



Q: “How Do PolyLube™ Bearings Withstand *E-Coating & Other Painting Processes?*”

A:

A common question with respect to processing bearings already press-fit into housing assemblies is what potential performance problems exist, if any, when the PolyLube bearing is sent through the E-Coat or other paint process. Specifically as it relates to composite bearings, the technical issues that potentially impact the performance integrity are three fold: ability to withstand the e-coat solution(s) used in either anodic or cathodic electrocoating, maintaining liner integrity and the mechanical capacity of the backing material, and lastly dealing with potential paint contamination within the wear-resistant, low friction liner itself.

Withstanding the E-coat Solution(s) For Anodic or Cathodic Electrocoating



The e-coat process itself relies on the chemical principle that “opposites attract.” Typical e-coat processes generate a DC charge on a metal part. The metal part itself is, at the time of this charge application, fully immersed in a solution of oppositely charged paint. The two steps in most continuous e-coat systems are the pretreatment zone and the electrocoat bath. It is in these baths that corrosive chemicals are applied in order to clean and in some cases chemically etch the metal substrate in preparation for the depositing of paint. During these two steps the PolyLube bearings can be exposed to the chemicals within the bath. Polygon’s internal chem lab has completed multiple long term immersion studies where samples of the composite structure are put through concentrated chemical baths of equivalent chemical agents, for equivalent exposure times, and at equivalent temperature settings.

These studies have showed no meaningful loss in mechanical properties for the composite structure itself. The actual measured mechanical properties include flexural modulus, flexural strength, interlaminar shear, and compressive strength. It is important also to point to Polygon’s almost 40 year supply of PolyLube bushings to the industrial equipment market, not one field failure has been found that has any association to the e-coating process itself.





Maintaining Liner Integrity & Mechanical Capacity of the Backing:

The second point focuses on whether or not the liner itself or the backing material is negatively effected by the baking process required to cure most paint systems. Cure techniques vary widely but most are within the 375-400°F range. The PolyLube bearing employs a thermoset resin system that is capable of performance functioning in ±325°F temperature range. The short term duration of the paint curing process is not a potential problem for PolyLube bearings. Because the resin chemistry of PolyLube bearings is thermoset, and not thermoplastic, the PolyLube bearing is not capable of a flow condition, regardless of temperature. The thermal gradient employed by e-coating and other painting processes does not impact the performance of the product. What can be seen at times is a slight color change from a light yellow to a darker color—the color change can be unnoticeable or can be a more dramatic change, depending on the time of the exposure. This is a common condition in the composites' industry called “greening.”

Greening is related to the color change that takes place with thermoset materials as they are exposed to high temperatures. It is related to the fact that thermoset polymers increase in cross-link density as they are exposed to high temperatures (greater than 400°F). A direct effect of this increasing cross link density is an color change. In lighter colored composites this is reflected in the slight change from a light to a darker coloration. No appreciable mechanical or other physical change occurs during this thermal exposure. Additional information about this particular issue should be directed a PolyLube application engineer sales@polygoncompany.com.

Dealing With Potential Paint Contamination Within the Liner:

It is here that a distinct performance enhancement for Polygon's line of PolyLube bearings exists. The PolyLube Fiber and MRP series bearings employ a proprietary liner architecture that is capable of easily ingesting significant contamination without fully inhibiting the film-transfer process and the overall performance of the bearing itself.



Contamination of the PolyLube bearing ID will not create performance problems assuming the paint is similar in its spread as to the above picture. As the pin cycles through its oscillatory or rotational degree of movement, the paint will easily and quickly come off the PTFE liner and the PTFE film transfer process will continue unabated.



*PolyLube journal bearing liners employ a proprietary liner architecture that have engineered “pockets” that allow for the ingestion of contamination—regardless of the type of contamination in question. In the case of paint, the paint is quickly removed from the PTFE filaments and embed themselves into the pockets, allowing the bearing to continue functioning. This is a **unique feature** to the PolyLube Fiber and MRP family.*