

# Horse Arena Footing

Story by Jody Gilbert

*Give your horse consistency, cushioning, traction and support.*

Poor arena footing can take the fun out of riding. Even worse, poor arena footing can create untold hardships for your horse, compromising performance, stealing confidence and putting him at risk for injury and degenerative problems such as osteoarthritis. Yet installing and maintaining safe, effective arena footing can be difficult, in part because of the many variables involved.

To help you sort out your arena footing options, we're going to look at some factors to consider when deciding what type of arena footing makes sense for your situation. If you understand the benefits and limitations of different types of footings and how they're likely to behave under particular conditions, you'll be able to make smart, realistic choices and arrive at what works best for you.



*How you use your arena will determine what kind of footing is best. Driving a cart requires a more compacted footing than a jumping arena because a shallower footing will help your horse pull the cart more efficiently.*

## Ideal Footing

Before we discuss what types of footing materials are available, it's important to know what to look for in an ideal footing.

Basically, you want a surface that makes it easy for your horse to do his job, whatever that happens to be. He should be confident that his footing is even and consistent — no dips, holes, sudden shifts in texture or “give” to distract him or make him wary or reluctant to move out or meet fences. The footing should offer enough resistance to allow him to push off without sinking too deeply, yet it should help absorb some of the concussion when his feet hit the ground.

If he needs traction for tight maneuvers, the footing shouldn't shift out from under him. If he needs to slide, the footing shouldn't be too thin or compacted.

Once you determine the best type of surface for the work you'll be doing, you can begin to look at the materials that will allow you to achieve it.

The questions you'll want to ask yourself include:

- \* Does this footing provide the right amount of resistance, cushioning and traction for the kind of riding I do?
- \* Will this footing work in my environment (indoors, outdoors, low impact, high traffic)?
- \* How much maintenance will this footing need?
- \* Do the downsides of this material (dust potential, cost, short lifespan) overshadow the benefits?
- \* Can this material be combined with other materials or additives to produce the desired surface?

New footing formulations and products are being developed all the time, but the selection of materials for arena footing generally fall into either primary footing media (sand, dirt made up of clay and silt, stone dust, wood products and polymer-fused/wax-coated sand) or additive materials (rubber, natural fibers or synthetic fibers).

In many cases, footing materials are mixed to offset shortcomings of individual materials and to produce better results. For instance, stone dust is sometimes added to sand to give it a bit more firmness and grip.

We'll look first at the characteristics of the primary footing materials, which if well maintained may be all you need to achieve the surface you want. Then we'll consider ways that the various additives can help you fine-tune your footing when necessary.

## Sand

If it's carefully selected and well-maintained, sand can provide an affordable, effective arena surface. Many types of sand are available. How it's described and categorized will differ by region, the supplier and even the person telling you about it. Still, certain characteristics are consistent, and it's better to understand those characteristics than to get locked into specific terminology that others may not interpret the same way.

**PARTICLE SIZE.** By definition, sand particles range from 0.05 to 2.00 mm. Any smaller is silt or clay; any larger is gravel. If the grains vary somewhat in size, they're apt to compact more readily as the smaller bits nestle in between the bigger ones. Conversely, uniformly sized grains will be less likely to compact, producing a looser footing.

To determine the mix of sizes (called the "particle size distribution") for a particular sand, you can have a sieve analysis performed. The sand is passed through a series of increasingly fine meshes and graded according to what percentage of particles pass through each sieve. Footing experts often recommend using "C-33" sand, an industry standard that specifies a mix of particle sizes with a small percentage of finer grains. Fine sand is quick to break down and produce dust, so the medium-to-coarse texture of C-33 helps avoid this problem.

**MINERAL COMPOSITION.** The minerals that form the sand govern the hardness of the sand particles. Often, this will be quartz, which is hard and durable. However, you may also run across sand that was formed from softer minerals such as mica or feldspar. The degree of hardness determines how quickly the sand will break down and become dusty, so you want the most durable composition you can find.



