

Design Team 1- Design Issues Paper

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Introduction

Over the course of the fall 2008 semester, our design team has encountered many unforeseen (by us, anyway) design issues, be they from our sponsor or from information we received in lecture. We will discuss three specific design issue considerations and how our project currently addresses, or could address, each design issue. It is required for this paper that we discuss product lifecycle management, often termed “PLM,” but two other important issues will be elaborated upon. Given the nature of our project, universal design principles are a major part of our design process, and our product development has been unique because of this. The topic of product safety is also pertinent to how our product is received, thus safety will be discussed as well.

Universal Design Principles

Let us begin by discussing universal design principles. When a product is in its developmental stages, design engineers are responsible for considering how the “average” user will be interacting with the product. Some popular technology products include mp3 players and web browsing software. Mp3 players now have screens that light up and display color images, allowing easy viewing of content and navigation of menus. Web browsers are becoming “smarter” by making more relevant suggestions in search boxes, and sporting cleaner and more intuitive interfaces, providing an all-around smoother web surfing experience for the average end user. These aforementioned provisions are all for the better, to be sure, but not one of them would benefit a user who is blind. This demonstrates principles of universal design being left by the wayside. That is not to say that potential users who lack eyesight are being purposefully ignored, but

simply forgotten, perhaps, during the design process. The estimated number of blind & visually impaired people who live in households (i.e., *excluding* institutionalized and homeless) of all ages is 6 to 8 million people in the United States alone [1]. That is definitely a group of potential customers that any rational company would consider to be worth addressing. Our project is directly related to the issue of universal design. The main sponsor for our project, Lettuce Duit, employs many individuals who are in some way disabled. We were given design specifications to account for persons with two types of disabilities: those with learning disabilities (such as Down's syndrome) and individuals with vision impairments. The interface of our design has undergone several revisions, but our final implementation involves a pragmatic and minimalist approach. Our display is a simple collection of three seven segment LED displays. The display is large and very bright, so that an individual who is partially sighted can still read the machine's setting. Also concerning feedback provided to the user is the audio we have implemented in the design. Our audio setup reads aloud any changes made to the machine's setting, allowing blind individuals to successfully operate the machine. In regard to how the machine's settings are actually changed, we have implemented a simple pair of push buttons. One button is responsible for changing the value of whole inches on the length setting, while the other changes the tenths inches value for the length setting. This is accomplished by having a button press only increment its corresponding value by one. By doing so, we have minimized the physical and mental dexterity required to properly operate the machine. This combination of audio/visual feedback and simplistic operation allows many types of disabled persons to be candidates for the machine's operation.

The mechanical design of our project is also of significance to the topic universal design. The frame of the machine will have a funneled feeder, where the user will insert material to be cut. Once the cutting sequence has been activated, the user is responsible only for monitoring the material as the machine pulls more length. For example, the user is just responsible for making sure ribbon material does not curl or tangle while the machine is in operation.

Product Safety

It is good design practice to remain customer driven, and our “customers” have unique needs we must address. Safety should be a top priority during the design process of any product, and ours is no different. We expect users of our machine to be impaired in some way, so extra caution is being taken with regard to the safety of our machine. The final physical structure will have safety guards that will prevent unwanted contact with rotary cutter, clamps, and motors during operation of the machine. Each of our DC gear motors is equipped with a three amp fuse while the rest of the machine circuitry, including the stepper motor drivers, is equipped with over - current protection and thermal shutdown mechanisms. All of the electronics will be housed inside a secure, grounded electronics enclosure. Had more time and resources been available for this project, it would have been possible to implement very sophisticated electronic protection throughout the machine, such as heat monitoring systems or some sort of system status display that could constantly update the condition of the machine to the user.

Product Lifecycle Management

Product lifecycle management may seem to be of fairly small scope with regard to our project, at least when compared to that of other projects being constructed in this course. However, even though our machine is not likely to be mass produced, we want our design to be effective and function for our customer as long as possible. The first logical step here is to initially create the project using appropriate components. An important part of product lifecycle management is the service that is made available to a customer after the product has left the factory, or in our case, left the design lab. Considering our design is somewhat of a custom production job, documentation is very important to our machine's cycle. It must be expected that the machine will need maintenance in the future. Though we, design team 1, can leave contact information for possible maintenance appointments, we must plan for alternative ways to address problems. By providing detailed yet understandable documentation of our design, we leave the door open for other individuals to carry out maintenance without having to contact the people who created the device.

Reference

AFB Career Connect

- 1.) <http://www.afb.org/Section.asp?DocumentID=1529&SectionID=7>