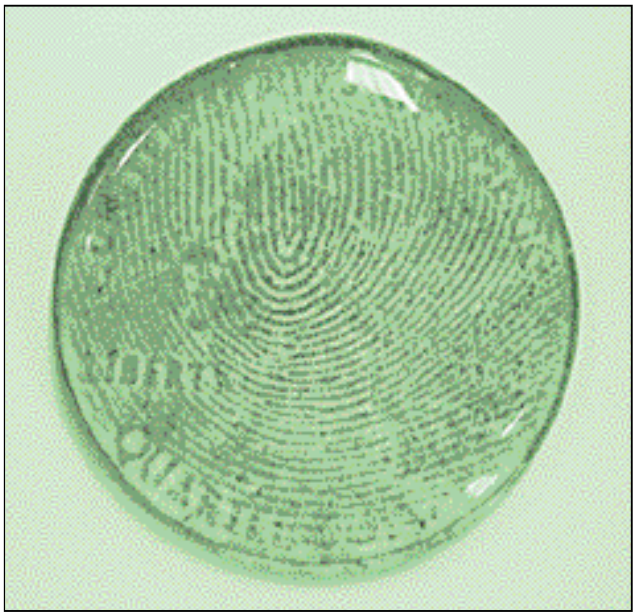
CLEARLY SUPERIOR RECOVERY

Results with conventional fingerprint lifting tape



Results with AccuTrans® transparent polyvinylsiloxane

The benefits of using transparent polyvinylsiloxane for recovery of developed fingerprints on challenging surfaces

Written by Detective Donald J. Frost II

EVERY PROFESSIONAL working in law enforcement understands the value of good fingerprint evidence in supporting the investigation of a criminal case. It can assist greatly in the development of a suspect who is possibly associated with the incident and ultimately the arrest and conviction of the actual perpetrator. Good fingerprint evidence can often be the difference between two extremes: getting a confession and conviction—or going through a lengthy and sometimes risky trial based on less-definitive evidence such as witness testimony and other circumstantial evidence. Or even worse, no arrest and no case at all.

A print can often look "good" at the crime scene—or on a piece of evidence back at the laboratory prior to processing—but it might turn out to be almost useless by the time it is developed, recovered, and examined by the latent-print examiner.

Many examiners have been frustrated by the absence of minutia points (unique characteristics in the ridge detail of the print) caused by the improper recovery of a print s u bmitted for comparison. One or two points of comparison that are lost in the recovery of the print can be the difference between a latent print being positively identified as the suspect's print or an "inconclusive" comparison that makes it useless for the prosecution (and conversely beneficial for the defense) in court. That is why proper recovery is imperative.

Latent-print recovery

There are essentially two methods of latent-print development, depending on the surface involved. The chemical-development method for porous surfaces relies on the applied chemical liquid or fumes to "react" with the components of the fingerprint in a fashion that will make the latent print appear visible on the surface for observation and photography. The physical-development method for non-porous surfaces relies on the development material

(traditionally fingerprint powder) to physically "stick" to the components of the fingerprint. Depending on the porosity of a surface and the quality of the latent fingerprint deposited, physical enhancers and lifters can be employed on some porous surfaces.

Both methods are complemented by photography in order to document the developed print—especially in the chemical-development method where opportunities to physically recover the print from the surface are limited. When possible, however, physically recovering the print from the surface is still extremely desirable for aiding the investigation.

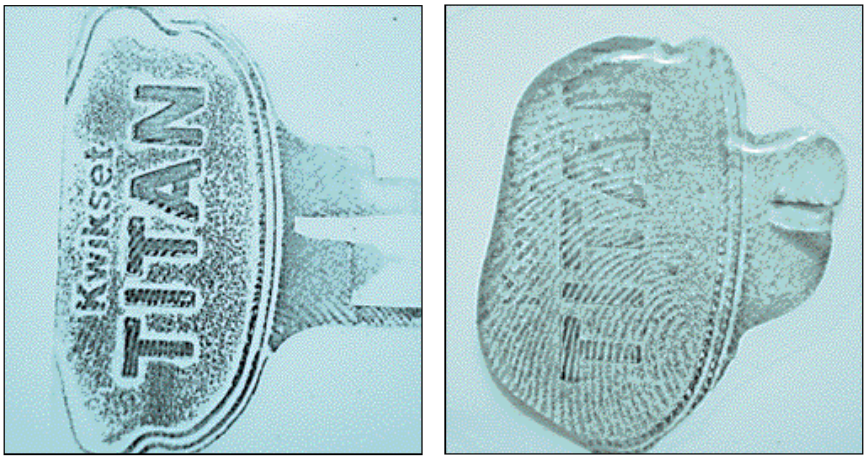
Print recovery from challenging non-porous surfaces

Curved and textured surfaces often prove challenging to the recovery of developed latent fingerprints. Traditionally, on smooth, flat, and non-porous surfaces, standard fingerprint lift tape or a "hinge-lift" can be used to recover the developed print. Fingerprints, however, are not always deposited on such surfaces. Human skin is extremely flexible and pliable, which allows fingerprints to be deposited down into the depressions of a textured surface or around a curved surface.

