



Wookey
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Hidden Earth 2008
Otley

What is this talk about?

- LED Technology review
- Lights
 - Wook's
 - Commercial
 - Other DIY
- Beamshots
- DIY Batteries
- Issues, feedback

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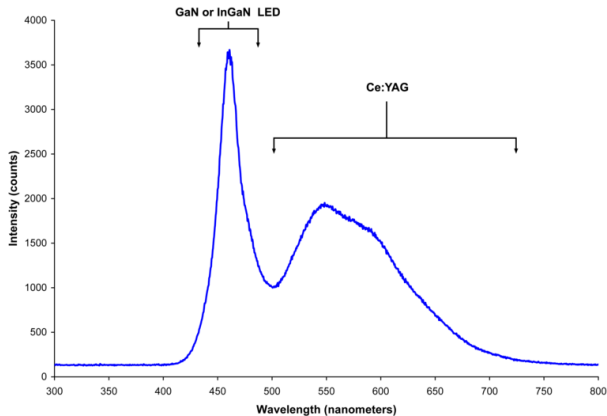
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LED Technology

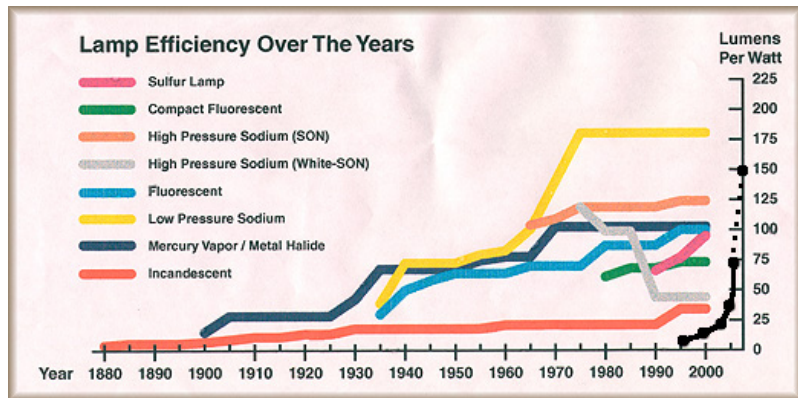
- Indium-gallium-nitride blue LED with phosphor
- cerium-doped yttrium aluminium garnet (Ce³⁺:YAG)



LED History

- 1996 1st Nichia 3mm/5mm LEDs. 7.5 lm/W @20mA
- 1999 Lumileds produced 1W die. 15 lm/W @350mA
- 2003 Lumileds Luxeon 5W. 18-22 lm/W @1A
- 2004 Luxeon 3W. 35 lm/W @ 350mA
- 2006 Cree XRE/SSC P4 60-80 lm/W @350mA
- Prototypes now at 150lm/W @20mA

LED efficiency

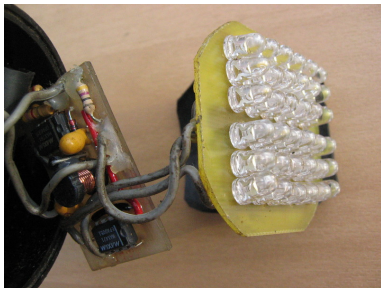


- Theoretical maximum: 683 lm/W

Wook's Lights



France Light



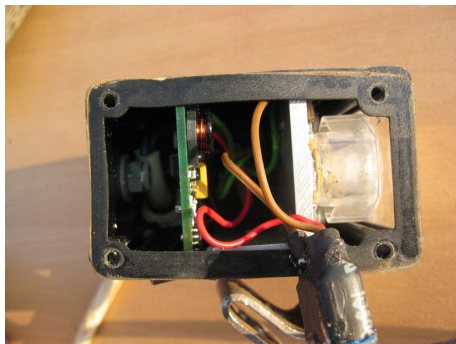
- Matched array. Resistor low-beam.
- 2.8W 36 LED full beam. 0.1W pilot.
- £70 + batts
- Mulu, China, 3-days caving (3 x 18650 cells)
- Some have now done > 1000hrs

