Cup Shoe Offers Different Approach On Bearing Surface

Farrier argues that the traditional, horizontal shoe fit can be improved upon

Martin Kenny

By Martin D. Kenny, CJF, RJF.

"The bearing surface of the shoe, especially at the ends of the branches, must be horizontal," wrote Anton Lungwitz in the 19th century. The German veterinarian, whose translated writings greatly influence horseshoeing in the 20th century, added, "The horizontal bearing surface is in accordance with nature because the changes of form of the hoof which takes place at the plantar border of the wall, on burdening and unburdening of the foot, should not be interfered with. A horizontal bearing surface best fulfills this requirement."[1]

The configuration allows the nail to follow the angle of wall with less lateral strain…

Lungwitz's observation has been passed down for decades and is still the accepted practice in the industry.

The Cup Shoe

The development of the cup shoe has been an offshoot of my continuing research at The Hoof Redevelopment Center. The cup shoe is designed with a concave bearing surface, not only over the inner region of the web of the shoe, but also around the entire outer rim of the web (**FIGURE 1**). A St. Croix Eventer shoe was modified in these photos.

The hoof wall is trimmed to accept this configuration using much the same method as the "mustang trim" that many barefoot enthusiasts are advocating.

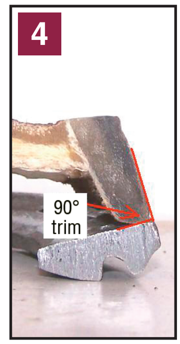
The configuration of the cup shoe allows the nail to follow the angle of wall (**FIGURE 2**) with less lateral (outward) strain on the basal ends of the wall than there would be with a more traditional bearing surface (**FIGURE 3**).

By trimming the basal hoof wall at an angle approximately 90 degrees to the external wall itself and then cupping the shoe to hug that trim (**FIGURE 4**), the shoe will allow the hoof capsule to "find center" with each loading phase. With the traditional horizontal bearing surface (**FIGURE 5**), you can see that the hoof wall attempts to "slide out" on the shoe.

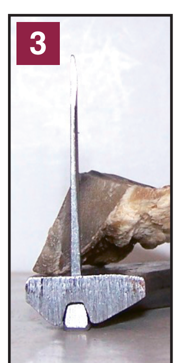
Not A New Idea

Lungwitz noted, "In Germany, on the other hand, there is another method, followed by the military shoeing shops, which consists of placing the bearing surface of the shoe as nearly as possible at right angles to the slant of the wall. According to this method the bearing surface of the shoe, depending upon the direction of the wall, should be inclined more or less."[2]

Lungwitz described the cup shoe very well. He did not subscribe to its validity, but by his own admission, the German



The basal hoof wall in at left is trimmed at 90 degrees, rather than the the horizontal traditional trim at right.

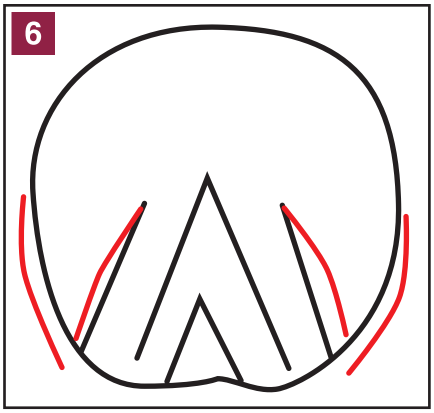


Third In A Series

For More By Martin Kenny, See:

"Hoof Capsule Distortion As A Process Rather Than An Event," *American Farriers Journal*, March 2009, Pages 61 to 65.

"The Effect Of Nail Placement On Hoof Capsule Distortion," *American Farriers Journal*, April 2009, Pages 36 to 41.



military seemed to think it was a good concept, Lungwitz felt this design would create contraction of the heel region.

Traditional wisdom has it that the hoof must expand to absorb concussion. Lungwitz felt the cup design would "contract" the hoof by limiting expansion. But let's look at that issue.

Dealing With Concussion

First, we need to establish the best way to absorb concussion.

