



Technical Note

Casting of 3-dimensional footwear prints in snow with foam blocks

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ARTICLE INFO

Article history:

Received 15 April 2015

Received in revised form 25 February 2016

Accepted 16 March 2016

Available online 24 March 2016

Keywords:

Foam

Snow

Footwear

Cast

ABSTRACT

Commercially available foam blocks are presented as an alternative material for the casting and preservation of 3-dimensional footwear impressions located in snow. The method generates highly detailed foam casts of questioned footwear impressions. These casts can be compared to the known outsole standards made from the suspects' footwear. Modification of the commercially available foam casting blocks is simple and fast. The foam block is removed and a piece of cardboard is secured to one side of the block with painter's masking tape. The prepared foam block is then placed back into its original box, marked appropriately, closed and stored until needed. When required the foam block is carefully removed from its storage box and gently placed, foam side down, over the questioned footwear impression. Next, the crime scene technician's hands are placed on top of the cardboard and pressure is gently applied by firmly pressing down onto the impression. The foam cast is removed, dried and placed back into its original container and sealed. The resulting 3D impressions can be directly compared to the outsole of known suspected item(s) of footwear.

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1. Introduction

The casting of 3-dimensional footwear impressions has a long history in forensic science. Throughout the last century materials such as, moulage, plaster of Paris, paraffin wax, dental stone, sulfur as well as other substances have been used to cast 3-dimensional footwear impressions in soil, sand, mud, and snow with varying degrees of success [1–8].

Impressions in snow have been particularly challenging to cast. Although sulfur and paraffin wax have been effectively used to cast snow imprints, they require special equipment to melt blocks of sulfur or paraffin wax into a liquid state so they can be poured into the impression [9]. Dental stone has also been used successfully to cast snow impression when used with Snow Print Wax. However, spraying the imprint with several layers of Snow Print Wax can conceal fine details present in the impression. In addition, Snow Print Wax will absorb heat from the sun which may cause the snow making up the impression to quickly melt. Furthermore, the sub-freezing temperatures typically encountered in the field during the winter months cause the dental stone to freeze before setting,

thereby making it difficult to obtain useable cast without the addition of a 5% solution of potassium sulfate in the solution to help prevent the cast from freezing [10].

In this paper the authors present an alternative method using commercially available, pliable, delicate blocks of foam to cast footwear impressions in snow without the need for using Snow Print Wax.

2. Materials and method

Bio foam blocks packed in cardboard boxes are obtained from scientific equipment supply houses. The supplied foam blocks are a well-accepted material normally used in the forensic laboratory to produce known standard impression of suspected footwear [11]. To prepare the modified foam kit, a foam block is removed from its packaging and placed on top of its container which has been previously emptied, closed and placed on a table. Next, a piece of pre-cut, heavy duty cardboard, measuring 36 cm × 15.25 cm is placed on top of the foam block and secured with Scotch[®] brand, 3 M Painter's masking tape. The block is then placed back into its original storage box, secured and marked for further use as demonstrated in Fig. 1.

When a questioned 3-dimensional footwear impression is located in the snow it must be documented with digital

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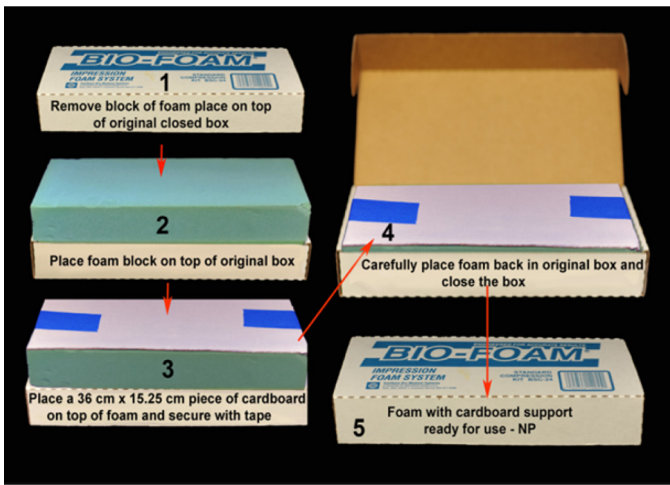


Fig. 1. Shown are the steps used in the preparation of the form casting kit. Step 1 – carefully remove the block of foam from its container, close box; Step 2 – place the foam block on top of box; Step 3 – place a 36 cm × 15.25 cm piece of cardboard on top of the block, and secure with painter's masking tape; Step 4 – carefully place foam block back into original box with cardboard facing up; Step 5 – close box and mark for identification.

photography before any attempt is made to cast it, see Fig. 2a. In order to cast a footwear impression with a Bio foam block, a previously prepared foam block is gently removed from its original storage box and carefully placed over the impression.

