Wooden Boat Review
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The Sensibulb

Low-energy lighting

Reviewed by Donald Eley

Interior cabin lighting has always presented a few challenges. Although it may show my age, I can still distinctly remember sitting below reading with the soft glow of an oil lamp. A common topic of discussion then was how to best trim the wick to get the brightest light.

Electric lights made it easier to read, but battery charging became the major issue. We've all experienced electric lights growing dimmer as the evening progresses and thought about adding more battery capacity and a larger alternator to keep up with our increased electrical demands.

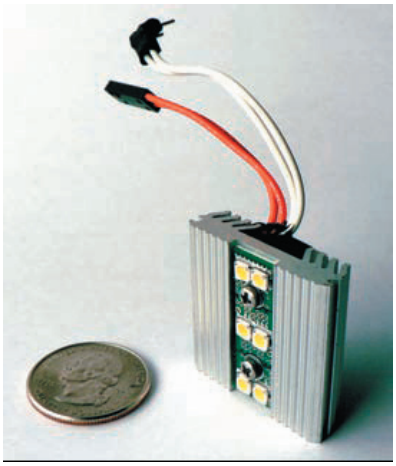
Electric lighting technology has changed quite a bit from the conventional incandescent bulbs we are all familiar with. Fluorescent, halogen, xenon, and now lightemitting diodes (LED) are all options. Recently WoodenBoat was sent the newest in LED technology, the Sensibulb.

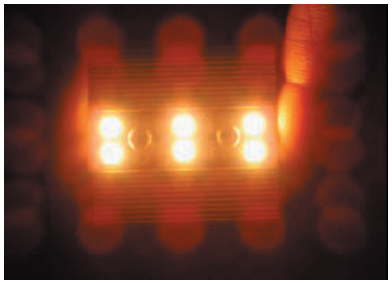
The Sensibulb is actually six LEDs mounted in a heat sink and wired for a 12-volt, two-pin, halogen bulb–style plug. Its rectangular shape makes it larger and more unconventional than standard light bulbs. It is rated at 10 watts because it produces the same amount of light as a 10-watt incandescent bulb while drawing significantly less current.

With conventional incandescent bulbs, watts are typically used to measure light output. A 20-watt bulb may produce twice the light of a 10-watt bulb, but it also draws twice the current, and as the battery voltage drops so does its light output (watts = volts x amps). Halogen and xenon bulbs produce more light than conventional incandescent bulbs, for the power used, but present the additional challenge of generating more heat.

Technically, light relative to the sensitivity of the human eye is measured in lumens and since our eyes are more sensitive to certain colors (wavelengths), the terms luminous flux and candela per square inch are often used when approaching this topic scientifically. Lumens per watt consumed is also a helpful comparative tool.

While I can strive for objectivity in comparing one light source to another in terms of lumens per watt consumed, there is some subjectivity in analyzing the quality of a light since the color of the light plays a role in that quality.





Fluorescent and LED lights have been accused of producing a yellow or blue tint that is not as appealing as the more natural and broader spectrum produced from incandescent lights. LED lights also typically produce only a very narrow beam of light. Sensibulb claims to have overcome these challenges with a "soft white hue" and a broad 120-degree focus. The Sensibulb also is said to use six to eight times less current than equivalent incandescent bulbs and generate significantly less heat.

To assess the Sensibulb, I set up a series of experiments using a 10-watt conventional incandescent bulb, 10-watt halogen and xenon bulbs (also incandescent), and the LED Sensibulb, rated at 10 watts. I was interested in not only the amount and quality of light produced by each bulb but also the power consumed and the heat generated. Knowing that an incandescent bulb's light output is proportional to the supply voltage, I set up a variable resistor in series to adjust the voltage from 13.2 volts (a fully charged battery) to 11 volts (a moderately discharged battery). I was able to measure the temperature of each bulb at its base and its relative brightness with a conventional photography light meter. Some subjectivity was introduced as I rated the quality and color of the light emitted, how comfortable it was to read by, how true colors seemed to be, and how wide the light was distributed. The experiment was set up using both a reading-style light and an overhead dome-type fixture.

