

Fabrication and Testing of LED Tube Making System

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Abstract - The conventional incandescent and fluorescent lights used today are inefficient in power consumption and environmentally unfriendly. High brightness Light Emitting Diodes (LEDs) can be used as an alternative in indoor and outdoor lighting applications. The average unit cost of locally assembled LED lighting fittings was found to be relatively cheaper than the unit cost of the imported ready-made equivalents. This study draws lessons on industry emergence, by analyzing how a solid-state lighting (SSL) industry grew out of light emitting diode (LED) technologies that evolved for half a century, with participation by tens of thousands of researchers in universities, national laboratories, and firms. A succession of LED market niches advanced the technology and provided profits to incentivize continuing research. Fluorescent plant lighting creates no heat and in this regard, is a much-improved alternative. Fluorescent plant lights do require stabilizer units to work effectively, and these units can be a massive expansion to the size of the plant lights themselves. These plant lights don't need extra ventilation whenever utilized, taking things down a notch, and vital installations are reasonable prices. One of the drawbacks of fluorescent plant lighting is that they are not directional. This implies that to be utilized effectively, reflectors are required. This factor, alongside the installation of extra wiring for balance units, complicates these plant light installations. A major new generation of lighting products is now disrupting the traditional lighting industry. Although the leading incumbent lighting firms all invested early and heavily in SSL, the industry's future leadership is uncertain.

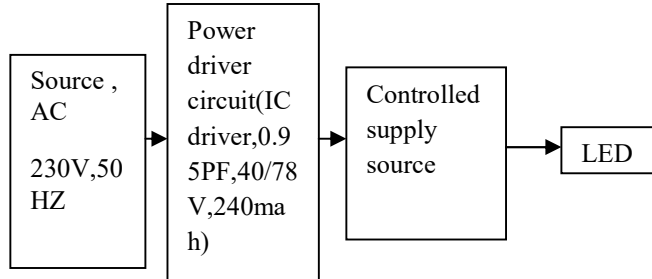
I. INTRODUCTION

LED tube is a type of LED lamp used in fluorescent tube luminaires with G5 and G13 bases to replace traditional fluorescent tubes. As compared to fluorescent tubes, the most important advantages of LED tubes are energy efficiency and long service life. LED tubes are sometimes also referred to as 'LED fluorescent tubes', but since the light actually comes from LED components and the tubes contain no fluorescent substance, 'LED tube' is more correct. In December 2014 was completed a standard for LED tubes (EN2776) that guarantees a safe replacement of the traditional T8 Fluorescent tube. Thanks to the standard, it is possible to replace old fluorescent tubes with LED tubes and use standardized LED tubes regardless of brand. Punching machine (Manual), Tikki (Heatsink), Fitting machine (Handpress), Lumens meter (LuMeter), Heatsink compound (01 KGS), Thermal Adhesive, Screw for PCB fitting (5000 pcs) these are the tools which are used to make the LED tubes. The conventional incandescent and fluorescent lights used today are inefficient in power consumption and environmentally unfriendly. High brightness Light Emitting Diodes (LEDs) can be used as an alternative in indoor and outdoor lighting applications. The average unit cost of locally assembled LED lighting fittings was found to be relatively cheaper than the unit cost of the imported ready-made equivalents. The LED tube standard EN 62776 is based on the

international standard IEC 62776 (Double-capped LED lamps designed to retrofit linear fluorescent lamps – Safety Specifications), which applies to LED tubes compatible with a magnetic as well as an electronic ballast.

II. PROPOSED SYSTEM

Fabrication of LED Tube



Source:

Voltage Range = 230V

Frequency Range = 50Hz

An LED driver is a self contained power supply which regulates the power required for an LED or array of LEDs. The light emitting diodes are low energy, lighting devices with a long lifespan and low energy consumption, hence the requirements for specialized power supplies. So Source which is given to the Power Driver Circuit.

Power Driver Circuits:

An LED driver's main purpose is to rectify higher voltage, alternating current to low voltage, direct current. LED driver also protect LEDs from voltage or current fluctuations too little current can therefore cause light output to vary or degrade faster due to higher temperatures within the LED.

