

Short Communication

Impact speed of heavy goods vehicles

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Abstract

Hazard assessment of the transport of hazardous materials sometimes creates a requirement for data on the impact speed of a vehicle at the moment of collision. Information has been obtained from tachographic records for heavy goods vehicles involved in accidents and data are presented on the individual accidents and on the distribution of impact speeds.

Introduction

In the hazard assessment of the transport of hazardous materials there is sometimes a requirement to estimate vehicle impact speeds. High quality data on such impact speeds are not easily obtained, but the advent of tachographic records provides an opportunity to obtain improved data. This note presents some data on impact speeds of heavy goods vehicles (HGVs) obtained from such records.

Tachograph records

Tachograph charts were introduced in Britain in 1974 and became compulsory for heavy goods vehicles in 1981 [1,2].

The data given by a tachograph record of a vehicle are the time, the speed and the distance travelled. Tachograph analysis [3] has become an integral part of accident investigation and is performed by specially trained police and forensic science personnel. The data provided by the recordings are often used as evidence in court cases, supplementing eyewitness accounts and information collected at the scene of the accident.

In Britain tachograph analysis was first introduced by the Metropolitan Police Forensic Science Laboratory (MPFSL) [4]. Consequently reports for earlier years cover incidents in various parts of the country. With the growth of other centres undertaking tachograph analysis the reports for later years are for London only.

Impact speeds

With the assistance of the MPFSL some 110 tachograph-based reports for HGVs covering the period 1978 to 1982 have been analysed. The results of the analysis are shown in Tables 1–3 and Fig. 1.

A tachograph record shows the variation of vehicle speed with time. The

TABLE 1

Impact speed of heavy goods vehicles: all accidents^a

Impact speed (mph)	Type of accident ^b	No. of accidents
<i>A Built-up areas</i>		
0-9	3F/MCS	4
10-19	3H; A; 2SVA; MCH; PC; 2PED	10
20-29	2H; 7F; S; 9SVA; MCS; 2PED	22
30-39	H; 6F; S; 4A; 2SVA; MCH; PC; 3PED	19
40-49	H; 3F; A; 4SVA; 2PED	11
50-60	2F	2
> 60		
Total		68
<i>B Outside built-up areas</i>		
0-9	S; SVA	2
10-19	H; S; 3SVA	5
20-29	A; 2SVA	3
30-39	2H; F; R; A; 2SVA; PC	8
40-49	3H; 5F; A; SVA; PC	11
50-60	2F	2
> 60	F	1
Total		32
<i>C Motorways</i>		
0-9		
10-19		
20-29	H; F; MCR	3
30-39	H; SVA	2
40-49	2F; SVA	3
50-60	F; R; 2SVA	4
> 60	SVA	1
Total		13

^aObtained from tachographic records.

^bKey to accident type is as follows: A, accident (impact position not known), F, frontal impact of HGV on another vehicle (other than head-on collision), H, head-on collision with another vehicle, MC, collision with motor cycle, PC, collision with pedal cyclist, PED, collision with pedestrian, R, impact of another vehicle into rear of HGV, S, impact of another vehicle into side of HGV, SVA, single vehicle accident.

TABLE 2

Impact speed of heavy good vehicles: vehicular collisions

Accidents ^{a,b}						
Impact speed (mph)	Built-up areas		Outside built-up areas		Motorway	
	Type	No.	Type	No.	Type	No.
0-9	3F	3	S	1		
10-19	3H; A	4	H; S	2		
20-29	2H; 7F; S	10	A	1	H; F	2
30-39	H; 6F; S; 4A	12	2H; F; R; A	5	H	1
40-49	H; 3F; A	5	3H; 5F; A	9	2F	2
50-60	2F	2	2F	2	F; R	2
> 60			F	1		
Total		36		21		7

^aExcluding accidents with motorcycles.

^bFor key to accident type see Table 1.

