

TECHTALK DESIGN ADVICE SERIES

CHOOSING THE RIGHT BEARING SHAFT MATERIAL



1. Cost Factors

Reducing costs is an important factor for most companies. The ability to use low-cost shafting heavily depends on the bearings chosen to run on it.

For example, ball bearings require very hard (60HRC or above) and smooth (under 4rms) shafting. Bronze bearings are similar: the shafting must be harder than the bronze material being used.

Because of these requirements, shafting choices are limited and a less expensive shafting material may not be suitable for the application.

Plastic bushings offer a few more options because they can run on many different shafts.

igus[®], plain bearings are available in a wide variety of polymer blends so you can match the lowest price shaft with a bearing most suited to the application.

For linear applications, igus[®] recommends an 8-16rms and in oscillating and rotating applications, depending on the bearing material, a 16-64rms.



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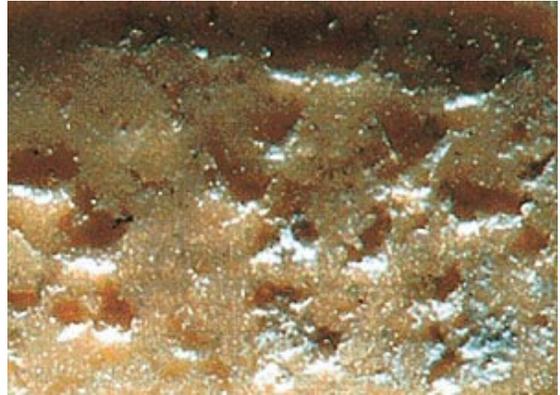
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2. Wear Factors

Aside from the cost factors, there are a number of other things to consider when designing shafting into a bearing system. Many things can affect the performance of the bearings used if they are not taken into consideration.

The direct relationship between coefficients of friction and shaft materials means that: if the shaft is too rough, wear can become a problem. Extremely rough shafting can act like a file and separate small particles of the bearing's surface during movement. When a shaft is too smooth, however, an increase in friction can occur due to the shafting and bearing surfaces adhering to one another. When there is a large difference between static and dynamic friction, alongside adhesion between mating surfaces, stick-slip—characterized by a loud squeaking noise—can become a problem.



Another important consideration is how hard and soft particles can damage bearings and shafts. If particles get in between a bearing and its mating surface, both can suffer from increased wear. Dirt, dust and paper fibers are just some elements that can cause problems. Self-lubricating bearings can eliminate this issue because no grease or oil are on the bearing. This means dirt particles cannot penetrate as easily and damage the bearing and shaft.

There are a number of shafting materials and each can affect the wear of a bearing in different ways. Aluminum, case-hardened steel, stainless steel, and chrome-plated steel are just some of the choices. The hardness and roughness of the shaft material plays an important role.

Hard chromed shafts, for example, are very hard, but also smooth. The wear of igus[®], iglide[®] plastic bushings are lower on this shaft type than any other. However, because of the little surface roughness, stick-slip issues can become a problem. Stainless steel works well in low-load applications, while corrosion-resistant aluminum, when paired with a corrosion-resistant bearing, is ideal for wet applications or where chemicals are present.

Conclusion

Work with a vendor that offers test results on wear in relation to different shafting materials. This makes it easier for you to choose the ideal and most cost-effective bearing and shaft combination and increase service life in your application.

For additional help or advice when choosing shafting, contact us directly at 1-888-803-1895 or e-mail sales@igus.com.

Useful Links

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[Expert System: bearing lifetime calculation program](#)

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