

Shoeprints and tire tracks

In fiction, trails of footprints lead the detectives straight to a criminal's hiding place. In reality, however, shoes and tires rarely create such an obvious trail. More often, they can help prove that an individual, or their vehicle, visited a crime scene. And shoeprints may also indicate a criminal's height and gait.

How do crime-scene examiners deal with shoe marks? Well, it depends on the surface on which the marks are printed, and whether any material has transferred from the shoe to the surface. The classic "footprint" in soft ground leaves a clearly indented pattern of the sole that can be photographed and cast. Forensic photographers use oblique lighting

to emphasize the indentation, with a camera held perpendicular to the ground. A measuring scale next to the print means that full-size photographs can be compared to the shoes of a suspect.

Filling a print with plaster or dental stone often records more detail than a photograph can capture. Examiners may first spray the print with fixatives, which stabilize fragile materials such as sand, or with a release agent, which helps the cast lift freely from the print. Footprints in snow are coated with a wax spray, and then filled with chilled casting material.

Prints without impressions

Visible prints on solid floors, hard ground, and carpets can be photographed just like impressed

◀ MUDDY BOOTS

Traces of materials caught in a shoe's tread, and left behind in a shoeprint, can suggest where the wearer has been before reaching the crime scene.

COMPARING SOLES ▶

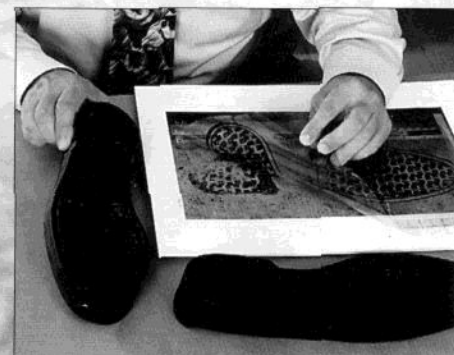
Simple measurement (top right) can quickly link a cast or photograph of a footprint with a shoe taken from a suspect. Copying prints on to an acetate overlay (bottom right) allows a direct comparison of every detail.



TWO TYPES OF PRINTS
"Footwear marks" are tracks of dust or dirt that a shoe leaves on a hard surface (above). Prints in soft ground (left), called "depressed marks," often provide greater detail of the shoe's sole and instep.

prints. Oblique lighting provides no benefit, but high-intensity forensic light sources can sometimes enhance detail.

Wet shoes leave clear trails of prints that are easily photographed. Dry prints in dust are harder to find. They can be lifted from a surface using two different methods. The first is a gelatin lifter, a thick layer of sticky gel on a fabric backing that lifts shoeprints in a way similar to fingerprint-lifting tape. The second is an electrostatic lifter, a foil sheet coated in black plastic that connects to a device generating a high static-electric charge. It lifts dust from the print on to the black surface, where it is more clearly visible.



When shoeprints are not so obvious, examiners may use the same treatments that bring out fingerprints, such as dusting and superglue fuming. On porous surfaces, ninhydrin and DFO (see p. 18) may be used to enhance bloody shoeprints.

Using shoeprint evidence

A recovered print can be compared side-by-side to a suspect's shoe. If the soles have matching patterns and wear marks, it strongly suggests that the shoe's owner was present at the crime scene.

Footprints can also demonstrate a link between otherwise unconnected crimes, and provide a new direction in a suspect hunt. Matching a print using shoe databases can identify the footwear's make and style. Also, shoe size is roughly proportional to stature, and a trail of prints can suggest a suspect's gait, such as a limp.

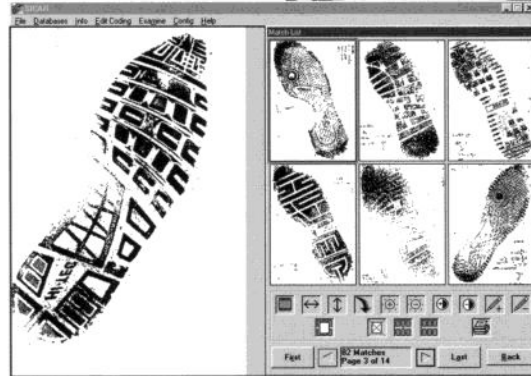
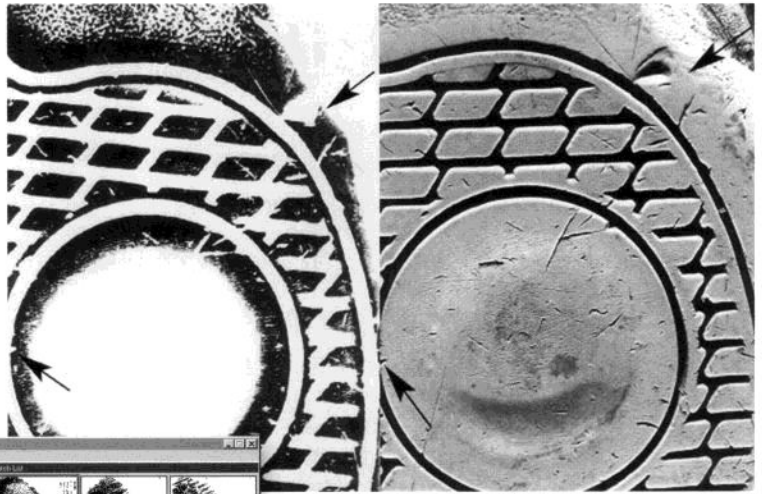
Tire tracks

Investigators treat tire tracks in much the same way as footprints, using the same techniques to photograph, cast, and lift them. However, the length of tire tracks can cause practical problems. Recording the track of a large truck may require several photographs or casts.

Like shoes, tires have identifying tread patterns. Similar treads can be distinguished by tread-wear gauges and subtle variations that manufacturers introduce to the tread to reduce noise or improve grip. By comparing a tire track with a standard reference, such as Tread Design Guide,

WEAR MARKS ▶

Manufacturing defects may be the same on many shoes, so they are not enough on their own to match a print found at the crime scene (near right) to the sole of a suspect's shoe (far right). But distinctive cuts (arrowed) are unique to a single sole.



investigators can identify most tire types. As with shoes (above), tread damage produces unique marks that can tie a track to a particular tire.

Although the distance between tire tracks or the radius of a tight turn do not provide conclusive information, they may be enough to eliminate a vehicle from an investigation, or to narrow a search.

TIRE CAST ▼

If an initial comparison between a cast from a trail roughly matches a tire from a suspect vehicle, investigators will examine the tire's whole circumference for points of similarity.



◀ SHOE DATABASE

A footprint index, such as SICAR, allows prints to be manually compared with those found at other scenes. Footwear manufacturers supply patterns of new sole styles for inclusion in the database.

CASE STUDY



Police in the town of Torquay, southwest England, were convinced of the value of a shoeprint database when they gave the Treadmark system a trial run in 2001. In one case, a customer slipped into the stock room of a Torquay sports store, stole a Nike jacket, and escaped through a second-floor window. The police had little to go on until three weeks later, when store staff opened a shoe box to find a pair of old shoes inside. The criminal who had stolen the jacket had also swapped his shoes for a new pair. Detectives scanned in the soles of the old shoes, and the Treadmark system matched them to the shoes of a man who had been previously arrested for an unconnected crime. Confronted with the evidence, he pleaded guilty to both offenses.

CASE STUDY