

Periodic Vehicle Inspection of cars (MOT)

Summary

The Periodical Vehicle Inspection (MOT) was introduced in the Netherlands during the 1980s. This fact sheet discusses the legal framework of the measure and the studies of its effects that have been carried out, also in a European context. Results of studies of the technical condition of cars when inspected and of cars involved in crashes were reviewed. The effect of correct tyre pressure and the contribution of the MOT to road safety are also examined.

Background

The MOT has had a long history in the Netherlands. About 20 years before its introduction, plans were already being made. Besides its safety effects and costs, the role of the various interested parties was studied. Among them were the Vehicle Technology and Information Centre RDW, the Royal Dutch Touring Club ANWB, and the Dutch Branch Association BOVAG. In 1974 a parliamentary bill which proposed that only independent bodies should be allowed to carry out inspections was defeated. A bill which also permitted regular garages to carry out inspections was passed in 1977. This gives the Netherlands rather a unique position within the European Union.

What are the legal requirements?

From 1978, the Dutch law distinguishes two types of MOT; one for 'heavy' vehicles (MOT 1) and one for 'light' vehicles (MOT 2). Both types of MOT could only be carried out by garages using qualified inspectors and which are approved by RDW. It was also determined that random checks would be made of the inspections. The sample size for light vehicles was set at 3%. In 1981 the MOT 1 for lorries was phased in, followed in 1985 by a phased introduction of the MOT 2 for cars.

The EU Directive 77/143 EEC entitled *Roadworthiness tests for motor vehicles and their trailers* from 1977 set a framework for the MOT frequency. The first inspection of a car must be carried out no longer than four years after its initial admission on the road. Then it has to be repeated within a maximum of every two years until the end of the vehicle's life duration (4-2-2-2, etc.). Until 1 January 2008, the Netherlands used a stricter schedule of 3-1-1-1. Since 2008 the standard schedule for the MOT 2 in the Netherlands is 4-2-2-1-1. Vehicles more than 8 years old must therefore still be inspected annually. Vehicles on LPG or diesel must undergo their first inspection after three years, followed by annual inspections. The reason for the different inspection schedule is the fact that these vehicles tend to have a higher annual mileage than vehicles with a petrol engine. Lorries and buses must be inspected annually from the beginning.

The inspection requirements were consolidated in the more recent EU Directive 96/96/EEC. Both the EU guidelines and the Dutch national legislation specify in detail which function groups and parts of a car should be checked during periodic testing. Most important are the road safety aspects, like for example properly working lights, brakes, steering, tyres, and exhaust system. Visual inspection is the most used tool here. Limits have been set for the emission of exhaust fumes to control air pollution, and fixed procedures are used to measure the emission.

Seeing as the vehicle documents and pollution aspects are also checked during an MOT, it can be argued that the MOT is more than just a safety inspection.

What is the technical condition of cars at the MOT?

Technical defects are seen as potential causes of crashes. The MOT 2 aims at reducing this potential danger to acceptable proportions. That is why we should know which types of defects result in rejection, and the numbers of such rejections. The percentage of recorded rejected vehicles is small in the Netherlands, which makes it impossible to know what types of technical defects are the cause. The small percentage of rejected cars is the immediate result of how inspections are conducted in the Netherlands: a combination of a major or minor check-up and the MOT, in which the MOT is free of charge. During the service, defects deserving rejection- are repaired and, thus rejection is prevented. Inspections by companies that do not carry out repairs themselves are exceptions to this procedure.

In October 2006, BOVAG, the Dutch Car Industry RAI, and the Dutch Traffic Safety Association made a study of the rejection percentages at inspection companies that do not carry out repairs themselves (BOVAG, RAI, & VVN, 2006). This report was based on 10,322 inspected vehicles and the rejection percentages were 21% for 3-year old cars and 28% for 5-year old cars, and the percentage goes up to almost 65% for cars of 15 years old and older (see *Figure 1*).