LEDs have become so common in such a short duration of time, because the LED Driver Circuit does not require a transformer in the power supply. The driver circuit design contains AC capacitors which are connected in a line one after another.

Controlled Supply Source:

During the operation, the light source must be protected from line-voltage fluctuations. changes in voltage can produce a disproportional change in current, which in turn can cause light output to vary, as the led output is proportional to current and is rated for current range. if current exceeds the manufacturer recommendations, the LEDs can become brighter, but their light output can degrade at a faster rate due to higher temperatures within the device which leads to a shorter useful life. One definition of useful life for LEDs is the point at which light output is declines by 30 percent.

LED:

Typically the forward voltage of an LED is between 1.8 and 3.3 volts. It varies by the color of the LED. A red LED typically drops 1.8 volts, but since both voltage drop and light frequency increase with band gap, a blue LED may drop from 3 to 3.3 volts. LED has high lumen/watt score. The LED bulb producing 4,000 Lm.

III. MACHINERIES OF LED

TOOLS OF LED:

There are the five tools used to design the Light Emitting Diode.

- Punching machine (Manual)

- Tikki Fitting machine (Handpress)
- Lumens meter(Lux Meter)
- Thermal Adhesive
- Screw for PCB fitting(5000 pcs)

Punching Machine(Manual):



Punching Machine(Manual)

Punching is a separating technique, mainly used to process holes into flat materials like plastic film or sheet metals.

Tikki Fitting Machine(Handpress):

This machine helps you to fit MCPCB in to housing fit faster speed with more accuracy. Tikki Fitting Machine will help you yo press the almunium plate(heat sink) to the level of your housing diffuser . Led bulb tikki fitting machine used for housing like philips type 180 degree and 270 degree syska type . This Machine helps you to fit mcpcb into housing at faster speed with more accuracy. Our fitting machine is very cheap in price and high in quality.



Tikki Fitting Machine

Lumens Meter(Lux Meter):



Lumens Meter(Lux Meter)

A light meter or lumen meter is a device used to measure the amount of light in a certain area. However for our purpose we want to reduce the amount of wasted light which equals wasted electricity. Light meters usually consist of a handheld display unit and a light sensor probe. They measure light in lumens, showing measurements in either lux (1 lumen per square meter) or foot-candles (1 lumen per square foot). Some meters toggle between both units of measure.

Thermal Adhesive:



Thermal Adhesive

Thermal adhesive is a type of thermally conductive glue used for electronic components and heat sinks. Bonds heat sinks to components and parts. It also allows parts and components to be bonded reliably not only to vertical cooling surfaces but also to metallic housing surfaces and side panels without having to use clips, screws or other mechanical forms of fixture. Typical applications include the bonding of transformers, transistors, microprocessors and other heat-generating components to PCBs or coolers. It has numerous advantages compared to traditional adhesive bonds, e.g. thermal hot melt adhesive or epoxy adhesive. It ensures permanent use and reliably complies with the thermal and technical properties. The adhesive is easy to apply and thus considerably reduces both production costs and service repair times.

Screw for PCB fitting:



Screw for PCB fitting

A screw is a mechanism that converts rotational motion to linear motion, and a torque (rotational force) to a linear force. The most common uses of screws are to hold objects together. More than any other tool, the screwdriver is used for jobs it was never meant to do. People use them for chipping, chiselling, scraping, prying, digging, gouging, testing circuits, making holes, stirring paint, propping doors open, and taking the lids off cans. When used improperly, workers have suffered eye injuries from flying fragments of screwdrivers struck with a hammer. However, the most common abuse of the screwdriver is using one that doesn't fit or match the screw. That means using a screwdriver too big or small for the screw or not matched to the screw head. The results are cuts and puncture wounds from slipping screwdrivers.

IV. WORKING PRINCIPLE

LEDs generally produce light when a current runs through them. This occurs when specific types of semiconductor materials are used to create PN diodes. The N side injects electrons into the P side and the P side injects holes into the N side. Then on each side the majority carrier types react with these injected carriers and produce light in the process taking the energy from the electrical current.

