

Forklift Battery Racks: Roller Beds vs. Slide Strips

Storage racks for forklift batteries must accommodate extreme weights and corrosive conditions. Ideally, they should also facilitate battery change-outs, helping battery rooms to operate at peak efficiency.

Racking systems contribute to efficient battery changes by limiting the force required to pull the battery into the lift truck. Dense, heavy duty rollers in the battery bed provide the smoothest transfers, while a flip stop at the lip of the rack can easily prevent batteries from rolling onto the floor.

Some manufacturers install thermoplastic slide strips rather than rollers in their storage racks. This design has a few disadvantages. In fact, the benefits of roller beds are so convincing that BHS uses them in all of our battery stands, and we do not manufacture slide strip racking at all. Our goal is to create the most reliable battery racks available, and slide strip technology does not offer sufficient protection.

This article will explain this claim by detailing the advantages of roller beds versus slide strips for the purpose of storing forklift batteries. When properly manufactured, rollers can extend the working life of forklift battery stands long past that of slide strip racking, with fewer maintenance requirements along the way.



Figure 1. The poly-sleeved rollers on BHS System Stands reduce wear on battery handling equipment while providing reliable long-term storage.

What are Slide Strips for Forklift Battery Racks?

Slide strips are low-friction rails that run the length of a storage system's battery bed, parallel to the sides of the rack.

Most contemporary slide strips are made of an advanced thermoplastic called ultra-high molecular weight polyethylene, abbreviated as UHMWPE, or simply UHMW. UHMW has a set of complementary characteristics that, at first glance, seem ideal for forklift battery slide strips:

- UHMW strips have an extremely low coefficient of friction, so objects can slide across them easily.
- This form of polyethylene is highly resistant to both impact and abrasion, so it can support the weight of forklift batteries without cracking or tearing.
- UHMW does not absorb much moisture and is resistant to most corrosive chemicals — with the notable exception of oxidizing acids, including sulfuric acid.

The combination of toughness and a low coefficient of friction make UHMW a strong choice for many applications, and polyethylene is used more than any other thermoplastic polymer across a wide range of industries.

However, the substance's vulnerability to sulfuric acid can be a problem for battery storage. While the diluted sulfuric acid of battery electrolyte is unlikely to damage most slide strips, the concentrated form of the substance can have a corrosive effect on UHMW, especially at high temperatures.

This chart demonstrates some of the conditions in which sulfuric acid has a documented deleterious effect on UHMW:

| High Molecular Weight Polyethylene Resistance to Sulfuric Acid | | | |
|--|--------------------------------|---|---------------------------------|
| Sulfuric Acid Concentration | 30 Day Exposure at 68°F (20°C) | 30 Day Exposure at 122°F (50°C) | 30 Day Exposure at 176°F (80°C) |
| 100% | Resistant | Ultimate tensile strength (UTS) loss of more than 20% | UTS loss of more than 20% |
| 75% | Resistant | UTS loss of more than 20% | UTS loss of more than 20% |
| 50% | Resistant | Resistant | Resistant |

Figure 2. Source: Engineered Materials Handbook Volume 2: Engineering Plastics.

Disadvantages of Slide Strip Forklift Racks

Battery racking systems that employ slide strip surfaces for forklift batteries typically use a modular, adjustable design. While this is often presented as a benefit, in practice it can develop into a serious safety hazard. If a stand is modified to store a larger product, smaller batteries can easily fall through gaps between slide strips.

Furthermore, battery racks with slide strips may require frequent maintenance and can even cause damage to batteries and battery handling equipment. They are generally less efficient than roller racks, which can reduce change-out times and operating costs.

We recommend roller beds over slide strip racks for the following reasons:

- 1. Slide Strips Cause More Wear on Forklift Battery Handling Equipment.** While UHMW does have a low coefficient of friction, it cannot compete with rollers for reducing the force needed to transfer a 2,000 or 3,000 pound forklift battery.

The additional force required to move batteries creates more wear on battery extractor arms. Over time, this will create more frequent maintenance for battery changers and the added cost of replacement parts.

- 2. Battery Changes Take Longer With Slide Strips.** Facilities that use BHS Operator Aboard Battery Extractors along with one or more tiers of battery System Stands can complete every change-out very quickly, often in only two or three minutes. The quick action of powered rollers in the Battery Extractor beds makes this efficiency possible. Slide strips do not allow users to take advantage of powered rollers.

Slide strip racks also tend to be higher off the ground than system stands that use rollers. The average height of a single-tier system of slide strip racking is 12 inches. This is adequate for counterbalance lift trucks, but most other types of forklifts position their battery compartments between 7 and 10 inches high. Adjusting battery changers to line up with these different heights will add considerable time to every battery change.

- 3. Slide Strips Can Damage Batteries.** Forklift batteries can easily weigh 3000 pounds or more, and when that weight is concentrated on a thin strip, the force along that strip surpasses the flexural strength of the steel battery case.

Over time, slide strips form indentations along the bottom of battery cases. These indentations can force the cells inside the case upwards and out of the electrolyte, increasing sulfation and oxidation, and ultimately limiting the life of the battery.

- 4. Installing Slide Strip Racking is Less Efficient.** Roller beds are used in modular welded steel racking, which is fairly quick and easy to install. In order to preserve their adjustability, slide strip racks must be bolted together, component by component. This process can take three or four times longer than installing modular welded systems.

- 5. Access to Drip Pans is Reduced in Slide Strip Racks.** With slide strip racking systems, drip pans are bolted into place. This makes access for clean-up or replacement far less convenient than in welded racking, in which drip pans simply slide in and out of the space beneath rollers.

- 6. Maintenance Requirements Increase With Slide Strip Designs.** In order to guide batteries onto slide strips, stands often include metal rollers at the lip of the rack. These lead rollers have to bear the weight of batteries alone as they guide them toward the slide strips, which makes them vulnerable to damage.

Lead rollers require more frequent replacement with slide strip racking, increasing maintenance costs and downtime, especially as compared with rollers stands.



Figure 3. B BHS Single Level Battery Extractors (BE-SL) feature powered roller beds for seamless integration with Battery Roller Stands

Building the Ideal Stand for Forklift Battery Storage

Forklift battery racks pose several interesting challenges for engineers. They need to allow for low-effort horizontal movement, but that movement must always be controlled; the risk of spontaneous battery dumping has to be eliminated. The surface must be spark-free and acid-resistant, and it must be able to bear thousands of pounds of pressure as well as the inevitable impact and vibration.

With some minor adjustments, heavy duty steel rollers can meet all of these goals. A sleeve of spark-proof polyethylene protects battery cases and eliminates the risk of sparking (a serious safety hazard in a room with multiple gassing batteries.) A simple flip-up battery stop will keep batteries in place during charging, and a slight rearward angle or pitch can help to ensure that batteries won't move even if heavy equipment causes vibration in the system.

The leading benefit of slide strip racking is that it is adjustable; however, very few facilities change battery sizes unless there is some major upheaval that requires a complete replacement of the entire forklift fleet. Facility managers who have tried to make sizing adjustments on slide strip racks after years of use have discovered that corrosion limits their ability to even access hardware. Welded modular battery racks like BHS Battery Roller Stands may not be adjustable, but they can be completely customized to match any forklift battery fleet, and provide optimal service and simple integration into existing battery handling systems.

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