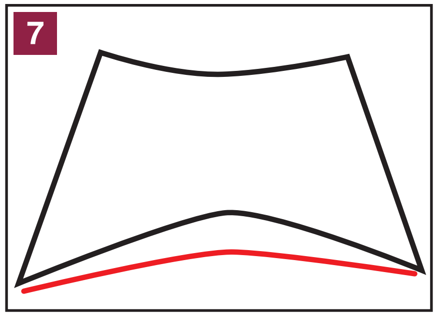


FIGURE 6 illustrates the expansion of the walls and bars (red lines). There would be a limited amount of absorption of concussion. The increase in internal hoof capsule area would be negligible at best.

But if you create additional concavity over the entire sole region by developing dynamic equilibrium, the increase in internal area is much greater than is possible with the expansion theory.

FIGURE 7 depicts a slice of the foot and shows how the flattening of concavity (red line) will greatly increase internal area and more efficiently absorb concussion than any horizontal movement can. The concave sole's ability to flatten during loading produces a much better mechanism of shock absorption.

When you realize that the concave sole allows for a rolling change in the shape of the sole as the foot rolls into position for the next phase of loading, you begin to understand how much more efficient this type of shock absorption is than the simple heel expansion we presently focus on.

This type of shock absorption allows loading to alter the entire hoof capsule structure with each stride, from initial landing of the foot, through weight coming over the center of the foot and finally to removal of load from the capsule. Focusing on the heel expansion as the primary means of shock absorption greatly limits the ability of the hoof capsule to alter itself during the entire loading, unloading and recoiling phases of each stride.

In **FIGURE 8**, the width of the foot (at the apex of frog) is 4.63 inches and the area of concavity is 0.46 square inches. After 3 months of being shod with a cup shoe, the same foot (**FIGURE 9**) has a width of 4.64 inches and concave area of 0.97 square inches — a full 0.51 square inches more.

This same effect occurs over the entire bottom of the foot, meaning that concussion absorption is much greater than could be achieved through simple expansion of the posterior portion of the hoof capsule.

At the same time, sole depth increased and the distance between the points of the medial and lateral heels increased by 1/4 inch. This would seem to negate Lungwitz's concerns that the design would limit expansion or create contraction.

Considering Other Factors

One thing that we too often fail to consider when thinking of hoof wall expansion is that the wall would not simply move absolutely horizontally. In order for the walls to expand under load, they have to expand both horizontally and vertically as depicted by the red lines and red arrows in **FIGURE 10**. This concept adds additional support for the cup shoe design, as opposed to that of the

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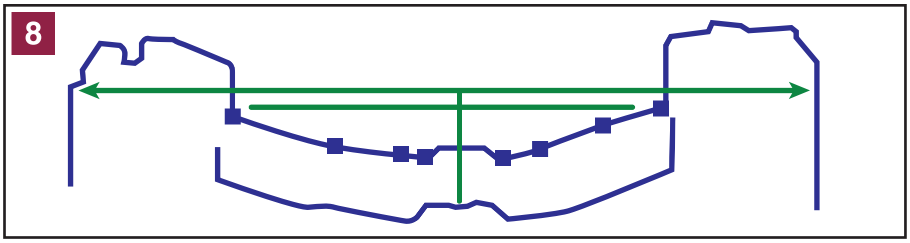

