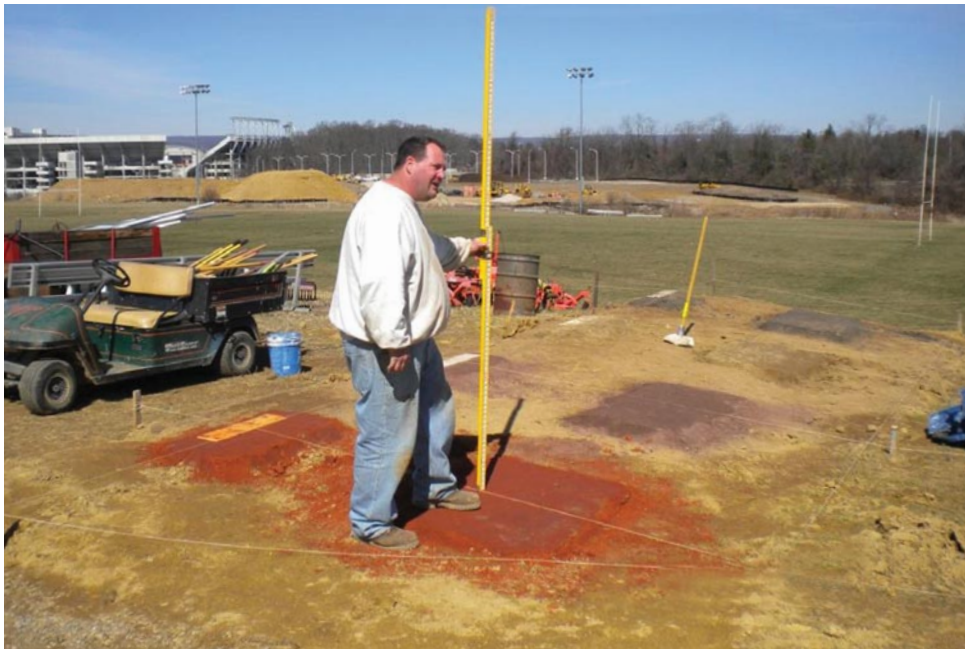


>> **CHAD KROPFF** checking elevation of landing areas

Quantitative and qualitative comparison of baseball mound clays

PITCHERS VARY IN THEIR PREFERENCE for mound clays used for toe plates and landing areas mostly based on differences in their aggressiveness of delivery. Field managers need information about mound clays in terms of ease of installation and repair, but they must also keep pitcher preferences in mind. Ultimately, a clay should be chosen that meets the preferences of the majority of home team pitchers while not requiring undue maintenance and expense. This study was conducted with these constraints in mind.

MATERIALS AND METHODS

A 4-mound bullpen was constructed at the Virginia Tech Recreational Sports Facility in February 2011. A sandy loam was hauled in and used for fill to ensure level mound and catcher's areas. The toe plates were set and leveled at 10 inches, and then a 2 x 2 foot landing area was installed of each individual clay product. A 1 inch per 1 foot grade was maintained using string lines. Toe plates and landing areas were checked with a transit, with clay being added or removed to ensure proper elevation relative to home plate.

The clay products used in this study were donated by their respective companies. They were:

- Mar Mound (Southern Athletic Fields, Inc.)
- Turface Professional Mound Clay (Profile Products LLC)
- Diamond Pro Professional Mound Clay (Diamond Pro/TXI)
- Pro's Choice Pro Mound (Pro's Choice Sports Field Products)

Qualitative comments about the four materials:

Mar Mound is a red clay that is very soft and fine. It flowed directly out of the bag and was quite easy to work with. No preparation out of the bag was required.

Turface has a purplish-brown color and is also quite soft and fine. Turface acted more like a sand as you could pour it out of the bag and it was very easy to break up small clumps. No preparation out of the bag was required.

Diamond Pro Professional Mound Clay is a unique product compared to the others. It was extremely dry out of the bag and required wetting for 24 hours before mound use. We found it easiest to pour a few bags at a time onto a concrete floor and add water as needed until a workable consistency was reached. However, using a concrete mixer for this process would have been more efficient. Once mixed, it tended to get clumpy requiring much more hand-work as opposed to the Mar Mound and Turface products which could simply be raked out.

Pro's Choice Pro Mound packing clay was also unique compared to the other products. The bagged product was clumpy and hard, with many of the chunks too large to use right away. Bags had to be poured onto a concrete floor and chunks broken apart with tamps, sledge hammers, or digging bars. Water was then added to soften the product and make it easier to work. Similar to Diamond Pro, this product was hard to rake and had to be formed by hand to install.

