Introduction to Arena Design

My name is Nigel McCoard, and through my company ***Kiwi Arena Rakes***, I design and build Equestrian Arena Grooming tools here in Invercargill, New Zealand.

With my Partner Lucy Collings, I also import and sell the ***Jump 4 Joy*** range of Showjumping equipment from England.

When designing the ***Kiwi Arena Rakes*** range of machines, I drew on more than 40 years of experience as an Engineering Tradesman, specialising in Quarry and Mining machinery, Jumping and Dressage rider, arena builder, sport administrator and Level 2 Coach.

I have just retired my own Level 5 Dressage horse and have young ones coming on.

My Partner Lucy Collings and I have travelled extensively around the world, specifically to study Arena surfaces, their use and maintenance.

The number of Arenas which have been built, are being built, or are being planned in NZ is staggering, but sadly the lack of construction experience of the owners, combined with a lack of any understanding on the part of some contractors, too often creates arenas that are below an acceptable standard, and in some cases actually unusable.

As a Rake supplier I am often asked if our Rakes will solve a particular problem with a surface, sadly there is often far more wrong than just the surface.

This Arena Construction information has been put together to give potential Arena owners some basic design knowledge, and introduce the type of terminology that Contractors will use, which otherwise tends to come across as bewildering to the uninitiated.

This information is provided free of charge, all I ask is that you give due consideration to our products when choosing an Arena Rake, or Jumping Equipment.

Nigel McCoard 12/7/2018

KIWI ARENA RAKE

Material Terminology

Pit Run refers to the **raw 'gravel'** (or 'metal' as it's called in some parts of New Zealand). This material is usually unprocessed or sorted.

Screened … A screen is a **mechanical sieve** used to sort gravel into the required sizes, simply a really big version of a kitchen flour sifter.

AP as in AP 25. AP stands for '**All Passing'**. When '**Pit run'** is '**screened'** in a machine using a **wire mesh with 25mm x 25mm square holes in it**, and all the material falling through the mesh is collected in a single pile, this is termed **All Passing 25** or **AP25**. This is the term applied to AP 5, AP 10, AP 65 etc.

Screened 3 to 5. This is a **screened** gravel, of which the smallest size is 3mm, the largest 5mm. It could be 10 to 19, 6 to 25 etc.

Sand Generally taken as an **All-in** product, with the largest pebbles in the mix approx. 3 or 4mm in diameter.

Natural Sand. Sand which is normally unprocessed, often dug straight from a resource site, may contain odd pieces of larger stone.

Washed Sand, or **Washed Gravel**, or **Washed Crusher dust**. Processing through a special washing machine which uses the water to carry away the microscopic particles of stone or silt in the mix, leaving a clean, free draining product.

Sharp Sand. Sand in which the particles have an **angular shape**, creating a binding action.

Crusher Dust. The fine product created when rocks are broken down in a Rock Crusher, generally smaller than 5mm in size.

Washed Rejects. Bigger stones that have been through a washing system, making them ideal for drains.

Rotten Rock. A common name for material which can be broken by on site rolling, or compaction. Often used as a sealing layer over a compacted rock base, or as the rock base. Varies in hardness from almost soft, to very hard and sharp, depending on source.

S Curve. Particularly applies to sand, but could be any all-in product.

If a sample of sand is dried in an oven and then put through a series of sieves to separate it into a range of sizes, from the finest 'talcum powder' through the .25mm, .5mm, 1mm sizes etc, up to the largest size in the sample, and the percentages of each plotted on a graph, the curve created virtually always comes out in the shape of a letter S.

Manufacturers of artificial arena additives will sometimes provide a size specification/content range for the preferred sand, which will work best with their fibre, or material mix.

One of the most frustrating problems with arena construction is the variability of products with the same name.

Sand is a classic example of this.

There is river sand, beach sand, pit sand, manufactured sand, washed sand, natural sand, blinding sand, and many more.

Two samples of river sand can look almost identical, and yet one will make a great riding surface, and the other will be terrible to ride on, so simply to say 'use river sand for a good surface' (as often appears on Facebook posts), sometimes gives a good result, and sometimes not at all.

Generally sand will include **microscopic particles**. These can be stone particles, or more often clay, as fine as talcum powder, referred to as **silt**.

