LED LIGHTING – THE FUTURE OF CAVING LIGHTS?

- Kip Mandeno*

Let's start at the beginning. What are LEDs (light emitting diodes)? They are simply not much different to a light bulb. The major difference is that they have no filaments (that thin wire that breaks all the time) and instead of being encased in a glass globe of gas, they have a material mounted on a board inside a globe of plastic. Add some electricity to this and you have light – this makes the LED "solid state" (as it is termed in the industry). It has no loose parts, so chucking an LED light across the room or running full speed into a cave wall, will do no harm to the light source (the rest we won't mention).

LEDs have existed since the early 1960s but there have only been the boring kinds – ones to tell you your TV is on or to turn the damn thing off using an infrared one. In the last few years the boffins have come up with white ones, blue ones and all sorts of colours. To achieve this is very tricky, so we will stop there on the science. With the advent new LED technology, just about every company that has ever made a torch is now producing an LED torch, because of the incredible low power required to drive it, and they last for an incredible amount of time. They use this as a very powerful selling tool for obvious reasons. The only catch with this is nearly every torch out there has nowhere enough LEDs to go caving on. The only people to come close to a caving lamp are Speleotechnics in the UK and HD Systems in the States. Companies like Petzl and Princeton-Tek have really good head-torches for cooking by and emergency lighting to just get home on, but that is all.

There has been a lot of work by British Cavers on LED technology for caving and some quite good stuff has come out of America lately as well. Making them for yourself is not too hard given some electronic skills and a vague understanding of the science of it all. Unlike an ordinary lamp that you can attach two wires to and stick on a battery, LEDs perform best on a controlled power supply that takes care of voltage and current. If you team up technology like this with a good battery source, something like Nickel Metal Hydride (NiMH) or Lithium Ion (Li), you can get staggering amounts of time from your light for very little battery power.

So just how many LEDs is a minimum to go caving on? Try 14 – that will take care of the average caver on his own or as a group light. Here at Black Water Rafting we are trying to go as low as 8 LEDs. We have found that the light is much like caving on white carbide light. Thus, it has little forward distance compared to a very high power halogen lamp. The advantage is that the quality of light is a lot higher than a halogen for near vision as it gives excellent depth perception. The other advantage is that unlike ordinary lamps, as your batteries fade LEDs don't yellow out – they stay white and you loose distance from your light.

The biggest hassle in using an LED Lamp for caving is the radical difference in light style, compared to what most cavers are used to. This difference can often lead people to see them as a lesser option, or to weird, to cave on. However, the given time though the quality of light is a rather addictive and I now curse most other caving lights for their yellow beam of light.

In conclusion, LED technology has along way to go before it completely kills the standard lamp market. Given the lack of light distance (approx 30m) from LEDs, I would still like to have a duo style light that has both a LED part for caving and a very high powered halogen for long distance caving stuff (those golden leads hiding up every aven). Over the next few years there is going to be some radical improvements to LEDs, to caver's benefit. The technology is being driven by the computer and electronic industry who are after devices with very stable light wave lengths with low power usage. As usual, battery technology will also be driven hard as well as more and more people use laptops, so if you want a longer lasting caving battery moan to a computer manufacturer that your laptop battery doesn't last long enough. If we get enough moaning we will get longer lasting battery technology sooner.

Now for the web grazer, the boffin type, or those who like to read endless stuff on the Net, try these for hours of fun filled reading:

http://www.misty.com/people/don/
A lot of really good info on driving LEDs.
http://ledmuseum.home.att.net/zone.htm
Find the route to the virtual LED museum – heaps of info.
http://www.nichia.com/
Hard core Specs on white LEDs.
http://www.hdssystems.com/
One of the flashest Caving Lamps around and the most expensive.
http://www.sat.dundee.ac.uk/~arb/creg/
BCRA site some good background stuff.
http://www.petzl.com/
Check out the Tika for a back up torch.
http://www.speleo.co.uk/
Check out that most likely to succeed as a LED caving lamp.