>> **MOUND CLAYS: Each product had a distinct color, particle size, and workability when taken directly from the bag.**

Table 1. MOUND WEAR (clay displacement) in weeks 1 and 4 with the four products

			Wear per 100 Pitches (inches)			
Bullpen date	Pitches since last rebuild	Rain (inches)	Mar Mound	Turface	Diamond Pro	Pro's Choice
Mar 14	30	0.01	9.2	3.3	1.9	3.8
Mar 15	45	0.07	4.4	NA	NA	3.3
Mar 16	60	--	2.7	2.0	1.5	1.1
Mar 17	45	--	2.2	6.5	3.5	3.7
Mar 18	25	0.05	4.0	7.1	5.4	2.9
Wk 1 Total or Mean		0.13	4.5	4.7	3.1	3.0
	Week 2 and 3 data not shown					
Apr 4	100	0.06	1.3	1.6	1.1	2.1
Apr 5	150	0.73	0.9	1.1	1.2	1.5
Apr 6	60	--	3.1	5.4	2.2	3.8
Apr 7	80	--	2.5	2.3	2.0	2.5
Apr 8	115	0.24	1.8	1.9	1.7	1.9
Wk 4 Total or Mean		1.03	1.9	2.5	1.6	2.4

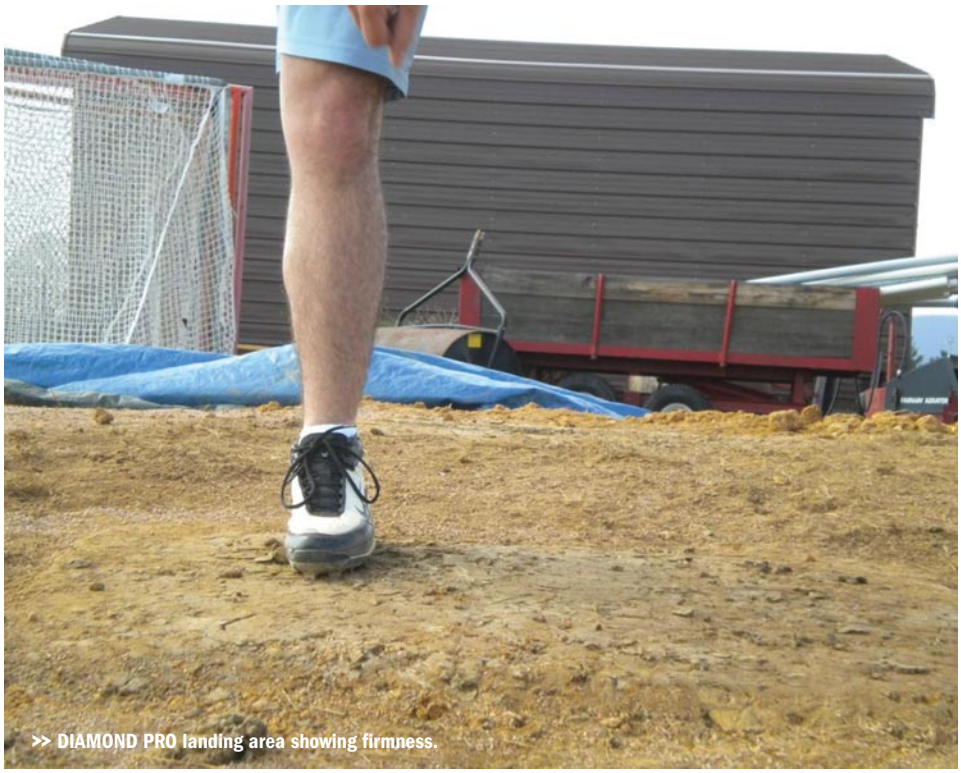
HOW THE CLAYS WERE EVALUATED

In an attempt to simulate four different "intensities" of maintenance programs, bullpen was thrown Monday through Friday for 4 weeks. During week 1 (March 14-18) the mounds were re-worked each morning before bullpen being thrown; in week 2 (March 21-25), the mounds were only re-worked on Monday, Wednesday and Friday; in week 3 (March 28-April 1), the mounds were re-worked on Tuesday and Thursday; and in week 4, mound re-working occurred only on Wednesday. Each pitcher practiced off one mound for an entire week and then rotated to the next mound type in week 2 and so on. A tight schedule was kept so that each mound would receive the same number of pitches each week.

