

HEAVY VEHICLE INSPECTIONS IN NEW SOUTH WALES

by Michael Paine and Rodney Vaughan
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HEAVY VEHICLE INSPECTIONS IN NSW

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INTRODUCTION

This paper covers the origins of the Heavy Vehicle Inspection Scheme and describes the equipment in use at the DMT's vehicle inspection stations. It also reviews some of the results achieved, and how the effectiveness of the scheme can be measured.

The scheme involves the annual inspection of heavy vehicles by Department of Motor Transport inspectors instead of relying on the annual inspection at licensed garages - "authorised inspection stations". The vehicles involved are those trucks which weigh 5 tonnes or more unladen, trailers which weigh 2.5 tonnes or more unladen, and any prime mover or semi-trailer. There are approximately 57,000 of these vehicles registered in NSW. About 10,000 buses and other public vehicles are also inspected twice a year under the scheme.

ORIGINS OF THE SCHEME

The Heavy Vehicle Inspection Scheme had its origins in a series of fatal crashes where vehicles which were supposed to have just passed authorised inspection station inspection suffered a failure of an item which should have been checked and which resulted in a crash. Analysis of crash data showed that brakes, steering or suspension system failures were four times more likely to be involved in a fatal crash with a heavy vehicle than in those crashes involving other vehicle types. The figures also demonstrate a dramatic rise in crash involvement with increasing weight. The 5 tonnes cut-off was chosen as the point at which the increased crash involvement becomes marked. There are of course several reasons possible for this increased involvement; the most obvious one being the increased usage of these vehicles on the road. But there are also other reasons - the increased mechanical complexity of these vehicles over lighter vehicles means there are more opportunities for things to go wrong. The lack of maintenance in certain sectors of the industry also guaranteed things would go wrong.

When the first crashes occurred back in 1979, the DMT put together a scratch team of vehicle inspectors to do some urgent random checks of trucks. We found that about two thirds of the trucks inspected had faults of some description and about a quarter had serious faults - including dangerous items such as disconnected brakes, steering held together with fencing wire. This led to the creation of the Mobile Inspection Division (MID), a group of 10 teams of inspectors who do random inspections on an on-going basis. Following the introduction of the MID, the incidence of major and extremely dangerous defects reduced from a quarter to about 1 in 15. Although this was a major improvement, it was still not satisfactory - just think about it - for every 15 trucks which a motorist encounters on the highway, one is likely to have defects which could readily lead to a crash.

The random inspection programme clearly identified the fact that the Authorised Inspections Station (AIS) Scheme simply doesn't work for large commercial vehicles. There are several reasons for this. Perhaps the most important reason is the conflict of interest experienced by the operator of an AIS. The truck owner is usually a valued customer who buys considerable quantities of fuel and services. If the AIS operator puts the vehicle off the road, the owner not only has to pay for the cost of repairs but of course the vehicle isn't earning. That in turn puts the custom of the truck owner to the AIS at risk.

A second important reason, though probably of lesser significance, is the fact that many AIS simply do not have qualified and practised inspection staff experienced with heavy vehicles. They simply do not have enough practice at inspecting vehicles so that with the best will in the world they are still less able to do a good inspection.

It should be pointed out at this stage that the majority of truck operators and AISs do take a responsible attitude towards vehicle maintenance. It is evident, however, that the AIS Scheme is not effective in the case of heavy vehicles - particular those belonging to the less scrupulous operators.