*The amount of dust a footing kicks up can be important, especially if you live in a dry climate. Frequent light watering is preferable to soaking the soil.*



*Hunter/jumper and dressage riders often opt for an 80/20 ratio of sand to fines, though 70/30 may give jumpers more resistance.*

**PARTICLE SHAPE.** The shape of the grains also plays an important role in the way the sand performs. For arena footing, you should steer clear of round grains, such as river sand or beach sand, because they tend to roll and shift. The best choice is angular sand, which locks together better and provides more stability underfoot.

**AMOUNT OF IMPURITIES.** A final consideration is how much silt, clay or organic material is mixed with the sand. These elements increase the dust you'll encounter, and the traditional recommendation is to use only clean, washed sand. However, clean sand costs more, and with moderate use, it will eventually break down and produce as much dust as unwashed sand. Another problem with washed sand is its tendency to travel. Without silt or clay particles to keep the sand grains in check, the footing will move around quite a bit, requiring a lot of maintenance to keep it level. You may also run into the problem of excessive shear — the footing will give too much under the horse's hoof when it strikes the ground.

Many arena owners make the tradeoff of a little extra dust to gain the stability of unwashed sand, which generally consists of from 10 to 30% “fines” — silt and clay particles. Footing expert Wayne Gregory, general manager of Footings Unlimited, sees a lot of dressage riders opting for an 80/20 ratio of sand to fines. The same proportions work well for hunter/jumper arenas, although some choose a 70/30 mix for a bit more resistance.

Sand prices vary considerably depending on the type of sand and on your location, running anywhere from \$5 a ton to \$20 a ton, delivered. So creating a two-inch surface for a small dressage arena (66 feet by 131 feet) — based on an estimated need of 70 tons — would cost somewhere between \$350 and \$1,400. When determining your sand needs, be sure to enlist the help of the quarry you're buying from. Explain the square footage and depth you have in mind and let the quarry run the formulas to help you pinpoint the required amount based on the size and density of the material. And remember to be conservative — it's much easier to add more sand if needed than to remove it if you wind up with too much.



## How Much Sand is in Your Sand?

Wayne Gregory, of Footings Unlimited, suggests this “kitchen test” to determine the sand/fines ratio of your current footing or for material you're purchasing:

Place two inches of footing in a glass jar, fill with water and stir vigorously for about a minute.

Within 60 seconds, the sand will settle to the bottom. You can measure the depth of this layer to determine how much sand is in your footing. For instance, if an inch and a half of sand settles out, you know that your footing is 75 percent sand.

The color of the water will also give you an idea of the amount of fines in the footing. If the water is almost clear, the level of fines is quite low. Brown or yellow water indicates higher levels. If you wait a couple of hours, the fines will settle out as well, producing a “parfait” of materials that tell the story of the footing's composition. Gregory advises that you perform the 60-second test on sand you have delivered before it's unloaded because quarries may not always bring in what you thought you were getting.

## Dirt (Clay and Silt)

Dirt footing used to be the most prevalent type of arena surface, and in some areas, it still is. In regions where the soil composition is suitable, creating this type of footing is simply a matter of digging it up. In particular, many Western disciplines favor dirt arenas, or dirt in combination with sand.

Bob Kiser, of Kiser Arena Specialists, is in charge of footings for many major events, including the AQHA World Championship Show and the National Reining Horse Association Futurity and Derby. He finds that a blend of sand and dirt usually offers a suitable footing that can be modified to meet the demands of a variety of sports.

“For the Western events, for the most part, you need something that will give you a certain amount of compaction under a horse. Pure sand has a tendency to roll under the horse’s feet too much. That’s why I use the mixtures of sands, silts and clays.”

His basic formula is roughly 80 percent sand and 20 percent silt and clay, although he may vary the ratio somewhat depending on the available materials and the sports involved. With a mixture of materials, he can control the firmness using equipment he designed, adding more moisture for speed events and adjusting the depth of the footing for different sports by compacting and loosening sub-layers. The variation in footing requirements can be significant. For instance, barrel horses and cutting horses are challenging different laws of physics.

“When a barrel horse goes around that barrel, you don’t want that ground to go anywhere. You want him to be able to get hold of it, but you don’t want it to move at all. With a cutting horse, you want that ground to move a little with him because of the force he’s exerting. When he hits that ground, you want it to give a little bit or it would be too hard on him, because he goes from one sudden stop one way to a sudden stop the other way.”

