For the new paint cap that Grumbacher has introduced to their paint bottles, we continue with the new design that allows for any shape and size paint cap to be removed.

The new design means the paint cap does not have to insert into a set shape, which was how our previous project functioned. We have introduced a clamp which will secure the paint cap without utilizing the large teeth of the old caps.

This design switches the function of the motor. Before, the motor spun the cap itself to unscrew it and remove it. In the new design, the paint tube itself twists while the cap remains stationary.

The most changed feature of our new design is the Paint Tube Enclosure, which holds the paint tube and rotates over its center using the motor. I will now describe our work performed on the Paint Tube Enclosure.

**Paint Tube Enclosure**

We first tried experimenting with different means of building the enclosure. We thought that a HDPE plastic could be built around the tube. The benefits were that it was cheap, easy to cut, and light. The plastic would we easily cleanable and easily formed.

The early models we built from the HDPE were unsuccessful. The main problem we ran into was adhering the HDPE to itself. We tested several types of glues but none formed a strong enough bond to withstand minimal shearing forces. Another problem we ran into
was trying to attach the enclosure to the motor head. We couldn’t figure out a good solution to bond the plastic to the metal and have a strong hold that would resist shear forces applied from the motor twisting.

This figure shows our failed attempts at trying to bond the HDPE plastic to itself using several types of glues. This particular attempt used PVC adhesive and after trying did not hold the plastic together whatsoever.

Finally, we came up with a great alternative to the HDPE. We would use a raw stock metal of aluminum or steel and use a mill press to have a recess. The metal would have a hole to fit the paint tube inside. Then, the metal would be all one piece and we would not have to worry about bonding separate pieces together.

These pictures show the aluminum enclosure that we built. The piece was designed using a raw block of aluminum, and this metal was chosen because it is light yet strong, and easy to mill. The recess was carved with mill press in many different passes.
We used “Climb Milling” because it reduces the friction and results in a cleaner, nicer finish on the product.

In the Climb Milling process, the feed (or stock) moves in the same direction as the mill bit. This means there is less chip getting forced into the way of the bit and results in a nice clean finish.

Project Overview

We are handling unforeseen problems well and are making good project on the projects. We are getting far with the paint cap remover and need to put in some more work with the monitor lift.

Future Work

We need to attach the motor to the paint tube enclosure.

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

We need to attach the linear actuator to the base.

Total Work Hours  12