

HIV Barrier Model – Product Design Specifications

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Problem Statement

To demonstrate the strength and durability of latex and polyurethane barriers against HIV infection and other sexually transmitted infections. Currently the original version developed by former BME students has been received extremely well by client's classes in the medical genetics course "Contemporary Issues on HIV/AIDS", however, the model is fragile and not easily transportable. The client is requesting an improved more sturdy and mobile product.

Client Requirements

- Client would like the device to be more mobile.
- A more user friendly version of the current model
 - Lightweight
 - Less parts
 - Easy to install
 - Less bulky
 - Make parts more easily replaceable
 - Sturdy
- Inexpensive (<\$100)
- The product must demonstrate the strength and effectiveness of condoms.
- Make a product that is easily reproducible.
- Possibly make a device that can test both male and female condoms.

Design Requirements

1. Physical and Operational Characteristics

a. *Performance requirements:*

The design would be used as a class and take home demonstration device. This means that it could be used five to ten times a semester. Our design would need to be capable of functioning properly on each of these occasions. To function properly our design needs to be self-contained; after uses there should not be any water or condom material left behind. The device should serve its purpose meaning that the display should capture the audience and teach them about condom strength.

b. *Safety:*

Our design needs to protect the operator from any harm while demonstrating its function. Furthermore, we may need to consider the possibility of small parts falling from the device and causing problems. If the device fails to contain any water, this may cause a slipping hazard to students. Users should be aware of this and clean up any spills.

- c. *Accuracy and Reliability:*
Ideally our product would be 100% reliable, meaning it would perform its function on every occasion. The device also needs to be reliable for any of the variety of condoms available to consumer. This means the device needs to be adjustable in height. The accuracy of the scale involved in our design is very important because this measurement is what demonstrates the strength of the condom. Specific directions should be given to anyone who is going to perform a demonstration. This will allow for consistent and productive demonstrations.
- d. *Life in Service:*
This device must be reusable. Although this device may only be used 5 to 10 times every 6 months it should be able to perform at any time if necessary.
- e. *Shelf Life:*
The shelf life would depend on a number of things including, the calibration of the scale, and the wear of parts or the misplacement of any parts. We would expect that with proper maintenance our product would last upwards of 20 years.
- f. *Operating Environment:*
Our device would be used in classrooms, or other presentation venues. This does not mean that our device should only work in these places. It should be capable of performing on any flat surface.
- g. *Ergonomics:*
The device must be extremely user friendly. Anyone who is at least 1.5 meters tall should be able to operate the device with ease. It is also important that the audience understands the mechanism, so that the durability of the condom can be portrayed.
- h. *Size:*
The device must be large enough so that someone sitting 20 meters (furthest distances in a regular classroom) away could see the results of the experiment. It must also be able to fold up in some fashion so that it would be easily transportable or stored.
- i. *Weight:*
The device would need to be light enough so that anyone capable of using it would be able to transport it. We believe that 7 kilograms is light enough for anyone capable of using the device.
- j. *Materials:*
The materials used would need to be somewhat aesthetically pleasing considering our device would be used as a presentation device. The materials must also be durable because the device would need to stay intact for many years.
- k. *Aesthetics, Appearance, and Finish:*
The device's appearance is actually quite important because it is being used as a presentation device. The device's materials would also need to be water resistant in order to prevent it from decaying rapidly.

2. Production Characteristics

- a. *Quantity:* 1 deliverable.
- b. *Target Product Cost:* Under \$100

3. Miscellaneous

- a. *Standards and Specifications:* N/A
- b. *Customer/Patient related concerns:* N/A
- c. *Competition:* As far as we know there are not any devices like this besides the previous BME design group product.