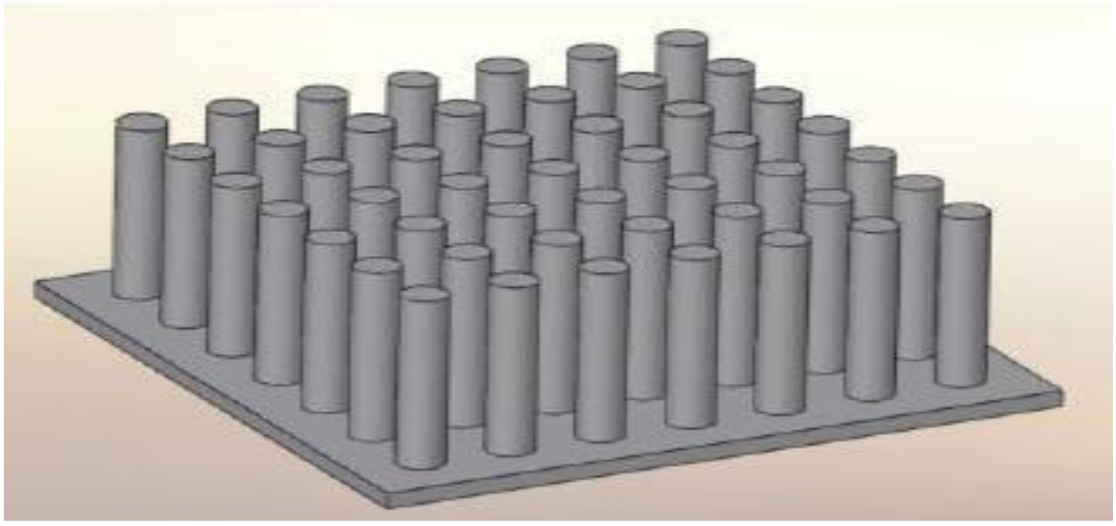


Plate 2: pin fin heat sink for LEDS

There are many devices, heat dissipating devices, such as heat pipe, be, heat sink, , and fan.

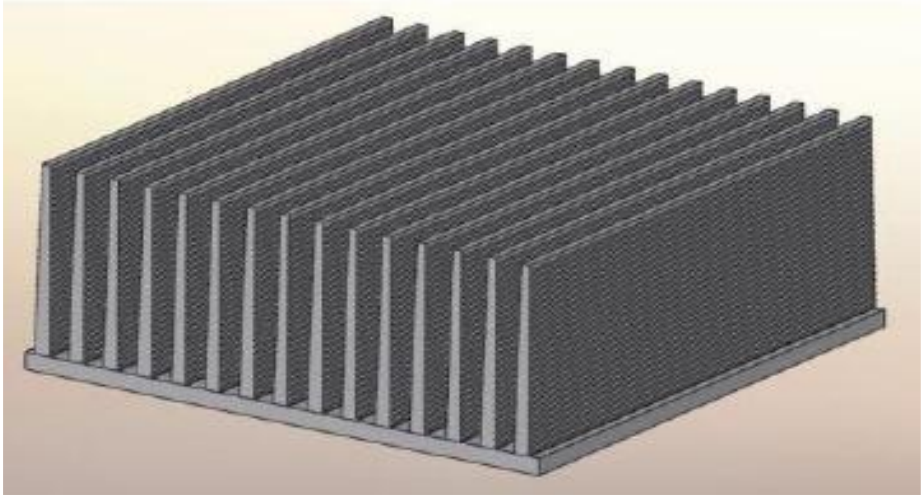
To most LED devices, heat sink ís Favored. The Cooling fins design of heat Sink will affect the LED Luminous efficiency.

This study developed a technology, to design high efficiency heat Sink, for LED desk Lamp.

Light-emitting diode (LED) is Consider a modern Lighting device

Considez aluminum Lighting device heat sink are made of material.

Plat3: trapezoidal scaled fin heat sink



Conventoal heat sink are made of aluminum material .