## Stone Dust

An alternative to sand — or a possible complement to it — is stone dust. Like sand, stone dust can vary in composition, so it’s important to determine exactly what you’re getting before you decide to install it as a footing.

Stone dust goes by several names, including blue stone, rock dust and limestone screenings. It offers excellent traction and drainage, but it has a tendency to compact to a concrete-like hardness. In fact, that attribute makes some stone dust a good choice for an arena base, since that layer needs to be as hard and impervious as possible.

---

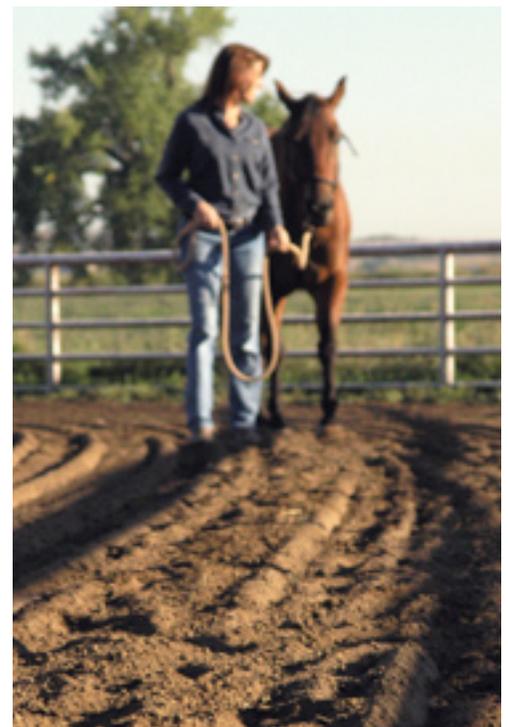
## Don’t Forget That Base

Good footing is essential in building a safe, reliable facility that allows horses to work confidently and to perform up to their potential. But even the best footing in the world can’t compensate for a poorly constructed arena base. Before you install your footing, make sure that the base is engineered to provide effective drainage and firm support for the pounding it will get. Here’s a recap of essential base features:

**Drainage** — The base should be as impermeable as possible so that water will drain across it rather than soaking in or creating puddles. It

should be graded with a slight crown or slope (1% to 2%) to help the drainage process, and you may need to build a swale around the arena to divert water and to handle runoff.

- **Durability** — The base should be compacted to at least 92% density to stand up to horse traffic without developing pits and ruts and to prevent rocks from pushing to the surface.
- **Depth** — The compacted base layer should be four to six inches deep for dressage or pleasure riding, and six to 12 inches deep for jumping or other high-impact activities.



To lessen the problem of compaction when using stone dust as a surface material, you should look for a product whose particles are the same size. Keeping your stone dust watered and harrowed will also help you maintain a softer surface. Some riders, hunter/jumpers in particular, favor a mix of stone dust and crumb rubber to reduce compaction without sacrificing the necessary degree of resistance for takeoff and landing.

If you have a sand footing that's too loose or slippery, the addition of a little stone dust can often help. The firmness of the stone dust will offset the excessive "give" of the sand, while the sand will keep the stone dust from compacting.

## Wood Products

Another footing option is wood, which may be used alone or mixed with sand. Various types of wood products are available, including shavings, chips, sawdust, shredded bark, hogfuel and shredded fibers.

On the plus side, wood provides resiliency and moisture retention. When added to a sand footing, wood products can slow the breakdown of sand particles by reducing abrasion, open up the footing for better drainage and hold moisture to give the surface more cohesion and less dust. In many areas, wood is readily available at low cost, making it a highly affordable option.



*When you order sand from a quarry, you might want to test it before it's unloaded to be sure you're getting what you ordered.*

However, wood footing does need to be kept watered. If it dries out, it will lose its flexibility, break down quickly and become dusty. It also tends to decompose in a relatively short time, so you'll have to add new material sooner than with other kinds of footing. (Not surprisingly, hardwood products offer more durability than softer wood, but you might end up paying more for hardwood, especially if it isn't locally available.) Some types of wood, shredded bark in particular, have a reputation for becoming slippery when wet. Adding an inch or so of sand generally takes care of the traction problems.