This fine particle/ silt content creates 2 issues.

It is the dust that blows around when the surface is dry, and it holds water in a manner which makes the surface sloppy, or sticky, when wet, neither of which is ideal.

Washed sand has been through a scrubbing process that literally 'washes' out the fine particles and silt, leaving a clean, **free draining** product.

If the washing is done well, it takes only the microscopic size particles, leaving a sand that will be a good riding surface, it will pack a little when wet, and not move too much when dry. Excess water will be able to drain out of the material freely.

If the washing is too aggressive, it takes out too much of the **'bottom end'** (quarry terminology), leaving a coarse sand that will move too much in use, and won't bind enough, even when wet.

Most unwashed river sand will have clay silt in it, but some does not, this is one of the traps.

My own arena has two different sands on each half, one a washed beach sand mixed with about 20% pebbles in the 3mm to 7mm range.

This works really well when wet, but gets soft when dry, so irrigation is being installed.

The washed material is free draining and is great to ride on 24hrs after the heaviest rain, as the arena has slope to assist the draining process. (See where will the rain water go?)

The pebbles 'stiffen' the mix to stop hoof penetration a bit when the arena dries out, but the main function is to stop the sand moving, as the arena is in a high wind area. The pebbles form a blanket, and are very effective in holding the sand, even in strong winds.

The other half of the arena has a high silt content river sand, which takes more time to dry out, and can get very sloppy, very quickly, with rain, and then takes much longer to drain than the washed beach sand.

The river sand may work well on a very sloping site, but in this case it remains too wet, for too long.

Update; the complete surface has been removed and the sand used as fill in another location.

The clay base has been reshaped, and the slope of about 400mm across the diagonal of the 44m x 55m trued up. The whole arena slopes to the one corner, where a flat spot slows the water flow, to allow the fine material to settle out, before the water goes out a 150mm diameter pipe.

There are no drains around the arena, all the water moves across the surface to the one corner.

A 50mm thick layer of crusher dust has been spread over the surface to seal the clay base off, and this is being allowed to compact and settle, using rain and light riding (walk and trot).

A new riding surface of washed Crusher dust (40%), and washed river sand (60%), will be premixed, and spread at 50mm thick, in the spring.

This mix seems to be common to our area, simple to put down, easy to maintain with an Arena Rake, and very usable across wide range of moisture content. This arena will have irrigation, as the damp surface is very stable, but not too stiff underfoot.

The influence of particle shape.

If the sand is made up of very round shaped granules, these will tend to act like mini ball bearings when ridden on. Beach sand is a classic example of this.

If you ride on the beach down by the waters edge, it can be a good riding area, but in the dry sand dunes, you can sink quite deep, very easily, so to use this sand on an arena, it may only be really usable when soaking wet, and terrible when dry.

Some natural sand is described a **'sharp sand'**. This refers to the particle shape being a lot more angular, and so more inclined to have a binding nature.

It may still move a little when ridden on, but will be much more stable across a much wider range of moisture content.

Crusher Dust.

This is a product that is exactly what its name says.

When rocks are put through a crushing machine, a wide range of sizes of small rocks are created. These are then put through '**screening machines'** (essentially giant versions of a kitchen flour sifter) for sorting, and if everything smaller than about 5mm is collected in one pile, that's the '***crusher dust'***.

Just as there is a huge range of sands, some good for riding on, some not, crusher dust is exactly the same.

The range of variables is large, including what sort of rocks were crushed, were these semi hard, or granite hard, brittle or flaky? Are the resulting particles granular in shape, or flaky and razor sharp? What is the mix of sizes like?

There are many different 'crusher machine' types, and these also have a very distinct impact on the character of the 'crusher dust', so clearly we again have the problem that to simply say 'use crusher dust for an arena', will give very variable results, depending on supplier location and machinery.

Two quarries working within sight of each other can easily be creating very different products, but both of which will be called Crusher Dust.

Personally I have seen this with a product called **'blinding sand'** which is a coarse washed sand used under concrete floors, one arena had a great surface, the other almost unusable, but the products had been sourced from two operations, only a few kilometres apart.

Crusher Dust can be sold as **all-in**, just as it comes from the machine, or 'washed', as with sand.

All-in Crusher dust can be a very good additive to sand as a **stiffening agent**, so this is a common mix used, often in a ratio of 60% Sand to 40% CD, or 70/30, depending on local materials.

