SPEED Fact Sheet NUMBER 05 September 09

Section Control: towards a more efficient and better accepted enforcement of speed limits?

Introduction

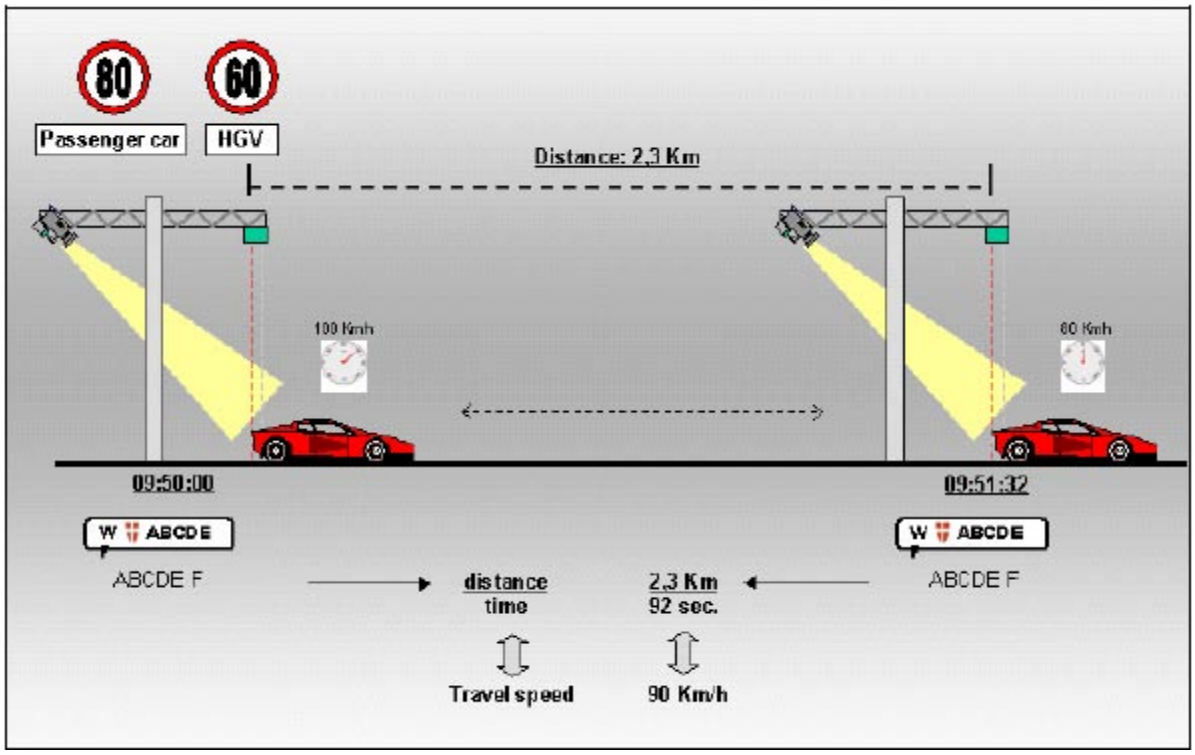
Section control is a method of speed enforcement involving a series of cameras installed over a stretch of road. An image and data are recorded for each vehicle as they enter and leave two points in the system (a section of road). The data are then used to calculate the average speed of the vehicle by dividing the distance between to points by the time taken to travel through them.

Distance / Time = Average Speed

The average speed is then checked against the speed limit for that section, and if the average speed exceeds the speed limit, a fine or other sanction can be issued to the offender. In the late 1990s the Netherlands became the first country to implement this technology and a number of other countries are using it or have trialed it since (mostly in Europe, but also in Australia). The system has been given a number of names including: time over distance cameras or average speed enforcement (in the United Kingdom), trajectory control (in the Netherlands), 'Tutor' (in Italy), point to point speed enforcement, and section control. For ease of reference we use the term Section Control (as in the 2006 OECD publication on speed management). The present Fact sheet will present a brief review of the experience gathered from countries that have started using this technology as an addition to more traditional speed enforcement techniques.

