Monitor Lift and Paint Cap Remover

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Weekly Progress Report
9/21-9/28

Work Completed
Paint Cap Remover

We hit a large snag this week in the Paint Cap Remover project. The entirety of last semester and the first 4 weeks of this semester was based on designing the paint cap remover for a specific kind of paint, with a specific shape and size. We found out this week that as of very recently, the Grumbacher 1.25 ounce bottles of oil paint have completely changed their caps. The caps that we designed our whole project on, had large teeth-like grooves. Utilizing that shape we had come up with a mold shaped around these grooves which we had already built and successfully worked to remove the paint cap. The new paint cap which they have started producing has very small, undefined grooves, rendering it impossible to use them as a basis for gripping the cap. See Figure Below:

The paint cap on the left is an original Grumbacher cap. Notice the jutted teeth and the defined grooves. This is what we modeled our project based upon. We build a working mold that fit this cap and were halfway through with our project when we found out that Grumbacher is switching their caps to the type on the right. This type of cap has very undefined grooves, nothing which can be easily matched to a working mold. The new cap cannot be inserted into a shape because the teeth don’t stick out far enough to protrude and catch onto anything. We are now left with the daunting responsibility of restarting the project from scratch. The new objective is to come up with a way of holding the paint cap that does not involve matching the shape of the cap.
Paint Cap Remover: The New Design

The new design for our paint cap remover will use a clamp that holds the paint cap. Since we are holding the paint cap, the best solution for unscrewing it is to rotate the paint tube itself. Here is a new picture of what our new device will look like:

As you can see by this diagram, there is a clamp which can be used to secure the paint cap. An enclosure is built to house the paint tube and will rotate the tube to untwist the cap. This enclosure will be centered on the motor and can be rotated by simply flicking a switch, activating the motor and unscrewing the cap.

An important aspect to our new design is the clamp. Clearly the user does not have enough hand strength to hold the cap by hand and unscrew it. The clamp will hold the cap all on its own as the user presses a button to operate the system.

But how can the user operate a clamp with limited strength? Here is where the power of static forces comes to our aid. The clamp grip is on a screw based system. To tighten the clamp one simply has to turn the screw, which is operated by a short bar. Our design will take advantage of this bar by making it into a long lever. With a 12” lever the user can apply 3 pound-inches of force by only applying a ¼ pound of pressure.
We experimented with different types of plastic to build the frame for the paint tube. We pondered that we might be able to adhere some HDPE to itself using PVC adhesives. These adhesives are very strong for PVC:

The figure on the right shows our experimentation with gluing the plastic parts. Unfortunately this type of glue does not work properly for our plastic. The bond was weak and slow setting, so we will have to find another means of creating the paint tube box.

**Project Overview**

The projects are going well, but we have reached some serious roadblocks unforeseen to us. We are handling these issues as best we can and will continue to work vigilantly to see that we surpass our problems and accomplish our finished project on time.

**Future Work**

We need to begin constructing the frame for the monitor lift.

We need to begin creating the box for the paint cap remover.

We need to attach the linear actuator to the base.

**Total Work Hours  12**