Operation Manual

Project Overview:

In a collaborative effort, our team engaged with representatives from Corning—Jeffery Roche, Trent Brush, and Justin Barber—through a series of meetings to establish the project's direction. The objective was identified: to devise a solution that effectively reduces debris accumulation on the mylar adhesive sticker. The result of this collaboration and our subsequent design efforts was the creation of the offset lip.

This innovative device is securely affixed using 10-32 fine thread bolts into eight strategically positioned holes within the lower tooling's inner circle. It serves a dual purpose: minimizing the gap between the filter and the lower tooling and acting as a shield against debris dislodged by the upper grippers. Through its implementation, the offset lip significantly enhances the operational cleanliness and efficiency of the process.

Component Description:

The Offset Lip consists of only three components. The picture below shows each of them. The grey component is the aluminum 6061 structural lip. This component is responsible for the structure of the device. Using the 8 spaced out holes on the top, it will mount on the lower tooling locking it in place. The next component shown in blue is the compressive medium. This is the 40 OO rubber that sits in between the structural lip and the contact surface. The last component is shown in red. This is the contact surface made of ultra-high molecular weight polyethylene. This material has a very low friction value making it very smooth. The three components fit inside of each other and are combined using cyanoacrylate glue.

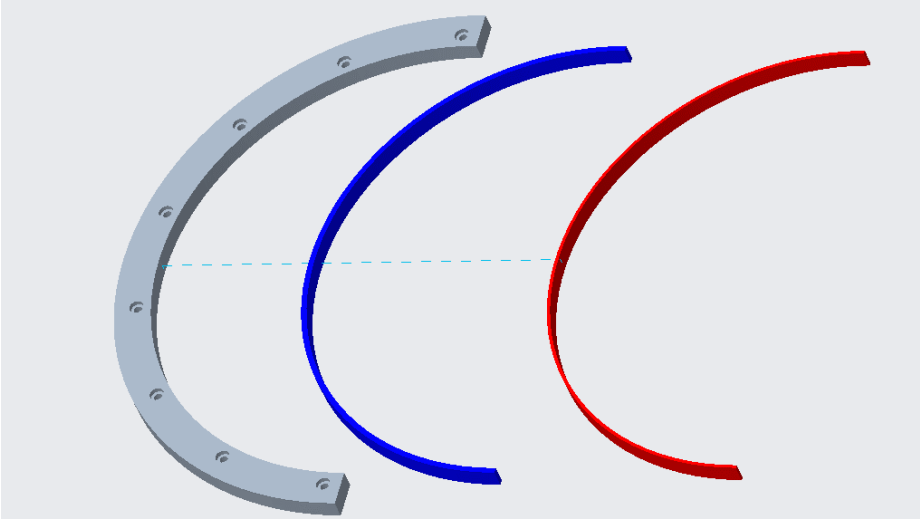

Figure 1: Exploded Assembly

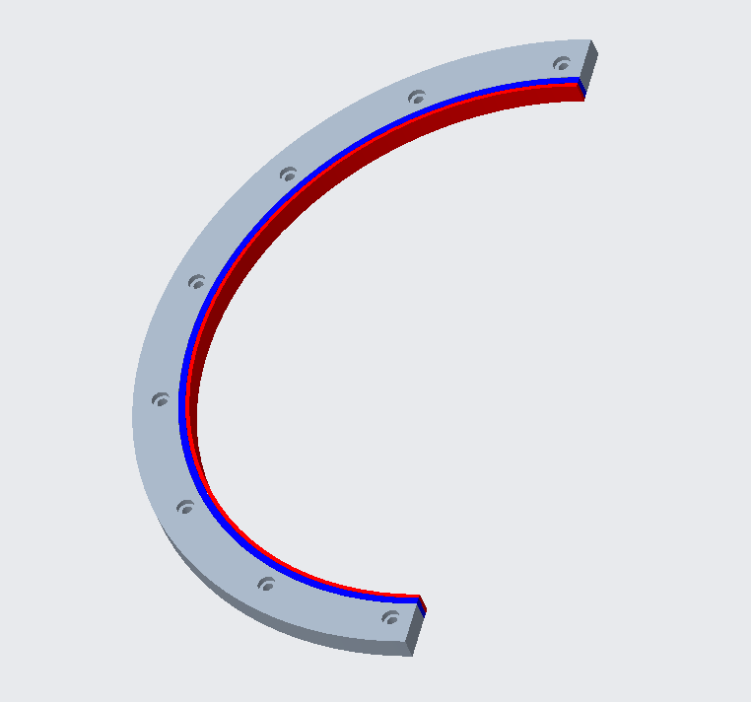

Figure 2: Assembly

Integration:

The assembly of the Offset Lip is very simple. To start, apply cyanoacrylate glue along in the inside rim of the aluminum component. Once the glue is applied, place the 40 OO rubber inside the aluminum so that it is flush against the aluminum rim. Next, apply glue to the inside of the rubber in a similar fashion with the aluminum. Once applied, place the UHWM flush against the rubber. When gluing each component together, ensure that the ends and bottom are lined up evenly. If there is any excess rubber or UHWM on either end, trim it so that it is flushed with aluminum. Finally, place the device on top of the lower tooling, lining up the holes on the structural lip. Once lined up, hand tighten the bolts through the structural lip and lower tooling to the Delrin seal underneath the lower tooling.

Operation:

The Offset Lip is designed for seamless integration with the lower tooling apparatus used in the diesel particulate filter (DPF) justification process. It securely mounts atop the lower tooling, utilizing eight pre-existing holes arranged in an inner circle for attachment. This is achieved through the use of 10-32 fine bolts, ensuring a robust connection that safeguards against detachment during standard operational procedures. The primary function of the Offset Lip is to channel debris away from the mylar adhesive sheet, enhancing the safety and efficiency of the justification process. With its static design and absence of moving components, the Offset Lip serves as a permanent enhancement to the lower tooling, significantly reducing the risk of contamination and ensuring a safer working environment for personnel.

Troubleshooting:

The Offset Lip does not have any moving parts and has a fairly simple assembly. Because of this, there will not be a lot of room for issues with our device. Should an issue arise, however, this will explain how to fix it.

Structural Lip Bolts:

If the bolts in the structural lip break or get stripped, simply remove the bolt without damaging any of the components on and around the lower tooling. Once the bolt is removed replace the bolt with a matching 10-32 fine thread bolt.

Damaged Components:

If any of the components on the device are damaged beyond repair, they will need to be replaced. The first step is to determine if the component can be removed without damaging the other components. If the UHMW component can be removed without damaging the rubber, simply remove the UHMW and cut and glue a new piece onto the inside of the rubber. IF the rubber gets damaged and can be removed, peel off the rubber and UHMW so the device is separated into its three pieces. Cut and glue a new piece of rubber to the inside of the aluminum, then reglue the used UHMW back to the rubber. If none of the components can be separated without damaging the other, the entire device will then need to be replaced. New components will need to be recut and shaped. Once each component is ready, use the glue to assemble the device. Once assembled, simply bolt the device back onto the lower tooling.

Ceramic Debris Build Up:

If there is any ceramic debris built up in between the individual components, use pressurized air to blow out the debris. Once the debris is removed reglue and clamp the device to return it to its original form and shape. If the debris is in between the device and the lower tooling, remove the device and use pressurized air or a brush to remove the debris. Once debris is clear, reattach the device back onto the lower tooling.