

## Meter/Mix/Dispensing of LORD Urethane Gap Filler Materials

### Description

Due to the high volume/high flow rate applications that are commonly associated with LORD urethane gap filler materials, automated meter/mix/dispense (MMD) processes are utilized in an effort to minimize material waste and cycle times, as well as reducing the overall cost. This document will cover a number of topics that customers/users will need to consider when evaluating automated dispense systems and processes.

LORD has experience working with many equipment manufacturers that specialize in dispensing these types of materials. For any questions, concerns, or assistance regarding the automated MMD processes of LORD urethane gap filler materials, please contact your local LORD representative, or e-mail [ElectronicMaterials@lord.com](mailto:ElectronicMaterials@lord.com).

### Choosing the Proper Equipment

There are many things to consider when selecting automated dispense equipment. The volume of material used in each application, desired flow rates, bead patterns, placement and volume accuracy will all be items that factor into the final decision on equipment type and specific manufacturers.

LORD urethane gap filler materials are also heavily filled and the filler particles are abrasive, which also factors into the type of equipment that should be selected for use. Gear/rotor pump systems, as well as certain piston pump systems, do not work well with this material as both contain tight tolerances around their moving parts, which maximizes the amount of wear that these systems can experience and therefore significantly impacts the Preventative Maintenance (PM) schedule. Systems such as rod displacement and progressive cavity are preferred as there are far fewer contact surfaces and these systems are better designed to handle filled materials or products that include glass beads. Internal surfaces

and components that come into contact with the liquid gap filler should also be designed to accommodate for increased wear. This might require metal components (valve seats, fluid chambers, etc.) to have special coatings and/or be manufactured from higher hardness materials.

When choosing equipment to be used with urethanes, moisture sensitivity of the hardener needs to be considered. If exposed to moisture, even from ambient air, the isocyanate can react and begin to gel. The rate of gelling varies depending on the product, humidity levels, and temperature. Work with the equipment manufacturer to ensure the hoses, connections, material feeding system, and any exposed shafts are protected from moisture and air ingress.

### Filler Separation and “Pack-out”

“Pack-out” occurs when the liquid portion of the material is forcibly separated from the filler. This occurs when systems are left under high pressure and there are available leak paths by which the liquid portion of the material can be filtered from the material and weep out. Improperly cleaned or tightened fittings, hose connections, and worn/loose fluid chamber seals are common areas where pack-out can occur. To defend against this, all pressure fittings, threaded components or sealed joints should be clean (no dirt, debris, material on threads) and assembled properly to prevent leak paths. Additionally, any automated dispense system that will be left unused for significant periods of time (>2 hours) should be relieved of all system pressure to minimize any possibility of filler separation. Many systems are designed with auto-depressurization features to accommodate for this.

# LORD TECHNICAL TIPS

Additionally, dispense systems should be designed to prevent “dead zones” – areas where filler can gather and pack-out during normal fluid flow conditions. Hard 90-degree turns should be avoided as well as fluid chambers that do not fully evacuate the material. Chambers that have flat edges/corners where material can gather should also be avoided, as these conditions can cause filler to build up in these areas during normal operation.

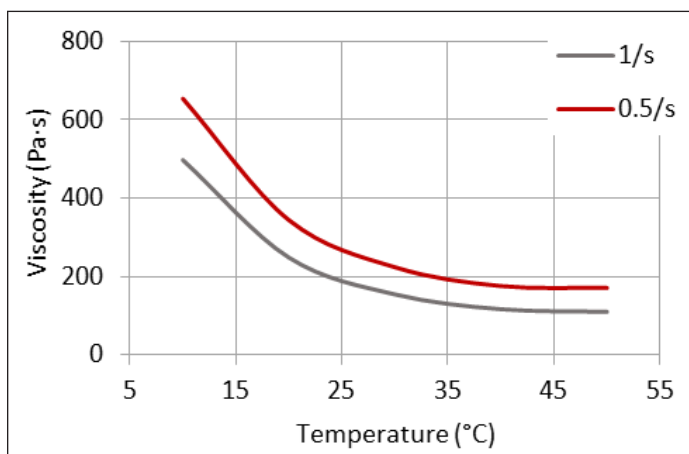
## Processing and Dispensing

### **Dispense Speed and Pressure**

MMD equipment varies widely, as each manufacturer's design is different. The dispense speed and pressure settings will be unique for the MMD setup and production speed. LORD Corporation cannot make specific recommendations regarding dispense speed and pressure. It is recommended to work with the MMD supplier to dial in the correct settings.

### **Viscosity**

Temperature of the material can have a significant impact on the ability of the material to be processed through a dispensing system as the viscosity of the bulk material has a direct correlation to its temperature (see Figure 1). It is recommended that dispense systems be designed to provide a moderate level of heat to the bulk material, feed lines, and fluid blocks in order to maintain the material at a constant temperature and therefore a consistent and predictable viscosity as material travels through the system. Dispensing temperatures should be kept below 45°C to avoid self-polymerization of the hardener.



**Figure 1: Temperature Sweep of CoolTherm UR-2002 Urethane Gap Filler**

### **Mix Tips**

It is recommended that a few types and sizes of mix tips be screened prior to moving to production. A suggested starting point for screening is a 10 mm ID mixer with 24 elements. If homogenous material is not dispensed (i.e., color striations are visible), alternate mix tips should be tested. This can be assessed by performing cross-sections of cured beads to look at color uniformity.

## Quality Control Recommendations

### **Mix Ratio Checks**

At least once a day (preferably at the start of each shift), perform a mix ratio check on each MMD unit dispensing LORD urethane gap filler. Simultaneously dispense the resin and hardener into separate cups, and then record the weight of each. The weights should be within  $\pm 5\%$  of the targeted weight ratio of resin to hardener. It is advised to keep a running chart of the mix ratio checks. This can help identify when normal maintenance of the MMD unit needs to be performed. Also, ensure that when the dispense event is triggered, that both the resin and hardener begin dispensing at the same time.

### **Switching Materials**

When transitioning from one product to another, it is important to clean the MMD unit. The standard process is a complete tear down, including replacing hoses. A thorough cleaning is imperative on the hardener side of the MMD unit as the hardener is highly reactive and may gel in contact with the other materials. Working with the equipment supplier and a LORD Corporation Application Engineer is suggested when switching materials as they can provide guidance on material compatibility and potentially save money.

# LORD TECHNICAL TIPS

## Shelf Life/Storage

Refer to the applicable technical data sheet for the shelf life duration and storage recommendations of each product. Shelf life is maximized when product is stored at 25°C in its original, unopened container.

Any bulk containers of material that have been opened and then returned to storage should have a dry nitrogen blanket placed over the remaining bulk material before closing and re-sealing the lid of the container. The hardener will react with the moisture in the air and be rendered unusable if nitrogen blanket is not applied.

## Cautionary Information

Before using this or any LORD product, refer to the Safety Data Sheet (SDS) and label for safe use and handling instructions.

*For industrial/commercial use only.* Must be applied by trained personnel only. Not to be used in household applications. Not for consumer use.

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