

Motorcycle manoeuvres review: the feasibility and safety implications – phase 1

Abstract

In June 2010, the Road Safety Minister announced a review of the practical motorcycle test, with the aim of devising a single-event test that is carried out on the road as far as possible. This study is the first stage in assessing the feasibility and safety of carrying out a revised set of manoeuvres for the motorcycle test. Care should be taken in interpreting these findings, and they should be considered alongside the later phases. In this first phase of the research, off-road locations were 'mocked-up' to resemble real roads in terms of marking the centre line and the edges of the carriageway. On this mock-road area, 'test ready' learner riders rode through the revised set of manoeuvres being proposed for potential on-road use, and through the existing module 1 manoeuvres on a separate layout. In this way it was possible to draw direct comparisons between the two sets of manoeuvres.

Main findings

- The revised manoeuvres, with the exception of the figure of 8, appear to be feasible, practicable and sufficiently safe to proceed with the second phase of testing revised manoeuvres on real roads with expert riders.
- Examiners rated their workload as significantly greater when examining the mock road versions of the ridden u-turn, the slalom, the figure of 8, the emergency brake and the hazard avoidance, in comparison with the module 1 versions of these manoeuvres. Higher workload was attributed to the physical and cognitive demands of marking out these manoeuvres using portable mats and examining in a mock-road environment.
- Learner riders were more likely to receive faults on the mock road versions of the figure of 8, emergency brake, and hazard avoidance manoeuvres, when compared with the module 1 versions.
- Examiners were generally inconsistent when estimating learners' speeds. When extrapolated to a test situation, the outcome would be an unacceptable number of incorrect pass or fail decisions (13-36%). An objective method of speed measurement appears necessary if on-road testing of the high-speed manoeuvres is to be attempted.
- On average, mock road manoeuvres took 13 minutes 34 seconds, in comparison with around 10 minutes for the current module 1 test. This includes set-up of all the manoeuvres and all briefings. Set-up times would be reduced with the use of alternatives to the portable mats, such as permanent paint on the road, although the effect of traffic on test timings is still to be explored.
- Having the road clear of traffic for the duration of each manoeuvre is essential and requires a good line of sight; assuming at least some traffic will travel at 35mph on 30mph roads, and that examiners must pay attention to the candidate for the duration of the manoeuvres, most of the manoeuvres could require between 250-376 metres of clear space in both directions to ensure that each manoeuvre can start and complete without interruption.
- Training for the mock road manoeuvres was rated by trainers as more difficult than for module 1, with the exception of the manual handling and slalom manoeuvres, which were rated as easier. Overall, trainers said that they would continue to train learners off-road, and would only progress to training some manoeuvres on road, in accordance with learners' abilities, safety and legality.
- The initial risk assessment identified several 'zones' where control measures would be required to mitigate some of the identified risks if the revised manoeuvres were to be examined on real roads.

Background

The current practical motorcycle test in Great Britain is modular, with the first of two modules testing candidates' ability to control their motorcycle in an off-road area during a series of low and higher speed manoeuvres. Concerns have been expressed about the accessibility of the module 1 test (especially for candidates who are not within easy reach of one of the 56 test centres or other casual sites equipped with an off-road manoeuvring area) and also the safety of some of the current module 1 manoeuvres.

Approach

A revised set of manoeuvres was devised by the motorcycle test review working group, which could be conducted within standard road dimensions. Phase 1 tested these manoeuvres by inviting 'test ready' learners to ride through the manoeuvres on an off-road area mocked up with the carriageway dimensions of a real road. The primary changes to the manoeuvres, when compared with their module 1 equivalents, were; introducing lateral space constraints for the manoeuvres by carrying them out within the width of a 7.5m road; having a straight run-up (rather than a curved one) to the emergency brake; and hazard avoidance manoeuvres, and introducing a new hazard avoidance manoeuvre.

