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Gender-Conscious Design

Being a student is a delicate balance. We must do well in classes and often support yourself, but those things first require physical health. While Purdue's state of the art workout facilities are well staffed and maintained for students, staying healthy can be difficult when working out is inhibited by size. In particular, selectorized strength equipment is great at adapting in some ways, but falls flat in others. They provide modifications for different leg lengths and strengths, but do not allow modifications for all parts of the body. Frequently excluded are arm length adjustments, adjustments for torso/core circumference and width, and adjustments for people with mobility or other physical handicaps. The issue that I frequently have is being unable to reach the handles of this equipment because of my short arms, which impedes my ability to accomplish my best workout at the gym. My goal in this project was to draw attention to areas of improvement in modern gym equipment and to create a solution for the problem that I personally encounter. When beginning to think about this, I was reminded of the articles we read about aircraft cockpits including both Deborah Johnson's nod to its equitable redesign in "Sorting out the Question of Feminist Technology" (2010) and Rachel Webber's more extensive work on it in "Manufacturing Gender in Commercial and Military Cockpit Design" (1997). Could the design of workout equipment also be based on the fit young man of America rather than a more average American? What percentile of women are comfortable using this equipment? If it is the case that fit male bodies fueled the research and design behind workout technology, that would mean it was intended to be used primarily by men. With this in mind, I wanted to design something to create a more equitable workout experience for people with a wide range of bodies.

I began by looking at how the current systems are adaptable and what techniques they use to accommodate different sizes. The equipment does allow modifications for some purposes, but still excludes some communities from use. While I would have loved to design an entirely new line of selectorized equipment that is aimed at being more inclusive, the scope of this project narrowed my designs to something I can add to the current equipment to improve the equipment for at least one population. I did research to see if there were any external modifications that worked in conjunction with these machines but could not find anything that would improve my workout by helping me reach handles. In order to complete this project, I had to make sure there was a need. While I know that *I* had a problem working out, I wanted to make sure that this wouldn't only apply to me. This project should be helpful for larger communities of people. I discussed this problem with many different user groups: men, women, college students, parents, and the elderly. People (particularly women) my height have similar issues with reaching the handles. Others I talked to noted that these machines are designed for people who are already physically fit and do not cater to larger populations. Parents complained that there should be more equipment for children to safely use so that they can begin teaching healthy habits earlier. Further, the equipment is not always clear about what proper usage and form looks like so there can be misuse of equipment.

Additionally, I had to come up with a solution that was applicable for the scale of this project. As previously noted, creating a new line of selectorized strength equipment would be an incredible opportunity, but, given time and resources, it was not a realistic goal. After creating a more simple solution, I sketched it and then modeled it in a 3D modeling software. Then, I constructed it. This was the logical order in which to complete the project because it followed the flow of thoughts. It is unreasonable to begin constructing without an idea of what the end goal is, and there is no use constructing something that will not be used. This process is the most efficient way to successfully create a product without wasting time or money. For this project, I decided 3D Printing was the best way to manufacture the item. If my final product was to be used in conjunction with current equipment, I had to be sure there would be no damage done to the equipment. This made the plastic filament of 3D printing attractive. Additionally, 3D printing would allow for easy iterative design and eventual mass production if desired.

The final product I created is a handle that mounts over the existing handle so that my short arms can reach it. This design also included string for easy mounting onto the current system. While the final product is useful, it is not necessarily aesthetically pleasing. In another iteration, I would like to add curves to the piece and create a more comfortable handle to grip. Compared to different materials, 3D printed materials work well for gym equipment because they will not cause splinters like wood and they require less work to become smooth than metal. This design is very flat, but could be produced in a variety of colors and texture could be added. Further, use of other plastics and rubbers could be incorporated to increase grip and comfortability of the handle. This handle is functional in its current size, so it would not need to be scaled for future use. Different parts could be modified though for people with larger or smaller hands.