Rationale for Introducing Section Control

The basis for introducing section control is that it encourages drivers to reduce their speed across an entire section of road and greater levels of behaviour changes can therefore be obtained. There are indeed multiple cases documenting speed reductions across entire sections of roads, consequently having a positive impact on the number of collisions and casualties (see section below).



source: KFV (2006)

Further, there is evidence that Section Control benefits from higher public acceptance compared to traditional cameras (Soole, 2009; SUPREME, 2007). Presumably, the reason for this is that excessive speed detected at a single point on the road could be explained by momentary lapses of concentration or the "need" to overtake a vehicle. Excessive "average speed" would therefore be a better indicator of speed limit violations than "point" speed measurements. Even if the enforcement of traffic rules is generally well received by the public, this information is valuable in the light of the fact that enforcement of speed limits is still slightly less popular than the enforcement of BAC limits (SARTRE 3, 2004).

Section control also has a number of additional uses and effects. Since speeds are expected to decrease along entire sections of road, Section Control is also intended to reduce both traffic congestion and mitigate the environmental impact emanating from vehicle emissions. In the Netherlands the technology has very much been put forward for such purposes in addition to road safety purposes. Some sites were actually equipped to support a new speed limit, reduced for air quality reasons (SUPREME, 2007). Near Rotterdam the introduction of section control has had a very beneficial effect on the air quality, with measurements showing a reduction of the air pollution around 5-10%. There are now more than 15 sections equipped with the technology in the Netherlands. The technology is also reported to reduce noise pollution (Bureau Verkeershandhaving Openbaar Ministerie, 2007).

In France the system has been installed by Cofiroute (a company operating motorways) on a 12 Km section of the A10 motorway to inform drivers when their average speed exceeds the speed limit. A variable display sign on the motorway shows the number plate of the car exceeding the speed limit and reads "too fast" next to it, effectively working as a deterrent rather than a system used to issue sanctions.

Section Control can also be used to detect a number of offences other than speed, since the number plate of all vehicles entering a section equipped with the technology are detected. Such number plates can be checked against the number plates of reported stolen vehicles for example.

In London another use has been found for Tower Bridge, where the system not only detects average speeds on the bridge, but also whether overweight goods vehicles cross the bridge. The idea is to prevent stress on the bridge structure and therefore protect this landmark (Speed Check Services, 2009).

Other strengths of the system include the ability to monitor simultaneously multiple lanes of traffic and all vehicle types. Further, some systems are also equipped to record data in addition to license plate, including whether vehicles lights are illuminated or if window stickers are present (Soole, 2009) which can be useful to check whether vehicles comply with congestion or environmental charges.

Effects on speed and casualties

The majority of evaluations of sites using section control show evidence of reductions in average and 85th percentile speeds, most often indicating that these speeds were reduced at, or below, the posted speed limit (Soole, 2009). In the Netherlands on a section of the A13 motorway, only 0.5% of vehicles were detected speeding after section speed control was put in use in 2002. Consequently such reductions have an impact on the number of collisions. For this same section in the Netherlands the total number of collisions was reduced by 47%. The number of casualties was also reduced even though the numbers were too small to allow valid conclusions (SUPREME, 2007). Many other case studies however indicate large casualty reductions, especially regarding serious injuries and road deaths. In England and Scotland a number of evaluations are published by Speed Check Services, the provider of this technology to the Police and highways authorities. The case studies include (comparing figures from the three years prior to installation with the three years+ post installation):

-in Nottinghamshire, killed and seriously injured figures reduced by an average of 65% (across eleven roads equipped with section control in 2000);
-in Northamptonshire, killed and seriously injured figures reduced by 60% on the A43 Lumbertubs Way and 85% on the A428 (equipped in 2001);
-in South Yorkshire, killed or seriously Injured figures reduced by 82% on the A616 Stocksbridge Bypass Trans-Pennine Route (equipped in 2003);
-in Strathclyde (Scotland), killed and seriously injured figures reduced by 37% across the A77, where there is an entire 32 miles controlled zone (equipped in 2005).

In Austria, on the Kaisermühlen tunnel near Vienna, Section Control reduced all injury accidents by a third

and almost halved the number of deaths and serious injury following its implementation compared to the three years prior. Moreover there were no deaths in the two years following operation (Stefan, 2006).

