

# A trace of evidence

## *New material aids investigators in lifting trace evidence*

It's long been known trace evidence, which contends that every contact no matter how slight will leave a trace, can help solve a case. This minute evidence is normally left by objects or substances coming into contact with one another, leaving a small sample on the contact surfaces. Today's investigators rely on many types of trace evidence, but some of the most commonly and successfully used are fingerprints and toolmarks.

To successfully use this evidence, an efficient means of collection must be used. A new casting material from Ultrronics Inc. incorporates ease of use, eliminates mixing and applies simply. Researchers set out to examine whether this casting material is a reliable, sensible product for forensic investigators by testing its performance on a variety of surfaces.

### **What is AccuTrans?**

Casting products traditionally are mixed from a tube then applied to a surface, and variables affecting their use typically include temperature, odor and hardening times. AccuTrans Auto Mix Dispensing System, from the Cuyahoga Falls, Ohio, company, utilizes a new material — polyvinylsiloxane — which assists the investigator because it does not require mixing and is easy to use. In addition, AccuTrans is available in a transparent material, alleviating photographic reversals.

This casting silicone is applied with an extruder gun. The material is flexible and does not distort the image. Once the impression is dry

and lifted, it cannot be smeared or smudged, making the lift permanent. The impression is 1:1 and can be placed under a scanner or camera and searched in the Automated Fingerprint Identification System (AFIS) in either the local, state or federal fingerprint data banks.

It is available in white, brown and a transparent material. The transparent version allows for instant print comparison without reversing the image. The transparent silicone enables an investigator to place the lift on any color background, allowing photographic image capture. In fact, it works well for all photographic purposes.

The main material in AccuTrans, polyvinylsiloxane, can be used on curved surfaces, and flat, horizontal or vertical planes. When used on vertical planes, only a small amount of silicone is needed. The material will smooth itself as it runs down over the area. This casting silicone also can be used on smooth or rough surfaces, human skin and blood evidence. The silicone can even be used to make an impression inside a gun barrel by using a light release agent before application.

AccuTrans has a boiling point of less than 150 degrees Fahrenheit (F), a relative density of 1.2g/l, and is insoluble in water and soluble in methyl ethyl ketone.

The compound doesn't irritate the skin, and wipes up easily. However, as a general precaution, it is recommended that users do not eat, drink or smoke when handling, wear

gloves and avoid contact with eyes and skin.

### **Using AccuTrans**

It should be noted that before treatment with silicone, forensic investigators should dust rough surfaces with magnetic fingerprint powders to bring out the fingerprint ridges. (See Figure 1 below.) Magnetic powders come in a variety of colors, which is beneficial for surface contrast and photographic purposes. Magnetic powders contain ferromagnetic particles, and are applied using a magnetic applicator or wand. Excess powder is easily removed by moving the appli-



**Top: The AccuTrans system. Bottom: In Figure 1, the investigator applies magnetic fingerprint powder to a golfball's surface before using AccuTrans.**

cator back over the print. However, magnetic powders should not be used on metallic surfaces.

At the beginning of the application, users must squeeze out a small amount of AccuTrans to properly blend the contents in the mixing tube. Doing this prevents large air bubbles in the casting. If small air bubbles are present in the cast, they do not interfere with ridge detail and usually occur in the beginning of the application, or if the user stops and starts or removes the extruder's tip. The extruder gun allows the material, and not the tip of the gun, to come in contact with the fingerprint, thus preserving the print's integrity.

If too much material is applied to a surface, the polyvinylsiloxane may

run down past the fingerprint. In this case, the investigator can simply place a piece of tape a few inches below the print to create a dam. The tape will allow the excess material to gather in this area. After AccuTrans dries, users can cut off the excess with a pair of scissors or a knife.

