

# Extreme Tire Wear: A Useful Tool in Association and Reconstruction

Tom Adair

**Abstract:** In April of 2008 a tire examination case was presented to the author in which the documented impression evidence showed evidence of extreme tire wear in the crime scene impressions. The suspect vehicle, which was recovered shortly after the crime, also exhibited corresponding wear on the tires in the same mounted positions. The degree of wear was such that the author was able to establish a greater degree of association between the impressions and the set of tires from the vehicle than he could otherwise expect from a single tire alone. The term “extreme tire wear” is introduced. The author also discusses the need to draw conclusions regarding the set of tires, as opposed to individual examinations, when the possibility presents itself.

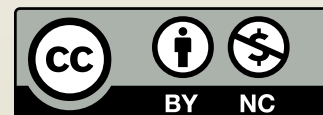
**Keywords:** tire examination, extreme tire wear, impression evidence, track evidence

Received: 09.01.2009

Revised: 10.14.2009

Accepted: 10.16.2009

Copyright: © 2009 Tom Adair. Copyright for this article is retained by the authors, with publication rights granted to the Association for Crime Scene Reconstruction. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.



Citation: Tom Adair. “Extreme Tire Wear: A Useful Tool in Association and Reconstruction.” *Journal of the Association for Crime Scene Reconstruction*, Volume 15, Issue 3, Fall 2009: pages 41-44.

## Introduction

At best, tire evidence is an under-utilized resource in criminal investigations. Much of this has to do with the fact that a majority of major crimes occur in large metropolitan areas replete with roadways, and thus, tire evidence is not routinely found. A second reason is the minimal training available in tire examination which is inextricably linked to the former. However, every crime scene has the potential to hold valuable tire evidence in either two or three dimensional form. When tire impression evidence is found in urban areas, usually one or two tires are represented at most. This may limit the value of such evidence to investigators. Occasionally, however, investigators might discover probative elements of track impression evidence that can significantly diminish the population of possible contributors as well as aid in the

reconstruction of certain events during the crime. Furthermore, examiners are encouraged to consider the cumulative weight of the track evidence in making associations to known tire sets rather than limit their analysis only to individual tracks independent of the others. I introduce the term extreme wear to define those tires with a tread depth of less than 1/32”.

## Case Study

These issues are exemplified in one such case presenting extreme tire wear on two of the four tires representing the totality of track evidence at the scene. In April of 2008 suspects committed a home invasion robbery with a firearm and subsequently fled the scene in the city of Westminster, Colorado. The victim was able to identify the suspects to law enforcement after calling 911 and police quickly began canvassing the



city for the suspect vehicle. The suspect vehicle was recovered several hours later in a parking lot near the location of one suspect residence. During the subsequent investigation investigators determined through an informant that the suspects hid from officers the previous evening by driving into an open space area and parking under a major overpass in the city. The pathway leading to the overpass stopped directly under the roadway above. Rugged terrain beyond the roadway would make further travel extremely difficult, if not impossible. According to the informant the suspects hid in the vehicle for several hours under the overpass to avoid police that were searching near their homes. During their time there one suspect exited the vehicle, walked past the overpass, and threw the handgun out into the field beyond.

position on the vehicle. All four tires were General Exclaim size P215/50R17. A senior criminalist with the Westminster Police Department responded to the scene and took photographs and track measurements. No castings were made of the impressions. Failure to cast impressions can hinder an analysis and should become routine in these types of investigations. The track width of the impressions was measured to be 60" between the centers of each tire impression. Several measurements were taken from both the rear and front track widths along the driving path. Wheel base measurements were not taken. A handgun believed to have been used in the home invasion was also recovered from the scene. Shoe impressions were also photographed in the area where investigators believed the vehicle was parked under the overpass.

Figure 1 ►



After hiding for several hours the suspects backed out of the tunnel area and into a dirt field adjacent to the roadway then reversed direction and headed back to paved city streets (fig. 1). By performing this maneuver the vehicle, a 1998 Chrysler Sebring, deposited easily distinguishable impressions from each tire relative to its mounted

Both suspects denied involvement in the crime. The vehicle was seized and brought to the crime laboratory for examination.