OPERATION OF THE SCHEME

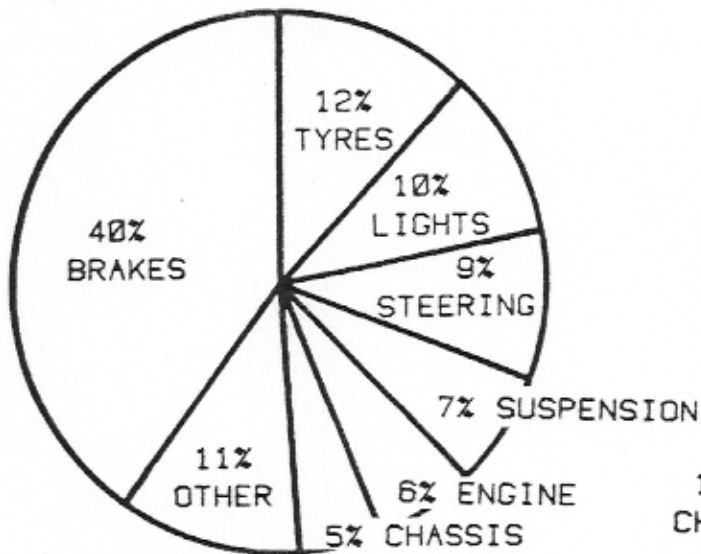
The Heavy Vehicle Inspection Scheme basically operates at three levels. Firstly, the random inspection programme will continue. Secondly, in the major metropolitan centres of Sydney (at Wetherill Park and Botany), Newcastle and Wollongong routine inspections are conducted at full-time inspection sites with specialised inspection equipment. Thirdly, in the rest of the State the routine inspections are conducted on an itinerary basis where teams of vehicle inspectors travel to an itinerary around parts of the State and conduct inspections at leased premises. All routine inspections are arranged by appointment. Vehicle owners are notified with plenty of warning that an inspection is due and are invited to telephone a booking service where they can book in a particular time and location for inspection. This minimises the inconvenience and cost to vehicle owners.

RESULTS OF INSPECTIONS

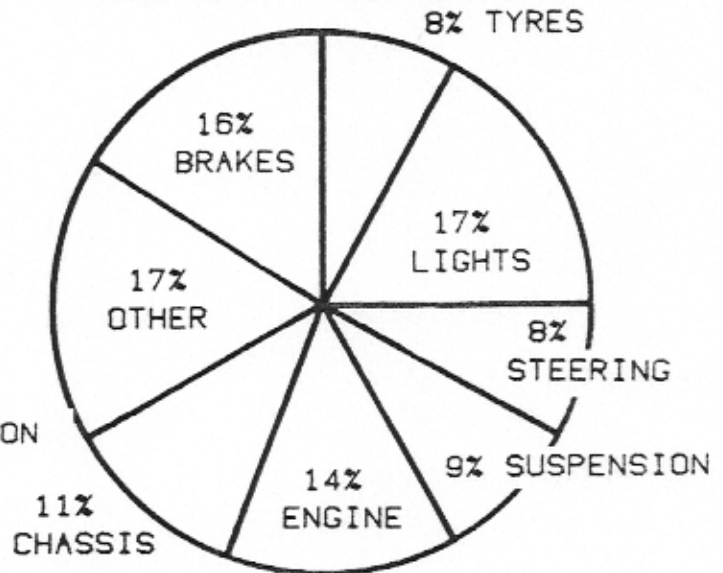
It was mentioned earlier, that following introduction of random inspections in 1979 the serious defect rate for roadside inspections dropped from 25% to 7%. Some other pertinent inspection results are:

- (a) About 3% of public vehicles (buses, taxis etc.) have serious defects, including some related to public vehicle operation such as missing fire extinguishers and faulty taximeters. These vehicles have undergone routine DMT inspections for many years.
- (b) In the first year of HVIS, about 6% of trucks undergoing prearranged routine inspections have serious defects. This is generally the first time such vehicles have undergone a DMT inspection and it tends to indicate a lack of knowledge, amongst operators, of proper maintenance practices.
- (c) It is typical for about 8% of vehicles registered in other States to have serious defects. Victorian trucks are generally worse, with about 14% having serious defects. These vehicles do not undergo any regular inspections - either by Government or private agencies.
- (d) The most common faults are in braking systems (18% of all defects and 40% of serious defects). Based on roadside inspection results, 1 in 30 trucks has serious braking defects.

SERIOUS DEFECTS



MINOR DEFECTS



COST/BENEFIT CONSIDERATIONS

There have been complaints about the relatively high inspection fees (\$60 for a truck, \$95 for an articulated vehicle). However, the scheme has been established on a cost recovery basis and the income from fees is designed to match long-term expenditure, including repayment of loans for capital works, the purchase of specialised vehicles and equipment and the cost of the MID random inspection programme. In country areas, the costs of leasing part-time inspection sites and travelling expenses for motor vehicle inspectors are high.