The generally flaky nature of most Crusher Dust locks, or binds, the sandy surface material.

All-in Crusher dust can be used as the top layer of a riding surface, but it often tends to pack very hard with use, unless a suitable grooming machine or 'Rake' is used very regularly.

Washed Crusher dust can also be used as the riding surface, but too often a flaky particle shape, combined with the lack of fine particles, will give a slippery, or shifty surface.

Only with local experience, can the suitability of either All-in, or Washed Crusher dust, be determined.

Lime

Lime can vary in size and texture from a soft, almost talcum powder product, through to 'lime chip' which can be as hard as marble.

There are some very good lime arenas in use, and most are far better when wet, or even soaked, but some of these also go very hard, very quickly, with even a gentle breeze blowing over the area for a couple of hours.

Some lime arenas turn into a cluggy, sticky mess when wet, experience with the local product is the only real guide, when considering it for use.

Lime is a binding agent, and the base material for cement, so it can make a good additive to stabilize an arena base (it's what they mix into road bases), or as a sealing layer between a rock base, and a sand based riding surface, if it's not the sticky type.

If considering Lime as part, or all of a top layer, there is a simple test to do.

Go to the suppliers quarry just after decent rain has fallen, if the stuff sticks to your boots and is tacky, it won't be great to ride on, if there is no sticking, you could be ok, but still find an arena with the product on it, if you can.

Personally I designed, and had built, a Rectangular Arena 145m x 85m in size.

Research on small arenas showed that a hard lime chip mix, of about 5mm size maximum, seemed to work well.

However, it was great when wet, but on the huge open surface, would set like concrete in an hour, with even a gentle breeze. A special tractor mounted breaker rake had to be designed and built, to work as a crust breaker.

This hard lime chip has since been mixed with washed river sand, and now works well, but is at its best when wet, or even very wet.

One unexpected side effect was the reflected glare from the glacier white lime chip surface, every Dressage rider, Judge and Writer required sunglasses, Stewards working on the Arena were getting sunburned! The things you learn from experience. The same arena with washed, dark sand mixed in is now much more user friendly.

Planning an Arena Checklist

Consider ease of access to the site from yards or stables.

If this a commercial operation, is there room to turn, and park, visiting vehicles?

Wind direction? Will wind strength be an issue, is shelter required?

Sun and Shade, are dark spots or shadows going to be an issue?

Is **run-on** water an issue? Is a high side drain required?

What is the plan for slope, or fall, on the Arena?

Where does the **run-off** water go?

Can the drains handle all the possible flow? And where will the water end up?

How firm is the site, does it need compacting, or will there be a need to dig and remove, or reshape, soil?

If so, how much material to move, and how, and to where?

What is site access like for trucks, diggers, tractors or a roller?

Is there ground water/ are drains required **under** the Arena site?

Is there anything else under the arena site, existing drains or power cables?

Will **Geotextile** material, or other sealing material, be required under the base?

What are the material options for creating a base?

What are the material options for the sealing or intermediate layer?

What are the options, or preference, for the riding surface?

Fencing of the site, what are the options? Can you create a secure environment so that a horse cannot leave the site if the rider has fallen, or lost control?

Will you put an Edge board around the outside? Gates?

Irrigation, will water be available, or need to be stored in a tank/s?

What will be the method of getting the water onto the surface?

Is there power for a pump, if required?

Has the supplier/contractor fitted irrigation to an Arena before?

How will the surface be maintained over the life of the arena?

Do you have a quad bike, side by side ute or similar, for a Towed rake, will you require a tractor mounted unit?

Has access for heavy vehicles been allowed for, if surface top-up is required in later years?

Contractor options, has the Contractor actually built an Arena before?

Can you see previous examples of their work? Do they come recommended?

Will they enter into a Legal Contract with you?

What Guarantees do you get?

What is the Budget for the project?

What is the timeline, when do you need the arena rideable?

What workload will the Arena be subject to?

Have you seen or ridden on another arena locally that works, and can you copy exactly the same design and materials, from exactly the same sources?

Calculating how much material to buy

This gets confusing as gravel suppliers talk in dollars per ton, but arenas are measured in metres of length and width, and you need to know how many cubic metres (m3) to buy.