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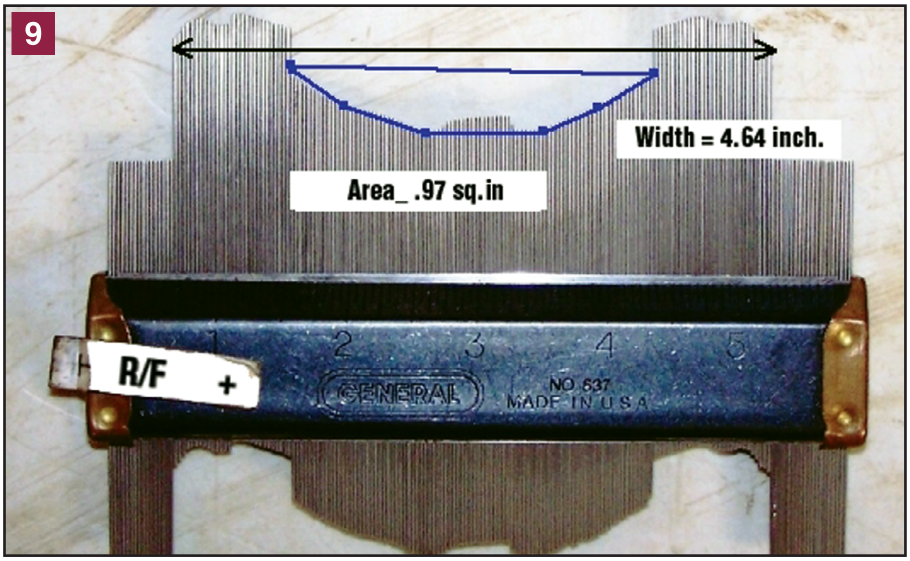

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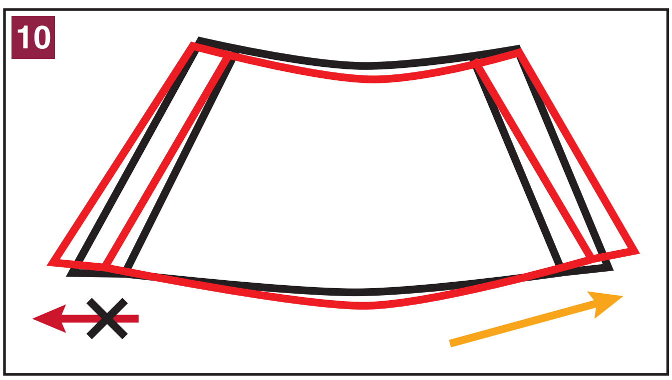

traditional horizontal bearing surface.

With the horizontal bearing surface, the wall loses contact with the shoe due to expansion at concussion, causing excessive wear on the bearing surface of the shoe (**FIGURE 11**) as well as the grinding away of heel tubules as the shoe

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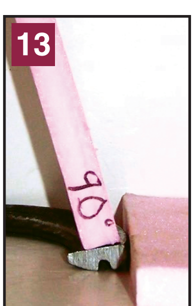

reloads with the rollover stage of stride.

This action can be illustrated by loading a section of foam board that has been cut to depict the angle of wall at the posterior quarter region (**FIGURE 12**). The loading of this artificial wall creates lift on the foam section on the ground as the artificial wall produces both horizontal and vertical pressures against the ground surface.

By trimming the basal wall at approximately 90 degrees to the external wall itself and creating an angle to match on the bearing surface of the shoe, the wall can maintain contact as it moves horizontally and vertically (**FIGURE 13**).

FIGURE 14 shows how the cup shoe looks once applied. The bearing surface should be at approximately 90 degrees to the outer wall at any point around the perimeter of the shoe.

(I have recently found that modifying a narrow-webbed shoe, such at the St. Croix Lite Rim shoe, as a cup shoe produces even better results than a wide-webbed shoe. It seems that the wall does not experience a greater impact per square inch with a narrow-webbed shoe, although the shoe itself does.)

Old Methods, Old Results

In summary, we have been duplicating old methods far too long. Many of the problems we see today have been around for a very long time. White line disease is not new. Lungwitz called it "loose wall." Seedy toe has been around for centuries. Abscesses are noted in historical writings of both vets and farriers. Since drastically changing the way I do things, the only abscesses I have had to deal with over the last 4 years are those due to the very occasional poorly placed nail.

The shoe in these photos has a traditional horizontal bearing surface and trim on the left branch. The right branch shows the cup shoe bearing surface and proper trim.

Understanding the hoof as it is, instead of as we have been told it is, is the key to reversing the problems we have struggled with for way too long.

Remember, keep doing what we always have done and we will keep getting what we always have!"

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Footnotes

[1] Anton Lungwitz, *Horseshoeing*, trans. John Adams, reprint, University of Pennsylvania, 1913, Page 117.

[2] *Ibid.*, Page 125.