Original Equipment Manufacturers and Polyurea Coatings- A Perfect Match

Tripp Ishmael
Elastomer Specialties, Inc.

Introduction

The invention of polyurea during the mid-1980's by Texaco Chemical Company® (now Huntsman Chemical®), has caused a heightened awareness of fast-curing, 100% solids coatings. The first 20 years of polyurea technology produced tremendous growth in polyurea applications which were previously limited to industrial and construction markets. Although these markets offer good growth potential, they are generally project oriented and can be somewhat spotty. The use of polyurea in the Original Equipment Manufacturer's markets is experiencing rapid expansion due to several advances in polyurea technology that include: improved application equipment, improved formulations (both aromatic and aliphatic in nature), and several improved raw materials which offer the formulator a variety of products to use in polyurea formulations.

A typical O.E.M Polyurea application with proper spray booth and personal protective equipment.

A typical construction/industrial-based application for polyurea includes ElastoGard ARC is sprayed onto geo-textile fabric as a wastewater pond liner. (Picture courtesy of Mike Francis-Protective Coatings)

Previous Polyurea Application Issues

One of the problems associated with the application of polyurea coatings is the continued maintenance required of the high-pressure plural component equipment to remain in good operational condition. This maintenance can include:

- Daily (and sometimes hourly) maintenance and cleaning of the spray guns.
- Maintenance and monitoring of drum transfer pumps.
- Constant monitoring of high-pressure pumping equipment pressure gauges and temperature readouts to ensure proper volume ratios.

Due to these maintenance issues, polyurea applications have been overlooked in favor of easier application methods. It has been commonplace in the industry for polyurea manufacturers to recommend that while spraying polyurea, one person should monitor the equipment and another person spray the coating to ensure proper application.

Prohibitive Equipment Cost Issues for Polyurea

In the past, polyurea applications required high-pressure plural component equipment that cost $20,000-$30,000 depending on the length of hose required. Additionally, most equipment required large amounts of air and electricity to operate the equipment. While some O.E.M accounts have large amounts of air and electricity available, the majority of small O.E.M's do not, resulting in an increased cost of a larger air compressor or electrical improvements. To solve this problem, ESI originally developed the Condor low-pressure pump which runs on 120 volts of electricity and uses a small amount of air. However, recent improvements to the Graco/Gusmer equipment line have allowed high-pressure polyurea to be applied using a 120 volt electrical circuits and 2.5 CFM of air at 100psi. As an advanced distributor of Graco/Gusmer equipment, E.S.I. will be instrumental in the continued development of this equipment.

Polyurea is used in several O.E.M. applications including marine, automotive, mining, and several others.

Why Polyurea for O.E.M's?

Polyurea offers several improvements to O.E.M. coatings technology which include:

- 100% Solids, No VOC's
- Virtually NO H.A.P.'s
- Fast Cure Times- No Bake Oven Required After Application
- UV-Stable Formulas or Standard Aromatic formulas
- Fast Stack Time of Sprayed Parts
- Wide Temperature Application Range (Ranges from -40F to 250F depending on the substrate)
- Can be Applied in 100% Humidity with No Bubbling
- With the proper primer, Polyurea can Be Applied to a Variety of Substrates Including Carbon Steel, Galvanized, Aluminum, Concrete, Polyester, and In-Mold Coatings

Polyurea Environmental and Disposal Issues

E.S.I. has been involved in the initial phases of start-up for several O.E.M customers in several states. The U.S.E.P.A. lists one of the components in polyurea as a Hazardous Air Pollutant (HAP). However, this chemical (i.e. 4,4-diphenylmethane diisocyanate) is present in small amounts due to the fact that the majority of this chemical (in free monomer form) is pre-reacted and vacuumed off to improve safety. This results in a H.A.P.S. reporting number that is extremely low. E.S.I's technical staff will gladly assist its customers in calculations of H.A.P's if needed.

E.S.I. has solved the issue of disposal of 55-gallon metal drums by supplying the majority of its O.E.M. customer's polyurea in 275 gallon, clear disposable totes. Customers simply return the totes to E.S.I for recycling after use. The totes provide two distinct improvements over drums. The first improvement is the ability to see the material in the totes therefore allowing the applicators to provide its purchasing department with proper Material Requirement Planning information. The second improvement is the elimination of maintenance laden drum transfer pumps. The tote application equipment is supplied by two diaphragm pumps, which are more user-friendly and have no moving parts or "open" parts to allow isocycanate to cure.

Personal Protection and Worker Safety

As with most sprayed-on coatings, the ultimate personal protection for the application of polyurea requires the use of forced-air respirators and Tyvek® suits. However, charcoal filters with full-face respirators have been used with success. When using charcoal filters, it is important to change the filters regularly as they can show

"break-thru" if too much material has built up on the respirators.

Additionally, standard paint booths are recommended to capture overspray particulate that can accumulate on filters. These filters can then be disposed of in a landfill with no restrictions. The filters have tested negative for TCLP testing parameters.

Furthermore, when designing a spray booth for O.E.M Applications, the ideal design should provide a high airflow volume to remove particulates (i.e. overspray) and provide a large filter bank that will maximize filter life. It should also be noted that a larger spray booth is needed if "texturing" is to be applied.

A typical O.E.M. Polyurea application spray booth.

Furthermore, it has been determined by independent air sampling and analysis that 20-25 feet from the spray gun (using a recommended spray booth drastically reduces this distance) is a safe "barrier zone" for workers to not require personal protective equipment. Air sampling results have shown that MDI is "not detectable"; even within 5 feet of the application. This is easily explained by the fast reaction time of polyurea. There simply is not enough time for MDI vapor to make it to the air sampling tubes.

When considering a Polyurea application in your facility, contact E.S.I. for specific recommendations for your overall polyurea needs.

Conclusion

Polyurea is fast becoming a standard coating in the O.E.M. industry due to its speed of cure, no V.O.C.'s and ability to be applied in harsh conditions. O.E.M. applications are perfectly suited to polyurea coatings because the Original Equipment Manufacturing industry is currently struggling with several issues in which polyurea seems to provide answers. With the ability to provide polyurea in UV-resistant, color stable formulations, the cost of polyurea (on a $/square foot basis) is comparable with aliphatic polyurethanes which are currently used in most Original Equipment Manufacturers facilities. When taking into consideration several key factors: No bake ovens required, Increased production because of short cure times, No VOC's, Easy environmental disposal, etc ; the cost savings become obvious. Perhaps you should consider polyurea for your O.E.M. coatings needs.