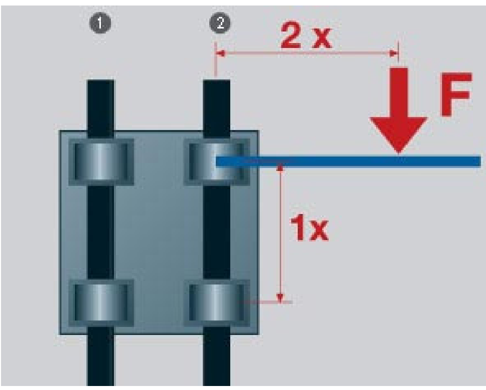
TECHTALK DESIGN ADVICE SERIES

THE 2:1 RULE AND HOW TO DEFINE FIXED AND FLOATING BEARINGS



When using DryLin®, it is important to ensure that all acting forces follow the 2:1 rule.

In a nutshell, if either the drive force (Fa) or applied load force (Fs) are a greater distance than twice the bearing length (wx), then a binding or chattering of the system can occur.

This distance is measured from these forces to the rail closest to the drive force, which should be defined as the fixed bearing side. It is always a good idea to spread these bearings as far apart as your design will allow.

Example: When designing a four-bearing, two-rail system, and the two bearings on the fixed rail are 10-inches apart, then both the drive force and applied mass-force need to be within 20-inches of that rail. On the side closest to the drive force (Fa), you should spec fixed bearings and on the the other side, floating bearings.

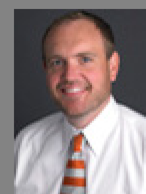
*If you are using a one-rail system, you only need to use fixed bearings.

Defining a Fixed and Floating Side

In a two-rail, four-bearing set up, it is important to define one rail as the fixed side: this should be the rail closest to the drive force. The other rail needs to be the floating side, which uses bearings with a little extra clearance: this should be the rail furthest from the drive force. You

igus®

YOUR CONTACT



Matt Mowry

Product manager, DryLin® linear bearings and guides

Mmowry@igus.com

>> Subscribe to e-newsletter

>> Contacts in your location (on-site within 24-48 hours)

>> Request catalogs / free samples

>> myigus

>> myCatalog

igus Inc.

PO Box 14349

East Providence, RI 02914

P. 1-800-527-2747

F. (401) 438-7270

sales@igus.com

www.igus.com

should only use two fixed bearings in any linear guide system to maximize the 2:1 ratio.

Fixed bearings give the system precision and optimize the 2:1 ratio. Floating bearings do not affect this ratio and only act as guides in the direction of the applied load.

Fixed – floating systems provide many benefits such as:

- optimizing the 2:1 ratio;
- reducing the drive power needed to move the system (i.e. you can use a smaller motor, cylinder, etc.);
- minimizing wear so the bearings will last longer;
- increasing the maximum permissible velocity;
- maintaining better precision (floating bearings) in the system over its lifetime; and
- compensating for angular rail misalignments (floating bearings) so if a drive force is located in the center of the two rails, it is still beneficial to specify a floating side.

*If you do not use floating bearings, you must calculate your 2:1 from the rail furthest away (as a worst-case scenario), which limits your design.

Frequently Asked Questions

Q. What happens the further my drive force/center of gravity gets from the fixed bearing side?

A. The greater the required drive force will be. The higher the wear will be in the system, the lower the max velocity. The increase in wear will lead to less accuracy over time.

Q. What if I use a larger motor/drive force, can I overcome the 2:1 Rule?

A. No, a larger moment will not overcome the friction-force and the system will not move properly. Essentially the more force you try to move it with, the greater the moment and friction-force becomes. The best thing to do is spread the bearings further apart on the fixed rail.

Q. What if I use all fixed bearings or all floating bearings?

A. You have over-defined the system. Your 2:1 ratio should now be calculated from the acting force to the rail furthest away. You will need a higher drive force to move the system. You may see binding or chattering. There will be increased wear. The max permissible velocity will be reduced. The system will not be as accurate over time as it would if you used fixed and floating bearings.