Next, the crime scene technician evenly applies pressure to the foam block by firmly pressing down on the cardboard as seen in Fig. 2b. The completed foam cast is removed and photographed, see Fig. 2c.

Finally, the foam cast is removed, placed in a room temperature environment, carefully dried off with a high quality, absorbent paper towel and then placed in its original box, sealed and marked for identification as demonstrated in Fig. 2d.

Many footwear impressions in snow were cast with Bio-Foam® blocks during this study. Two of these casts are displayed below in Figs. 3 and 4 to demonstrate the versatility of this method. While the impression successfully cast in Fig. 2a was very shallow, the footwear impression in Fig. 3a was approximately 1 inch deep and the impression cast in Fig. 4a was several inches in depth. These figures exhibit the capability of this method to obtain detailed cast of footwear impressions made in snow at a variety of depths.

When first learning how to use foam blocks to cast impression at different depths one must learn to judge how much pressure to apply. If too little pressure is applied, no print will be obtained; if too much pressure is applied the foam block will be crushed. With a little practice, one will quickly learn how much pressure is required to cast an acceptable impression.

3. Results and discussion

Bio foam possesses many positive features which makes it a suitable material for the accurate reproduction of footwear impression. It is a durable closed-cell foam structure; a soft, sensitive, easy to handle, moisture-proof, readily deformable,

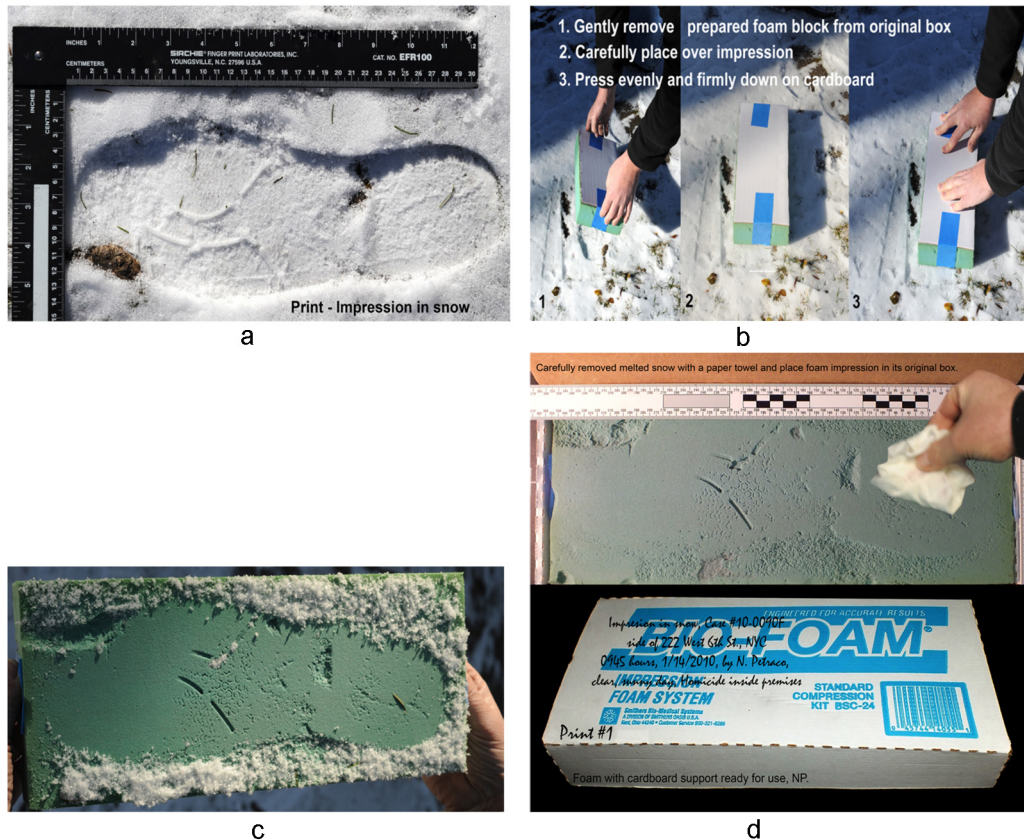


Fig. 2. (a) The questioned impression is photographed with and without a scale (not shown) prior to casting. (b) Shown is the procedure for the casting of a footwear impression in snow with a modified Bio-Foam® block. (c) Photograph the foam cast after removal from the impression. (d) The foam cast is gently dabbed with an absorbent paper towel, marked for identification, and packaged in its original box.

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