

## **“I Say Tomato, You Say Tomayto” – An Appreciation Of The Use Of Skid Resistance Data By Highway Management Practitioners & Crash Investigators**

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### **ABSTRACT**

This paper will introduce the capture and use of road skid resistance (friction) data by two groups of professionals, highway management practitioners and crash (incident) investigators & reconstructionists. It is the authors' experience that a number of highway management practitioners view, and have historically viewed, the third party investigation of crashes on their road networks with some suspicion. In the opinion of the authors, some of this suspicion may well be valid; but some of it certainly is not and can largely be attributed to lack of mutual awareness and understanding. This paper discusses, from two personal viewpoints, the aims, objectives and tools of the trade of these two professional groups in capturing and using skid resistance data, before illustrating how a conscious effort in improving mutual awareness and understanding could alleviate some of the issues present. The presentation that accompanies this paper will be in the form of a mock debate between the authors, which will conclude issues of mutual understanding and acceptability.

## **1. INTRODUCTION**

There are many situations during a professional career, and in life in general, where a number of people can view and interpret a piece of data or documentation in a slightly different way according to their historical background, training, experience, needs and expectations.

With respect to the capture and use of road skid resistance (friction) data, the highway management professional is primarily interested in assessing all of the road surfaces across a pre-defined road network for comparison purposes, so allowing the prioritisation of surfacing improvements, whereas the crash (incident) investigator is primarily interested in determining the most likely causation factors in an incident and incident parameters such as pre-impact vehicle speeds.

The following sections of this paper set out the respective roles and methodologies of these two professional groups through the eyes of the authors.

## **2. HIGHWAY MANAGEMENT PROFESSIONAL (by Paul Hillier)**

I must start my section of this joint paper by holding my hands up and admitting that physics lessons were never my favourite past time during my secondary schooling in the UK. At that time, I was most certainly more interested in scoring a the winning runs in an Ashes test, than concentrating on a simple wooden block sliding down a ramped surface and a 'thing' called friction. As my sporting aspirations died one after another (some slower than others), and the need for a decent and respectable career grew, only in hindsight have I appreciated that this should have been one the lessons given my utmost attention !

Upon leaving education, little did I know that a summer vacation job working in the highway materials laboratory of West Sussex County Council would ultimately turn into what has been, and still remains, an enjoyable and satisfying career in civil engineering.

I believe that I was extremely fortunate to receive a firm grounding in highway materials very early on in my working career, being mentored by 'old-school' professionals who knew exceedingly well their specialisms of soils, aggregates, bituminous materials and road surface characteristics. They were also not afraid to pass on their knowledge and let their subordinates try, and become proficient at using, a wide range of equipment both in controlled and on-site situations. By the time I had clocked up four years in the laboratory, I had developed a real feel for the road construction and maintenance industries, and also used, maintained and processed the outputs of a range of test equipment. In the field of surfacings, I had sampled aggregates, bituminous materials (including reseals and their constituents) & concretes and tested them for a range of physical parameters; tested new road surfaces for potential ride quality (using a rolling straight edge) and texture (using sand patch tests and a mini texture meter). I had also investigated sites of interest in terms of skid resistance using both a pendulum tester (PSRT) and the authority's Grip Tester. I also became involved in the procurement and planning of the authority's annual skid resistance testing programme, which utilized a contractors SCRIM machine to test one-third of the principal network each year.

Through the above experience, I believe I developed a good awareness of the sensitivities and limitations of the various pieces of equipment (and indeed their intended usages), and dare I say it, an in-built suspicion of the conversion formulae that had been developed by some bodies to try and convert the output from one device to enable a direct comparison with that of another. The principle of skid resistance measurements obtained by highway management practitioners being only a 'snap shot in time' was engrained, with the values obtained being only truly applicable to the particular spot on the road at the particular time of test by the particular machine undertaking it. I also learnt that raw SCRIM data took a considerable time to process and accordingly, usable results were often slow to reach the engineer responsible for conducting further analysis.

Around that time, I too developed a reliable eye for what constituted a road surface in good and bad condition. Fortunately (and I truly believe that), I was also engrained with the practice of never judging a book by its cover; measurement very much ruled, and the practice of assigning a likely texture or skid resistance value to a site by

visual means only was very much resisted and people that claimed that they could do this reliably and consistently were treated with some suspicion.

I became fully aware of the use of SCRIM data to compare sites across a network, in order to prioritize sites for detailed site inspection and then, where found necessary, include them on listings for surface remedial measures (such as resealing or resurfacing). The erection of 'slippery when wet' road warning signs, as an interim measure, also became a familiar occurrence, based on the application of UK technical standard HD28/94 and the Local Authority Associations Highway Maintenance Code of Good Practice 1991.

At this time, I will admit that knew only of sideways-force co-efficients (SFCs); mean summer SCRIM co-efficients (MSSCs), grip numbers (GNs), skid resistance values (SRVs) and Investigatory Levels (ILs). Coefficients of friction were not in my daily vocabulary or understanding. I knew that the Police and other third parties investigated crashes on the authority's road network, but not exactly how they did this and certainly knew little of their preferred vocabulary and the equipment of their trade. My involvement in post incident investigations stopped at providing the latest SCRIM data for the sections of road of interest. Occasionally a localized pendulum (PSRT) or grip tester study was commissioned for a certain site and some historical crash data was provided to enable chainages to be tied down. This gave me a basic awareness of a link between sites with low skid resistance values and clusters of crashes. However, it also proved to me that Investigatory Levels are just that, a level below which some form of investigation / inspection should be considered. This countered the often believed (and unfortunately often stated!) argument that Investigatory Levels are 'black and white' or exact numbers, below which a site becomes inherently dangerous with vehicles leaving the road with ever increasing numbers.

