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Analysis and reverse engineering of a Samsung ES25 Digital Camera

I have chosen the Samsung ES 25 digital camera as the subject of my reverse engineering project because it is a sturdy quality item, with several parts and components that were accessible and ideal to disassemble and on a personal note it was responsible for capturing my early childhood. Digital Cameras were first seen in the late 1970's and Samsung as expected were right there with the market leaders. Samsung have always had a justified reputation for producing reliable high-quality items and as expected they continue to generate innovative exciting designs today. The "ES 25" was an extremely compact and easily transportable device, designed in particular to be portable to take anywhere and use quickly and easily. It soon became known, at the time, as one of the "point-and-shoot cameras." Functionally it was designed to be more efficient than its' predecessors, as it didn't use a traditional film to record both video and still pictures. Instead it has the capacity to take thousands of pictures and videos that can be easily downloaded and stored on a computer.

The Samsung has many components, which we will investigate in more detail, such as a lens, a shutter, an image sensor, CCD and CMOS imager, an LCD screen and a memory card. The camera's compact dimensions are; width 3.8" depth 0.9" height 2.4" and weight 4.02" Each component of the camera has a specific assembly method to reflect the material used during its manufacturing processes. In addition, each part has to perfectly fit and contribute to the overall function of the camera in order for the ergonomics to be effective. "Ergonomics; the study of how humans interact with manmade objects." This camera is made of a lightweight material, it is smooth to touch with effortlessly flowing lines. The flash and zoom control buttons are constructed from aluminium, again a light weight material, but also cool to the touch so tactile and easy to locate.

The main outer casing of the camera and the cover are made of a polycarbonate composite, consisting of approximately 10-20% glass fibre. Using Polycarbonate is an ideal choice of material for the casing, as not only is it extremely lightweight and durable, but it is also shock-resistant so therefore it will offer longevity to the life of the product. There is just one down-side to using polycarbonate and that is it not resistant to chemicals. Additionally, this material is also tolerant to external temperature changes, during manufacturing this allows the component to be moulded to precise manufacturing requirements so that the resultant casing that is produced will perfectly house the internal workings of the camera. The benefit of this is that it also withstands widespread variations of humidity, so the camera will be greatly effective and extremely reliable in any climate and at any destination. These qualities make it an ideal camera for travelling, sports and hobbies so therefore makes it a highly viable, marketable product.

If we look on the front section of the camera we can see that's where the optical zoom is situated, this is purposely designed to magnify an image by physically moving and tweaking the lens whilst retaining the characteristic and quality of the resolution. Unfortunately, the disadvantage of today's current technology is that we now use a digital zoom which although it requires no moving parts in the camera it can however sacrifice the resolution quality of the picture image produced. So, although technology continues to innovate and move forward not all "improvements" are necessarily seen as acceptable progression. There is an LCD Liquid Crystal Display, this is a flat screen that will reveal images due to liquid crystal technology. The camera is marketed on its portability and has neat convenient strap for ease of carrying, it is a durable synthetic material strap. Finally, there is a removable memory card made from a single sheet of flexible plastic material, such as polyvinyl chloride (PVC).

Many of the component parts would have been produced from different assembly lines, such as the mainly mechanical shutter assembly, that reassembles the blink of an eye, and photograph capture system which has electronics and microchips. Interestingly the viewfinder lens aperture, although it is a specialist part, it still utilises the camera lens manufacturing methods and is made of either optical glass, plastic, or a glass and plastic blend. During the manufacturing process there were up to 17 coatings added to the in-line mirror to perfect it's reflective properties. The cost of this lengthy process was outweighed by the quality of the pictures that the camera produced and retained Samsung's reputation for quality and picture superiority. This would have been a vast advantage to Samsung's marketing department over its major competitors. Samsung have always been associated with great quality, and renowned for their constant innovative ideas. Now considering their future cameras, and all of their technical products for that matter, the obvious way forward is to expand the electronic systems to achieve greater performance and capacity. Furthermore, they need to innovate further and create a design that is even more sturdy but light weight by introducing either carbon fibre for the casing, although this is costlier, or by using a recycled plastic that can then be recycled again after the life of product. The consumer is now far more environmentally conscious and respective of the planet, so to reduce the burden on renewable resources, future cameras could use rechargeable batteries or even better be fitted with miniature solar panels. Whilst these solar panels probably would not be sufficiently resourceful to fulfil 100% of the requirements of the rechargeable batteries they would certainly contribute to a respectable amount.

During this process of reverse engineering the camera I been able to analyse and identify the components and parts and recognise which are mechanical. I have determined their materials and manufacturing process. In addition, I have produced an A3 poster to illustrate my findings. Finally, I have explored the possibility of sustainable alternatives for the future.

Bibliography

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Digital zoom, LED screen uses a AA battery as the power source, wrist strap,



Lens, a shutter, an image sensor, CCD and CMOS imager, an LCD screen and a memory card



Glass fiber reinforced (fiberglass) epoxy resin with a copper foil bonded on to the one side



Casing made from polycarbonate



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