### AccuTrans to the test

Researchers recently devised a comparison test using various substrates to determine the ways in which AccuTrans might be used. They applied the product to each substrate, and the drying time was noted for every surface. After the material cured, the impressions were lifted and compared for quality, and to determine whether the latent fin-

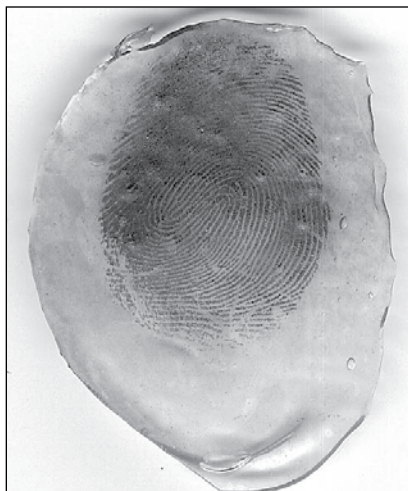
gerprint needed to be reversed.

All latent fingerprint impressions produced in the study were photographed on a light table for maximum results and clarity, and scaled 1:1. Researchers used a Nikon D100 Digital Camera, set on ISO 1000 in Aperture Priority Mode at f/16, equipped with a Sigma 50mm Macro Lens.

The tests were conducted with Accutrans transparent and brown casting material using the following surfaces.

#### Rough surfaces:

- Golf ball
- Concrete block
- Bricks
- Rocks
- Fruits (lemon, lime, orange)



**Figures 2, 2A and 3 (from left to right). Figure 2 shows a latent print lifted from a lime. Figure 2A shows a latent lifted from a dashboard. Figure 3 shows a fingerprint lifted from a light bulb.**

- Computer surfaces
  - Dashboards
  - Unfinished wood
- Smooth surfaces:**
- Dollar bill
  - Light bulbs
  - Glass
  - Mirrors

- Finished wood
  - Smith & Wesson 9mm handgun
- Special surfaces:**
- Wesson 9mm slip
  - Dry blood prints
  - Human skin
  - Fingers and palms

The brown AccuTrans casting material was tested on the following toolmarks:

- Hammer hit in wood
- Pry marks on screwdriver
- Smith & Wesson 9mm handgun barrel

The examinations considered ease

of mix and application, drying time, latent quality, and latent reversal requirements.

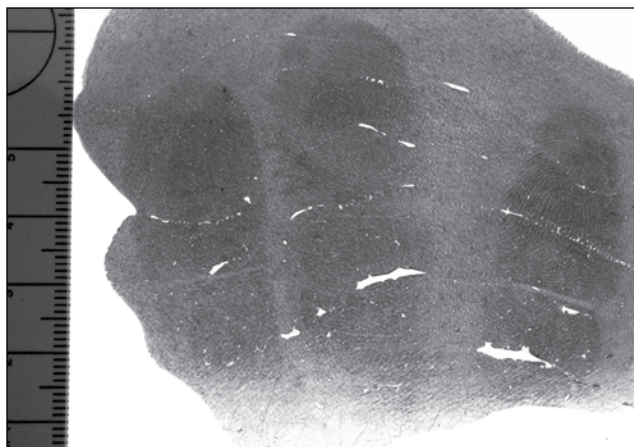
The **rough** surfaces tested revealed that latent fingerprint impressions on all of the substrates, except the concrete block, yielded positive results and latent fingerprints of value.

The concrete block displayed what appeared to be finger marks, and when AccuTrans was applied and the prints lifted, the finger marks contained little ridge detail. All lifted latents were of AFIS quality, except for those on the concrete block. The product's drying time was approximately 3 minutes at 78 degrees F. Researchers determined back light photography may be needed if the AccuTrans becomes too thick for AFIS entry or comparison. (See



Figure 2 of a latent lifted from a lime and Figure 2A of a latent print from a vehicle dashboard on Page 86.)

