

AS LEVEL Section D

FACT FILES

Technology & Design

For first teaching from September 2011

For first award in Summer 2013

Product Analysis  
and Improvement



tech  
nology  
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design

## 1.33 Product Analysis and Improvement



### Product investigation

#### Battery Operated Torch

The following content focuses on the product analysis and re-design proposal for a battery operated torch.



### Learning Outcomes

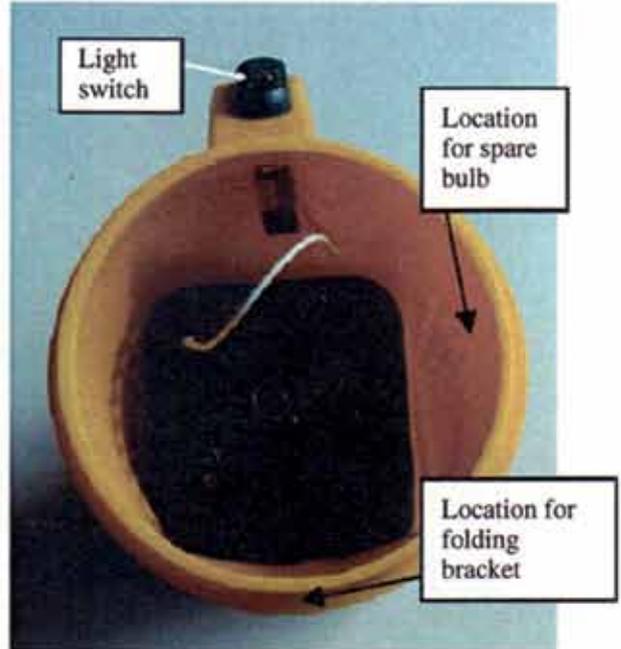
Students should be able to:

- analyse, evaluate and produce re-design proposals for existing products under the following headings:
  - form;
  - cost;
  - manufacture;
  - materials;
  - function;
  - performance;
  - aesthetics;
  - marketing constraints, target audience;
  - ergonomics and anthropometrics;
  - cultural, ethnic, moral and environmental issues;
  - safety of the user.