Solid Light - mk1



- Modified bike light
- Luxeon 3W, 20 degree optic
- PIC. Up to 6 levels - settable via SDK
- dodgy-cable-proof. Nice control, low-batt fallback
- £60

Solid Light - mk2



- SSC P4 x2
- 10 degree and 20 degree optics
- 0.06W, 1W, 4W
- min-power start
- £16

Actionlight



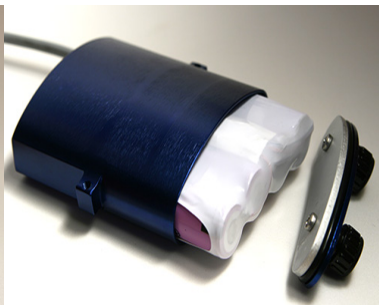
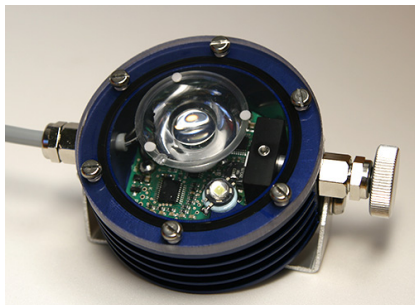
- HDS systems - First Nichia array

Nova5



- First (only?) 5W Luxeon light
- 5 levels
- 6mA standby!
- 50m waterproof, magnetic flex-switch
- £100

Scurion



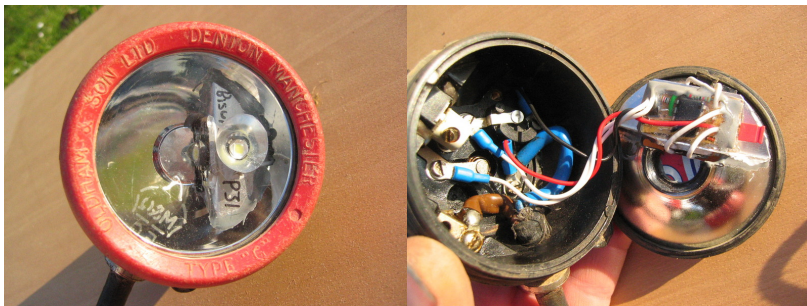
- SSC P4 x 2 (or P7), 6 degree and 180 degree + UV LED
- up to 10 settings, 4 levels per LED, independent.
- charge indicator, transport lock, programmable, waterproof
- 5.1Ah 7.2V Li-ion. 8h @250lm, 24h @100lm, 70h, > 250h
- £147 (£295 inc batt, case, charger)

Stenlight



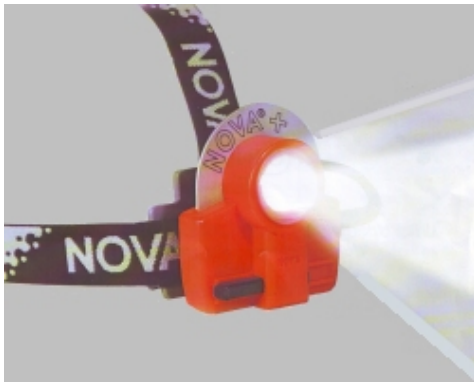
- SSC P4 3W x2, 5 and 15 degree optics (25,50 options)
- 4 levels: 4-7W (2hrs 300lm), 2W (7hrs 120lm), 0.6W (>24hrs 25lm), 0.1W (>3 days 5lm)
- 7.5m waterproof, magnetic switch, no CPU. 6-18V batt.
- £139 (£200 light+batt)

Bisun



- 2x SSC P4, one v. pointy, one 50 degrees
- 2 or 3 levels per led, (1W, 0.3W, 0.1W), independent
- 3.6-5.5V batts. Lion, 3x niMH or alkaline
- dodgy-cable-proofing. low-batt warning removed
- £75 (P31) £50 (M31)

Nova Plus



- SSC P4 3W
- 2 levels
- Waterproof
- £85

Retro2



- SSC P4 1W x2
- 1-7V batt (2-6V useful)
- 4 levels: 2W (200lm), 1.5W (150lm), 1W (100lm), 0.3W (30lm)
- Overheat fallback, low batt warning (jumper for batt type)
- £75

Princeton Apex



- Luxeon 3W + 4 5mm LEDs
- Light, small, neat engineering
- Annoying switch, not waterproof
- £50

Biff Light



- SSC P4
- 4 modes (3+1)
- Waterproof
- small Ali housing.
- £?

