

Technical Note

The Dry-Casting Method: A Reintroduction to a Simple Method for Casting Snow Impressions

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Abstract: We report on a method of casting snow impressions with dental stone that produces impressive results with minimal effort. Although variations of this method have been reported as early as 1932, the technique seems to have been overlooked in contemporary forensic texts. Many investigators are dependent on snow print wax and dental stone for casting impression evidence in snow. This method adds yet another option for the crime scene investigator to consider. We introduce the term “dry casting” and provide simple steps for using this casting method.

Introduction

Casting impression evidence in snow has challenged investigators for decades. Several excellent casting methods, such as the use of sulfur, have been developed over the years but have been infrequently used by investigators. Many investigators seem to have become too dependent on the use of aerosol wax products followed with dental stone to cast impressions in snow. This technique begins by layering the impression with several coats of snow print wax. This is done to establish a protective base onto which a dental stone mixture is poured. Several authors have commented on the pros and cons of this method [1-8]. Hilderbrand suggests snow print wax and casting material as the way to preserve snow impressions [4]. This method can produce excellent results. However, several factors, including

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the age of the product, weather conditions, characteristics of the snow pack, method of application, protective measures, and the abilities of the person casting, may limit the success of this method. Snow print wax is one of the most expensive casting methods available. Some manufacturers sell a single can for as much as \$15.00 (U.S.), which may be enough product to adequately cover only one cast. The senior author has seen cans clog and sputter after just a few short bursts. Because of this, many smaller agencies may be reluctant to purchase new stocks of snow print wax during the winter months, causing older products to be kept in reserve.

In 1932, a translation of a German paper by Mullner appeared in the *Journal of Criminal Law and Criminology* [9]. The paper, "The Mullner Moulage Method", discussed a technique used by the author since 1923. When using this method, the investigator covered the impression with a very shallow layering of powdered plaster. This was done by using an atomizer attached to a cardboard tube. The plaster was sprayed above the impression and allowed to free fall onto the impression area. The use of a tube restricted globules of plaster from falling onto the impression. Alcohol was then sprayed onto the plaster layer by the use of a vaporizer until the plaster was saturated. This process was repeated to build several layers. Once fully cured, a mixture of plaster of Paris was poured onto the impression. In 1948, Reynard [10] recommended sifting the plaster of Paris into a snow impression to the depth of about 1/8", misting cold water onto the plaster, and repeating these steps until a base was formed onto which a regular mixture of plaster of Paris could be poured. In 1955, Allen [11] reported on a variation of this technique, although he did not reference Mullner and may have developed the technique independently. Allen recommended applying powdered plaster (with either a syringe or fine wire sieve) to the impression, spraying with water until the plaster was saturated, and repeating this process until several layers were created. Once the base was sufficiently cured, a thick mixture of plaster of Paris was poured onto the impression. In 1964, Abbott [12] instructed readers to spray the snow print impression with thin layers of powder. A binder was needed between the layers of powder. If plaster powder was used, water was misted onto the impression between layers; however, if talc was used, then shellac was applied between layers. Abbott found three layers of plaster powder and water mist to be the most successful. He followed the powder layers with a thickened plaster mixture that was created with cold water. In 1972,

Samen [13] reported on yet another variation in which talcum powder and aerosol lacquer were used to create a base layer. In 1977, Given [14] discussed applying water-soluble powder with a powder atomizer to enhance details of impressions in snow. Adair et al. [15] discussed the use of this technique with fast-setting concrete. This paper presents a variation of the dry-casting method using dental stone, which has proven to be very effective for casting impressions in snow.

Sifting dental stone has been used by various investigators for capturing underwater impressions. Cassidy, Bodziak, and Hilderbrand all advocate sifting or sprinkling casting powder onto the impression before pouring the casting mixture into the underwater impression. Bodziak and Hilderbrand both recommend applying approximately one inch of dry powder to cover the impression before the mixed casting material is applied.

