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Course: Automotive Design

Module Name: Materials and Manufacturing

Module Code: ADDA4001

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Materials and Manufacturing

Introduction

The flashlight that I am deconstructing is a two in one object; by this I mean it is a flashlight and also a portable tool kit. The flashlight uses the old incandescent bulbs rather than a newer LED bulb which is much widely used in today's society. The tool kit that comes with the flashlight is simple and small but it can get the job done. With a variety of screw bits available and with the small and easy to use handle, it is effective as a travel tool kit, possibly for emergencies.

Historical Background

The background behind flashlights starts with the use of candles, torches and then lanterns as sources of light. This was all before the methods of generating electricity had happened so when the first official flashlight was created by Joshua Lionel Cowen in 1898 using batteries to power the light. Eventually the idea was developed further by Cowen and his sales team to join the lightbulbs with metal tubes and dry cell batteries to create the first flashlight the world has ever seen. Eventually they went on sale along with the sales of batteries. As time has gone on the development of flashlights has progressed on a massive scale with rechargeable batteries, LED lights for more powerful beam, and even some special operation flashlights for low or high temperatures.

Type of product to be analysed

The type of product that I have chosen is a 25 piece tool kit and flashlight combination. The product is dated a little bit but the main use of the product can be used for years due to the flashlight having the mini tool kit as well. But for the analysis I will be focusing on the flashlight aspect of the product.

Bill of Materials & Assembly/Construction Methods for manufacturing

Part	Quantity	Material	Assembly Method
Case	1	Polystyrene (Thermoplastic Polymer)	Injection Moulding
Inside Plastic (Tool Kit Organiser)	2	ABS Sheet	Vacuum Forming
Lens	1	Polyethylene	Grinding, Polishing and Shaping
Reflector	1	Polished Aluminium Layer over Polystyrene (Thermoplastic Polymer)	Injection Moulding
Incandescent Bulb	1	Metal Filament Glass Aluminium	Drawing Ribbon Machine Injection Moulding
Contact Strip	3	Copper	Embossing Die, Die Cutting
Battery Holder	1	Polystyrene (Thermoplastic Polymer)	Injection Moulding
Springs	4	Nickel Plated Carbon Steel	Coiling

Switch	1	ABS Plastic (Thermosetting Plastic)	Injection Moulding
Switch Wires	3	Copper in PVC	Wire Drawing, Insulation, Phase Wiring
Screws	2	Stainless Steel	Thread Rolling

Advantages of chosen methods and materials applied to this product over other materials and methods

The advantages of the materials that are used include the plastic polymer which can be heated up and re-shaped if needed, or when the flashlight is thrown away/recycled. So the material can be used on something else like another flashlight of a different design or a completely different product.

The use of the manufacturing method of injection moulding is much more efficient compared to other methods for the making of the case and other components. The use of injection moulding allows for the cost of making the parts for the product cheaper as the process is all fully automated by machinery and forms of robotics. This allows for reduced manufacturing costs and ultimately more precise and accurate injection moulded designs, and nothing has to be redone afterwards.

Using copper insulated with PVC for the switch wires is a good option due to the ability for the wires to pass electricity through safely and easily. In addition to this, the wire does not get heated up very quickly and the PVC material itself is the property of preventing any fires the copper wire has. Finally the wire is very durable against wear and also cheaper to other wire options making it the more affordable option.

Future Development of these materials and methods (possible replacement with advanced technology)

The future developments of the flashlight include the durability of the case material to allow the flashlight to last longer. This can be exceptionally helpful for camping, explorers, or those who love to travel and love the outdoors. Another development which isn't massively popular but does get used here and there is the use of a wind up handle flashlight. This allows for no external power source and the flashlight would be powered by kinetic energy which gets stored within the springs. This is good on the environment as it does not use batteries or any kind of electricity. The only problem with this type of flashlight is that it can lose the energy being stored when not in use and can be a pain in addition to taking a while when winding up the handle for use. So this kind of flashlight wouldn't be very beneficial for emergencies or those who don't use the flashlight a lot.

