SKINNED INFIELD MAINTENANCE

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Introduction

Proper maintenance of a professional level skinned infield on a baseball diamond can be very time consuming. However, if maintenance is kept up on a daily basis, the amount of work needed to produce a high-quality playing surface can be minimized.

The major components of developing a quality infield can be broken down into two distinct categories - Proper construction and maintenance. Within these two main categories, several sub-categories exist. Material specification, installation and conditioning constitute the construction category while daily, weekly, monthly and yearly maintenance form the maintenance category. Each one of these areas will be explained in detail within the following paragraphs.

Proper construction

Material Specification

Any good infield surface begins with proper specification of materials and installation of those materials. There are several different theories on what constitutes a good infield mix. Some groundskeepers prefer an infield material that is extremely high in clay, somewhere in excess of 60% to 70% by volume. Others, myself included, prefer a material that has a moderate amount of clay, somewhere in the 20% to 35% range.

The final decision on what you use is typically based on economics. Organizations tend to acquire infield materials that are easily available locally and are priced reasonably. When you can specify a material, the following is a general guideline to use. If you decide to use a lower clay content mix with the clay portion equaling 20% to 35% of the total mix, this should provide a playing surface that is firm yet easily manipulated. It will also provide a surface that does not become overly slippery after rains and dries out quickly compared to higher clay content infields. I use a material that varies between 22% and 30% clay. The remainder of the mix has a silt content between 8% and 15% and a sand content of 60% to 70%. All these percentages can be determined on any material by having a Particle Size Analysis (PSA) test performed on them. This test is available through most any quality soil laboratory and costs typically under $30 per sample.

Obviously, if you decide to use a higher percentage clay material, the sand and silt percentages will be lower. In general, a good rule of thumb is your silt content should never exceed your clay content. If possible, the silt percentage should be a number about half the size of the clay percentage. This should produce a workable infield mix that does not become overly slippery when rained upon and does not turn to dust when dry. No matter what, for most non-professional fields, a mix should always have at least 50% sand in it. I would also recommend that the clay percentage never exceed 35%. Any percentage of material that comes back on a PSA test as gravel is unacceptable and that material should not be used unless the gravel portion can be mechanically removed (screened out) prior to installation.

Material Installation

Once the proper infield mix has been acquired, it needs to be properly installed. In general, a four inch layer of infield mix will provide a very stable playing surface that is deep enough to work properly and provide a thick enough base that when necessary can be tilled without disturbing the underlying material. Some individuals also prefer to make the areas around the bases a bit thicker, somewhere around the six-inch depth. This may help provide a little extra insurance in these high wear areas. I do not believe that it is absolutely necessary in most instances.

In field construction, grade is everything! After the material has been brought in and spread out fairly even across the infield surface, the material needs to be rolled. A smooth double drum vibratory one

and one half ton to two-ton construction roller works extremely well for this task. Roll the infield in two different directions without the vibratory option turned on at this point. Once the infield is rolled, it needs to be graded. This can easily be accomplished using a laser-guided box blade and tractor or a small road grader. Laser leveling the surface provides an extremely accurate method of quickly producing a consistently level playing surface. If possibly, the infield surface should fall from the infield to the outfield about two inches. This gentle slope will provide enough fall to facilitate surface runoff of rainfall, thus preventing puddles and muddy infields. Add any additional infield material as needed at this time to get the level of the skin even with the level of the surrounding turf (some hand raking and tamping of edges will be required to get this correct). When done properly, a foot placed half on the turf and half on the skin should detect no noticeable grade difference.

Once the initial grade work is completed, the infield should be rolled again; this time with the vibratory option turned on, in two different directions. The infield can now be finish graded using the laser equipment. Once that is completed, the infield should be rolled again without the vibratory option turned on. One direction should be sufficient. Water the infield heavily, puddling the infield if possibly. This will facilitate faster settling of the materials and will help firm the new surface up.

Conditioning

Once the new infield material has been properly installed, it needs to be conditioned. Good infields actually consist of two different layers - the base layer (infield mix) and the top cushion. The top cushion is achieved by conditioning the infield mix with various amendments. By conditioning the infield, you are providing a surface for play to take place upon. The infield should be capable of retaining the proper moisture level in the base material and be dry on top to the point that the top layer of infield will not stick to the players cleats and can easily be moved around with mat drags or other grooming implements. It also affords infielders the ability to repair small cleat marks on their own as the game progresses.