The **smooth** surfaces were found to provide an excellent area from which to lift latent fingerprints, furnishing positive results and latent fingerprints of value on all of the substrates tested. In fact, all of the latents lifted were of AFIS quality. Due to the use of the AccuTrans



**Above: Both Figures 4 and 4A show latent prints lifted from human skin.**


transparent, the latent prints were ready to be added to AFIS immediately. As was the case with rough surfaces, back light photography may be needed if the AccuTrans becomes too thick for AFIS entry or comparison. In this test, latents did not need to be reversed. The product's drying time was approximately

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- AutoMix is easy to use... no mixing required!
- Unique spreader tip for smooth application




**The difference is clear... ACCUTRANS sets a new standard for lifting fingerprints.**

- Ideal for all surfaces, including Styrofoam, brick, computer housings, etc.
- Transparent PVS material allows direct comparison of minutia points.

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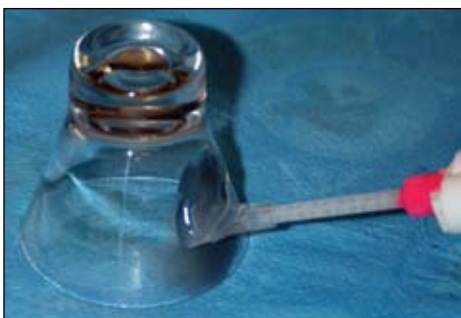
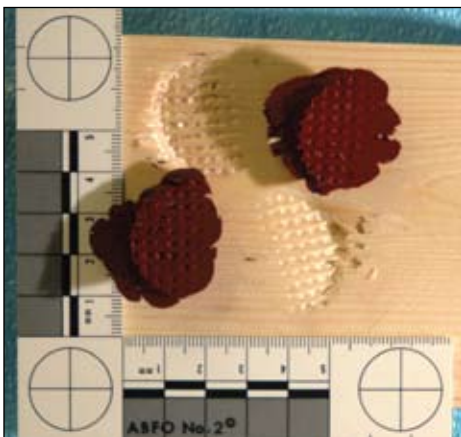
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3 minutes at 78 degrees F. (See Figure 3 on Page 86 to view a latent print lifted from a light bulb.)

The **special** surfaces test allowed researchers to experiment a bit with AccuTrans in order to recover fingerprints from human skin and dried blood, and actual finger and palm impressions. The finger and palm impressions were of excellent quality and easily comparable. On deceased persons, it was determined that AccuTrans can be used to assist in identification by casting the decedent's fingerprint impressions. Doing this is fairly simple: When the material is dry, a small amount of release agent is applied to the inside of the cast and the cast is then filled with AccuTrans and allowed to dry. After drying, the impression can be rolled on a fingerprint card for identification purposes. Another method would be to dust the fingers with magnetic powder, apply transparent AccuTrans to the deceased's fingers, allowing the material to dry,



An Examination of Latent Print Lifting with AccuTrans				
Transparent AccuTrans				
Item Processed with AccuTrans:	Ease of Mixing & Application:	Drying Time:	Latent Quality:	Latent Requires Reversing for Examination:
<b>Rough Surfaces</b>				
Golf Ball	5	2 - 3 Minutes	5	No
Concrete Block	5	2 - 3 Minutes	No Value	No
Rocks	5	2 - 3 Minutes	5	No
Fruits: Lemon, Lime, Orange	5	2 - 3 Minutes	5	No
Computers	5	2 - 3 Minutes	5	No
Dashboards	5	2 - 3 Minutes	5	No
Unfinished Wood	5	2 - 3 Minutes	5	No
<b>Smooth Surfaces</b>				
Dollar Bill	5	2 - 3 Minutes	5	No
Light Bulb	5	2 - 3 Minutes	5	No
Glass	5	2 - 3 Minutes	5	No
Mirrors	5	2 - 3 Minutes	5	No
Finished Wood	5	2 - 3 Minutes	5	No
<b>Special Surfaces</b>				
Dry Blood Prints	5	2 - 3 Minutes		No
Human Skin	5	2 - 3 Minutes	3	No
Clip	5	2 - 3 Minutes	5	No
Fingerprint	5	2 - 3 Minutes	5	Yes
<b>Brown AccuTrans</b>				
<b>Tool Marks</b>				
Hammer Marks	5	2 - 3 Minutes	4	N/A
Screw Driver	5	2 - 3 Minutes	4	N/A
Gun Barrel	5	5 Minutes	4	N/A
<b>Legend:</b>				
1 Very Difficult, Very Poor				
2-Difficult, Poor				
3-Normal, Good				
4-Easy, Very Good				
5-Very Easy, Excellent				