The annual cost of the scheme is \$4.4 million. This is distributed as follows:

Ongoing random inspection programme	18%
Salaries and overheads for routine inspection	39%
Travel expenses, site rentals and vehicle operation	9%
Other operational costs (maintenance, phones, data processing etc.)	13%
Interest and loan repayments on capital expenditure	21%

A major difficulty with assessing the effects of the scheme, or indeed of most countermeasures, on traffic accidents in NSW is that these effects are only expected to be small. The effects generally get swamped by natural variations and major countermeasures (such as random breath testing).

By way of comparison, the introduction of compulsory wearing of seat belts led to a 20% reduction in occupant fatalities - the second most effective counter measure ever introduced (random breath testing has been the most effective). Yet, in a statistical sense, the effect of the seat belt initiative was barely significant. Other statistical methods, which take into account the effects of other factors are being investigated, together with surrogate measures, such as the improved condition of vehicles during random inspections.

Although the effects are expected to be small, they only need to be small in order for the scheme to be cost-effective. It is conservatively estimated that the overall cost to the community of heavy vehicle crashes in NSW is \$136 million per year (Appendix A). The annual administrative costs of HVIS represent about 3% of this figure. Mechanical failure was implicated in 7% of the 4,600 heavy vehicle crashes which occurred in 1983. Due to the recording methods, this rate is likely to be an underestimate. Overseas research involving detailed investigations of crashes indicates that the actual contribution of mechanical faults is much higher - of the order of 10% to 15%. It can be seen that the cost of HVIS is well within the range of potential savings resulting from a reduction in crashes involving mechanical defects.

There are also secondary savings resulting from improved vehicle maintenance such as increased vehicle life and reduced "down-time" which tend to offset the cost, to vehicle owners, of presenting vehicles for inspection. This is confirmed by European heavy vehicle operators who have had many years of experience with annual government inspections.

INSPECTION TECHNOLOGY

Wetherill Park and the other new inspection facilities incorporate the lessons learnt in other inspection systems used in various parts of the world. In particular, considerable development of inspection technology has taken place in some western European countries - Germany, Belgium, Sweden, Britain and also in Japan. Over the past five years the DMT has established close contact with inspection authorities in these countries. Within our needs and resources, the best features of their systems - both building layouts and choice of equipment - have been built into Wetherill Park and our other Stations.

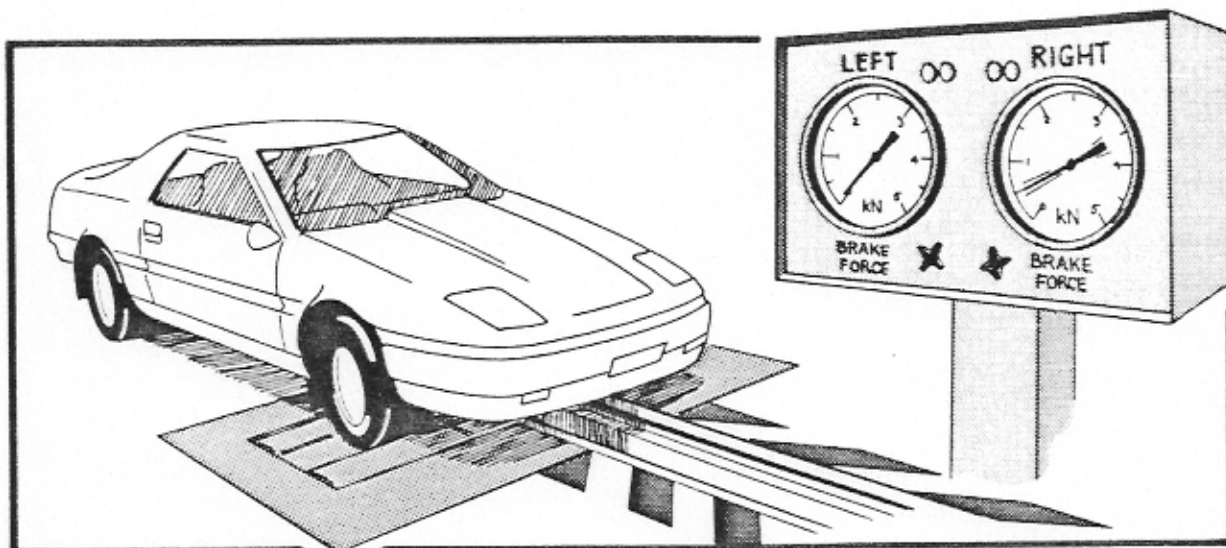
The basic stages of vehicle inspection are brake testing on a roller brake testing machine, suspension and steering checks using a powered suspension play detection system, underbody checks, and lighting checks. The most important two items of equipment not widely used previously in Australia are the roller brake testing machine and the suspension play detection systems.