Most professional level infields consist of the base infield material topped with about one half inch of conditioner worked into the infield soil. This provides a surface that, when stepped upon with cleats, will produce a clean cleat mark. Other than the actual cleat depression, virtually no other soil is disturbed. The infield will not "chunk out" and become too chopped up during play.

Currently, there are two main types of infield conditioners on the market, calcined clays (Pro's Choice infield conditioner, Diamond Pro Calcined Clay, Mule Mix, Klakon, Turface, etc.) and vitrified clays (Diamond Pro Infield Conditioner). Each type of conditioner has different performance characteristics. Calcined clays absorb tremendous amounts of moisture in a relatively short amount of time. As such, they work very well for quickly drying up wet spots on an infield. Also, they can be beneficial if tilled into an infield mix that is less than optimal in sand/silt/clay percentages. However, if you are utilizing a quality infield mix, incorporation of amendments by tilling or other means is usually not necessary.

Vitrified clays are baked hotter and longer than calcined clays. Hence, they do not break down as quickly. Another characteristic of vitrified clay is that it does not absorb as much moisture initially as calcined clays. Over an extended period of time, vitrified clay does absorb as much moisture as calcined clay. It does release moisture back out of the particle at approximately the same rate as calcined. Thus, during rain, vitrified clay helps to remove excess moisture off the infield surface by facilitating surface run off rather than attempting to absorb all the moisture as it falls. This produces an infield surface that is capable of taking fairly good rain storms and can be put back into play soon after the rain has stopped with minimal work. If necessary, after the rain has ceased, additional amounts of calcined clay can be used to dry excessively wet areas. Vitrified clay can also be added post-rain along with the calcined as the vitrified will help to reduce the stickiness of the infield surface even when wet.

I prefer to use a mix of these two types of conditioners. Typically speaking, we try to achieve a mix that is roughly 75% vitrified clay and 25% calcined clay. This provides us with a infield top cushion that does not "cake up" and get sticky when moist, dries out in the hot sun more slowly and helps "sheet" excess moisture off the infield surface without holding too much in the top cushion. Normally we will place three quarters of a ton vitrified clay on the infield surface several days after the infield has been installed and has had time to settle. A drop-type fertilizer spreader is used to evenly distribute the conditioner on the infield surface. This material is spiked into the top quarter to half inch of the infield mix utilizing a nail board and smoothed with a mat drag. The field is then rolled with a 500 to 1000 pound roller. After a light watering, one half ton of calcined clay is dropped onto the infield and lightly spiked in.

Once again, it is mat dragged and rolled. Finally, another one half ton of vitrified clay is dropped on the infield, lightly spiked in and mat dragged. The infield is then moderately watered and the field is ready for play. The finished surface should be comprised mostly of infield conditioners with very little infield mix being visible. Anymore, the professional game is really played on conditioners rather than soil.

Please note that every infield will perform differently and will require different amounts of conditioning to achieve the desired results. Educated trial and error seems to be the best way to achieve what works well on different fields.

Maintenance

Daily

To maintain your infield in professional condition, several maintenance practices need to be performed on a daily basis. The most important maintenance task is maintaining the infield's moisture level. A properly maintained infield should ideally have a moist base (not muddy) and a top cushion that is damp but not sticky. In order to achieve this, the skin must be watered several times on a daily basis. First thing in the morning, the moisture should be checked on the infield and additional water should be applied if necessary. You want to create a damp infield in the morning so you can perform your other maintenance tasks to the skin easily and efficiently. If possible, use a one inch hose or larger (fire hoses work well) to water the skin. The actual amount of water you add is dependent upon weather conditions (wind speed, sunlight, evaporation rate, etc.). Be sure that you don't water too much and create a problem for yourself if you have an early game or little sunshine. More water should be added to the infield later in the day, after other maintenance tasks have been completed. A general guideline will follow later in this section.

After the initial moisture check in the morning, the infield should be spiked using a nail board. A nail board can be easily manufactured in-house utilizing number 10D nails, 1x4's and 2x4's. I normally produce nail boards that are hand pulled. They are a 3 foot by 3 foot frame that has six rows of nails spaced one half inch apart on three different sets of 2x4 (a complete article on producing a nail board can be found on page 38 of the October 1999 edition of "Athletic Turf Maintenance and Technology" magazine). I prefer the nail board to the harrow or spike attachments commercially available on most infield grooming machines as these type of attachments "rip" an infield instead of "raking" it like the closely spaced nails on the nail board do. Simply, the nail board will do a better job. If you must, using a field rake machine or similar implement is acceptable if it is all that is available. Once the infield has started to "haze over" after watering (the top layer of the infield will start to dry slightly, giving the infield mix a hazed look somewhat like wax drying on a car), begin spiking. The nail board should be pulled across the infield by hand or behind a vehicle so that a 3/8" thick layer of the top cushion is worked up until "fluffy". Once the worked up layer has dried sufficiently, the infield should be smoothed with a mat drag to produce a flawless finish.

