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# Use and Application of Glue-on Shoes and Synthetic Hoof Appliances

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**Take Home Message**— Alternative methods of shoe application may be very beneficial to equine patients with special podiatry needs. Proper hoof trim, preparation, and application are critical when using synthetic materials for appliance or shoe application. There is no replacement for sound traditional farriery.

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## I. INTRODUCTION

THE innovative and proactive industry of equine hoof care has provided veterinarians and farriers an extensive array of products to aid in the comfort and well being of our equine patients. However, it is very important for us to know how to correctly prepare and apply these products to prevent improper use and do no harm. The basic principles of farriery should not be lost; there is no substitute for a well-shod horse with nails or a healthy barefoot horse. Unfortunately, there are many situations we encounter which require us to depend on other products to manage or rehabilitate the equine foot. For example, the lamintic horse is often in need of alternative shoeing applications due to the severity of lameness or poor quality of hoof leading to the inability to apply a shoe with nails. The objective of this paper is to discuss the methods of alternative shoe application, the materials involved and the indication of use for each.

## II. MATERIALS AND METHODS

The most common method of glue-on shoe application is referred to as “direct glue.” This method requires an adhesive to be placed between the ground surface of the hoof and the foot surface of the shoe. Direct glue application adheres the shoe to the wall and partially the sole of the hoof. Aluminum shoes are very commonly used for this due to the porous nature of the metal and its ability to bond adhesives. (Fig. 1) Alternately, recent advancements have allowed polyurethane shoes to be used for direct glue application with success. (Figs. 2A, 2B) Steel shoes can also be used for direct glue application and are typically used with a urethane adhesive.

The second most common application method is “indirect glue.” This relies on a cuff or tabs attached to the shoe and adhered to the outer perimeter of the hoof wall. (Figs. 3A-F) Therefore, no adhesive is in contact with the solar aspect of the hoof/shoe interface.



Fig. 1. Aluminum shoe direct glue with acrylic.



Fig. 2A. Polyflex (a) shoe direct glue with acrylic.



Fig. 2B. Polyflex (a) shoes.



Fig. 3A. Sigafos series I SM shoes (b).



Fig. 3D. Materials needed for indirect gluing process.



Fig. 3B. Sigafos Series II shoe (b). These shoes are individually custom made from a solid plate and the cuff manually attached once the correct shape is reached.



Fig. 3E. One foot is prepped for the gluing process and the other is wrapped with plastic waiting for the acrylic to set on the Sigafos series II cuff (b).



Fig. 3C. Sigafos Series II (b) ground surface with tread.



Fig. 3F. Sigafos Series III cuff (b). This allows the clinician to apply the cuff to virtually any shoe.

### III. HOOF WALL REBUILD

A “hoof wall rebuild” is performed when the wall is broken away to the point a shoe cannot be successfully nailed on. (Fig. 4) This process commonly uses an acrylic and some type of matrix (fiberglass, Kevlar, or poly-fiber) to replace the lost wall. In some instances, a “hoof wall rebuild” may be more suitable than gluing a shoe on because of the discipline of the horse and the ability to actually attach the shoe by alternative means other than nails. In which case, the shoe can be nailed on normally following the reconstruction. For example, a gaited horse wearing padded shoes would be very difficult to maintain the same shoeing prescription on both feet without nailing the shoe on.



**Fig. 4. Hunter show horse with a hoof wall rebuild using acrylic and Kevlar fiber as a matrix.**

Regardless of the alternative method of shoeing application, proper hoof preparation is essential. The hoof must be properly trimmed, dried and cleaned so that it is free of debris and any oily substance. The work area that is chosen to do this should be open and well ventilated. The area should also be well lit, dry, and not in extreme temperatures.

The adhesives used for applying horseshoes are variable and it is very important to understand their differences and which shoeing application each is best suited. Polymethyl methacrylate, commonly known as acrylic is a widely used adhesive for application of shoes. Acrylic can be used to bond aluminum, polyurethane, or embedded into a fiber in the case of an indirect glue technique or a patch. Several commercial acrylic products are available specifically for gluing on horseshoes. Polyurethane adhesives are another commonly used material to apply horseshoes or rebuild hoof wall. Polyurethane adhesives can be used to adhere aluminum, steel, polyurethane or wood shoes to the hoof. Cyanoacrylate, commonly known as “super-glue” has been used for shoe application, however, this clinician has had minimal success applying shoes with this adhesive.

