

# Industrial Floor Coating Based On Biorenewable Materials

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Ultraviolet (UV) coating technology is widely used for decoration and protection in many different applications in a wide range of industries. The environmental benefits of UV technology are well documented for the reduction of emissions of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs).<sup>1,2</sup> Additional advantages of this environmentally friendly technology include faster cure, increased production speed, improved process efficiency, source reduction, and sustainability. Fast cure under UV lamps eliminates the need for ovens or extensive manufacturing space for drying of coatings, with corresponding savings in energy costs and infrastructure. UV technology can provide a healthier work environment, and can decrease risks and lower insurance costs by eliminating flammable solvents from coating processes. Regulatory costs can be significantly reduced with UV technology which can provide lower applied coating cost and reduced overall cost through improved process efficiency and elimination of pollution. UV technology is not only applicable in a factory setting, but is also suitable for field use with handheld UV lamps and UV floor cure units.

The capabilities of UV coating technology have been extended to the high performance protection of a variety of surfaces, including industrial floor surfaces.<sup>3</sup> The requirements of UV cure do not prevent this technology from providing surfaces with UV protection and resistance to weathering from sunlight.<sup>3</sup> The toughness, solvent resistance, and abrasion resistance of UV coatings are ideal for high performance flooring applications, and the efficiency of UV technology can provide a significant reduction in the time required to apply a high performance coating to a floor and to cure the coating and quickly put that floor back into service.

Along with UV technology advantages such as lower material usage, cure efficiency, and environmental benefits, high performance has now been demonstrated for UV curable industrial floor coatings based on biorenewable materials. This adds to the existing environmental advantages of UV technology since petrochemical sources are finite and may become increasingly prone to price fluctuations and supply interruptions. Availability of UV curable materials with significant biorenewable content continues to increase. A number of acrylate monomers, polyester acrylates, and modified epoxy acrylates are based on natural source materials that include oils from soybeans and flax, pine tree resin, wood byproducts from paper processing, alcohols from carbohydrates, and glycerol from oils, fatty acids and sugars. With suitable demand, biorenewable raw material production volumes have the potential to become very large. As one crop example, at 60 pounds per bushel of soybeans, the annual U.S. soybean production is over 250 billion pounds.<sup>4,5</sup>

By 2020-2021, the global paints and coatings market size is estimated to be \$176.5 billion<sup>6</sup> and the industrial floor coating market size is estimated to be \$6.07 billion.<sup>7</sup> Common floor coating materials include epoxy products, polyurethanes, polyureas/polyaspartics, and acrylics. Disadvantages of these materials include extended time periods required for cure, for evaporation of water or solvents,

or a combination of these factors. During this time, an area that is being coated is unavailable for other use, and may require multiple days before being put back into service. This can result in significant opportunity costs related to leaving the floor out of service for this period of time. For two-part floor coating systems, limited pot life can be an additional disadvantage which can require numerous applicators to properly apply the material in a compressed period of time, and wasted material can result from premature cure before application. These disadvantages are magnified for multiple coat systems.

UV curable industrial floor coatings based on biorenewable materials are solvent-free, one-component products that are quickly cured using a UV cure floor machine, and they do not have pot life limitations. Fast cure is provided with reduced labor costs, providing significant advantages when compared to other commercial floor coating systems. Market segments of particular interest are those where down-time is problematic and the environmental and convenience advantages of the biorenewable-based technology are advantageous, and include industrial warehouses, hospitals and assisted care facilities, schools, restaurants, retail stores, public buildings, clean rooms, laboratories, and food preparation areas. In some cases, fast cure allows jobs to be done overnight, often with no loss of usage for the area being coated.

UV curable industrial floor coatings based on biorenewable materials have been demonstrated to be easily applied by roller, and fillers included in the formulations provide texture without an additional application step. Pigmented and clear versions have been demonstrated on a number of different types of surfaces, including concrete, tile, and wood.



**Figure 1. Application Of Biobased Industrial Floor Coating By Roller**

Quick cure of the biobased industrial floor coatings is achieved with a UV cure floor machine, followed by a walking operator similar to a person using a floor scrubber, floor polisher, industrial vacuum, or lawn mower. Full cure and hardening of the material occurs under the UV lamp before the coating is stepped on by the operator. Properties are comparable to those of other commercial floor coating materials, with the UV cured biobased industrial floor coatings demonstrating good toughness, abrasion resistance, and resistance to common cleaning liquids and automotive fluids.



**Figure 2. Quick Cure Of Biobased Industrial Floor Coating With A UV Cure Floor Machine**

Another advantage of the biobased industrial floor coating system is that it can be quickly and easily repaired and cured with a handheld UV lamp without taking the area out of service for an extended period of time that would be required with competitive floor coating materials.



**Figure 3. Quick Cure Of Biobased Coating Spot Repair Using Handheld UV Cure Lamp**

The quick application and fast UV cure of the biobased industrial floor coating system enables more efficient critical path scheduling for new construction and also for floor refurbishment projects.

## Conclusion

The advantages of UV technology have been demonstrated for field applied industrial floor coatings based on biorenewable raw materials. The efficiency of UV technology provides significant advantages over conventional floor coatings, including reduced labor costs, one-part systems to minimize waste, more efficient critical path scheduling, and a fast return to service with fully developed coating properties. Market segments of particular interest are those where down-time is problematic, such as industrial warehouses, hospitals and assisted care facilities, schools, restaurants, retail stores, and food preparation areas. UV cured biobased industrial floor coatings demonstrate good toughness, abrasion resistance, and resistance to common cleaning liquids and automotive fluids.

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