Once the infield has been spiked and matted, it should be watered again. If batting practice or the game is several hours off, do not be afraid to give the infield a good "drink", weather permitting. On hot days, it may be necessary to water the infield moderately every hour to hour and a half until the start of activities to maintain proper moisture. Try to time your last watering so it is completed about 20 minutes before players start using the field. This ensures a surface that is moist but not sticky.

Other maintenance tasks should include leveling around each of the bases every day. Infield material tends to become displaced as players' slide into bases or lead off of them. As such, it is necessary to pull material back into the sliding and lead off areas. Use the back of a landscape rake or other implement to accomplish this task. After the material has been pulled back into these areas, you may wish to roll them to keep them firm. The tires of a small tractor or a maintenance cart work very well for this purpose. Simply drive back and forth on the loose areas until they are packed back down. Usually this type of task is performed after the morning watering and prior to spiking the infield. You could also do it after the game if so desired.

Additionally, each day after field activities conclude, the edges of the infield should be checked for material build-up. A leaf rake, corn broom or backpack blower can be used to remove excess conditioner and infield mix from the turf. If this is not done, a field that started with a nice smooth transition between turf and skin will eventually have a lip.

The infield should also be raked to remove any cleat marks on a daily basis. A sand rake

attachment on the back of an infield groomer works well for this task. You can also use a landscape rake and simply smooth out the heavy wear areas (where each infielder stands, lead off areas, etc). After raking, the infield should be mat drug again. If necessary, roll the infield with a five hundred to one thousand pound roller after dragging to help firm the infield back up and "set" it for the evening. Finally, a good heavy watering should be performed. Weather permitting, the infield can be soaked almost to the point of puddling. By the time morning comes, the moisture will have worked its' way down deep into the soil profile. This is key to maintaining proper infield moisture.

Weekly

Weekly maintenance of the infield surface should include adding infield conditioners and edging. Additional amounts of conditioner should be applied and incorporated into the infield on an as-needed basis. Generally, an application of 10 to 15 bags of vitrified clay or 10 bags of calcined clay lightly spiked and rolled in every seven to 10 days will help to keep the surface in first class condition. Alternating applications of vitrified and calcined clay is a good way to keep your mix consistent. We like to add vitrified clay about twice as often as calcined but you can do whatever you prefer. It is also a good idea to add 10 bags or so of calcined clay if rain is in the forecast and more than likely it will come during a game. This can help keep the infield playable a bit longer.

Weekly edging of the infield is critical to minimizing lip buildup. By edging frequently, you are able to trim the excess growth rather than having to remove large strips of turf, which is common when edging is only performed on a monthly or bi-monthly basis. A very easy way to edge is run a string line tightly along the edge of the turf where you wish to trim. A tight string is critical to the success of this process. Run a walk-behind gas powered edge along the string. The string will actually "hop" back and forth on either side of the edger blade as you move forward. Try to keep the blade on the same side of the string line at all times. This should produce a nice, clean edge. Any excess grass that does need to be removed can be pulled by hand or removed with a loop-type "hula hoe". Be careful to remove only the excess plants and not the infield mix. In other words, edge – don't trench!

Monthly

Monthly maintenance consists of adding material to the key wear areas on an infield, washing lip build up and floating the infield with a leveling device. Areas around the bases (the sliding and leadoff areas) tends to become low after repetitive use. These areas should have new material incorporated into them to keep the infield level and free of low spots that may collect excess moisture during rainstorms or irrigation. Prior to adding the material, all the conditioner must be pushed out of the way so that you are adding infield mix to infield mix, not infield mix to conditioner. If the conditioner is not first removed, the new infield mix will not properly adhere to the existing material. Once exposed to heat and sunlight, the new material will crack off of the base mix and you will be left with a sloppy mess that is unsuitable for play. After removing the conditioner, wet down the base material. Let is sit for a few minutes to allow the moisture to soak into the top half to one inch of the mix. Once the base mix is good and moist, work up the area. Chopping the area with a shovel, firm raking or other cultivative methods can accomplish this. I prefer to use a Garden Weasel. This tool is perfect for working up small areas. A roto-tiller can be used if it is operated carefully and you have time for the area to settle back down after the material is added. Tilling is not the best way to level a wear area as it does disturb a good deal of soil and incorporates large amounts of air into the material in the process. It increases the amount of time the field needs to settle and compact back down to the proper firmness. After the new material has been added, rake it out level with the surrounding area. Work the new material into the old with your shovel or Weasel. Finish level with a rake. Roll the new material or tamp with a hand tamp. Water the new material and let sit until it has had time to set up and is firm. Roll this area again and cover back over with the conditioner material you removed at the start of the project.

