How to buy Headlights

Surgical Headlights are worn by surgeons and dentists to help reduce the reliance on cumbersome overhead lighting systems. The main problem with overhead lights is that in order to achieve optimal lighting during a surgical procedure, they need to be readjusted and re-aimed every time the surgeon moves from one part of the operating field to another. This may happen several times during the course of an operation and can be very frustrating for the medical professional.

Furthermore, it is difficult to illuminate certain parts of the body, especially deeper cavities, using overhead lights. Headlights have the advantage that they directly aim light wherever the surgeon is working and can be combined with other items such as loupes or a camera. On the down side, some surgeons and dentists may find wearing a headlight restrictive or uncomfortable. This was certainly true with the old generation of heavy headband mounted headlights, which are attached to a light source with a light cable. Nowadays there are newer lower profile headlights which do not even need a cable!

TYPES OF HEADLIGHTS

Fibre Optic Lights

The fibre optic headlight consist of a light box (which emits the light), a fibre optic cable of variable length (which transmits the light) and a headlight (which shines the light onto the subject).

Light box

There are a variety of light boxes of different shapes and sizes. The basic feature is that they have a lamp (either a halogen or xenon), which emits light through a rotating turret with ports that fit to a variety of different commercially available fibre optic cables. This means the light source can be used in conjunction with different pieces of equipment including headlights, fibre optic cables, microscopes and endoscopes etc.

Xenon light sources consist of a xenon lamp powered by electricity. It uses ionized Xenon gas to produce a bright white light that closely mimics natural daylight. The colour of the light varies with the temperature measured in Kelvin and usually is around the 5500 to 6000°. As a general rule, the higher the temperature the whiter the light.

The power rating for commercially available Xenon light sources varies between 100 and 300 watts. The lamp life for a Xenon bulb varies between 500 to 1000 hours and is much longer than halogen bulbs (80 to 100 hours). Halogen lamps also produce a more yellow light. Replacement Xenon lamps can be expensive and this must be factored into the cost.

Fibre optic cable

An optical fibre cable is a cable containing one or more optical fibres. The optical fibre elements are typically individually coated with plastic layers and are contained in a protective tube. The function of the fibre optic cable is to transmit light from the light box to the headlight. The cable varies in length and is an important consideration when choosing a fibre optic system. Fibre optic cables can be damaged especially during heavy use and these may appear as specks in the light circle. Depending on how often they are used usually determines how often they need to be replaced, which also should be factored in to your budget.

Headlights

This is the functional end of the fibre optic system which is used to shine the light onto the subject. Fibre optic headlights are usually headband mounted and can be combined with accessories such as loupes or even cameras. A good headlight will have the facility to aim the beam, adjust the spot size and even focus the light properly, to give a good depth of vision. Since headlights can get hot a suitable heat sink should also incorporated.

Non Fibre Optic Lights

LED lights

A LED lamp is a type of solid state lighting (SSL) that utilizes light-emitting diodes (LEDs) as a source of illumination rather than electrical filaments or gas. LED headlights require much less power and therefore can be run on batteries which can be incorporated onto the headband or clip on battery pack. This means that the surgeon/dentist does not need to be restricted by a fibre optic cable attached to a light source. LED lights are rapidly developing and becoming more powerful and some units are 50,000+ lux (see below). LED lights tend to be quite lightweight and therefore can be headband mounted or can be clipped on to spectacle frames.

1 = LED Lamp
2 = Heat sink
3 = Switch
4 = Pivot Joint
5 = Charging jack
6 = Adjustment buckle
7 = Battery Pack
8 = Brow protecting pad
9 = Loupe (optional)

Things to consider when buying a headlight

Comfort

This is especially important during lengthy procedures. The weight of the unit is important but the weight distribution is also a factor. A low profile lightweight system will allow the user to have an unrestricted view of the operating site. The material used is also important and leather material may be more comfortable than the traditional plastic materials used in headbands.

Some surgeons may find headbands restrictive, in which case, a clip-on light is an alternative (see below). The length of cable, if selecting a fibre optic light source, is also an important consideration and for surgeons/dentists who find fibre optic cables restrictive, a battery operated unit is a useful alternative. These will usually be LED powered lights.

Mounting

As mentioned, most units are headband mounted. The advantages with headbands are that the weight is evenly distributed around the head; headlights can be combined with loupes and if high magnification is not required a simple magnifier can be incorporated into the mechanism. Clip-on lights are an alternative to headbands and can be clipped onto spectacle frames. Although these are usually lightweight, weight may bear on the bridge of the nose, especially if combined with a loupe system.

Headband mounted LED

light Clip on light

Beam adjustability

Most headlight systems allow the size of light circle to be adjusted, which is important if the user wants to adjust the area that is to be illuminated. Some headlights also have optics that allow focusing of light, which has implications for depth of vision.

An advantage of light boxes is that the intensity of the light can also be adjusted.

Colour of light

The colour of the light needs to be taken into account. For a brighter whiter light, a Xenon lamp and LEDs lamps are better than halogen.

Intensity

The intensity of the light is measured in lux. This is equivalent to 1000 lumens per square metre. One

lux is equivalent to 10.7 foot candles. For example:
• 10 lux is equivalent to a candle 30cm away
• 80 lux is equivalent to the light intensity in a hallway or toilet
• 400 lux is equivalent to a brightly lit room or office
• 32,000 lux is equivalent to the minimum intensity on an average day
• 100,000 lux is equivalent to a bright day
Lux can be measured using a light meter. For headlights, it is important to specify at what working distance the lux refers to. An average 300 watt Xenon light will emit about 120,000 + lux, and a high power operating light will emit about 50,000 lux.
For most outpatient procedures, 30,000 lux will give ample lighting. During surgical procedures, 50,000 lux will be more suitable making the powerful LED lights a viable alternative to fibre optic lights.

Maintenance

This is an important consideration for ongoing cost. For fibre optic systems, lamps for both Xenon lights and halogen bulbs will need replacement at intervals, units will require servicing and fibre optic cables may require servicing/repair and replacement.
LED lights have a semi-permanent light and last about 10,000 hours; after which time the whole LED light unit will need to be replaced.

Portability

Battery operated lights are obviously more portable and this can be a consideration when the surgeon or dentist operates in different theatres or environments.

Cost

In general, Xenon light sources are the most expensive - although the lamp life is longer when compared to halogen lamps. However, the cost of maintenance should be taken into consideration. Since fibre optic lights contain more serviceable parts (light box, lamp, fibre optic cable), maintenance costs are likely to be higher. But, if a light box can be used for more than one purpose this may have cost-saving benefits.
Operating grade LED lights, although initially expensive, are now becoming more affordable, and the higher end more powerful LED lights are a viable alternative to fibre optic lights.

Conclusion

Currently available surgical headlamp systems have been designed to optimize function and surgeon comfort. Light intensity, profile, beam adjustability, cost and portability, together with individual preference, have all to be taken into consideration. Essentially, when purchasing a suitable headlight system, you need a high quality, high performance system that offers you value for money.
These are just a few of the facts and product features of headlight systems. We supply superior diagnostic products and offer you the most advanced LED lights available today. Most importantly, we provide a very high level backup service with each of our products.
Please go to the headlight product page for full details of our headlight product range and to purchase products. Alternatively, if you would like to speak to someone about our headlights systems, please contact us directly on Tel : 0844 272 1918.