Evaluating the success of the UK skid policy

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ABSTRACT

Twenty years after the introduction of Standards for aggregates used in road surfacing materials and for in-service skid resistance, it is clear that these approaches have been widely adopted and have produced a number of benefits, including better skid resistance and an acceptably low level of claims arising from slippery surfaces. However, benefits in terms of accident reduction have not been quantified adequately, and so it is difficult to assess whether the anticipated benefits of these Standards are being delivered in practice. This paper reviews the extent to which these Standards have been successful, and identifies a need for better information to be gathered to facilitate monitoring of in-service skid resistance and to support quantification of accident benefits.

1. INTRODUCTION

A Standard for the selection of aggregates used in new surface courses was introduced in the UK in 1976. In specifying resistance to polishing and abrasion, it aimed to provide surfacings that maintained adequate skid resistance and durability under traffic. It was followed, twelve years later, in 1988, by the introduction of routine monitoring and assessment of in-service skid resistance. Research carried out prior to the introduction of this Standard (summarised in the paper by Roe and Caudwell, 2008) suggested that accident savings as a result of implementing this policy would outweigh the costs by a factor of 5:1.

Both Standards applied to trunk (major) roads throughout the United Kingdom and updated versions of the same Standards are still in place today (HD36/06 and HD28/04). The approach they follow is essentially similar to that introduced twenty years ago. It is therefore relevant to assess the extent to which these policies have been successful. This paper reviews the indications of success, including accident benefits and identifies developments needed in the future.

2. MEASURES OF SUCCESS

By a number of counts, the policy has been successful:

Both Standards are still in force and are perceived to be delivering benefits in terms of providing adequate skid resistance and reducing the risk of skidding accidents occurring on wet roads.

The principles have been widely adopted by others, for example:

- SCRIM has become a widely used test method, with an established national Standard. Variations on the SCRIM concept have been adopted in a number of other countries and numerous other test devices have been developed to support research and routine monitoring.
- Many other countries in Europe and throughout the world now monitor skid resistance and include the results when assessing maintenance priorities, reflecting the acknowledged importance of skid resistance in providing a safe road network.
- The Code of Practice for Maintenance Management adopts a similar approach to HD28 for monitoring and assessment of skid resistance on local roads.
- Standards for managing skid resistance in Australia and New Zealand are based on HD28, with a simplified approach to site categories and Investigatory Levels.

The processes involved are robust, and have been embedded in pavement management procedures in the UK. In England, notable successes include:

- Introduction of annual surveys with an improved process for reducing the influence of seasonal variation on the results. Data is loaded onto a central pavement management system and Lane one surveys for more than 90% of the length of the main carriageways were loaded in 2007, up from 65%

(spread over a 3 year period) in 2000.

- Investigatory levels are set and site investigations are carried out on a more robust and consistent basis than ever before, supported by improved guidance (Highways Agency, 2007).

The skid resistance of the trunk road network has improved, since the introduction of the policy. The proportion of the English trunk road network at or below investigatory level has been relatively stable, at approximately 8% of the network, since centralised reporting of pavement condition was formalised in 2000.

Claims from road users arising from a slippery surface are minimal, and experience shows they can be defended providing there is evidence that the defined processes have been adhered to.

3. EVALUATING ACCIDENT BENEFITS

The successes listed in section 2 are notable, but do not address the wider objective, of reducing the likelihood of road users skidding on wet roads, thereby reducing the number and severity of accidents. A study carried out prior to introducing the in-service skid resistance Standard suggested that the costs associated with improving the skid resistance would be outweighed by the financial benefits deriving from accident savings, by a substantial margin (5:1). More recent research showed that the changes to the site categories and investigatory levels made in the 2004 update to the Standard would also result in net benefits, i.e. the cost of the treatment would be recovered via the resulting accident savings during the lifetime of the surfacing Parry and Viner, 2005).

However, it is currently difficult to assess whether or not these predicted benefits are being achieved in practice.

In general, the Highways Agency has shown good progress in reducing casualties on the English trunk road network, being broadly on course to meet the reductions in the numbers killed and seriously injured demanded by the Government's 2010 casualty reduction targets and showing good progress on the targets for reducing slight casualties and child casualties.

