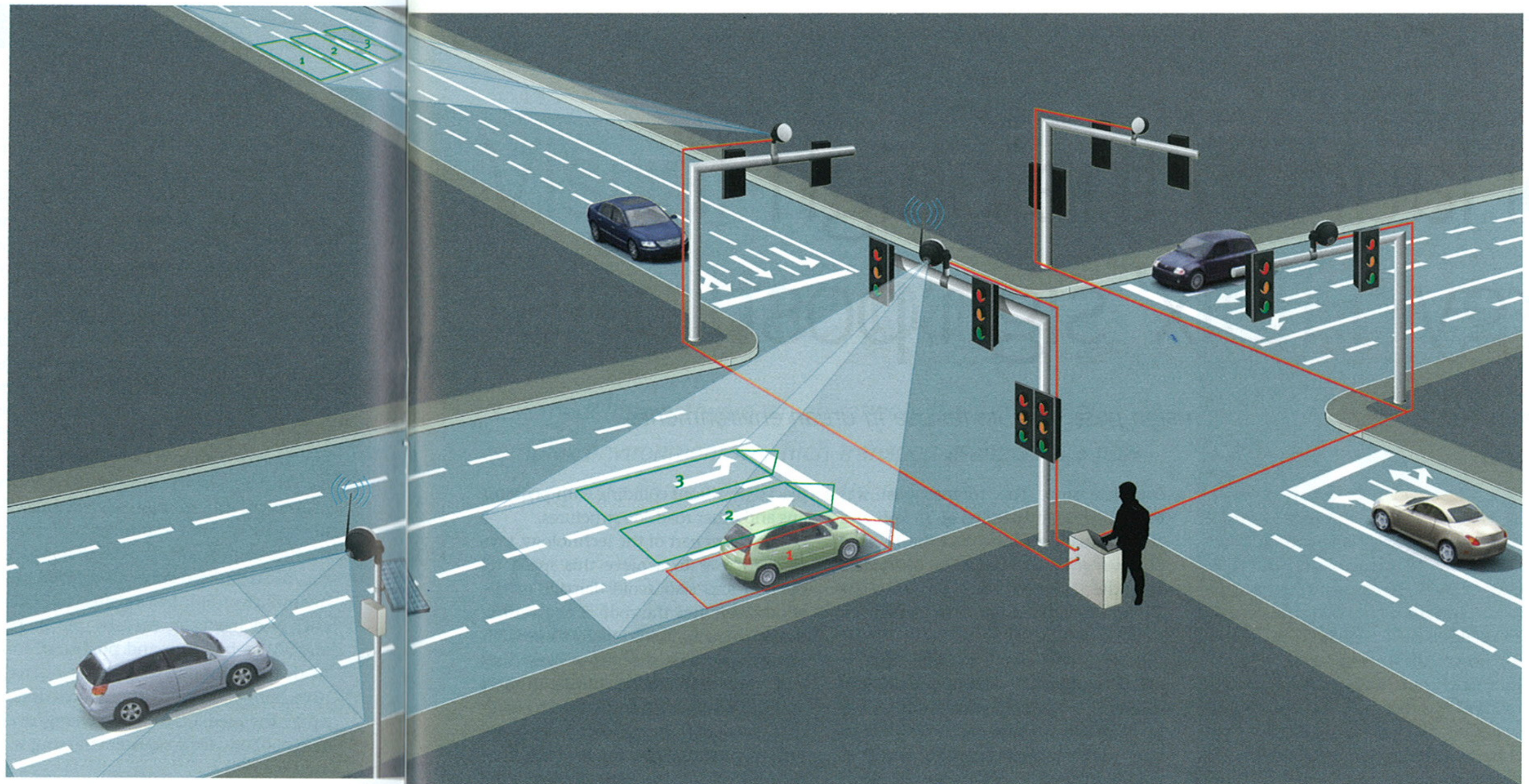
PRODUCT REVIEW

TEC

TrafiCam passes detector trial test

A viable alternative to the inductive loop for use with SCOOT and MOVA



Despite many predictions over the years that the induction loop is yesterday's technology, it remains the detection system of choice for use with SCOOT and MOVA. However, even its most enthusiastic advocates will admit that the modern highway environment is not loop friendly. Whether it is damage from heavy traffic or destruction by utility companies, loops fail and replacement is an expensive and disruptive procedure. Not surprisingly then, development work in recent years has focussed on above ground detection.

The Department for Transport, as part of a programme to assist in the development of vehicle and pedestrian systems for urban traffic management, routinely assesses the performance of new detection systems and the latest product to undergo these trials is the TrafiCam video vehicle detector. The good news is that the results were positive – the TrafiCam worked well compared with a loop system making it a viable alternative for use with SCOOT and MOVA.