The above table shows the results of AccuTrans testing on a variety of materials.

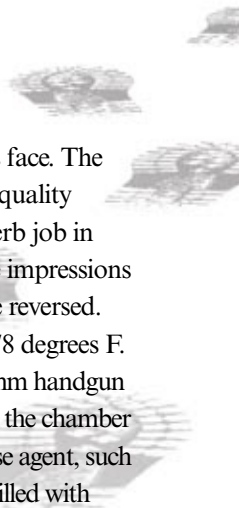
then removing the impressions from the fingers. Back light photography would then be used for comparison purposes, producing a positive print.

When examining fingerprints in blood, the blood must be dry and the fingerprint dusted with magnetic powder before applying the casting material. If the substance is applied when the blood is wet, it will destroy the fingerprint and smear the blood on the surface. When attempting to lift latent

fingerprints from human skin, it is recommended that the application occur within 2 hours. Standard dusting with magnetic powder produces identifiable results with the AccuTrans transparent application. However, photography with back light is necessary to eliminate the need to reverse the latent print. Drying time was approximately 3 minutes at 78 degrees. (Figure 4 and 4A on Page 87 show latents lifted from human skin.)

**Top Left: Figure 5 shows that scales can be applied before or after the material's application. The lifted marks were from a screw driver. Bottom Left: AccuTrans applies easily, even to curved surfaces.**

In the **toolmarks** test, brown AccuTrans was used to recover several tool impressions in wood. The tool impressions were produced with a flat-head screwdriver and a framer's



hammer with a check design on the hammer's face. The screw driver and the hammer produced good quality impressions, and brown AccuTrans did a superb job in capturing these toolmarks from the wood; the impressions showed excellent detail and did not need to be reversed.

Drying time was approximately 3 minutes at 78 degrees F.

Applying material to the Smith & Wesson 9mm handgun barrel was extremely easy; after adding a plug at the chamber portion of the barrel, a slight amount of a release agent, such as gun oil, was applied and then the barrel was filled with AccuTrans brown. Simply pulling on the impression released the cast from the barrel. The results proved to be of excellent quality with the chamber, lands and grooves clearly visible.

The product's drying time was approximately 5 minutes at 78 degrees F. (See Figure 5 of screw driver marks on Page 88.)

### **Pro and cons**

On the positive side, researchers found AccuTrans easy to use and durable. They noted the material had very little or no shrinkage at various temperatures and produced high quality latent fingerprint and toolmark impressions. In addition, they found the product has no smell and does not stain. They reported that the dispenser gun was easy to operate (once loading is achieved and the cartridge locked into place, attachment of the tips is keyed and a spreader tip is available for even distribution of the polyvinylsiloxane material in a 1-inch wide path for latent fingerprints). On the negative side, brown AccuTrans had visible voids, cracks and air bubbles when applied for casting, which can require the investigator to perform multiple castings. This was the only negative researchers encountered with the product.

Overall, researchers found two primary benefits to AccuTrans use: ease of mixing and ease of application. The accuracy of detail and available colors also weigh heavily in its favor. They concluded AccuTrans is so precise it can capture the ink depth of a dollar bill, making it a logical choice for forensic investigators. ■

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