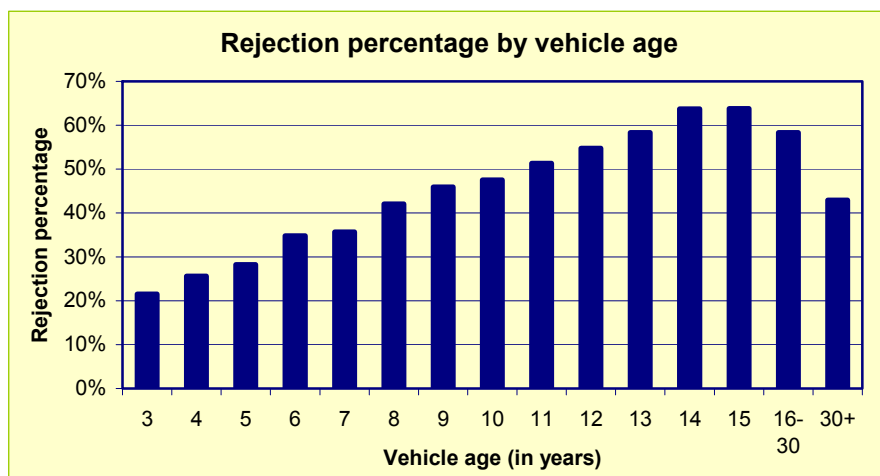


Figure 1. *The rejection percentage of 10,322 inspected vehicles in the July-October 2006 period by vehicle age. Source: Van Abeelen neutral inspection stations.*

DEKRA (2005) has slightly higher percentages for Germany of 28%, 36%, and 75%. According to these reports both countries show a strong increase in rejection percentages as the cars get older.

What is the technical condition of cars involved in crashes?

The Netherlands has no systematic data about the technical condition of cars that were involved in crashes. For this data we need to go abroad, to Germany in particular, where independent inspection stations, which do not repair, also carry out crash studies. This is done by, among others, the earlier mentioned DEKRA.

In 2000, DEKRA (2005) studied 15,809 crashes and observed that in 5% of these the direct cause was a technical defect. In 4% of the cases a technical defect was one of the causes, and in another 4% a technical defect was probably the cause. This report shows that 24.6% of the vehicles involved in a crash had serious defects and, in 24% of these, the vehicle defects were considered to be the cause of the crash. 45% of these crash causes could be blamed on brakes, 23% on tyres, and another 25% on suspension. The study showed that 35% of the tyre defects were due to bad maintenance by the motorist, a too low tyre pressure being one of the causes.

Making calculations with the above percentages i.e. 24% of 24.4%, shows that in 6% of the crashes, serious vehicle defects were considered to be the cause or main cause. This percentage is very similar to the percentage SWOV determined in the 1980s on the basis of 1970s international literature (Tromp, 1985). Nor have there been large changes in the subdivision by type of vehicle defect. Tromp also observed that nearly half of the crashes with a vehicle defect as cause had defective brakes and about a quarter had faulty tyres. As mentioned previously, according to DEKRA these percentages were 45% for brakes, i.e. 3% of all crashes at the most, and 23% for tyres, i.e. 1.5% at the most.

What is the effect of correct tyre pressure?

In the Netherlands the importance of correct tyre pressure has been made part of an ecodriving programme called The New Driving Force. This programme promotes a driving style that is good for the environment, fuel consumption, and road safety (Het Nieuwe Rijden, 2006). The importance for road safety is due to a better grip on the road, which limits the number of skid crashes and reduces the braking distance and therefore the number of rear-end collisions.

Checking the tyre pressure has been part of the Dutch MOT 2 since 2009. As the tyre pressure should really be checked every month, this addition to the annual MOT is not likely to be very effective. It is much more efficient if the driver not only checks the tyre pressure monthly, but if he also were to be automatically warned if the pressure is too low. An automatic warning system has been mandatory in the United States since 2008. In the decision making process towards its introduction, considerations concerning the benefits of environment, fuel consumption and tyre wear were made in addition to the safety benefits. Both for road safety and for the environment it is desirable that an automatic warning system is made compulsory for the European market. The question is: just how large really is the safety effect of an automatic warning system.

In the United States the automatic tyre pressure warning system was seen to have a positive effect on road safety. Based on a somewhat older USA crash study it has been calculated that an automatic warning system can be expected to have a safety effect of 0.8% fewer road deaths. In the United States with more than 32,000 road deaths per year this amounts to an annual saving of more than 250 road deaths. By way of comparison; the Netherlands has about 400 road deaths in car crashes per year so that a 0.8% saving would amount to three road deaths per year.

The road safety effect of correct tyre pressure can also be estimated using more recent DEKRA data for the German situation (see the previous section). If we assume 6% of crashes to be caused by serious vehicle defects, of which about 1.5% are tyre defects, a third of these at the most would be due to low tyre pressure, which is 0.5% of all crashes. This percentage is somewhat lower than the effect found in the USA. It may be assumed that such a percentage of 0.5% would also apply to the Netherlands because of the similarity of the technical condition of the car stock at the time of MOTs with the German situation.

Has the MOT had an effect on the development of crashes?

International research gives a varied picture of the MOT's road safety effect, ranging from positive to none at all.