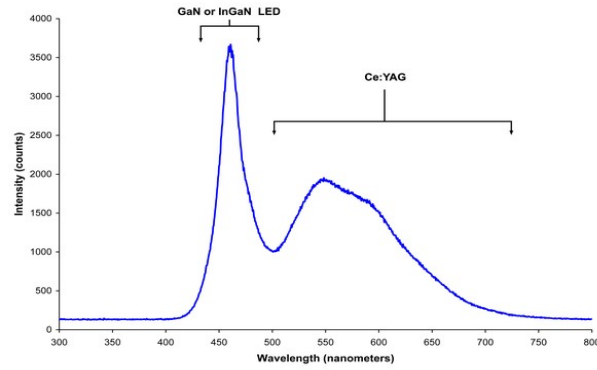
Lighting with LEDs work exactly like mercury-tube-based fluorescents only the source of stimulating light energy comes from an LED rather than a discharge in mercury vapor which produces ultraviolet radiation.

Both types of lighting have phosphors that fluoresce to produce white light. White LEDs used for lighting use a blue, violet or ultraviolet emitting LED to stimulate fluorescence and white light production.

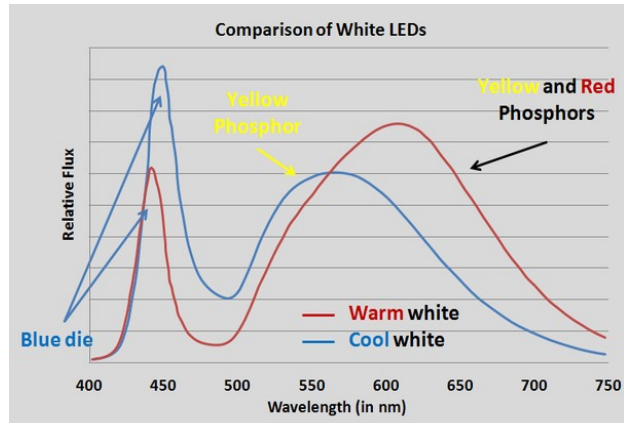


Diagram of LED Tube Light

There is another type of white LED that is used in signage which combined 3 separate red, green and blue LEDs. The added complexity is not desirable for lighting but it gives the ability to create any color you want hence its use in signage and displays.



Characteristic of LED

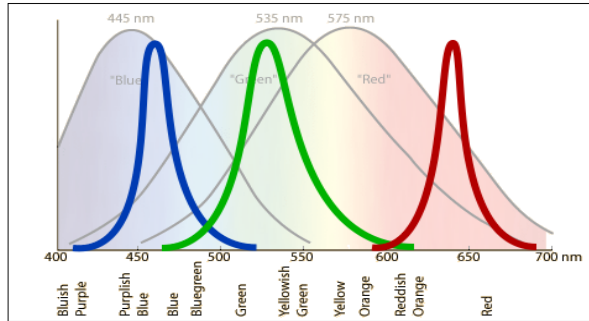


Comparison of White LEDs



Different Colour of LED

There is another type of white LED that is used in signage which combined 3 separate red, green and blue LEDs. The added complexity is not desirable for lighting but it gives the ability to create any color you want hence its use in signage and displays.



Comparison of another Colour LEDs

These work because our eyes only sense red, green and blue light - all other colors are “training” in our brain based on the ratios of these 3 colors. When all three colors are present it is perceived as white. Similarly other color ratios are perceived as other colors.

Strictly in the physical world these LEDs do not produce the light energy/wavelengths that are responsible for colors in the natural world - these LEDs use a limitation of our vision to trick our brain into thinking we are seeing other colors.

V. CONCLUSION

Light Emitting Diodes has such a profound impact on society. It affects our daily lives as well as activities. It is used in so many applications and so many places. With Light Emitting Diodes, so many significant improvements to already existing technology could be made. Historically the LED market has experienced signal digit growth of about 8.5 percent. The laser diode market has experienced double-digit growth in the past of approximately 30.0 percent and once economic conditions improve it is anticipated that the market will experience strong growth rates once again. As this technology expands, so does our horizon and our conquest for the betterment of today’s technology. Light Emitting Diodes truly is a great invention of the age.

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