Others

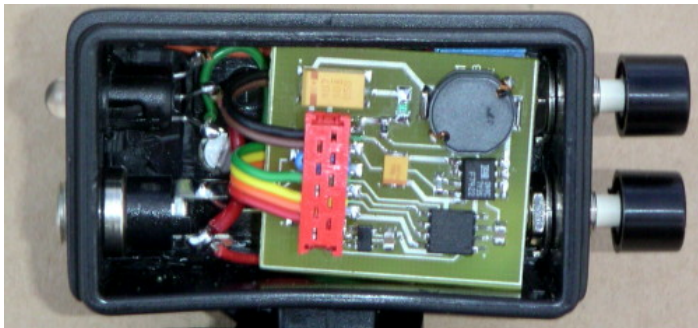
- Petzl Myo, Duo
- Speleotechnics Leds
- Oldham LED/Lion
- Gerber
- Various things off ebay
- ledcavinglight

CUCC light



- Luxeon 3W
- Resistor control - 2 levels 1.6W, 0.3W
- 3 or 4 NiMH
- 20 degree optic
- £25, (£50ish inc batt)

AT-Tiny



- Published hardware design.
- Resistor control - 2 levels 1.6W, 0.3W
- 3 or 4 NiMH
- 20 degree optic
- £25, (£50ish inc batt)

DIY

- SSC P4 or rebel x2 with 5 degree + wide
- 18670/18650 or AA cells. 1-2 Lion cell/3xNiMH
- Driver (bflex/buckpuck/solidlights/ATtiny)
- Zoom box
- Ali box or Oldham

State-of-the-art light for about £100

Beamshot comparisons

- 12 lights in Read's Cavern
- Consistent camera settings and positions
- Scurion, Petzl Duo (LED), Myo XP, Myo older
- DIY CUCC, Wook solidlight, Oldham
- Speleotechnics Nova 3 plus, Nova 3
- Later trip: Bisun, Biff light
- Thanks to Carmen

Solidlight



5 lumens
0.06W



70 lumens
1W



270 lumens
3.8W

Wook Lights



36-led Nichia Array
2.8W



SSC P4
3.8W

Pointy beam

Bisun



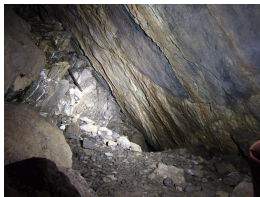
Scurion



Myo XP



Nova 3 plus



Biff

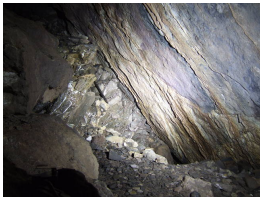


Oldham



Pointy beam II

Solidlight



Duo



Nova 3



Wide beam

Bisun



Scurion



Biff



Nova 3 plus



Solidlight



Francelight



Max beam

Bisun



Scurion



Biff



Nova 3 plus



Solidlight



Francelight



Batteries



- Potted. Heavy.
- Bungee is good
- zoom box, ali former
- Brass contact tubes
- Self-amalgamating good for 3-5 yrs
- 18650/18670 or AA
NiMH or Lion.
- Discuss. . .

Conclusions

- LEDs are great! Especially on expedition
- We have plenty of choice
- Doesn't have to be expensive
- Pointy + wide is best
- Pointy should be 5 degrees
- Wide - whatever you like

Issues

- Radio Interference - Nova5 - any others?
- Reliability - batt cables, even on scurion, stenlight
- Stenlight switch jamming, scurion batt case issues
- Nova 3 not popular in megalayha
- Oldhams poor heatsinks
- Mine exploreres and expedition cavers differ
- Smaller, lighter, more reliable

Comments

- What's yours - is it any good?