PUBLICATION

LiteStyx LED Task Light
Kinetic Instruments Inc.
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1. Dual Intense Emitters for Comfortable Shadow-free Illumination

1.1 Generally speaking, most task lighting or illumination of workspaces is limited to a single placement of the light source. As a result, to uniformly bathe a specific task area with light means the source should be positioned directly above the desired location. However, it is apparent that this arrangement conflicts somewhat with the human head. To circumvent this issue, LiteStyx employs dual emitters that can be conveniently placed to the sides of the work area thus providing a very comfortable viewing space between the emitters.

1.2 Although shadow-free illumination is definitely a highly desirable attribute, it is not the only benefit of a dual emitter design. Many work pieces or products contain design details that are multi-directional. That is, there are parts, mechanisms or electronics that are better viewed from the side of the device. In this case, one of the emitters could be placed at, for instance, 10 o'clock and the other at 3 o'clock to more efficiently cover the application with illumination.

1.3 Indeed, if that weren't enough, a single LiteStyx system could be utilized to illuminate two separate operations several feet apart! Considering the cost of high quality LED task lighting systems, it is possible to realize significant enough savings to actually reduce the effective investment in a single LiteStyx system by 50% under those circumstances.

2. Selectable "Forget-Me" 2-Hour Automatic Off

2.1 We consider this feature one of the most pleasurable aspects of the LiteStyx design … our customers overwhelming agree. Inevitably, every day, someone inadvertently leaves lights, appliances, soldering irons, computers, sprinklers, TVs and whatever else can be imagined in their ON position. Wouldn't it be nice if these devices had "brains" and could shut themselves off when not being used? We gave LiteStyx a brain.

2.2 In actuality, it is not really a brain … just a simple electronic device called a micro-controller (MCU). And, it can't really detect when it is not in use because there is no easy way to find out if a real person is using the LiteStyx illumination. Instead, we did the next

best thing with our MCU capability by permitting the user to tell LiteStyx if it should shut off automatically in two hours or stay on indefinitely. The default operation is to turn off automatically, or “Forget-Me” mode.

2.3 To any good engineer, product design and development should embrace those aspects of a new technology that easily lend themselves toward human engineering. The “Forget-Me” mode is a result of the LED innovation and its inherent ability to produce bright light at far lower voltage and current levels than any other lighting technique. This is just one example of taking advantage of LED properties that is apparent throughout the LiteStyx design.

3. Emitter "Styx" Available in 12", 18" or 24" Lengths

3.1 There is actually more to this feature than meets the eye. True, LiteStyx emitters are available in standard 12 inch, 18 inch or 24 inch lengths. However, the point that is consistently missed is that the emitters are removable and can be interchanged. Aside from the obvious mixing of different length emitters, the emitter itself can be custom designed to produce light that differs from the standard two hues of white light.

3.2 Although this is not a common request, LiteStyx emitters can be constructed to produce colored light or light that is outside the visible spectrum. We have had applications in microbiology that required light with a mix of infrared wavelengths that significantly enhanced bacterial growth and permitted a cost effective way to accelerate the testing time for total coliform in potable water from drilled wells. Once again it is just simply taking advantage of available technology.

4. Bendable "Flex-arm" Copper Positioning Construction

4.1 Many, if not all, task lights employ some sort of mechanical mechanism to position and hold the light source in the desired position. Whatever the mechanism, it should be adjustable in three dimensions to provide the positioning required. Some of these mechanical marvels can be quite complicated, involving springs, counterweights, orbital devices and the like. All of this complexity to simply hold up a 100 watt light bulb.

4.2 Probably the most common mechanism is the “goose neck” which is a series of interlocked metal “vertebrae” that can be manipulated to almost any position within its flexibility range. Some other designs incorporate a coiled spring-like tube that performs the same function. The “goose-neck” is generally designed to be strong enough to support a light source that has substantial weight. They are relatively effective when new but after continued use, they inevitably become worn from friction and partially or completely lose their integrity.