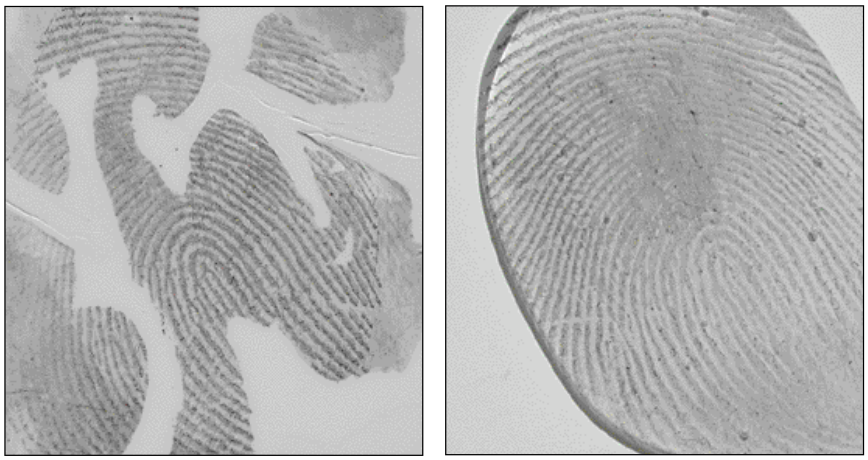
If a print is developed on a textured surface (such as a computer-monitor housing) or on a convex surface (such as a doorknob or a beer bottle), the standard lift mediums usually will not flex around a curvature or make adhesive contact with the depressions or "valleys" of the textured surface. Attempts to use these lifting mediums on such challenging surfaces usually result in spotty and incomplete fingerprint lifts, which make comparisons much more difficult.

Addressing the limitations of current materials

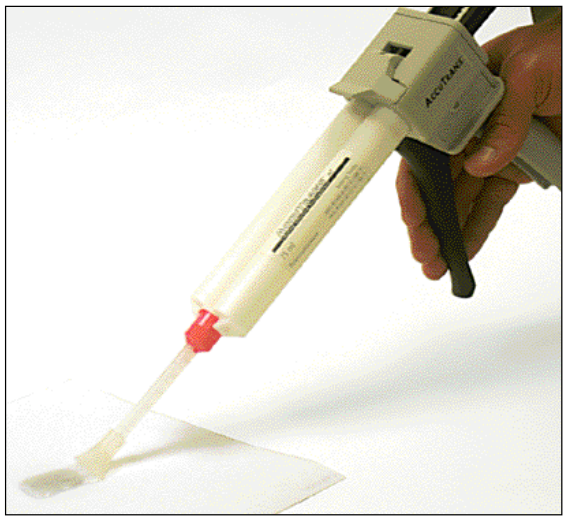
One company that is based in Ohio decided to study the issues involving latent-print recovery from these and other challenging surfaces. Ultronics Inc. investigated the current practices of law-enforcement agencies and the tools used in the recovery of latent prints. Methods and materials were examined firsthand to see what worked, what did not work, and how improvements could be made. The company



Latent fingerprints can be deposited in the depressions of a textured surface—and common lifting techniques cannot recover the entire print. The latent print from a key (above, left) was lifted with tape and is only a partial, which could make an ident difficult. The other print (above, right) was recovered using a product called "AccuTrans Transparent" (polyvinylsiloxane). Similar results were achieved when recovering latent prints on coins (facing page).



The use of tapes on round surfaces—such as a doorknob—can result in wrinkles that tend to break up the print (above, left). But polyvinylsiloxane conforms easily to curves (above, right).



There are a number of ways to apply the polyvinylsiloxane product in order to lift latent prints from round, porous, or other challenging surfaces. The manufacturer (Ultronics) offers an innovative spreader tip that can be used with an extruder-gun. That application unit is shown here.

interviewed dozens of crime-scene investigators from different agencies across the state, asking them what they did and did not like about what was currently available and what improvements they would like to see in future latent-print recovery materials. The options they studied included variations of gel-like or rubber-like lifting sheets or tapes and the different semi-aqueous lifting materials, often referred to as glues, putties, or silicones.

After extensive research, it became evident that the semi-aqueous lifting materials offered better flexibility in the field and the better opportunity for product enhancements. And given the longstanding dental materials background of their parent company—the multinational Coltene/Whaledent Inc.—Ultronics was logistically poised to accelerate this particular technology to the next level.

Semi-aqueous materials include two-part casting silicones that cure chemically. These materials were originally designed for the recovery of tool-mark impressions. Their nature gives them the ability to flow into the texture of most surfaces and makes them for applications involving curved surfaces. They come in color selections—standard whites, grays, browns, and blacks—that tend to vary by brand. They are packaged primarily in one of two different systems: pairs of squeeze tubes and dual-cylinder cartridges for use in extruder-guns.

