

# TECHTALK DESIGN ADVICE SERIES

## FOUR CONSIDERATIONS WHEN SELECTING A SHAFT FOR USE WITH IGLIDE® BEARINGS

In order to optimize the friction and wear of your bearing systems, shaft and bearing materials that work well together are crucial. Cohesiveness between the shaft and bearing materials is essential, as a whole range of problems can arise if the wrong shaft material is used with a particular bearing. Here are a few things to consider when it comes to choosing the surface treatment of your bearings' shaft surfaces.

**1. Shaft Material:** Many different shaft materials are available on the market, but not all will work well with all bearings. There are a few different factors to consider when choosing a specific shaft to be used in combination with a plastic bearing.

- Weight: Are you looking for a lightweight shaft? If so, aluminum, carbon fiber, and plastic may be your best options. However, these lightweight materials may present issues for certain bearing materials, including bronze or fiber-wound bearings that typically work best on a hardened steel shaft. When choosing a plastic bearing, there are certain materials that will work better than others on these types of lightweight shafts.

- Corrosion resistance: If the shaft will be used in an environment where chemicals or liquid media, including water, will be present, then corrosion resistance of the shaft is of concern, and must be taken into account. iglide bearings work well on shafts that offer corrosion resistance, such as hard-anodized aluminum, or chrome plated shafts, as well as shafts with a number of different surface treatments, like gas nitride finishes.



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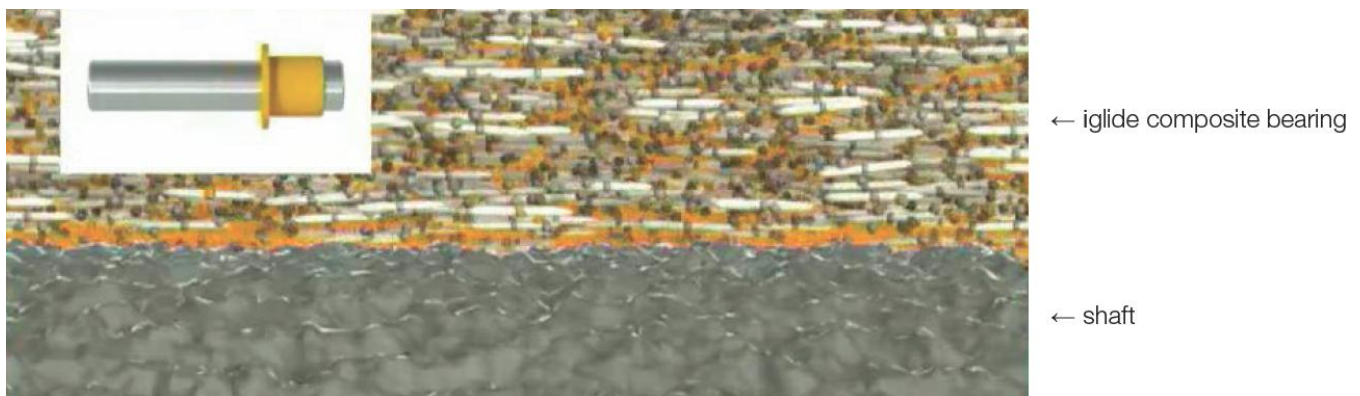
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- **Strength:** The shafting in applications must be able to withstand the stressors of the application at hand. For certain high-load applications, certain lightweight shafts may be subject to deflection.
- **Magnetism:** We have heard from many customers, especially those in the lab industry, that the components in their application must not be magnetic in nature. iglide bearings themselves are non-magnetic, but to suit these types of applications, the shaft cannot be magnetic either. iglide bearings work well with non-magnetic materials, even fully plastic shafts.
- **Cost:** Price is almost always a factor in determining what type of shaft can be used. Some applications do require more expensive materials, such as stainless steel, hardened shafts, or carbon fiber shafts, to name a few, while other applications can take advantage of a less expensive option.

**2. Roughness:** The roughness of a particular material is especially important when using a self-lubricating plastic bearing.

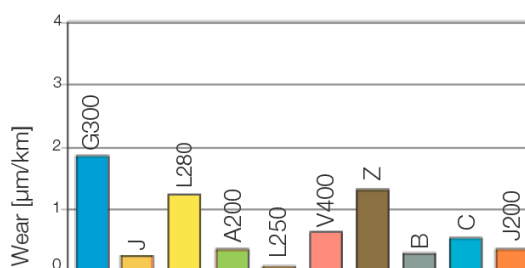
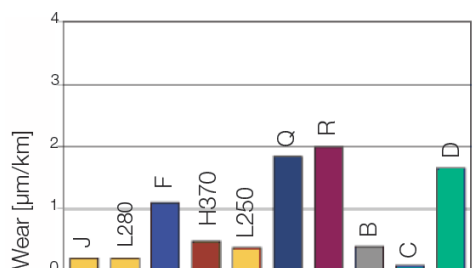
- Generally speaking, an iglide bearing should be used on a shaft with a roughness of 8-64 rms. For linear applications, the best performance is seen with a shaft roughness of 8-16 rms, and 16-64 rms for oscillating or rotating applications. This may vary depending on the particular bearing material or shaft selected.
- Some bearing materials require an expensive, polished shaft. A composite plastic that has been homogenously blended, on the other hand, reacts better with some shaft roughness. When using an iglide bearing gliding along the shaft, a certain amount of roughness will allow the solid lubricant to fill the valleys of the shaft, and act as an optimal gliding surface. (See image below)



**3. Hardness:** The hardness of a particular shaft material should be considered in a bearing application, for the following reasons:

- The shaft and the bearing must both be able to withstand the load of an application in order to run properly and last.
- Hardness of the bearing: For certain bearing materials, including composite plastics, if the bearing material is harder, or contains certain fibers, it can cause significant physical damage to a softer shaft.

For this reason, it is very important to look at not only the individual shaft and bearing materials, but how they interact. Hardness recommendations for shafting to be used with iglide bearings are available depending on application details.



Wear rates of iglide® bearings when used on hard-chromed (Left) and hard-anodized (Right) aluminum shafts

#### 4. Shaft/Bearing Combination:

- iglide bearings work well with a variety of different shaft materials, allowing for a high degree of design freedom.
- If the shaft has already been selected when you're choosing a bearing material, the most important things to take into account are the application's load, speed, motion, shaft roughness, and environmental concerns.
- The thermal conductivity of the bearing and shaft can create problems if the system's PV Value gets too high. The thermal conductivity of each material in the system will help to predict the lifetime that can be expected from the application.
- Testing on bearing/shaft combinations under real-world conditions can help to give an accurate lifetime predictor for bearings. Extensive testing carried out by igus has resulted in an extensive database, which includes a lifetime calculator, which allows you to input applications details to receive an expected bearing lifetime in hours. This tool is available for use by anyone, and is found at: [www.igus.com/iglidurConf](http://www.igus.com/iglidurConf).