During my time at the materials laboratory, I also completed a BEng Hons in Civil Engineering through block release study, after which it was deemed that my grounding and skills would be of use in the authority's highway management division. An introduction to world of term maintenance contracts and deriving programs of works followed. Resurfacing programs were heavily (although not exclusively) based on available skid resistance (SCRIM) data, but the process also involved some liaison with the road safety engineering team at the authority. It was then that I became fully aware of how crash statistics were collected and collated by road authorities and also that third party legal claims were made against authorities when it was averred that the road surface condition was a contributory factor in a past incident. I began to see internal crash reports and documentation supplied by the claimant's legal representatives. These often included reports by attending Police officers and sometimes, commissioned experts (reconstructionists and expert witnesses). Occasionally, I would be asked to attend local site investigations and provide input to internal investigations into such crashes.

It is only at this stage that I became aware of the term 'co-efficient of friction' and test devices that were new to me, such as accelerometers, chalk guns, drag sleds and proprietary products such as Skid Man (and latterly, Vericom). I tried to keep an open mind, but these were largely foreign concepts, seemingly aimed at establishing pre-impact vehicle speeds and often more generically, to apportion blame in an incident.

It also seemed that the spotlight was nearly always thrown onto the road surface and the actions of the road authority, regardless of the many details given and phases of the crash itself. I detected what I thought was unfairness in some cases, mainly due to my perception that only a narrow investigation had seemingly been undertaken. I also noted some inconsistencies and lack of awareness of highway management practices in third party reports and based on my laboratory experience, some injudicious use of test equipment conversion factors etc.

Before leaving the authority (after 10 years of service) I headed its Highway Management Policy and Research Team for 3 years, where I oversaw the review, development and implementation of strategy, policy, standards and practices and their associated documentation. This provided me with a wider insight into all things highway management (and notably a distinct lack of resources) as well as opening my eyes to the more political aspects of local government. It became obvious that permanently addressing all sites on a road network where the skid resistance test value obtained falls below IL is simply not possible in practice, both in financial and resource terms.

I began my current employment with the Investigations and Risk Management Group at TRL in July 1999 (emigrating to Australia in September 2000 to head TRL's Sydney office). Almost immediately, I became involved in conducting in-depth investigations into highway related incidents around the world and which have national, state and road authorities as defendants. This work involves retrospectively assessing and reporting upon the policies, practices and actions of the pertinent road authority with respect to the causation and severity of the incident in question.

The road surface is nearly always called into question in such incidents, but my historical scepticism of this has now been eroded slightly by an emerging knowledge of the tactics behind civil legal proceedings. In short, I now appreciate the inevitability of alleging that the road surface was a factor in any vehicle related incident. I do believe, however, that awareness amongst investigators (be they reconstructionists or expert witnesses) across the board should be raised of the importance of fully considering a number of other aspects with respect to highway provision and management during the course of an investigation. As a third party report can ultimately have a huge bearing on the outcome of a case (and indeed, liability apportionment), then the benefits of conducting a wide ranging and thorough investigation should be immediately obvious to all. Accordingly, I strongly believe that the practical objectives of highway management strategies (such as management of skid resistance across a large road network) and the many pressures and competing needs faced by highway management practitioners need greater advertisement and recognition as a reality.

As with my earlier role in the public sector, I still see things in the reports of third party investigators that sometimes make me feel uneasy or raise suspicion. For example, I am extremely wary of calculations that assume co-efficients of friction for a site, based on look up tables, many of which have emanated from other countries. Remember, I come from a background where measurement was 'king'. I do accept, however, that using available look up tables is better than say making a 'stab in the dark' at a co-efficient of friction if nothing else is available.

Similarly I am wary of the use of historical skid resistance data, where experts have assumed that skid resistance will continue to fall from the value obtained over time. This shows a lack of awareness of widely held concepts such as skid resistance (through it being a product of microtexture) tending to an equilibrium value, which then exhibits only seasonal variation, ie. the test value obtained may well be an equilibrium value.

With further experience, I have now concluded that my suspicions are largely down to the fact that I do not fully understand the protocols and objectives of investigators. I am certainly trying to take all opportunities available to close this gap in my professional knowledge, not least through preparing this joint paper and its accompanying presentation (debate). I certainly have a great opportunity to close the gap, both working, and regularly liaising, with some of Australia and New Zealand's finest and most respected Police and civilian crash investigators.

Whilst I accept some inevitability in that my expert witness investigations will focus on, and discuss, different aspects of an incident to the report of a 'pure' incident investigator / reconstructionist, I am convinced that there is surely much to be gained from the groups working more closely. Only then can we all fully understand and respect the underpinning objectives of each professional group's work during the course of a full investigation.

### **3. CRASH (INCIDENT) INVESTIGATOR (by Grant Johnston)**

Covered by general discussion.

### **4. DISCUSSION**

The conclusions from this paper will largely emerge from the presentation (in debate format) that will accompany this paper.

*Whilst every effort has been made to ensure that the material presented in this paper is relevant, accurate and up-to-date, the authors cannot accept any liability for any error or omission.*

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