A box which is 1m wide x 1m long x 1m high, is 1 cubic metre (*or* 1m3)

If you fill the 1m3 box with sand, it will then weigh about 1.5tonnes (1500 kg) written as 1.5t/m3 (1.5tonnes per m3)

Example;

A standard Dressage Arena is 60m x 20m. It needs 40mm of extra material on it. The sand is $14 per tonne, at 1.5tonnes per m3

First convert all the measurements to metres.

Divide the 40mm by 1000, to convert to Metres

So; 40mm divided by 1000 = .04metres

So then; 60m x 20m x.04m = 48m3 of material required.

Therefore; 48m3 required x 1.5tonnes per m3 = 72 tonnes of sand required.

So; 72 tonnes required at $14 tonne = $1008-00 for the 40mm of Sand across the arena.

Footnote; In this example we have used a figure of 1.5Tonnes per cubic metre as the weight for sand, although this can vary considerably depending on the product.

Trucking companies usually also talk in dollars per tonne, to cart gravel or sand.

Building the base

There is NOTHING more important in the construction of an Equestrian arena, than the base.

Talk to a hundred people about to build an arena, and the vast majority will be focused on the actual riding surface; will it be sand, sand/ gravel mix, rubber/sand mix, imported fibre, or silica sand and shredded foam fibre?

The surface decision is important, but the best surface on a rubbish base, is a recipe for heartbreak.

I have probably seen 150 arenas all around the world, and have enough horror stories to fill a book, and many of them relate to issues with the base design or construction.

The base will;

1) set the fall to deal with water.

2) provide a solid base to carry the weight of machinery spreading the successive layers, the actual weight of horses, and the weight of a groomer or rake to maintain the surface.

3) prevent sagging, or movement, throughout the life of the arena.

As stated else where in these documents, building up is better than digging down.

While there is a need to build on firm ground, removing vast amounts of top soil to get down to clay or similar, is not always necessary.

If the ground is firm and dry, especially in areas such as Canterbury, which can be hard and stony, there is often no need to dig anymore than to create a level surface.

Even in areas with top soil it can be simpler, and more cost effective, to simply compact the soil with a big road roller in preparation for the base material, than it is to dig down, and move soil around.

Layering material, just as is done when building a road, is the best way to create a base, if building up from flat ground, or a clay base.

On a flat site, after compacting the soil, or creating a solid clay base area, the next layer can be compactable **rotten rock, AP40, AP25 or similar,** which can be spread, rolled and sloped, or crowned, to give the required fall to deal with the water.

This base material should be rolled and compacted, with water if necessary, until it looks like a road.

At this stage a thin blinding, or binding, layer can also be added to further lock the base rocks in place.

This is the **critical** point, as any rocks or stones which break loose will then come up to contaminate the riding surface, a very bad situation especially when the rocks are razor sharp and the size of golf balls.

The 145 x 85 arena I designed had this happen.

The contractor grossly underestimated the work required, decided to cut the rolling short and proceeded to spread the riding surface before getting the base checked, despite there being a '**Hold Point'** in the contract. The end result was that the base broke up badly, with the only option being to pull off the entire riding surface with a digger, stock pile it to one side to be 'screened' to remove the sharp stones, and reused.

The entire base was then reworked correctly by an exceptional contractor, and the riding surface re-laid, tens of thousands of dollars later, and things are back on track!

I have built an arena with a clay base, with good fall, and then put the sand mix straight on the top. In some situations this will work, but more usually (as I found out) the sand will thin out in places, leaving only a thin layer over the clay. Combine this clay with water from recent rain, and you have a wet, slippery layer, just under the thin layer of sand, a very bad situation.

My Level 5 Dressage horse slipped, losing his hind legs completely, ending with us both falling, and him rolling onto me, leaving me lying with both legs wedged under the horse for nearly 10 minutes, I couldn't get out, and he wasn't initially able to roll off me, a nasty mess, hence my encouragement to arena builders to at least put a good (50mm thick minimum) sealing layer on the clay, if there is no need of a rock base to create fall.

This sealing/ buffer layer can be Lime, crusher dust, AP10 or similar.

This buffer layer will keep the horses hoof off the base, if/ when it penetrates the riding surface.