In Italy, section control has been heavily deployed on motorways since 2006. Autostrade per l'Italia (ASPI), the network operator, has announced that in its first year only, the sections equipped with the system (called 'Tutor' in Italy) witnessed a 51% reduction in road deaths, a 27% reduction in injuries, and a 19% reduction in the overall number of accidents. At present the system is operational on 2,220 Kilometers of the network operated by ASPI, representing about 33% of the network (ASPI, 2009).

Effects on speed and casualties

Section control relies on two specific technologies: ANPR (Automatic Number Plate Recognition) and GPS (Global Positioning System). Vehicle and registration details are recorded using ANPR and a date and time stamp is produced for each vehicles using GPS technology. Section Control is thus a relatively expensive technology, and it has therefore been suggested that to be a cost effective enterprise, Section Control should be installed on heavy trafficked main roads (Soole, 2009). Indeed, most case studies concern motorways or other heavy trafficked high speed roads.

While there are limited studies on cost/benefit of Section Control available, one example is the evaluation of the Kaisermühlen tunnel in Austria near Vienna, where an impressive cost benefit ratio of 5.3 was calculated (Stefan, 2006). According to analyses of safety measures in Work Package 1 of the European ROSEBUD project, measures with a CBR larger than 3 are ranked "excellent".

Further, Section Control is usually used on stretches of road without entrances or exits (OECD, 2006), and average speed checks are always announced at the beginning of the section by a signpost, and at least one other signpost reminding drivers of the speed limit.

Section control for 30km/h / 20 mph zones?

Despite this propensity for being deployed on main roads, the United Kingdom is seriously considering the possibility to introduce section control to enforce speed limits even in 20mph zones. According to the Parliamentary Advisory Council for Transport Safety, one significant impediment to lowering speed limits and expanding the 20mph network is that, at present, standard cameras are not type approved to enforce limits below 30 mph. Traffic humps and chicanes are therefore used. However such traffic calming, while effective, can be unpopular, can increase some emissions locally, and can cause inconvenience to service and emergency vehicles. The British Social Attitudes Survey suggested that around three quarters of people support 20mph speed restrictions in residential areas, including 72 per cent of drivers questioned. However, only 43 per cent of drivers favour speed bumps, which can be necessary to enforce this popular, low speed limit (PACTS, 2008). If time over distance cameras get type approved for lower speeds it is therefore very likely that they will be used in the United Kingdom to enforce the speed limits even in 20mph zones.

Indeed the OECD publication on Speed Management also states that the system 'could also be used for example between the entrance and exit of a village or in 30Km/h zones' in which case 'only the travel time of those vehicles that travel directly between entrance and exit point will provide meaningful information' (OECD, 2006). Speeds of vehicles who do not take the direct road would be of course underestimated.

Legal requisites

For privacy reasons, in countries currently using Section Control, data of vehicles not exceeding speed limits are automatically erased by the systems. Data protection should not therefore constitute a major legal obstacle for the deployment of Section Control. However legislation varies from country to country, and since data from all vehicles entering a section of road equipped with Section Control are collected and processed in a first step before being erased, this might constitute a problem for some.

A bigger obstacle however regards whether vehicle owners or drivers are liable for traffic offences: in Austria there have been difficulties in prosecuting foreign offenders since one of its large neighbouring country, Germany, has driver liability and therefore requires drivers to be identified with a photography and section control is based on automatic number plate recognition (Soole, 2009). The same legal problem arose in Finland, where the technology has been trialed but its implementation will prove difficult because

Finland also has driver liability (Soole, 2009). Driver liability might also be the reason why other countries, including Sweden for example, are not using the technology.

Conclusions

Traffic characteristics vary from country to country, one should therefore be cautious before assuming generalisability of findings. However the experience gathered so far indicates that Section Control is an efficient speed enforcement method, leading to reductions in speeds across entire sections of roads and reductions in the number of collisions and casualties. Positive impacts on other road transport externalities are also reported (congestion, air pollution, noise). Moreover, Section Control might be a good attempt to win the hearts and minds of people further, since average speed measurements might be a more popular indicator for speed limit violations. There are therefore good premises for a wider deployment of Section Control, even if the absolute priority for countries still lagging behind in terms of speed enforcement remains the installation of an automated network of speed cameras.

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ETSC is grateful for the financial support provided for the Spee Fact Sheets by KeyMed