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CASE-X

Project Proposal

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INTRODUCTION

Having dirty eyeglasses is a common issue people face on a daily basis and is something that can drive people insane. It's not hard to clean your glasses, but the problem arises when you are unable to access your cleaning supplies while away from home. If you were to carry around your bulky bottle of cleaning solution you may find that it is an inconvenience and it can take up a lot of space in your pockets or handbag. Dirty glasses with no effective way of cleaning them can affect your ability to do everyday tasks as it can impair your vision. For example, if someone is driving at night with dirty eyeglasses, they can catch a glare off street lights or the headlights from oncoming cars and can make it very difficult to see, which can be a great danger to themselves and the people around them. The solution to this issue is the idea that the glasses case, cleaning solution, and

microfiber cloth could all be combined in such a way that it will always be possible for glasses wearers to have all three in a convenient and easily portable manner. This will help people keep their glasses clean at all times as well as prevent them from attempting to clean their glasses other ways, such as with an article of clothing or the rough paper towel in public washrooms which can result in damaging the lenses. This concept led to the design idea of a glasses case that features a built-in compartment to store and dispense the cleaning solution and a storage area for a microfiber cloth. The ultimate goal however is to optimize this technology so that it is effective in both cleaning and protecting the glasses while also creating a product that consumers would aspire to use.

OBJECTIVES

- Alter the design of a conventional glasses case to include a built-in compartment to store and dispense eyeglass lense cleaning solution and a storage area for a microfiber cloth.
- Build the case so there is a retractable spray nozzle, giving the case a sleek dynamic look.
- Design the case so it has similar properties, such as mass and dimensions, to a conventional glasses case while also adding the fluid compartment, spray nozzle, and cloth compartment.
- Investigate and analyze the engineering topics of economics, fluid mechanics, strength of materials, and physics, to ensure the correct functioning of this apparatus.
- Perform a cost analysis on the materials used.

DESIGN CONSIDERATIONS

- How much liquid should be dispensed each time the nozzle is sprayed?
- How much should it/will it weigh?
- How heavy is too heavy? It should be able to comfortably carried around without being noticeably heavier than a conventional glasses case it around without it being too heavy
- What size of springs will optimize the cases functions?
- What kind of materials will optimize the mass, durability, and price?
- Figure out how to fasten the different components of the cases mechanics together.
- Will it be able to withstand everyday use without malfunctioning or leaking?
- Can you drop it without breaking it or the glasses inside?
- How hard should you be pressing the button?
    - Easy enough to push it without trouble, but withstand enough force so it doesn't get pressed by accident in a purse, pockets, etc.
- How to keep liquid from spilling?
- Create an aesthetically pleasing design that will appeal to consumers.

PROJECTED TIMELINE

For the remaining eight weeks to complete this project:

- Week 1 - Determine the amount of cleaning solution the compartment should hold in order for the weight to remain within reason while being enough fluid to last at least a few days. Determine the desired dimensions of the glasses case and both compartments.

- Week 2 - Finalize the overall design of the case and complete CAD drawings.
- Week 3 - Determine the materials that will be used for the case, nozzle, and internal mechanics. Begin to collect materials.
- Week 4 - Determine how the internal mechanics of the spray nozzle and the button that releases the nozzle will work.
- Week 5,6 - Build the prototype and perform various tests.
- Week 7 - Evaluate the total cost of the project and determine what price the case will be able to be sold in stores for.
- Week 8 - Complete final report and prepare for the final presentation.

TARGET MARKET

This product can be used by anyone who wears any type of glasses such as eyeglasses, sunglasses, reading glasses, etc. The high price of glasses and sunglasses warrant that consumers look for different ways to protect them. This versatile glasses case will do just that by protecting your glasses inside the case and out. It will also feature a fashionable, sleek design that consumers will always want to have with them. Along with this, to target a wide range of consumers this case will be designed to be user friendly by keeping its operation simple so many people can benefit from it. By understanding the market that this product will be entering, it'll be possible to design a glasses case that is more functional than the conventional ones, yet not too fancy that it is impractical. This concept will be explained later with the help of economic concepts.

ENGINEERING DESIGN

The cleaning solution dispenser is initially hidden inside of the case where the top of the nozzle will blend in with the design of the exterior shell of the case. To get the nozzle out there will be a button on the side of the case. The button will release the nozzle allowing a loaded spring to push the nozzle up and out of the case where it is then locked into place. To unlock the spray nozzle to allow fluid to be pumped from it, there will need to be a twisting motion that exposes the hole where the solution gets dispensed from. After that, the case is ready to dispense fluid by pushing down on the nozzle just like on a cologne or sunscreen bottle. From there, the work of the dispenser does its job relying on both, the mechanical components of the case and the air suction to draw the fluid upwards and overcome the force of gravity. Every time the dispenser gets pushed down or exceeds a certain amount of force the piston releases pressure on the spring while moving the ball upward taking glass cleaner fluid with it. When finished cleaning the glasses lock the nozzle, and push using a reasonable amount of force to place the nozzle back in place releasing the button back to initial position.

ENGINEERING ECONOMICS

The case will be designed in such a way to optimize its mass, durability, and cost. It will have to be made from a material that is lighter than the conventional glasses case in order to make up for the extra weight added from the mechanical components and the fluid. Typically, light and durable materials cost a lot so there will need to be some research done in order to find the best materials for this project. This case will need to compete with other conventional glasses cases so it needs to be kept in a reasonable price range. The benefits of this case must outweigh the extra price to

ensure that people will buy it.

FLUID MECHANICS

The study of the fluid at rest will help determine the minimal amount of cleaner fluid required to clean the area of the two glass lenses. There should be no waste left over due to wasted products having negative economic impacts. The specifications of the fluid gives information about what product to use for the lining of the case to make it waterproof and seal it. Specifications will also be used to identify the liquids freezing point and account for this in the design. Other concepts of fluid mechanics include the process of drawing the fluid upwards from the case, measuring the density, and determining the velocity required to release a specific amount of fluid out of the nozzle.

STRENGTH OF MATERIALS

The materials used in this design are an essential aspect of the project. The materials must be durable enough for everyday occurrences such as sitting on it, dropping it, etc. A key feature of the material is that it must be lightweight to counteract for the extra weight added from the fluid and the mechanical aspects of the case. Another strength crucial to the design would be to make sure the internal mechanical structure of the case is durable and will not break during use. Overall this case should be relatively similar to the properties and dimensions of a regular glasses case.

PHYSICS

The mechanical components of the case such as the spray nozzle and nozzle release button will be powered by the potential energy from loaded springs. In order for the spray nozzle to rise out of the case we need a spring to push it up. The spray nozzle also needs a spring in order to pump the liquid up the straw and out through the chamber. The button will also need a spring in order to retract after being pushed in. Each spring will need to be able to contain a certain amount of potential energy to perform their desired task. An analysis will need to be performed in order to determine the size of springs needed in order to perform this task, as well as keeping its operation smooth and easy. If the springs are too large it may require an unnecessary amount of pressure to push the button or to push the nozzle back into the bottle. Finding the perfect size spring will optimize the operation of the case.

CONCLUSION

In conclusion, the plan being proposed above will help to solve the issue of having dirty glasses by creating a new innovative technology to benefit people who wear glasses. Through engineering calculations and economic knowledge this technology can be developed to suit the needs of many and allow people to always have access to glasses cleaning supplied in a convenient location.