Hueske and Wolff have advocated the pouring of dental stone directly into the impression, following highlighting with spray paint [6, 16]. Some types of snow pack or ice, coupled with below freezing temperatures, may allow for the capture of some detail using this method, but we have found this to be rare at best. Care must be taken to protect the impression from solar radiation to prevent melting if the impression is sunlit. Other investigators have cautioned against using this method for fear that the resulting cast will be devoid of detail. This is due to the exothermic reaction that occurs during the curing process of dental stones. As higher temperatures are generated in the cast, the impression detail may melt prior to the setting of the material, resulting in a generally uniform layer of casting material, with minimal or no outside detail. Bodziak [17] states that many of the snow casts he has examined were the result of pouring dental stone into the impression without establishing any type of base layer, all of which were of poor quality.

Materials and Methods

Super Dent dental stone was used for the casts depicted in the figures of this paper. However, over the years, the authors have successfully used several types of dental stone products on a variety of snow packs. The Super Dent dental stone product has a consistency of 30% (30 ml/100 g), compression strength of 8,500 psi, and an expansion rating of 0.12%. Our variation uses a commercial pastry sifter to sift the dry dental stone powder

onto the impression in fine layers (Figure 1). These layers are approximately 1/8" in depth. Apply a fine spray of water to the sifted product by using a plastic spray bottle. Cool water in the snow prior to application. (Snow can also be added to the water bottle to accelerate the cooling process.) Spray from directly above the impression, allowing it to free fall onto the sifted dental stone. The dental stone powder will darken in color as water is absorbed. Apply the water so that this absorption is uniform across the impression surface, with no areas of dry powder exposed. Avoid spraying a stream of water directly onto the impression, especially on the first layer, as this may damage or destroy the impression detail. This is less of a concern once successive layers have begun to cure. The moisture content of the snow will influence the amount of water that is needed, if any. Impressions in slush or wet compactable snow may require little or no additional moisture through spraying. Carefully watch the sifted material for absorption to avoid overapplication of water, which may weaken the final cast. Standing or beading water on top of the moistened dental stone is an indicator that too much water has been applied. If this occurs, simply sift additional dental stone onto the impression to absorb the excess water.

Discussion

Overall, investigators seem reluctant to cast snow impressions and instead rely on photography alone. Relying exclusively on photography handicaps the footwear examiner to varying degrees. A quality cast can help to verify the physical size of the impression and may reveal additional detail not seen in a photograph with poor contrast. Even though highlighted impressions may present greater contrast, they do not provide the same amount of information contained in a cast.

The dry-casting method is remarkable for several reasons. First, the method uses materials commonly carried by crime scene investigators, namely dental stone and water. Second, pastry sifters are inexpensive and simple to use. The technique is not adversely affected by cold temperatures and works well on a variety of snow pack conditions. More important, however, is the quality of the final cast when compared to the application of dental stone by pouring. Noticeably improved quality is obtained by simply changing the technique in applying the dental stone product (Figures 2-5).

The authors do recommend that investigators practice this method prior to using it in crime scene work. Additionally, investigators may choose to practice on nearby snow packs at the crime scene to evaluate such variables as setting time and water content of the snow. This method can be used following highlighting with spray paint. Investigators should recognize that paints or snow print wax used in highlighting a snow impression will absorb solar heat, which may rapidly begin to melt the impression. If a highlighting spray is used, we recommend either the use of a box cover or the timely application of the dental stone product to reduce the effects of direct sunlight on the impression.

We are not advocating the replacement of snow print waxes with the dry-casting method. Snow print wax can produce excellent-quality casts. However, dry casting consistently produces better quality impressions over a wide variety of snow conditions. A number of factors (e.g., the characteristics of the snow pack, quality of casting materials available, weather conditions, and the skills of the investigator) may influence the ability to reproduce an impression through casting. Equally important is the quality of the footwear or tire leaving the impression. Obviously, a flat-soled dress shoe will likely leave fewer class characteristics than an athletic shoe. Regardless of shoe or tire style, the characteristics of the snow pack and the manner in which the impression was made (running, walking, standing, slipping, accelerating, etc.) may prohibit fine detail from being recorded regardless of the casting method used. Dry casting is presented here simply to offer investigators another option for snow casting.

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Figure 1
Sifting powdered dental stone onto impression.



Figure 2

Snow impression prior to the pouring of normal dental stone mixture.



Figure 3

Cast of snow impression following normal dental stone application.



Figure 4
Snow impression prior to dry-casting method.



Figure 5
Cast of impression following dry-casting method.