

# TECHTALK DESIGN ADVICE SERIES

## PLASTIC VERSUS STEEL ROD ENDS BEARINGS



Spherical rod end bearings are ideal for facilitating rotary and linear motion in a wide variety of applications from packaging and agricultural equipment, to medical and exercise machinery.

However, with different choices available, it is important to remember that not every rod end is the same;

each has its own unique set of advantages, disadvantages and limitations.

Below are some of the key elements to keep in mind when choosing between a steel rod end bearing and a plastic rod end bearing.

### Design

Steel rod end bearings and plastic rod end bearings operate differently as a result of how each is designed.

Most steel rod ends feature three pieces: a housing, a “step” (also known as a pivot) bearing, and a ball bearing. A plastic rod end, however, features two pieces: a housing and a ball.



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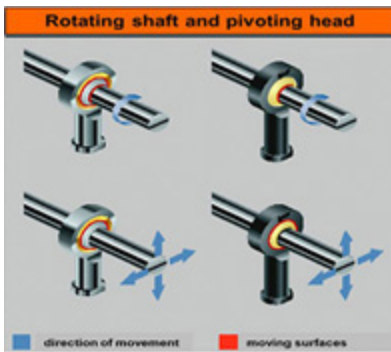
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## Movement

The configuration of the steel rod end bearing causes it to rotate with both the shaft and ball against the housing, and compensate for angular deviations by positioning the ball against the housing. In comparison, the plastic rod end bearing rotates differently – with the shaft against the ball. Like steel rod ends, plastic rod ends also compensate for angular deviations by situating the ball against the housing.

Specifically, igubal<sup>®</sup> plastic rod ends from igus<sup>®</sup> are ideal for rotating or linear applications where the rod end's spherical ball needs to move slightly to compensate for shaft misalignment.

## Advantages and disadvantages

Steel rod end bearings and plastic rod end bearings each have many benefits, but also some limitations. It is important to understand these in order to identify the best bearing for your application.

### Plastic rod end bearings

Advantages:

- Self-lubricating, which eliminates the need for grease fittings and maintenance
- 50 percent lighter than steel / metal rod ends
- Vibration dampening
- Dirt and dust resistant
- Corrosion resistant
- Can be used in rotating, oscillating and linear motions

Disadvantages:

- Lower static capacity
- Larger E10 tolerance with plastic compared to steel at H7
- More heat buildup
- Lower tightening torque than metal parts (from thread)
- Inability to directly fix the ball with a screw (a metal sleeve is required)



## Steel rod end bearings

### Advantages:

- Higher static load capacity
- Better heat dissipation
- Higher torque when tightening
- Smaller inner diameter (ID) tolerances because they are machined

### Disadvantages:

- Heavier than plastic rod ends (up to 50 percent)
- Susceptible to corrosion (unless stainless steel)
- Require lubrication, which attracts dust and dirt
- Not vibration dampening



### Field Application

In a year-long test, an igubal<sup>®</sup> plastic rod end bearing was still running at 97 million cycles, whereas the steel rod end bearing failed after 50 million cycles.

Test parameters:

Total operation time: 6,500 hours

Cycles completed: 97 million

Inner diameter after the test: pin gauge 6.0 moving / 6.1 not moving

Load 50-90 N

## Other Solutions

If neither steel rod ends nor plastic rod ends are a good fit for your application, you might want to consider one of the following alternatives:

- Plain metal rod ends (metal on metal)
- Rod ends with PTFE or nylon lining
- Bronze rod ends
- Needle rod ends
- Ball bearings

## Useful Links and Tools

[Learn more about igubal® spherical bearings.](#)

[Click here to download an informational flyer about igus®' new igubal® K-series rod ends with interchangeable balls.](#)

[Click here to read an archived edition of TechTalk that reviews the six reasons to use plastic spherical bearings.](#)

[Use the igubal® product selector to help choose the best spherical bearing for your application.](#)