The author was requested to compare photographs of the impressions and track measurement taken from the crime scene to the known vehicle and tires. Powdered

transparencies were made of each tire under load for overlay comparison. No individual characteristics could be associated between the photographs and the transparencies. The tread on the front two tires showed generally even wear with the tread depth measuring on average 6/32". The rear tires however showed evidence of extreme tread wear resulting from long term under-inflation of the tires. This is indicated by the complete, and near complete, removal of tread elements on the outer ribs of the tire (fig. 2 & 3). Furthermore, each of the rear tires could be clearly differentiated from the other by the degree of extreme wear. The outer ribs on the rear driver's side tire were completely worn down making it impossible to clearly define the size and shape of the tread blocks. The rear passenger side tire, however, did show some definition of the tread blocks on the outer roadside rib but not on the vehicle side outer rib. After comparing the tires to the questioned impressions (fig. 4 & 5) found at the crime scene I found that they corresponded not only in class features of tread design but also in evidence of extreme wear, and tire position found on the vehicle as well. The track width measurements from the crime scene also corresponded with the track width of the suspect vehicle. The reconstruction of the track evidence also confirmed the informant's story of vehicle path movement at the scene. Suspects eventually pled to a



◀ Figure 2



◀ Figure 3

lesser charge and did not contest the track examination results.

◀ Figure 4

▼ Figure 5



## Additional Research

No other cases or comparisons of questioned impressions to extremely worn tires or sets of tires could be located in the forensic literature. In order to understand the frequency of extreme tire wear one might expect in the general population I surveyed 200 tire sets (800 tires) found mounted on vehicles and 200 tires discarded at three different tire recycling depots. The vehicles were observed in public places such as parking lots and streets. Only those tires exhibiting shallow looking tread were measured for this study. Tires showing good tread depth (obviously not worn down) were not measured. The purpose of the survey was not to document average tread depths found in a population but merely those tires exhibiting extreme wear. Measurements were taken from numerous positions across the tread circumference with a commercial tread depth gauge. I also spoke with representatives of two local tire retailers and found that they both recommend to customers that they replace their tires when the tread depth measures 3/32". Only one vehicle in the survey was found to have extreme tire wear on two front tires. Additionally, three tires were found in the recycling depots that exhibited extreme wear as well.

## Discussion

This case presents some interesting issues for both examiners and reconstructionists alike. Some impression evidence examiners advocate that comparisons between known sources and unknown impressions should stand on their own and weighed independently from other examinations in the case. In part, I agree with that. Conclusions derived from direct examinations (i.e. known to unknown) should stand on their own independently from all other case data. However, who says the examination should end there? Obviously, the impression evidence found at the above described scene clearly indicates that all four tires are as-

sociated with one vehicle. So shouldn't all track evidence be considered and weighted cumulatively as well? Consider the field of bloodstain pattern analysis. Analysts certainly evaluate each stain individually, but the examination doesn't stop there. The stains are then evaluated as a population within the scene. The same should be true of impression evidence as well. By examining impression evidence as a population or community of evidence the analyst may be able to draw additional supportable conclusions to better understand the event in question.

Impression evidence examiners in the United States predominantly use a graduated conclusion scale. This was the first case in my career where I also made conclusions based on the cumulative class data observed from independent impression sources. Because the extreme wear found in the crime scene impressions corresponded to the condition and placement of the tires on the vehicle (as well as track width measurements) I was comfortable in forming an opinion that it was highly probable that this set of tires on the suspect vehicle made the four impressions as a community at the crime scene. Regardless of the ultimate conclusions an examiner draws from the evidence they should be open to the idea of examining groups of evidence when they can be associated as part of the same "population" formed during the commission of a crime. Such is the role of the reconstructionist, is it not? Limiting ourselves exclusively to traditional binary examinations may contribute to a myopic view of the populations of evidence formed during the commission of a crime. Analysts are encouraged to consider these populations in totality as well as individually.