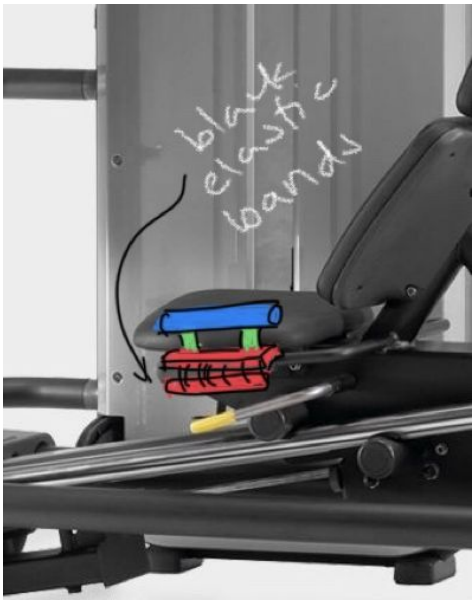

Figure 1.1 *Initial Sketch (side)*

Figure 1.2 *Initial Sketch (top)*

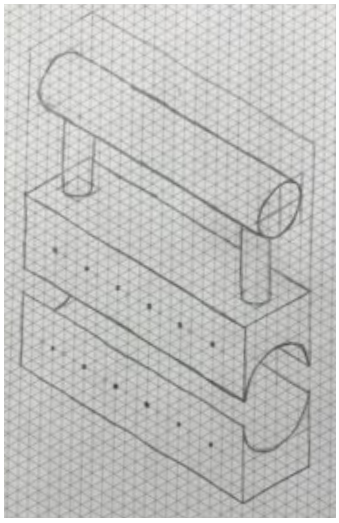

Figure 2.1 *Isometric Sketch*

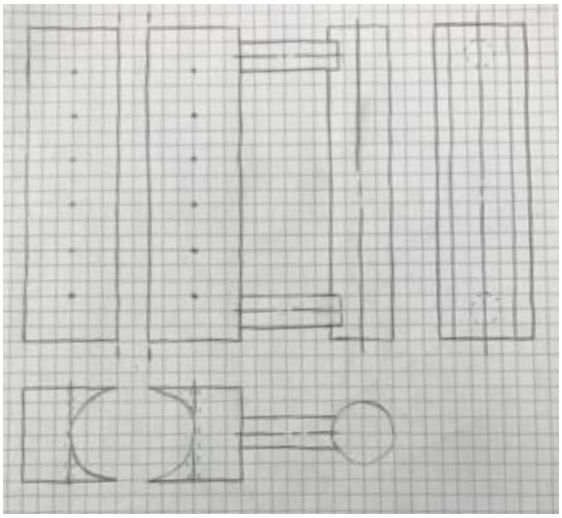

Figure 2.2 *Multiview Drawing*

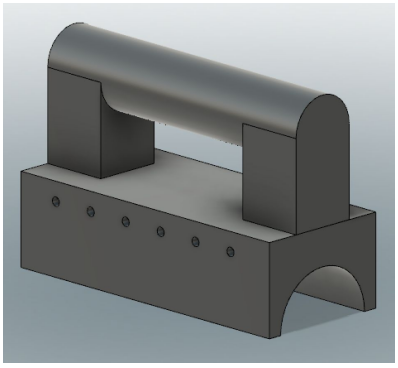

Figure 3.1 *3D model of handle portion*

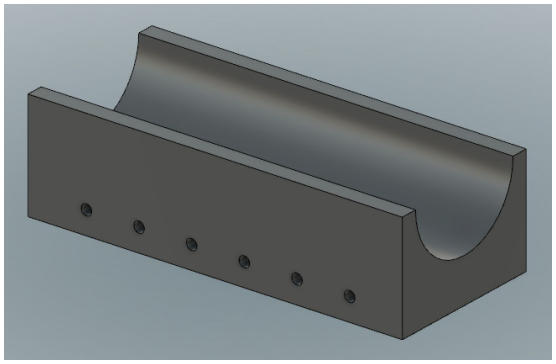

Figure 3.2 *3D model of base portion*

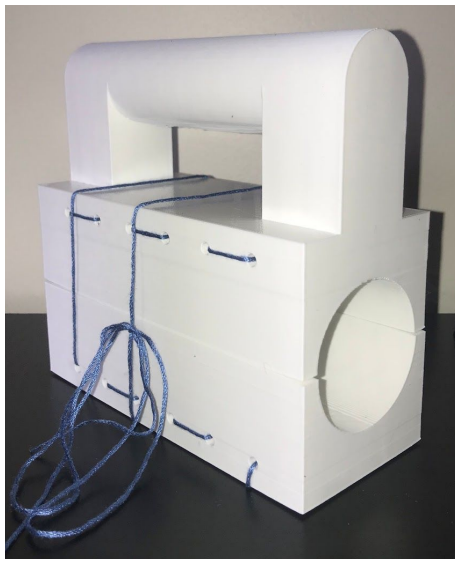

Figure 4.1 *Final Product*

I did not have too much trouble modeling the desired product, but realized it would be difficult to 3D print with so much overhang. I had to modify the design slightly to adjust to that need. The first print still failed, so I added supports and created the final product. The difficult part of 3D printing is waiting for it to print. Many times, prints of this scale can take 12 hours (as this one did) and require attention in case of filament runout or failure.

Overall, I learned about the difficulties of manufacturing an initial prototype and verbalizing design ideas. I often have visions of what want, but putting that into words can be challenging, especially when others do not have the same experiences. Given funding and time, I would like to make this design more aesthetically pleasing, comfortable to grip, and create a better system for mounting/dismounting the device to/from the gym equipment. Ideally, I would like to create a new line of selectorized strength equipment to help people with different body types stay healthy and strong. Using a feminist methodology required me to think a lot more about the implications of the design. For example, using string on my design excludes populations with poor dexterity from being able to easily use my design. While this solved one minor problem in the world, there is still plenty of gender-conscious design (or re-redesign) to take place before we live equitably.

Resources

Weber, R. N. (1997). Manufacturing Gender in Commercial and Military Cockpit Design. *Science, Technology, & Human Values, 22,* 235-253.

Johnson, D. G. (2010). Sorting Out the Question of Feminist Technology. In L. Layne, S. Vostral, & K. Boyer (Eds.), *Feminist Technology (Women Gender and Technology)* (36-54). Champaign, IL: University of Illinois Press.