The entire infield can benefit from a monthly "floating". This process is to help keep the infield level, removing any high spots and filling in any low areas that may have formed over time. A large float drag can be built to perform this task. Whatever implement you choose, make sure it is not overly aggressive; you can do more damage than good if the proper equipment and technique is not utilized. Floating is not the same as laser grading but rather a light touch-up procedure.

If necessary, wash out all the edges on the field that have started to form lips. Using a garden hose with a high-pressure nozzle works well for this task. It produces a nice high power water stream but utilizes much less water than a fire hose or one inch booster hose. Wash the lips out so that when stepped

upon, the edge of the turf makes a smooth transition to the skin.

Yearly

At the end of the playing season, several procedures should be performed to the field to get it in shape for the coming winter months and the following spring. All infield conditioner should be pushed into piles on the infield with the back of a landscape rake and removed for the winter. The will keep the conditioner from migrating into the grass edge during the course of the winter. Heavy rains and snow will tend to float material toward the back edge of the skin, eventually causing a lip build-up problem. If you wish, this material can be stored and re-applied in the spring.

Next, the infield should be re-graded. Any extra material that may need to be added to account for settling and wear should be applied at this time. Remember to work the new material into the existing base material very well or it will not bond properly and will crack out, creating an unsafe condition for the players. You can either till in the new material or use an Aerovator. The Aerovator offers the advantage of good incorporation of the new and base materials together with little disruption to the overall grade of the field. Regardless which implement you use, after the addition of the material and the tilling/aerovation, re-check the general grade. If the worked-up area appears to be consistent, roll the infield. If it appears to have high and low areas, correct these grade problems and then roll. Once again, roll the infield in two directions with a vibratory road roller with the vibratory option turned on. This will help smooth and level the surface. After rolling, touch up the grade with a box blade or float and roll again, this time without the vibratory option on. You may wish to double-check the grade by running string lines from the front edge of the infield to the back every two to three feet. Any low and high areas will be very apparent to you utilizing this method. Make sure you pack the infield down well for the winter. Again, this will help minimize drifting of the material.

Some individuals do add a small ditch or trench along the back edge of the infield skin to help catch any infield material that may run off the field during the winter months. The can be beneficial in some instances. Remember to fill the trench back in come springtime.

Other Products

There are a variety of products available to individuals for conditioning infields other than the ones previously mentioned. Brick dusts, Ag lime, diatomaceous earth conditioners, lava sands and other similar products simply will not give you the desired results you are looking for in a high quality field. Many of these products are expensive while being abrasive to uniforms, balls and people. Some do provide a nice color but have virtually no moisture management characteristics. If you are looking to spend money on conditioners, purchase calcined or vitrified clays… it will prove to be a much better investment than the others long-term.

STABILIZER infield conditioner does deserve special mention. This product is a fibrous material that is similar in consistency to flour. It is tilled into the infield after being evenly spread with a drop spreader. Once it has been incorporated into the field and watered in well, it helps with moisture management of the skin surface. While not being a replacement for other conditioners, it definitely is a good addition to them. In my experience, this product will help you take more rainfall and get back onto the field more quickly than you can without using *STABILIZER*. It can also be used to help firm up soft infields as an option to adding unfired clay as it acts like a natural soil "glue". It is a nice addition to your mix if you can afford the additional expense.

Conclusion

Maintenance of an infield surface can be done properly if good material, proper construction techniques and a good maintenance program are provided. Keeping up on the daily, weekly, monthly and yearly maintenance of the field is key to producing a consistently high-quality surface. Many times, an excess of hard work and attention can compensate for a lack of funds. Regardless of what your situation is, by utilizing some or all of these maintenance techniques, you can improve your playing surface and help make it a safer, more enjoyable surface for the players to perform upon.