### IV. SOLE SUPPORT MATERIAL

Sole support material is another use of synthetic products that can greatly aid the healing and wellbeing some horses. Silicones have been used for a long period of time and are usually quite soft yet do not adhere to the sole very well. Therefore, this type of sole support is usually used under a horseshoe pad. Elastomeric impression material has traditionally been used in human dentistry but is now commonly used in equine podiatry as sole support material. This material can be found in varying durometer or firmness. Elasmers also do not adhere to the sole of the hoof and are usually placed under a pad, bar, heelplate, or imbedded in a mesh to maintain placement under the hoof. Urethanes are also commonly used for sole support and are widely known as “pour-in pads.” (Fig. 5). This material does adhere to the sole and is commonly used in an open heeled shoe without a pad. However, it is strongly recommended to use a mesh material between the shoe and the hoof to provide a matrix for the urethane to form to and prevent loss when using in an open heeled shoe. As with any application of synthetic material to the hoof, care of preparation is critical. The solar surface of the hoof should be cleaned free of debris and dry prior to the application of any of the previously mentioned products.



**Fig. 5. Vettec Equipak CS (c) pour-in pad under a stabilizer plate on a thoroughbred racehorse.**

### V. RESULTS AND DISCUSSION

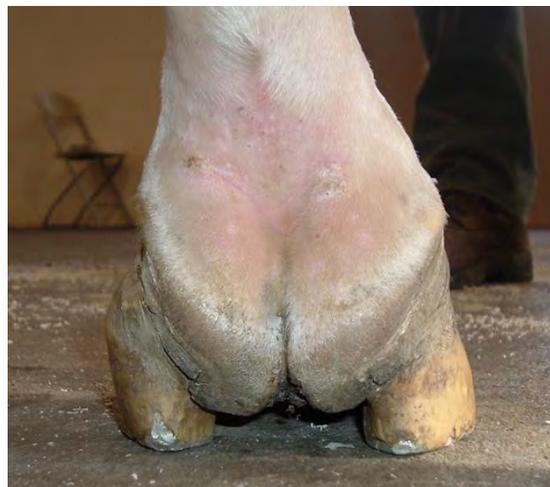
A single shoeing period of poor hoof care such as improper shoe fit or poor nailing may lead to broken-out and poor quality walls, thus requiring the use of alternative methods of shoe application to keep the horse in work. Many cases may just require some time off to allow the hoof to regenerate before applying another shoe. High-end horses in competition

are seldom given this needed time off, therefore pulling the shoes and giving them the winter off isn't always an option. Many cases that have poor hoof wall quality and are frequently throwing shoes require an alternative method of application. In order to rehabilitate these hooves a shoe needs to stay on firmly to allow the damaged wall to grow out without further disruption of the wall by nailing. Once the hoof wall has improved and is able to accept a nail, we then recommend the patient get placed in a good farriery program. There is also the occasional case that truly has very little hoof growth throughout the shoeing cycle and is very difficult to repeatedly nail shoes on regardless of what you do. In some of these cases I do keep in a glue-on shoe system for long periods of time and try to alternate between traditional nail-on shoes.

Alternative shoeing methods may be more desirable when dealing with laminitic cases due to the non-invasive manner in which the shoes can be applied. The laminitic horse is often very sensitive to the concussion created by hammer blows when nailing on shoes. I have found my cases respond better and are more comfortable if shoeing techniques that eliminate trauma are used. The motto "time is trauma" holds true to these cases as the longer the horse is required to stand full weight bearing on a laminitic limb while the contralateral limb is being worked, the more damage is potentially being inflicted on the fragile lamellae.

Drawbacks defiantly exist for using glue-on shoes; however, if done properly, great success can be had. The main caution this author would give is the potential to trap microbes under the glue and create a septic condition resulting in an abscess or white line disease. For this reason the foot must be cleaned and dried to the fullest potential before the adhesive is applied. It is advisable to soak the feet in a disinfectant such as oxychlorosene prior to this process. Careful attention must be taken not to apply the adhesive over any exposed sensitive tissue or areas lacking cornified horn; doing this will result in an unsuccessful outcome. Recently, copper sulfate powder has been used as a topical dressing over cracks and imperfections of the hoof (particularly the white line) prior to application of adhesive.

When using direct glue application of aluminum or steel shoes, the potential of constricting the hoof and contracting the heels is very real. Since the heels of the hoof are "locked" into the same position of the shoe and are not allowed to expand, the hoof contracts over time (Fig. 6). It is not advisable to repetitively direct glue aluminum or steel shoes to a hoof more than three shoeing intervals. However, this author has maintained very healthy hooves on horses shod exclusively in "direct glue" polyurethane shoes using acrylic adhesive for over two years without contracting the hooves in any way. This is due to the ability of the polyurethane shoes to expand with loading and unloading of the hoof.



**Fig. 6. Contracted heels and prolapsed frog due to over use of direct glue aluminum shoes.**

#### FOOTNOTES

- a. Polyflex Horseshoes, No Anvil LLC, Wellington, FL
- b. Sound Horse Technologies, PO Box 689, Unionville, PA 19375.
- c. Vettec, Inc. 600 Ease Hueneme Road, Oxnard, CA 93033 8600.