ROLLER BRAKE TESTING

Up until now, brake tests have consisted of firstly observing the movement of actuators and other components to check that all brakes apply and secondly conducting a low-speed road test to measure peak deceleration. These methods tell us nothing about the actual braking force achieved at each wheel.

Roller brake testing machines have been in use in Europe and Japan for many years. These machines measure braking force on individual wheels and allow the following problems to be detected:

- excessive brake drag
- inoperative or inefficient brakes
- imbalance of braking forces on any one axle



In addition the machines can be used to detect out-of-round brake drums, defective load proportioning valves and other servicing problems. In fact, roller brake testing machines have a wider application in the vehicle servicing industry than in routine inspections.

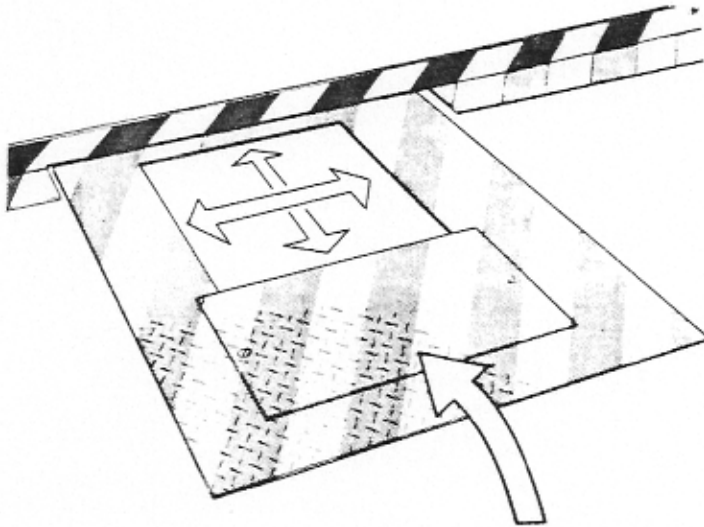
Considering the overall investment that most fleet operators have in their vehicles, the installed cost of around \$30,000 for a roller brake testing machine seems a worthwhile investment. Many European operators routinely check their vehicles with a roller brake testing machine as they leave the depot for a major journey.

