

## Polyurethane and Polyurea Technologies: Working Together?

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**T**here has been an industry competition between polyurea and solventless/fast-set polyurethanes for the past two decades, and it is probably a little confusing to the average contractor. In reality, some of the application and performance differences between a polyurea and a polyurethane may be occasionally overhyped. In fact, the physical properties between the polyurea and polyurethane systems are really relatively close when compared to other coatings and elastomers. But despite the way these different systems are touted, the chemistry of each of these systems can influence what applications suit their attributes.

### System Similarities

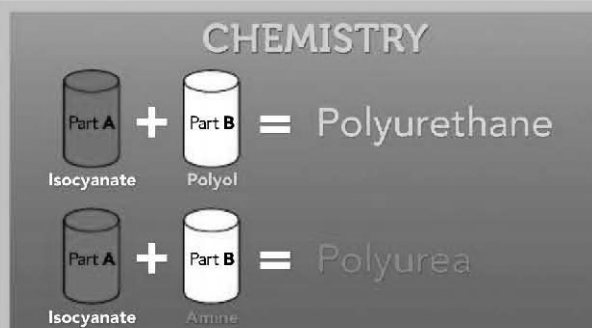
There are both differences and similarities between these two coatings systems, and each system has some advantages depending on the end-use application. One of the similarities is that the “A Component” used in both systems is an isocyanate polymer; the same product could be used as the A Component for both the polyurea and polyurethane systems. Another similarity is that both systems typically use a 1:1 ratio between the A and B sides. They can also both be sprayed with the same plural component spray proportioner and plural spray gun.

The key difference between the two systems is the B side, or resin. The polyurethane system is based on a blend of resins (a polyol) that require a catalyst system in order to cure quickly with the A side. The polyurea system, on the other hand, is based on a resin-blend system (polyetheramines) that is “auto-catalytic,” meaning that it will cure quickly and automatically with the A side without a catalyst.

### Chemistry in Action

Now let’s look at how these chemistries influence application and physical properties. Both systems can be formulated to cure in less than 30 seconds, so a major advantage is their fast-cure properties. This property can allow a contractor to finish his or her projects in a portion of the time that traditional coating systems may offer. On top of that, polyurea systems can cure at a colder temperature than polyurethane systems, thus providing a longer application season; however, there are times when fast-cure is not an advantage.

For instance, there are some applications where a geotextile is required to be embedded into a membrane system, which means the system might cure too fast to allow



the proper “wetting out” of the geotextile. In this type of application, which is what happened at the St. Louis bridge deck project, the polyurea systems are not a good candidate; however, a polyurethane system (with a 5- to 10-minute cure time) might be ideal for this type of application, since it allows the geotextile to be embedded into the polyurethane coating system prior to it curing.

Additionally, solventless polyurethane systems typically have slightly more abrasion resistance, chemical resistance, and elongation than polyurea. But polyurea systems typically have higher tensile and tear resistance than polyurethanes.

### Working Together

In the case of the concrete land bridge deck project that required waterproofing in front of the St. Louis Arch grounds, the contractor used the advantages of both the polyurea and polyurethane waterproofing systems to accomplish the required end result. The specification for this project required 100 mils (2,540 microns) of a polyurea system followed by 50 mils (1,270 microns) of a polyurethane system with a geotextile embedded into the topcoat. The polyurea system provided the productivity of curing fast, the tolerance for cooler temperatures, and the tolerance for potential moisture in the concrete deck. The polyurethane system offered abrasion resistance and a slower cure time, so that it could be sprayed over the polyurea and have enough open time so that the geotextile could be rolled into the membrane prior to it curing. (The polyurethane system was slowed down by adjusting the catalyst type and amount to have an eight-minute cure time.)

Using both systems enabled the contractor to get the most of each of the two types of systems. Both polyurea and polyurethane systems have their pluses and minuses, but this project goes to show that using different systems together can sometimes have the best result. **CP**