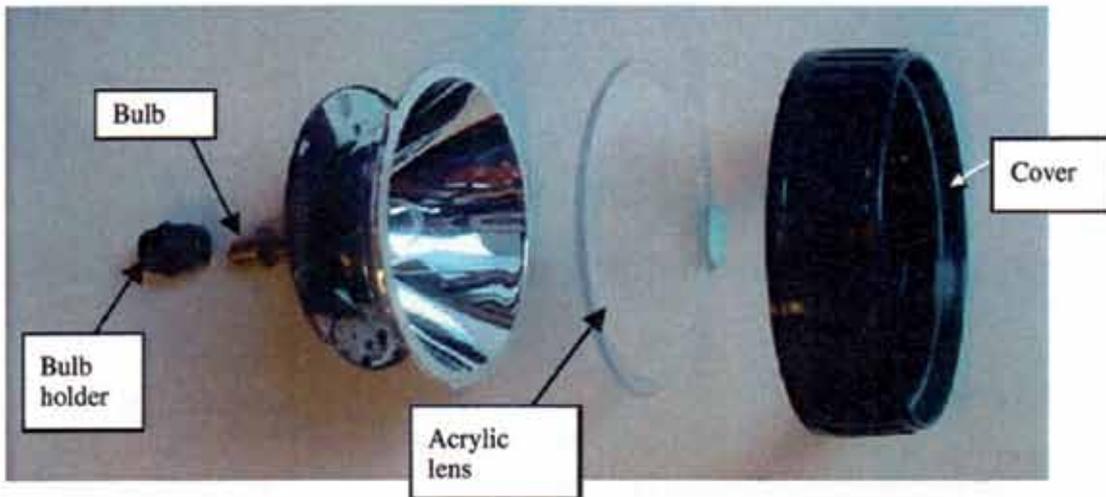




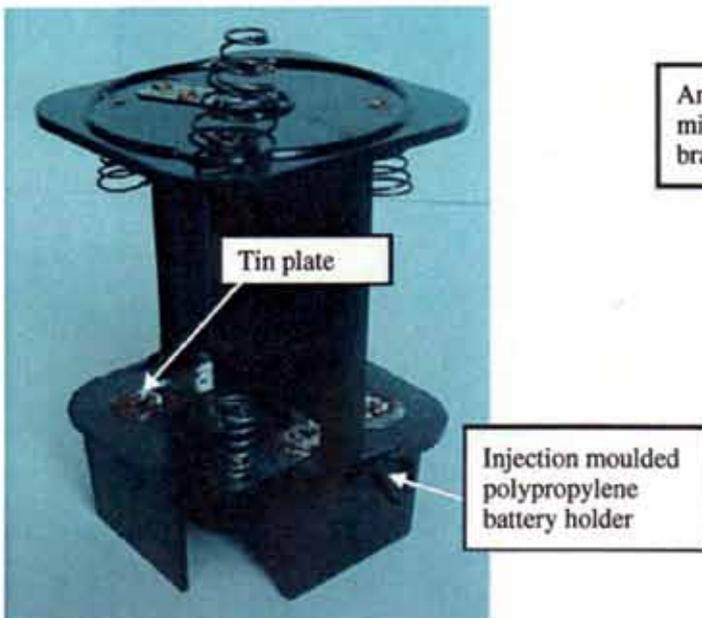
**Fig. 1**



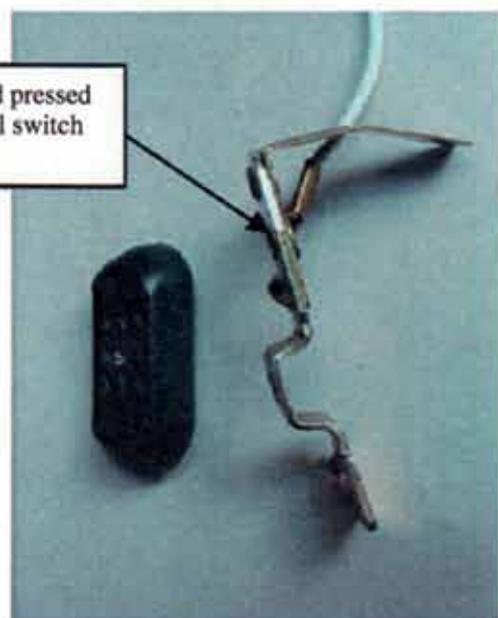
**Fig. 2**



**Fig. 3**



**Fig. 4**

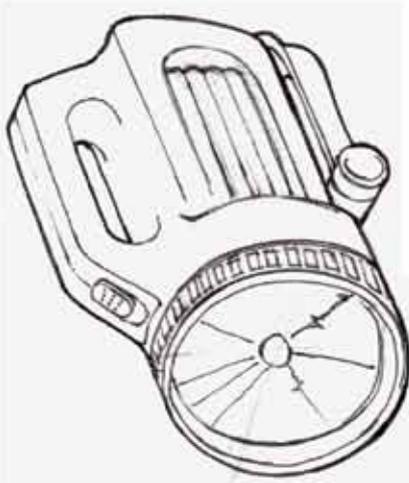


**Fig. 5**

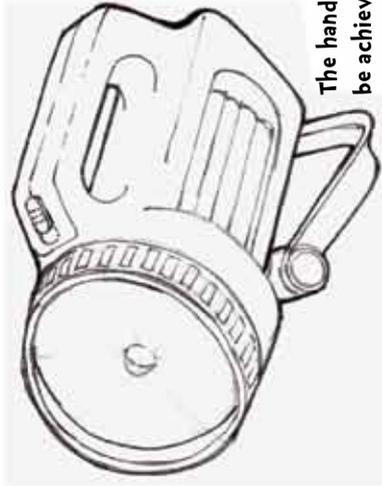
	Analysis	Evaluation	
		Pros	Cons
<b>Form</b>	The product is shaped in a way that is ergonomically-viable - the handle is shaped in such a way that it can be held comfortably by one's side. It is essentially cuboid in shape with a u-shaped handle attached to one side and a cylindrical end surrounding the lens.	It is a functional design that will remain stable when placed on a flat surface and is a good example of form following function.	It is quite bulky and not very compact, the shape being dictated by the space required to store the large batteries.
<b>Cost</b>	This is a basic torch aimed at the lower end of the market. As such I would not expect it to cost anymore than £8 to £10.	The low cost makes it affordable meaning more than one could be purchased and kept in different locations around the home or business premises.	The low cost is reflected in the design and potential lack of durability. The technology used is also quite basic.
<b>Manufacture</b>	I think that this is a mass-produced item requiring a degree of hand-assembly. The main parts would be made from injection-moulded plastic, the smaller components, such as the mirror and battery connections, would be standard components.	Being mass-produced helps make the product more affordable.	Mass production normally requires a lot of initial capital investment, so changes or improvements to the design once production starts would be difficult to implement.
<b>Materials</b>	The main body and lens surround of the product are made of high-density polyethylene (HDPE). The lens cover is made from clear acrylic.	HDPE is waterproof thus preventing water from damaging the internal components or causing condensation on the lens. HDE is resistant to chemicals so would maintain its integrity should the batteries leak. It is also lightweight making the product easier to carry and move around.	The acrylic in the lens is quite brittle and could be easily cracked or scratched
<b>Function</b>	The function of this product is to provide a convenient source of light in conditions where either natural light is not adequate or other sources of artificial light are not available.	The product is simple to operate and would provide an adequate source of illumination.	This product only has one mode of operation (on/off) and is therefore not very versatile.

	Analysis	Evaluation	
		Pros	Cons
<b>Performance</b>	The product would provide a reasonable beam spread that would be adequate for everyday use .		The operation of the product relies on the batteries having enough charge. The bulb is a conventional type with a limited lifespan. It does not have any alternate modes of operation, such as a 'high beam' function.
