Average Speed Enforcement: share the benefit spread the cost

Geoff Collins CEng,

Vysionics ITS Ltd, UK

ABSTRACT

More than 50 permanent SPECS average speed enforcement cameras are in operation around the UK, delivering on average Killed or Seriously Injured (KSI) reductions of more than 70%. One reason they haven't been more widely implemented is the cost and complexity needed to install a fully functional site, because equipment is needed along a significant length of road, at a number of locations rather than just at a 'collision hotspot'. However, a recent innovation allows the benefits and cost of the technology to be spread across a number of sites, rather than simply addressing the most dangerous locations.

SPECS3 POD (Portable Outstation Device) allows the expensive 'controllers' to be moved between a number of pre-prepared enforcement locations. The low cost street furniture (poles and cameras) can cover a much larger area, delivering the very visible impression of enforcement without the heavy handed 100% enforcement approach.

SPECS3 is now operated by more than 20 Road Safety Partnerships in the UK, with a high level of public acceptability, because the enforcement locations are very obvious. This removes the argument that safety schemes have been put in to make money – key to being seen as fair and appropriate.

KEYWORDS

ANPR, Average Speed, Camera, Driver Behaviour, Enforcement, Portable, Speed Management.

1. EFFECTIVENESS VERSUS COST: SETTING THE SCENE

A very effective tool is of no use if you can't afford to use it. Frustrating as this is, it is certainly true for some of the options that are available to road safety professionals. This is particularly valid now, in an environment of cost saving and budget reductions, where the only options available tend to be compromises, or taking no action. A good example of this conundrum is the use of average speed cameras, which have proved to be particularly effective in reducing casualties, but can still be considered as a costly intervention, despite the very high rate of return they show through casualty reduction.

1.1 THE OBSERVER EFFECT AND DRIVER BEHAVIOUR

From analysis of dozens of SPECS average speed installations, it is apparent that driver behaviour is mostly influenced by the appearance of the street furniture (i.e. the columns and cameras; figure 1 shows an example of the typical street furniture associated with average speed enforcement), rather than the actual level of enforcement taking place. This is due to the 'observer effect'; a well known phenomenon in research, which basically means that people or processes are changed, simply through the perception that monitoring is taking place. This is certainly the case with enforcement systems, where road users dramatically change their behaviour if they know they are being watched, potentially with the threat of penalty points and a fine to follow. Safety scheme designers will be delighted with this, if their intention is to reduce or eliminate the undesirable behaviour (e.g. speeding, or travelling through a red light), but it does mean that the original problem may not have gone away, perhaps having been displaced to a different area.

Figure 1: A SPECS3 POD installation in use on Marine Parade, Southend (Essex). This installation covers a 20mph limit along the sea front.

Anecdotal evidence from previous SPECS installations has suggested that in a small

number of cases, accompanying a dramatic reduction in speeds and casualties along the obviously monitored route, some drivers seek alternative routes that are not enforced, in order to make their journey. This has been noticed in particular on routes that are considered to be "drivers' roads", where the route has been taken deliberately in order to drive fast, rather than to commute or reach a destination. Is it then cost effective to spend yet more money on nearby, alternative routes which may simply displace the problem again? Due to the lengthy development and approvals processes and demands, enforcement installations are rarely low cost, meaning that a considerable amount of money will have been spent on each installation; if the original problem has moved away, was this money well spent?

Average speed cameras provide a particularly good example of this phenomenon; SPECS installations around the UK have on average delivered a greater than 70% reduction in the Killed or Seriously Injured (KSI) figure, on routes where they were installed as a casualty reduction measure. This reduction typically brings down the casualty risk on a dangerous road to an acceptable level. In addition, the offence level seen at these sites is usually very low, with only a handful of tickets issued per week. The casualty problem has been solved and the public don't view this suspiciously, because casualties are down and tickets issued are very low. The downside is that the expensive technology is almost redundant, because it has done its job in harmonising speeds and reducing collisions. There may be another hazardous route nearby that would also benefit from a similar approach, but the capital budget has already been spent on the slightly more dangerous road.

2.0 TECHNOLOGY OVERVIEW

SPECS is an average speed enforcement system that is widely used across the UK, with over 50 permanent and 300 temporary installations to date. Automatic Number Plate Recognition (ANPR) is used to identify vehicles at multiple camera locations. A remote central server calculates the journey time between valid detection points, and when a vehicle's speed between two points exceeds the relevant threshold, images of the offence are requested from the remote camera Outstations. Figure 2 shows an example of these images, taken at an entry and exit point on the A465 Head of the Valleys installation, a permanent average speed enforcement site in South Wales

Figure 2: SPECS3 POD offence images, taken in complete darkness using infra-red overview illumination. This site is the A465 Head of the Valleys in South Wales.

3.0 DRIVER BEHAVIOUR WITHIN AN AVERAGE SPEED ENFORCEMENT ZONE

Figure 3 below demonstrates the influence that this average speed control has on driver behaviour, when they are aware that their speed is being monitored over a length of road. The chart shows anonymously captured speed data for individual vehicles, put into 1mph 'bins'. It is noticeable that all of these speed profiles follow a predictable normal distribution, with very little speed variation either above or below the posted limit. This is achieved because the vast majority of drivers travel at what they think is exactly the speed limit, with very few choosing to drive at speeds in excess of the limit.