Time can be a critical factor in hand-mixing materials from the squeeze tube systems, because as soon as the two components contact each other, the catalyzation process begins. That means that the mixing process must be maintained long enough to ensure sufficient component integration but within a short enough period of time that the material does not begin to set up prior to and during application.

Extruder-guns automatically mix the components in a matter of seconds by utilizing a special applicator tip during dispensation, thereby making the silicones easier to use. They eliminate the potential ratio errors that are associated with different-sized tubes, as well as incomplete mixing and premature set-up. They also facilitate a cleaner work environment and utilize the material quantity more economically than squeeze tubes, because you dispense the exact amount of material you need, as you need it. Extruder-gun systems are accurate, precise, more economical in material use, and are well worth the additional investment.

Since traditional casting silicones are pigmented, they recover the fingerprint in a similar fashion to colored gelatinous/rubber lifting sheets. This means that when casting silicones recover a print, you can only view the print from the "bottom". This is known as a reverse or mirror-image print.

Obtaining prints in this fashion requires the extra step of having to "re-reverse" the print prior to making a comparison. There have been cases where latent-print examiners were not aware of this, and comparisons have been wrongly called *non-ident* between prints from the same finger, where the one print being compared was reversed.

To overcome the difficulties that are associated with print reversal, a brand-name consumer product known as blue gel glue—or its forensic brand-name equivalent—has been used as an alternative in recovering prints from challenging surfaces, because it dries clear and flexible. This makes it ideal for recovering a "forward" print, ready for direct comparison and entry into an AFIS system. It also allows the examiner to change the background color behind the print to maximize contrast. Because they cure through air-drying rather than chemical curing, the cure times can present serious difficulty with these blue gel glues. Cure times usually range anywhere from one to more than twelve hours, depending on application thickness, air temperature and circulation, and relative humidity. This often makes them impractical for use in the field at most crime scenes.

Clear solutions using AccuTrans transparent polyvinylsiloxane

Ultronics Inc. took the information that they gleaned from their research and married it to their casting-materials technology, thereby producing a new,

state-of-the-art product. It is a clear polyvinylsiloxane with the brand name AccuTrans Transparent. Available in squeeze tubes (AccuTrans Tubes) and extruder-gun systems (AccuTrans Automix), the AccuTrans Transparent system carries with it the benefits of drying clear like blue gel glue but also curing quickly like traditional casting silicones. AccuTrans Transparent sets in only six minutes at 72°F.

AccuTrans Transparent is self-pooling on flat, horizontal surfaces. It has a lower viscosity than most other comparable pigmented silicones, which gives it an excellent flow rate and tremendous coverage benefits. On occasions when a flatter lift may be required or the work surface is sloped or vertical, additional manipulation is easy with AccuTrans. It can be easily worked across the surface of a print while still "wet" using standard lift tape or pressed out with a clean, flat object.

The cured material can be removed from the surface after curing and comes up cleanly. The captured prints are durable and will not smudge. The lift can be secured with lift tape on the backing of your choice—usually a standard backing card or sheet of clear acetate—or it can be simply dropped into an envelope and tagged as evidence.

Since its release in August of 2005, AccuTrans has enjoyed success on a variety of test and real-world surfaces, including computer-monitor housings, coins, keys, painted cinder block, styrofoam, doorknobs, plastic and glass drink bottles, and other surfaces. The material has already recovered AFIS-quality prints from a convex surface involved in a current homicide case in Akron, Ohio. Most experts consider this system to be very exciting from an investigative standpoint.

AccuTrans application system enhancements

The AccuTrans squeeze tube kits are supplied with a protective transport case to maximize tube life. The tubes are of equal size for easy and accurate component ratio dispensation. The kit also provides a sizable mixing pad that is bound on three sides for easy mixing on a steady surface. In situations where you want a flatter lift, Ultronics has an innovative spreader tip attachment for the extruder-gun mixing tip. It dispenses the material in a flat ribbon about one inch wide, which is perfect for most individual fingerprints. It also eliminates the need for manipulation when a thinner lift is required. AccuTrans is also available in white and brown—both in tubes and Automix kits—for a variety of forensic applications.

Summary

Latent-print recovery is as much an art as it is a science. It requires a great deal of training, practice, and study for the investigator to remain proficient. A thorough knowledge of materials and techniques is a must for today's crime-scene technician or detective. Just as the variety of situations we face differ vastly from one scene to the next, so should our selection of tools and materials.

AccuTrans Transparent provides today's crime-scene technician with state-of-the-art technology that is one of the best solutions to the problems associated with print recovery from challenging surfaces.

We now have the opportunity to add an effective new tool to our laboratory and field kits. A wide range of options allows us the very best opportunity to discover, secure, and recover the best evidence possible. This is our primary responsibility as crime-scene investigators and helps ensure that evidence in criminal investigations excludes the innocent and identifies the perpetrator. And that should always be our goal in our part of the investigation.

About the Author

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To learn more about AccuTrans, you can go to the Ultronics website:

www.ultronicsusa.com/forensics.htm