Changes are summarised in the table below:

Module 1 manoeuvres	Revised mock road manoeuvres
On and off the stand/manual handling	Forward bay push / reverse bay push / pushed u-turn (each learner only did one of these)
Ridden u-turn (in 7.5m)	Ridden u-turn (in road width of 7.5m)
Slalom (no space constraints)	Slalom (in single carriageway of 3.75m)
Figure of 8 (no space constraints)	Figure of 8 (in road width of 7.5m)
Emergency stop from 30mph after curved approach	Emergency stop from 30mph after 85m straight approach
Hazard avoidance from 30mph after curved approach	Revised hazard avoidance from 30mph after 85m straight approach

There were 17 trial days during which 139 learners took part at eight locations across England and Wales. All learners were accompanied by their trainers, who provided them with additional training for the revised manoeuvres. Learners who attended were considered 'test ready' by their trainers. On attending, each learner was assessed by a DSA examiner on the module 1 and mock road manoeuvres (the order was pseudo-randomised). DSA examiners were sourced from nearby test centres and were supervised by senior DSA examiners. Multiple data sources were used, of which the key sources were:

- Data from examiners on candidate faults during each trial, estimated speed for manoeuvres with a minimum speed requirement, and subjective workload ratings for examining the two sets of manoeuvres. Senior examiners provided competence ratings for candidates' performance on each set of manoeuvres.
- Subjective workload ratings from candidates for module 1 and mock road manoeuvres.
- Objective speed measurements and hazard logs from TRL observers.
- Ratings of perceived difficulty from trainers.

In addition, eight focus groups and interviews were conducted with trainers who brought learners to the study. The discussions gave further insight to the training requirements for the revised manoeuvres. Finally, an initial risk assessment was undertaken to create a framework for estimating the potential risks of on-road testing of the revised manoeuvres.

Research findings

Faults

Learner riders were statistically significantly more likely to receive faults on the mock road versions of the figure of 8, emergency brake, and hazard avoidance manoeuvres, when compared with the module 1 versions. Senior examiner ratings of learner competence confirmed this, with statistically significantly lower ratings of competence in the mock road versions of these manoeuvres.

Inspection of fault descriptions suggested that the elevated fault rates for the figure of 8 and hazard avoidance manoeuvres on the mock road were largely due to these manoeuvres providing opportunities to commit faults more easily than

their module 1 equivalents; in the figure of 8 the clearly marked kerb lines made it easier for examiners to report a fault when riders exceeded the permitted space, and in the hazard avoidance the flat rubber markers were easier to ride over than the short cones used in module 1 and thus attracted faults that were harder to commit in the module 1 hazard avoidance. Inspection of the emergency brake fault descriptions did not give a clear indication of the reasons for the increased rate of faults for this manoeuvre in the mock road trial.

In terms of line violations (kerb lines) more than a third of participants (36%) violated the edge line at least once during the mock road figure of 8, and 12% did so on the ridden U-turn. Less than 3% violated the edge lines on the emergency brake, slalom, and hazard avoidance manoeuvres. These data suggest that the figure of 8 manoeuvre is not suitable for on-road testing. Line violations did not differ between large and small bikes.

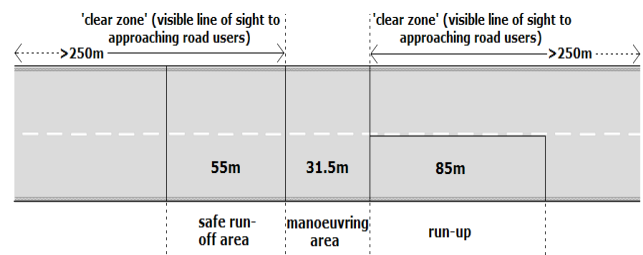
Risk assessment

This assessment used expert judgement and some initial data from the trials to estimate the frequency and consequence of anticipated hazardous events occurring during each manoeuvre, if it were examined on a real road.

This initial risk analysis helped to identify additional control measures that could be implemented to permit phase 2 trials. Further analysis, through phases 2 and 3, is required to develop a more robust and detailed risk assessment of the necessary controls needed should on-road testing of the manoeuvres be attempted.

