METER/MIX/DISPENSING OF COOLTHERM® URETHANE GAP FILLER MATERIALS

Technical Tips

Due to the high volume/high flow rate applications that are commonly associated with CoolTherm® 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.

Parker Lord has experience working with many equipment manufacturers that specialize in dispensing these types of materials. For questions, concerns, or assistance regarding the automated MMD processes of CoolTherm urethane gap filler materials, please contact your local Parker Lord representative, or e-mail electronicmaterials@parker.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 all factor into the final decision on equipment type.

CoolTherm urethane gap filler materials are heavily filled and the filler particles may be abrasive, which 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 abrasive materials as both contain tight tolerances around their moving parts. This maximizes the amount of wear these systems can experience and therefore affects the Preventative Maintenance (PM) schedule. Systems such as rod displacement and progressive cavity are preferred as there are fewer contact surfaces and these systems are better designed to handle filled materials or products that include glass beads. Internal surfaces and components that contact 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 may 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, or 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 the possibility of filler separation. Many systems are designed with auto-depressurization features to accommodate this.

Additionally, dispense systems should be designed to prevent “dead zones” – areas where filler can gather and pack-out during normal fluid flow conditions. 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 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. Parker Lord cannot make specific recommendations regarding dispense speed and pressure. It is recommended to work with the MMD supplier to dial in the correct settings.

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Viscosity

Temperature of the material can have a significant impact on its ability to move 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 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.

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 dispensed material is not homogenous (i.e., color striations are visible), alternate mix tips should be tested. This can be assessed by performing cross-sections of cured beads to analyze 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 Parker 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 ± 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, 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 prior materials. Working with the equipment supplier and a Parker Lord Application Engineer is suggested when switching materials as they can provide guidance on material compatibility and potentially prevent repair costs.

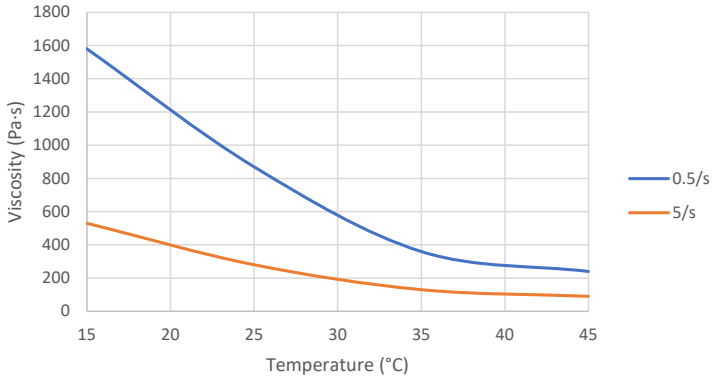

Figure 1: Temperature Sweep of CoolTherm UR-2000 Urethane Gap Filler

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 material before closing and re-sealing the lid of the container. The hardener will react with moisture in the air and be rendered unusable if a nitrogen blanket is not applied.

Cautionary Information

Before using this or any Parker 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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TT3084 OD 03/25 Rev.1