<b>Aesthetics</b>	The product housing is yellow-orange in colour with a black plastic lens surround. The ribbed detail on the main body and lens surround provide visual interest and make the product appear less box-like.	The bright colour would make the product easy to locate in a dimly-lit location like a garage or if it was stored amongst a lot of other items on a shelf.	This product has been designed with purely function in mind and this has resulted in it not being very visually appealing or memorable.
<b>Marketing constraints/ Target Audience</b>	This product would be aimed at the lower end of the commercial/industrial marketplace rather than domestic consumers.	As this product would be aimed at commercial customers the low price would be the most important factor, so expensive marketing campaigns in order to access the mass consumer market would not be required.	The product does not have any unique selling points and would be difficult to differentiate from other similar products already on the market.
<b>Ergonomics/ Anthropometrics</b>	The product is carried using the large u-shaped handle. A sliding on/off switch is located on the front of the handle and can be operated using the thumb. The batteries and bulb can be accessed by unscrewing the circular lens surround.	The location of the on/off switch is very convenient and would be easy to operate. The handle is large and easy to grip. The lens surround is large with a ribbed surface which would make it easy to open should the batteries or bulb need to be changed.	The handle, though large, is also smooth and flat, so may prove difficult to grip if it became wet.
<b>Cultural, Ethnic, Moral, Environmental issues</b>	This is a product that is widely available to all and is of use in many everyday situations.	Having the product to hand gives people a sense of security and reassurance should an event such as a power cut occur. It also enables people to move around or carry out tasks safely in low-light conditions.	High-density polyethylene is a product of petroleum and is not considered to be biodegradable because it takes centuries to break down naturally. It is battery-powered and some types of battery are made from toxic chemicals.
<b>Safety of user</b>	One of this product's functions is to make certain tasks safer to carry out. All of its exposed surfaces are smooth and any edges are rounded.	The plastic body is non-conductive so the product can be used safely in damp conditions. The lens cover prevents the user from touching the bulb when it is illuminated.	The mirror and bulb would be relatively fragile and have the potential to shatter when the batteries or bulb are being changed.