SUSPENSION PLAY DETECTION

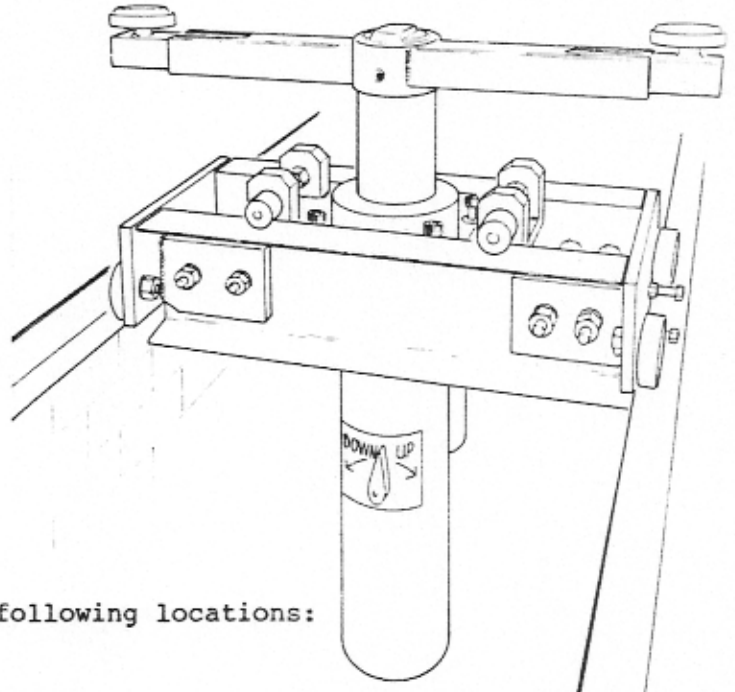
Wear in steering and suspension components has traditionally been checked by jacking each wheel and attempting to detect movement by manually applying forces to the wheel (for example, with a pinch bar). Many crucial suspension components can only be readily observed from underneath the vehicle therefore there is a strong possibility that excessive wear in these components will go unnoticed.

The suspension play detection system was developed to overcome these difficulties. It consists of power-operated metal plates mounted on each side of an inspection pit. The wheels of a vehicle under test are placed on the plates. A pit-mounted jacking system is used to relieve some of the loads on the suspension components, then using a hand-held switch which is built into a lamp the inspector causes the plates to move in either a transverse or longitudinal direction for about 50mm. This loads and unloads various suspension and steering components, enabling excessive wear to be observed.

Suspension play detection machines are intended primarily for checking front axles. However, they have also proved very effective for other axles - especially multi-axle groups of trailers. Some of the common faults observed are excessive movement in steering joints, worn king-pins, axle locating rods and spring shackles, defective wheel bearings and insecurely mounted brake components.



Air cylinder housing cover




This equipment has been installed at the following locations:

- Botany Vehicle Inspection Station
- Wetherill Park Vehicle Inspection Station
- Carrington (Newcastle) Vehicle Inspection Station
- Unanderra (Wollongong) Vehicle Inspection Station
- Campbelltown Motor Registry
- Wagga Wagga Motor Registry
- Nowra Motor Registry
- Tweed Heads Motor Registry
- Hornsby Motor Registry
- Penrith Motor Registry

"PASS" LABEL & CERTIFICATE

Note label is aligned to indicate an April inspection (4th month)



	No 000245
VEHICLE No	<input type="text"/>
WAS INSPECTED ON	<input type="text"/>
AND FOUND TO COMPLY WITH PRESCRIBED REQUIREMENTS	
_____ Signature of Inspector	

APPENDIX A

COST OF HEAVY VEHICLE CRASHES

REFERENCES: Federal Office of Road Safety Report
 "The Cost of Road Crashes", 1984
 NSW traffic accident statistics for 1983

The Office of Road Safety (ORS) estimates that the overall cost to the community of traffic crashes is:

\$300,000/crash where a fatality occurs
\$ 67,000/crash where a major injury occurs
\$ 8,000/crash where a minor injury occurs
\$ 1,900/crash where only property damage occurs

These categories do not agree entirely with the categories recorded for NSW traffic accidents (fatal accidents, casualty accidents and tow-away accidents). In any case, the ORS estimates are for a typical crash. Heavy vehicle crashes are likely to be more severe than average. In the circumstances, the following figures should provide a conservative estimate of the cost of heavy vehicle crashes.

\$300,000 for a fatal crash
\$ 50,000 for a casualty crash
\$ 2,000 for a tow-away crash

In 1983 there was a total of 4,621 heavy vehicle crashes. 157 (3.4%) were fatal, 1,676 were casualty crashes and 2,788 were tow-away crashes.

157 x 300,000 =	\$ 47,000,000
1,676 x 50,000 =	\$ 83,800,000
2,788 x 2,000 =	\$ 5,576,000
Total cost	<u>\$136,376,000/year</u>

Note that the value used for a tow-away crash is likely to be an underestimate for a typical heavy vehicle crash. A value of \$10,000/tow-away crash would increase the total to \$158,680,000.