



# Improve assembly using PUR adhesives

3M demystifies PURs and explains how these adhesives can improve productivity.

PURs create durable bonds that resist temperature differentials, weathering, moisture and chemicals. Once a polyurethane crosslinks and forms a permanent bond, it can never be broken.

**P**olyurethane reactive adhesives, also known as curing hot melts, have been on the market for several years. While their use has grown rapidly in the woodworking and furniture industries, there are still misconceptions about their chemistry and applications.

Professional furniture manufacturers are highly skilled in woodworking, but many who spoke with 3M at the AWFS Fair in Las Vegas admitted that they aren't experts when it comes to adhesive selection and use. To help furniture makers improve productivity, 3M technicians answered these common assembly questions about PURs.

**Q:** *What is the difference between a PUR and other bonding systems?*

*By Debra Bettes, Product Marketing Supervisor, 3M Industrial Adhesives and Tapes Division*

**A:** Bonding systems such as hot melts, liquid PVA-type adhesives and one-part room temperature applied urethanes can be used effectively for various tasks, but they all have some limitations. PURs, however, offer the combined benefits of various adhesives and can overcome many obstacles that other options cannot.

● **Hot-melt adhesives** will typically join parts very quickly, but are not recommended for permanent, high-strength, load-bearing bonds. They also will not yield the thin glue line that can be obtained with PURs and usually only allow seconds for assembly.

● **PVA adhesives**, commonly known as white and yellow glue, typically do a nice job of producing a high-strength bond with thin glue lines. However, they require long clamping times, and the resulting bonds do not allow for movement in case of wood shrinkage or expansion. The advantage of PURs is that you can usually obtain handling strength in seconds, which allows the parts to be removed from the clamp and eliminates the need for nails or brads to secure the parts until a glue system dries.

● **One-part room temperature urethane adhesives** also produce high-strength, flexible bond lines, but still require clamping time. Many of these urethanes also tend to foam, which forces adhesive out of the glue line. This foaming makes cleanup time-consuming and can also create a foam or honeycomb glue line that could potentially decrease the strength of the bond.

With PURs, the adhesive does not foam and any squeezed-out adhesive can be removed by hand or with a plastic putty knife once it has turned solid, usually within two to four minutes. Cleanup is generally very easy, as long as excess adhesive is removed in the first 15 minutes. There are also PUR formulas that will allow for fixturing in up to two to three minutes. PURs can also bond dissimilar substrates such as wood to plastic.

**Q:** *Do PURs form structural-strength bonds?*

**A:** Yes, within minutes, PURs have the holding strength of more than 1,000 pounds. PUR adhesives form a bond in two stages. First they cool and form an initial bond and then crosslink molecularly. They absorb moisture from the wood and from the air to form a permanent bond. Once a polyurethane

*continued*

crosslinks and forms a permanent bond, it can never be broken. The bond usually becomes stronger than the substrate.

**Q:** *Is it possible to get thin bond lines with PUR adhesives?*

**A:** Yes, 3M's Scotch-Weld PUR adhesives create thin glue lines that are often difficult to achieve with 100 percent solids adhesives. They can be applied in a bead pattern using the proper application equipment and can be thinned out by adding manual pressure and/or a press. After the bonded piece is stained, a PUR bondline is very difficult to locate with the human eye.

**Q:** *When applying a PUR, how much open time do you have to join your substrates?*

**A:** Open times will vary based the temperature at which the adhesive is dispensed. The Scotch-Weld PUR Easy 250 Adhesive System dispenses adhesive at 250 F. The higher application temperature allows a longer open time for production flexibility. Substrates can be repositioned during the adhesive's open time. Then, once the adhesive has cross-linked, the bonded substrates are ready for immediate processing and finishing. This is ideal for longer-length substrates, such as crown molding or countertop laminates, which take time to line up properly.

**Q:** *Can I use PURs on heat-sensitive materials?*

**A:** PURs create durable bonds that resist temperature differentials, weathering, moisture and chemicals. The bond usually becomes stronger than the substrate. This gives the adhesives extremely good heat- and moisture-resistance properties, which makes them ideal for kitchen and



The Scotch-Weld PUR Easy 250 Adhesive System dispenses adhesive at 250 F, which allows a longer open time for production flexibility.

bathroom countertops, window and door applications. They are also good at sticking diverse substrates such as vinyl, paper, film or foil to metal, wood, PVC, particleboard and honeycomb core materials.

**Q:** *How can a PUR reduce assembly time?*

**A:** With production benefits similar to hotmelt technologies, PURs optimize a fast-set time with some reaching handling strength in as few as five seconds, eliminating the need for long clamping time, which increases throughput. With fewer pieces in clamps, less shop floor space is used for drying time.

Additionally, some new-to-market PUR dispensing systems can be used with plastic disposable nozzles that eliminate system purging and tip caps, thereby minimizing adhesive waste and decreasing applicator maintenance. ●