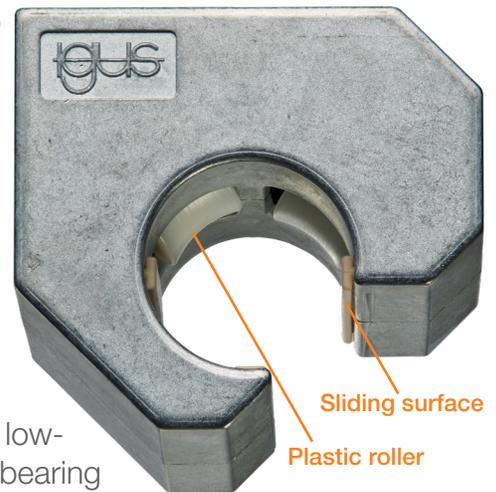


How to Lower driving force and friction with hybrid linear bearings

Many customers want to use self-lubricating plastic linear bearings, but are challenged with manual applications heavy loads, or struggle with drive force configuration. To reduce some of these headaches, igus® created the drylin® WJRM hybrid system of linear bearings. These hybrid linear bearings are a cost-effective solution with three main goals:

1. To reduce bearing friction
2. To reduce required drive force
3. Allow the system to function without constraints of [the 2:1 rule](#)

With standard [drylin® self-lubricating plastic bearings](#), the bearing's low-friction qualities come from a tribologically-optimized plain plastic bearing surface, which slides, rather than rolls, along the shaft. While the plain bearing itself offers low friction under low loads, higher loads, or manual operation, may require lower initial bearing friction, a reduction in the drive power required to quickly and easily move the system by hand.



In a hybrid linear bearing, a combination of plain and roller bearings work together: integrated rollers achieve low drive forces, while the sliding effect of the plain bearings protect against lateral forces. This combination allows for the absorption of abuse forces. This absorption of forces can be key in manual sliding applications; for example, to manually move a 100 pound door with a sliding linear bearing would require approximately 25 pounds of drive force (estimating a static coefficient of friction of 0.2 - 0.25 and minor misalignment). By integrating a hybrid bearing system, this force requirement could be reduced to only 5 pounds, making for easier manual operation. In this type of application, we would recommend the use of two hybrid bearings on the top, with two standard Drylin® linear bearings below to act as guides.

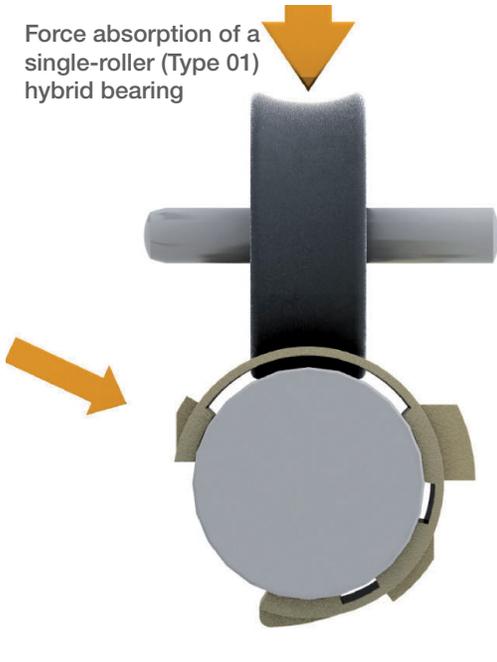
Options available

drylin® WJRM hybrid linear bearings are a cost-saving alternative to cam roller or linear ball bearings, while maintaining easy linear movement without the need for external lubrication. There are two types of drylin® self-lubricating hybrid linear bearings available: those equipped with one roller bearing ([Types 01](#)) and those equipped with two ([Type 21](#)).

Type 01 hybrid bearings

A single bearing housing and linear plain bearing liner is equipped with an integrated plastic roller. The plastic roller absorbs applied by the load, and should be installed so that the bearing load is applied in the rolling direction only. Other load directions are possible with single-roller hybrid bearings, but this may create greater friction forces.

Force absorption of a single-roller (Type 01) hybrid bearing

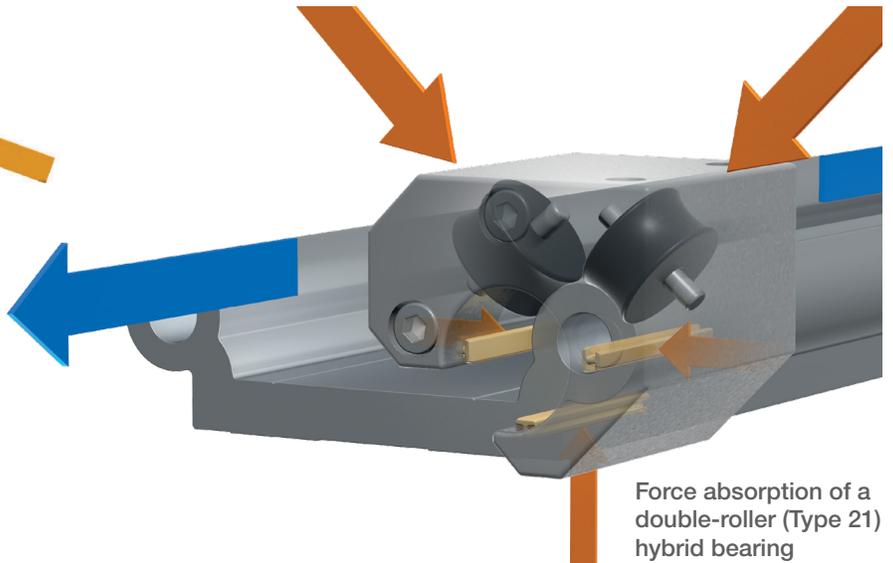


Type 21 double-roller hybrid bearings

Double-roller hybrid bearings are integrated with two plastic bearings rollers set at an angle of either 70° or 80°. The two rollers offer a higher load capacity than single-roller hybrid bearings, and help to reduce friction forces caused by cantilevered loads. The configuration of the rollers also allows for side-mounted drives, and low-profile installation.

Integrating a hybrid bearing system into an application, such as machine doors, camera sliders, or control panels, can even reduce friction forces and ease the operation of applications where the 2:1 rule is not applied.

The 2:1 rule states that if either the drive force (F_a) or applied load force (F_s) are a greater distance than twice the bearing length (w_x), then a binding or chattering of the system can occur. When using a hybrid linear bearing, this ratio can be greatly extended, making a 5:1 rule more appropriate.



Force absorption of a double-roller (Type 21) hybrid bearing

To learn more about drylin® linear systems, or for questions about your individual application, contact igus® directly via email at sales@igus.com, or by calling 800.521.2747.