4.3 LiteStyx, on the other hand, takes advantage of metallurgical engineering. Or, in other words, the natural properties of various metals … in this case, copper. Besides being one of the best electrical conductors, copper possesses the third best combination of ductility and malleability, exceeded only by gold and silver. What that means is that copper can be deformed fairly easily without developing stress cracks that eventually lead to failure.

The “Styx” of LiteStyx are manufactured from food service grade refrigeration tubing that is almost 100% pure copper. This construction facilitates a strong, flexible arm to hold the emitters in any desired position.

5. Continuously Variable Emitter Intensity Control

5.1 Variable intensity is another feature that is directly related to the LED technology and not a result of electrical engineering. Everyone is familiar with a household light dimmer … simple enough. However, what is not so apparent when a light dimmer is used to turn down the intensity of regular incandescent or halogen incandescent lamps is that the color of the light changes dramatically toward the red region. Human eyes quickly adjust and we are not bothered by the color change. When doing close up work, our eyes are not so forgiving and the color shift can be distracting and annoying.

5.2 An LED is a semiconductor that emits a particular quality of light that is relatively constant. The intensity of an LED is directly proportional to the amount of electrical current that is supplied and the characteristics of the light generated do not change with varied brightness. For this reason, a major advantage of any LED light source is its ability to be dimmed without any noticeable effects. Perhaps LiteStyx is so well designed that the illumination intensity is exactly perfect for all applications. Just in case it is not, the variable intensity control is incorporated.

5.3 During our extensive market research we quickly realized that there is a relationship between the desired intensity and the application that is fairly simple. The closer the work is to the eyes, the less illumination is required. In particular, work involving a microscope was significantly harder and more tiresome on the eyes with illumination levels too high. In addition, because LiteStyx emitters are available in two hues of white, the required illumination varies depending which white hue is used. Another reason to have the handy intensity control.

6. Emitters Available in 4500°K or 6000°K Color Temperature

6.1 Color temperature of white light emitters is a fairly complex issue and deserves a rather basic explanation just for information purposes. Color temperature is a characteristic of visible light that has important applications in lighting, photography, videography, publishing, manufacturing, astrophysics, and other fields. The color temperature of a light source is the temperature of an ideal blackbody radiator that radiates light of comparable hue to that of the light source. Color temperature is conventionally stated in the unit of absolute temperature, the Kelvin, having the unit symbol °K. Color temperatures over 5000°K are called cool colors (bluish white), while lower color temperatures are called warm colors (yellowish white through red).

6.2 The application of the color temperature selection for the LiteStyx emitters is largely a matter of preference. Conventional incandescent, including halogen incandescent, light sources can have color temperatures ranging from 2700°K to 3600°K. These would be considered “warm” white illuminators and are probably the most common sources for task lights due to their low cost. The other possibility is florescent tubes, coils or rings

that typically emit light anywhere from 5000°K to 8000°K and are “cool” white sources. The sun, for purposes of comparison, is about 5500°K on a nice day.

6.3 LiteStyx emitters are available in neutral white at 4500°K and cool white at 6000°K. Therefore, generally speaking, the neutral white will appear to be more “natural” to the eye, like sunlight, and the cool white light more toward that experienced with a ceiling mounted florescent light fixture. It should be noted, however, that the eye is more sensitive to the cool (bluish) white and therefore may be more applicable to small intricate work that requires easier recognition of detail.

7. Solid Aluminum Base Mounts in 8 Different Positions

7.1 One thing that must be pointed out about the LiteStyx design is that it must be mounted to something and is not free standing. A clamp type bracket is available but rarely used in the field. Mainly, this is because users prefer to take advantage of the many mounting possibilities that the base unit facilitates. The solid aluminum base is only 2”x 2”x 3” and has two 5/16” drilled thru holes at 90° angles that allow the provided cap screw to be inserted in four different directions that, in turn, permit eight mounting positions.