When shopping for a wood footing, always make sure you know the source of the product. For example, a supplier may offer hardwood, but it could consist of shredded pallets that haven't been cleaned to remove foreign materials such as metal. Or you might find a low-cost — or even no-cost — source for wood chips, but they could include trimmings from trees such as black walnut, which are highly toxic to horses. Commercial suppliers of wood footing products that guarantee the material is clean and nontoxic include Dejno's WoodEdge, Zeager's Horsecarpet and The Fibar Group's Fibar product.

## Polymer-fused/Wax-coated Sand

A final category of primary footing materials is the high-tech option of polymerized or wax-coated sand. These are not cheap materials. On average, they cost between \$4 and \$7 a square foot. The pricing includes full installation and warranties, but these products are still used by only a small percentage of facilities.

Although they can be used for anything that regular sand would be used for, coated sand products offer the added benefits of consistency, freeze resistance, dust reduction without need for watering (a major selling point in regions where water shortages are critical) and enough stability to prevent excessive shear.

Options for wax-coated products include EuroWax, which offers a "do-it-yourself" wax application system for about \$1.50 per square foot. Other wax products, which require professional installation, cost up to \$4.00 per square foot.

Polymer-fused products include Terra 2000 and Equation. These footings, which are described as being like perfectly

moistened sand or brown sugar, require professional installation as well. A polymerized sand installed in a small dressage arena could run from \$35,000 to \$60,000.

## Additives

Once you settle on a primary footing material, you may find that it works great... except. Stone dust works great except it needs a bit more bounce. Sand works great except it shifts too much. That's when it's time to consider whether a little tweaking with an additive can produce a better effect — or relieve you of some of the maintenance efforts required to get the results you want. The world of additives currently consists of two types of material: rubber and either natural or synthetic fiber.

Rubber additives are generally made from recycled tires or industrial scrap rubber and are available either as a granulated product or as flat chips. Experts caution that rubber should not be used as a footing by itself — it should be mixed with another material, such as sand or stone dust. Not only that, but you should also be careful not to use too much. The effect, says Gregory, should be “like pepper on mashed potatoes.”

Generally, you'll want at least one pound per square foot. (Less than that, and you won't see any appreciable improvement.) But you shouldn't exceed two pounds per square foot because not only will you be wasting money, you're likely to change the surface in two undesirable ways. First, you'll increase the density so much that your horse's toes won't be able to penetrate for proper breakover. Second, you may reduce concussion to the point that your horse becomes deconditioned. Owners who train on highly rubberized surfaces often find that their horses perform poorly and even sustain injuries when they're taken to competitions where the surface is less bouncy.

How do you choose between granular and flat rubber pieces? Granular rubber works best in sand that contains fines (such as an 80/20 mix) or stone dust, where the main goal is to reduce compaction. It's not a good choice for clean sand, which may be too loose already. In the case of clean sand, flat rubber pieces are best because they have an interlocking tendency that adds stability to the surface.

Exercise caution when shopping for rubber additives. Because much of the available rubber comes from recycled tires, you need to make sure the manufacturer offers a guarantee that its product contains no metal or other foreign materials. Also, be wary of exaggerated claims such as “dust-free” and “lasts forever.” Depending on your situation, it may reduce dust and it's certainly durable — but it's not indestructible. Rubber products on the market include Equi-Turf, Perma-Flex, RX, Equi-tread, Rubbermates and Surefoot.

Rubber additives vary in cost depending on the particular kind you buy and how far it has to ship. At a pound per square foot, it will cost about 15 to 20 cents for each square foot in your arena. So, for example, adding a pound per square foot to a small dressage arena is likely to cost somewhere between \$1,300 and \$1,740; a large dressage arena (66 feet by 198 feet) would run from about \$1,950 to \$2,600

## Footing Depends on the Discipline

*When you consider the different athletic challenges each riding discipline imposes, it's easy to see the role that footing plays in making your horse's job easier or harder. For example, a reining horse will have a tough time sliding on a shallow, compacted footing. But that footing might provide the ideal resistance for takeoff and cushion for landing if you're jumping. Preferences vary, of course, but here are some basic guidelines:*