The initial assessment found that if the revised manoeuvres were to be examined on real roads, several 'zones' would be required to mitigate some of the identified risks. There would be:

- A manoeuvring area of 31.5m, occupying both lanes of the road
- A run up zone of 85m occupying one lane of the road for the manoeuvres that require a minimum speed
- A safe run off zone of 55m occupying both lanes of the road
- Clear zones in both directions of at least 250m (to provide visible line of sight to traffic that is approaching at 35mph)



Examiners' workload ratings

Examiners reported significantly greater workload when examining the mock road versions of the ridden U-turn, the slalom, the figure of 8, the emergency brake and the hazard avoidance. For the phase 1 trials, several manoeuvres required that flat rubber markers were laid on the mock road and then retrieved after the manoeuvre was completed. This required examiners to bend down frequently, enter the mock road frequently and walk up and down the mock road several times per test. These are substantial physical demands that are associated with examining the revised manoeuvres and they may affect the health of some examiners (examiners are likely to bend 22–31 times per mock road test). Phases 2 and 3 will need to consider how to address these issues, for example by using permanent markers that do not impose the same physical workload on examiners.

An average mock road test event required examiners to be in the road for 3 minutes and 09 seconds. From a risk perspective, those manoeuvres that required markers to be laid in the road (slalom, figure of 8 and hazard avoidance) expose examiners to traffic for the longest periods of time. If it were a real road, this level of exposure to traffic might affect the safety of examiners. The figure of 8 in particular has a long average exposure time to traffic. It is also worth noting that learners spend some time (between 9 and 137 seconds) waiting in the road while examiners are setting up manoeuvres and briefing them.

Conclusions

This study has confirmed that, the revised manoeuvres with the exception of the figure of 8 appear to be feasible, practicable and sufficiently safe to proceed with the second phase of testing the revised manoeuvres on real roads with expert riders.

Overall, the revised versions of the manoeuvres were considered to be more difficult in terms of workload, and led to a higher failure rate, compared with the existing off-road manoeuvres, which the learner riders also performed. This may be partly due to learners and trainers being less familiar with the revised manoeuvres, compared

with the current manoeuvres, which they will have been practising for their module 1 tests.

There are also clear indications that the rider competencies required to complete the manoeuvres successfully are different for some of the revised manoeuvres than for their module 1 equivalents.

The findings relating to difficulty were largely unrelated to the size of bike used (125cc or >500cc).

This study has provided a set of initial findings for the key research questions and further stages of work are deemed necessary to provide a more complete answer regarding the feasibility and safety of on-road testing for the revised motorcycle manoeuvres.

One key limitation of phase 1 is that it is very difficult for trainers to prepare their learners for a revised set of manoeuvres in the same way that they do for the current test, given the importance of the outcomes (i.e. passing or failing a licence acquisition process) for the latter, but not the former. Despite trainers' best efforts, they are constrained in the amount of time they can spend preparing learners for the revised manoeuvres, as well as being constrained by the resources they have available to provide suitable training provisions.

It does not seem plausible that differences in preparedness can account for all differences in faults and workload data seen in this study between the mock road and module 1 versions of the manoeuvres; nonetheless it will be important for phase 3 of the project (if undertaken) to ensure that learner riders who come to be tested on-road are prepared in the same way as they are for their module 1 test. In addition, the phase 2 testing (involving expert riders) should be able to help address this issue.

About the project

This study explored whether the motorcycle manoeuvres required by EU Directives to be part of the practical motorcycle test in Great Britain could be carried out on the road safely and practically. This study compared the mock examination of 139 existing 'test-ready' learners on versions of the current module 1 test manoeuvres (carried out using the existing module 1 layout) and the revised manoeuvres being proposed (which were conducted on a 'mock road' area—an off-road site with the dimensions and lane markings of a typical two-way, single carriageway road). Conclusions were drawn from the subjective workload ratings of learners and examiners, the test fault reports from examiners, and the observations of trainers.

Further information

These Findings can also be downloaded free of charge from www.dft.gov.uk/topics/road-safety/research

Although this research was commissioned by the Department for Transport, the findings and recommendations are those of the authors and do not necessarily represent the views of the DfT.

© Queen's Printer and Controller of HMSO, 201[X].