While the results of the experiment are not totally surprising, I did find it interesting to see how the lights performed relative to each other (see graph opposite). The Sensibulb does draw significantly less current (only 0.24 amp) to produce light intensity equivalent to the halogen and xenon bulbs. Also, the Sensibulb generated considerably less heat, which from a safety perspective is significant.

Current Draw: The three 10-watt incandescent bulbs drew between 0.75 and 0.80 amp at 13.2 volts and produced very equal amounts of light. The Sensibulb consumed only 0.24 amp while producing relatively the same amount of light. (While I measured nearly twice the 0.14 amp claimed by Sensibulb, it still draws less than onethird the current of an incandescent.) The light per watt consumed is significantly better than the incandescent bulbs.

Voltage Drop: As the voltage was lowered, all the incandescent bulbs lost a substantial amount of their brightness, while the LED Sensibulb maintained its original

brightness even well below 11 volts. This ability, coupled with its smaller current draw, makes it excellent choice on small boats where lighting is challenged by limited battery capacity.

Heat Generated: Another distinguishing feature of the Sensibulb is that it generated considerably less heat than either the halogen or the xenon bulbs. Temperature at the heat sink measured 125°F, where temperatures at the base of the halogen and xenon bulbs reached 232°F and 220°F, respectively. High heat is an issue, especially when lights are mounted in tight areas such as headliners.

Amount of Light Produced: While I tried to be objective as possible, some subjectivity came into play here. Using a photography light meter 12" from the light, all the bulbs produced essentially the same amount of light at 13.2 volts. I tried all the bulbs in a reading light fixture, and with the lamp at about 24" from a magazine page I again found all the bulbs to be very equal as reading lights.

Quality of Light: Quality/color of the light is probably one of the biggest issues with LED lighting. Sensibulb is advertised as producing a "soft white hue," and while the light it produced is certainly fine for reading, I did find that it left skin tones with a slightly more yellowish appearance. Whether this is objectionable is of personal preference.

Light Distribution: Another criticism of earlier LED lights was their very narrow beam width. The Sensibulb seems to have solved this problem with its 120-degree focus. At 6' from the light fixture there was no noticeable difference, among all the lights tested, in how wide the light was distributed.

One issue with the Sensibulb is its unconventional appearance. At first glance it looks like a microchip mounted to a heat sink. It is designed to plug into a typical halogen/xenon two-pin base; however, an adapter is needed to mount in a reading light fixture. The adapter clips onto the base, and then with double-stick tape the Sensibulb attaches to the adapter. This can be a little awkward to install—especially in a small reading light. Also, the aesthetics in an open lamp may be an issue. When the Sensibulb is installed in an overhead dome light with an opaque lens, its size and shape were not distinguishable. Another adapter was supplied in order to use the Sensibulb in a conventional bayonet-style base readinglight fixture. The adapter was somewhat difficult to install since there is little to hold onto, and once it was in place the clip adapter also needed to be used. When installing the Sensibulb in a dome light the double-stick tape is all that is needed for attachment.

Price may be an issue since conventional incandescent bulbs cost about $1.50 apiece, halogen and xenon are in the $3.00 to $5.00 range, and the Sensibulb is listed at $39.95. On the other hand, life expectancy of the Sensibulb is said to be 50,000 hours, something I wasn't able to test (if you used the light 4 hours a day every day, it would last over 34 years).

I was most impressed with the Sensibulb's ability to produce an equivalent and broadly distributed amount of light when compared to the incandescent bulbs. With its smaller amount of current draw and ability to maintain initial brightness as the voltage dropped, it is an excellent option, I think, for boat owners trying to maximize battery life.

Sensibulb also offers a red version of the bulb and a mini-controller kit, which allows the light to be dimmed. For more information contact:Sailor's Solutions, <www.sailorssolu tions.com>, 631–754–1945.