Table 1 compares the percentage of vehicles skidding on wet roads, taken from Government reports on STATS19 personal injury accidents (DoT, 1991 and DfT, 2007). It shows that the number of cars skidding on wet roads has decreased substantially since 1990, although the total number of cars involved in accidents has also decreased and the overall percentage of cars skidding has remained at a similar level. The percentage of motorcycles skidding has increased during this period, indicating that the number of motorcycles skidding has not fallen as much as the overall number of motorcycles. Conversely, the percentage of accident-involved HGVs that skidded has fallen since 1990.

Other evidence comes from a "before and after" study of accidents sections of the English trunk road network that had been resurfaced (Greene and Crinson, 2008). This shows that in the twelve months following resurfacing, the accident risk is similar

to or lower than before resurfacing, and there is a significant decrease in fatal accidents. This indicates that there could be net accident savings as a result of resurfacing. However, offsetting this benefit, there is evidence of a small, but statistically significant increase in accident risk in the initial 6 months after laying, which is associated mainly with accidents in dry conditions.

Table 1 Incidence of skidding in accident involved vehicles on wet* roads

	1990			2006		
	All vehicles	Skidding vehicles	% skidding	All vehicles	Skidding vehicles	% skidding
Car	114,288	23,285	20.4	85,572	17,307	20.2
Motorcycle	7,397	2,168	29.3	5,753	1,934	33.6
HGV	6,062	1,384	22.8	3,425	550	16.1

*wet or flood

Although the results above are encouraging, many different factors influence these trends, making it impossible to separate out the effect of the skid resistance policy from those of other initiatives. Previous efforts to encourage engineers to submit details skid resistance schemes to centralised databases such as MOLASSES[1] have not succeeded in gathering sufficient information to enable trends and benefits to be established.

However, a greater knowledge of the costs and benefits of intervention in different circumstances would support decisions about treatment priorities, allowing an informed balance to be reached between the safety benefits of treatment and the cost and disruption associated with maintenance, as well as the environmental costs associated with the use of aggregate supplies and energy. There is likely to be an increased focus on these decisions in future as a result of:

- The drive to minimise maintenance interventions to reduce user delays.
- Greater awareness of the need to manage skid resistance in local authorities and highway authorities across Europe, which is likely to increase demand on the demand for limited resources of polish-resistant aggregate.
- Higher traffic levels, and the probable introduction of more sections of traffic-controlled motorway. The influence of these effects on speed and road user behaviour could change the demand for friction by road users, and/or change the extent to which surfaces polish under the action of traffic.

Gathering better information to support the monitoring of in-service skid resistance performance as well as accident benefits where interventions are carried out is therefore a priority for the Highways Agency, looking forward. Typically, there are only a small number of accidents at individual sites, making robust statistical assessment impractical for individual cases, particularly given the need to control for

[1] A database of safety schemes, initially developed to assist local authorities assess the benefits of different types of scheme, but now superceded by the UK-Morse database

the effect of the sites having been selected on the basis of an elevated prior accident history. However, by aggregating over a sufficiently large number of interventions, it has been shown that meaningful conclusions can be reached in before and after studies (for example Greene and Crinson, 2008).

The requirements for improved record keeping set out in the recent advice to service providers (Highways Agency, 2007) forms the first step in improving the assessment of benefits, and will be further developed as the specification of a future Integrated Asset Management Strategy is shaped. The quantification of accident benefits that this will allow could allow the objective of the policy to be defined in greater detail. At present, the objective specified in HD28 is to "manage the risk of skidding accidents in wet conditions, so that the risk is broadly equalised across the trunk road network." In future, it may be possible to define this more precisely in terms of accident reduction, setting a target against which improvements can be monitored.

4. SUMMARY

Twenty years after the introduction of Standards for aggregates used in road surfacing materials and for in-service skid resistance, it is clear that these approaches have been widely adopted and have produced a number of benefits, including better skid resistance and keeping claims arising from slippery surfaces to an acceptably low level. However, benefits in terms of accident reduction have not been quantified adequately, and so it is difficult to assess whether the anticipated benefits of these Standards are being delivered in practice. Gathering information to allow better monitoring of in-service skid resistance and to support quantification of accident benefits is therefore a future priority for the Highways Agency.

5. REFERENCES

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