It is always best that the buffer layer and the riding surface are compatible, as, particularly with a sand top surface, they will tend to mix over time, unless the top surface is either quite thick, or very resistant to hoof penetration.

Laying down the Riding Surface

In an ideal world, when a surface is made up of two materials, such as washed sand and crusher-dust, these will arrive premixed from the supplier.

Whether you are only using one type of material, or a mix, try to use the system which follows;

The surface material should be laid down in a layer of about 50mm thick and allowed to settle.

This includes being used for light riding, and waiting for a good lot of rain, before topping up the surface to 80-100mm thick. 100mm is usually a maximum.

Often for very practical reasons, such as the contractor moving off site, there is no real ability to wait, and the whole surface has to be laid in one hit.

Either way, there will always be a settling in period, during which the surface may well start off being loose.

Compaction can be helped by the use of a roller, and water, if available (in the absence of rain).

Common sense must apply! Most sand based arenas settle best when the initial use is restricted to walk and trot, interspersed with dressing with the correct rake or groomer.

Finishing an Arena on the Friday, and holding a Jumping clinic up to 1.30m on the Saturday, will, all-most certainly, not end well.

By starting with a thinner layer, you keep the options open.

If the surface doesn't ride as well as planned, other additives might be an option, but dumping 100mm on from the start will, too often, give a deep, tendon damaging, energy sapping nightmare, which takes a long time to settle, and becomes expensive to change.

Fibre based surfaces are specialist installations, and will generally be more compacted right from the start, but again care in initial use, and correct maintenance, will increase the working life of the product.

Surface Material Additives

There is a large range of materials that can be added to a sand-based surface, for a variety of effects.

Pebbles.

A percentage (20%) of small pebbles (less than 6-7mm diameter) acts as a blanket on a sand surface, to prevent fine material loss in a windy environment.

Shell.

Crushed shell is available in some areas. This has the effect of acting as a load spreader, preventing hoof penetration, and providing some measure of cushioning effect. The shell adds structure and aids drainage.

Providing the pieces are not too large, it seems to have very little chance of damaging the hoof sole, and seems to work well, but it will break down over time.

Bark

The bark and sand will usually separate quickly, with the sand sinking, and approach using it as a whole surface with extreme caution; it will become compost quickly, especially in wetter climates.

Rubber

This comes in a range of sizes from tiny pieces, almost like pencil shavings, right up to lumps the size of eggs on some arenas.

Pieces about the size of a little fingernail, often marketed as 'crumb', seem to be about the best, especially when mixed with clean, washed, sand.

The rubber provides bulk and cushioning, but can 'move' quite a lot, and separate easily from the sand. Sharp sand tends to bind with the rubber better than sand with rounded particles.

Rubber mix arenas need more regular grooming with a proper rake/ groomer, to keep the sand and rubber mixed.

Chopped up electrical cable insulation.

I have seen this on several arenas, but the purpose of mixing it into the surface remains unclear.

The plastic won't bind to the sand, isn't big enough to provide cushioning, and tends to separate, and float about, when there is rain. If you are into colour, it probably looks pretty.

Specialist surface mixes, including foam, fibre and matting, or carpet pieces.

These are marketed by a number of companies in New Zealand, some, but not all, of the 'ingredients' being imported.

These mixes generally have 3 components;

1) fine sand, often a silica sand, which binds with the fibre and material
2) The fibre component which acts as a binder in the same way as root structure does in soil, and provides some rebound or cushioning
3) The foam or matting pieces which spread the hoof load and prevent penetration.

The proportions of each component, the characteristics of the sand, the quality of the mixing, and the care and quality of the laying, all have major effects on the outcome achieved.

Some mixes require the addition of wax, or similar substances, to give then added stability when used outdoors.

These surfaces tend to be expensive in the initial investment, and need good involvement from the supplier to ensure a quality result.

Usually they need a higher skill level in maintenance and irrigation, especially when used outdoors, but the quality and consistency of the riding surface are the main promotional points.

The main issues with these mixes are the result of incorrect mixing and laying or the specification creating a mix that is too soft, in an attempt to get 'rebound' to help the horse (especially Dressage Horses) gain elevation in their movement.

The bottom line is that this philosophy actually creates more issues than it solves.

Horses need a firm surface to work from, particularly Dressage horses in Lateral movements, and Jumping horses which plant the front feet and rotate through the shoulders at takeoff.