The trial

The trial, which was conducted by TRL, was carried out at a test site in Winchester provided by Hampshire County Council. Here trial detectors can be mounted on a lamp column adjacent to a SCOOT loop and the output from the trial detector returned to the SCOOT computer for off-line comparison with the output of the inductive loop detector.

The lamp column is situated opposite the loop and is ideal for testing side-fire detectors. However, the TrafiCam does not operate in true side-fire as the best performance for night-time operation is to view the rear lights of vehicles. Because of this the detector was mounted on the lamp column, at between 4 and 5 metres high, looking slightly downstream of the loop. This meant that the TrafiCam activated slightly after the loop resulting in a difference in detection times which had to be allowed for in the analysis of the results.

The TrafiCam was wired into a junction box connected to the controller and the required detection zone drawn using the custom set up software. For the purposes of the trial the TrafiCam interface card in the controller was connected to the OTU (outstation transmission unit) and the detector output returned to the central SCOOT controller together with those of all the other detectors connected to the controller. The SCOOT data was configured so that the TrafiCam output was associated with a dummy link at the same node as the nearby SCOOT loop. That link was monitored by SCOOT but not used by any of the optimisers so that it had no influence on the signal operation. However, as a fully configured SCOOT link all the SCOOT link and detector-based messages were available.

The test site in Winchester provided by Hampshire County Council.

Analysis

SCOOT uses both the flow of vehicles and the length of time each vehicle activates the detector so the analysis was designed to count individual discrepancies between detection of a vehicle by each detector.

Because the TrafiCam needed to view the rear of vehicles for night-time detection, the detection zones for the loop and TrafiCam are not coincident. The distance between them was constant but the time between detection in the two zones was not. At busy times, for instance, queues would build back towards the junction from the next junction downstream, slowing vehicles in the vicinity of the detectors. That meant that at some times the start of detection of a vehicle at the inductive loop was well in advance of detection by the TrafiCam. At other times, for instance under free-flow conditions, the difference in initial detection was less than a second. Therefore, a vehicle detection by the TrafiCam within one second of a detection by the loop was classified as a successful detection by both detectors.

A second criterion was needed for congested conditions. This was because a vehicle could be delayed by the queue and remain stationary and would be detected by the loop for some time before moving into the detection zone of the TrafiCam. When it started to move, however, it would be expected to enter the TrafiCam's detection zone soon after leaving that of the inductive loop. So, the second criterion for successful detection was defined to be detection by the TrafiCam within half a second of ceasing to be detected by the loop.

Three categories of TrafiCam detection were defined:

- Successful detection which was either the start of detection by the TrafiCam within one second of the start of detection by the inductive loop, or start of detection by the TrafiCam within half a second of the end of detection by the inductive loop.
- False positive which was detection by the TrafiCam without a detection by the inductive loop.
- False negative which was detection by the inductive loop without a detection by the TrafiCam.

In addition to counting successful detections, false positives and false negatives, the total occupancy and occupancy per vehicle were calculated.

Results

The summary results are shown in Figure 1 and they show that the overall agreement between the TrafiCam and the inductive loop was good and that the system tested for SCOOT seemed to work well in comparison with a loop system. Because of the need for the TrafiCam to see the rear lights of vehicles, its detection zone was not coincident with the inductive loop and as a result comparison of individual vehicle counts in slow moving traffic was more difficult than it would have been with coincident detection zones. Nevertheless, 99% of individual detections were matched.

In terms of total occupancy, TrafiCam was about 10% greater than the loop. Some of this difference could have been due to a slightly longer effective detection zone. In addition, the TrafiCam detection zone was downstream of the loop and, therefore, more likely to be queued in resulting in more vehicles being delayed in its detection zone, hence greater occupancy, than over the loop. The SCOOT validation process would allow for a small difference in the length of the detection zone which would then have no practical effect on the operation of SCOOT.

Stijn Vanderburie of Traficon says the company has been delighted by the results. 'What this means is that we are able to offer the market an effective above ground detection system which can be used with confidence for both SCOOT and MOVA applications. We see this as a very important 'next step' for Traficon in convincing the UK market about the benefits of video detection for urban traffic management. But more importantly, it provides the UK market with another field-proven option when it comes to specifying new junction equipment.'

This article is based on the published project report from TRL No PPR434, 'Test of TrafiCam vehicle detector in Winchester' by Keith Wood.

Figure 1: The summary results show the overall agreement between the TrafiCam and the inductive loop was good.

	Inductive loop	TrafiCam	Ratio
Vehicle count (Vehicles)	23333	23323	99.96%
Occupancy	14911	16331	110%
Matches		23102	99.0%
False positives		221	0.9%
False negatives		231	1.0%