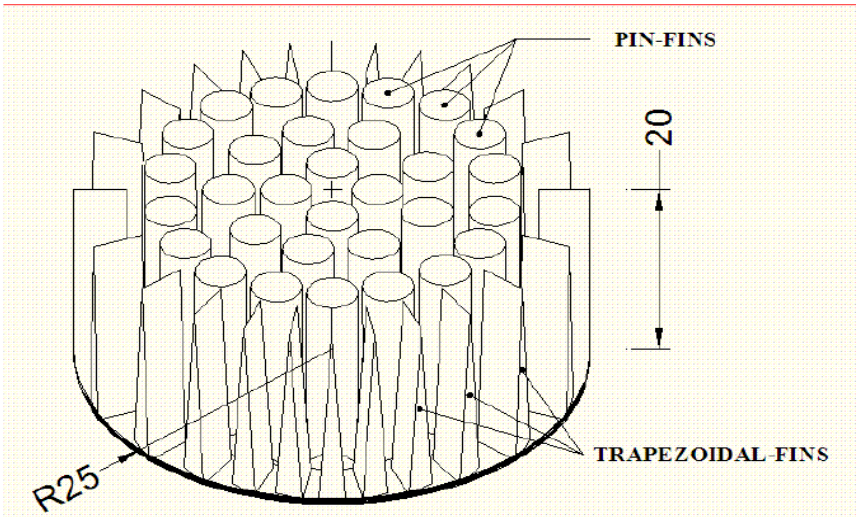


Figure 5: Isometric view of NASENI-ELDI (Pin-Trapezium Hybrid Heat Sink) LED Bulb

The most Common LED applications use heat sinks from aluminum and copper.

In most cases the use of aluminum heat sinks is preferred.
because they are easily handled and have Low weight.
Pure aluminum heat sink shows tempeztures very close to those of Copper heat sink, it has thermal Conductivity and is easily handled and has a cost Lower than that of Copper, which makes it an optimal choice for material for heat sink.
A Comparative thermal simulation results presented on basic recta-rectant fins. pin fins and trapezoidal .

Scaled tapered fins using Solid Works the Least Case tempezture is recorded for trapezoidal scaled fin heat sink at $440c^0$.

VII. Pin Trapezium Hybrid LED Bulb

As we show from the figure, shown the orthographic and isometric Views of the novel pin-trapzium fins and heat Sink Pin Trapezium hybrid fins heat sink LED bulbs are Light emitting diodes with Case tempezture below of equal to $42.56c^0$
This value is optimal Compared to Case tempertures of 46.48 C^0

for the Convential squar or rectangular pin and trapezoidal scaled fins respectively reported by Pal (2014).
Finite Element Analysis (FEA) approach used to execute thermal modeling and, analysis of all models with solid work's
The block diagram LED Arrangement.

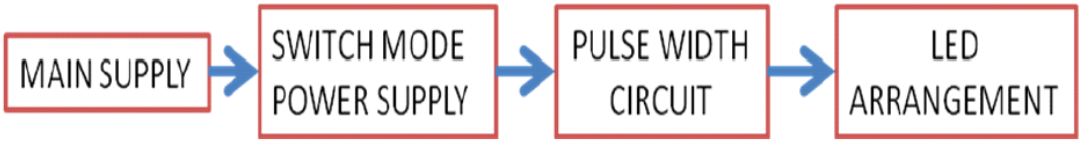
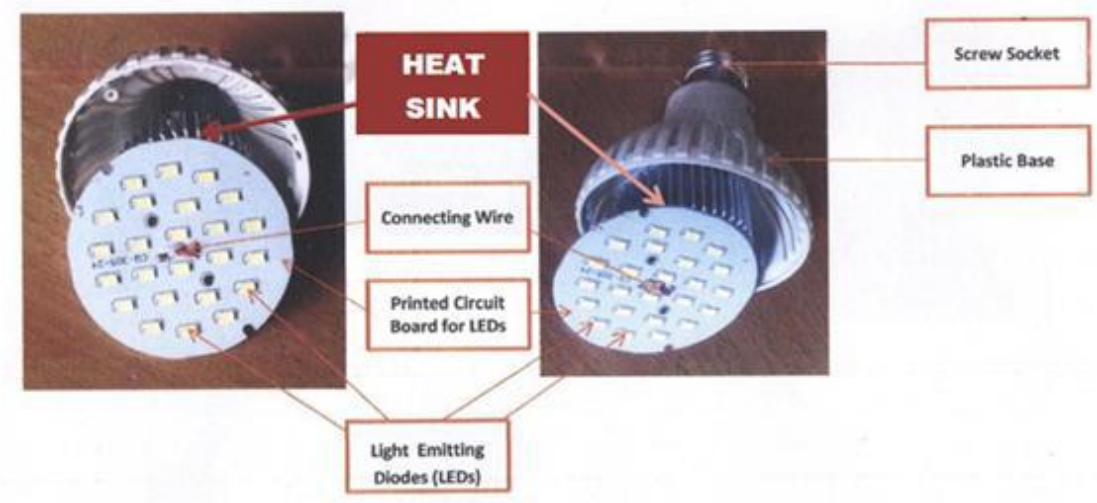


Figure 6: The Block Diagram

VIII. Conclusion

he novel Pin Trapezium fins heat sink Bulb (Plate.4). was developed at the Electronics developments.



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