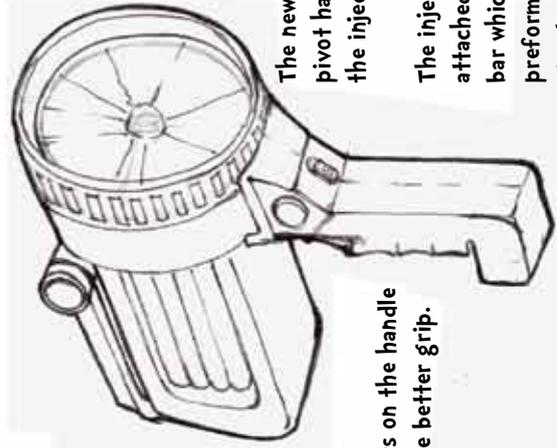
The use of the high performance CREE LED offers exceptional brightness and an incredible operation lifetime of over 50,000 hours.



The second handle can be used for steadying when holding the torch and also acts as an adjustable stand for hands free use. This stand/handle allows you to hang the torch up so you still have both hands to work with. e.g. under the bonnet of a car.

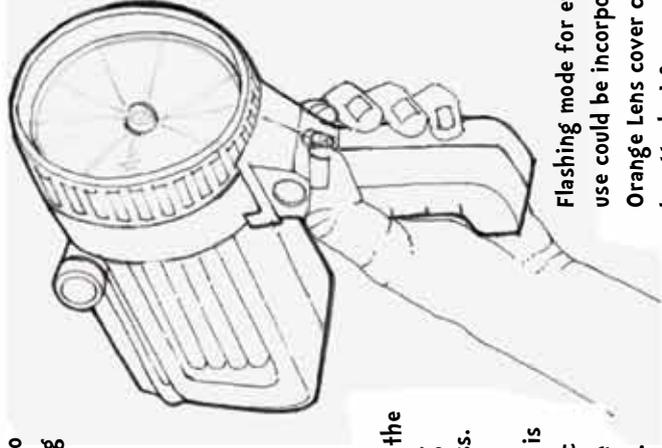
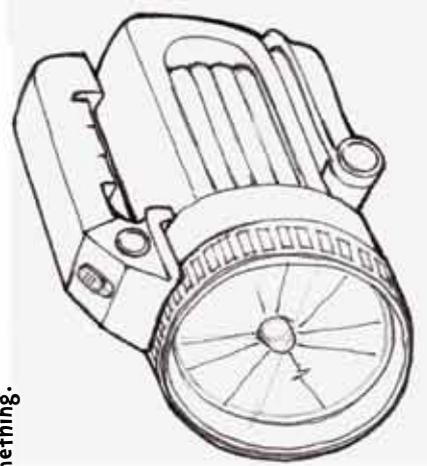


The handle is pivoted. This can be achieved by a plastic bar that has been inserted into the tubular housing which has been formed during the injection moulding process. The handle is dipped into each end of the plastic bar during assembly in the factory.



Indents on the handle provide better grip.

In this drawing the main handle has been modified. The handle can rotate through 90 degrees. This allows a greater degree of accuracy when aiming the light at something.



Flashing mode for emergency use could be incorporated. Orange lens cover can also be attached for emergency usage.

The new bracket that houses the pivot has been formed during the injection moulding process.

The injection moulded handle is attached again using a plastic bar which passes through the preformed hole in the handle. Circular plastic clips hold the handle in place.