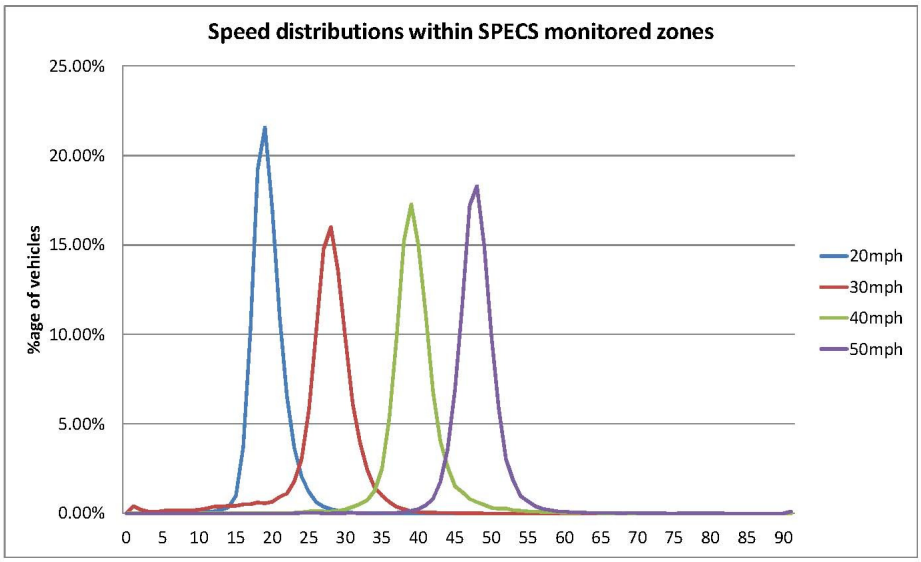

Figure 3: Speed profiles collected from SPECS controlled zones, covering 20mph, 30mph, 40mph and 50mph limits.

4.0 TECHNOLOGICAL SOLUTION – RE-LOCATABLE PROCESSORS

In the past, the only practical solution was to invest yet more capital in additional sites, until as many locations as is practically and financially possible are covered. Unfortunately, this approach is impossible in financially challenging times, with expenditure only available on the most critical or deserving projects. Vysionics have put considerable effort into this issue; trying to find a solution that is still effective in changing driver behaviour, whilst not being limited to only the most demanding locations. The answer is a solution that can be easily moved between different locations, allowing the benefit and the cost to be shared, without compromising the influence on driver behaviour and associated casualty reductions.

SPECS3 POD (Portable Outstation Device) was developed specifically to address this issue, and it received Home Office Type Approval in late 2011, as an amendment to the existing SPECS3 device. It has quickly become the standard average speed enforcement solution, with more than twenty Safety Camera Partnerships now working with schemes that contain POD elements. The POD approach uses standard, highly recognisable and visible SPECS cameras and columns, with portable processors that can be simply moved between multiple potential links. Multiple sites can be configured

to accept the POD devices, so a pair of PODs could be shared across a number of routes and camera locations, providing a high level of flexibility to the operator. Figures 4 and 5 show a POD device with an example from the Marine Parade (Southend) site.

Figure 4: A POD device installed at Marine Parade.

Figure 5: A POD device, ready to be installed into a pre-prepared cabinet location.

It is the basic (and low cost) street furniture that has the greatest impact on driver behaviour; because road users see camera columns along the monitored route and as a result, they drive in a more controlled way. It is well established that within an average speed control zone, speeds harmonise and this reduces the likelihood of collisions and casualties. However, if the cameras were never able to enforce, word would get out and eventually the compliance seen along the road would drop off, with an increase in some vehicle speeds and thus the speed variability. If it was known that enforcement did take place (and there are plenty of internet forums that discuss this in detail), compliance remains high, even if enforcement activity isn't continual.

The cost of the basic camera columns is low, which allows highway authorities to cover a number of routes, or even a network, at the same cost that it would be to monitor a single route. With the PODs shared between multiple sites, compliance is gained over a much larger area, whilst managing the capital cost and maintaining an 'acceptable' level of enforcement. This approach is now being widely used, allowing not only the 'worst' road in a county to be addressed, but providing road safety professionals with an area wide management scheme that can be dynamically adjusted, if required. The movement of the POD devices can be scheduled whenever required, so changes in driver behaviour or site specific concerns can be addressed, whilst still within a practical budget.

5.0 CONCLUSION

Enforcement solutions are strong proof that monitoring something will change it – but it is a change that is beneficial to everyone. Through understanding both this and the financial limitations highway authorities are facing, re-locatable systems provide a technological solution that still delivers casualty reduction, through a change to driver behaviour, whilst still managing the financial expenditure associated with such a project.

Author Biography

Geoff is the Sales & Marketing Director for Vysionics ITS Limited, responsible for all permanent route management solutions and temporary roadworks schemes, where SPECS has been used to provide both safer and smoother traffic flows. Geoff has been involved in the design, implementation and monitoring of over 250 such schemes, giving an unrivalled understanding of the factors behind the successful operation of an average speed enforcement scheme.

Geoff joined SCS in 2004, following ten years in the machine vision industry. He graduated from Nottingham University in 1991, is a Chartered Engineer and a member of the IET, CIHT and AIRSO.

During the ten years Geoff has worked with Vysionics, the Average Speed market has developed significantly and is now a widely implemented, well understood casualty reduction and traffic management tool.