According to DEKRA (2005), an MOT was introduced in Texas in 1999; since then the percentage of crashes caused by technical defects has decreased from 12% to 4% of the total number of car crashes.

In Norway, which also has an MOT, Fosser (1992) measured the effectiveness by inspection frequency. The vehicles that were used for the measurement were inspected annually, once every three years, or never. No difference in crash involvement was found between the three groups.

A recent report in Norway by Christensen & Elvik (2007) showed that the percentage of technical defects had decreased strongly for MOT 2, but that, contrary to expectation, there was no effect on crash involvement.

In Auckland, New Zealand, Blows et al. (2003) carried out a similar study, which showed that vehicles which were not regularly inspected were significantly more often involved in fatal or severe injury crashes.

This is indeed a varied picture. SWOV sees no reason to revise its conclusion of 1985: the safety effect of the MOT is not to be estimated as being large, but rather 'too small to measure' (Tromp, 1985). Also then it had already been determined that with 2 to 6% the contribution of technical defects to crashes occurring was limited. Only very few of these could be prevented by the MOT: there are also defects, whether or not of inspected parts, that occur in between two MOTs. SWOV did not further specify these 'very few' in terms of a percentage, but would now estimate this at several tens of percentage points. The results of the effect study that was carried out by CITA (2007) is worth mentioning here. The average contribution of vehicle defects to the occurrence of crashes was put at 5.8%. This is quite similar to the previously mentioned DEKRA study (2005) from which a contribution of approximately 6% can be derived. The CITA/Autofore study assumed that if an inspection every two years was replaced by an inspection every year for older cars which have many more defects, the contribution of vehicle defects to crashes would be reduced by 60%.

What is the effect of developments concerning the MOT and the technical condition of cars?

Over the years, the technical condition of cars has improved. This can be concluded from the longer manufacturers' warranty periods and from the lesser number of check-ups now advised by the manufacturers; some car brands advise a reduced frequency of only 30 000 kilometres, irrespective of the vehicle's age.

An average annual distance driven of approximately 16 000 kilometres therefore means that these days a passenger car only needs to go to the garage for maintenance once a year or once every two years. As since 2009 most cars only need to be MOT-tested once every two years, the periods that a car does not visit a garage have become longer.

Also concerning corrosion the technical condition of cars has improved in recent years. German data shows that technical defects found during the MOT often concern parts that are subject to wear, for example lights, brakes and tyres. These parts are also excluded from the warranty when normal wear is concerned.

For a long time now, SWOV has supported monitoring the status of wear-sensitive parts on which an MOT can only give a momentary judgement by continuous signalling of in-built sensors and detectors (Tromp, 1985). One can think of brake lining, brake pads, and brake discs, light bulbs, and tyre tread depth. This has already been realized for some of these parts.

Will there be any more changes in the MOT?

From May 2009 the test requirements for the MOT 2 have been extended to include the proper functioning of the warning lights for the airbags and the seat belt tensioners in addition to the tyre pressure. Furthermore, the proper functioning of the adjustment and the washing system is checked for cars with xenon headlights. RDW and BOVAG have announced that in 2010 the MOT will be updated further by including onboard computers, anti-locking devices and other electronic systems.

Also the car manufacturers aim at well-functioning instruments which are mutually cooperative and as a check installs intelligent devices, for which the term 'onboard diagnosis' (OBD) is used. While servicing the car, the dealer will often use the information stored inside these devices, which of course requires detailed brand knowledge. It will therefore be difficult to incorporate such devices in the MOT tests. Since 2009, OBD may be partly used in MOTs; this is the case for the exhaust fumes.

Conclusion

The percentage of vehicle defects that cause or contribute to crashes has hardly changed since the 1970s. According to a SWOV literature study in 1985, this referred to 2-6% of all crash causes. According to the most recent German studies, this is nowadays about 6% of all crashes. The question about which proportion of these can be prevented by the MOT cannot be answered precisely because of the lack of scientific evidence. In SWOV's opinion this could be several tens of percentage points. The CITA study claims a reduction of 60% for a specific target group of older cars.

Nowadays, cars are standard fitted with a whole range of electronic systems some of which are of direct safety importance and some of which can even intervene autonomously. After the updates of 2009 and 2010 the MOT now also investigates these electronic systems.

Recommendation

An annual MOT or an MOT once every two years only gives a momentary survey of a cars technical condition. It is SWOV's opinion that it would be preferable if those vehicle defects that affect safety were to be detected by in-vehicle systems continuously. This is a sustainable way of checking which warns the driver if necessary.

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