TABLE 3

Impact speed of heavy goods vehicles: single vehicle accidents

Accidents ^{a,b}						
Impact speed (mph)	Built-up areas		Outside built-up areas		Motorway	
	Type	No.	Type	No.	Type	No.
0-9			SVA	1		
10-19	2SVA; 2PED	4	3SVA	3		
20-29	9SVA; 2PED	11	2SVA	2		
30-39	2SVA; 3PED	5	2SVA	2	SVA	1
40-49	4SVA; 2PED	6	SVA	1	SVA	1
50-60					2SVA	2
> 60					SVA	1
Total		26		9		5

^aIncluding accidents with pedestrians.

^bFor key to accident type see Table 1.

trace for the last few seconds leading up to the accident will usually show the normal speed, followed by an interval of deceleration, and then a vertical line dropping straight down when impact occurs. The impact speed is the speed at the time when this vertical drop occurs. The impact speeds quoted in the tables are the best estimates of the investigators of the particular incident, typically determined in this way.

The data presented are considered to be a biased sample, because each report

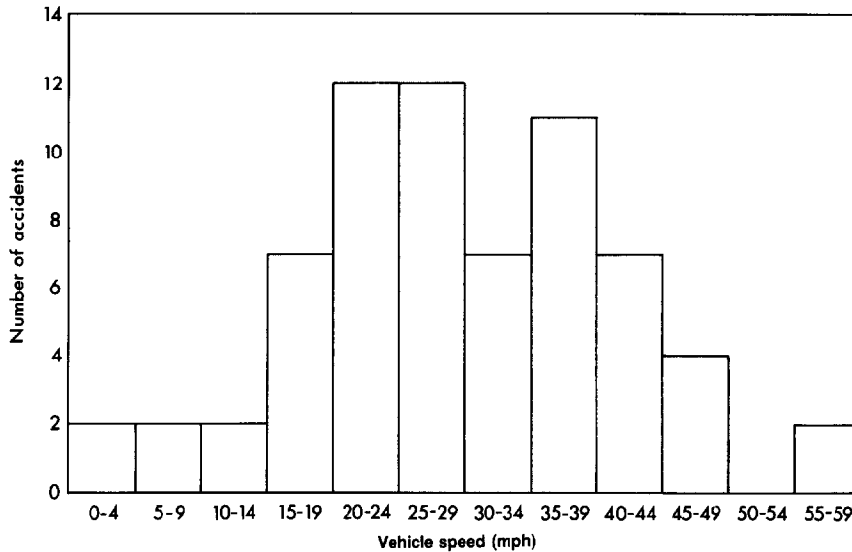


Fig. 1. Impact speed of heavy goods vehicles in built-up areas (from tachographic records).

is part of an accident investigation which involves some combination of a serious casualty, police inquiries and court proceedings. It may be expected that this sample will have rather higher speeds than the overall population of impacts from which it is drawn.

Table 1 presents the impact speeds in HGV accidents, obtained from the tachograph records, by road type and accident type. Tables 2 and 3 give further breakdowns of the data in Table 1 for accidents involving more than one vehicle and for single vehicle accidents, respectively. Of particular interest are impact speeds in built-up areas where the consequences of an accident, in terms of the population at risk from release or reaction of hazardous materials, are likely to be more serious than in less populated areas. The maximum impact speed recorded in a built-up area was 57 mph (90 km/h). Impact speeds in built-up areas are plotted as a histogram in Fig. 1.

Conclusions

The study provides some useful, but limited, data on vehicle impact speeds. There is need for a fuller study based on a larger and less biased sample and, in particular, for more data on the higher impact speeds in built-up areas. For many assessments this is the crucial information. Better data in this region would allow statistical methods for the tail of a distribution to be applied with greater confidence.

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References

- 1 Regulation (EEC) 1463/70, OJ L164/1, 27.7.70; amended by 1787/73, OJ L181/1, 4.7.73 and by 2828/77, OJ 334/5, 24.12.77.
- 2 The Passenger and Goods Vehicles (Recording Equipment) Regulations 1979, HM Stationery Office, London.
- 3 R.F. Lambourn, The analysis of tachograph charts for road accident investigation, *Forensic Sci. Int.*, 28 (1985) 181.
- 4 R.F. Lambourn, Metropolitan Police Forensic Science Laboratory, personal communication, 1988.