A soft surface is the equivalent of us trying to run on a trampoline, or in sand dunes.

On the fully synthetic surface of the warm-up arena for the Dublin Showjumping Grand Prix, they levelled the surface, **rolled it with a vibrating roller to give a solid footing**, and then used a rake to fluff up the top 20mm to take away any chance of slip.

The jumping horses barely marked the surface, and there was no noticeable movement of the material.

The artificial surfaces for both the World Equestrian Games, in France and Kentucky, and others I have also seen in England, Germany and Spain were all similar.

Here in NZ there are some synthetic surfaces that have been done well, but I have seen several others that could only be described as 'loose' at best, and must be very shifty and difficult for horses to work on.

Water, in all its forms

On any outdoor arena, water will have an impact.

Water may be present under the arena in the form of groundwater.

It will be on the surface as either irrigation or rain.

It may come onto the arena as runoff from surrounding, higher land.

A few basic rules.

Building up is always better than digging down.

Never dig down to such an extent that the finished arena is lower than the surrounding soil, all you are making is a pond, which will fill up when it rains.

Always try to make some slope on the arena, to get runoff.

100mm of fall across a 20m wide arena is a fall of 1:200 (100mm of fall to 20,000mm of width, or 1mm of fall for every 200mm of width), which seems to work quite well, any less and it will usually be too flat to get the water to move, much more and you tend to feel as though you are riding up and downhill, and raising the potential for surface wash off.

The huge arena I did personally, at 145m x 85m, is crowned from the centre outward in both directions, with only a 250mm rise in the centre. This works really well, but this level of accuracy required laser level systems, and a grader operator with exceptional skill, to get a perfect slope, with no low spots or hollows.

Any arena will collect a lot of water; 10mm of rain on a 60m x 20m is 12,000 litres to deal with.

25mm of rain on an 80m x 40m jumping arena is 80,000 litres, enough to fill three of the largest plastic water tanks. If this rain falls in an hour, as it can, you need some good systems to deal with the run-off.

The 145m x 85m arena created problems with the efficiency of the run-off moving the water quickly to the sides of the arena, turning the grass in the immediate area into a bog.

This had to be countered with gravel filled collection drains around the entire outside of the arena.

Prepare for water from surroundings.

Drains may be required on the uphill side of an arena on sloping ground, particularly if the arena has been dug into a hill.

Groundwater.

If there are springs or persistently wet ground in the area where an arena is planned, these must be dealt with properly, before any further construction can begin.

Groundwater doesn't go away, it will rise up through even a very solid base, to give no end of trouble.

In extreme cases, or on soft/ sandy ground, it can be necessary to put down Geotextile Matting.

This is the material often used on roads to limit water rising up, and is put down deep under the road base material.

On a sandy site it can also be used to stop the base material sinking into the sand, acting as a supporting blanket.

Drains in the arena structure.

A common mistake is to put drains immediately under the surface of the arena, as part of the base design.

When the water travels to the drain, a swampy patch is created, which becomes an area that is always wetter, and softer, than the rest of the surface.

Drains can be right under the base to deal with ground water, or around the arena perimeter, to deal with run-off, or run-on water, but never in the arena itself.

Arena Surface Maintenance

Too often the actual construction of an Arena takes all of the attention of an owner, and the ongoing maintenance falls a long second behind.

These owners make no provision for the purchase of an Arena Rake, or grooming system, as part of the whole package.

They have a lovely new arena, but then proceed to tow a pallet around, or a gate, or worse still, an old set of heavy tine harrows.

These either compact the surface or simply flatten it, or dig too deep, keeping the surface too loose.

Part of the process of arena construction must be the provision of a suitable Arena Rake.

The design of these is often surface specific, what works well on straight sand, or sand with some additives, won't work well on a surface including rubber, and the machines for specialist mix surfaces are different again.

What at first appears to be a simple machine actually has a complex action on a surface!

A good rake for a sand-based surface will;

1) Fluff the top 25mm of the surface, without disturbing the base.
2) Fill in the hoof marks.
3) Remix the materials.
4) Level the surface and leave an attractive finish.
5) Be easy to handle, hook up, and simple to adjust.
6) Be robust, solid and weather resistant.
7) Be simple to maintain.

