Work Completed

This week we made great progress on the paint cap removal aid device that we are to build. We were having problems with the design after the paint manufacturing company changed their long time cap head design to one with more refined teeth and edges. Our previous design from last year relied heavily on the old cap head. We were told that we only had to design a removal aid for that particular cap head. It was then morally and ethically concerning to build a device that would be obsolete in a matter of months.

We decided to change gears and alter our design to incorporate a multitude of cap head designs. Our previous design allowed for the insertion of the cap head into a mold that would spin while the paint tube was held stationary. Now that the cap head removal mold can only accommodate one or at very most a few cap head designs we decided to hold the cap itself still in a vice and then spin the tube. Since the vice will hold by the means of pressure it can accommodate a variety of cap heads, even ours which is almost to the point of being smooth.

Our design now must focus on how to hold the paint tube and spin it. We currently have a motor that can spin at a slow enough rate and a high enough torque, now we need to implement some sort of machined part onto the motor to spin the paint tube. We played with a variety of designs and methods of spinning the cap and decided that milling out a small block of metal to create a pocket for the tube to fall into would be the best idea.

On Tuesday we went into the machine shop and with the help of Serge milled our a piece of aluminum. What we did consisted of creating a valley within the aluminum block that will house the paint tube as it spins on the motor. Then to mount the motor to the milled piece of metal it was suggested that we drill a hole on the bottom side in the center for the stem of the motor to go into. Once the stem of the motor hole was drilled we can then drill another hole from the side and thread that hole. We will then insert a set screw into this hole that will pressure lock the motor stem to the block of metal and thus secure it to the milled piece. Below in Figure 1.1 is our metal piece holding the paint tube and a mock set up.
We are currently talking with Dr. Halowell in regards to whether they will be purchasing an LCD monitor or if they will stick with the old 80lb monitor. Our design hinges on which path they use. We have successfully tested the linear actuator and confirmed that it had within it the limit switches both at the upper and lower limit. The reverse polarity also worked in heightening and lowering the linear actuator. Our next obstacle was to figure out how to reverse the polarity within a switch.

For a good part of the week I researched how to reverse the polarity of the lift and found that a rocker switch or a toggle switch would be best. These switches have three positions, two on positions and a middle off position. We then decided that it would be a good idea to have a switch that forced personnel to have to hold the button down during the entirety of the linear actuators motion, for safety reasons. This would force someone to be supervising the lifting and the lowering of the device. After much research I was able to find switches that were momentary, meaning they had to be held down to work and would revert to the off position in the middle if they were not held down. I purchased a three position reverse polarity momentary toggle switch this weekend at Home Depot. It seems that this is the perfect type of switch for our desired use. Below is a picture of the switch as well as how it will be wired to our device.
Future Work

Future work will focus on affixing the motor to the metal subunit as well as test the motor to make sure it has enough torque to spin the cap off. We will also start work on building a frame unit for this device to be housed in. With regards to the monitor lift we will have to start making up the base as well as the guide wall. We will have to attach the guide rails as well as the linear actuator to the metal base.
Hours Worked

In Lab: 9

Out of Lab: 5

Total Hours Worked: 14