Some of the materials and possibly methods have been changed in recent years from this model (as it is quite dated) to better materials and methods. LED Lights and rechargeable batteries are just some of the examples of the developments flashlights have made since this model was released between the years 2000 - 2010.

Summary

To sum up, the flashlight that I have analysed is fairly dated but most of the materials and methods that have been used to make the flashlight still get used within today's products. The newer flashlight models show how the future developments of the flashlight are continuing to improve and make the product better and cheaper to

manufacture. Using a LED light, thicker and more durable casing along with rechargeable batteries all make the product more widely used. The use of the chosen materials and methods make the product as a whole much more reliable and used by the customer. Due to the fairly cheap manufacturing processes, the flashlight is not a very expensive product but it comes with many advantages over other flashlights just because of the additional mini travel tool kit. Furthermore if the product was to be recycled, the whole product can be easily picked apart to access all areas of the flashlight.

Overall I feel like the flashlight will be a product of the future with continued developments to make the product continuously better than the previous set of models. The materials may change or be improved upon but the manufacturing processes will very much be the same or again improved upon.

Bibliography

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Materials & Assembly Methods

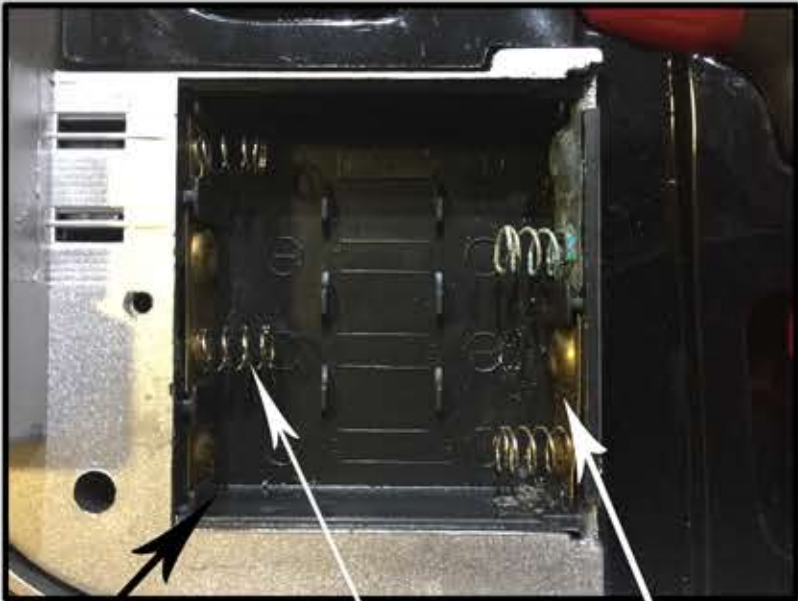
25 Piece Tool Kit/Flashlight



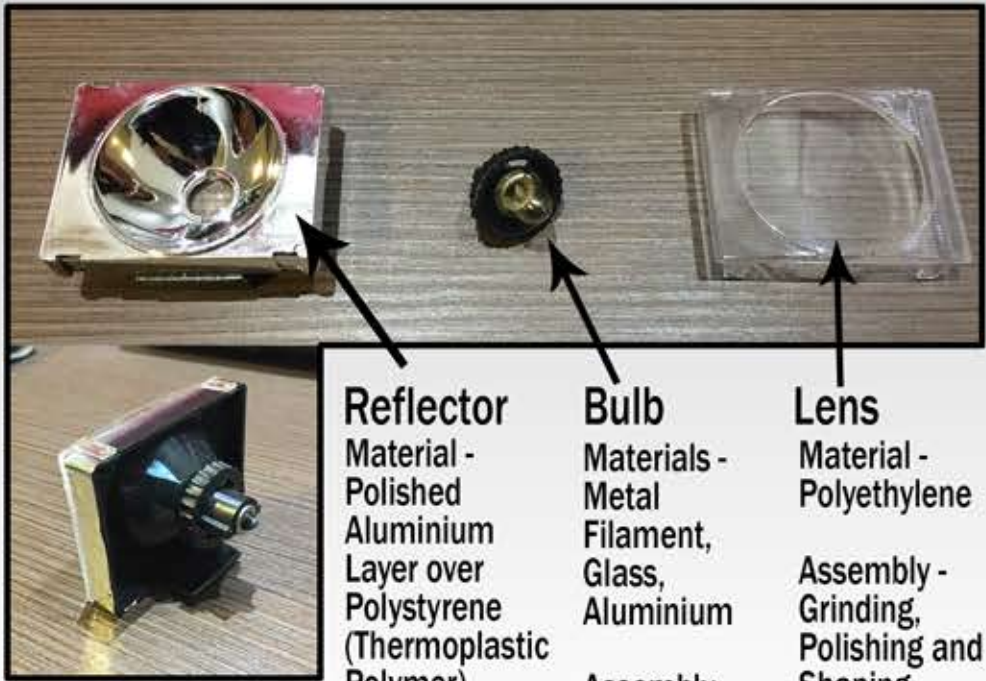
Case
Material - Polystyrene
(Thermoplastic Polymer)
Assembly - Injection Moulding