Dressing the surface/ How to use an Arena rake.

If the rake is towed in the same pattern repeatedly, it is common for 'waves' or 'lumps' to form in the Arena surface.

The way to counter this is to vary the pattern, every few dressings.

On a typical dressage Arena this will involve travelling lengthways sometimes, then in figure 8's across the diagonals, 20m circles form one end to the other etc.

By travelling across any waves that are starting to form, the levelling blade takes the top off the 'wave', redistributing the material.

This is the best system to use when an arena has been used for some time, without having a proper Arena Rake in use, and needs reconditioning and levelling.

How often do I rake?

Little and often is the secret, some users will ride, put the horse away and groom the surface, as part of their everyday routine.

It is far easier, and much quicker, to dress the surface when it has had one, or only a few horses on it, than it is to wait until a week has passed, and then try to rework/ recondition the surface.

Users and Vets regularly report that horses and ponies seem more 'free' in their movement when ridden, and take bigger strides when being lunged, on a well-maintained surface.

We agree and put this down to the horse and ponies being able to move with confidence and enjoying the consistency and evenness of the footing.

Making additions, to an existing sand surface

Too often an existing riding surface is failing to live up to the owners' expectations.

It is very rare to find sand-based surfaces that are too firm; generally, they tend to be more soft and shifty than is desirable.

The range of materials that can be added to 'stiffen' up the surface, is covered in Surface Material Additives p13, these could include all-in crusher dust, shell etc.

If in doubt, do a trial, don't commit to reworking the whole arena in one operation.

In this situation I direct people to get a small amount of additive, a trailer load maximum, and put **some** on the existing surface, mix it in if possible, or at least spread it evenly, and then ride through the area, as usual.

Analyse the result, add more as necessary. Wait for rain, if there is no irrigation, as this may change the result produced in the surface firmness quite dramatically.

This becomes a simple process of determining the amount of new material that works best, and then up scaling for the full arena size.

The worst thing to do is dump a thick layer of additive in one place, trying to get a result. Little at a time gives control of the process.

It may be time consuming to trial a small area, but it certainly beats redoing the whole arena, only to find it's been a disaster, and now the whole arena is worse than before, and it happens!!

Using an Arena Rake correctly

It may seem that to groom an arena, all one does is drive around the edge, and work inwards.

There are even videos on YouTube, put up by well-meaning people from overseas, showing this exact method, or slight variations of it.

Nothing could be worse for a sand-type arena surface.

If the same travel direction is used consistently 'waves' will nearly always start to form in the surface.

These progressively get worse, leaving areas that are either too thick or too thin.

There are simple steps to follow for best results or to rework an existing surface.

Ideally, it is best to vary the travel direction, and pattern, with each grooming.

On a standard 60m x 20m this means travelling up and back lengthways in a basic pattern.

After 2 or 3 grooms lengthways, change to working figure 8's across the diagonals, for 1 or 2 times.

Another option is working in 20m circles from one end to the other end.

The point of these patterns is to work the levelling blade across any waves forming, from the basic end-to-end pattern, and to redistribute, and mix, the surface materials.

This is particularly important with additives such as rubber crumb, which tends to separate quickly from the sand.

Q. Why would you buy one of our rakes?

- I am an Engineer and build these machines myself.
- I travelled extensively through Europe learning about surfaces, and surface maintenance.
- I am a Past President of Southland Showjumping and have just retired my own Level 5 Dressage horse, so I know what works, and what doesn't.
- The rakes are designed to be very easy to put on the tow unit, being perfectly balanced, and are extremely simple to adjust.
- The rakes are made from heavy gauge steel, hot dip galvanised, so they can be left near the arena for ease of use.
- The steel wheels, and weight, mean the rakes don't bounce over hoof marks, as the light, balloon tyred rakes do.
- We also have towed or tractor-mounted models, for fibre-type surfaces.
- We Sponsor Dressage NZ and provide the rakes for the Grand Prix Dressage Arena, and the Showjumping warm-up Arenas, at the Horse Of The Year Show in Hastings, Dressage Nationals at Feilding, and the Young Horse Show at Taupo.
- Our rakes have a full 12-month warranty against faulty materials or workmanship.
- The first Kiwi Arena Rake was sold in January 2016 and we have sold nearly 180 since then.

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