7.2 We have had many positive comments regarding the single mounting bolt design in that it easily permits LiteStyx to be firmly attached to a curved surface. This feature is especially useful in a machine shop environment where equipment commonly has curved castings. The LiteStyx base can therefore be mounted directly to the machine head where it will be in close proximity to the work area.

8. Sealed Construction Rejects Liquid Contamination

8.1 Originally conceived to be highly resistant to harsh environments, LiteStyx is a compilation of design materials that are well known for oil and chemical resistance. When used in a machine shop, for example, LiteStyx can be exposed to substances such as alkaline cutting fluid, water, lubricating oil, cleaning agents, abrasives and other harsh substances. LiteStyx is engineered to resist this constant abuse.

8.2 The solid aluminum mounting base is finished with a process known as “hard coat”. Using a sulfuric acid chemical, the process produces an extremely hard surface of aluminum oxide that is commonly used in sandpaper. This surface is virtually impervious to everything as well as mechanical knocks and dings. Additionally, the electrical connectors in the mounting base are expensive sealed types and are installed in such a way as to make them completely liquid tight.

8.3 The “Styx” that contain the light emitters are manufactured from a combination of Delrin plastic and silicone tubing. Both of these materials are well established as highly resistant to most solvents, acids, and other commonly used chemicals. The LED emitter module itself is located behind a tempered quartz glass “window” to protect it from exposure to substances in the immediate environment.

9. Unique Heat Sink Insures Indefinite Emitter Life

9.1 Contrary to popular belief, LED light sources do produce substantial heat. The misconception originates from the fact that an LED does not emit any heat the way a halogen lamp does. However, the semiconductor material itself heats up and, if not properly controlled, can completely destroy the emitter chips. This temperature control issue is so paramount to LED emitter life that it is the single most difficult engineering problem that is preventing LED light sources from replacing most of our standard incandescent light bulbs.

9.2 An innovative aspect to the LiteStyx design is that the "flex-arm" copper material, in addition to providing convenient positioning control, also happens to be one of the best thermal conductors. Therefore, the copper tube is also used as a highly effective heat sink that quickly conducts heat along its length and keeps the LED emitters at a stable non-destructive temperature. In fact, the LED emitters, at 100% intensity, are operating at a temperature that is well below their rated limit. At this level, emitter life is indefinite!!

10. Safe Low Voltage Class 5 Efficiency Operation

10.1 Actually, low voltage and efficiency are two completely separate topics and are not inter-related in any way. The voltage level that operates a device is indicative of a safety issue and the efficiency is a measure of energy consumption. Below a certain voltage level, safety is not a concern because the human body has too much resistance for low-level voltages to overcome and cause a shock. Generally, anything at 24 VDC or lower is considered operationally safe. LiteStyx operates at 9 VDC on the input side and the actual emitters are operating at a mere 7 volts.

10.2 Efficiency, on the other hand, is measurable in total amount of energy consumed with respect to the total amount energy produced for the application. Efficiency in LiteStyx can be separated into two sections, the LED emitters and the input power supply. The emitters consume approximately 6 watts of electrical energy to produce about 600 lumens of light. That is roughly equivalent to the light produced by a 60-watt light bulb. Therefore, comparing the two, the light bulb efficiency is around 10 lumens/watt and the LED is 100 lumens/watt!! That is 10 times as efficient!

10.3 With regard to the input side that is operating at 12 VDC, LiteStyx design utilizes a device called a "switch mode" power supply or simply "switcher". Without going into a rather complex operational description, suffice it to say that almost all applications requiring an external power supply (a computer for example) currently use a switcher instead of the familiar wall transformer. Although the switcher is inherently more efficient in operation, the tremendous gain in efficiency is the fact that the wall transformer is operating continuously (24/7) while the switcher only operates when the connected device requires energy. That is a BIG "green" advancement.