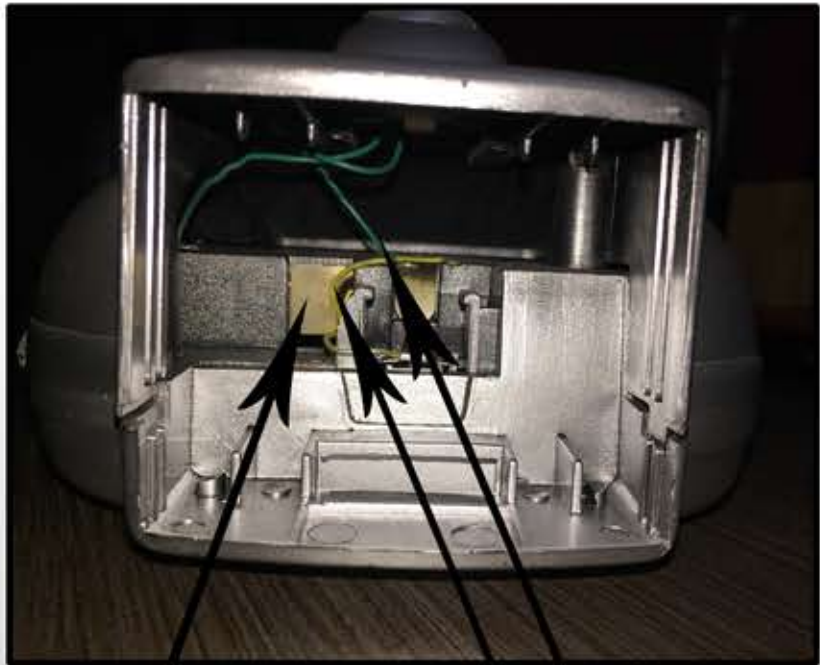
Battery Holder
Material - Polystyrene
(Thermoplastic Polymer)
Assembly - Injection Moulding



Springs
Material - Nickel Plated
Carbon Steel
Assembly - Coiling
Contact Strips
Material - Copper
Assembly - Embossing Die
& Die Cutting



Reflector
Material - Polished
Aluminium
Layer over
Polystyrene
(Thermoplastic
Polymer)
Assembly -
Injection
Moulding
Bulb
Materials -
Metal
Filament,
Glass,
Aluminium
Assembly -
Drawing,
Ribbon
Machine,
Injection
Moulding
Lens
Material -
Polyethylene
Assembly -
Grinding,
Polishing and
Shaping



Contact Strip
Switch Wires
Materials - Copper in PVC
Assembly - Wire Drawing, Insulation, Phase
Wiring



Handle & Switch (External)
Material - Polystyrene (Thermoplastic
Polymer)
Assembly - Injection Moulding



Switch (Internal)
Material - ABS Plastic (Thermosetting Plastic)
Assembly - Injection Moulding



Tool Kit Organiser
Material - ABS Sheet
Assembly - Vacuum Forming

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