Quantitative data was collected at the end of each day on the depth of greatest clay displacement on the toe plate and landing areas and summed. These numbers, along with the number of pitches thrown since the last rebuild, were used to calculate a value of clay displacement (or deflection) per 100 pitches thrown. At the end of each bullpen pitchers filled out a daily assessment sheet to subjectively rate the firmness, shape, consistency, moisture, and cleat indentation characteristics of the mound on a 1 to 10 scale, with 1 = worst and 10 = best. These subjective data are not presented, but they greatly influenced the overall qualitative judgments expressed later in the report.

RESULTS

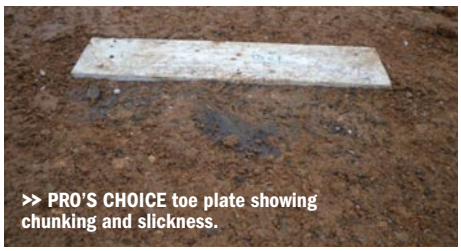
Mar Mound: On the first day of the study Mar Mound did not perform well. The first bullpen resulted in the highest measured clay displacement of the study at 9.2 inches/100 pitches (Table 1). The pitcher dug into it easily at the toe plate and landing area, leaving a small hole instead of simple cleat indentations. At the end of week 1, the average wear per 100 pitches was 4.5, which was second only to Turface. However, no other product showed more improvement through the 4 weeks as Mar Mound, ending at a 1.9 inch wear



>> DIAMOND PRO landing area showing firmness.

>> TOE PLATE hole after day 1 on Mar Mound.

>> TOE PLATE hole for Turface mound in week 2



>> PRO'S CHOICE toe plate showing chunking and slickness.

value. By week 2 Mar Mound firmed dramatically, with the wear pattern going from a hole to merely large cleat indentations. By the final week Mar Mound was performing very well; it was extremely firm and finished with two straight weeks in which the wear per 100 pitches was below 2 inches. The wear became spread out, with very little product needed for re-working.

Turface: Turface, especially in week 1, performed very similar to Mar Mound, with a deep hole dug at the toe plate that continued into week 2.

By weeks 3 and 4 Turface showed significant improvement in terms of wear with an average displacement of 2.5 inches. The third day of week 4 (Apr 6) bumped this average up due to the wet conditions caused by rain the previous day. One of the most desirable attributes of Turface was its ability to give, yet remain firm. A number of the 14 pitchers commented on their comfort from this mound. One pitcher said, "The landing area was soft enough to land on and not feel stiff on your front leg. This helps me keep the ball down in the zone."

Diamond Pro: This product was one of the most consistent throughout the study, showing less displacement than the others, especially by week 4. The main difference between Diamond Pro and the others was in how it wore. When the area was a bit wet, as in week 1, it would deform, but at all other times cleat indentation was the only sign of wear. This firmness required very little product to be used for re-working. Often times scarifying and tamping the worn areas was sufficient. Many pitchers preferred Diamond Pro amongst the group, but the firmness caused some consistent complaints such as: "I don't feel comfortable pushing off and landing on this surface"; or "I feel restrained in the landing area which may affect my fielding ability; and, finally: "I can't get enough torque or spin off the toe plate because it is too firm".

Pro's Choice: This product took the most time to form and build the mound. Once built, the clay areas performed very well. During week 1 it was the material with the least wear. Pro's Choice wore differently than the others as it would chip off rather than leaving a hole (Mar Mound and Turface) or just cleat indentations (Diamond Pro). Some of the pitchers complained about this chipping leaving slick areas that restricted their torque. The landing area was extremely firm which was viewed as a plus or a minus depending on pitcher preference.

PITCHER PREFERENCES

At the end of the study each pitcher was asked to pick their favorite product. Many wanted a firm, strong product that would not give out when they landed. Others preferred something softer that could help them finish their motion and keep pitches down in the strike zone. The 14 votes were as follows: Mar Mound (2); Turface (3); Diamond Pro (6); and Pro's Choice (3).

FIELD MANAGER PERSPECTIVE

We put the four products into two categories, high and low initial input. The two products that were not as easy to use straight out of the bag we placed in the high initial input category: Diamond Pro and Pro's Choice. Mar Mound and Turface were very user-friendly so we describe them as low initial input. For those managing a larger facility with a lower budget and many fields to work on weekly, we would choose Mar Mound first and Turface a close second. For those managers on higher profile fields who may not mind the extra up-front time required to prepare their mound, we would recommend Diamond Pro first and Pro's Choice second. However, these are fine distinctions we have drawn and we would like to close with a quote from our primary author: "All four products were better than anything I have ever used or thrown from in my 17 years of playing baseball." ■

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