*# Barrel racing, cutting, roping — Deeper, thicker footing is generally preferred to reduce the stress on horses' legs. Some experts recommend as much as four to six inches of topping. Often, a soil/sand mix is used (for example, 75/25) because it can be watered and packed for firmness or fluffed up for a looser footing when needed.*

*# Reining — Like other Western sports, reining requires a stable footing, but usually not as much depth—roughly 2½ to 3 inches.*

*# Flatwork — Recommendations are typically for two inches of footing. Dressage in particular will suffer if footing is much deeper. Crumb rubber or wood products are sometimes considered beneficial additives for flatwork because they make the surface springier.*

*# Jumping — Footing that's too deep will absorb energy and propulsion, making takeoff difficult. The optimum footing will offer good resistance for pushing off without being so hard that there's too much concussion on landing. The depth may be similar to that used for flatwork, but the surface for jumping is usually firmer.*

## A Word About Dust

Our focus here has been on the characteristics of footing materials and additives, so we haven't touched on the bonding/absorbing agents that are available to help combat problems with dust. In fact, that's a huge topic, which we'll examine in detail in a future article. But it's still a good idea to be aware of some of your dust-fighting options.

**Water.** Most arena experts cite water as the best all-purpose dust suppressant. However, to be effective, water must be applied correctly. In general, you want your footing to hold a moisture content of 8% to 12% through the top two or three inches (or as far into the footing as your horse's hooves penetrate). This will typically be the depth you drag the footing. You can determine the moisture percentage using a moisture meter, an inexpensive tool available at garden supply stores. To cut down on evaporation, it's advisable to water at night. (This also gives the water a chance to soak in well while the arena's not in use.) Frequent light watering is recommended over one big drenching, and it's important to make sure the water is well-distributed so you don't wind up with slick spots and puddles.

**Organic soil conditioners.** Applying an organic soil conditioner such as Dust Down may help your dust control efforts. Applied when you water, Dust Down encourages the growth of microbes that slow the evaporation of water, hold particles together and keep dust at ground level. Enzyme-based DustLoc is a soil-conditioning product that also increases moisture retention.

**Oils.** Environmentally safe oils (as opposed to used motor oil), which include food-grade coconut oil, peanut oil, glycerin and lanolin, represent another dust-suppressing solution. One product, ArenaPro, is derived from soybean oil. As a rule, oil tends to be expensive and requires reapplication every two or three years.

**Synthetic agents.** Products in the synthetics category include Arena Moist, an acrylic copolymer that absorbs and releases moisture, and Arena RX, a synthetic fluid that coats footing particles. PH\*

---

## What If They Eat It?

If your horse is turned out in (or has access to) an arena that includes a rubber additive, you may be concerned about the harm it could do if he decides to snack on it. Rubber additive vendors have apparently fielded this question many times — enough to include it in the “FAQ” pages of their Web sites, anyway. For instance, the RubberRecycle site says, “Sure-foot is non-toxic (and in the case of colored surfacing chips, only non-toxic paints are used). The chips have no taste appeal, but if they should be accidentally swallowed, test reports show that the chips will simply pass through the digestive tract of both humans and animals.” The Perma-Flex FAQ says, “From what we've heard from our customers, even the horse that will typically ‘eat anything

and everything in sight’ will — at the most — pick up a piece and spit it back out.”

Fiber additives have been popular in Europe for some time and are now catching on in the United States. Fibers may consist of natural materials, such as burlap or cotton, or synthetic materials, such as nylon and polypropylene. The idea behind adding fibers is to simulate the feel of a good grass surface. The fibers interweave and knit the footing together, which produces a consistent surface.

Like rubber, fiber shouldn't be used by itself. It's generally recommended for use as an additive at a rate of about a pound per square foot, with

no more than two pounds per square foot. A wide assortment of fiber products are on the market. Among the more prominent are EuroTrack, EuroFelt and Fibresand.

As a general rule, you can expect to pay between 15 and 50 cents a square foot for fiber additives, with the natural materials being cheapest and the nylon or polypropylene costing the most.

A number of commercial additives have been developed that combine rubber and fibers. Examples include SandMate and SandTies, both of which mix rubber and fiber to add stability to loose sand and retain moisture.